



VISHAY INTERTECHNOLOGY, INC.

INTERACTIVE

data book

WET TANTALUM CAPACITORS

VISHAY

VSE-DB0030-11#\$W

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One of the World's Largest Manufacturers of
Discrete Semiconductors and Passive Components



VISHAY INTERTECHNOLOGY, INC.

DATA BOOK



WET TANTALUM CAPACITORS

Elastomer Seal, Axial Leaded Styles
Subminiature, Axial Leaded Styles
Hermetic Seal, Axial Leaded Styles
Military MIL-PRF-39006 Qualified Styles
SuperTan® Styles (ST, STA, STE, 93026)
CECC 30202 Qualified Styles
DSCC Qualified Styles
Surface Mount Styles
High Energy Capacitors
Standard and Custom Arrays

SEMICONDUCTORS

RECTIFIERS

- Schottky (single, dual)
- Standard, Fast and Ultra-Fast Recovery (single, dual)
- Bridge
- Superrectifier®
- Sinterglass Avalanche Diodes

HIGH-POWER DIODES AND THYRISTORS

- High-Power Fast-Recovery Diodes
- Phase-Control Thyristors
- Fast Thyristors

SMALL-SIGNAL DIODES

- Schottky and Switching (single, dual)
- Tuner/Capacitance (single, dual)
- Bandswitching
- PIN

ZENER AND SUPPRESSOR DIODES

- Zener (single, dual)
- TVS (TRANZORB®, Automotive, ESD, Arrays)

FETs

- Low-Voltage TrenchFET® Power MOSFETs
- High-Voltage TrenchFET® Power MOSFETs
- High-Voltage Planar MOSFETs
- JFETs

OPTOELECTRONICS

- IR Emitters and Detectors, and IR Receiver Modules
- Optocouplers and Solid-State Relays
- Optical Sensors
- LEDs and 7-Segment Displays
- Infrared Data Transceiver Modules
- Custom Products

ICs

- Power ICs
- Analog Switches

MODULES

- Power Modules (contain power diodes, thyristors, MOSFETs, IGBTs)

PASSIVE COMPONENTS

RESISTIVE PRODUCTS

- Film Resistors
 - Metal Film Resistors
 - Thin Film Resistors
 - Thick Film Resistors
 - Metal Oxide Film Resistors
 - Carbon Film Resistors
- Wirewound Resistors
- Power Metal Strip® Resistors
- Chip Fuses
- Variable Resistors
 - Cermet Variable Resistors
 - Wirewound Variable Resistors
 - Conductive Plastic Variable Resistors
- Networks/Arrays
- Non-Linear Resistors
 - NTC Thermistors
 - PTC Thermistors
 - Varistors

MAGNETICS

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- Transformers

CAPACITORS

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 - Coated Chip Tantalum Capacitors
 - Solid Through-Hole Tantalum Capacitors
 - Wet Tantalum Capacitors
- Ceramic Capacitors
 - Multilayer Chip Capacitors
 - Disc Capacitors
- Film Capacitors
- Power Capacitors
- Heavy-Current Capacitors
- Aluminum Capacitors

Wet Tantalum Capacitors

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Wet Tantalum Capacitors

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All Military Product is manufactured with DSCC approved designs, processes and testing. Commercial product is manufactured to be in compliance with EIA Industry Standards

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Note

* Type 109D capacitors are commercial equivalents of military style CL64 and CL65 designed to meet the performance requirements of obsolete Military Specification MIL-C-3965/4.

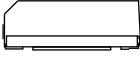
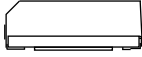
All Military Product is manufactured with DSCC approved designs, processes and testing. Commercial product is manufactured to be in compliance with EIA Industry Standards.

Wet Tantalum Capacitors

WET TANTALUM CAPACITOR CHARACTERISTICS					
MODEL	MIL SPEC/ TYPE	OUTLINE DRAWING	CAPACITANCE RANGE (μ F)	WORKING VOLTAGES AT 85 °C (V _{bc})	PAGE
Military Parts-Polar CLR65 CLR69	M39006/09		1.7 to 1200 6.8 to 2200	6 to 125	60
CLR79 CLR81 CLR90 CLR91	M39006/22 M39006/25 M39006/30 M39006/31		1.7 to 1200 1.7 to 1200 6.8 to 2200 6.8 to 2200	6 to 125	60
109D-Wet, Polar	MIL-DTL-3965 (CL64/65)		1.7 to 2200	6 to 125	14
769D-Wet, Polar	CECC 30202-013		3.6 to 2200	6 to 125	31
135D-Wet, Polar	M39006/22/25 CLR79/81 CLR90/91		1.7 to 2200	6 to 125	37
735D-Wet, Polar CT79 735DE	CECC 30202-001 CECC 30202-005 CECC 30202-801		2.7 to 2200 3.9 to 2200 3.6 to 2200	6 to 125	50
138D-Wet, Polar	M39006/09/21 (CLR65/69)		1.7 to 2200	6 to 125	19
738D-Wet, Polar CT9	CECC-30202-004		3.3 to 1200 3.9 to 2200	6 to 125	26
ST	DSCC 93026		10 to 1800	25 to 125	88
T16			150 to 680	50 to 125	99
STA			150 to 4700	6 to 15	91
STE	DSCC 10004		750 to 10 000	10 to 125	93
134D			10 to 680	50 to 125	96

WET TANTALUM CAPACITOR CHARACTERISTICS					
MODEL	MIL SPEC/ TYPE	OUTLINE DRAWING	CAPACITANCE RANGE (μ F)	WORKING VOLTAGES AT 85 °C (V _{DC})	PAGE
XTH-K-M-L-V	DSCC 04022 (CLR10, 14, 17)		2 to 2200 2 to 1300	8 to 630	103
200D-Wet, Polar 202D-Wet, Polar	DSCC 04021 (CL55)		70 to 1500	15 to 150	120
211D			70 to 14 000	10 to 150	130
285D			1 to 410	6 to 300	132
HE3	DSCC 10011		3300 to 72 000	25 to 125	114
MT2			220 to 6000	6 to 125	140
CA2/CE3	CECC 30202-002		47 to 1800	6 to 125	147, 152
CH2			33 to 470	3 to 75	157
CS2			50 to 750	3 to 70	147
MC2			235 to 6000	6 to 125	135



WET TANTALUM CAPACITOR CHARACTERISTICS					
MODEL	MIL SPEC/ TYPE	OUTLINE DRAWING	CAPACITANCE RANGE (μF)	WORKING VOLTAGES AT 85 °C (V_{DC})	PAGE
M35			1.7 to 220	6 to 125	170
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Wet Electrolytic Tantalum Capacitors

Tantalum electrolytic capacitors are the preferred choice in applications where volumetric efficiency, stable electrical parameters, high reliability and long service life are the primary considerations. The stability and resistance to elevated temperatures of the tantalum/tantalum oxide system make wet tantalum capacitors an appropriate choice for today's technology. Vishay is a pioneer and leader in this field, producing a large variety of tantalum capacitor types for industrial, military and aerospace electronic applications. Tantalum is not found in its pure state. Rather, it is commonly found in a number of oxide minerals, often in combination with Columbian ore. This combination is known as tantalite when its contents are more than one-half tantalum. Important sources of tantalite include Australia, Brazil, Canada, China and several African countries. Synthetic tantalite concentrates produced from tin slags in Thailand, Malaysia and Brazil are also a significant raw material for tantalum production.

Electronic applications and particularly capacitors consume the largest share of world tantalum production. Other important applications for tantalum include cutting tools (tantalum carbide), high temperature super alloys, chemical processing equipment, medical implants and military ordnance.

Vishay is a major user of tantalum materials in the form of powder and wire for capacitor elements and rod and sheet for high temperature vacuum processing.

THE BASICS OF TANTALUM CAPACITORS TECHNOLOGY

Most metals form crystalline oxides which are non-protecting, such as rust on iron or black oxide on copper. A few metals form dense, stable, tightly adhering, electrically insulating oxides. These are the so-called valve metals and include titanium, zirconium, niobium, tantalum, hafnium and aluminum. Only a few of these permit the accurate control of oxide thickness by electrochemical means. Of these, the most valuable for the electronics industry are aluminum and tantalum.

Wet tantalum capacitors are basic to all kinds of electrical equipment from satellites, aerospace, airborne, military ground support, oil exploration and power supplies. Their function is to store an electrical charge for later use.

Capacitors consist of two conducting surfaces, usually metal plates, whose function is to conduct electricity. An insulating material or dielectric separates them. The dielectric used in all tantalum electrolytic capacitors is tantalum pentoxide.

Tantalum pentoxide compound possesses high dielectric strength and a high dielectric constant. As capacitors are being manufactured, a film of tantalum pentoxide is applied to their electrodes by means of an electronic process. The film is applied in various thicknesses and at various voltages and although transparent to begin with, it takes on different colors as light refracts through it. This coloring occurs on the tantalum electrodes of all types of tantalum capacitors. Rating for rating, tantalum capacitors tend to have as much

as three times better capacitance/volume efficiency than aluminum electrolytic capacitors. An approximation of the capacitance/volume efficiency of other types of capacitors may be inferred from the following table, which shows the dielectric constant ranges of the various materials used in each type. Note that tantalum pentoxide has a dielectric constant of 26, some three times greater than that of aluminum oxide. This, in addition to the fact that extremely thin films can be deposited during the electrolytic process mentioned earlier, makes the tantalum capacitor extremely efficient with respect to the number of microfarads available per unit volume. The surface area of the two conducting plates determines the capacitance of any capacitor, the distance between the plates and the dielectric constant of the insulating material between the plates.

COMPARISON OF CAPACITOR DIELECTRIC CONSTANTS	
DIELECTRIC	K DIELECTRIC CONSTANT
Air or Vacuum	1.0
Paper	2.0 - 6.0
Plastic	2.1 - 6.0
Mineral Oil	2.2 - 2.3
Silicone Oil	2.7 - 2.8
Quartz	3.8 - 4.4
Glass	4.8 - 8.0
Porcelain	5.1 - 5.9
Mica	5.4 - 8.7
Aluminum Oxide	8.4
Tantalum Pentoxide	26
Ceramic	12 - 400.000

In the tantalum electrolytic capacitor, the distance between the plates is very small since it is only the thickness of the tantalum pentoxide film. As the dielectric constant of the tantalum pentoxide is high, the capacitance of a tantalum capacitor is high if the area of the plates is large:

$$C = \frac{eA}{t}$$

where

C = capacitance

e = dielectric constant

A = surface area of the dielectric

t = thickness of the dielectric

The liquid electrolyte in wet slug capacitor, along with the case, forms the cathode (negative) plate. The anode lead wire consists of two pieces. A tantalum lead embedded in the pellet, which is in turn connected to a termination or leadwire. The cross section drawings clearly show the construction details of the various wet tantalum capacitors.

109D COMMERCIAL STYLE

SILVER CASE ELASTOMER SEAL

Voltage Range:

6 WVDC to 125 WVDC

Capacitance Range:

1.7 μF to 2200 μF

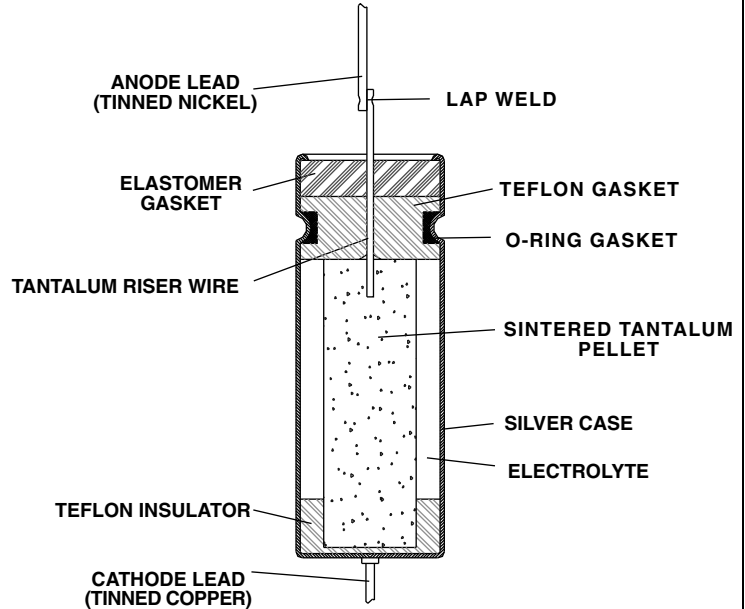
Size Range:

0.188" [4.78 mm] diameter x 0.453" [11.51 mm] long to

0.375" [9.52 mm] diameter x 1.062" [26.97 mm] long

Primary Applications:

Industrial, automotive and telecommunication applications where a superior quality, reliable design is desired



135D AND MIL STYLE CLR79/81/90/91

ALL TANTALUM HERMETIC SEAL (MILITARY SPECIFICATION MIL-PRF-39006)

Voltage Range:

6 WVDC to 125 WVDC

Capacitance Range:

1.7 μF to 2200 μF

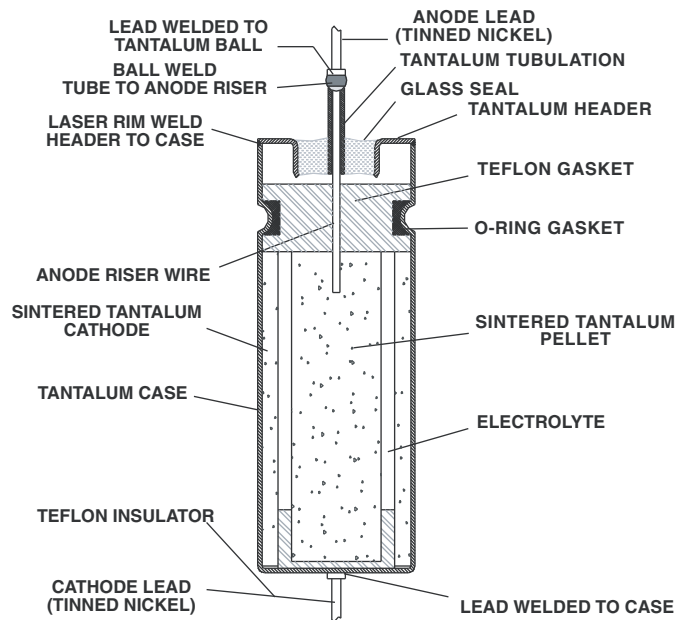
Size Range:

0.188" [4.78 mm] diameter x 0.453" [11.51 mm] long to

0.375" [9.52 mm] diameter x 1.062" [26.97 mm] long

Primary Applications:

Industrial and military applications requiring energy storage, voltage hold-up and filtering. Designed for aerospace, oil exploration and power supplies. The capacitors have a high resistance to damage from shock and vibration.



138D AND MIL STYLES CLR65/69

**SILVER CASE HERMETIC SEAL
(MILITARY SPECIFICATION MIL-PRF-39006)**

Voltage Range:

6 WVDC to 125 WVDC

Capacitance Range:

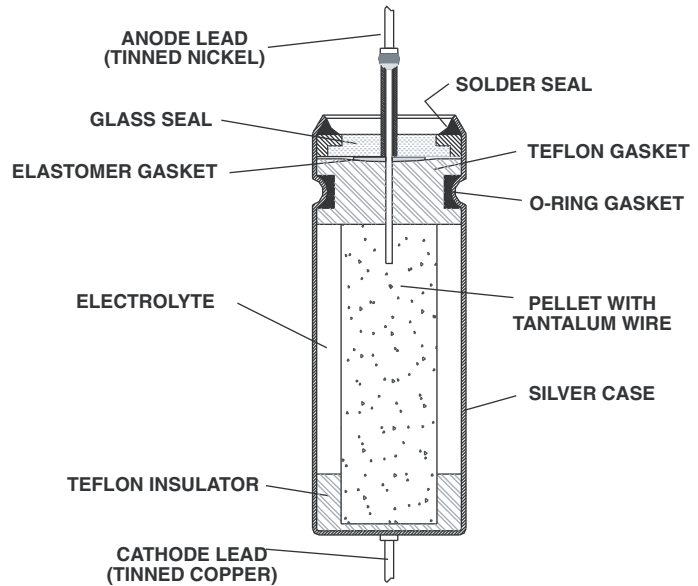
1.7 μ F to 2200 μ F

Size Range:

0.188" [4.78 mm] diameter x 0.453" [11.51 mm] long to
0.375" [9.52 mm] diameter x 1.062" [26.97 mm] long

Primary Applications:

Industrial and military equipment where reliability and premium performance with respect to low DC leakage current, high inrush current capability and high volumetric efficiency are vital.



SUPERTAN® AND MIL STYLE DSCC 93026

**ALL TANTALUM HERMETIC SEAL
(MILITARY DRAWING DSCC 93026)**

Voltage Range:

6 WVDC to 125 WVDC

Capacitance Range:

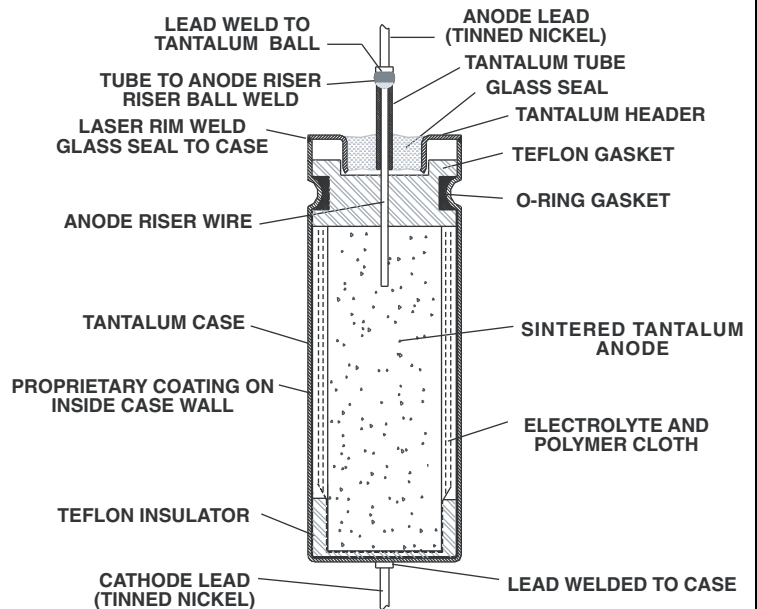
10 μ F to 4700 μ F

Size Range:

0.188" [4.78 mm] diameter x 0.453" [11.51 mm] long to
0.375" [9.52 mm] diameter x 1.062" [26.97 mm] long

Primary Applications:

Industrial and military applications where high capacitance, size and weight are the primary considerations. SuperTan® is preferred capacitor style for the voltage hold-up timing and filtering circuit design





WET ELECTROLYTE TANTALUM CAPACITORS

Wet electrolyte, sintered anode tantalum capacitors often called wet slug tantalum capacitors, use a pellet of sintered tantalum powder to which a lead has been attached.

Tantalum powder of suitable fineness, sometimes mixed with binding agents, is mechanically pressed into pellets.

The lead is embedded during pressing of the pellet. The next step is a sintering operation in which binders, impurities and contaminants are vaporized and the tantalum particles are sintered into a porous mass with a very large surface area.

A film of tantalum pentoxide is electrochemically formed on the surface areas of the fused tantalum particles. Provided sufficient time and current is available, the oxide will grow to a thickness determined by the applied voltage.

The pellet is then inserted into a tantalum or silver can, which contains an electrolyte solution. A suitable end seal arrangement prevents the loss of the electrolyte.

Wet slug tantalum capacitors are manufactured in a voltage range up to 125 WVDC.

The Vishay SuperTan® represents a major breakthrough in tantalum electrolyte capacitor design. The SuperTan design dramatically increased the available capacitance in each of the four standard cased sizes. It provides two to three times more capacitance per unit volume while substantially increasing ripple current capability as well as reduced ESR.

In airborne, aerospace, satellite and smart munitions applications where size and weight are the primary considerations, SuperTan is the preferred capacitor style for the energy storage, voltage hold-up, timing and filtering circuit design. With these circuit functions in mind, along with long-term shelf life, operation life and reliability, SuperTan provides the circuit designer a solution to many of the problems that previously were resolved with marginally reliable and ineffective size options.

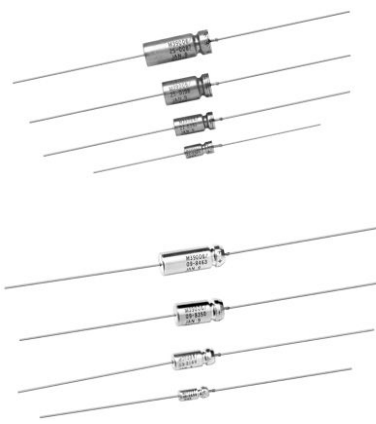
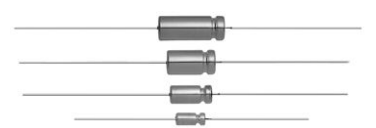

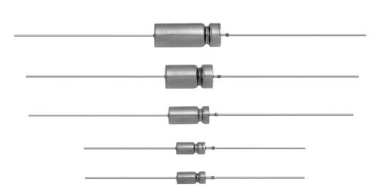
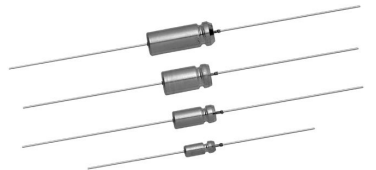
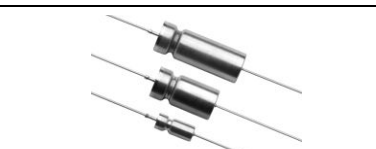
SuperTan is available to the military sector on a DSCC approved drawing (93026) as well to the commercial sector as a standard device.

TANTALUM CAPACITORS FOR ALL DESIGN CONSIDERATIONS

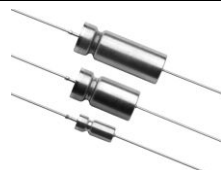


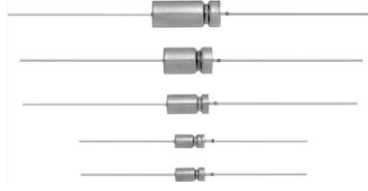



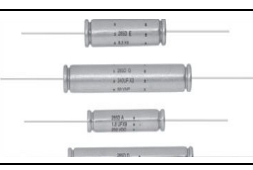

In choosing between the solid or wet style of tantalum capacitor, the circuit designer customarily uses wet tantalum capacitors, where the lowest DC leakage is required. The conventional silver can design will not tolerate any reverse voltages. In military or aerospace applications, tantalum cases units are used in place of silver cases where the utmost reliability is desired. The tantalum cased styles, CLR79 and CLR81, will withstand reverse voltages up to 3 V. They will operate under higher ripple currents and can be used at temperatures up to + 392 °F (+ 200 °C).

Vishay has the broadest line of tantalum capacitors and has continued its position of leadership in this field. Data sheets covering the various types and styles of Vishay capacitors for industry and for military applications are available on the Vishay web site: www.vishay.com

Wet Tantalum Capacitors



WET TANTALUM CAPACITORS				
PICTORIAL	MODEL	CASE CODES	DESCRIPTION	PAGE
	MIL-PRF-39006	T1, T2, T3, T4	Wet tantalum capacitors: Axial lead, tubular, hermetically sealed, metal case. These capacitors are MIL-PRF-39006 qualified and are established reliability. In accordance with the MIL-PRF-39006, all capacitors are marked with the Military part number - M39006/xx-xxxx and should be ordered using this designation. Performance characteristics for these capacitors are found in the latest issue of the Military specification. MIL-PRF-39006 establishes 1000 h failure rate levels of 1.0 %, 0.1 %, and 0.01 %. When ordering these parts, care must be exercised that the correct part number expressing the appropriate failure level be specified. Each order for Military style capacitors requiring government inspection must state whether inspection is to be at the destination or at the Vishay wet tantalum plant. Orders requiring source inspection cannot be shipped until this has been accomplished.	60
	CLR65 M39006/09			
	CLR69 M39006/21			
	CLR79 M39006/22			
	CLR81 M39006/25			
	CLR90 M39006/30			
CLR91 M39006/31				
	109D CL64/65 M3965/4	C, F, T, K	Wet tantalum capacitor-sintered anode-silver case Tantalex® capacitor for operation to + 125 °C: Axial lead. Tubular. Elastomer sealed. For applications where a superior quality, reliable design is desired as in telecommunications, automotive, and industrial applications. These capacitors have an shelf life in excess of ten years.	14
	769D	A, B, C, D	Wet tantalum capacitor-sintered anode capacitor for operation to + 125 °C: Axial lead. Tubular. Epoxy resin end-fill. Designed for industrial and telecommunication applications. Offers higher microfarad value per unit volume than conventional styles. Shelf life in excess of ten years. These capacitors are CECC 30202-013 qualified.	31
	135D	C, F, T, K	Wet tantalum capacitors-tantalum Case with glass-to-tantalum hermetic seal for operation from - 55 °C to + 200 °C: Axial lead. Electrolytic capacitor with 3 V reverse voltage capability at 85 °C and a higher ripple than conventional styles with similar combinations of capacitance and case size. For aerospace applications, these capacitors will withstand high levels of shock and vibration. The European styles are certified to CECC 30202-001, 801, 005 (see datasheet for detailed information).	37
	735D/DE CT79	A, B, C, D		50
	138D	C, F, T, K	Wet tantalum capacitor-sintered anode-silver case Tantalex® capacitor. Axial lead. Hermetically sealed with true glass-to-tantalum seal which offers improved reliability.	19
	738D CT9	A, B, C, D	The construction eliminates all internal lead welds while retaining the strength of internal lead-welded parts. This construction offers outstanding resistance to thermal shock.	26
	ST DSCC 93026	1, 2, L2, 3, 4	Wet tantalum capacitor-sintered anode-tantalum case capacitor. Axial lead. Hermetically sealed. A patented unique cathode design enables an 85 % to 250 % increase in capacitance as well as improved ESR and ripple current capabilities when compared to conventional wet tantalum devices. These capacitors are DSCC 93026 qualified.	88

See individual datasheets for complete details

WET TANTALUM CAPACITORS				
PICTORIAL	MODEL	CASE CODES	DESCRIPTION	PAGE
	STA	1, 2, 3, 4	Wet tantalum capacitors-sintered anode-tantalum case capacitor. Axial lead. Hermetically sealed. Operation temperature range of - 55 °C to + 85 °C in the voltage range 6 V to 15 V. This range is exceptionally well suited for low voltage filtering and energy storage applications.	91
	STE	2, 4	Wet tantalum capacitor-sintered anode tantalum case capacitor. Axial lead. Hermetically sealed. A patented unique cathode design enables an 85 % to 250 % increase in capacitance as well as improved ESR and ripple current capabilities when compared to conventional wet tantalum devices.	93
	134D	C, F, T, K	Wet tantalum capacitor-sintered anode tantalum case capacitor. Axial lead. Hermetically sealed. A patented unique cathode design enables an 85 % to 250 % increase in capacitance as well as improved ESR and ripple current capabilities when compared to conventional wet tantalum devices. HI TMP® (+ 200 °C).	96
	T16	D	For avionics and aerospace applications, the new T16 series of wet tantalum capacitors with glass-to-tantalum hermetic seals provides all the advantages of Vishay's SuperTan series devices, while offering enhanced performance with a reverse voltage of 1.5 V at + 85 °C and a high-reliability design with improved vibration (sine: 20 g; random: 27.7 g), thermal shock (300 cycles), and mechanical shock capabilities.	99
	XT	K, M, L, H, V	Wet tantalum design with hermetic seal. Will handle extreme environmental conditions and high temperature (- 55 °C to + 175 °C). Suitable for aircraft, space and well logging applications. Can be supplied in various terminal configurations.	103
	HE3	A, B, C	ULTRA high capacitance, HIGH ENERGY wet tantalum sintered-anode tantalum case capacitor. Operation to + 125 °C.	114
	200D 202D	A1 - A5 B1 - B7 D3	Wet tantalum capacitor-sintered anode Tantalex® capacitor for operation to + 175 °C: Available in three standard case styles and 13 case codes. Operating temperature is - 55 °C to + 125 °C. 200D units are constructed with the negative terminal connected to the case. Used in filtering , coupling, bypass and time-delay circuits in computers, missiles, airborne equipment, radar and fire control systems.	120
	285D	A, B, C, D, E, F, G, H	Tantalum foil replacement capacitor. Wet tantalum sintered-anode tantalum case capacitor. Operation to + 125 °C. Both polar and non-polar designs available.	132
	CA2, CE2, CH2, CS2	B, C	Wet tantalum capacitor, tantalum anode-cathode, unique button style, suitable for avionics and oil exploration markets.	147, 152, 157, 162

See individual datasheets for complete details



WET TANTALUM CAPACITORS				
PICTORIAL	MODEL	CASE CODES	DESCRIPTION	PAGE
	M34, M35	C	Wet tantalum capacitor, tantalum anode-cathode, surface mount package, suitable for military and avionics applications.	166, 170
	Custom Design Arrays	contact: wettants@vishay.com	Vishay offers a complete design service to provide the best technical and commercial solution. This service includes assistance preparing specifications and making samples, special testing, evaluating test results and making any necessary changes to achieve the ultimate in design.	203

See individual datasheets for complete details

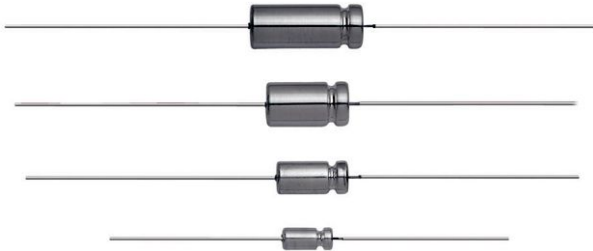


Silver Case Standard

Contents

M39006/09/21	60
109D	14
138D	19
738D, CT9	26
769D	31

Wet Tantalum Capacitors Sintered Anode TANTALEX[®] Capacitors for Operation to 125 °C, Elastomer Sealed



FEATURES

- Terminations: standard tin/lead (SnPb), 100 % tin (RoHS compliant) available
- Vishay Sprague model 109D tubular elastomer-sealed, sintered anode TANTALEX[®] capacitors fill the basic requirements for applications where a superior quality, reliable design for industrial, automotive and telecommunications application is desired.
- Model 109D capacitors are the commercial equivalents of Tansitor style WC, UWC, Mallory-NACC style TLS, TLH and the Military Style CL64 and CL65, designed to meet the performance requirements of Military Specification MIL-DTL-3965.
- Compliant to RoHS Directive 2002/95/EC



RoHS*
COMPLIANT

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 85 °C
(to + 125 °C with voltage derating).

Capacitance Tolerance: At 120 Hz, + 25 °C. ± 20 % standard. ± 10 %, ± 5 % available as special.

DC Leakage Current (DCL max.):

At + 25 °C, + 85 °C, + 125 °C: Leakage current shall not exceed the values listed in the Standard Ratings Tables.

Life Test: Capacitors are capable of withstanding a 2000 h life test at a temperature of + 85 °C or + 125 °C at the applicable DC working voltage.

Following the life test:

1. DCL shall not exceed the initial requirements or 1 µA, whichever is greater.
2. The ESR shall meet the initial requirement.
3. Change in capacitance shall not exceed 10 % from the initial measurement. For capacitors with voltage ratings of 15 WV_{DC} and below, change in capacitance shall not exceed + 10 %, - 25 % from the initial measurement.

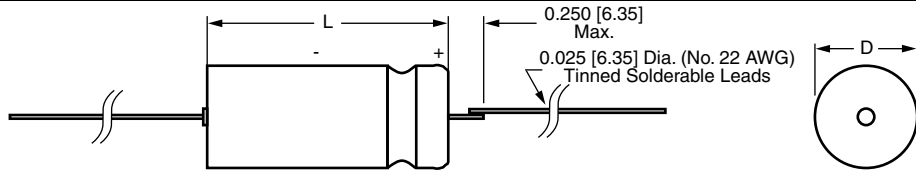
ORDERING INFORMATION

109D	207	X0	006	C	0	E3
MODEL	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	CASE CODE	STYLE NUMBER	RoHS COMPLIANT
	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow	X0 = ± 20 % X9 = ± 10 % X5 = ± 5 % Special Order	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	See Ratings and Case Codes Table	0 = No outer sleeve. Standard 2 = Outer plastic film insulation	E3 = 100 % tin termination (RoHS compliant) Blank = SnPb termination (standard design)

Note

Packaging: The use of formed plastic trays for packaging these axial lead components is standard. Tape and reel is not recommended due to the unit weight.

DIMENSIONS in inches [millimeters]



CASE CODE	BARE TUBE		WITH PLASTIC-FILM INSULATING SLEEVE		LEAD LENGTH
	D	L	D Max.	L Max.	
C	0.188 ± 0.016 [4.78 ± 0.41]	0.453 + 0.031 - 0.016 [11.51 + 0.79 - 0.41]	0.219 [5.56]	0.608 [15.45]	1.500 ± 0.250 [38.10 ± 6.35]
F	0.281 ± 0.016 [7.14 ± 0.41]	0.641 + 0.031 - 0.016 [16.28 + 0.79 - 0.41]	0.312 [7.92]	0.796 [20.22]	2.250 ± 0.250 [57.15 ± 6.35]
T	0.375 ± 0.016 [9.53 ± 0.41]	0.766 + 0.031 - 0.016 [19.46 + 0.79 - 0.41]	0.406 [10.31]	0.921 [23.40]	2.250 ± 0.250 [57.15 ± 6.35]
K ⁽¹⁾	0.375 ± 0.016 [9.53 ± 0.41]	1.062 + 0.031 - 0.016 [26.97 + 0.79 - 0.41]	0.406 [10.31]	1.217 [30.91]	2.250 ± 0.250 [57.15 ± 6.35]

Note

⁽¹⁾ Replaces previous W case

* Pb containing terminations are not RoHS compliant, exemptions may apply



Wet Tantalum Capacitors Sintered Anode TANTALEX® Capacitors
for Operation to 125 °C, Elastomer Sealed

STANDARD RATINGS										
CAPACITANCE (µF)	CASE CODE	PART NUMBER ⁽¹⁾	MAX. ESR	MAX. IMP.	MAX. DCL (µA)		MAX. CAPACITANCE CHANGE (%)			MAX. RMS RIPPLE CURRENT 120 Hz (mA)
			at + 25 °C 120 Hz (Ω)	at - 55 °C 120 Hz (Ω)	at	at	at	at	at	
6 WV _{DC} at + 85 °C . . . 4 WV _{DC} at + 125 °C										
68	C	109D686X0006C0	4	60	1	2	- 40	+ 14	+ 16	160
140	F	109D147X0006F0	2	40	1	3	- 40	+ 14	+ 16	330
270	F	109D277X0006F0	4	25	1	7	- 44	+ 17.5	+ 20	270
560	T	109D567X0006T0	3	25	2	13	- 64	+ 17.5	+ 20	340
1200	K	109D128X0006K0	1.6	20	3	14	- 80	+ 25	+ 25	530
8 WV _{DC} at + 85 °C . . . 5 WV _{DC} at + 125 °C										
22	C	109D226X0008C0	6	115	1	2	- 40	+ 10.5	+ 12	130
220	F	109D227X0008F0	4	30	1	7	- 44	+ 17.5	+ 20	270
10 WV _{DC} at + 85 °C . . . 7 WV _{DC} at + 125 °C										
20	C	109D206X0010C0	5	175	1	2	- 32	+ 10.5	+ 12	140
47	C	109D476X0010C0	5	100	1	2	- 36	+ 14	+ 16	160
180	F	109D187X0010F0	4	40	1	7	- 36	+ 14	+ 16	270
390	T	109D397X0010T0	3	25	2	16	- 64	+ 17.5	+ 20	340
15 WV _{DC} at + 85 °C . . . 10 WV _{DC} at + 125 °C										
15	C	109D156X0015C0	6	155	1	2	- 24	+ 10.5	+ 12	130
33	C	109D336X0015C0	5	90	1	2	- 28	+ 14	+ 16	160
120	F	109D127X0015F0	4	50	1	7	- 28	+ 17.5	+ 20	270
270	T	109D277X0015T0	3	30	2	16	- 56	+ 17.5	+ 20	340
540	K	109D547X0015K0	1.2	23	6	24	- 80	+ 25	+ 25	610
25 WV _{DC} at + 85 °C . . . 15 WV _{DC} at + 125 °C										
10	C	109D106X0025C0	6	220	1	2	- 16	+ 8	+ 9	130
22	C	109D226X0025C0	5	140	1	3	- 20	+ 10.5	+ 12	160
50	F	109D506X0025F0	4	70	1	5	- 28	+ 13	+ 15	270
100	F	109D107X0025F0	4	50	1	10	- 28	+ 13	+ 15	270
100	T	109D107X0025T0	4	45	2	10	- 48	+ 13	+ 15	410
180	T	109D187X0025T0	4	32	2	18	- 48	+ 13	+ 15	340
350	K	109D357X0025K0	1.3	24	7	28	- 70	+ 25	+ 25	580
30 WV _{DC} at + 85 °C . . . 20 WV _{DC} at + 125 °C										
7	C	109D705X0030C0	8	275	1	2	- 16	+ 8	+ 12	110
8	C	109D805X0030C0	7.5	275	1	2	- 16	+ 8	+ 12	130
15	C	109D156X0030C0	8	175	1	2	- 20	+ 10.5	+ 12	160
40	F	109D406X0030F0	4	65	1	5	- 24	+ 10.5	+ 12	270
68	F	109D686X0030F0	6	60	1	8	- 24	+ 13	+ 15	270
100	T	109D107X0030T0	6	40	2	12	- 28	+ 10.5	+ 12	410
150	T	109D157X0030T0	4.1	35	2	18	- 48	+ 13	+ 15	340
300	K	109D307X0030K0	1.6	25	8	32	- 60	+ 25	+ 25	550

Note

⁽¹⁾ Part Numbers shown are for units with ± 20 % capacitance tolerance and uninsulated capacitors. For ± 10 % units, change the digit following the letter "X" from "0" to "9". For units with outer plastic-film insulation, substitute "2" for "0" at the end of the Part Number. For RoHS compliant add "E3".



STANDARD RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER (1)	MAX. ESR	MAX. IMP.	MAX. DCL (μ A)		MAX. CAPACITANCE CHANGE			MAX. RMS RIPPLE CURRENT 120 Hz (mA)
			at + 25 °C 120 Hz (Ω)	at - 55 °C 120 Hz (Ω)	at		(% at			
					+ 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
50 WV_{DC} at + 85 °C . . . 30 WV_{DC} at + 125 °C										
4.5	C	109D455X0050C0	9	400	1	2	- 16	+ 5	+ 6	110
5	C	109D505X0050C0	9	400	1	2	- 16	+ 5	+ 6	130
10	C	109D106X0050C0	8	250	1	2	- 24	+ 8	+ 9	160
22	F	109D226X0050F0	7	95	1	4	- 20	+ 10.5	+ 12	230
25	F	109D256X0050F0	6	95	1	5	- 20	+ 10.5	+ 12	270
47	F	109D476X0050F0	6	70	1	9	- 28	+ 13	+ 15	270
60	T	109D606X0050T0	3	45	2	12	- 16	+ 10.5	+ 12	410
82	T	109D826X0050T0	4	45	2	16	- 32	+ 13	+ 15	340
160	K	109D167X0050K0	2.2	27	8	32	- 50	+ 25	+ 25	460
60 WV_{DC} at + 85 °C . . . 40 WV_{DC} at + 125 °C										
4	C	109D405X0060C0	10	550	1	2	- 16	+ 5	+ 6	110
8.2	C	109D825X0060C0	8	275	1	2	- 24	+ 8	+ 9	140
20	F	109D206X0060F0	5	105	1	5	- 16	+ 10.5	+ 12	270
39	F	109D396X0060F0	7	90	1	9	- 28	+ 10.5	+ 12	230
50	T	109D506X0060T0	4	50	2	12	- 16	+ 10.5	+ 12	410
68	T	109D686X0060T0	6	50	2	16	- 32	+ 10.5	+ 12	340
140	K	109D147X0060K0	2.4	28	8	32	- 40	+ 20	+ 20	430
75 WV_{DC} at + 85 °C . . . 50 WV_{DC} at + 125 °C										
3.5	C	109D355X0075C0	10	650	1	2	- 16	+ 5	+ 6	110
6.8	C	109D685X0075C0	8	300	1	2	- 20	+ 8	+ 9	140
13	F	109D136X0075F0	6	160	1	4	- 16	+ 8	+ 9	190
15	F	109D156X0075F0	6.5	150	1	5	- 16	+ 8	+ 9	270
33	F	109D336X0075F0	7	90	1	10	- 24	+ 10.5	+ 15	230
40	T	109D406X0075T0	5	60	2	12	- 16	+ 10.5	+ 12	410
56	T	109D566X0075T0	6	60	2	17	- 28	+ 10.5	+ 15	300
110	K	109D117X0075K0	3.1	29	9	36	- 35	+ 20	+ 20	400
100 WV_{DC} at + 85 °C . . . 65 WV_{DC} at + 125 °C										
2.5	C	109D255X0100C0	26.5	950	1	2	- 16	+ 7	+ 8	100
3.0	C	109D305X0100C0	10	800	1	2	- 16	+ 7	+ 8	110
4.7	C	109D475X0100C0	10	500	1	2	- 16	+ 7	+ 8	130
10	F	109D106X0100F0	6	215	1	4	- 16	+ 7	+ 8	190
11	F	109D116X0100F0	6	200	1	4	- 16	+ 7	+ 8	230
22	F	109D226X0100F0	7	100	1	9	- 16	+ 7	+ 8	230
30	T	109D306X0100T0	4	80	2	12	- 16	+ 7	+ 8	340
43	T	109D436X0100T0	6	70	2	17	- 20	+ 7	+ 8	300
125 WV_{DC} at + 85 °C . . . 85 WV_{DC} at + 125 °C										
1.7	C	109D175X0125C0	54.6	1250	1	2	- 16	+ 7	+ 8	100
3.6	C	109D365X0125C0	15	600	1	2	- 16	+ 7	+ 8	110
9	F	109D905X0125F0	15	240	1	5	- 16	+ 7	+ 8	210
14	F	109D146X0125F0	12	167	1	7	- 16	+ 7	+ 8	190
25	T	109D256X0125T0	10	93	2	13	- 16	+ 7	+ 8	260

Note

(1) Part Numbers shown are for units with $\pm 20\%$ capacitance tolerance and uninsulated capacitors. For $\pm 10\%$ units, change the digit following the letter "X" from "0" to "9". For units with outer plastic-film insulation, substitute "2" for "0" at the end of the Part Number. For RoHS compliant add "E3".



Wet Tantalum Capacitors Sintered Anode TANTALEX® Capacitors
for Operation to 125 °C, Elastomer Sealed

109D

Vishay

EXTENDED RATINGS										
CAPACITANCE (µF)	CASE CODE	PART NUMBER (1)	MAX. ESR	MAX. IMP.	MAX. DCL (µA)		MAX. CAPACITANCE CHANGE			MAX. RMS RIPPLE CURRENT 120 Hz (mA)
			at + 25 °C 120 Hz (Ω)	at - 55 °C 120 Hz (Ω)	at		at			
					+ 25 °C	+ 85 °C	- 55 °C	+ 85 °C	+ 125 °C	
6 WV _{DC} at + 85 °C . . . 4 WV _{DC} at + 125 °C										
140	C	109D147X0006C2	3	54	2	9	- 45	+ 13	+ 16	160
820	F	109D827X0006F0	2.5	18	3	14	- 88	+ 16	+ 20	300
1500	T	109D158X0006T0	1.5	18	5	20	- 90	+ 20	+ 25	480
2200	K	109D228X0006K0	1	13	6	24	- 90	+ 25	+ 30	670
8 WV _{DC} at + 85 °C . . . 5 WV _{DC} at + 125 °C										
680	F	109D687X0008F0	2.5	22	3	14	- 83	+ 16	+ 20	300
10 WV _{DC} at + 85 °C . . . 7 WV _{DC} at + 125 °C										
120	C	109D127X0010C0	4	60	2	9	- 45	+ 13	+ 16	160
150	C	109D157X0010C0	3	54	2	9	- 55	+ 13	+ 16	180
470	F	109D477X0010F0	2.5	30	3	16	- 65	+ 16	+ 20	300
560	F	109D567X0010F0	2.5	27	3	16	- 77	+ 16	+ 20	300
1000	T	109D108X0010T0	1.5	20	5	20	- 75	+ 20	+ 25	480
1200	T	109D128X0010T0	1.5	18	5	20	- 88	+ 20	+ 25	480
1200	K	109D128X0010K0	1	18	7	25	- 75	+ 30	+ 30	670
1500	K	109D158X0010K0	1	15	7	25	- 88	+ 25	+ 30	670
15 WV _{DC} at + 85 °C . . . 10 WV _{DC} at + 125 °C										
82	C	109D826X0015C0	4	80	2	9	- 38	+ 13	+ 16	160
100	C	109D107X0015C0	4	72	2	9	- 44	+ 13	+ 16	160
330	F	109D337X0015F0	2.5	35	3	16	- 60	+ 16	+ 20	300
390	F	109D397X0015F0	2.5	31	3	16	- 66	+ 16	+ 20	300
510	T	109D517X0015T0	1.8	25	6	24	- 65	+ 20	+ 25	340
820	T	109D827X0015T0	1.8	22	6	24	- 77	+ 20	+ 25	440
820	K	109D827X0015K0	1.2	20	8	32	- 70	+ 30	+ 30	610
1000	K	109D108X0015K0	1.2	17	8	32	- 77	+ 25	+ 30	610
25 WV _{DC} at + 85 °C . . . 15 WV _{DC} at + 125 °C										
68	C	109D686X0025C0	4.3	90	2	9	- 40	+ 12	+ 15	160
270	F	109D277X0025F0	2.7	33	3	16	- 62	+ 13	+ 16	300
560	T	109D567X0025T0	1.8	24	7	28	- 72	+ 20	+ 25	440
680	K	109D687X0025K0	1.2	19	8	32	- 72	+ 25	+ 30	610
750	K	109D757X0025K2	1.0	18	8	29	- 60	+ 25	+ 25	610
30 WV _{DC} at + 85 °C . . . 20 WV _{DC} at + 125 °C										
39	C	109D396X0030C0	5.2	110	2	- 28	+ 10	+ 12		140
47	C	109D476X0030C0	5.2	100	2	9	- 30	+ 10	+ 12	140
56	C	109D566X0030C0	5.2	100	2	9	- 38	+ 12	+ 15	140
150	F	109D157X0030F0	2.5	40	3	9	- 40	+ 12	+ 15	300
180	F	109D187X0030F0	2.5	40	3	16	- 45	+ 13	+ 16	300
220	F	109D227X0030F0	2.5	36	3	16	- 60	+ 13	+ 16	300
330	T	109D337X0030T0	1.8	28	8	16	- 45	+ 20	+ 25	440
390	T	109D397X0030T0	1.8	28	8	32	- 50	+ 20	+ 25	440
470	T	109D477X0030T0	1.8	25	8	32	- 65	+ 20	+ 25	550
560	K	109D567X0030K0	1.3	20	9	32	- 65	+ 25	+ 30	590

Note

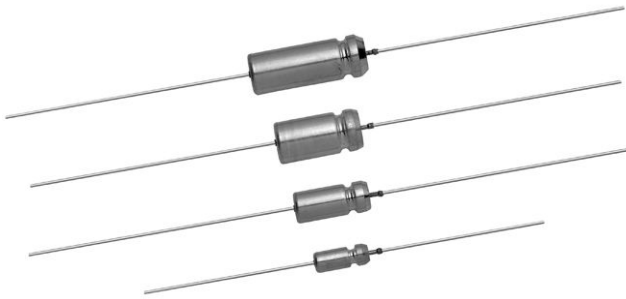
(1) Part Numbers shown are for units with ± 20 % capacitance tolerance and uninsulated capacitors. For ± 10 % units, change the digit following the letter "X" from "0" to "9". For units with outer plastic-film insulation, substitute "2" for "0" at the end of the Part Number. For RoHS compliant add "E3".

EXTENDED RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER ⁽¹⁾	MAX. ESR	MAX. IMP.	MAX. DCL (μ A)		MAX. CAPACITANCE CHANGE			MAX. RMS RIPPLE CURRENT 120 Hz (mA)
			at + 25 °C 120 Hz (Ω)	at - 55 °C 120 Hz (Ω)	at		at			
					+ 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
50 WV_{DC} at + 85 °C . . . 30 WV_{DC} at + 125 °C										
33	C	109D336X0050C0	5	135	2	9	- 29	+ 10	+ 12	140
120	F	109D127X0050F0	2.5	49	4	24	- 42	+ 12	+ 15	300
270	T	109D277X0050T0	1.8	29	8	32	- 46	+ 20	+ 25	440
330	K	109D337X0050K0	1.5	22	9	36	- 46	+ 25	+ 30	550
60 WV_{DC} at + 85 °C . . . 40 WV_{DC} at + 125 °C										
27	C	109D276X0060C0	5	144	3	12	- 24	+ 10	+ 12	140
68	F	109D686X0060F0	3	60	3	20	- 30	+ 12	+ 15	270
100	F	109D107X0060F0	2.5	54	4	20	- 36	+ 12	+ 15	300
140	T	109D147X0060T0	2	32	8	32	- 30	+ 16	+ 20	420
220	T	109D227X0060T0	1.8	29	8	32	- 40	+ 16	+ 20	440
270	K	109D277X0060K0	1.5	23	9	36	- 45	+ 20	+ 25	550
75 WV_{DC} at + 85 °C . . . 50 WV_{DC} at + 125 °C										
12	C	109D126X0075C0	5	175	2	12	- 12	+ 8	+ 10	140
15	C	109D156X0075C0	5	160	2	12	- 14	+ 10	+ 12	140
22	C	109D226X0075C0	5	157	3	12	- 19	+ 10	+ 12	140
47	F	109D476X0075F0	3	75	4	24	- 18	+ 10	+ 12	270
56	F	109D566X0075F0	3	70	4	24	- 20	+ 12	+ 15	270
82	F	109D826X0075F0	2.5	63	4	24	- 30	+ 12	+ 15	300
110	T	109D117X0075T0	2	33	9	36	- 25	+ 16	+ 20	420
180	T	109D187X0075T0	1.8	30	9	36	- 35	+ 16	+ 20	440
220	K	109D227X0075K0	2.2	24	10	40	- 40	+ 20	+ 25	450
270	K	109D277X0075K2	1.3	24	10	40	- 40	+ 20	+ 25	450
100 WV_{DC} at + 85 °C . . . 65 WV_{DC} at + 125 °C										
8.2	C	109D825X0100C0	6	250	3	12	- 12	+ 12	+ 12	130
10	C	109D106X0100C0	6	200	3	12	- 17	+ 10	+ 12	130
33	F	109D336X0100F0	3.5	85	4	24	- 18	+ 15	+ 15	250
39	F	109D396X0100F0	3.5	80	5	24	- 20	+ 12	+ 15	250
56	T	109D566X0100T0	2.2	45	9	36	- 20	+ 15	+ 15	400
68	T	109D686X0100T0	2.2	40	10	40	- 30	+ 14	+ 16	400
86	K	109D866X0100K0	3.2	30	10	40	- 25	+ 15	+ 15	370
125 WV_{DC} at + 85 °C . . . 85 WV_{DC} at + 125 °C										
6.8	C	109D685X0125C0	11.7	300	3	12	- 14	+ 10	+ 12	130
27	F	109D276X0125F0	3.5	90	5	24	- 18	+ 12	+ 15	250
47	T	109D476X0125T0	2.2	50	10	40	- 26	+ 14	+ 16	400
56	K	109D566X0125K0	4.1	32	10	40	- 25	+ 15	+ 15	330

Note

⁽¹⁾ Part Numbers shown are for units with ± 20 % capacitance tolerance and uninsulated capacitors. For ± 10 % units, change the digit following the letter "X" from "0" to "9". For units with outer plastic-film insulation, substitute "2" for "0" at the end of the Part Number. For RoHS compliant add "E3".

Wet Tantalum Capacitors Sintered Anode TANTALEX[®] Capacitors Hermetically-Sealed with True Glass-to-Tantalum Seal


FEATURES

- Terminations: standard tin/lead (SnPb), 100 % tin (RoHS compliant) available
- Improved reliability through the use of a glass-to-tantalum true hermetic anode seal is the prime feature of the Type 138D sintered anode TANTALEX[®] capacitor. This construction offers outstanding resistance to thermal shock.
- Model 138D is the commercial equivalents of Tansitor styles WT, UWT, Mallory-NACC styles TLX, TXX and Military styles CL66, CL67, CLR65, and CLR69, designed to meet the performance requirements of Military Specification MIL-PRF-39006/09/21. Capacitors in accordance with military specifications should be ordered by their military part numbers.
- Compliant to RoHS Directive 2002/95/EC


RoHS*
COMPLIANT

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 85 °C and with voltage derating to two-thirds the + 85 °C rating at + 125 °C. Use of Type 138D capacitors for high temperature applications is recommended.

Capacitance Tolerance: At 120 Hz, + 25 °C. ± 20 % standard. ± 10 %, ± 5 % available as special.

DC Leakage Current (DCL Max.): At + 25 °C, + 85 °C and + 125 °C: Leakage current shall not exceed the values listed in the Standard Ratings tables.

Life Test: Capacitors are capable of withstanding a 2000 h life test at a temperature of + 85 °C or + 125 °C at the applicable rated DC working voltage.

Following the life test:

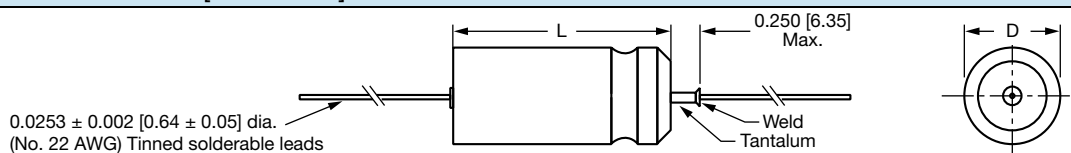
1. DCL shall not exceed 125 % of the original requirement.
2. The ESR shall not exceed 200 % of the initial requirement.
3. Change in capacitance value shall not exceed the percentages below.
 - a) 6 WV_{DC} Units: + 10 % to - 25 % of initial measurement.
 - b) 8 WV_{DC} and 10 WV_{DC} Units: + 10 % to - 20 % of initial measurement.
 - c) 15 WV_{DC} Units: + 10 % to - 15 % of initial measurement.
 - d) 20 WV_{DC} and above: ± 10 % of initial measurement.

ORDERING INFORMATION

138D	306	X0	006	C	2	E3
MODEL	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	CASE CODE	TERMINATION	RoHS COMPLIANT
	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow	X0 = ± 20 % X9 = ± 10 % X5 = ± 5 % Special Order	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	See Ratings and Case Codes table	0 = No outer sleeve 2 = Outer plastic film insulation	E3 = 100 % tin termination (RoHS compliant) Blank = SnPb termination (standard design)

Note

Packaging: The use of formed plastic trays for packaging these axial lead components is standard. Tape and reel is not recommended due to the unit weight.

DIMENSIONS in inches [millimeters]


CASE CODE	BARE TUBE		WITH OUTER PLASTIC - FILM INSULATION		LEAD LENGTH	MAX. WEIGHT (oz./g)
	D	L	D (Max.)	L (Max.)		
C	0.188 ± 0.016 [4.78 ± 0.41]	0.453 + 0.031 - 0.016 [11.51 + 0.79 - 0.41]	0.219 [5.56]	0.608 [15.45]	1.500 ± 0.250 [38.10 ± 6.35]	0.07 [2.0]
F	0.281 ± 0.016 [7.14 ± 0.41]	0.641 + 0.031 - 0.016 [16.28 + 0.79 - 0.41]	0.312 [7.92]	0.796 [20.22]	2.250 ± 0.250 [57.15 ± 6.35]	0.18 [5.1]
T	0.375 ± 0.016 [9.53 ± 0.41]	0.766 + 0.031 - 0.016 [19.46 + 0.79 - 0.41]	0.406 [10.31]	0.921 [23.40]	2.250 ± 0.250 [57.15 ± 6.35]	0.36 [10.2]
K	0.375 ± 0.016 [9.53 ± 0.41]	1.062 + 0.031 - 0.023 [26.97 + 0.79 - 0.58]	0.406 [10.31]	1.127 [30.91]	2.250 ± 0.250 [57.15 ± 6.35]	0.49 [13.9]

* Pb containing terminations are not RoHS compliant, exemptions may apply

STANDARD RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER (1)	MAX. ESR	MAX. IMP.	MAX. DCL (μ A)		MAX. CAPACITANCE CHANGE (%)			MAX. RMS RIPPLE CURRENT 120 Hz (mA)
			at + 25 °C 120 Hz (Ω)	at - 55 °C 120 Hz (Ω)	at		- 55 °C	+ 85 °C	+ 125 °C	
6 WV _{DC} at + 85 °C . . . 4 WV _{DC} at + 125 °C										
30	C	138D306X0006C2	4	100	1	2	- 40	+ 10.5	+ 12	140
68	C	138D686X0006C2	4	60	1	2	- 40	+ 14	+ 16	160
140	F	138D147X0006F2	2	40	1	3	- 40	+ 14	+ 16	330
270	F	138D277X0006F2	4	25	1	6.5	- 44	+ 17.5	+ 20	330
330	T	138D337X0006T2	2	20	2	7.9	- 44	+ 14	+ 16	410
560	T	138D567X0006T2	3	25	2	13	- 64	+ 17.5	+ 20	410
1200	K	138D128X0006K2	1.6	20	3	14	- 80	+ 25	+ 25	530
8 WV _{DC} at + 85 °C . . . 5 WV _{DC} at + 125 °C										
25	C	138D256X0008C2	4	100	1	2	- 40	+ 10.5	+ 12	140
56	C	138D566X0008C2	4	59	1	2	- 40	+ 14	+ 16	160
220	F	138D227X0008F2	4	30	1	7	- 44	+ 17.5	+ 20	270
430	T	138D437X0008T2	3	25	2	14	- 64	+ 17.5	+ 20	410
850	K	138D857X0008K2	1	22	4	16	- 80	+ 25	+ 25	670
10 WV _{DC} at + 85 °C . . . 7 WV _{DC} at + 125 °C										
20	C	138D206X0010C2	4	175	1	2	- 32	+ 10.5	+ 12	140
47	C	138D476X0010C2	5	100	1	2	- 36	+ 14	+ 16	160
100	F	138D107X0010F2	2	60	1	4	- 36	+ 14	+ 16	270
180	F	138D187X0010F2	4	40	1	7	- 36	+ 14	+ 16	270
250	T	138D257X0010T2	2	30	2	10	- 40	+ 14	+ 16	410
390	T	138D397X0010T2	3	25	2	16	- 64	+ 17.5	+ 20	410
750	K	138D757X0010K2	1	23	4	16	- 80	+ 25	+ 25	670
15 WV _{DC} at + 85 °C . . . 10 WV _{DC} at + 125 °C										
15	C	138D156X0015C2	5	155	1	2	- 24	+ 10.5	+ 12	130
33	C	138D336X0015C2	5	90	1	2	- 28	+ 14	+ 16	160
70	F	138D706X0015F2	4	75	1	4	- 28	+ 14	+ 16	270
120	F	138D127X0015F2	4	50	1	7	- 28	+ 17.5	+ 20	270
170	T	138D177X0015T2	2	35	2	10	- 32	+ 14	+ 16	410
270	T	138D277X0015T2	3	30	2	16	- 56	+ 17.5	+ 20	410
540	K	138D547X0015K2	1.0	23	6	24	- 80	+ 25	+ 25	610
20 WV _{DC} at + 85 °C . . . 13 WV _{DC} at + 125 °C										
27	C	138D276X0020C2	5	100	1	2	- 20	+ 11	+ 14	160
220	T	138D227X0020T2	4	30	2	16	- 48	+ 13	+ 15	410
25 WV _{DC} at + 85 °C . . . 15 WV _{DC} at + 125 °C										
10	C	138D106X0025C2	6	220	1	2	- 16	+ 8	+ 9	130
22	C	138D226X0025C2	5	140	1	2	- 20	+ 10.5	+ 12	160
27	C	138D276X0025C2	4.3	110	2	9	- 35	+ 12	+ 15	160
50	F	138D506X0025F2	4	70	1	5	- 28	+ 13	+ 15	270
100	F	138D107X0025F2	4	50	1	10	- 28	+ 13	+ 15	270
180	T	138D187X0025T2	4	32	2	18	- 48	+ 13	+ 15	340
350	K	138D357X0025K2	1.3	24	7	28	- 70	+ 25	+ 25	580
30 WV _{DC} at + 85 °C . . . 20 WV _{DC} at + 125 °C										
8.0	C	138D805X0030C2	7.5	275	1	2	- 16	+ 8	+ 12	130
15	C	138D156X0030C2	8	175	1	2	- 20	+ 10.5	+ 12	160
40	F	138D406X0030F2	4	65	1	5	- 24	+ 10.5	+ 12	270
100	T	138D107X0030T2	6	40	2	12	- 28	+ 10.5	+ 12	410
150	T	138D157X0030T2	2.5	35	2	16	- 48	+ 13	+ 15	340
300	K	138D307X0030K2	1.6	25	8	32	- 60	+ 25	+ 25	550

Note

(1) Part Numbers listed are for units with outer plastic-film insulation and a capacitance tolerance of $\pm 20\%$. For bare case units, substitute "0" for "2" at the end of the Part Number. For capacitors with $\pm 10\%$ tolerance, change the digit following the letter "X" to "9". For RoHS compliant add "E3".



Wet Tantalum Capacitors Sintered Anode TANTALEX® Capacitors
Hermetically-Sealed with True Glass-to-Tantalum Seal

STANDARD RATINGS											
CAPACITANCE (µF)	CASE CODE	PART NUMBER (1)	MAX. ESR	MAX. IMP.	MAX. DCL (µA)		MAX. CAPACITANCE CHANGE (%)			MAX. RMS RIPPLE CURRENT 120 Hz (mA)	
			at + 25 °C 120 Hz (Ω)	at - 55 °C 120 Hz (Ω)	at + 25 °C	at + 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C		
35 WV _{DC} at + 85 °C . . . 22 WV _{DC} at + 125 °C											
68	F	138D686X0035F2	6	60	1	8	- 24	+ 12	+ 15	270	
120	T	138D127X0035T2	4	38	2	16	- 30	+ 13	+ 15	410	
270	K	138D277X0035K2	2.2	23	8	32	- 45	+ 20	+ 25	500	
50 WV _{DC} C at + 85 °C . . . 30 WV _{DC} at + 125 °C											
5.0	C	138D505X0050C2	9	400	1	2	- 16	+ 5	+ 6	130	
10	C	138D106X0050C2	8	250	1	2	- 24	+ 8	+ 9	160	
25	F	138D256X0050F2	6	95	1	5	- 20	+ 10.5	+ 12	270	
47	F	138D476X0050F2	6	70	1	9	- 28	+ 10.5	+ 15	270	
60	T	138D606X0050T2	3	45	2	12	- 16	+ 10.5	+ 12	410	
82	T	138D826X0050T2	4	45	2	16	- 32	+ 13	+ 15	410	
160	K	138D167X0050K2	2.2	27	8	32	- 50	+ 25	+ 25	460	
60 WV _{DC} at + 85 °C . . . 40 WV _{DC} at + 125 °C											
4.0	C	138D405X0060C2	10	550	1	2	- 16	+ 5	+ 6	110	
8.2	C	138D825X0060C2	8	275	1	2	- 24	+ 8	+ 9	140	
20	F	138D206X0060F2	5	105	1	5	- 16	+ 10.5	+ 12	270	
39	F	138D396X0060F2	7	90	1	9	- 28	+ 10.5	+ 12	330	
50	T	138D506X0060T2	4	50	2	12	- 16	+ 10.5	+ 12	410	
68	T	138D686X0060T2	6	50	2	16	- 32	+ 10.5	+ 12	410	
140	K	138D147X0060K2	2.4	28	8	32	- 40	+ 20	+ 20	430	
75 WV _{DC} at + 85 °C . . . 50 WV _{DC} at + 125 °C											
3.5	C	138D355X0075C2	10	650	1	2	- 16	+ 5	+ 6	110	
6.8	C	138D685X0075C2	8	300	1	2	- 20	+ 8	+ 9	140	
15	F	138D156X0075F2	6.5	150	1	5	- 16	+ 8	+ 9	270	
33	F	138D336X0075F2	7	90	1	10	- 24	+ 10.5	+ 15	270	
40	T	138D406X0075T2	5	60	2	12	- 16	+ 10.5	+ 12	410	
56	T	138D566X0075T2	6	60	2	17	- 28	+ 10.5	+ 15	410	
110	K	138D117X0075K2	3.1	29	9	36	- 35	+ 20	+ 20	110	
100 WV _{DC} at + 85 °C . . . 65 WV _{DC} at + 125 °C											
2.5	C	138D255X0100C2	26.5	950	1	2	- 16	+ 7	+ 8	100	
4.7	C	138D475X0100C2	10	500	1	2	- 16	+ 7	+ 8	130	
11	F	138D116X0100F2	6	200	1	4	- 16	+ 7	+ 8	230	
22	F	138D226X0100F2	7	100	1	9	- 16	+ 7	+ 8	230	
30	T	138D306X0100T2	4	80	2	12	- 16	+ 7	+ 8	340	
43	T	138D436X0100T2	6	70	2	17	- 20	+ 7	+ 8	340	
86	K	138D866X0100K2	3.1	30	9	36	- 25	+ 15	+ 15	400	
125 WV _{DC} at + 85 °C . . . 85 WV _{DC} at + 125 °C											
1.7	C	138D175X0125C2	54.6	1250	1	2	- 16	+ 7	+ 8	100	
3.6	C	138D365X0125C2	15	600	1	2	- 16	+ 7	+ 8	110	
9.0	F	138D905X0125F2	15	240	1	5	- 16	+ 7	+ 8	210	
14	F	138D146X0125F2	12	167	1	7	- 16	+ 7	+ 8	210	
18	T	138D186X0125T2	11	129	2	9	- 16	+ 7	+ 8	340	
25	T	138D256X0125T2	10	93	2	13	- 16	+ 7	+ 8	340	
56	K	138D566X0125K2	4.1	32	10	40	- 25	+ 15	+ 15	400	

Note

(1) Part Numbers listed are for units with outer plastic-film insulation and a capacitance tolerance of ± 20 %. For bare case units, substitute "0" for "2" at the end of the Part Number. For capacitors with ± 10 % tolerance, change the digit following the letter "X" to "9". For RoHS compliant add "E3".

EXTENDED RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER ⁽¹⁾	MAX. ESR	MAX. IMP.	MAX. DCL (μ A)		MAX. CAPACITANCE CHANGE			MAX. RMS RIPPLE CURRENT 120 Hz (mA)
			at + 25 °C 120 Hz (Ω)	at - 55 °C 120 Hz (Ω)	at		at			
					+ 25 °C	+ 85 °C	- 55 °C	+ 85 °C	+ 125 °C	
6 WV _{DC} at + 85 °C . . . 4 WV _{DC} at + 125 °C										
560	F	138D567X0006F2	2.5	20	3	14	- 80	+ 16	+ 20	300
820	F	138D827X0006F2	2.5	18	3	14	- 88	+ 16	+ 20	300
1500	T	138D158X0006T2	1.5	18	5	20	- 90	+ 20	+ 25	480
2200	K	138D228X0006K2	1	13	6	24	- 90	+ 25	+ 30	670
8 WV _{DC} at + 85 °C . . . 5 WV _{DC} at + 125 °C										
180	C	138D187X0008C2	3	45	2	9	- 60	+ 13	+ 16	180
470	F	138D477X0008F2	2.5	25	3	14	- 75	+ 16	+ 20	300
680	F	138D687X0008F2	2.5	22	3	14	- 83	+ 16	+ 20	300
1800	K	138D188X0008K2	1	14	7	25	- 90	+ 20	+ 30	670
10 WV _{DC} at + 85 °C . . . 7 WV _{DC} at + 125 °C										
100	C	138D107X0010C2	3	60	2	9	- 50	+ 13	+ 16	160
150	C	138D157X0010C2	3	54	2	9	- 55	+ 13	+ 16	180
390	F	138D397X0010F2	2.5	30	3	16	- 70	+ 16	+ 20	300
560	F	138D567X0010F2	2.5	27	3	16	- 77	+ 16	+ 20	300
1200	T	138D128X0010T2	1.5	18	5	20	- 88	+ 20	+ 25	480
1500	K	138D158X0010K2	1	15	7	25	- 88	+ 25	+ 30	670
15 WV _{DC} at + 85 °C . . . 10 WV _{DC} at + 125 °C										
68	C	138D686X0015C2	4	80	2	9	- 40	+ 13	+ 16	140
100	C	138D107X0015C2	4	72	2	9	- 44	+ 13	+ 16	160
270	F	138D277X0015F2	2.5	35	3	16	- 60	+ 16	+ 20	300
390	F	138D397X0015F2	2.5	31	3	16	- 16	+ 16	+ 20	300
540	T	138D547X0015T2	1.8	25	6	24	- 70	+ 20	+ 25	440
820	T	138D827X0015T2	1.8	22	6	24	- 77	+ 20	+ 25	440
1000	K	138D108X0015K2	1.2	17	8	32	- 77	+ 25	+ 30	610
20 WV _{DC} at + 85 °C . . . 13 WV _{DC} at + 125 °C										
56	C	138D566X0020C2	4.3	90	2	9	- 38	+ 13	+ 16	140
82	C	138D826X0020C2	4.3	81	2	9	- 43	+ 13	+ 16	160
220	F	138D227X0020F2	2.7	35	3	16	- 60	+ 16	+ 20	300
330	F	138D337X0020F2	2.7	31	3	16	- 66	+ 16	+ 20	300
25 WV _{DC} at + 85 °C . . . 15 WV _{DC} at + 125 °C										
47	C	138D476X0025C2	4.3	100	2	9	- 35	+ 12	+ 15	140
68	C	138D686X0025C2	4.3	90	2	9	- 40	+ 12	+ 15	160
180	F	138D187X0025F2	2.7	37	3	16	- 55	+ 13	+ 16	300
270	F	138D277X0025F2	2.7	33	3	16	- 62	+ 13	+ 16	300
350	T	138D357X0025T2	1.8	27	7	28	- 60	+ 20	+ 25	440
30 WV _{DC} at + 85 °C . . . 20 WV _{DC} at + 125 °C										
39	C	138D396X0030C2	5.2	110	2	9	- 32	+ 12	+ 15	140
56	C	138D566X0030C2	5.2	100	2	9	- 38	+ 12	+ 15	140
150	F	138D157X0030F2	2.5	40	3	16	- 50	+ 13	+ 16	300
220	F	138D227X0030F2	2.5	36	3	16	- 60	+ 13	+ 16	300
330	T	138D337X0030T2	1.8	28	8	32	- 50	+ 20	+ 25	440
470	T	138D477X0030T2	1.8	25	8	32	- 65	+ 20	+ 25	440
560	K	138D567X0030K2	1.3	20	9	36	- 65	+ 25	+ 30	590

Note

⁽¹⁾ Part Numbers listed are for units with outer plastic-film insulation and a capacitance tolerance of $\pm 20\%$. For bare case units, substitute "0" for "2" at the end of the Part Number. For capacitors with $\pm 10\%$ tolerance, change the digit following the letter "X" to "9". For RoHS compliant add "E3".



Wet Tantalum Capacitors Sintered Anode TANTALEX® Capacitors
Hermetically-Sealed with True Glass-to-Tantalum Seal

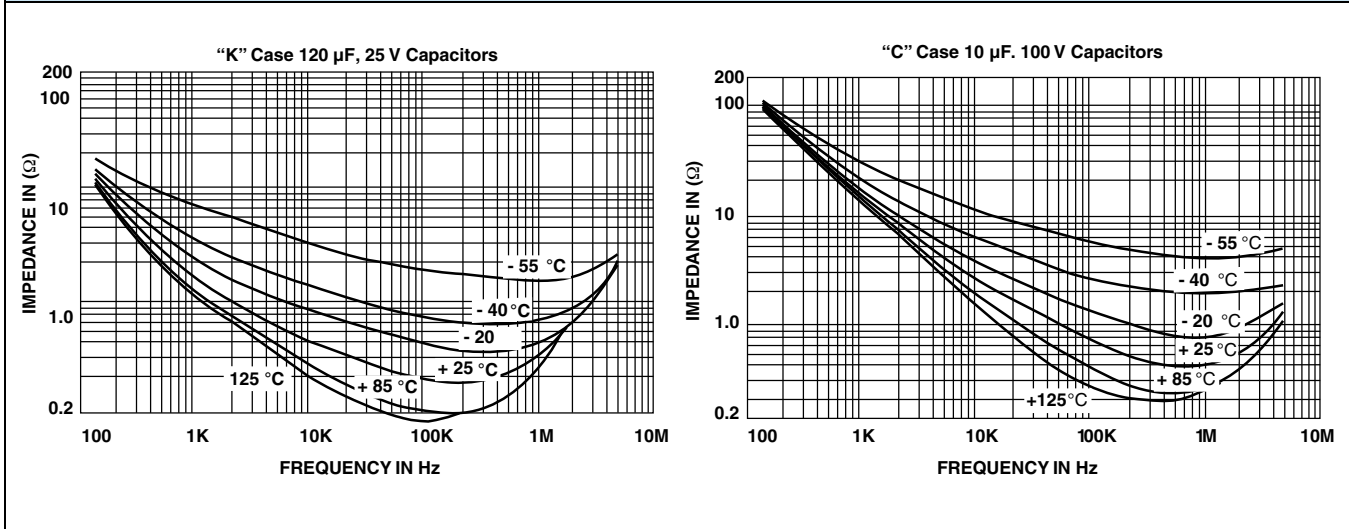
EXTENDED RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER (1)	MAX. ESR	MAX. IMP.	MAX. DCL (μ A)		MAX. CAPACITANCE CHANGE (%)			MAX. RMS RIPPLE CURRENT 120 Hz (mA)
			at + 25 °C 120 Hz (Ω)	at - 55 °C 120 Hz (Ω)	at		at			
					+ 25 °C	+ 85 °C	- 55 °C	+ 85 °C	+ 125 °C	
35 WV_{DC} at + 85 °C . . . 22 WV_{DC} at + 125 °C										
33	C	138D336X0035C2	5.2	130	2	9	- 30	+ 10	+ 12	140
47	C	138D476X0035C2	5.2	115	2	9	- 35	+ 10	+ 12	140
120	F	138D127X0035F2	2.5	45	3	16	- 45	+ 13	+ 16	300
220	T	138D227X0035T2	1.8	30	8	32	- 45	+ 20	+ 25	440
390	T	138D397X0035T2	1.8	27	8	32	- 58	+ 20	+ 25	440
470	K	138D477X0035K2	1.3	21	9	36	- 58	+ 25	+ 30	590
50 WV_{DC} at + 85 °C . . . 30 WV_{DC} at + 125 °C										
22	C	138D226X0050C2	5	150	2	9	- 24	+ 10	+ 12	140
33	C	138D336X0050C2	5	135	2	9	- 29	+ 10	+ 12	140
82	F	138D826X0050F2	2.5	55	4	24	- 35	+ 10	+ 15	300
120	F	138D127X0050F2	2.5	49	4	24	- 42	+ 12	+ 15	300
160	T	138D167X0050T2	1.8	32	6	32	- 35	+ 20	+ 25	420
270	T	138D277X0050T2	1.8	29	8	32	- 46	+ 20	+ 25	440
330	K	138D337X0050K2	1.5	22	9	36	- 46	+ 25	+ 30	550
60 WV_{DC} at + 85 °C . . . 40 WV_{DC} at + 125 °C										
18	C	138D186X0060C2	5	160	3	12	- 20	+ 10	+ 12	140
27	C	138D276X0060C2	5	144	3	12	- 24	+ 10	+ 12	140
68	F	138D686X0060F2	3	60	4	20	- 30	+ 12	+ 15	270
100	F	138D107X0060F2	2.5	54	4	20	- 36	+ 12	+ 15	300
140	T	138D147X0060T2	2	32	8	32	- 30	+ 16	+ 20	420
220	T	138D227X0060T2	1.8	29	8	32	- 40	+ 16	+ 20	440
270	K	138D277X0060K2	1.5	23	9	36	- 45	+ 20	+ 25	550
75 WV_{DC} at + 85 °C . . . 50 WV_{DC} at + 125 °C										
15	C	138D156X0075C2	5	175	3	12	- 16	+ 10	+ 12	140
22	C	138D226X0075C2	5	157	3	12	- 19	+ 10	+ 12	140
56	F	138D566X0075F2	3	70	4	24	- 25	+ 12	+ 15	270
82	F	138D826X0075F2	2.5	63	4	24	- 30	+ 12	+ 15	300
110	T	138D117X0075T2	2	33	9	36	- 25	+ 16	+ 20	420
180	T	138D187X0075T2	1.8	30	9	36	- 35	+ 16	+ 20	440
220	K	138D227X0075K2	2.2	24	10	40	- 40	+ 20	+ 25	450
100 WV_{DC} at + 85 °C . . . 65 v at + 125 °C										
8.2	C	138D825X0100C2	6	250	3	12	- 12	+ 10	+ 12	130
10	C	138D106X0100C2	6	200	3	12	- 17	+ 10	+ 12	130
33	F	138D336X0100F2	3.5	85	5	24	- 18	+ 12	+ 15	250
39	F	138D396X0100F2	3.5	80	5	24	- 20	+ 12	+ 15	250
68	T	138D686X0100T2	2.2	40	10	40	- 30	+ 14	+ 16	400
120	K	138D127X0100K2	2.8	30	12	48	- 35	+ 15	+ 17	440
125 WV_{DC} at + 85 °C . . . 85 WV_{DC} at + 125 °C										
6.8	C	138D685X0125C2	11.7	300	3	12	- 14	+ 10	+ 12	130
27	F	138D276X0125F2	3.5	90	5	24	- 18	+ 12	+ 15	250
39	T	138D396X0125T2	2.2	60	10	40	- 16	+ 14	+ 16	400
47	T	138D476X0125T2	2.2	50	10	40	- 26	+ 14	+ 16	400
82	K	138D826X0125K2	2.8	32	12	48	- 30	+ 15	+ 17	440

Note

(1) Part Numbers listed are for units with outer plastic-film insulation and a capacitance tolerance of \pm 20 %. For bare case units, substitute "0" for "2" at the end of the Part Number. For capacitors with \pm 10 % tolerance, change the digit following the letter "X" to "9". For RoHS compliant add "E3".



TYPICAL CURVES OF IMPEDANCE AS A FUNCTION OF FREQUENCY AT VARIOUS TEMPERATURES



PERFORMANCE CHARACTERISTICS

1. Operating Temperature: Capacitors are designed to operate over the temperature range of - 55 °C to + 125 °C.

UP TO + 85 °C WORKING VOLTAGE (V)	AT + 125 °C WORKING VOLTAGE (V)	UP TO + 85 °C WORKING VOLTAGE (V)	AT + 125 °C WORKING VOLTAGE (V)
6	4	35	22
8	5	50	30
10	7	60	40
15	10	75	50
20	13	100	70
25	15	125	85
30	20	150	100

2. **DC Working Voltage:** The DC working voltage is the maximum operating voltage for continuous duty at the rated temperature.
3. **Surge Voltage:** The surge DC rating is the maximum voltage to which the capacitors should be subjected under any conditions. This includes transients and peak ripple at the highest line voltage. The surge voltage of capacitors rated below 150 V is 115 % of the rated DC working voltage. The surge voltage of capacitors rated at 150 V DC is 165 volts.
- 3.1 **Surge Voltage Test:** Capacitors shall withstand the surge voltage test applied through a 1000 Ω ± 10 % resistor in series with the capacitor and voltage source at the rate of one-half minute on, four and one-half minutes off, for 1000 successive test cycles at + 85 °C or + 125 °C.
4. **Capacitance Tolerance:** The capacitance of all capacitors shall be within the specified tolerance limits of the nominal rating.

- 4.1 Capacitance measurements shall be made by the bridge method at or referred to, a frequency of 120 Hz at a temperature of + 25 °C. A polarizing voltage shall be used of such magnitude that there shall be no reversal of polarity due to the AC component. The maximum AC voltage will be 1 volt rms applied during measurement.

5. **Capacitance Change With Temperature:** The capacitance change with temperature shall not exceed the limits given in the Standard and Extended Ratings Table for each capacitor.

6. **Equivalent Series Resistance:** Measurements shall be made by the bridge method at or referred to, a frequency of 120 Hz at a temperature of + 25 °C. A polarizing voltage shall be used of such magnitude that there shall be no reversal of polarity due to the AC component. The maximum AC voltage will be 1 V_{rms} applied during measurement.

- 6.1 The equivalent series resistance shall not exceed the maximum value in ohms listed in the Standard and Extended Ratings Table for each capacitor.

- 6.2 The dissipation factor may be calculated from the equivalent series resistance and capacitance values as shown:

$$DF = \frac{2\pi fRC}{10^4}$$

where:

DF = Dissipation Factor in %

R = ESR in ohms

C = Capacitance in µF

f = frequency in Hz

At 120 Hz, the above equation becomes:

$$DF = \frac{R \times C}{13.26}$$

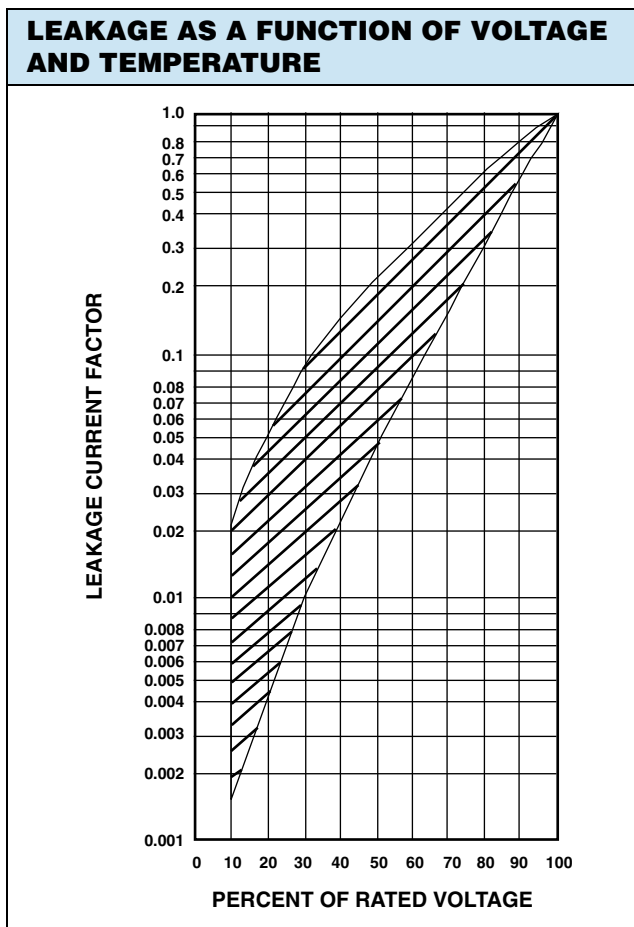
PERFORMANCE CHARACTERISTICS (Continued)

For example, percent dissipation factor of a 30 μF, 6 V capacitor, which has a maximum ESR of 3.4 Ω at + 25 °C and 120 Hz, would be calculated as shown:

$$DF = \frac{2\pi \times 120 \times 3.4 \times 30}{10^4} = \frac{3.4 \times 30}{13.26} = 7.7 \%$$

7. **Leakage Current:** Measurements shall be made at the applicable rated working voltage at + 25 °C ± 5 °C through application of a steady source of power, such as a regulated power supply. The total resistance in series with each capacitor shall be between 1000 Ω and 10 000 Ω. The voltage shall be applied to the capacitor for 5 minutes before making the leakage current measurement.
- 7.1 The maximum leakage current for any capacitor shall not exceed the value in microamperes listed in the Standard and Extended Ratings Table for each capacitor.

Note: leakage current varies with applied voltage. See graph below for the appropriate adjustment factor.



8. **Low Temperature Impedance:** The impedance of any capacitor at - 55 °C at 120 Hz, shall not exceed the values given in the Standard and Extended Ratings tables.

9. **Life Test:** Capacitors are capable of withstanding a 2000 h life test at a temperature of + 85 °C or + 125 °C at the applicable rated DC working voltage.
10. **High Frequency Vibration:** Capacitors shall withstand vibration from 10 Hz to 2000 Hz at 20 g when tested.
11. **Lead Pull Test:** Capacitors shall withstand a lead tensile stress of 3 pounds (13.2 N) for 30 s, applied axially.
12. **Marking:** Capacitors shall be marked with Sprague® and/or the Sprague trademark 2, the Sprague type (138D); rated capacitance and tolerance (the tolerance shall be coded, using the list shown in How to Order); rated DC working voltage at + 85 °C; the standard EIA date code of manufacture.

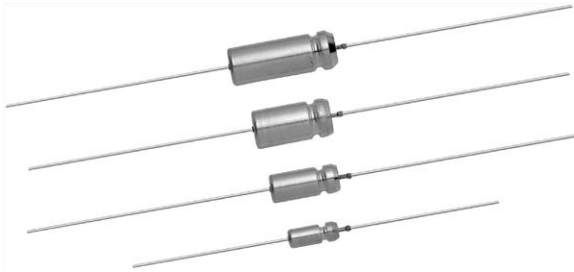
GUIDE TO APPLICATION

1. **Ripple Current:** All capacitors will withstand rms ripple currents as listed for each capacitor.
 - 1.1 The rms ripple current rating is independent of temperature or frequency within the following limitations:
 - 1.1.1 At frequencies of less than 120 Hz, the rated rms ripple current must be multiplied by the factors shown:

FREQUENCY IN HERTZ			
25	50	60	100
0.36	0.59	0.65	0.88

- 1.1.2 The sum of the peak AC voltage plus the DC voltage shall not exceed the DC working voltage of the capacitor.
- 1.1.3 The sum of the negative peak AC voltage, plus the applied DC voltage shall not allow a voltage reversal.
2. **Cleaning wiring boards with Type 138D capacitors:** Customary cleaning solvents used in the electronics industry at present will not affect Type 138D capacitors. However, the use of ultrasonic cleaning techniques is not recommended under any circumstances.
3. **Apparent Capacitance:** Note that in timing circuit applications, the circuit designer must take into account two important variables which affect any electrolytic capacitor. These are the internal leakage resistance of the capacitor and its dielectric absorption, which will depend on the elapsed time since the capacitor was last energized. In applications where electrolytic capacitors are subjected to DC energy, or in effect, extremely low frequencies, the value of the apparent capacitance will be somewhat higher than that which is measured at 120 Hz.
4. **No Reverse Voltage:** The application of reverse voltage to these capacitors will cause internal damage. The resulting damage will lead to immediate or delayed failure of the unit. This will take the form of a catastrophic short circuit with possible expulsion of the electrolyte.

Wet Tantalum Capacitors with Glass-to-Tantalum Hermetic Seal, Sintered Anode TANTALEX[®] Capacitors



FEATURES

- Terminations: standard tin/lead (SnPb), 100 % tin (RoHS compliant) available
- Improved reliability through the use of a glass-to-tantalum true hermetic anode seal is the prime feature of the type 138D sintered anode
- Hermetic glass-to-tantalum seal
- High CV per unit volume
- Extremely low leakage current
- Wide temperature range: - 55 °C to + 175 °C
- Improved reliability through the use of a glass-to- tantalum true hermetic anode seal is the prime feature of the 738D and CT9 sintered anode TANTALEX[®] capacitor. This construction eliminates all internal lead welds while retaining the strength of internal lead-welded parts.
- The construction offers outstanding resistance to thermal shock
- Compliant to RoHS Directive 2002/95/EC



Note

* Pb containing terminations are not RoHS compliant, exemptions may apply

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 85 °C and with voltage derating to two-thirds the + 85 °C rating at + 125 °C. Capable of + 175 °C operation at reduced voltage. Use of Type 135D capacitors for high temperature applications is recommended.

Capacitance Tolerance: At 120 Hz, + 25 °C. ± 20 % standard. ± 10 %, ± 5 % available as special.

DC Leakage Current (DCL Max.): At + 25 °C, + 85 °C and + 125 °C: Leakage current shall not exceed the values listed in the Standard Ratings tables.

Life Test: Capacitors are capable of withstanding a 2000 h life test at a temperature of + 85 °C or + 125 °C at the applicable rated DC working voltage.

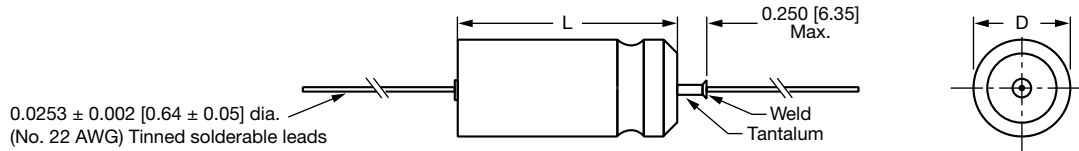
APPROVALS

CECC 30202-004 CT9 style

ORDERING INFORMATION						
CT9 738D	226	X0	100	B	2	E3
MODEL	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	CASE CODE	STYLE NUMBER	RoHS COMPLIANT
	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow	X0 = ± 20 % X9 = ± 10 % X5 = ± 5 % Special Order	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	See Ratings and Case Codes table	0 = Bare case 2 = Outer polyester film insulation 6 = High temperature film insulation (above + 125 °C)	E3 = 100 % tin termination (RoHS compliant design) Blank = SnPb termination (standard design)

Note

- Packaging: The use of formed plastic trays for packaging these axial lead components is standard. Tape and reel is not recommended due to the unit weight

DIMENSIONS in inches [millimeters]


CASE CODE	BARE TUBE		WITH OUTER PLASTIC - FILM INSULATION		LEAD LENGTH	MAX. WEIGHT (oz./g)
	D	L	D (Max.)	L (Max.)		
A	0.188 ± 0.016 [4.78 ± 0.41]	0.453 + 0.031/- 0.016 [11.51 + 0.79/- 0.41]	0.219 [5.56]	0.608 [15.45]	1.500 ± 0.250 [38.10 ± 6.35]	0.07 [2.0]
B	0.281 ± 0.016 [7.14 ± 0.41]	0.641 + 0.031/- 0.016 [16.28 + 0.79/- 0.41]	0.312 [7.92]	0.796 [20.22]	2.250 ± 0.250 [57.15 ± 6.35]	0.18 [5.1]
C	0.375 ± 0.016 [9.53 ± 0.41]	0.766 + 0.031/- 0.016 [19.46 + 0.79/- 0.41]	0.406 [10.31]	0.921 [23.40]	2.250 ± 0.250 [57.15 ± 6.35]	0.36 [10.2]
D	0.375 ± 0.016 [9.53 ± 0.41]	1.062 + 0.031/- 0.023 [26.97 + 0.79/- 0.58]	0.406 [10.31]	1.127 [30.91]	2.250 ± 0.250 [57.15 ± 6.35]	0.49 [13.9]

738D STANDARD RATINGS

CAPACITANCE (μF)	CASE CODE	PART NUMBER	MAX. DF AT	MAX. IMP. AT -55 °C	MAX. IMP. AT +20 °C	MAX. DCL (μA) AT		MAX. CAPACITANCE CHANGE (%) AT		
			+20 °C (%)	100 Hz (Ω)	100 kHz (Ω)	+20 °C	+85 °C +125 °C	-55 °C	+85 °C	+125 °C
6.3 V_{DC} AT + 85 °C; 4 V_{DC} AT + 125 °C; 3 V_{DC} AT + 175 °C										
68	A	738D686X06R3A2	17.1	10	1.0	1	2	-40	+10.5	+17.5
270	B	738D277X06R3B2	67.8	10	1.0	1	7	-44	+17.5	+20
560	C	738D567X06R3C2	151.9	10	1.0	2	13	-64	+17.5	+20
1000	D	738D108X06R3D2	100.5	10	1.0	3	14	-80	+25	+25
1200	D	738D128X06R3D2	120.6	10	1.0	3	14	-80	+25	+25
8 V_{DC} AT + 85 °C; 5 V_{DC} AT + 125 °C; 4 V_{DC} AT + 175 °C										
56	A	738D566X0008A2	14.1	10	1.0	1	2	-40	+10.5	+16
220	B	738D227X0008B2	55.2	10	1.0	1	7	-44	+17.5	+20
470	C	738D477X0008C2	82.6	10	1.0	2	14	-64	+17.5	+20
820	D	738D827X0008D2	51.5	10	1.0	4	16	-80	+25	+25
10 V_{DC} AT + 85 °C; 6.3 V_{DC} AT + 125 °C; 5 V_{DC} AT + 175 °C										
39	A	738D396X0010A2	15.1	10	1.0	1	2	-36	+12	+16
47	A	738D476X0010A2	15.1	10	1.0	1	2	-36	+14	+16
150	B	738D157X0010B2	28.2	10	1.0	1	6	-36	+14	+16
180	B	738D187X0010B2	45.2	10	1.0	1	7	-36	+14	+16
330	C	738D337X0010C2	51.9	10	1.0	2	16	-60	+17.5	+20
390	C	738D397X0010C2	73.5	10	1.0	2	16	-64	+17.5	+20
680	D	738D687X0010D2	42.7	10	1.0	4	16	-80	+25	+25
16 V_{DC} AT + 85 °C; 10 V_{DC} AT + 125 °C; 8 V_{DC} AT + 175 °C										
27	A	738D276X0016A2	10.3	10	1.0	1	2	-28	+10.5	+16
33	A	738D336X0016A2	10.3	10	1.0	1	2	-28	+14	+16
120	B	738D127X0016B2	30.2	10	1.0	1	7	-28	+17.5	+20
220	C	738D227X0016C2	34.5	10	1.0	2	16	-50	+17.5	+18
270	C	738D277X0016C2	50.8	10	1.0	2	16	-56	+17.5	+20
470	D	738D477X0016D2	35.4	10	1.0	6	24	-80	+25	+25
560	D	738D567X0016D2	42.2	10	1.0	6	24	-80	+25	+25
25 V_{DC} AT + 85 °C; 16 V_{DC} AT + 125 °C; 13 V_{DC} AT + 175 °C										
18	A	738D186X0025A2	6.9	10	1.0	1	2	-20	+10.5	+12
22	A	738D226X0025A2	6.9	10	1.0	1	2	-20	+10.5	+12
82	B	738D826X0025B2	20.6	10	1.0	1	10	-28	+13	+15
100	B	738D107X0025B2	25.1	10	1.0	1	10	-28	+13	+15
180	C	738D187X0025C2	42.2	10	1.0	2	18	-48	+13	+15
330	D	738D337X0025D2	27.2	10	1.0	7	28	-70	+25	+25
390	D	738D397X0025D2	31.8	10	1.0	7	28	-70	+25	+25



738D STANDARD RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. DF AT	MAX. IMP. AT - 55 °C	MAX. IMP. AT + 20 °C	MAX. DCL (μ A) AT		MAX. CAPACITANCE CHANGE (%) AT		
			+ 20 °C (%)	100 Hz (Ω)	100 kHz (Ω)	+ 20 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C
30 V_{DC} AT + 85 °C; 19 V_{DC} AT + 125 °C; 15 V_{DC} AT + 175 °C										
15	A	738D156X0030A2	7.5	10	1.0	1	2	- 20	+ 10.5	+ 12
68	B	738D686X0030B2	25.6	10	1.0	1	8	- 24	+ 13	+ 15
120	C	738D127X0030C2	24.4	10	1.0	2	17	- 44	+ 13	+ 15
150	C	738D157X0030C2	37.7	10	1.0	2	18	- 48	+ 13	+ 15
270	D	738D277X0030D2	27.2	10	1.0	8	32	- 60	+ 25	+ 25
40 V_{DC} AT + 85 °C; 25 V_{DC} AT + 125 °C; 20 V_{DC} AT + 175 °C										
12	A	738D126X0040A2	6.7	10	1.0	1	2	- 24	+ 8	+ 10
56	B	738D566X0040B2	21.1	10	1.0	1	9	- 28	+ 13	+ 15
100	C	738D107X0040C2	15.7	10	1.0	2	17	- 40	+ 13	+ 15
220	D	738D227X0040D2	25.0	10	1.0	8	32	- 55	+ 25	+ 25
50 V_{DC} AT + 85 °C; 32 V_{DC} AT + 125 °C; 25 V_{DC} AT + 175 °C										
10	A	738D106X0050A2	5.7	10	1.0	1	2	- 24	+ 8	+ 9
47	B	738D476X0050B2	17.7	10	1.0	1	9	- 28	+ 12	+ 15
82	C	738D826X0050C2	20.6	10	1.0	2	16	- 32	+ 12	+ 15
180	D	738D187X0050D2	23.7	10	1.0	8	32	- 50	+ 25	+ 25
63 V_{DC} AT + 85 °C; 40 V_{DC} AT + 125 °C; 32 V_{DC} AT + 175 °C										
8.2	A	738D825X0063A2	4.1	10	1.0	1	2	- 24	+ 8	+ 9
39	B	738D396X0063B2	17.2	10	1.0	1	9	- 28	+ 10.5	+ 12
68	C	738D686X0063C2	25.6	10	1.0	2	16	- 32	+ 10.5	+ 12
150	D	738D157X0063D2	23.6	10	1.0	8	32	- 40	+ 20	+ 20
75 V_{DC} AT + 85 °C; 50 V_{DC} AT + 125 °C; 38 V_{DC} AT + 175 °C										
5.6	A	738D565X0075A2	3.4	10	1.0	1	2	- 20	+ 8	+ 9
6.8	A	738D685X0075A2	3.4	10	1.0	1	2	- 20	+ 8	+ 9
27	B	738D276X0075B2	11.8	10	1.0	1	9	- 22	+ 11	+ 13
33	B	738D336X0075B2	14.5	10	1.0	1	10	- 24	+ 15	+ 15
56	C	738D566X0075C2	21.8	10	1.0	2	17	- 28	+ 15	+ 15
100	D	738D107X0075D2	19.5	10	1.0	9	36	- 35	+ 20	+ 20
120	D	738D127X0075D2	23.3	10	1.0	9	36	- 35	+ 20	+ 20
100 V_{DC} AT + 85 °C; 63 V_{DC} AT + 125 °C; 50 V_{DC} AT + 175 °C										
4.7	A	738D475X0100A2	2.9	30	3.0	1	2	- 16	+ 7	+ 8
18	B	738D186X0100B2	7.8	15	1.5	1	8	- 16	+ 7	+ 8
22	B	738D226X0100B2	9.7	15	1.5	1	9	- 16	+ 7	+ 8
33	C	738D336X0100C2	9.3	15	1.0	2	15	- 16	+ 7	+ 8
39	C	738D396X0100C2	14.7	15	1.0	2	17	- 20	+ 7	+ 8
47	C	738D476X0100C2	17.7	15	1.0	2	17	- 20	+ 7	+ 8
68	D	738D686X0100D2	13.7	15	1.5	9	36	- 25	+ 15	+ 15
82	D	738D826X0100D2	16.4	15	1.5	9	36	- 25	+ 15	+ 15
125 V_{DC} AT + 85 °C; 80 V_{DC} AT + 125 °C; 63 V_{DC} AT + 175 °C										
3.3	A	738D335X0125A2	3.4	30	3.0	1	2	- 10	+ 7	+ 8
3.9	A	738D395X0125A2	3.4	30	3.0	1	2	- 16	+ 7	+ 8
10	B	738D106X0125B2	9.4	15	1.5	1	5	- 16	+ 7	+ 8
12	B	738D126X0125B2	8.3	15	1.5	1	6	- 16	+ 7	+ 8
15	B	738D156X0125B2	11.2	15	1.5	1	7	- 16	+ 7	+ 8
18	C	738D186X0125C2	10	15	1.0	2	9	- 16	+ 7	+ 8
22	C	738D226X0125C2	12.1	15	1.0	2	11	- 16	+ 7	+ 8
27	C	738D276X0125C2	16.7	15	1.0	2	13	- 16	+ 7	+ 8
39	D	738D396X0125D2	7.5	15	1.5	10	40	- 25	+ 15	+ 15
47	D	738D476X0125D2	9.2	15	1.5	10	40	- 25	+ 15	+ 15
56	D	738D566X0125D2	14.2	15	1.5	10	40	- 25	+ 15	+ 15



CT9 STANDARD RATINGS									
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. DF AT + 20 °C (%)	MAX. IMP. AT - 55 °C 100 Hz (Ω)	MAX. DCL (μ A) AT		MAX. CAPACITANCE CHANGE (%) AT		
					+ 20 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C
6.3 V_{DC} AT + 85 °C; 4 V_{DC} AT + 125 °C; 3 V_{DC} AT + 175 °C									
68	A	CT9686X06R3A2	15	72	1	2	- 40	+ 14	+ 16
270	B	CT9277X06R3B2	41	30	1	7	- 44	+ 17.5	+ 20
560	C	CT9567X06R3C2	55	30	2	16	- 64	+ 17.5	+ 20
1200	D	CT9128X06R3D2	94	24	4	16	- 80	+ 25	+ 25
10 V_{DC} AT + 85 °C; 6.3 V_{DC} AT + 125 °C; 5 V_{DC} AT + 175 °C									
47	A	CT9476X0010A2	14	120	1	2	- 36	+ 14	+ 16
180	B	CT9187X0010B2	29	48	1	7	- 36	+ 14	+ 16
390	C	CT9397X0010C2	44	30	2	16	- 64	+ 17.5	+ 20
820	D	CT9827X0010D2	65	28	4	16	- 80	+ 25	+ 25
16 V_{DC} AT + 85 °C; 10 V_{DC} AT + 125 °C; 8 V_{DC} AT + 175 °C									
33	A	CT9336X0016A2	10	108	1	2	- 28	+ 14	+ 16
120	B	CT9127X0016B2	24	60	1	7	- 28	+ 17.5	+ 20
270	C	CT9277X0016C2	45	36	2	16	- 56	+ 17.5	+ 20
560	D	CT9567X0016D2	44	28	6	24	- 80	+ 25	+ 25
25 V_{DC} AT + 85 °C; 16 V_{DC} AT + 125 °C; 13 V_{DC} AT + 175 °C									
22	A	CT9226X0025A2	7	168	1	2	- 20	+ 10.5	+ 12
100	B	CT9107X0025B2	21	60	1	10	- 28	+ 13	+ 15
180	C	CT9187X0025C2	29	39	2	18	- 48	+ 13	+ 15
390	D	CT9397X0025D2	40	29	7	28	- 70	+ 25	+ 25
40 V_{DC} AT + 85 °C; 25 V_{DC} AT + 125 °C; 20 V_{DC} AT + 175 °C									
12	A	CT9126X0040A2	6	234	1	2	- 24	+ 8	+ 10
56	B	CT9566X0040B2	14	78	1	9	- 28	+ 13	+ 15
100	C	CT9107X0040C2	18	48	2	17	- 40	+ 13	+ 15
220	D	CT9227X0040D2	27	31	8	32	- 55	+ 25	+ 25
63 V_{DC} AT + 85 °C; 40 V_{DC} AT + 125 °C; 32 V_{DC} AT + 175 °C									
8.2	A	CT9825X0063A2	4.5	330	1	2	- 24	+ 8	+ 9
39	B	CT9396X0063B2	12	108	1	9	- 28	+ 10.5	+ 12
68	C	CT9686X0063C2	13	60	2	16	- 32	+ 10.5	+ 12
150	D	CT9157X0063D2	18	34	8	32	- 40	+ 20	+ 20
80 V_{DC} AT + 85 °C; 50 V_{DC} AT + 125 °C; 40 V_{DC} AT + 175 °C									
6.8	A	CT9685X0080A2	5	360	1	2	- 20	+ 8	+ 9
33	B	CT9336X0080B2	10	108	1	10	- 24	+ 10.5	+ 15
56	C	CT9566X0080C2	11	72	2	17	- 28	+ 10.5	+ 15
100	D	CT9107X0080D2	12	36	9	36	- 35	+ 20	+ 20
100 V_{DC} AT + 85 °C; 63 V_{DC} AT + 125 °C; 50 V_{DC} AT + 175 °C									
4.7	A	CT9475X0100A2	3	600	1	2	- 16	+ 7	+ 8
22	B	CT9226X0100B2	8	132	1	9	- 16	+ 7	+ 8
47	C	CT9476X0100C2	8	84	2	17	- 20	+ 7	+ 8
82	D	CT9826X0100D2	10	40	9	36	- 25	+ 15	+ 15
125 V_{DC} AT + 85 °C; 80 V_{DC} AT + 125 °C; 63 V_{DC} AT + 175 °C									
3.9	A	CT9395X0125A2	3.5	720	1	2	- 16	+ 7	+ 8
15	B	CT9156X0125B2	6	200	1	7	- 16	+ 7	+ 8
27	C	CT9276X0125C2	6	106	2	13	- 16	+ 7	+ 8
56	D	CT9566X0125D2	7	58	10	40	- 25	+ 15	+ 15



CT9 EXTENDED RATINGS									
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. DF AT + 20 °C (%)	MAX. IMP. AT - 55 °C 100 kHz (Ω)	MAX. DCL (μ A) AT		MAX. CAPACITANCE CHANGE (%) AT		
					+ 20 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C
6.3 V_{DC} AT + 85 °C; 4 V_{DC} AT + 125 °C; 3 V_{DC} AT + 175 °C									
180	A	CT9187X06R3A2	30	55	1.0	10	- 60	+ 13	+ 16
820	B	CT9827X06R3B2	115	22	2.0	17	- 88	+ 16	+ 20
1500	C	CT9158X06R3C2	115	22	6.0	25	- 90	+ 20	+ 25
2200	D	CT9228X06R3D2	125	16	6.0	25	- 90	+ 25	+ 70
10 V_{DC} AT + 85 °C; 6.3 V_{DC} AT + 125 °C; 5 V_{DC} AT + 175 °C									
150	A	CT9157X0010A2	25	65	1.0	10	- 55	+ 13	+ 16
560	B	CT9567X0010B2	80	34	2.0	17	- 77	+ 16	+ 20
1200	C	CT9128X0010C2	95	22	3.0	25	- 88	+ 20	+ 25
1500	D	CT9158X0010D2	85	18	6.0	25	- 88	+ 25	+ 30
16 V_{DC} AT + 85 °C; 10 V_{DC} AT + 125 °C; 8 V_{DC} AT + 175 °C									
100	A	CT9107X0016A2	25	88	1.0	10	- 44	+ 13	+ 16
390	B	CT9397X0016B2	55	38	2.0	17	- 66	+ 16	+ 20
820	C	CT9827X0016C2	85	27	4.0	25	- 77	+ 20	+ 25
1000	D	CT9108X0016D2	60	21	6.0	35	- 80	+ 30	+ 30
25 V_{DC} AT + 85 °C; 16 V_{DC} AT + 125 °C; 13 V_{DC} AT + 175 °C									
68	A	CT9686X0025A2	17	110	1.0	10	- 40	+ 12	+ 15
270	B	CT9277X0025B2	38	40	2.0	17	- 62	+ 13	+ 16
560	C	CT9567X0025C2	58	25	5.0	35	- 72	+ 20	+ 25
680	D	CT9687X0025D2	38	24	6.0	35	- 80	+ 25	+ 30
40 V_{DC} AT + 85 °C; 25 V_{DC} AT + 125 °C; 20 V_{DC} AT + 175 °C									
39	A	CT9396X0040A2	12	140	2.0	10	- 35	+ 10	+ 12
150	B	CT9157X0040B2	22	50	4.0	35	- 52	+ 13	+ 16
330	C	CT9337X0040C2	22	30	6.0	40	- 60	+ 20	+ 25
470	D	CT9477X0040D2	35	28	6.0	40	- 70	+ 25	+ 30
63 V_{DC} AT + 85 °C; 40 V_{DC} AT + 125 °C; 32 V_{DC} AT + 175 °C									
27	A	CT9276X0063A2	8.0	180	2.0	15	- 24	+ 10	+ 12
100	B	CT9107X0063B2	15	70	4.0	25	- 36	+ 12	+ 15
220	C	CT9227X0063C2	23	36	5.0	35	- 40	+ 16	+ 20
270	D	CT9277X0063D2	26	35	6.0	40	- 65	+ 25	+ 30
80 V_{DC} AT + 85 °C; 50 V_{DC} AT + 125 °C; 40 V_{DC} AT + 175 °C									
22	A	CT9226X0080A2	6.0	190	2.0	15	- 19	+ 10	+ 12
82	B	CT9826X0080B2	12	80	4.0	25	- 30	+ 12	+ 15
180	C	CT9187X0080C2	19	36	5.0	40	- 35	+ 16	+ 20
220	D	CT9227X0080D2	21	30	6.0	40	- 60	+ 20	+ 25
100 V_{DC} AT + 85 °C; 63 V_{DC} AT + 125 °C; 50 V_{DC} AT + 175 °C									
10	A	CT9106X0100A2	4.0	250	2.0	15	- 17	+ 10	+ 12
39	B	CT9396X0100B2	7.0	96	4.0	30	- 20	+ 12	+ 15
68	C	CT9686X0100C2	8.0	50	5.0	50	- 30	+ 14	+ 16
120	D	CT9127X0100D2	15	36	6.0	50	- 40	+ 15	+ 20
125 V_{DC} AT + 85 °C; 80 V_{DC} AT + 125 °C; 63 V_{DC} AT + 175 °C									
6.8	A	CT9685X0125A2	4.0	360	2.0	15	- 14	+ 10	+ 12
27	B	CT9276X0125B2	5.0	110	4.0	30	- 18	+ 12	+ 15
47	C	CT9476X0125C2	6.0	65	5.0	50	- 26	+ 16	+ 16
82	D	CT9826X0125D2	8.0	40	6.0	50	- 30	+ 16	+ 17

Wet Tantalum Capacitors with Epoxy End-Fill, Sintered Anode, TANTALEX[®] Capacitors, CECC 30202-013 Approved



FEATURES

- Terminations: standard tin/lead (SnPb), 100 % tin (RoHS compliant) available
- For 125 °C operation
- Very high CV per unit volume
- Long shelf life in excess of ten years
- Extremely low leakage current
- Epoxy end-filled for better shock and vibration performance
- Compliant to RoHS Directive 2002/95/EC


RoHS*
COMPLIANT

Note

* Pb containing terminations are not RoHS compliant, exemptions may apply

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 125 °C

Capacitance Tolerance: ± 20 % is standard; ± 10 % and ± 5 % available as specials

Capacitance Range: 3.6 µF to 2200 µF

Life Test: Capacitors are capable of withstanding a 2000 h life test at a temperature of + 85 °C or + 125 °C at the applicable rated DC working voltage.

APPROVALS

CECC 30202-013 (6-125 V)

APPLICATIONS

Designed for industrial and telecommunications applications, offers higher microfarad value per unit volume than any other type. The epoxy resin end-fill construction also offers improved mechanical strength, outstanding resistance to temperature cycling, and trouble-free application when flow-soldering capacitors to printed circuit board.

769D	306	X0	006	A	2	E3
MODEL	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	CASE CODE	STYLE NUMBER	RoHS COMPLIANT
	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow	X0 = ± 20 % X9 = ± 10 % X5 = ± 5 % special order	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating	See Ratings and Case Codes table	0 = Bare case 2 = Outer plastic-film insulation	E3 = tin termination (RoHS compliant design) Blank = SnPb termination (standard design)

Note

- Packaging: The use of formed plastic trays for packaging these axial lead components is standard. Tape and reel is not recommended due to the unit weight

DIMENSIONS in inches [millimeters]				
CASE CODE	WITH OUTER PLASTIC-FILM INSULATION			
	L ₁ + 0.031/- 0.078 [+ 0.8/- 2.0]	D ± 0.015 [± 0.4]	L ₂	Ø d + 10 % ± 0.002 [- 0.05]
A	0.535 [13.6]	0.192 [4.9]	0.984 [25]	0.023 [0.6]
B	0.724 [18.4]	0.283 [7.2]	0.984 [25]	0.023 [0.6]
C	0.846 [21.5]	0.377 [9.6]	0.984 [25]	0.023 [0.6]
D	1.129 [28.7]	0.377 [9.6]	0.984 [25]	0.023 [0.6]



STANDARD RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. DF AT + 25 °C (%)	MAX. IMP. AT - 55 °C (Ω)	MAX. DCL (μ A) AT		MAX. CAPACITANCE CHANGE (%) AT			MAX. RMS RIPPLE 120 Hz (mA)
					+ 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
6 V_{DC} AT + 85 °C; 4 V_{DC} AT + 125 °C										
30	A	769D306X0006A2	8	100	1	2	- 40	+ 12	+ 12	70
68	A	769D686X0006A2	18	59	1	2	- 40	+ 16	+ 16	80
140	B	769D147X0006B2	18	40	1	3	- 40	+ 16	+ 16	300
220	A	769D227X0006A2	40	22	2	9	- 65	+ 16	+ 16	90
270	B	769D277X0006B2	70	22	1	7	- 44	+ 20	+ 20	270
330	C	769D337X0006C2	43	25	2	8	- 44	+ 16	+ 16	500
560	C	769D567X0006C2	110	20	2	13	- 64	+ 20	+ 20	500
820	B	769D827X0006B2	68	20	3	14	- 80	+ 20	+ 20	280
1200	D	769D128X0006D2	60	20	3	12	- 80	+ 25	+ 25	800
1500	C	769D158X0006C2	82	10	5	20	- 85	+ 25	+ 25	540
2200	D	769D228X0006D2	80	15	9	30	- 80	+ 25	+ 25	800
8 V_{DC} AT + 85 °C; 5 V_{DC} AT + 125 °C										
25	A	769D256X0008A2	7	100	1	2	- 40	+ 12	+ 12	70
56	A	769D566X0008A2	15	60	1	2	- 40	+ 12	+ 12	80
180	A	769D187X0008A2	36	28	2	9	- 60	+ 16	+ 16	90
220	B	769D227X0008B2	57	30	1	7	- 44	+ 20	+ 20	250
430	B	769D437X0008B2	42	25	3	14	- 80	+ 20	+ 20	270
430	C	769D437X0008C2	84	25	2	14	- 64	+ 20	+ 20	500
620	B	769D627X0008B2	53	20	3	14	- 80	+ 20	+ 20	280
680	B	769D687X0008B2	55	20	3	14	- 80	+ 20	+ 20	280
850	C	769D857X0008C2	65	20	4	16	- 80	+ 25	+ 25	500
850	D	769D857X0008D2	50	22	4	16	- 80	+ 25	+ 25	850
1200	C	769D128X0008C2	82	15	5	20	- 80	+ 25	+ 25	520
1600	D	769D168X0008D2	68	18	7	25	- 80	+ 25	+ 25	800
1800	D	769D188X0008D2	70	18	8	28	- 80	+ 25	+ 25	800
10 V_{DC} AT + 85 °C; 7 V_{DC} AT + 125 °C										
20	A	769D206X0010A2	5	120	1	2	- 32	+ 12	+ 12	70
47	A	769D476X0010A2	15	90	1	2	- 36	+ 16	+ 16	80
100	A	769D107X0010A2	13	60	1	4	- 36	+ 16	+ 16	80
120	A	769D127X0010A2	32	50	2	9	- 50	+ 16	+ 16	80
140	A	769D147X0010A2	32	46	2	9	- 50	+ 16	+ 16	90
150	A	769D157X0010A2	32	40	2	9	- 50	+ 16	+ 16	90
180	B	769D187X0010B2	46	40	1	7	- 36	+ 16	+ 16	250
250	C	769D257X0010C2	32	35	2	10	- 40	+ 16	+ 16	500
390	C	769D397X0010C2	75	25	2	16	- 64	+ 20	+ 20	500
470	B	769D477X0010B2	35	21	3	16	- 70	+ 20	+ 20	280
510	B	769D517X0010B2	45	21	3	16	- 70	+ 20	+ 20	280
560	B	769D567X0010B2	50	21	3	16	- 70	+ 20	+ 20	280
750	D	769D757X0010D2	44	22	4	16	- 80	+ 25	+ 25	850
1000	C	769D108X0010C2	67	12	5	20	- 75	+ 25	+ 25	540
1300	D	769D138X0010D2	63	18	7	25	- 75	+ 25	+ 25	800
1500	D	769D158X0010D2	66	17	8	28	- 75	+ 25	+ 25	800



STANDARD RATINGS											
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. DF AT + 25 °C (%)	MAX. IMP. AT - 55 °C (Ω)	MAX. DCL (μ A) AT		MAX. CAPACITANCE CHANGE (%) AT			MAX. RMS RIPPLE 120 Hz (mA)	
					+ 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C		
15 V_{DC} AT + 85 °C; 10 V_{DC} AT + 125 °C											
15	A	769D156X0015A2	5	145	1	2	- 24	+ 12	+ 12	70	
33	A	769D336X0015A2	10	100	1	2	- 28	+ 16	+ 16	80	
70	B	769D706X0015B2	11	63	1	4	- 28	+ 16	+ 16	250	
100	A	769D107X0015A2	28	40	2	9	- 40	+ 16	+ 16	80	
120	B	769D127X0015B2	27	50	1	7	- 28	+ 20	+ 20	250	
170	C	769D177X0015C2	22	38	2	10	- 32	+ 16	+ 16	500	
270	C	769D277X0015C2	50	30	2	16	- 56	+ 20	+ 20	500	
360	B	769D367X0015B2	38	22	3	16	- 60	+ 20	+ 20	280	
390	B	769D397X0015B2	38	21	3	16	- 60	+ 20	+ 20	280	
540	C	769D547X0015C2	45	25	5	20	- 70	+ 25	+ 25	500	
540	D	769D547X0015D2	15	23	3	24	- 80	+ 25	+ 25	850	
680	C	769D687X0015C2	50	13	5	20	- 70	+ 25	+ 25	510	
750	C	769D757X0015C2	52	13	6	24	- 70	+ 25	+ 25	510	
820	C	769D827X0015C2	60	13	6	24	- 70	+ 25	+ 25	510	
1100	D	769D118X0015D2	53	18	8	25	- 70	+ 25	+ 25	750	
1200	D	769D128X0015D2	55	17	8	28	- 70	+ 25	+ 25	750	
20 V_{DC} AT + 85 °C; 13 V_{DC} AT + 125 °C											
82	A	769D826X0020A2	25	50	2	9	- 40	+ 16	+ 16	70	
330	B	769D337X0020B2	30	21	3	16	- 60	+ 20	+ 20	280	
560	C	769D567X0020C2	40	20	5	20	- 70	+ 25	+ 25	510	
1000	D	769D108X0020D2	40	21	8	28	- 70	+ 25	+ 25	750	
25 V_{DC} AT + 85 °C; 15 V_{DC} AT + 125 °C											
10	A	769D106X0025A2	4	190	1	2	- 16	+ 9	+ 9	70	
22	A	769D226X0025A2	7	140	1	2	- 20	+ 12	+ 12	80	
50	A	769D506X0025A2	18	80	2	9	- 35	+ 15	+ 15	80	
68	A	769D686X0025A2	22	50	2	9	- 35	+ 15	+ 15	80	
100	B	769D107X0025B2	15	50	1	10	- 28	+ 15	+ 15	250	
180	C	769D187X0025C2	46	32	2	18	- 48	+ 15	+ 15	500	
270	B	769D277X0025B2	24	22	3	16	- 45	+ 16	+ 16	280	
350	C	769D357X0025C2	27	26	7	28	- 60	+ 25	+ 25	500	
350	D	769D357X0025D2	25	24	7	28	- 80	+ 25	+ 25	850	
470	C	769D477X0025C2	33	18	6	24	- 60	+ 25	+ 25	510	
510	C	769D517X0025C2	33	16	7	28	- 60	+ 25	+ 25	510	
750	D	769D757X0025D2	36	18	8	29	- 60	+ 25	+ 25	750	
820	D	769D827X0025D2	40	17	9	30	- 60	+ 25	+ 25	750	
30 V_{DC} AT + 85 °C; 20 V_{DC} AT + 125 °C											
8	A	769D805X0030A2	4	235	1	2	- 16	+ 12	+ 12	60	
15	A	769D156X0030A2	8	175	1	2	- 20	+ 12	+ 12	80	
40	B	769D406X0030B2	10	80	1	5	- 24	+ 12	+ 12	250	
56	A	769D566X0030A2	20	55	2	9	- 32	+ 15	+ 15	70	
68	B	769D686X0030B2	26	60	1	8	- 24	+ 15	+ 15	250	
100	C	769D107X0030C2	16	45	2	12	- 28	+ 12	+ 12	500	
150	C	769D157X0030C2	38	35	2	18	- 48	+ 15	+ 15	500	
180	B	769D187X0030B2	21	27	3	16	- 40	+ 16	+ 16	280	
200	B	769D207X0030B2	21	25	3	16	- 40	+ 16	+ 16	280	
220	B	769D227X0030B2	23	25	3	16	- 40	+ 16	+ 16	280	
300	C	769D307X0030C2	25	18	7	28	- 55	+ 25	+ 25	500	
300	D	769D307X0030D2	27	25	4	31	- 60	+ 25	+ 25	820	
390	C	769D397X0030C2	27	15	6	24	- 55	+ 20	+ 25	510	
430	C	769D437X0030C2	27	15	7	28	- 55	+ 25	+ 25	510	
620	D	769D627X0030D2	32	22	8	29	- 60	+ 20	+ 25	750	
680	D	769D687X0030D2	36	20	7	25	- 60	+ 25	+ 25	750	



STANDARD RATINGS											
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. DF AT + 25 °C (%)	MAX. IMP. AT - 55 °C (Ω)	MAX. DCL (μ A) AT		MAX. CAPACITANCE CHANGE (%) AT			MAX. RMS RIPPLE 120 Hz (mA)	
					+ 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C		
35 V_{DC} AT + 85 °C; 23 V_{DC} AT + 125 °C											
39	A	769D396X0035A2	18	80	2	9	- 32	+ 15	+ 15	70	
47	A	769D476X0035A2	18	60	2	9	- 32	+ 15	+ 15	70	
150	B	769D157X0035B2	20	30	3	16	- 40	+ 16	+ 16	270	
330	C	769D337X0035C2	26	20	6	24	- 55	+ 25	+ 25	500	
470	D	769D477X0035D2	28	25	7	25	- 60	+ 25	+ 25	750	
480	D	769D487X0035D2	28	25	8	29	- 60	+ 25	+ 25	750	
560	D	769D567X0035D2	29	24	8	32	- 60	+ 25	+ 25	750	
50 V_{DC} AT + 85 °C; 30 V_{DC} AT + 125 °C											
5	A	769D505X0050A2	3	355	1	2	- 16	+ 6	+ 6	60	
10	A	769D106X0050A2	5	250	1	2	- 24	+ 9	+ 9	80	
25	A	769D256X0050A2	14	135	3	12	- 24	+ 12	+ 12	70	
25	B	769D256X0050B2	10	90	1	5	- 20	+ 12	+ 12	250	
33	A	769D336X0050A2	16	120	2	9	- 24	+ 12	+ 12	70	
47	B	769D476X0050B2	18	70	1	9	- 28	+ 15	+ 15	250	
60	C	769D606X0050C2	12	50	2	12	- 16	+ 12	+ 12	500	
82	B	769D826X0050B2	21	45	2	16	- 32	+ 15	+ 15	270	
120	B	769D127X0050B2	18	26	3	18	- 35	+ 15	+ 15	280	
160	C	769D167X0050C2	30	35	12	48	- 40	+ 25	+ 25	500	
160	D	769D167X0050D2	15	27	5	40	- 50	+ 20	+ 20	750	
270	C	769D277X0050C2	24	16	7	28	- 40	+ 25	+ 25	510	
360	D	769D367X0050D2	24	22	8	32	- 45	+ 25	+ 25	750	
390	D	769D397X0050D2	25	20	8	32	- 45	+ 25	+ 25	750	
60 V_{DC} AT + 85 °C; 40 V_{DC} AT + 125 °C											
4	A	769D405X0060A2	3	405	1	2	- 16	+ 6	+ 6	50	
8.2	A	769D825X0060A2	4	275	1	2	- 24	+ 9	+ 9	60	
20	A	769D206X0060A2	7	120	1	5	- 20	+ 12	+ 12	70	
20	B	769D206X0060B2	6	105	1	5	- 16	+ 12	+ 12	250	
27	A	769D276X0060A2	14	90	3	12	- 20	+ 12	+ 12	70	
39	B	769D396X0060B2	18	90	1	9	- 28	+ 12	+ 12	250	
50	B	769D506X0060B2	9	75	2	12	- 30	+ 15	+ 15	250	
50	C	769D506X0060C2	9	55	2	12	- 16	+ 12	+ 12	500	
68	C	769D686X0060C2	27	50	2	16	- 32	+ 12	+ 12	500	
100	B	769D107X0060B2	15	28	4	20	- 30	+ 15	+ 15	280	
140	C	769D147X0060C2	18	32	7	28	- 35	+ 20	+ 20	500	
140	D	769D147X0060D2	21	28	8	32	- 40	+ 20	+ 20	750	
220	C	769D227X0060C2	18	17	7	28	- 35	+ 20	+ 20	510	
300	D	769D307X0060D2	21	21	8	32	- 45	+ 20	+ 20	750	
330	D	769D337X0060D2	23	23	9	36	- 45	+ 20	+ 20	750	



STANDARD RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. DF AT + 25 °C (%)	MAX. IMP. AT - 55 °C (Ω)	MAX. DCL (μ A) AT		MAX. CAPACITANCE CHANGE (%) AT			MAX. RMS RIPPLE 120 Hz (mA)
					+ 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
75 V_{DC} AT + 85 °C; 50 V_{DC} AT + 125 °C										
6.8	A	769D685X0075A2	4	300	1	2	- 20	+ 9	+ 9	60
8.2	A	769D825X0075A2	12	200	1.5	7	- 16	+ 12	+ 12	60
12	A	769D126X0075A2	12	155	2	9	- 16	+ 12	+ 12	70
15	A	769D156X0075A2	12	130	3	12	- 16	+ 12	+ 12	70
15	B	769D156X0075B2	6	135	1	5	- 16	+ 9	+ 9	250
18	A	769D186X0075A2	12	100	3	12	- 16	+ 12	+ 12	70
22	A	769D226X0075A2	12	80	3	12	- 16	+ 12	+ 12	70
33	B	769D336X0075B2	15	90	1	10	- 24	+ 15	+ 15	250
40	C	769D406X0075C2	13	60	2	12	- 16	+ 12	+ 12	500
47	B	769D476X0075B2	20	75	3.5	20	- 25	+ 15	+ 15	260
56	B	769D566X0075B2	20	70	2	16	- 25	+ 15	+ 15	260
56	C	769D566X0075C2	22	60	2	17	- 28	+ 15	+ 15	500
68	B	769D686X0075B2	12	42	4	24	- 25	+ 15	+ 15	280
82	B	769D826X0075B2	12	30	4	24	- 25	+ 15	+ 15	280
100	C	769D107X0075C2	18	33	8	32	- 30	+ 20	+ 20	500
110	C	769D117X0075C2	18	33	8	32	- 30	+ 20	+ 20	500
110	D	769D117X0075D2	15	29	5	36	- 35	+ 20	+ 20	750
120	C	769D127X0075C2	18	28	6	26	- 30	+ 20	+ 20	500
150	C	769D157X0075C2	18	24	7	28	- 30	+ 20	+ 20	500
180	C	769D187X0075C2	18	17	8	32	- 30	+ 20	+ 20	510
220	D	769D227X0075D2	16	24	9	36	- 40	+ 20	+ 20	750
240	D	769D247X0075D2	17	24	9	36	- 40	+ 20	+ 20	750
270	D	769D277X0075D2	18	22	10	40	- 30	+ 20	+ 20	750
100 V_{DC} AT + 85 °C; 70 V_{DC} AT + 125 °C										
4.7	A	769D475X0100A2	3	500	1	2	- 16	+ 6	+ 6	60
10	A	769D106X0100A2	12	200	3	12	- 16	+ 12	+ 12	60
11	B	769D116X0100B2	4	200	1	4	- 16	+ 6	+ 6	250
22	B	769D226X0100B2	10	100	1	9	- 16	+ 6	+ 6	250
30	C	769D306X0100C2	8	85	2	12	- 16	+ 8	+ 8	500
39	B	769D396X0100B2	20	80	5	24	- 25	+ 15	+ 15	250
43	C	769D436X0100C2	16	70	2	17	- 20	+ 8	+ 8	500
68	C	769D686X0100C2	18	40	10	40	- 30	+ 20	+ 20	500
86	D	769D866X0100D2	15	30	5	35	- 25	+ 20	+ 20	750
120	D	769D127X0100D2	25	36	12	48	- 40	+ 20	+ 20	750
125 V_{DC} AT + 85 °C; 85 V_{DC} AT + 125 °C										
3.6	A	769D365X0125A2	4	615	1	2	- 16	+ 8	+ 8	50
6.8	A	769D685X0125A2	12	300	3	12	- 16	+ 12	+ 12	50
9	A	769D905X0125A2	12	240	4	15	- 16	+ 12	+ 12	50
9	B	769D905X0125B2	9	220	1	5	- 16	+ 6	+ 6	250
14	B	769D146X0125B2	10	160	1	7	- 16	+ 7	+ 7	250
25	C	769D256X0125C2	16	120	2	13	- 16	+ 10	+ 10	500
27	B	769D276X0125B2	20	90	5	24	- 25	+ 15	+ 15	250
47	C	769D476X0125C2	18	50	10	40	- 30	+ 20	+ 20	500
80	D	769D806X0125D2	20	34	9	50	- 20	+ 20	+ 20	750
82	D	769D826X0125D2	25	40	12	48	- 40	+ 20	+ 20	750

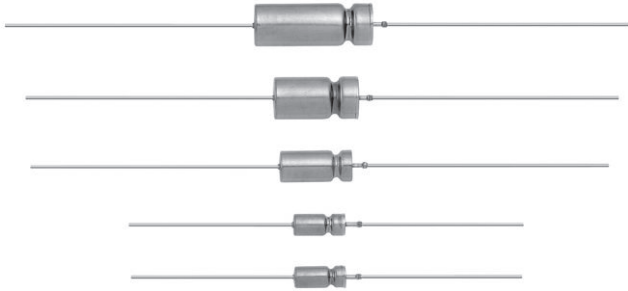


Tantalum Case Standard

Contents

M39006/22/25	60
135D	37
735D/DE, CT79	50

Wet Tantalum Capacitors Tantalum-Case with Glass-to-Tantalum Hermetic Seal for - 55 °C to + 200 °C Operation



FEATURES

- Terminations: standard tin/lead (SnPb), 100 % tin (RoHS compliant) available
- Standard and extended ratings
- Model 135D tantalum-case electrolytic capacitors incorporate the advantages of all the varieties of electrolytic capacitors and eliminate most of the disadvantages. These units have a 3 V reverse voltage capability at + 85 °C and a higher ripple current capability than any other electrolytic type with similar combinations of capacitance and case size.
- Designed for the aerospace applications, this capacitor was developed under partial sponsorship of the Marshall Space Flight Center, National Aeronautics and Space Administration. The capacitors have a high resistance to damage from shock and vibration. Extended range ratings and high temperature designs are available.
- Model 135D capacitors are commercial equivalents of Tansitor Style; AQ, AR, HAQ, HAR, Mallory-NACC Style; TLT, TXT, THT, THX and Military Style CLR79 and CLR81, designed to meet the performance requirements of Military Specification MIL-PRF-39006/22/25. Capacitors to meet MIL-PRF-39006/22/25 should be ordered by part numbers shown in that specification.
- Compliant to RoHS Directive 2002/95/EC



RoHS*
COMPLIANT

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 85 °C
(To + 200 °C with voltage derating)

Capacitance Tolerance: At 120 Hz, + 25 °C. ± 20 % standard. ± 10 %, ± 5 % available as special.

DC Leakage Current (DCL Max.): At + 25 °C and above: Leakage current shall not exceed the values listed in the Standard Ratings Tables.

Life Test: Capacitors are capable of withstanding a 2000 h life test at a temperature of + 85 °C or + 125 °C at the applicable rated DC working voltage.

Following life test:

1. DCL, measured at + 85 °C rated voltage, shall not be in excess of the original requirement.
2. The equivalent series resistance shall not exceed 150 % of the initial requirement.
3. Change in capacitance shall not exceed 10 % from the initial measurement.

ORDERING INFORMATION						
135D	306	X0	006	C	2	E3
MODEL	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	CASE CODE	STYLE NUMBER	RoHS COMPLIANT
	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow	X0 = ± 20 % X9 = ± 10 % X5 = ± 5 %	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	See ratings and case codes table	Std. temperature (max. + 125 °C) 0 = No insulating sleeve 2 = Polyester insulation sleeve 3 = High temperature film insulation High temperature (max. + 200 °C) 6 = High temperature film insulation 8 = No insulating sleeve	E3 = 100 % tin termination (RoHS compliant design) Blank = SnPb termination (standard design)

Note

Packaging: The use of formed plastic trays for packaging these axial lead components is standard. Tape and reel is not recommended due to the unit weight.

* Pb containing terminations are not RoHS compliant, exemptions may apply

**Wet Tantalum Capacitors Tantalum-Case with Glass-to-Tantalum
Hermetic Seal for - 55 °C to + 200 °C Operation**

DIMENSIONS in inches [millimeters]						
<p>0.0253 ± 0.002 [0.64 ± 0.05] Dia. (No. 22 AWG) Tinned Nickel Leads Solderable and Weldable</p>						
CASE CODE		D	L₁	L₂ (Max.)	E	WEIGHT (g) (Max.)
TYPE	DCLR 79/81 EQUIV.					
135D						
C	T1	0.188 ± 0.016 [4.78 ± 0.41]	0.453 + 0.031 - 0.016 [11.51 + 0.79 - 0.41]	0.734 [18.64]	1.500 ± 0.250 [38.10 ± 6.35]	2.6
F	T2	0.281 ± 0.016 [7.14 ± 0.41]	0.641 + 0.031 - 0.016 [16.28 + 0.79 - 0.41]	0.922 [23.42]	2.250 ± 0.250 [57.15 ± 6.35]	6.2
T	T3	0.375 ± 0.016 [9.53 ± 0.41]	0.766 + 0.031 - 0.016 [19.46 + 0.79 - 0.41]	1.047 [26.59]	2.250 ± 0.250 [57.15 ± 6.35]	11.6
K	T4	0.375 ± 0.016 [9.53 ± 0.41]	1.062 + 0.031 - 0.016 [26.97 + 0.79 - 0.41]	1.343 [34.11]	2.250 ± 0.250 [57.15 ± 6.35]	17.7

Note

- For insulated parts, add 0.015" [0.38] to the diameter. The insulation shall lap over the ends of the capacitor body.

STANDARD RATINGS											
CAPACITANCE (µF)	CASE CODE	PART NUMBER (1)	MAX. ESR		MAX. IMP.		MAX. DCL (µA)		MAX. CAPACITANCE CHANGE (%) at		MAX. RIPPLE 40 kHz I_{RMS} (mA)
			at + 25 °C 120 Hz (Ω)	at - 55 °C 120 Hz (Ω)	at + 25 °C	at + 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C		
6 WV_{DC} at + 85 °C . . . 4 WV_{DC} at + 125 °C . . . 3.6 WV_{DC} at + 200 °C											
30	C	135D306X0006C2	4.0	100	1.0	2.0	- 40	+ 10.5	+ 12	820	
68	C	135D686X0006C2	3.2	60	1.0	2.0	- 40	+ 14	+ 16	960	
140	F	135D147X0006F2	2.0	40	1.0	3.0	- 40	+ 14	+ 16	1200	
270	F	135D277X0006F2	2.2	25	1.0	6.5	- 44	+ 17.5	+ 20	1375	
330	T	135D337X0006T2	1.4	20	2.0	7.9	- 44	+ 14	+ 16	1800	
560	T	135D567X0006T2	1.3	25	2.0	13.0	- 64	+ 17.5	+ 20	1900	
1200	K	135D128X0006K2	1.0	20	3.0	14.0	- 80	+ 25	+ 25	2265	
8 WV_{DC} at + 85 °C . . . 5 WV_{DC} at + 125 °C . . . 4.8 WV_{DC} at + 200 °C											
25	C	135D256X0008C2	4.0	100	1.0	2.0	- 40	+ 10.5	+ 12	820	
56	C	135D566X0008C2	3.3	59	1.0	2.0	- 40	+ 14	+ 16	900	
120	F	135D127X0008F2	2.6	50	1.0	2.0	- 44	+ 17.5	+ 20	1230	
220	F	135D227X0008F2	2.4	30	1.0	7.0	- 44	+ 17.5	+ 20	1370	
290	T	135D297X0008T2	1.8	25	2.0	6.0	- 64	+ 17.5	+ 20	1770	
430	T	135D437X0008T2	1.4	25	2.0	14.0	- 64	+ 17.5	+ 20	1825	
850	K	135D857X0008K2	1.0	22	4.0	16.0	- 80	+ 25	+ 25	2330	
10 WV_{DC} at + 85 °C . . . 7 WV_{DC} at + 125 °C . . . 6 WV_{DC} at + 200 °C											
20	C	135D206X0010C2	4.0	120	1.0	2.0	- 32	+ 10.5	+ 12	820	
47	C	135D476X0010C2	3.7	90	1.0	2.0	- 36	+ 14	+ 16	855	
100	F	135D107X0010F2	2.4	60	1.0	4.0	- 36	+ 14	+ 16	1200	
180	F	135D187X0010F2	2.2	40	1.0	7.0	- 36	+ 14	+ 16	1365	
250	T	135D257X0010T2	1.8	30	2.0	10.0	- 40	+ 14	+ 16	1720	
390	T	135D397X0010T2	1.5	25	2.0	16.0	- 64	+ 17.5	+ 20	1800	
750	K	135D757X0010K2	1.0	23	4.0	16.0	- 80	+ 25	+ 25	2360	
15 WV_{DC} at + 85 °C . . . 10 WV_{DC} at + 125 °C . . . 9 WV_{DC} at + 200 °C											
15	C	135D156X0015C2	4.4	155	1.0	2.0	- 24	+ 10.5	+ 12	780	
33	C	135D336X0015C2	4.0	90	1.0	2.0	- 28	+ 14	+ 16	820	
70	F	135D706X0015F2	2.8	75	1.0	4.0	- 28	+ 14	+ 16	1150	
120	F	135D127X0015F2	2.6	50	1.0	7.0	- 28	+ 17.5	+ 20	1450	
170	T	135D177X0015T2	2.4	35	2.0	10.0	- 32	+ 14	+ 16	1480	
270	T	135D277X0015T2	2.2	30	2.0	16.0	- 56	+ 17.5	+ 20	1740	
540	K	135D547X0015K2	1.0	23	6.0	24.0	- 80	+ 25	+ 25	2330	

Note

- (1) Part Numbers are for units with ± 20 % capacitance tolerance, standard + 125 °C maximum temperature, standard polyesterfilm insulation, and tin-lead terminations. For other capacitance tolerances, other maximum temperatures, insulation and termination options, please consult ORDERING INFORMATION on page 1 for proper part number.

STANDARD RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER (1)	MAX. ESR	MAX. IMP.	MAX. DCL (μ A)		MAX. CAPACITANCE CHANGE (%) at			MAX. RIPPLE 40 kHz I_{RMS} (mA)
			at + 25 °C 120 Hz (Ω)	at - 55 °C 120 Hz (Ω)	at + 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
25 WV_{DC} at + 85 °C ... 15 WV_{DC} at + 125 °C ... 12 WV_{DC} at + 200 °C										
10	C	135D106X0025C2	5.3	220	1.0	2.0	- 16	+ 8	+ 9	715
22	C	135D226X0025C2	4.2	140	1.0	2.0	- 20	+ 10.5	+ 12	800
50	F	135D506X0025F2	3.0	70	1.0	2.0	- 28	+ 13	+ 15	1130
100	F	135D107X0025F2	2.8	50	1.0	10.0	- 28	+ 13	+ 15	1435
120	T	135D127X0025T2	2.6	38	2.0	6.0	- 32	+ 13	+ 15	1450
180	T	135D187X0025T2	2.2	32	2.0	18.0	- 48	+ 13	+ 15	1525
350	K	135D357X0025K2	1.3	24	7.0	28.0	- 70	+ 25	+ 25	1970
30 WV_{DC} at + 85 °C ... 20 WV_{DC} at + 125 °C ... 18 WV_{DC} at + 200 °C										
8	C	135D805X0030C2	6.6	275	1.0	2.0	- 16	+ 8	+ 12	640
15	C	135D156X0030C2	6.2	175	1.0	2.0	- 20	+ 10.5	+ 12	780
22	F	135D226X0030F2	4.6	95	1.0	5.0	- 20	+ 10.5	+ 12	1005
40	F	135D406X0030F2	4.0	65	1.0	5.0	- 24	+ 10.5	+ 12	1120
68	F	135D686X0030F2	2.9	60	1.0	8.0	- 24	+ 13	+ 15	1285
100	T	135D107X0030T2	2.7	40	2.0	12.0	- 28	+ 10.5	+ 12	1450
150	T	135D157X0030T2	2.3	35	2.0	18.0	- 48	+ 13	+ 15	1525
300	K	135D307X0030K2	1.4	25	8.0	32.0	- 60	+ 25	+ 25	1950
35 WV_{DC} at + 85 °C ... 22 WV_{DC} at + 125 °C ... 21 WV_{DC} at + 200 °C										
15	C	135D156X0035C2	6.2	175	0.75	1.5	- 20	+ 10.5	+ 12	660
68	F	135D686X0035F2	2.9	60	1.0	2.0	- 24	+ 13	+ 15	1195
270	K	135D277X0035K2	1.4	26	3.0	12.0	- 58	+ 25	+ 25	1950
50 WV_{DC} at + 85 °C ... 30 WV_{DC} at + 125 °C ... 30 WV_{DC} at + 200 °C										
5	C	135D505X0050C2	8.0	400	1.0	2.0	- 16	+ 5	+ 6	580
10	C	135D106X0050C2	6.4	250	1.0	2.0	- 24	+ 8	+ 9	715
25	F	135D256X0050F2	4.6	95	1.0	5.0	- 20	+ 10.5	+ 12	1005
47	F	135D476X0050F2	3.7	70	1.0	9.0	- 28	+ 13	+ 15	1155
60	T	135D606X0050T2	2.9	45	2.0	12.0	- 16	+ 10.5	+ 12	1335
82	T	135D826X0050T2	2.5	45	2.0	16.0	- 32	+ 13	+ 15	1400
160	K	135D167X0050K2	1.5	27	8.0	32.0	- 50	+ 25	+ 25	1900
60 WV_{DC} at + 85 °C ... 40 WV_{DC} at + 125 °C ... 36 WV_{DC} at + 200 °C										
4	C	135D405X0060C2	9.3	550	1.0	2.0	- 16	+ 5	+ 6	525
8.2	C	135D825X0060C2	6.6	275	1.0	2.0	- 24	+ 8	+ 9	625
20	F	135D206X0060F2	4.7	105	1.0	5.0	- 16	+ 8	+ 9	930
39	F	135D396X0060F2	3.4	90	1.0	9.0	- 28	+ 10.5	+ 15	1110
50	T	135D506X0060T2	2.9	50	2.0	12.0	- 16	+ 10.5	+ 12	1330
68	T	135D686X0060T2	2.5	50	2.0	16.0	- 32	+ 10.5	+ 15	1365
140	K	135D147X0060K2	1.5	28	8.0	32.0	- 40	+ 20	+ 20	1850
75 WV_{DC} at + 85 °C ... 50 WV_{DC} at + 125 °C ... 45 WV_{DC} at + 200 °C										
3.5	C	135D355X0075C2	9.5	650	1.0	2.0	- 16	+ 5	+ 6	525
6.8	C	135D685X0075C2	6.8	300	1.0	2.0	- 20	+ 8	+ 9	610
15	F	135D156X0075F2	5.3	150	1.0	5.0	- 16	+ 8	+ 9	890
33	F	135D336X0075F2	4.2	90	1.0	10.0	- 24	+ 10.5	+ 15	1000
40	T	135D406X0075T2	3.0	60	2.0	12.0	- 16	+ 10.5	+ 12	1250
56	T	135D566X0075T2	2.6	60	2.0	17.0	- 28	+ 10.5	+ 15	1335
110	K	135D117X0075K2	1.5	29	9.0	36.0	- 35	+ 20	+ 20	1850

Note

(1) Part Numbers are for units with $\pm 20\%$ capacitance tolerance, standard + 125 °C maximum temperature, standard polyesterfilm insulation, and tin-lead terminations. For other capacitance tolerances, other maximum temperatures, insulation and termination options, please consult ORDERING INFORMATION on page 1 for proper part number.



Wet Tantalum Capacitors Tantalum-Case with Glass-to-Tantalum Hermetic Seal for - 55 °C to + 200 °C Operation

STANDARD RATINGS												
CAPACITANCE (µF)	CASE CODE	PART NUMBER (1)	MAX. ESR		MAX. IMP.		MAX. DCL (µA)		MAX. CAPACITANCE CHANGE (%) at			MAX. RIPPLE 40 kHz I _{RMS} (mA)
			at + 25 °C 120 Hz (Ω)	at - 55 °C 120 Hz (Ω)	at + 25 °C	at + 85 °C + 125 °C	at + 25 °C	at + 85 °C	at + 125 °C			
100 WV_{DC} at + 85 °C . . . 65 WV_{DC} at + 125 °C . . . 60 WV_{DC} at + 200 °C												
2.2	C	135D225X0100C2	10.6	950	1.0	2.0	- 16	+ 7	+ 8	505		
2.5	C	135D255X0100C2	10.6	950	1.0	2.0	- 16	+ 7	+ 8	505		
4.7	C	135D475X0100C2	8.5	500	1.0	2.0	- 16	+ 7	+ 8	565		
39	C	135D395X0100C2	20.4	557	2.0	5.0	- 16	+ 7	+ 8	1240		
11	F	135D116X0100F2	6.0	200	1.0	4.0	- 16	+ 7	+ 8	835		
22	F	135D226X0100F2	4.8	100	1.0	9.0	- 16	+ 7	+ 8	965		
30	T	135D306X0100T2	3.3	80	2.0	12.0	- 16	+ 7	+ 8	1240		
43	T	135D436X0100T2	2.6	70	2.0	17.0	- 20	+ 7	+ 8	1335		
82	K	135D826X0100K2	1.6	39	3.0	24	- 24	+ 18	+ 18	1860		
86	K	135D866X0100K2	1.6	30	9.0	36.0	- 25	+ 15	+ 15	1800		
125 WV_{DC} at + 85 °C . . . 85 WV_{DC} at + 125 °C . . . 75 WV_{DC} at + 200 °C												
1.7	C	135D175X0125C2	15.6	1250	1.0	2.0	- 16	+ 7	+ 8	415		
3.6	C	135D365X0125C2	10.0	600	1.0	2.0	- 16	+ 7	+ 8	520		
9	F	135D905X0125F2	7.4	240	1.0	5.0	- 16	+ 7	+ 8	755		
14	F	135D146X0125F2	5.7	167	1.0	7.0	- 16	+ 7	+ 8	860		
18	T	135D186X0125T2	3.7	129	2.0	9.0	- 16	+ 7	+ 8	1130		
25	T	135D256X0125T2	3.2	93	2.0	13.0	- 16	+ 7	+ 8	1200		
56	K	135D566X0125K2	1.6	32	10.0	40.0	- 25	+ 15	+ 15	1800		

Note

(1) Part Numbers are for units with ± 20 % capacitance tolerance, standard + 125 °C maximum temperature, standard polyesterfilm insulation, and tin-lead terminations. For other capacitance tolerances, other maximum temperatures, insulation and termination options, please consult ORDERING INFORMATION on page 1 for proper part number.

EXTENDED RATINGS												
CAPACITANCE (µF)	CASE CODE	PART NUMBER (1)	MAX. ESR		MAX. IMP.		MAX. DCL (µA)		MAX. CAPACITANCE CHANGE (%) at			MAX. RIPPLE 40 kHz I _{RMS} (mA)
			at + 25 °C 120 Hz (Ω)	at - 55 °C 120 Hz (Ω)	at + 25 °C	at + 85 °C + 125 °C	at + 25 °C	at + 85 °C	at + 125 °C			
6 WV_{DC} at + 85 °C . . . 4 WV_{DC} at + 125 °C . . . 3.6 WV_{DC} at + 200 °C												
220	C	135D227X0006C2	3.0	36	2	9	- 64	+ 13	+ 16	1000		
560	F	135D567X0006F2	2.5	21	3	9	- 77	+ 16	+ 20	1500		
820	F	135D827X0006F2	2.5	18	3	14	- 88	+ 16	+ 20	1500		
1200	T	135D128X0006T2	1.5	18	5	18	- 88	+ 20	+ 25	1900		
1500	T	135D158X0006T2	1.5	18	5	20	- 90	+ 20	+ 25	1900		
2200	K	135D228X0006K2	1.0	13	6	24	- 90	+ 25	+ 30	2300		
8 WV_{DC} at + 85 °C . . . 5 WV_{DC} at + 125 °C . . . 4.8 WV_{DC} at + 200 °C												
180	C	135D187X0008C2	3.0	45	2	9	- 60	+ 13	+ 16	1000		
680	F	135D687X0008F2	2.5	22	3	14	- 83	+ 16	+ 20	1500		
1500	T	135D158X0008T2	1.5	18	5	20	- 90	+ 20	+ 25	1900		
1800	K	135D188X0008K2	1.0	14	7	25	- 90	+ 25	+ 30	2300		
10 WV_{DC} at + 85 °C . . . 7 WV_{DC} at + 125 °C . . . 6 WV_{DC} at + 200 °C												
120	C	135D127X0010C2	3.2	54	2	6	- 40	+ 14	+ 16	900		
150	C	135D157X0010C2	3.0	54	2	9	- 55	+ 13	+ 16	900		
390	F	135D397X0010F2	2.5	27	3	9	- 66	+ 16	+ 20	-		
470	F	135D477X0010F2	2.5	27	3	16	- 66	+ 16	+ 20	1450		
560	F	135D567X0010F2	2.5	27	3	16	- 77	+ 16	+ 20	1450		
1200	T	135D128X0010T2	1.5	18	5	20	- 88	+ 20	+ 25	1850		
1500	K	135D158X0010K2	1.0	15	7	25	- 88	+ 25	+ 30	2300		

Note

(1) Part Numbers are for units with ± 20 % capacitance tolerance, standard + 125 °C maximum temperature, standard polyesterfilm insulation, and tin-lead terminations. For other capacitance tolerances, other maximum temperatures, insulation and termination options, please consult ORDERING INFORMATION on page 1 for proper part number.

EXTENDED RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER (1)	MAX. ESR	MAX. IMP.	MAX. DCL (μ A)		MAX. CAPACITANCE CHANGE (%) at			MAX. RIPPLE 40 kHz I_{RMS} (mA)
			at + 25 °C 120 Hz (Ω)	at - 55 °C 120 Hz (Ω)	at + 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
15 WV_{DC} at + 85 °C . . . 10 WV_{DC} at + 125 °C . . . 9 WV_{DC} at + 200 °C										
82	C	135D826X0015C2	3.9	72	2	6	- 35	+ 12	+ 16	900
100	C	135D107X0015C2	3.9	72	2	9	- 44	+ 13	+ 16	900
270	F	135D277X0015F2	2.5	31	3	9	- 62	+ 16	+ 15	1450
390	F	135D397X0015F2	2.5	31	3	16	- 66	+ 16	+ 20	1450
680	T	135D687X0015T2	1.8	22	6	18	- 74	+ 20	+ 25	1800
820	T	135D827X0015T2	1.8	22	6	24	- 77	+ 20	+ 25	1800
1000	K	135D108X0015K2	1.2	17	8	32	- 77	+ 25	+ 30	2330
25 WV_{DC} at + 85 °C . . . 15 WV_{DC} at + 125 °C . . . 12 WV_{DC} at + 200 °C										
47	C	135D476X0025C2	5.2	100	2	6	- 23	+ 12	+ 15	800
56	C	135D566X0025C2	4.3	90	2	6	- 25	+ 12	+ 15	850
68	C	135D686X0025C2	4.3	90	2	9	- 40	+ 12	+ 15	850
180	F	135D187X0025F2	2.7	33	3	9	- 54	+ 13	+ 15	1400
270	F	135D277X0025F2	2.7	33	3	16	- 62	+ 13	+ 16	1400
390	T	135D397X0025T2	1.8	25	6	18	- 55	+ 18	+ 25	1500
470	T	135D477X0025T2	1.8	24	6	18	- 65	+ 18	+ 25	1750
560	T	135D567X0025T2	1.8	24	7	28	- 72	+ 20	+ 25	1750
680	K	135D687X0025K2	1.2	19	8	32	- 72	+ 25	+ 30	2100
820	K	135D827X0025K2	1.3	26	8	32	- 80	+ 25	+ 25	-
30 WV_{DC} at + 85 °C . . . 20 WV_{DC} at + 125 °C . . . 18 WV_{DC} at + 200 °C										
47	C	135D476X0030C2	5.2	100	2	6	- 23	+ 12	+ 15	800
56	C	135D566X0030C2	5.2	100	2	9	- 38	+ 12	+ 15	800
150	F	135D157X0030F2	2.5	36	3	9	- 42	+ 13	+ 15	1200
220	F	135D227X0030F2	2.5	36	3	16	- 60	+ 13	+ 16	1200
300	T	135D307X0030T2	2.2	44	3	12	- 60	+ 15	+ 15	-
390	T	135D397X0030T2	1.8	25	6	18	- 55	+ 18	+ 25	1500
470	T	135D477X0030T2	1.8	25	8	32	- 65	+ 20	+ 25	1500
560	K	135D567X0030K2	1.3	20	9	36	- 65	+ 25	+ 30	2000
35 WV_{DC} at + 85 °C . . . 22 WV_{DC} at + 125 °C . . . 21 WV_{DC} at + 200 °C										
39	C	135D396X0035C2	4.1	61	2	6	- 22	+ 12	+ 14	820
120	F	135D127X0035F2	2.5	31	3	10	- 40	+ 13	+ 15	1315
330	T	135D337X0035T2	1.8	20	6	18	- 50	+ 16	+ 25	1640
370	K	135D377X0035K2	1.3	15	9	36	- 60	+ 25	+ 30	2040
40 WV_{DC} at + 85 °C . . . 25 WV_{DC} at + 125 °C . . . 20 WV_{DC} at + 200 °C										
39	C	135D396X0040C2	4.1	61	2	6	- 22	+ 12	+ 14	820
370	K	135D377X0040K2	1.5	30	5	25	- 75	+ 25	+ 25	1900
470	K	135D477X0040K2	1.3	30	9	35	- 80	+ 25	+ 25	-
50 WV_{DC} at + 85 °C . . . 30 WV_{DC} at + 125 °C . . . 30 WV_{DC} at + 200 °C										
33	C	135D336X0050C2	5.0	135	2	9	- 29	+ 10	+ 12	700
100	F	135D107X0050F2	2.8	49	4	12	- 36	+ 13	+ 15	1200
120	F	135D127X0050F2	2.5	49	4	24	- 42	+ 12	+ 15	1200
270	T	135D277X0050T2	2.0	30	8	32	- 46	+ 20	+ 25	1450
330	K	135D337X0050K2	1.5	30	9	36	- 46	+ 25	+ 30	1900

Note

(1) Part Numbers are for units with $\pm 20\%$ capacitance tolerance, standard + 125 °C maximum temperature, standard polyesterfilm insulation, and tin-lead terminations. For other capacitance tolerances, other maximum temperatures, insulation and termination options, please consult ORDERING INFORMATION on page 1 for proper part number.



Wet Tantalum Capacitors Tantalum-Case with Glass-to-Tantalum Hermetic Seal for - 55 °C to + 200 °C Operation

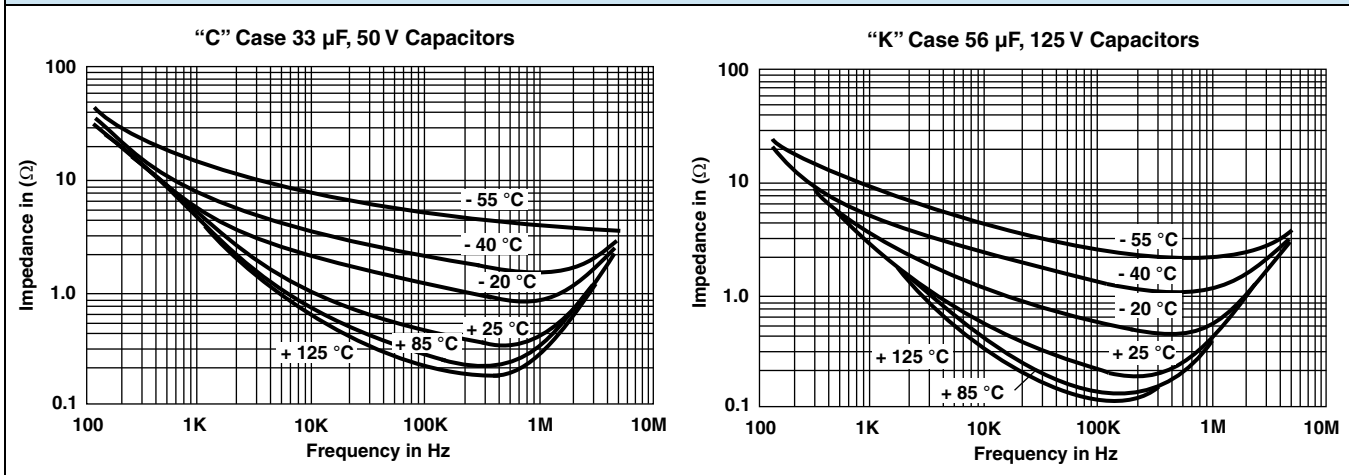
EXTENDED RATINGS										
CAPACITANCE (µF)	CASE CODE	PART NUMBER (1)	MAX. ESR	MAX. IMP.	MAX. DCL (µA)		MAX. CAPACITANCE CHANGE (%) at			MAX. RIPPLE 40 kHz I _{RMS} (mA)
			at + 25 °C 120 Hz (Ω)	at - 55 °C 120 Hz (Ω)	at + 25 °C	at + 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
60 WV_{DC} at + 85 °C . . . 40 WV_{DC} at + 125 °C . . . 36 WV_{DC} at + 200 °C										
18	C	135D186X0060C2	7.0	160	2	12	- 20	+ 7	+ 8	700
27	C	135D276X0060C2	5.0	144	3	12	- 24	+ 10	+ 12	700
82	F	135D826X0060F2	2.9	54	4	16	- 30	+ 15	+ 15	1100
100	F	135D107X0060F2	2.5	54	4	20	- 36	+ 12	+ 15	1100
220	T	135D227X0060T2	1.8	29	8	32	- 40	+ 16	+ 20	1400
270	K	135D277X0060K2	1.4	23	9	36	- 45	+ 20	+ 25	1850
330	K	135D337X0060K2	1.3	31	10	40	- 72	+ 25	+ 25	1850
63 WV_{DC} at + 85 °C . . . 40 WV_{DC} at + 125 °C . . . 31 WV_{DC} at + 200 °C										
10	C	135D106X0063C2	5.3	250	1.0	2.0	- 20	+ 8	+ 9	715
27	C	135D276X0063C2	5.0	144	3	12	- 24	+ 10	+ 12	700
100	F	135D107X0063F2	2.5	54	2	12	- 36	+ 12	+ 15	1100
75 WV_{DC} at + 85 °C . . . 50 WV_{DC} at + 125 °C . . . 45 WV_{DC} at + 200 °C										
12	C	135D126X0075C2	5.1	157	3	12	- 19	+ 10	+ 12	600
22	C	135D226X0075C2	5.1	157	3	12	- 19	+ 10	+ 12	600
56	C	135D565X0075C2	14.2	475	2	5	- 17	+ 8	+ 8	600
11	F	135D117X0075F2	2.5	54	4	20	- 36	+ 12	+ 15	1100
68	F	135D686X0075F2	3.0	63	4	16	- 25	+ 12	+ 15	1000
82	F	135D826X0075F2	2.5	63	4	24	- 30	+ 12	+ 15	1000
180	T	135D187X0075T2	2.2	30	9	36	- 35	+ 16	+ 20	1300
220	K	135D227X0075K2	1.8	24	10	40	- 40	+ 20	+ 25	1800
300	K	135D307X0075K2	1.8	32	12	48	- 60	+ 22	+ 22	2000
100 WV_{DC} at + 85 °C . . . 65 WV_{DC} at + 125 °C . . . 60 WV_{DC} at + 200 °C										
10	C	135D106X0100C2	5.9	200	3	12	- 17	+ 10	+ 12	800
56	C	135D565X0100C2	14	475	2	5	- 17	+ 8	+ 8	-
39	F	135D396X0100F2	3.5	80	5	24	- 20	+ 12	+ 15	1300
47	T	135D476X0100T2	2.5	70	2	10	- 23	+ 10	+ 10	-
68	T	135D686X0100T2	2.2	40	10	40	- 30	+ 14	+ 16	1600
120	K	135D127X0100K2	2.7	30	12	48	- 35	+ 15	+ 17	2000
125 WV_{DC} at + 85 °C . . . 85 WV_{DC} at + 125 °C . . . 75 WV_{DC} at + 200 °C										
3.9	C	135D395X0125C2	20.4	557	2	5	- 16	+ 7	+ 8	-
6.8	C	135D685X0125C2	11.7	300	3	12	- 14	+ 10	+ 12	700
15	F	135D156X0125F2	5.3	167	1	7	- 16	+ 7	+ 8	1200
27	F	135D276X0125F2	3.5	90	5	24	- 18	+ 12	+ 15	1200
47	T	135D476X0125T2	2.2	50	10	40	- 26	+ 14	+ 16	1500
68	K	135D686X0125K2	2.2	32	11	44	- 28	+ 15	+ 16	1850
82	K	135D826X0125K2	2.8	32	12	48	- 30	+ 15	+ 17	1900

Note

(1) Part Numbers are for units with ± 20 % capacitance tolerance, standard + 125 °C maximum temperature, standard polyesterfilm insulation, and tin-lead terminations. For other capacitance tolerances, other maximum temperatures, insulation and termination options, please consult ORDERING INFORMATION on page 1 for proper part number.



TYPICAL CURVES OF IMPEDANCE AS A FUNCTION OF FREQUENCY AT VARIOUS TEMPERATURES



PERFORMANCE CHARACTERISTICS

1. Operating Temperature: Capacitors are designed to operate over a temperature range of - 55 °C to + 200 °C.

UP TO + 85 °C (V)	AT + 125 °C (V)	AT + 175 °C (V)	AT + 200 °C (V)
6	4	3	
8	5	4	
10	7	5	
15	10	8	
25	15	13	
30	20	15	(1)
35	23	18	
50	30	25	
60	40	30	
75	50	38	
100	65	50	
125	85	63	

(1) Consult Vishay Sprague for information at + 200 °C. See paragraph 9.3.

2. **DC Working Voltage:** The DC working voltage is the maximum operating voltage for continuous duty at the rated temperature.
3. **Surge Voltage:** The surge voltage rating is the maximum voltage to which the capacitors should be subjected under any conditions. This includes transients and peak ripple at the highest line voltage.
 - 3.1 The surge voltage of capacitors is 115 % of rated DC working voltage.
 - 3.2 **Surge Voltage Test:** Capacitors shall withstand the surge voltage applied through a 1000 Ω ± 10 % resistor in series with the capacitor and voltage source at the rate of one-half minute on, four and one-half minutes

off, for 1000 successive test cycles at + 85 °C or + 125 °C.

- 3.3. Following the surge voltage test, the capacitance at + 25 °C shall not have changed by more than ± 10 % and the equivalent series resistance and DC leakage current will not exceed the values shown in the "Standard Ratings Table" for each capacitor.
4. **Capacitance Tolerance:** The capacitance of all capacitors shall be within the specified tolerance limits of the nominal rating.
 - 4.1 Measurements shall be made by the bridge method at or referred to a frequency of 120 Hz at a temperature of + 25 °C. The maximum voltage applied to the capacitors during measurement shall be 1 V_{RMS}. Measurement accuracy of the bridge shall be within ± 2 %.
5. **Capacitance Change With Temperature:** The capacitance change with temperature shall not exceed the values given in the "Standard Ratings Table" for each capacitor.
6. **Equivalent Series Resistance:** Measurements shall be made by the bridge method at, or referred to, a frequency of 120 Hz at a temperature of + 25 °C. A maximum of 1 V_{RMS} shall be applied during measurement.
 - 6.1 The equivalent series resistance shall not exceed the maximum value in ohms listed in the "Standard Ratings Table" for each capacitor.

6.2. The dissipation factor may be calculated from the equivalent series resistance and capacitance values as shown:

$$DF = \frac{2\pi fRC}{10^4}$$

where:

- DF = Dissipation Factor in %
- R = ESR in Ω
- C = Capacitance in μF
- f = Frequency in Hz

At 120 Hz, the above equation becomes:

$$DF = \frac{R \times C}{13.26}$$

For example, percent dissipation factor of a 30 μF , 6 V capacitor, which has a maximum ESR of 4.0 Ω at + 25 °C and 120 Hz, would be calculated as shown:

$$DF = \frac{2\pi \times 120 \times 4 \times 30}{10^4} = \frac{4 \times 30}{13.26} = 9.05 \%$$

7. **Leakage Current:** Measurements shall be made at the applicable rated working voltage at + 25 °C \pm 5 °C through application of a steady source of power, such as a regulated power supply. A 1000 Ω resistor to limit the charging current shall be connected in series with each capacitor under test. Rated working voltage shall be applied to capacitors for 5 minutes before making leakage current measurements.

7.1 The maximum leakage current for any capacitor shall not exceed the maximum value in mA listed in the "Standard and Extended Ratings Table" for each capacitor.

Note

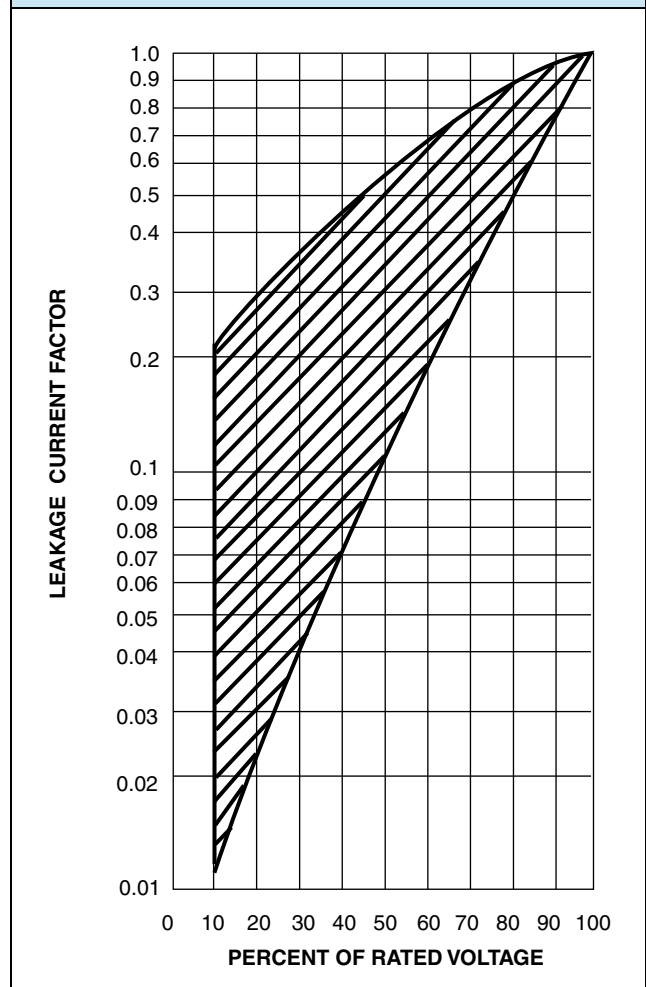
- Leakage current varies with applied voltage. See graph next column for the appropriate adjustment factor

8. **Low Temperature Impedance:** The impedance of any capacitor at - 55 °C at 120 Hz, shall not exceed the values given in the "Standard and Extended Ratings tables".

9. **Life Test:** Capacitors are capable of withstanding a 2000 h life test at a temperature of + 85 °C or + 125 °C at the applicable rated DC working voltage.

9.1 Following the life test, the capacitors shall be returned to 25 °C \pm 5 °C. The leakage current, measured at the + 85 °C rated voltage, shall not be in excess of the original requirement; the capacitance value shall not exceed 150 % of the initial requirement; the capacitance value shall not change more than 10 % from the initial measurement.

TYPICAL LEAKAGE CURRENT FACTOR RANGE



9.3 Capacitors are capable of withstanding life test at the following conditions:

TEMPERATURE	HOURS	% RATED VOLTAGE
+ 175 °C	2000	50
+ 175 °C	300	65
+ 200 °C	300	60

9.4 Following the life test, the capacitors shall be returned to + 25 °C \pm 5 °C. The leakage current, at the rated voltage shall not exceed 200 % of the original requirement or \pm 10 μA , whichever is greater; the equivalent series resistance shall not be greater than 200 % of the original requirement; the capacitance value shall not increase by more than 10 % or decrease by more than 20 % from the initial measurement.



10. **Ripple Life Test at + 85 °C:** Capacitors shall be tested in accordance with Military Specification MIL-C-39006 except that:
- Operation Conditions: This test shall be run at a frequency of 40 kHz \pm 2 kHz sinusoidal and at the RMS ripple current levels specified in the "Standard and Extended Ratings Table".
 - Applied DC voltage shall be reduced so that the peak AC voltage plus DC voltage shall not exceed the rated voltage of the capacitor in either the forward or reverse direction.
- 10.1 When tested as specified above, capacitors shall meet the following requirements:
- The DC leakage current at + 25 °C and at + 85 °C shall not exceed the original requirements.
 - The capacitance shall not change more than \pm 15 % from the initial measured value.
 - The dissipation factor shall not exceed the original requirements.
 - Visual examination: There shall be no damage, obliteration of marking or leakage of electrolyte.
11. **Reverse Voltage Test:** Capacitors shall withstand a reverse voltage of 3 V_{DC} at + 85 °C or 2 V at + 125 °C for 2000 h. The capacitors shall then be restabilized for 24 h at 85 °C with rated DC forward potential applied through a 1000 Ω resistor.
- 11.1 Following the reverse voltage test, the DC leakage current shall not be in excess of the original requirement; the equivalent series resistance shall not exceed 200 % of the initial requirement; the capacitance value shall not be less than 90 % of the initial measurement.
12. **Mechanical Shock Test:** Capacitors shall withstand a shock of 500 g when tested in accordance with method 213 of MIL-STD-202, test condition D.
- 12.1 Following the mechanical shock test, capacitors shall be examined for evidence of mechanical damage and leakage of electrolyte. Capacitance, equivalent series resistance, and DC leakage current shall meet the initial requirements.
13. **High Frequency Vibration:** Capacitors shall withstand vibration from 10 Hz to 2000 Hz at 80 g without internal damage when tested in accordance with MIL-STD-202, method 204, test condition H. Electrical measurements made while under these conditions shall show no intermittent contacts, open circuits or short circuits.
- 13.1 Capacitors shall be securely fastened by means of suitable component clips or brackets.
14. **Random Vibration:** Capacitors shall withstand random vibration at all levels up to 51 g RMS overall when tested in accordance with MIL-STD-202, method 214, test condition II K. The test shall be conducted for 1.5 h in each of three mutually perpendicular directions.
- 14.1 Electrical measurements made during the test shall show no intermittent contacts, open circuits or short circuits.
15. **Pull Test:** Leads shall withstand a tensile stress of 3 lbs. (1.4 kg) for 30 s applied axially in accordance with MIL-STD-202, method 211, test condition A.
16. **Lead Bend Test:** Leads shall meet the bend test specified in Military Standard MIL-STD-202, method 211 A, condition C except that the number of bends shall be 4.
17. **Moisture Resistance:** Capacitors shall withstand the moisture resistance cycling test specified in Military Standard MIL-STD-202, method 106, without departure from the original limits of capacitance, equivalent series resistance and DC leakage current.
18. **Reduced Pressure:** Capacitors shall be stabilized at a reduced atmospheric pressure of 0.82" [20.83 mm] of mercury for a period of 5 min. Rated DC voltage shall be applied for 1 min. Capacitors shall not flash over nor shall end seals be damaged by this nor should the capacitors be electrically effected insofar as capacitance, equivalent series resistance or leakage current is concerned.
19. **Seal Test:**
- 19.1 Capacitors shall be tested in accordance with MIL-STD-202, method 112, test condition C, procedure IIIa. Specimens shall be pressurized at 4 atmospheres (gage) for 4 h.
20. **Thermal shock:** Capacitors shall be subjected to 300 cycles of thermal shock in accordance with Military specification MIL-C-39006.
- 20.1 Following the thermal shock test, capacitor leakage current shall not exceed twice the initial requirement.
21. **Marking:** Capacitors shall be marked with Sprague, the Sprague type (135D); rated capacitance and tolerance (the tolerance shall be coded, using the list shown in How to Order); rated DC working voltage at + 85 °C; the standard EIA date code of manufacture.
- 21.1 Polarity shall be indicated by plus signs (+) adjacent to the positive terminal.

GUIDE TO APPLICATION

1. **AC Ripple Current:** Subjecting a capacitor to an AC voltage causes an AC current to flow through it. The amplitude of the current is dependent on the impedance of the capacitor at the frequency of the applied signal:

$$I = \frac{V}{Z}$$

where:

I = Ripple current

V = Applied AC voltage

Z = Impedance of capacitor (frequency dependent)

This current causes heating in the capacitor because of I^2R losses (R is the equivalent series resistance at the applied frequency). This heating or power dissipation, is one of the limiting factors of the capacitor's ripple current rating.

CASE CODE	MAXIMUM PERMISSIBLE POWER DISSIPATION AT + 25 °C (W) IN FREE AIR
C	1.00
F	1.55
T	1.75
K	1.95

These power dissipation ratings are based on a calculated + 50 °C internal temperature rise in still air. The maximum allowable ripple currents given in the "Standard and Extended Ratings Tables" are based on these ratings and the maximum equivalent series resistance at that frequency.

The relationship is written as follows:

$$P = I^2R$$

where:

P = Maximum power

I = Maximum ripple current

R = Equivalent series resistance

Therefore:

$$I = \sqrt{\frac{P}{R}}$$

where:

R is in Ω

P is in W

I is in A_{RMS}

2. **AC Ripple Voltage:** In operation, the peak voltage across the capacitor (DC working voltage plus peak ripple voltage) must not exceed the rated working voltage of the capacitor. The DC component of the applied voltage should be sufficiently large to prevent polarity reversal in excess of 3 V at + 85 °C or 2 V at 125 °C.

There will be a point at the lower frequency and capacitance values when the peak AC voltage will be the limiting factor on the ripple current - not its heating effects.

For example:

Given a 25 μF , 8 V capacitor in the "C" case code and assuming a ripple current application at a frequency of 120 Hz, the total maximum allowable peak to peak voltage at + 25 °C is:

$$8 V_F + 3 V_R = 11 V_{pp}$$

In order to allow the full swing of 11 V_{pp} and not exceed rated forward or rated reverse, a DC bias of 2.5 V is assumed to be applied.

From the "Standard Ratings Table", the maximum ripple current at 40 kHz is 0.820 A. Compensating for the lower frequency from the "Ripple Current Multipliers" tables:

$$I_{RMS} (120 \text{ Hz}) = 0.820 \text{ A} \times 0.6 = 0.492 A_{RMS}$$

This current rating is calculated strictly on the basis of maximum power dissipation. Now calculate what impressed voltage this amount of current will cause across this capacitor.

Assuming a sinusoidal voltage, calculate the rated peak to peak current:

$$I_{pp} = I_{RMS} \times 2\sqrt{2} = 0.492 \times 2.828 = 1.39 A_{pp}$$

$$V_{pp(\text{impressed})} = I_{pp} \times Z_C (120 \text{ Hz})$$

where:

$$Z_{C(120\text{Hz})} = (\sqrt{(\text{ESR})^2} + (X_{C(120 \text{ Hz})})^2)$$

ESR = 4 Ω (from "Standard Ratings" table)

$$X_C = \frac{1}{2\pi fC} = \frac{1}{2(\pi)(120)(25 \times 10^{-6})} = 53.1 \Omega$$

Therefore:

$$Z_C = \sqrt{(4)^2 + (53.1)^2} = 53.3 \Omega$$

and

$$\begin{aligned} V_{pp(\text{impressed})} &= 1.39 A_{pp} \times 53.3 \Omega \\ &= 74.1 V_{pp} > 11 V_{pp} \end{aligned}$$

Therefore, the peak voltage of the capacitor is the limiting factor for the ripple current and can be calculated as follows:

$$\text{Max } I_{pp} = \frac{V_{C_{pp}(\text{allowed})}}{Z_C} = \frac{11.0 \text{ V}}{53.3 \Omega} = 0.206 A_{pp}$$



or

$$\frac{0.206}{2\sqrt{2}} = 0.073 A_{RMS} \text{ at } 120 \text{ Hz}$$

Verifying that the 40 kHz rating does not exceed the peak voltage limitations:

$$I_{rated} = 0.820 A_{RMS}$$

$$I_{pp(rated)} = 0.820 \times 2\sqrt{2} = 2.32 A_{pp}$$

$$Z_{C(40 \text{ kHz})} = \sqrt{(ESR_{(40 \text{ kHz})})^2 + (X_{C(40 \text{ Hz})})^2}$$

where:

$$ESR_{(40 \text{ kHz})} = 4 \Omega_{(120 \text{ Hz})} \times 0.34$$

(from Extended Range tables) = 1.36 Ω

and:

$$X_{C(40 \text{ kHz})} = \frac{1}{2\pi fC}$$

$$= \frac{1}{2\pi \times (40 \times 10^3) \times (25 \times 10^{-6})} = 0.159 \Omega$$

thus:

$$Z_{C(40 \text{ kHz})} = \sqrt{(1.36)^2 + (0.159)^2} = 1.37 \Omega$$

Therefore the impressed voltage is:

$$V_{C_{pp}} = Z_{C_{pp}} I_{pp} = 1.37 \Omega \times 2.32 A_{pp} = 3.18 V_{pp}$$

and:

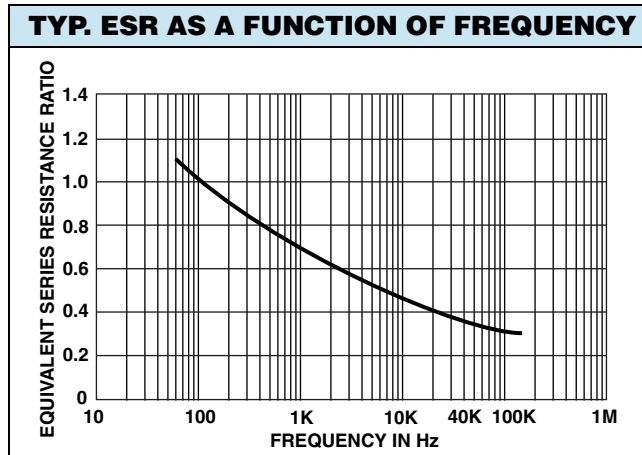
$$3.18 V < 11V$$

Therefore, if the capacitor is biased between - 1.41 V DC and + 6.41 V_{DC}, it can withstand the rated ripple

current, which is based only on the maximum allowable power dissipation.

3. **Ripple Current Multipliers:** The “Standard and Extended Ratings” tables list the maximum permissible RMS ripple current at 40 kHz for each rating. These values are based on the maximum power dissipation allowed at that frequency.

This ripple current, will cause heating, which adds to the ambient temperature. The higher ambient temperatures, voltage derating or current derating is required (see “Ripple Current Multipliers” tables). Also shown are the multipliers for ripple currents at various frequencies, caused by the frequency dependence of the (ESR) equivalent series resistance. (see “Typical ESR as a Function of Frequency” chart)



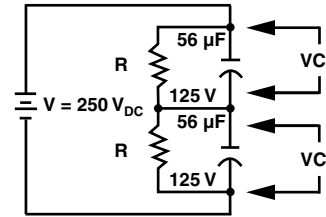
RIPPLE CURRENT MULTIPLIERS (120 Hz to 1 kHz)									
% OF + 85 °C RATED PEAK VOLTAGE	RIPPLE CURRENT MULTIPLIERS								
	120 Hz			800 Hz			1 kHz		
	≤ - 55 °C	+ 85 °C	+ 125 °C	≤ - 55 °C	+ 85 °C	+ 125 °C	≤ - 55 °C	+ 85 °C	+ 125 °C
100	0.60	0.39	-	0.71	0.43	-	0.72	0.45	-
90	0.60	0.46	-	0.71	0.55	-	0.72	0.55	-
80	0.60	0.52	-	0.71	0.62	-	0.72	0.62	-
70	0.60	0.58	-	0.71	0.69	-	0.72	0.70	-
≤ 67	0.60	0.60	0.27	0.71	0.71	0.32	0.72	0.72	0.32

RIPPLE CURRENT MULTIPLIERS (10 kHz to 100 kHz)									
% OF + 85 °C RATED PEAK VOLTAGE	RIPPLE CURRENT MULTIPLIERS								
	10 kHz			40 kHz			100 kHz		
	≤ - 55 °C	+ 85 °C	+ 125 °C	≤ - 55 °C	+ 85 °C	+ 125 °C	≤ - 55 °C	+ 85 °C	+ 125 °C
100	0.88	0.55	-	1.0	0.63	-	1.1	0.69	-
90	0.88	0.67	-	1.0	0.77	-	1.1	0.85	-
80	0.88	0.76	-	1.0	0.87	-	1.1	0.96	-
70	0.88	0.85	-	1.0	0.97	-	1.1	1.07	-
≤ 67	0.88	0.88	0.40	1.0	1.0	0.45	1.1	1.1	0.50

Wet Tantalum Capacitors Tantalum-Case with Glass-to-Tantalum Hermetic Seal for - 55 °C to + 200 °C Operation

- Storage Life:** A storage life of 10 years or more, with no voltage at room temperature, may be expected.
- Series Operation:** These capacitors may be used in some series applications. For such an application to achieve a high voltage rating (e.g. 28 μ F, 250 V using two 56 μ F, 125 V capacitors), a suitable balancing network of resistors in parallel with the capacitors is required to evenly distribute the voltage across each capacitor. The value of the appropriate resistor will be dependent on the DC leakage current of the capacitors and, as recommended value, it should be selected to allow a current equal to 10 times the DC leakage current limit (see "Standard and Extended Ratings" table at the appropriate temperature) to flow parallel to each capacitor.

For example:



For example:

$$R = \frac{V_C}{10 I_{DCL}} = \frac{125 \text{ V}}{200 \mu\text{A}} = 625 \text{ k}\Omega$$

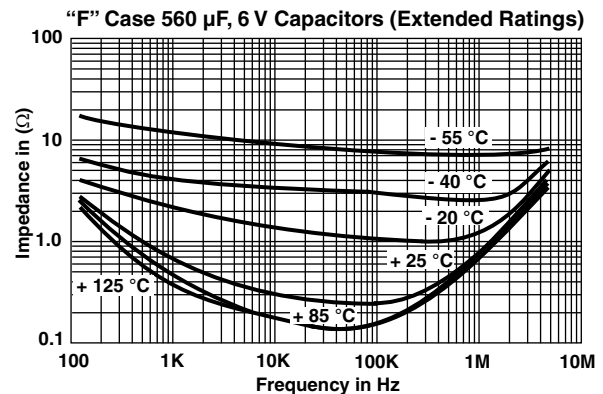
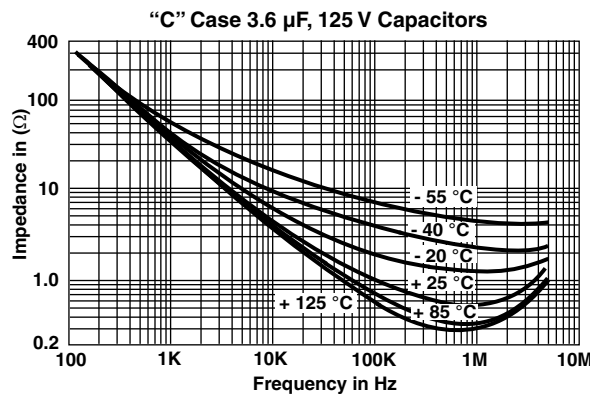
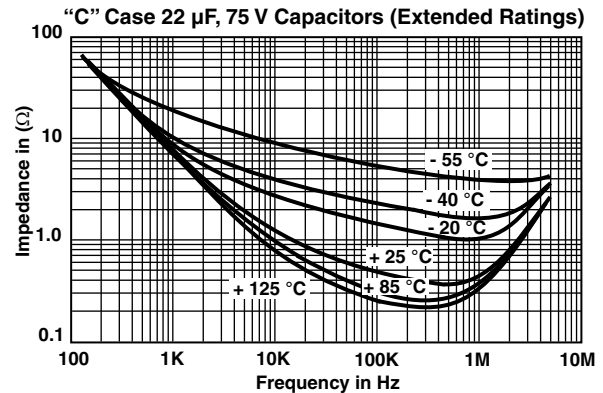
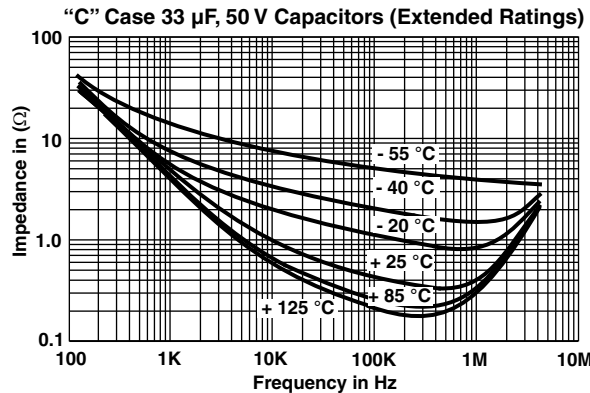
where:

V_C = Voltage across capacitor

I_{DCL} = DC leakage current at + 85 °C from "Standard and Extended Ratings" table

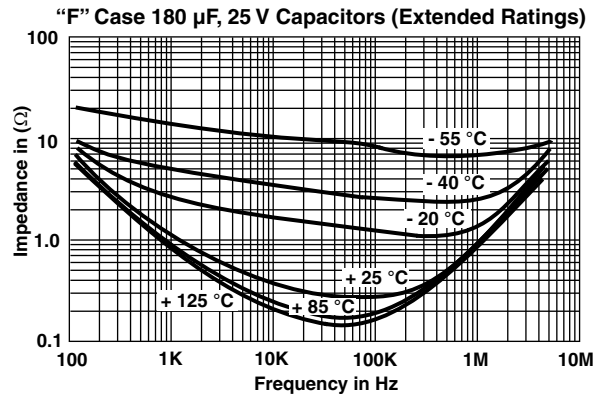
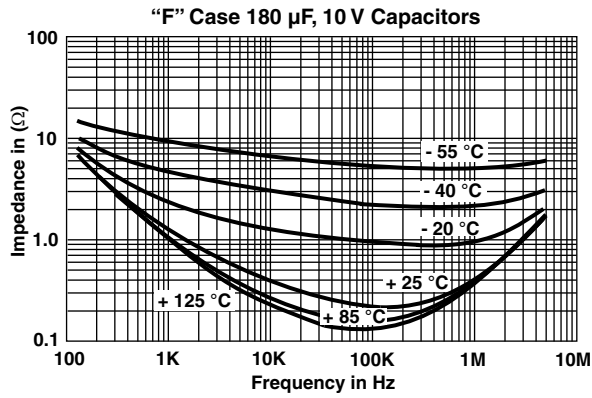
- Special Applications:** Vishay Sprague product specialists will, on request, furnish recommendations for your particular application.

TYPICAL CURVES OF IMPEDANCE, AS A FUNCTION OF FREQUENCY

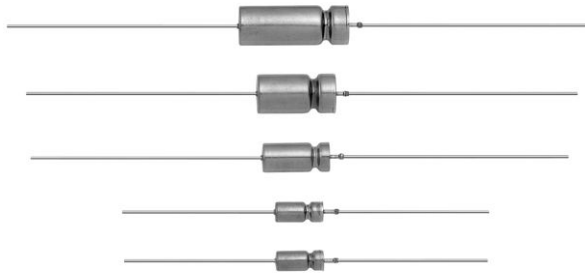




TYPICAL CURVES OF IMPEDANCE, AS A FUNCTION OF FREQUENCY



Wet Tantalum Capacitors with Glass to Tantalum Hermetic Seal CECC 30202 Approved



FEATURES

- Terminations: standard tin/lead (SnPb), 100 % tin (RoHS compliant) available
- For - 55 °C to + 125 °C operation
- All tantalum case
- Glass to tantalum hermetic seal
- Low ESR
- High CV per unit volume
- Extremely low leakage current
- High permissible ripple current
- 3 V reverse voltage capability
- Compliant to RoHS Directive 2002/95/EC



RoHS*
COMPLIANT

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 85 °C
(To + 125 °C with voltage derating)

Capacitance Tolerance: At 120 Hz, + 25 °C. ± 20 % standard. ± 10 %, ± 5 % available as special

DC Leakage Current (DCL Max.):

At + 25 °C and above: Leakage current shall not exceed the values listed in the Standard Ratings Tables

APPROVALS

- CECC-30202-001 style 735D
- CECC-30202-801 style 735DE
- CECC 30202-005 style CT79

APPLICATIONS

Designed specifically for the severe operating environment of aerospace applications, this capacitor was developed under partial sponsorship of the Marshall Space Flight Center, National Aeronautics and Space Administration. To meet aerospace requirements, the capacitors have a high resistance to damage from shock and vibration.

ORDERING INFORMATION						
CT79 735D 735DE	226	X0	025	A	2	E3
MODEL	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT +85 °C	CASE CODE	STYLE NUMBER	RoHS COMPLIANT
	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow	X0 = ± 20 % X9 = ± 10 % X5 = ± 5 %	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	See Table of Dimensions	0 = Bare case 2 = Outer polyester film insulation 3 = High temperature film insulation	E3 = 100 % tin termination (RoHS compliant design) Blank = SnPb termination (standard design)

Note

Packaging: The use of formed plastic trays for packaging this type of axial lead component is standard. Tape and reel is not recommended due to the unit weight.

* Pb containing terminations are not RoHS compliant, exemptions may apply

735D, 735DE, CT79 (CECC 30202)



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Wet Tantalum Capacitors with Glass to
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DIMENSIONS in inches [millimeters]						
CASE CODE		D	L ₁	L ₂ (Max.)	E	WEIGHT (g) (Max.)
TYPE 735D	DCLR 79/81 EQUIV.					
A	T1	0.188 ± 0.016 [4.78 ± 0.41]	0.453 + 0.031 - 0.016 [11.51 + 0.79 - 0.41]	0.734 [18.64]	1.500 ± 0.250 [38.10 ± 6.35]	2.6
B	T2	0.281 ± 0.016 [7.14 ± 0.41]	0.641 + 0.031 - 0.016 [16.28 + 0.79 - 0.41]	0.922 [23.42]	2.250 ± 0.250 [57.15 ± 6.35]	6.2
C	T3	0.375 ± 0.016 [9.53 ± 0.41]	0.766 + 0.031 - 0.016 [19.46 + 0.79 - 0.41]	1.047 [26.59]	2.250 ± 0.250 [57.15 ± 6.35]	11.6
D	T4	0.375 ± 0.016 [9.53 ± 0.41]	1.062 + 0.031 - 0.016 [26.97 + 0.79 - 0.41]	1.343 [34.11]	2.250 ± 0.250 [57.15 ± 6.35]	17.7

Note

• For insulated parts, add 0.007" [0.178] to the diameter. The insulation shall lap over the ends of the capacitor body.

STANDARD RATINGS										
CAPACITANCE (µF)	CASE CODE	PART NUMBER	MAX. DF at	MAX. IMP. at	MAX. DCL (µA) at		MAX. CAP. CHANGE (%) at			MAX. RMS RIPPLE CURRENT 40 kHz (mA)
			+ 20 °C (%)	- 55 °C (Ω)	+ 20 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
6.3 V_{DC} at + 85 °C, 4 V_{DC} at + 125 °C										
68	A	735D686X06R3A	15	60	1.0	2.0	- 40	+ 14	+ 16	960
120	A	735D127X06R3A	21	81	1.5	3.0	- 41	+ 15	+ 16	820
150	A	735D157X06R3A	34	80	2.0	9.0	- 42	+ 16	+ 16	820
220	B	735D227X06R3B	40	30	1.0	6.5	- 44	+ 16	+ 18	1370
470	B	735D477X06R3B	90	46	2.0	10	- 60	+ 20	+ 20	1285
560	B	735D567X06R3B	106	48	2.0	10	- 68	+ 20	+ 20	1255
560	C	735D567X06R3C	50	25	2.0	16	- 64	+ 18	+ 20	1900
1000	D	735D108X06R3D	72	22	3.0	14	- 80	+ 25	+ 25	2390
1500	C	735D158X06R3C	172	36	5.0	20	- 90	+ 25	+ 25	1615
2200	D	735D228X06R3D	170	22	6.0	24	- 90	+ 25	+ 25	2265
10 V_{DC} at + 85 °C, 7 V_{DC} at + 125 °C										
47	A	735D476X0010A2	13	100	1.0	2.0	- 36	+ 14	+ 16	855
68	A	735D686X0010A2	21	85	1.5	3.0	- 40	+ 15	+ 16	820
82	A	735D826X0010A2	25	84	2.0	6.0	- 40	+ 16	+ 16	820
100	A	735D107X0010A2	30	82	2.0	6.0	- 40	+ 16	+ 16	820
150	B	735D157X0010B2	30	45	1.0	7.0	- 32	+ 14	+ 16	1275
180	B	735D187X0010B2	30	40	1.0	7.0	- 35	+ 14	+ 16	1300
330	B	735D337X0010B2	65	52	2.0	10	- 54	+ 17	+ 18	1195
390	B	735D397X0010B2	74	54	2.0	10	- 60	+ 19	+ 20	1195
470	C	735D477X0010C2	44	25	2.0	15	- 65	+ 18	+ 20	1800
680	D	735D687X0010D2	46	20	3.0	16	- 80	+ 25	+ 25	2490
820	D	735D827X0010D2	57	22	3.0	16	- 80	+ 25	+ 25	2360
1000	C	735D108X0010C2	92	36	4.0	16	- 80	+ 25	+ 25	1720
1200	C	735D128X0010C2	137	36	5.0	20	- 80	+ 25	+ 25	1720
1500	D	735D158X0010D2	114	23	7.0	25	- 88	+ 30	+ 30	2360
1800	D	735D188X0010D2	138	24	7.0	25	- 88	+ 30	+ 30	2360



735D, 735DE, CT79 (CECC 30202)

Wet Tantalum Capacitors with Glass to
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STANDARD RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. DF at + 20 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. DCL (μ A) at		MAX. CAP. CHANGE (%) at			MAX. RMS RIPPLE CURRENT 40 kHz (mA)
					+ 20 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
16 V_{DC} at + 85 °C, 10 V_{DC} at + 125 °C										
33	A	735D336X0016A2	10	90	1.0	2.0	- 28	+ 14	+ 16	820
47	A	735D476X0016A2	20	100	1.5	3.0	- 28	+ 16	+ 16	760
56	A	735D566X0016A2	22	100	1.5	3.0	- 28	+ 16	+ 16	760
120	B	735D127X0016B2	25	50	1.0	7.0	- 28	+ 14	+ 16	1230
220	B	735D227X0016B2	42	62	2.0	10	- 35	+ 16	+ 16	1215
270	B	735D277X0016B2	55	60	2.0	12	- 45	+ 18	+ 18	1215
330	C	735D337X0016C2	40	30	2.0	14	- 58	+ 18	+ 20	1760
470	D	735D477X0016D2	37	24	3.0	18	- 75	+ 25	+ 25	2100
560	D	735D567X0016D2	40	23	3.0	18	- 80	+ 25	+ 25	2300
680	C	735D687X0016C2	80	42	5.0	20	- 80	+ 25	+ 25	1585
820	C	735D827X0016C2	95	42	6.0	24	- 80	+ 25	+ 25	1585
1000	D	735D108X0016D2	92	25	8.0	32	- 82	+ 25	+ 25	2300
1200	D	736D128X0016D2	103	25	8.0	32	- 84	+ 25	+ 30	2300
25 V_{DC} at + 85 °C, 16 V_{DC} at + 125 °C										
22	A	735D226X0025A2	7	140	1.0	2.0	- 20	+ 10	+ 12	800
27	A	735D276X0025A2	11	140	1.5	3.0	- 20	+ 12	+ 12	715
33	A	735D336X0025A2	13	130	1.5	3.0	- 24	+ 14	+ 14	715
39	A	735D396X0025A2	16	120	2.0	9.0	- 28	+ 16	+ 16	715
100	B	735D107X0025B2	21	50	1.0	9.0	- 28	+ 13	+ 15	1215
150	B	735D157X0025B2	35	62	2.0	10	- 35	+ 15	+ 15	1130
180	B	735D187X0025B2	35	60	2.0	10	- 48	+ 14	+ 15	1130
220	C	735D227X0025C2	35	33	2.0	13	- 52	+ 18	+ 20	1615
330	D	735D337X0025D2	30	27	3.0	20	- 60	+ 25	+ 25	1865
390	C	735D397X0025C2	48	48	7.0	28	- 70	+ 25	+ 25	1400
390	D	735D397X0025D2	35	24	3.0	20	- 68	+ 25	+ 25	2025
470	C	735D477X0025C2	48	48	7.0	28	- 76	+ 25	+ 25	1400
560	C	735D567X0025C2	60	48	7.0	28	- 80	+ 25	+ 25	1400
680	D	735D687X0025D2	60	24	8.0	32	- 80	+ 25	+ 25	1940
820	D	735D827X0025D2	82	26	8.0	32	- 80	+ 25	+ 25	1865
40 V_{DC} at + 85 °C, 25 V_{DC} at + 125 °C										
15	A	735D156X0040A2	7	175	1.0	2.0	- 20	+ 10	+ 12	660
18	A	735D186X0040A2	10	200	1.5	4.0	- 20	+ 12	+ 12	580
22	A	735D226X0040A2	11	190	1.5	4.0	- 24	+ 12	+ 12	580
68	B	735D686X0040B2	15	60	1.0	8.0	- 24	+ 13	+ 15	1285
100	B	735D107X0040B2	25	60	2.0	10	- 40	+ 15	+ 15	1285
120	B	735D127X0040B2	30	62	2.0	12	- 32	+ 15	+ 15	1245
150	C	735D157X0040C2	23	35	2.0	12	- 48	+ 14	+ 15	1525
220	D	735D227X0040D2	23	27	3.0	22	- 58	+ 23	+ 23	1900
270	C	735D277X0040C2	37	52	7.0	28	- 60	+ 25	+ 25	1375
330	C	735D337X0040C2	43	52	8.0	32	- 65	+ 25	+ 25	1375
390	D	735D397X0040D2	43	30	8.0	32	- 75	+ 25	+ 25	1900
470	D	735D477X0040D2	45	30	9.0	36	- 80	+ 25	+ 25	1900

735D, 735DE, CT79 (CECC 30202)



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Wet Tantalum Capacitors with Glass to
Tantalum Hermetic Seal CECC 30202 Approved

STANDARD RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. DF	MAX. IMP.	MAX. DCL (μ A)		MAX. CAP. CHANGE (%)			MAX. RMS RIPPLE CURRENT 40 kHz (mA)
			at + 20 °C (%)	at - 55 °C (Ω)	at + 20 °C	at + 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
63 V_{DC} at + 85 °C, 40V_{DC} at + 125 °C										
10	A	735D106X0063A2	4	250	1.0	2.0	- 20	+ 8	+ 9	575
12	A	735D126X0063A2	7	233	2.0	4.0	- 20	+ 8	+ 9	575
15	A	735D156X0063A2	8	220	2.0	9.0	- 22	+ 9	+ 9	565
47	B	735D476X0063B2	13	70	1.0	9.0	- 24	+ 13	+ 15	1150
56	B	735D566X0063B2	18	72	2.0	12	- 26	+ 14	+ 15	1150
82	B	735D826X0063B2	22	70	2.0	12	- 36	+ 15	+ 15	1150
100	C	735D107X0063C2	18	42	2.0	11	- 37	+ 14	+ 15	1420
120	C	735D127X0063C2	20	49	3.0	18	- 40	+ 18	+ 18	1420
150	D	735D157X0063D2	17	27	3.0	22	- 45	+ 20	+ 20	1865
220	C	735D227X0063C2	37	55	8.0	32	- 50	+ 25	+ 25	1345
270	D	735D277X0063D2	26	33	9.0	36	- 70	+ 24	+ 25	1850
330	D	735D337X0063D2	32	31	10	40	- 72	+ 25	+ 25	1850
75 V_{DC} at + 85 °C, 50 V_{DC} at + 125 °C										
6.8	A	735D685X0075A2	3	300	1.0	2.0	- 20	+ 8	+ 9	610
8.2	A	735D825X0075A2	6	280	1.5	3.0	- 22	+ 9	+ 9	610
33	B	735D336X0075B2	10	90	1.0	9.0	- 24	+ 10	+ 12	1079
47	B	735D476X0075B2	15	87	2.0	10	- 30	+ 14	+ 14	1055
68	B	735D686X0075B2	21	86	2.0	12	- 36	+ 15	+ 15	1055
68	C	735D686X0075C2	13	50	2.0	10	- 30	+ 14	+ 15	1525
82	C	735D826X0075C2	15	45	2.0	10	- 32	+ 15	+ 15	1335
100	C	735D107X0075C2	19	60	8.0	32	- 36	+ 17	+ 18	1335
120	D	735D127X0075D2	12	28	3.0	24	- 36	+ 20	+ 20	1915
150	C	735D157X0075C2	25	60	9.0	36	- 40	+ 20	+ 20	1335
150	D	735D157X0075D2	17	30	9.0	36	- 48	+ 21	+ 22	1915
180	C	735D187X0075C2	28	60	9.0	36	- 50	+ 22	+ 22	1335
220	D	735D227X0075D2	37	32	10	40	- 60	+ 22	+ 22	1850
100 V_{DC} at + 85 °C, 70 V_{DC} at + 125 °C										
4.7	A	735D475X0100A2	3	500	1.0	2.0	- 16	+ 7	+ 8	565
5.6	A	735D565X0100A2	6	475	2.0	5.0	- 17	+ 8	+ 8	530
22	B	735D226X0100B2	8	100	1.0	9.0	- 16	+ 8	+ 8	1065
33	B	735D336X0100B2	14	95	3.0	15	- 16	+ 8	+ 8	1065
33	C	735D336X0100C2	7	93	2.0	10	- 16	+ 8	+ 8	1200
39	B	735D396X0100B2	10	92	2.0	12	- 24	+ 12	+ 12	1065
39	C	735D396X0100C2	8	90	2.0	10	- 16	+ 8	+ 8	1285
47	C	735D476X0100C2	9	70	2.0	10	- 23	+ 10	+ 10	1390
56	C	735D566X0100C2	11	60	2.0	10	- 28	+ 14	+ 15	1335
68	C	735D686X0100C2	15	60	10	40	- 30	+ 15	+ 15	1335
68	D	735D686X0100D2	8	42	3.0	26	- 24	+ 15	+ 15	1860
82	D	735D826X0100D2	10	39	3.0	24	- 24	+ 18	+ 18	1860
100	D	735D107X0100D2	11	36	3.0	24	- 35	+ 20	+ 20	1860
125 V_{DC} at + 85 °C, 85 V_{DC} at + 125 °C										
2.7	A	735D275X0125A2	3	780	1.0	2.0	- 16	+ 7	+ 8	455
3.3	A	735D335X0125A2	3	600	1.0	2.0	- 16	+ 7	+ 8	495
3.9	A	735D395X0125A2	3.5	557	2.0	5.0	- 16	+ 8	+ 8	495
15	B	735D156X0125B2	6	167	1.0	7.0	- 16	+ 7	+ 8	1050
18	B	735D186X0125B2	8	133	2.0	10	- 16	+ 8	+ 8	1065
39	C	735D396X0125C2	8	90	2.0	10	- 16	+ 8	+ 8	1285
47	C	735D476X0125C2	9	70	2.0	10	- 23	+ 10	+ 10	1285
68	D	735D686X0125D2	8	42	3.0	26	- 24	+ 15	+ 15	1860
82	D	735D826X0125D2	10	39	3.0	24	- 24	+ 18	+ 18	1860



735D, 735DE, CT79 (CECC 30202)

Wet Tantalum Capacitors with Glass to
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STANDARD RATINGS to mil range CLR79										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. ESR at + 25 °C 120 Hz (Ω)	MAX. IMP. at - 55 °C (Ω)	MAX. DCL (μ A) at		MAX. CAP. CHANGE (%) at			MAX. RMS RIPPLE CURRENT 40 kHz (mA)
					+ 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
6 V_{DC} at + 85 °C, 4 V_{DC} at + 125 °C										
30	A	735D306X0006A2	4.0	100	0.75	1.5	- 40	+ 12	+ 12	820
68	A	735D686X0006A2	2.9	60	0.75	1.5	- 40	+ 16	+ 16	960
140	B	735D147X0006B2	2.2	40	1.0	3.0	- 40	+ 16	+ 16	1200
160	A	735D167X0006A2	4.0	80	1.5	3.0	- 42	+ 16	+ 16	820
270	B	735D277X0006B2	2.0	25	1.0	2.0	- 44	+ 20	+ 20	1375
330	C	735D337X0006C2	1.4	20	2.0	6.0	- 44	+ 16	+ 16	1800
560	B	735D567X0006B2	2.4	48	2.0	10	- 68	+ 20	+ 20	1255
560	C	735D567X0006C2	1.3	25	2.0	6.0	- 64	+ 20	+ 20	1900
1200	D	735D128X0006D2	0.9	20	3.0	12	- 80	+ 25	+ 25	2388
1500	C	735D158X0006C2	1.8	36	3.0	15	- 84	+ 25	+ 25	1615
2200	D	735D228X0006D2	1.0	22	4.0	15	- 86	+ 25	+ 25	2265
8 V_{DC} at + 85 °C, 5 V_{DC} at + 125 °C										
25	A	735D256X0008A2	4.0	100	0.75	1.5	- 40	+ 12	+ 12	820
56	A	735D566X0008A2	3.3	59	0.75	1.5	- 40	+ 16	+ 16	900
120	A	735D127X0008A2	4.0	80	1.0	2.0	- 44	+ 20	+ 16	820
120	B	735D127X0008B2	2.6	50	1.0	2.0	- 44	+ 20	+ 16	1230
220	B	735D227X0008B2	2.4	30	1.0	2.0	- 44	+ 18	+ 20	1300
290	C	735D297X0008C2	1.8	25	2.0	6.0	- 64	+ 20	+ 16	1745
430	B	735D437X0008B2	2.6	54	2.0	10	- 64	+ 20	+ 20	1230
430	C	735D437X0008C2	1.4	25	2.0	6.0	- 64	+ 20	+ 20	1825
850	D	735D857X0008D2	1.0	22	3.0	12	- 80	+ 25	+ 25	2456
10 V_{DC} at + 85 °C, 7 V_{DC} at + 125 °C										
20	A	735D206X0010A2	4.0	175	0.75	1.5	- 32	+ 12	+ 12	820
100	B	735D107X0010B2	2.4	60	1.0	2.0	- 35	+ 16	+ 16	1200
250	C	735D257X0010C2	1.8	30	2.0	6.0	- 40	+ 16	+ 16	1720
300	B	735D307X0010B2	2.6	52	2.0	5.0	- 54	+ 18	+ 18	1195
350	B	735D357X0010B2	2.6	52	2.0	5.0	- 60	+ 18	+ 18	1195
390	C	735D397X0010C2	1.5	25	2.0	6.0	- 64	+ 20	+ 20	1800
750	D	735D757X0010D2	0.9	22	3.0	12	- 80	+ 25	+ 25	2487
850	C	735D857X0010C2	1.8	36	3.0	12	- 84	+ 25	+ 25	1720
15 V_{DC} at + 85 °C, 10 V_{DC} at + 125 °C										
15	A	735D156X0015A2	4.4	155	0.75	1.5	- 24	+ 12	+ 12	780
33	A	735D336X0015A2	4.0	90	0.75	1.5	- 28	+ 16	+ 16	820
47	A	735D476X0015A2	4.7	100	1.0	2.0	- 28	+ 16	+ 16	760
56	A	735D566X0015A2	4.7	100	1.0	2.0	- 28	+ 16	+ 16	760
70	B	735D706X0015B2	2.8	75	1.0	2.0	- 28	+ 16	+ 16	1150
120	B	735D127X0015B2	2.6	50	1.0	2.0	- 28	+ 16	+ 16	1230
170	C	735D177X0015C2	2.4	35	2.0	6.0	- 32	+ 16	+ 16	1480
220	B	735D227X0015B2	2.8	62	2.0	5.0	- 35	+ 16	+ 16	1215
270	B	735D277X0015B2	2.8	60	2.0	5.0	- 45	+ 18	+ 18	1215
270	C	735D277X0015C2	2.2	30	2.0	6.0	- 56	+ 20	+ 20	1709
290	B	735D297X0015B2	2.8	65	2.0	5.0	- 54	+ 18	+ 18	1215
540	D	735D547X0015D2	1.0	23	3.0	12	- 80	+ 25	+ 25	2300
750	C	735D757X0015C2	2.1	42	3.0	15	- 80	+ 25	+ 25	1582
850	D	735D857X0015D2	1.0	24	4.0	15	- 80	+ 25	+ 25	2300
1200	D	735D128X0015D2	1.0	25	4.0	15	- 84	+ 25	+ 25	2300

735D, 735DE, CT79 (CECC 30202)



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Wet Tantalum Capacitors with Glass to
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STANDARD RATINGS to mil range CLR79										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. ESR at + 25 °C 120 Hz (Ω)	MAX. IMP. at - 55 °C (Ω)	MAX. DCL (μ A) at		MAX. CAP. CHANGE (%) at			MAX. RMS RIPPLE CURRENT 40 kHz (mA)
					+ 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
25 V_{DC} at + 85 °C, 15 V_{DC} at + 125 °C										
10	A	735D106X0025A2	5.3	220	0.75	1.5	- 16	+ 9	+ 9	715
43	A	735D436X0025A2	5.3	120	1.5	3.0	- 28	+ 16	+ 16	715
50	B	735D506X0025B2	3.0	70	1.0	2.0	- 28	+ 15	+ 15	1130
120	C	735D127X0025C2	2.6	38	2.0	6.0	- 32	+ 15	+ 15	1420
160	B	735D167X0025B2	3.0	60	2.0	5.0	- 35	+ 15	+ 15	1130
180	C	735D187X0025C2	2.0	32	2.0	6.0	- 48	+ 15	+ 15	1531
350	D	735D357X0025D2	1.0	24	3.0	12	- 64	+ 25	+ 25	2246
850	D	735D857X0025D2	1.3	26	4.0	15	- 80	+ 25	+ 25	1970
30 V_{DC} at + 85 °C, 20 V_{DC} at + 125 °C										
8.0	A	735D805X0030A2	6.6	275	0.75	1.5	- 16	+ 12	+ 12	640
15	A	735D156X0030A2	6.2	175	0.75	1.5	- 20	+ 12	+ 12	660
25	A	735D256X0030A2	6.6	160	1.5	3.0	- 24	+ 12	+ 12	640
33	A	735D336X0030A2	6.6	160	1.5	3.0	- 26	+ 12	+ 12	640
40	B	735D406X0030B2	3.7	65	1.0	2.0	- 24	+ 12	+ 12	1065
68	B	735D686X0030B2	2.8	60	1.0	2.0	- 24	+ 15	+ 15	1215
100	C	735D107X0030C2	2.6	40	2.0	6.0	- 28	+ 12	+ 12	1477
120	B	735D127X0030B2	3.0	60	2.0	5.0	- 32	+ 15	+ 15	1185
150	B	735D157X0030B2	3.0	60	2.0	6.0	- 35	+ 15	+ 15	1185
150	C	735D157X0030C2	2.3	35	2.0	6.0	- 48	+ 15	+ 15	1525
170	B	735D177X0030B2	3.0	65	2.0	7.0	- 48	+ 15	+ 15	1185
300	C	735D307X0030C2	2.2	44	3.0	12	- 60	+ 15	+ 15	1559
300	D	735D307X0030D2	1.2	31	3.0	12	- 60	+ 25	+ 25	2100
330	C	735D337X0030C2	2.6	52	3.0	12	- 65	+ 25	+ 25	1373
350	C	735D357X0030C2	2.6	52	3.0	15	- 70	+ 25	+ 25	1477
390	C	735D397X0030C2	2.6	52	3.0	15	- 75	+ 25	+ 25	1477
430	C	735D437X0030C2	2.6	54	3.0	15	- 80	+ 25	+ 25	1477
560	D	735D567X0030D2	1.4	30	4.0	20	- 80	+ 25	+ 25	1050
50 V_{DC} at + 85 °C, 30 V_{DC} at + 125 °C										
5.0	A	735D505X0050A2	8.0	400	0.75	2.0	- 16	+ 6	+ 6	580
10	A	735D106X0050A2	6.4	250	0.75	2.0	- 20	+ 9	+ 9	640
18	A	735D186X0050A2	8.0	200	1.5	3.0	- 24	+ 12	+ 12	580
22	A	735D226X0050A2	8.0	190	1.5	4.0	- 24	+ 12	+ 12	580
25	B	735D256X0050B2	4.6	95	1.0	3.0	- 20	+ 12	+ 12	1065
47	B	735D476X0050B2	3.7	70	1.0	3.0	- 24	+ 15	+ 15	1215
60	C	735D606X0050C2	2.9	45	2.0	7.0	- 16	+ 12	+ 12	1285
82	C	735D826X0050C2	2.3	45	2.0	7.0	- 32	+ 15	+ 15	1460
100	B	735D107X0050B2	3.2	67	2.0	7.0	- 40	+ 15	+ 15	1150
160	D	735D167X0050D2	1.3	27	3.0	16	- 50	+ 23	+ 23	2040
270	C	735D277X0050C2	2.6	52	3.0	15	- 60	+ 25	+ 25	1373
350	D	735D357X0050D2	1.5	30	4.0	20	- 70	+ 25	+ 25	1900
390	D	735D397X0050D2	1.5	30	5.0	25	- 75	+ 25	+ 25	1900
430	D	735D437X0050D2	1.5	31	5.0	25	- 80	+ 25	+ 25	1900



735D, 735DE, CT79 (CECC 30202)

Wet Tantalum Capacitors with Glass to
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STANDARD RATINGS to mil range CLR79										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. ESR at + 25 °C 120 Hz (Ω)	MAX. IMP. at - 55 °C (Ω)	MAX. DCL (μ A) at		MAX. CAP. CHANGE (%) at			MAX. RMS RIPPLE CURRENT 40 kHz (mA)
					+ 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
60 V_{DC} at + 85 °C, 40 V_{DC} at + 125 °C										
4.0	A	735D405X0060A2	9.3	550	0.75	2.0	- 16	+ 6	+ 6	525
8.2	A	735D825X0060A2	6.6	275	0.75	2.0	- 20	+ 9	+ 9	625
20	B	735D206X0060B2	4.0	105	1.0	4.0	- 16	+ 12	+ 12	1026
39	B	735D396X0060B2	3.0	90	1.0	4.0	- 24	+ 12	+ 12	1185
50	C	735D506X0060C2	2.6	50	2.0	7.0	- 16	+ 12	+ 12	1341
68	C	735D686X0060C2	2.4	50	2.0	7.0	- 30	+ 15	+ 15	1393
82	B	735D826X0060B2	3.2	70	2.0	7.0	- 36	+ 15	+ 15	1150
140	D	735D147X0060D2	1.3	28	3.0	16	- 40	+ 20	+ 20	1990
220	C	735D227X0060C2	2.6	55	3.0	15	- 50	+ 25	+ 25	1341
270	D	735D277X0060D2	1.5	33	5.0	22	- 70	+ 25	+ 25	1850
330	D	735D337X0060D2	1.5	31	5.0	25	- 72	+ 25	+ 25	1850
75 V_{DC} at + 85 °C, 50 V_{DC} at + 125 °C										
3.5	A	735D355X0075A2	9.5	650	1.0	2.0	- 16	+ 6	+ 6	525
9.0	A	735D905X0075A2	8.2	280	2.0	5.0	- 20	+ 9	+ 9	572
15	B	735D156X0075B2	5.0	150	1.0	4.0	- 16	+ 9	+ 9	1000
40	C	735D406X0075C2	3.0	60	2.0	8.0	- 16	+ 12	+ 12	1293
43	B	735D436X0075B2	3.8	89	2.0	8.0	- 24	+ 12	+ 12	1051
56	B	735D566X0075B2	3.8	84	2.0	10	- 30	+ 15	+ 15	1051
56	C	735D566X0075C2	2.4	60	2.0	8.0	- 28	+ 15	+ 15	1396
110	D	735D117X0075D2	1.3	29	3.0	20	- 35	+ 20	+ 20	1990
250	D	735D257X0075D2	1.5	33	5.0	22	- 68	+ 25	+ 25	1850
100 V_{DC} at + 85 °C, 70 V_{DC} at + 125 °C										
30	B	735D306X0100B2	3.7	99	2.0	12	- 16	+ 8	+ 8	1065
30	C	735D306X0100C2	3.3	80	2.0	8.0	- 16	+ 8	+ 8	1200
43	C	735D436X0100C2	2.4	70	2.0	8.0	- 20	+ 8	+ 8	1389
86	D	735D866X0100D2	1.5	30	3.0	20	- 24	+ 15	+ 15	1859
125 V_{DC} at + 85 °C, 85 V_{DC} at + 125 °C										
3.6	A	735D365X0125A2	11.1	600	1.0	2.0	- 16	+ 8	+ 8	495
14	B	735D146X0125B2	5.0	167	1.0	4.0	- 16	+ 8	+ 8	1050
25	C	735D256X0125C2	2.6	93	2.0	8.0	- 16	+ 8	+ 8	1335
56	D	735D556X0125D2	1.5	47	3.0	20	- 25	+ 15	+ 15	1859

735D, 735DE, CT79 (CECC 30202)



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Wet Tantalum Capacitors with Glass to
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CT79 STANDARD RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. DF	MAX. IMP.	MAX. DCL (μ A)		MAX. CAP. CHANGE (%)			MAX. RMS RIPPLE CURRENT 40 kHz (mA)
			at + 25 °C (%)	at - 55 °C (Ω)	at + 25 °C	at + 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
6.3 V_{DC} at + 85 °C, 4 V_{DC} at + 125 °C										
68	A	CT79686X06R3A2	15	72	1	12	- 40	+ 14	+ 16	960
270	B	CT79277X06R3B2	41	30	1	7	- 44	+ 17.5	+ 20	1375
560	C	CT79567X06R3C2	55	30	2	16	- 64	+ 17.5	+ 20	1900
1200	D	CT79128X06R3D2	94	24	4	16	- 80	+ 25	+ 25	2265
10 V_{DC} at + 85 °C, 6.3 V_{DC} at + 125 °C										
47	A	CT79476X0010A2	14	120	1	2	- 36	+ 14	+ 16	855
180	B	CT79187X0010B2	29	48	1	7	- 36	+ 14	+ 16	1300
390	C	CT79397X0010C2	44	30	2	16	- 64	+ 17.5	+ 20	1800
820	D	CT79827X0010D2	65	28	4	16	- 80	+ 25	+ 25	2360
16 V_{DC} at + 85 °C, 10 V_{DC} at + 125 °C										
33	A	CT79336X0016A2	10	108	1	2	- 28	+ 14	+ 16	820
120	B	CT79127X0016B2	24	60	1	9	- 28	+ 17.5	+ 20	1230
270	C	CT79277X0016C2	45	36	2	16	- 56	+ 17.5	+ 20	1500
560	D	CT79567X0016D2	44	28	6	24	- 80	+ 25	+ 25	2300
25 V_{DC} at + 85 °C, 16 V_{DC} at + 125 °C										
22	A	CT79226X0025A2	7	168	1	2	- 20	+ 10.5	+ 12	800
100	B	CT79107X0025B2	21	60	1	10	- 28	+ 13	+ 15	1215
180	C	CT79187X0025C2	29	39	2	18	- 48	+ 13	+ 15	1460
390	D	CT79397X0025D2	40	29	7	28	- 70	+ 25	+ 25	1970
40 V_{DC} at + 85 °C, 25 V_{DC} at + 125 °C										
12	A	CT79126X0040A2	6	234	1	2	- 24	+ 8	+ 10	660
56	B	CT79566X0040B2	14	78	1	9	- 28	+ 13	+ 15	1100
100	C	CT79107X0040C2	18	48	2	17	- 40	+ 13	+ 15	1400
220	D	CT79227X0040D2	27	31	8	32	- 55	+ 25	+ 25	1900
63 V_{DC} at + 85 °C, 40 V_{DC} at + 125 °C										
8.2	A	CT79825X0063A2	4.5	330	1	2	- 24	+ 8	+ 9	625
39	B	CT79396X0063B2	12	108	1	9	- 28	+ 10.5	+ 12	1015
68	C	CT79686X0063C2	13	60	2	16	- 32	+ 10.5	+ 12	1365
150	D	CT79157X0063D2	18	34	8	32	- 40	+ 20	+ 20	1850
80 V_{DC} at + 85 °C, 50 V_{DC} at + 125 °C										
6.8	A	CT79685X0080A2	5	360	1	2	- 20	+ 8	+ 9	610
33	B	CT79336X0080B2	10	108	1	10	- 24	+ 10.5	+ 15	1000
56	C	CT79566X0080C2	11	72	2	17	- 28	+ 10.5	+ 15	1350
100	D	CT79107X0080D2	12	36	9	36	- 35	+ 20	+ 20	1825
100 V_{DC} at + 85 °C, 63 V_{DC} at + 125 °C										
4.7	A	CT79475X0100A2	3	600	1	2	- 16	+ 7	+ 8	565
22	B	CT79226X0100B2	8	132	1	9	- 16	+ 7	+ 8	935
47	C	CT79476X0100C2	8	84	2	17	- 20	+ 7	+ 8	1335
82	D	CT79826X0100D2	10	40	9	36	- 25	+ 15	+ 15	1800
125 V_{DC} at + 85 °C, 80 V_{DC} at + 125 °C										
3.9	A	CT79395X0125A2	3.5	720	1	2	- 16	+ 7	+ 8	495
15	B	CT79156X0125B2	6	200	1	7	- 16	+ 7	+ 8	860
27	C	CT79276X0125C2	6	106	2	13	- 16	+ 7	+ 8	1200
56	D	CT79566X0125D2	7	58	10	40	- 25	+ 15	+ 15	1800



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CT79 EXTENDED RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. DF	MAX. IMP.	MAX. DCL		MAX. CAP. CHANGE			MAX. RMS RIPPLE CURRENT 40 kHz (mA)
			at + 25 °C (%)	at - 55 °C (Ω)	(μ A) at + 25 °C	(μ A) at + 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
6.3 V_{DC} at + 85 °C, 4 V_{DC} at + 125 °C										
150	A	CT79157X06R3A2	34	80	2.0	9.0	- 42	+ 16	+ 16	960
560	B	CT79567X06R3B2	106	48	2.0	10	- 68	+ 20	+ 20	1550
1500	C	CT79158X06R3C2	172	36	5.0	20	- 90	+ 25	+ 25	1930
2200	D	CT79228X06R3D2	170	22	6.0	24	- 90	+ 25	+ 25	2330
10 V_{DC} at + 85 °C, 6.3 V_{DC} at + 125 °C										
100	A	CT79107X0010A2	30	82	2.0	6.0	- 40	+ 16	+ 16	930
390	B	CT79397X0010B2	74	54	2.0	10	- 60	+ 19	+ 20	1470
1200	C	CT79128X0010C2	137	36	5.0	20	- 80	+ 25	+ 25	1850
1800	D	CT79188X0010D2	138	24	7.0	25	- 88	+ 30	+ 30	2300
16 V_{DC} at + 85 °C, 10 V_{DC} at + 125 °C										
56	A	CT79566X0016A2	22	100	1.5	3.0	- 28	+ 16	+ 16	890
270	B	CT79277X0016B2	55	60	2.0	12	- 45	+ 18	+ 28	1430
820	C	CT79827X0016C2	95	42	6.0	24	- 80	+ 25	+ 25	1800
1200	D	CT79128X0016D2	103	25	8.0	32	- 84	+ 25	+ 30	2300
25 V_{DC} at + 85 °C, 16 V_{DC} at + 125 °C										
39	A	CT79396X0025A2	16	120	2.0	9.0	- 28	+ 16	+ 16	820
180	B	CT79187X0025B2	36	60	2.0	10	- 48	+ 14	+ 15	1400
560	C	CT79567X0025C2	60	48	7.0	28	- 80	+ 25	+ 25	1750
820	D	CT79827X0025D2	82	26	8.0	32	- 80	+ 25	+ 25	2100
40 V_{DC} at + 85 °C, 25 V_{DC} at + 125 °C										
22	A	CT79226X0040A2	11	190	1.5	4.0	- 24	+ 12	+ 12	745
120	B	CT79127X0040B2	30	62	2.0	12	- 32	+ 15	+ 15	1315
330	C	CT79337X0040C2	43	52	8.0	32	- 65	+ 25	+ 25	1640
470	D	CT79477X0040D2	45	30	9.0	35	- 80	+ 25	+ 25	2040
63 V_{DC} at + 85 °C, 40 V_{DC} at + 125 °C										
15	A	CT79156X0063A2	8.0	220	2.0	9.0	- 22	+ 9	+ 9	650
82	B	CT79826X0063B2	22	70	2.0	12	- 36	+ 15	+ 15	1220
220	C	CT79227X0063C2	37	55	8.0	32	- 50	+ 25	+ 25	1520
330	D	CT79337X0063D2	32	31	10.0	40	- 72	+ 25	+ 25	1970
80 V_{DC} at + 85 °C, 50 V_{DC} at + 125 °C										
8.2	A	CT79825X0080A2	6.0	280	1.5	3.0	- 22	+ 9	+ 9	610
68	B	CT79686X0080B2	21	86	2.0	12	- 36	+ 15	+ 15	1200
150	C	CT79157X0080C2	25	60	9.0	36	- 40	+ 20	+ 20	1490
220	D	CT79227X0080D2	37	32	10	40	- 60	+ 22	+ 22	1900
100 V_{DC} at + 85 °C, 63 V_{DC} at + 125 °C										
5.6	A	CT79565X0100A2	6.0	475	2.0	5.0	- 17	+ 8	+ 8	565
39	B	CT79396X0100B2	10	92	2.0	12	- 24	+ 12	+ 12	1300
68	C	CT79686X0100C2	15	60	10	40	- 30	+ 15	+ 15	1600
100	D	CT79107X0100D2	11	36	3.0	24	- 35	+ 20	+ 20	1900
125 V_{DC} at + 85 °C, 80 V_{DC} at + 125 °C										
18	B	CT79186X0125B2	8.0	133	2.0	10	- 16	+ 8	+ 8	1065
47	C	CT79476X0125C2	9.0	70	2.0	10	- 23	+ 10	+ 10	1500
82	D	CT79826X0125D2	10.0	39	3.0	24	- 24	+ 18	+ 18	1900

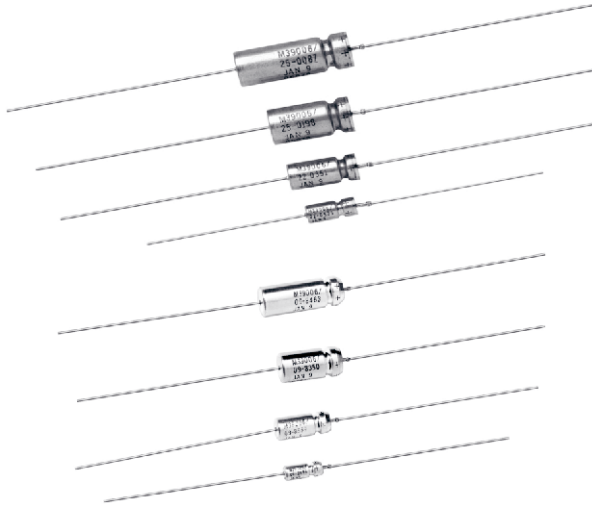


Tantalum Case Low ESR

Contents

M39006/30/31	60
136D	81

Wet Tantalum Capacitors, Military Established Reliability, MIL-PRF-39006 Qualified Styles CLR65, 79, 81, 90, 91



FEATURES

- Hermetically sealed
- Metal cased
- Axial lead
- Tubular

SPECIFICATIONS

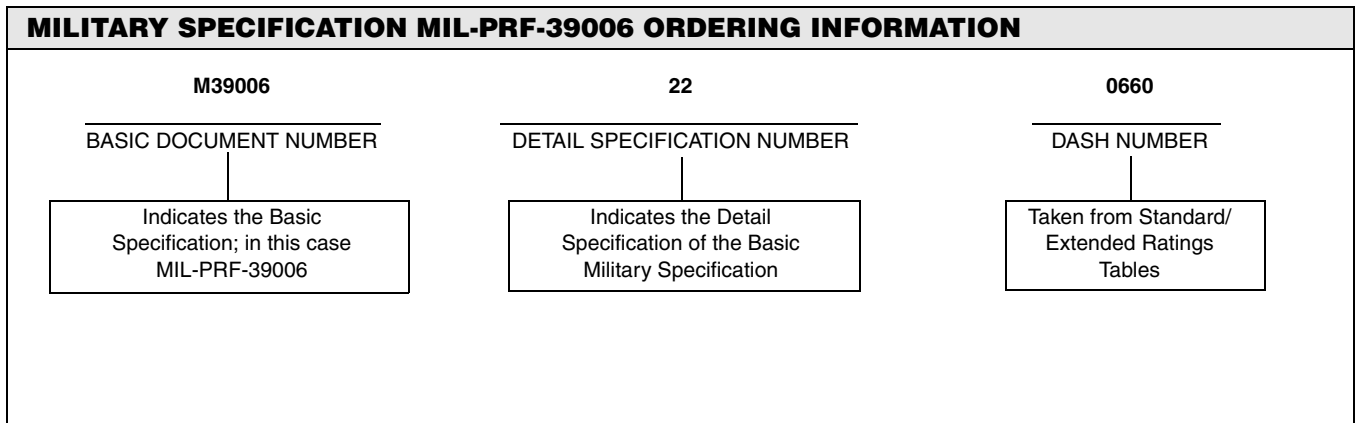
- Style CLR65, M39006/09
- Style CLR69, M39006/21
- Style CLR79, M39006/22
- Style CLR81, M39006/25
- Style CLR90, M39006/30
- Style CLR91, M39006/31

Established Reliability Tantalum Capacitors to Military Specification MIL-PRF-39006: In accordance with the Military Specification, MIL-PRF-39006 all capacitors are marked with the Military Part Number (M39006/xx-xxxx) rather than the older Style designation (CLRxxxxxxx) and should be ordered as such.

For information on the performance characteristics of these capacitors, please refer to the latest issue of the Military

Specification. MIL-PRF-39006 establishes 1000 h failure rate levels of 2 %, 1 %, 0.1 %, and 0.01 %. When ordering these parts, care must be exercised that the correct part number expressing the appropriate failure level be specified.

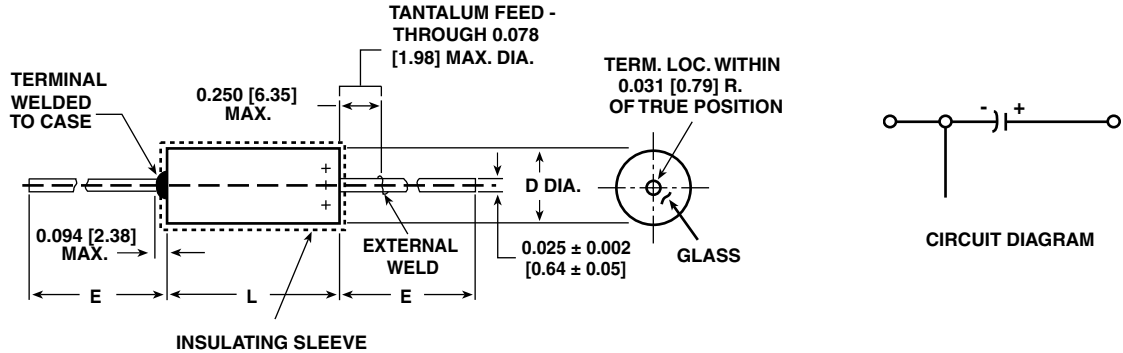
Each order for Military Style capacitors requiring government inspection must state whether inspection is to be at the destination or at the Vishay Sprague plant. Orders requiring source inspection cannot be shipped until this has been accomplished



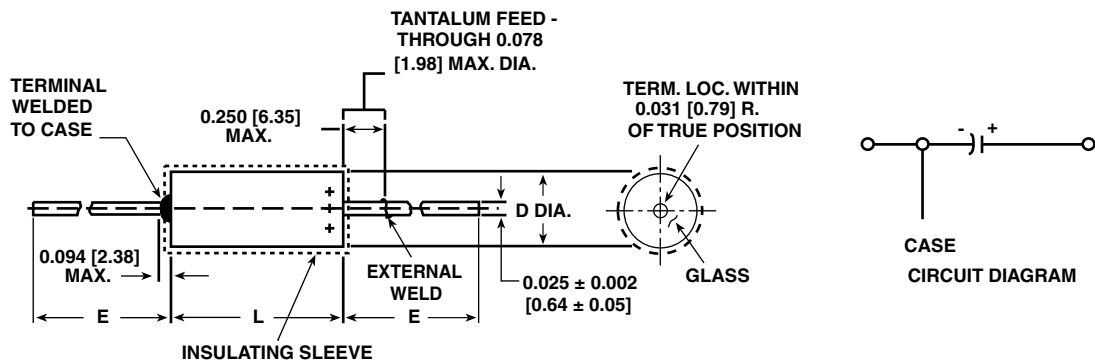
Note

The material in this section has been abstracted from MIL-PRF-39006/09/22/25/30/31.

DIMENSIONS in inches [millimeters]

 STYLE CLR65
 STYLE CLR69


CASE CODE	BARE CASE		WITH INSULATING SLEEVE		E LEAD LENGTH	WEIGHT (oz./g) (Max.)
	D	L	D (Max.)	L (Max.)		
T1	0.188 ± 0.016 [4.78 ± 0.41]	0.453 + 0.031 - 0.016 [11.51 + 0.79 - 0.41]	0.219 [5.56]	0.515 [13.08]	1.500 ± 0.250 [38.10 ± 6.35]	0.07 [2.0]
T2	0.281 ± 0.016 [7.14 ± 0.41]	0.641 + 0.031 - 0.016 [16.28 + 0.79 - 0.41]	0.312 [7.92]	0.704 [17.88]	2.250 ± 0.250 [57.15 ± 6.35]	0.18 [5.1]
T3	0.375 ± 0.016 [9.53 ± 0.41]	0.766 + 0.031 - 0.016 [19.46 + 0.79 - 0.41]	0.406 [10.31]	0.828 [21.03]	2.250 ± 0.250 [57.15 ± 6.35]	0.36 [10.2]
T4	0.375 ± 0.016 [9.53 ± 0.41]	1.062 + 0.031 - 0.016 [26.97 + 0.79 - 0.41]	0.406 [10.31]	1.126 [28.60]	2.250 ± 0.250 [57.15 ± 6.35]	0.49 [13.9]

 STYLE CLR79
 STYLE CLR81
 STYLE CLR90
 STYLE CLR91


CASE CODE	BARE CASE		WITH INSULATING SLEEVE		E LEAD LENGTH	WEIGHT (oz./g) (Max.)
	D	L	D (Max.)	L (Max.)		
T1	0.188 ± 0.016 [4.78 ± 0.41]	0.453 + 0.031 - 0.016 [11.51 + 0.79 - 0.41]	0.219 [5.56]	0.515 [13.08]	1.500 ± 0.250 [38.10 ± 6.35]	0.09 [2.6]
T2	0.281 ± 0.016 [7.14 ± 0.41]	0.641 + 0.031 - 0.016 [16.28 + 0.79 - 0.41]	0.312 [7.92]	0.704 [17.88]	2.250 ± 0.250 [57.15 ± 6.35]	0.22 [6.2]
T3	0.375 ± 0.016 [9.53 ± 0.41]	0.766 + 0.031 - 0.016 [19.46 + 0.79 - 0.41]	0.406 [10.31]	0.828 [21.03]	2.250 ± 0.250 [57.15 ± 6.35]	0.41 [11.6]
T4	0.375 ± 0.016 [9.53 ± 0.41]	1.062 + 0.031 - 0.016 [26.97 + 0.79 - 0.41]	0.406 [10.31]	1.126 [28.60]	2.250 ± 0.250 [57.15 ± 6.35]	0.62 [17.7]



STANDARD/EXTENDED RATINGS: CLR65*, M39006/09-XXXX													
CAPACITANCE (μF)	CASE CODE	CAP. TOL. (± %)	PART NO. M39006/09- FAILURE RATE LEVEL (%/1000 h)				MAX. DCL (μA) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at		
			L	M	P	R	+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C
			2.0	1.0	0.1	0.01							
6 WVDC at + 85 °C . . . 4 WVDC at + 125 °C													
30.0	T1	20	8001	8206	8411	8616	1.0	2.0	9.1	100	- 40	+ 10.5	+ 12
30.0	T1	10	8002	8207	8412	8617	1.0	2.0	9.1	100	- 40	+ 10.5	+ 12
30.0	T1	5	8003	8208	8413	8618	1.0	2.0	9.1	100	- 40	+ 10.5	+ 12
68.0	T1	20	8004	8209	8414	8619	1.0	2.0	20.4	60	- 40	+ 14	+ 16
68.0	T1	10	8005	8210	8415	8620	1.0	2.0	20.4	60	- 40	+ 14	+ 16
68.0	T1	5	8006	8211	8416	8621	1.0	2.0	20.4	60	- 40	+ 14	+ 16
140.0	T2	20	8007	8212	8417	8622	1.0	3.0	21.3	40	- 40	+ 14	+ 16
140.0	T2	10	8008	8213	8418	8623	1.0	3.0	21.3	40	- 40	+ 14	+ 16
140.0	T2	5	8009	8214	8419	8624	1.0	3.0	21.3	40	- 40	+ 14	+ 16
270.0	T2	20	8010	8215	8420	8625	1.0	6.5	81.8	25	- 44	+ 17.5	+ 20
270.0	T2	10	8011	8216	8421	8626	1.0	6.5	81.8	25	- 44	+ 17.5	+ 20
270.0	T2	5	8012	8217	8422	8627	1.0	6.5	81.8	25	- 44	+ 17.5	+ 20
330.0	T3	20	8013	8218	8423	8628	2.0	7.9	49.6	20	- 44	+ 14	+ 16
330.0	T3	10	8014	8219	8424	8629	2.0	7.9	49.6	20	- 44	+ 14	+ 16
330.0	T3	5	8015	8220	8425	8630	2.0	7.9	49.6	20	- 44	+ 14	+ 16
560.0	T3	20	8016	8221	8426	8631	2.0	13.0	128.0	25	- 64	+ 17.5	+ 20
560.0	T3	10	8017	8222	8427	8632	2.0	13.0	128.0	25	- 64	+ 17.5	+ 20
560.0	T3	5	8018	8223	8428	8633	2.0	13.0	128.0	25	- 64	+ 17.5	+ 20
1200.0	T4	20	8019	8224	8429	8634	3.0	14.0	144.4	20	- 80	+ 25	+ 25
1200.0	T4	10	8020	8225	8430	8635	3.0	14.0	144.4	20	- 80	+ 25	+ 25
8 WVDC at + 85 °C . . . 5 WVDC at + 125 °C													
25.0	T1	20	8021	8226	8431	8636	1.0	2.0	7.6	100	- 40	+ 10.5	+ 12
25.0	T1	10	8022	8227	8432	8637	1.0	2.0	7.6	100	- 40	+ 10.5	+ 12
25.0	T1	5	8023	8228	8433	8638	1.0	2.0	7.6	100	- 40	+ 10.5	+ 12
56.0	T1	20	8024	8229	8434	8639	1.0	2.0	17.0	59	- 40	+ 14	+ 16
56.0	T1	10	8025	8230	8435	8640	1.0	2.0	17.0	59	- 40	+ 14	+ 16
56.0	T1	5	8026	8231	8436	8641	1.0	2.0	17.0	59	- 40	+ 14	+ 16
220.0	T2	20	8027	8232	8437	8642	1.0	7.0	66.4	30	- 44	+ 17.5	+ 20
220.0	T2	10	8028	8233	8438	8643	1.0	7.0	66.4	30	- 44	+ 17.5	+ 20
220.0	T2	5	8029	8234	8439	8644	1.0	7.0	66.4	30	- 44	+ 17.5	+ 20
430.0	T3	20	8030	8235	8440	8645	2.0	14.0	91.5	25	- 64	+ 17.5	+ 20
430.0	T3	10	8031	8236	8441	8646	2.0	14.0	91.5	25	- 64	+ 17.5	+ 20
430.0	T3	5	8032	8237	8442	8647	2.0	14.0	91.5	25	- 64	+ 17.5	+ 20
850.0	T4	20	8033	8238	8443	8648	4.0	16.0	65.8	22	- 80	+ 25	+ 25
850.0	T4	10	8034	8239	8444	8649	4.0	16.0	65.8	22	- 80	+ 25	+ 25
10 WVDC at + 85 °C . . . 7 WVDC at + 125 °C													
20.0	T1	20	8035	8240	8445	8650	1.0	2.0	6.1	175	- 32	+ 10.5	+ 12
20.0	T1	10	8036	8241	8446	8651	1.0	2.0	6.1	175	- 32	+ 10.5	+ 12
20.0	T1	5	8037	8242	8447	8652	1.0	2.0	6.1	175	- 32	+ 10.5	+ 12
47.0	T1	20	8038	8243	8448	8653	1.0	2.0	18.1	100	- 36	+ 14	+ 16
47.0	T1	10	8039	8244	8449	8654	1.0	2.0	18.1	100	- 36	+ 14	+ 16
47.0	T1	5	8040	8245	8450	8655	1.0	2.0	18.1	100	- 36	+ 14	+ 16
100.0	T2	20	8041	8246	8451	8656	1.0	4.0	15.2	60	- 36	+ 14	+ 16
100.0	T2	10	8042	8247	8452	8657	1.0	4.0	15.2	60	- 36	+ 14	+ 16
100.0	T2	5	8043	8248	8453	8658	1.0	4.0	15.2	60	- 36	+ 14	+ 16
180.0	T2	20	8044	8249	8454	8659	1.0	7.0	54.4	40	- 36	+ 14	+ 16
180.0	T2	10	8045	8250	8455	8660	1.0	7.0	54.4	40	- 36	+ 14	+ 16
180.0	T2	5	8046	8251	8456	8661	1.0	7.0	54.4	40	- 36	+ 14	+ 16
250.0	T3	20	8047	8252	8457	8662	2.0	10.0	37.8	30	- 40	+ 14	+ 16
250.0	T3	10	8048	8253	8458	8663	2.0	10.0	37.8	30	- 40	+ 14	+ 16
250.0	T3	5	8049	8254	8459	8664	2.0	10.0	37.8	30	- 40	+ 14	+ 16
390.0	T3	20	8050	8255	8460	8665	2.0	16.0	87.6	25	- 64	+ 17.5	+ 20
390.0	T3	10	8051	8256	8461	8666	2.0	16.0	87.6	25	- 64	+ 17.5	+ 20
390.0	T3	5	8052	8257	8462	8667	2.0	16.0	87.6	25	- 64	+ 17.5	+ 20
750.0	T4	20	8053	8258	8463	8668	4.0	16.0	56.5	23	- 80	+ 25	+ 25
750.0	T4	10	8054	8259	8464	8669	4.0	16.0	56.5	23	- 80	+ 25	+ 25

Note

* Style CLR65 is inactive for new military design. For new design use Style CLR79.



STANDARD/EXTENDED RATINGS: CLR65*, M39006/09-XXXX													
CAPACITANCE (µF)	CASE CODE	CAP. TOL. (± %)	PART NO. M39006/09- FAILURE RATE LEVEL (%/1000 h)				MAX. DCL (µA) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at		
			L	M	P	R	+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C
			2.0	1.0	0.1	0.01							
15 WVDC at + 85 °C . . . 10 WVDC at + 125 °C													
15.0	T1	20	8055	8260	8465	8670	1.0	2.0	5.7	155	- 24	+ 10.5	+ 12
15.0	T1	10	8056	8261	8466	8671	1.0	2.0	5.7	155	- 24	+ 10.5	+ 12
15.0	T1	5	8057	8262	8467	8672	1.0	2.0	5.7	155	- 24	+ 10.5	+ 12
33.0	T1	20	8058	8263	8468	8673	1.0	2.0	12.5	90	- 28	+ 14	+ 16
33.0	T1	10	8059	8264	8469	8674	1.0	2.0	12.5	90	- 28	+ 14	+ 16
33.0	T1	5	8060	8265	8470	8675	1.0	2.0	12.5	90	- 28	+ 14	+ 16
70.0	T2	20	8061	8266	8471	8676	1.0	4.0	13.1	75	- 28	+ 14	+ 16
70.0	T2	10	8062	8267	8472	8677	1.0	4.0	13.1	75	- 28	+ 14	+ 16
70.0	T2	5	8063	8268	8473	8678	1.0	4.0	13.1	75	- 28	+ 14	+ 16
120.0	T2	20	8064	8269	8474	8679	1.0	7.0	36.8	50	- 28	+ 17.5	+ 20
120.0	T2	10	8065	8270	8475	8680	1.0	7.0	36.8	50	- 28	+ 17.5	+ 20
120.0	T2	5	8066	8271	8476	8681	1.0	7.0	36.8	50	- 28	+ 17.5	+ 20
170.0	T3	20	8067	8272	8477	8682	2.0	10.0	25.4	35	- 32	+ 14	+ 16
170.0	T3	10	8068	8273	8478	8683	2.0	10.0	25.4	35	- 32	+ 14	+ 16
170.0	T3	5	8069	8274	8479	8684	2.0	10.0	25.4	35	- 32	+ 14	+ 16
270.0	T3	20	8070	8275	8480	8685	2.0	16.0	60.9	30	- 56	+ 17.5	+ 20
270.0	T3	10	8071	8276	8481	8686	2.0	16.0	60.9	30	- 56	+ 17.5	+ 20
270.0	T3	5	8072	8277	8482	8687	2.0	16.0	60.9	30	- 56	+ 17.5	+ 20
540.0	T4	20	8073	8278	8483	8688	6.0	24.0	49.0	23	- 80	+ 25	+ 25
540.0	T4	10	8074	8279	8484	8689	6.0	24.0	49.0	23	- 80	+ 25	+ 25
25 WVDC at + 85 °C . . . 15 WVDC at + 125 °C													
10.0	T1	20	8075	8280	8485	8690	1.0	2.0	4.6	220	- 16	+ 8	+ 9
10.0	T1	10	8076	8281	8486	8691	1.0	2.0	4.6	220	- 16	+ 8	+ 9
10.0	T1	5	8077	8282	8487	8692	1.0	2.0	4.6	220	- 16	+ 8	+ 9
22.0	T1	20	8078	8283	8488	8693	1.0	2.0	8.3	140	- 20	+ 10.5	+ 12
22.0	T1	10	8079	8284	8489	8694	1.0	2.0	8.3	140	- 20	+ 10.5	+ 12
22.0	T1	5	8080	8285	8490	8695	1.0	2.0	8.3	140	- 20	+ 10.5	+ 12
100.0	T2	20	8081	8286	8491	8696	1.0	10.0	31.4	50	- 28	+ 13	+ 15
100.0	T2	10	8082	8287	8492	8697	1.0	10.0	31.4	50	- 28	+ 13	+ 15
100.0	T2	5	8083	8288	8493	8698	1.0	10.0	31.4	50	- 28	+ 13	+ 15
180.0	T3	20	8084	8289	8494	8699	2.0	18.0	54.3	32	- 48	+ 13	+ 15
180.0	T3	10	8085	8290	8495	8700	2.0	18.0	54.3	32	- 48	+ 13	+ 15
180.0	T3	5	8086	8291	8496	8701	2.0	18.0	54.3	32	- 48	+ 13	+ 15
350.0	T4	20	8087	8292	8497	8702	7.0	28.0	35.0	24	- 70	+ 25	+ 25
350.0	T4	10	8088	8293	8498	8703	7.0	28.0	35.0	24	- 70	+ 25	+ 25
30 WVDC at + 85 °C . . . 20 WVDC at + 125 °C													
8.0	T1	20	8089	8294	8499	8704	1.0	2.0	4.5	275	- 16	+ 8	+ 12
8.0	T1	10	8090	8295	8500	8705	1.0	2.0	4.5	275	- 16	+ 8	+ 12
8.0	T1	5	8091	8296	8501	8706	1.0	2.0	4.5	275	- 16	+ 8	+ 12
15.0	T1	20	8092	8297	8502	8707	1.0	2.0	9.1	175	- 20	+ 10.5	+ 12
15.0	T1	10	8093	8298	8503	8708	1.0	2.0	9.1	175	- 20	+ 10.5	+ 12
15.0	T1	5	8094	8299	8504	8709	1.0	2.0	9.1	175	- 20	+ 10.5	+ 12
40.0	T2	20	8095	8300	8505	8710	1.0	5.0	12.2	65	- 24	+ 10.5	+ 12
40.0	T2	10	8096	8301	8506	8711	1.0	5.0	12.2	65	- 24	+ 10.5	+ 12
40.0	T2	5	8097	8302	8507	8712	1.0	5.0	12.2	65	- 24	+ 10.5	+ 12
68.0	T2	20	8098	8303	8508	8713	1.0	8.0	31.0	60	- 24	+ 13	+ 15
68.0	T2	10	8099	8304	8509	8714	1.0	8.0	31.0	60	- 24	+ 13	+ 15
68.0	T2	5	8100	8305	8510	8715	1.0	8.0	31.0	60	- 24	+ 13	+ 15
100.0	T3	20	8101	8306	8511	8716	2.0	12.0	19.0	40	- 28	+ 10.5	+ 12
100.0	T3	10	8102	8307	8512	8717	2.0	12.0	19.0	40	- 28	+ 10.5	+ 12
100.0	T3	5	8103	8308	8513	8718	2.0	12.0	19.0	40	- 28	+ 10.5	+ 12
150.0	T3	20	8104	8309	8514	8719	2.0	18.0	46.0	35	- 48	+ 13	+ 15
150.0	T3	10	8105	8310	8515	8720	2.0	18.0	46.0	35	- 48	+ 13	+ 15
150.0	T3	5	8106	8311	8516	8721	2.0	18.0	46.0	35	- 48	+ 13	+ 15
300.0	T4	20	8107	8312	8517	8722	8.0	32.0	35.0	25	- 60	+ 25	+ 25
300.0	T4	10	8108	8313	8518	8723	8.0	32.0	35.0	25	- 60	+ 25	+ 25

Note

* Style CLR65 is inactive for new military design. For new design use Style CLR79.



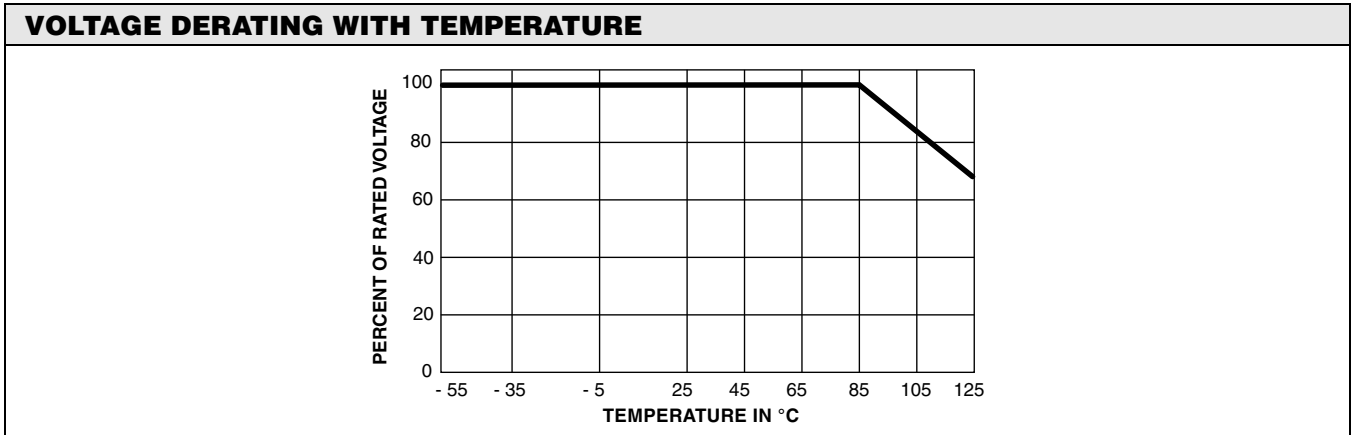
STANDARD/EXTENDED RATINGS: CLR65*, M39006/09-XXXX															
CAPACITANCE (μF)	CASE CODE	CAP. TOL. (± %)	PART NO. M39006/09- FAILURE RATE LEVEL (%/1000 h)				MAX. DCL (μA) at		MAX. DF at (%)	MAX. IMP. at (Ω)	Max. CAPACITANCE CHANGE (%) at				
			L	M	P	R	+ 25 °C	+ 85 °C			+ 25 °C	- 55 °C	- 55 °C	+ 85 °C	+ 125 °C
			2.0	1.0	0.1	0.01									
50 WVDC at + 85 °C . . . 30 WVDC at + 125 °C															
5.0	T1	20	8109	8314	8519	8724	1.0	2.0	3.4	400	- 16	+ 5	+ 6		
5.0	T1	10	8110	8315	8520	8725	1.0	2.0	3.4	400	- 16	+ 5	+ 6		
5.0	T1	5	8111	8316	8521	8726	1.0	2.0	3.4	400	- 16	+ 5	+ 6		
10.0	T1	20	8112	8317	8522	8727	1.0	2.0	6.0	250	- 24	+ 8	+ 9		
10.0	T1	10	8113	8318	8523	8728	1.0	2.0	6.0	250	- 24	+ 8	+ 9		
10.0	T1	5	8114	8319	8524	8729	1.0	2.0	6.0	250	- 24	+ 8	+ 9		
25.0	T2	20	8115	8320	8525	8730	1.0	5.0	11.2	95	- 20	+ 10.5	+ 12		
25.0	T2	10	8116	8321	8526	8731	1.0	5.0	11.2	95	- 20	+ 10.5	+ 12		
25.0	T2	5	8117	8322	8527	8732	1.0	5.0	11.2	95	- 20	+ 10.5	+ 12		
47.0	T2	20	8118	8323	8528	8733	1.0	9.0	21.4	70	- 28	+ 13	+ 15		
47.0	T2	10	8119	8324	8529	8734	1.0	9.0	21.4	70	- 28	+ 13	+ 15		
47.0	T2	5	8120	8325	8530	8735	1.0	9.0	21.4	70	- 28	+ 13	+ 15		
60.0	T3	20	8121	8326	8531	8736	2.0	12.0	13.6	45	- 16	+ 10.5	+ 12		
60.0	T3	10	8122	8327	8532	8737	2.0	12.0	13.6	45	- 16	+ 10.5	+ 12		
60.0	T3	5	8123	8328	8533	8738	2.0	12.0	13.6	45	- 16	+ 10.5	+ 12		
82.0	T3	20	8124	8329	8534	8739	2.0	16.0	24.9	45	- 32	+ 13	+ 15		
82.0	T3	10	8125	8330	8535	8740	2.0	16.0	24.9	45	- 32	+ 13	+ 15		
82.0	T3	5	8126	8331	8536	8741	2.0	16.0	24.9	45	- 32	+ 13	+ 15		
160.0	T4	20	8127	8332	8537	8742	8.0	32.0	25.7	27	- 50	+ 25	+ 25		
160.0	T4	10	8128	8333	8538	8743	8.0	32.0	25.7	27	- 50	+ 25	+ 25		
60 WVDC at + 85 °C . . . 40 WVDC at + 125 °C															
4.0	T1	20	8129	8334	8539	8744	1.0	2.0	3.0	550	- 16	+ 5	+ 6		
4.0	T1	10	8130	8335	8540	8745	1.0	2.0	3.0	550	- 16	+ 5	+ 6		
4.0	T1	5	8131	8336	8541	8746	1.0	2.0	3.0	550	- 16	+ 5	+ 6		
8.2	T1	20	8132	8337	8542	8747	1.0	2.0	5.0	275	- 24	+ 8	+ 9		
8.2	T1	10	8133	8338	8543	8748	1.0	2.0	5.0	275	- 24	+ 8	+ 9		
8.2	T1	5	8134	8339	8544	8749	1.0	2.0	5.0	275	- 24	+ 8	+ 9		
20.0	T2	20	8135	8340	8545	8750	1.0	5.0	7.6	105	- 16	+ 10.5	+ 12		
20.0	T2	10	8136	8341	8546	8751	1.0	5.0	7.6	105	- 16	+ 10.5	+ 12		
20.0	T2	5	8137	8342	8547	8752	1.0	5.0	7.6	105	- 16	+ 10.5	+ 12		
39.0	T2	20	8138	8343	8548	8753	1.0	9.0	20.7	90	- 28	+ 10.5	+ 12		
39.0	T2	10	8139	8344	8549	8754	1.0	9.0	20.7	90	- 28	+ 10.5	+ 12		
39.0	T2	5	8140	8345	8550	8755	1.0	9.0	20.7	90	- 28	+ 10.5	+ 12		
50.0	T3	20	8141	8346	8551	8756	2.0	12.0	15.3	50	- 16	+ 10.5	+ 12		
50.0	T3	10	8142	8347	8552	8757	2.0	12.0	15.3	50	- 16	+ 10.5	+ 12		
50.0	T3	5	8143	8348	8553	8758	2.0	12.0	15.3	50	- 16	+ 10.5	+ 12		
68.0	T3	20	8144	8349	8554	8759	2.0	16.0	30.7	50	- 32	+ 10.5	+ 12		
68.0	T3	10	8145	8350	8555	8760	2.0	16.0	30.7	50	- 32	+ 10.5	+ 12		
68.0	T3	5	8146	8351	8556	8761	2.0	16.0	30.7	50	- 32	+ 10.5	+ 12		
140.0	T4	20	8147	8352	8557	8762	8.0	32.0	25.7	28	- 40	+ 20	+ 20		
140.0	T4	10	8148	8353	8558	8763	8.0	32.0	25.7	28	- 40	+ 20	+ 20		
75 WVDC at + 85 °C . . . 50 WVDC at + 125 °C															
3.5	T1	20	8149	8354	8559	8764	1.0	2.0	2.5	650	- 16	+ 5	+ 6		
3.5	T1	10	8150	8355	8560	8765	1.0	2.0	2.5	650	- 16	+ 5	+ 6		
3.5	T1	5	8151	8356	8561	8766	1.0	2.0	2.5	650	- 16	+ 5	+ 6		
6.8	T1	20	8152	8357	8562	8767	1.0	2.0	4.1	300	- 20	+ 8	+ 9		
6.8	T1	10	8153	8358	8563	8768	1.0	2.0	4.1	300	- 20	+ 8	+ 9		
6.8	T1	5	8154	8359	8564	8769	1.0	2.0	4.1	300	- 20	+ 8	+ 9		
15.0	T2	20	8155	8360	8565	8770	1.0	5.0	7.5	150	- 16	+ 8	+ 9		
15.0	T2	10	8156	8361	8566	8771	1.0	5.0	7.5	150	- 16	+ 8	+ 9		
15.0	T2	5	8157	8362	8567	8772	1.0	5.0	7.4	150	- 16	+ 8	+ 9		
33.0	T2	20	8158	8363	8568	8773	1.0	10.0	17.5	90	- 24	+ 10.5	+ 15		
33.0	T2	10	8159	8364	8569	8774	1.0	10.0	17.5	90	- 24	+ 10.5	+ 15		
33.0	T2	5	8160	8365	8570	8775	1.0	10.0	17.5	90	- 24	+ 10.5	+ 15		
40.0	T3	20	8161	8366	8571	8776	2.0	12.0	15.2	60	- 16	+ 10.5	+ 12		
40.0	T3	10	8162	8367	8572	8777	2.0	12.0	15.2	60	- 16	+ 10.5	+ 12		
40.0	T3	5	8163	8368	8573	8778	2.0	12.0	15.2	60	- 16	+ 10.5	+ 12		
56.0	T3	20	8164	8369	8574	8779	2.0	17.0	26.0	60	- 28	+ 10.5	+ 15		
56.0	T3	10	8165	8370	8575	8780	2.0	17.0	26.0	60	- 28	+ 10.5	+ 15		
56.0	T3	5	8166	8371	8576	8781	2.0	17.0	26.0	60	- 28	+ 10.5	+ 15		
110.0	T4	20	8167	8372	8577	8782	9.0	36.0	25.7	29	- 35	+ 20	+ 20		
110.0	T4	10	8168	8373	8578	8783	9.0	36.0	25.7	29	- 35	+ 20	+ 20		

Note
* Style CLR65 is inactive for new military design. For new design use Style CLR79.



STANDARD/EXTENDED RATINGS: CLR65*, M39006/09-XXXX													
CAPACITANCE (µF)	CASE CODE	CAP. TOL. (± %)	PART NO. M39006/09- FAILURE RATE LEVEL (%/1000 h)				MAX. DCL (µA) at		MAX. DF at +25 °C (%)	MAX. IMP. at -55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at		
			L 2.0	M 1.0	P 0.1	R 0.01	+25 °C	+85 °C +125 °C			-55 °C	+85 °C	+125 °C
100 WVDC at +85 °C . . . 65 WVDC at +125 °C													
2.5	T1	20	8169	8374	8579	8784	1.0	2.0	5.0	950	-16	+7	+8
2.5	T1	10	8170	8375	8580	8785	1.0	2.0	5.0	950	-16	+7	+8
2.5	T1	5	8171	8376	8581	8786	1.0	2.0	5.0	950	-16	+7	+8
4.7	T1	20	8172	8377	8582	8787	1.0	2.0	3.6	500	-16	+7	+8
4.7	T1	10	8173	8378	8583	8788	1.0	2.0	3.6	500	-16	+7	+8
4.7	T1	5	8174	8379	8584	8789	1.0	2.0	3.6	500	-16	+7	+8
11.0	T2	20	8175	8380	8585	8790	1.0	4.0	5.0	200	-16	+7	+8
11.0	T2	10	8176	8381	8586	8791	1.0	4.0	5.0	200	-16	+7	+8
11.0	T2	5	8177	8382	8587	8792	1.0	4.0	5.0	200	-16	+7	+8
22.0	T2	20	8178	8383	8588	8793	1.0	9.0	11.8	100	-16	+7	+8
22.0	T2	10	8179	8384	8589	8794	1.0	9.0	11.8	100	-16	+7	+8
22.0	T2	5	8180	8385	8590	8795	1.0	9.0	11.8	100	-16	+7	+8
30.0	T3	20	8181	8386	8591	8796	2.0	12.0	9.1	80	-16	+7	+8
30.0	T3	10	8182	8387	8592	8797	2.0	12.0	9.1	80	-16	+7	+8
30.0	T3	5	8183	8388	8593	8798	2.0	12.0	9.1	80	-16	+7	+8
43.0	T3	20	8184	8389	8594	8799	2.0	17.0	19.7	70	-20	+7	+8
43.0	T3	10	8185	8390	8595	8800	2.0	17.0	19.7	70	-20	+7	+8
43.0	T3	5	8186	8391	8596	8801	2.0	17.0	19.7	70	-20	+7	+8
86.0	T4	20	8187	8392	8597	8802	9.0	36.0	20.7	30	-25	+15	+15
86.0	T4	10	8188	8393	8598	8803	9.0	36.0	20.7	30	-25	+15	+15
125 WVDC at +85 °C . . . 85 WVDC at +125 °C													
1.7	T1	20	8189	8394	8599	8804	1.0	2.0	7.0	1250	-16	+7	+8
1.7	T1	10	8190	8395	8600	8805	1.0	2.0	7.0	1250	-16	+7	+8
1.7	T1	5	8191	8396	8601	8806	1.0	2.0	7.0	1250	-16	+7	+8
3.6	T1	20	8192	8397	8602	8807	1.0	2.0	4.1	600	-16	+7	+8
3.6	T1	10	8193	8398	8603	8808	1.0	2.0	4.1	600	-16	+7	+8
3.6	T1	5	8194	8399	8604	8809	1.0	2.0	4.1	600	-16	+7	+8
9.0	T2	20	8195	8400	8605	8810	1.0	5.0	10.2	240	-16	+7	+8
9.0	T2	10	8196	8401	8606	8811	1.0	5.0	10.2	240	-16	+7	+8
9.0	T2	5	8197	8402	8607	8812	1.0	5.0	10.2	240	-16	+7	+8
14.0	T2	20	8198	8403	8608	8813	1.0	7.0	12.7	167	-16	+7	+8
14.0	T2	10	8199	8404	8609	8814	1.0	7.0	12.7	167	-16	+7	+8
14.0	T2	5	8200	8405	8610	8815	1.0	7.0	12.7	167	-16	+7	+8
18.0	T3	20	8201	8406	8611	8816	2.0	9.0	15.0	129	-16	+7	+8
18.0	T3	10	8202	8407	8612	8817	2.0	9.0	15.0	129	-16	+7	+8
18.0	T3	5	8203	8408	8613	8818	2.0	9.0	15.0	129	-16	+7	+8
25.0	T3	20	8204	8409	8614	8819	2.0	13.0	19.0	93	-16	+7	+8
25.0	T3	10	8205	8410	8615	8820	2.0	13.0	19.0	93	-16	+7	+8
25.0	T3	5	9026	9029	9032	9035	2.0	13.0	19.0	93	-16	+7	+8
56.0	T4	20	9027	9030	9033	9036	10.0	40.0	17.5	32	-25	+15	+15
56.0	T4	10	9028	9031	9034	9037	10.0	40.0	17.5	32	-25	+15	+15

Note
* Style CLR65 is inactive for new military design. For new design use Style CLR79.





STANDARD/EXTENDED RATINGS: CLR69*, M39006/21-XXXX													
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PART NO. M39006/21- FAILURE RATE LEVEL (%/1000 h)				MAX. DCL (μ A) at		MAX. DF at $+25^{\circ}$ C (%)	MAX. IMP. at -55° C (Ω)	MAX. CAPACITANCE CHANGE (%) at		
			L	M	P	R	$+25^{\circ}$ C	$+85^{\circ}$ C $+125^{\circ}$ C			-55° C	$+85^{\circ}$ C	$+125^{\circ}$ C
			2.0	1.0	0.1	0.01							
6 WVDC at $+85^{\circ}$C . . . 4 WVDC at $+125^{\circ}$C													
220.0	T1	20	0001	0089	0177	0265	2.0	9.0	50	36	-64	+13	+16
220.0	T1	10	0002	0090	0178	0266	2.0	9.0	50	36	-64	+13	+16
820.0	T2	20	0003	0091	0179	0267	3.0	14.0	155	18	-88	+16	+20
820.0	T2	10	0004	0092	0180	0268	3.0	14.0	155	18	-88	+16	+20
1500.0	T3	20	0005	0093	0181	0269	5.0	20.0	172	18	-90	+20	+25
1500.0	T3	10	0006	0094	0182	0270	5.0	20.0	172	18	-90	+20	+25
2200.0	T4	20	0007	0095	0183	0271	6.0	24.0	170	13	-90	+25	+30
2200.0	T4	10	0008	0096	0184	0272	6.0	24.0	170	13	-90	+25	+30
8 WVDC at $+85^{\circ}$C . . . 5 WVDC at $+125^{\circ}$C													
180.0	T1	20	0009	0097	0185	0273	2.0	9.0	41	45	-60	+13	+16
180.0	T1	10	0010	0098	0186	0274	2.0	9.0	41	45	-60	+13	+16
680.0	T2	20	0011	0099	0187	0275	3.0	14.0	130	22	-83	+16	+20
680.0	T2	10	0012	0100	0188	0276	3.0	14.0	130	22	-83	+16	+20
1500.0	T3	20	0013	0101	0189	0277	5.0	20.0	170	18	-90	+20	+25
1500.0	T3	10	0014	0102	0190	0278	5.0	20.0	170	18	-90	+20	+25
1800.0	T4	20	0015	0103	0191	0279	7.0	25.0	138	14	-90	+25	+30
1800.0	T4	10	0016	0104	0192	0280	7.0	25.0	138	14	-90	+25	+30
10 WVDC at $+85^{\circ}$C . . . 7 WVDC at $+125^{\circ}$C													
150.0	T1	20	0017	0105	0193	0281	2.0	9.0	34	54	-55	+13	+16
150.0	T1	10	0018	0106	0194	0282	2.0	9.0	34	54	-55	+13	+16
560.0	T2	20	0019	0107	0195	0283	3.0	16.0	106	27	-77	+16	+20
560.0	T2	10	0020	0108	0196	0284	3.0	16.0	106	27	-77	+16	+20
1200.0	T3	20	0021	0109	0197	0285	5.0	20.0	137	18	-88	+20	+25
1200.0	T3	10	0022	0110	0198	0286	5.0	20.0	137	18	-88	+20	+25
1500.0	T4	20	0023	0111	0199	0287	7.0	25.0	114	15	-88	+25	+30
1500.0	T4	10	0024	0112	0200	0288	7.0	25.0	114	15	-88	+25	+30
15 WVDC at $+85^{\circ}$C . . . 10 WVDC at $+125^{\circ}$C													
100.0	T1	20	0025	0113	0201	0289	2.0	9.0	30	72	-44	+13	+16
100.0	T1	10	0026	0114	0202	0290	2.0	9.0	30	72	-44	+13	+16
390.0	T2	20	0027	0115	0203	0291	3.0	16.0	74	31	-66	+16	+20
390.0	T2	10	0028	0116	0204	0292	3.0	16.0	74	31	-66	+16	+20
820.0	T3	20	0029	0117	0205	0293	6.0	24.0	111	22	-77	+20	+25
820.0	T3	10	0030	0118	0206	0294	6.0	24.0	111	22	-77	+20	+25
1000.0	T4	20	0031	0119	0207	0295	8.0	32.0	92	17	-77	+25	+30
1000.0	T4	10	0032	0120	0208	0296	8.0	32.0	92	17	-77	+25	+30
25 WVDC at $+85^{\circ}$C . . . 15 WVDC at $+125^{\circ}$C													
68.0	T1	20	0033	0121	0209	0297	2.0	9.0	22	90	-40	+12	+15
68.0	T1	10	0034	0122	0210	0298	2.0	9.0	22	90	-40	+12	+15
270.0	T2	20	0035	0123	0211	0299	3.0	16.0	55	33	-62	+13	+16
270.0	T2	10	0036	0124	0212	0300	3.0	16.0	55	33	-62	+13	+16
560.0	T3	20	0037	0125	0213	0301	7.0	28.0	76	24	-72	+20	+25
560.0	T3	10	0038	0126	0214	0302	7.0	28.0	76	24	-72	+20	+25
680.0	T4	20	0039	0127	0215	0303	8.0	32.0	63	19	-72	+25	+30
680.0	T4	10	0040	0128	0216	0304	8.0	32.0	63	19	-72	+25	+30
30 WVDC at $+85^{\circ}$C . . . 20 WVDC at $+125^{\circ}$C													
56.0	T1	20	0041	0129	0217	0305	2.0	9.0	22	100	-38	+12	+15
56.0	T1	10	0042	0130	0218	0306	2.0	9.0	22	100	-38	+12	+15
220.0	T2	20	0043	0131	0219	0307	3.0	16.0	42	36	-60	+13	+16
220.0	T2	10	0044	0132	0220	0308	3.0	16.0	42	36	-60	+13	+16
470.0	T3	20	0045	0133	0221	0309	8.0	32.0	64	25	-65	+20	+25
470.0	T3	10	0046	0134	0222	0310	8.0	32.0	64	25	-65	+20	+25
560.0	T4	20	0047	0135	0223	0311	9.0	36.0	55	20	-65	+25	+30
560.0	T4	10	0048	0136	0224	0312	9.0	36.0	55	20	-65	+25	+30

Note

* Style CLR65 is inactive for new military design. For new design use Style CLR81.



STANDARD/EXTENDED RATINGS: CLR69*, M39006/21-XXXX													
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PART NO. M39006/21-				MAX. DCL (μ A)		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at		
			FAILURE RATE LEVEL (%/1000 h)				at				- 55 °C	+ 85 °C	+ 125 °C
			L 2.0	M 1.0	P 0.1	R 0.01	+ 25 °C	+ 85 °C + 125 °C					
50 WVDC at + 85 °C . . . 30 WVDC at + 125 °C													
33.0	T1	20	0049	0137	0225	0313	2.0	9.0	12.3	135	- 29	+ 10	+ 12
33.0	T1	10	0050	0138	0226	0314	2.0	9.0	12.3	135	- 29	+ 10	+ 12
120.0	T2	20	0051	0139	0227	0315	4.0	24.0	22.5	49	- 42	+ 12	+ 15
120.0	T2	10	0052	0140	0228	0316	4.0	24.0	22.5	49	- 42	+ 12	+ 15
270.0	T3	20	0053	0141	0229	0317	8.0	32.0	37	29	- 46	+ 20	+ 25
270.0	T3	10	0054	0142	0230	0318	8.0	32.0	37	29	- 46	+ 20	+ 25
330.0	T4	20	0055	0143	0231	0319	9.0	36.0	38	22	- 46	+ 25	+ 30
330.0	T4	10	0056	0144	0232	0320	9.0	36.0	38	22	- 46	+ 25	+ 30
60 WVDC at + 85 °C . . . 40 WVDC at + 125 °C													
27.0	T1	20	0057	0145	0233	0321	3.0	12.0	10.2	144	- 24	+ 10	+ 12
27.0	T1	10	0058	0146	0234	0322	3.0	12.0	10.2	144	- 24	+ 10	+ 12
100.0	T2	20	0059	0147	0235	0323	4.0	20.0	19	54	- 36	+ 12	+ 15
100.0	T2	10	0060	0148	0236	0324	4.0	20.0	19	54	- 36	+ 12	+ 15
220.0	T3	20	0061	0149	0237	0325	8.0	32.0	30	29	- 40	+ 16	+ 20
220.0	T3	10	0062	0150	0238	0326	8.0	32.0	30	29	- 40	+ 16	+ 20
270.0	T4	20	0063	0151	0239	0327	9.0	36.0	27	23	- 45	+ 20	+ 25
270.0	T4	10	0064	0152	0240	0328	9.0	36.0	27	23	- 45	+ 20	+ 25
75 WVDC at + 85 °C . . . 50 WVDC at + 125 °C													
22.0	T1	20	0065	0153	0241	0329	3.0	12.0	8.5	157	- 19	+ 10	+ 12
22.0	T1	10	0066	0154	0242	0330	3.0	12.0	8.5	157	- 19	+ 10	+ 12
82.0	T2	20	0067	0155	0243	0331	4.0	24.0	15.2	63	- 30	+ 12	+ 15
82.0	T2	10	0068	0156	0244	0332	4.0	24.0	15.2	63	- 30	+ 12	+ 15
180.0	T3	20	0069	0157	0245	0333	9.0	36.0	24.4	30	- 35	+ 16	+ 20
180.0	T3	10	0070	0158	0246	0334	9.0	36.0	24.4	30	- 35	+ 16	+ 20
220.0	T4	20	0071	0159	0247	0335	10.0	40.0	37.0	24	- 40	+ 20	+ 25
220.0	T4	10	0072	0160	0248	0336	10.0	40.0	37.0	24	- 40	+ 20	+ 25
100 WVDC at + 85 °C . . . 65 WVDC at + 125 °C													
10.0	T1	20	0073	0161	0249	0337	3.0	12.0	4.5	200	- 17	+ 10	+ 12
10.0	T1	10	0074	0162	0250	0338	3.0	12.0	4.5	200	- 17	+ 10	+ 12
39.0	T2	20	0075	0163	0251	0339	5.0	24.0	10.4	80	- 20	+ 12	+ 15
39.0	T2	10	0076	0164	0252	0340	5.0	24.0	10.4	80	- 20	+ 12	+ 15
68.0	T3	20	0077	0165	0253	0341	10.0	40.0	11.3	40	- 30	+ 14	+ 16
68.0	T3	10	0078	0166	0254	0342	10.0	40.0	11.3	40	- 30	+ 14	+ 16
120.0	T4	20	0079	0167	0255	0343	12.0	48.0	25	30	- 35	+ 15	+ 17
120.0	T4	10	0080	0168	0256	0344	12.0	48.0	25	30	- 35	+ 15	+ 17
125 WVDC at + 85 °C . . . 85 WVDC at + 125 °C													
6.8	T1	20	0081	0169	0257	0345	3.0	12.0	6.0	300	- 14	+ 10	+ 12
6.8	T1	10	0082	0170	0258	0346	3.0	12.0	6.0	300	- 14	+ 10	+ 12
27.0	T2	20	0083	0171	0259	0347	5.0	24.0	7.2	90	- 18	+ 12	+ 15
27.0	T2	10	0084	0172	0260	0348	5.0	24.0	7.2	90	- 18	+ 12	+ 15
47.0	T3	20	0085	0173	0261	0349	10.0	40.0	7.9	50	- 26	+ 14	+ 16
47.0	T3	10	0086	0174	0262	0350	10.0	40.0	7.9	50	- 26	+ 14	+ 16
82.0	T4	20	0087	0175	0263	0351	12.0	48.0	17.4	32	- 30	+ 15	+ 17
82.0	T4	10	0088	0176	0264	0352	12.0	48.0	17.4	32	- 30	+ 15	+ 17

Note

* Style CLR65 is inactive for new military design. For new design use Style CLR81.



STANDARD/EXTENDED RATINGS: CLR79, M39006/22-XXXX													
CAPACITANCE (µF)	CASE CODE	CAP. TOL. (± %)	PART NO. M39006/22-* FAILURE RATE LEVEL (%/1000 h)			MAX. DCL (µA) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX.** RIPPLE CURRENT at + 85 °C 40 kHz (mA)
			M	P	R	+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C	
			1.0	0.1	0.01								
6 WVDC at + 85 °C . . . 4 WVDC at + 125 °C													
30.0	T1	20	0001	0221	0441	1.0	2.0	9	100	- 40	+ 10.5	+ 12	820
30.0	T1	10	0002	0222	0442	1.0	2.0	9	100	- 40	+ 10.5	+ 12	820
30.0	T1	5	0003	0223	0443	1.0	2.0	9	100	- 40	+ 10.5	+ 12	820
68.0	T1	20	0004	0224	0444	1.0	2.0	15	60	- 40	+ 14	+ 16	960
68.0	T1	10	0005	0225	0445	1.0	2.0	15	60	- 40	+ 14	+ 16	960
68.0	T1	5	0006	0226	0446	1.0	2.0	15	60	- 40	+ 14	+ 16	960
140.0	T2	20	0007	0227	0447	1.0	3.0	21	40	- 40	+ 14	+ 16	1200
140.0	T2	10	0008	0228	0448	1.0	3.0	21	40	- 40	+ 14	+ 16	1200
140.0	T2	5	0009	0229	0449	1.0	3.0	21	40	- 40	+ 14	+ 16	1200
270.0	T2	20	0010	0230	0450	1.0	6.5	45	25	- 44	+ 17.5	+ 20	1375
270.0	T2	10	0011	0231	0451	1.0	6.5	45	25	- 44	+ 17.5	+ 20	1375
270.0	T2	5	0012	0232	0452	1.0	6.5	45	25	- 44	+ 17.5	+ 20	1375
330.0	T3	20	0013	0233	0453	2.0	7.9	36	20	- 44	+ 14	+ 16	1800
330.0	T3	10	0014	0234	0454	2.0	7.9	36	20	- 44	+ 14	+ 16	1800
330.0	T3	5	0015	0235	0455	2.0	7.9	36	20	- 44	+ 14	+ 16	1800
560.0	T3	20	0016	0236	0456	2.0	13.0	55	25	- 64	+ 17.5	+ 20	1900
560.0	T3	10	0017	0237	0457	2.0	13.0	55	25	- 64	+ 17.5	+ 20	1900
560.0	T3	5	0018	0238	0458	2.0	13.0	55	25	- 64	+ 17.5	+ 20	1900
1200.0	T4	20	0019	0239	0459	3.0	14.0	90	20	- 80	+ 25	+ 25	2265
1200.0	T4	10	0020	0240	0460	3.0	14.0	90	20	- 80	+ 25	+ 25	2265
8 WVDC at + 85 °C . . . 5 WVDC at + 125 °C													
25.0	T1	20	0021	0241	0461	1.0	2.0	7.5	100	- 40	+ 10.5	+ 12	820
25.0	T1	10	0022	0242	0462	1.0	2.0	7.5	100	- 40	+ 10.5	+ 12	820
25.0	T1	5	0023	0243	0463	1.0	2.0	7.5	100	- 40	+ 10.5	+ 12	820
56.0	T1	20	0024	0244	0464	1.0	2.0	14	59	- 40	+ 14	+ 16	900
56.0	T1	10	0025	0245	0465	1.0	2.0	14	59	- 40	+ 14	+ 16	900
56.0	T1	5	0026	0246	0466	1.0	2.0	14	59	- 40	+ 14	+ 16	900
120.0	T2	20	0027	0247	0467	1.0	2.0	20	50	- 44	+ 17.5	+ 20	1220
120.0	T2	10	0028	0248	0468	1.0	2.0	20	50	- 44	+ 17.5	+ 20	1220
120.0	T2	5	0029	0249	0469	1.0	2.0	20	50	- 44	+ 17.5	+ 20	1220
220.0	T2	20	0030	0250	0470	1.0	7.0	37	30	- 44	+ 17.5	+ 20	1370
220.0	T2	10	0031	0251	0471	1.0	7.0	37	30	- 44	+ 17.5	+ 20	1370
220.0	T2	5	0032	0252	0472	1.0	7.0	37	30	- 44	+ 17.5	+ 20	1370
290.0	T3	20	0033	0253	0473	2.0	6.0	34	25	- 64	+ 17.5	+ 20	1770
290.0	T3	10	0034	0254	0474	2.0	6.0	34	25	- 64	+ 17.5	+ 20	1770
290.0	T3	5	0035	0255	0475	2.0	6.0	34	25	- 64	+ 17.5	+ 20	1770
430.0	T3	20	0036	0256	0476	2.0	14.0	46	25	- 64	+ 17.5	+ 20	1825
430.0	T3	10	0037	0257	0477	2.0	14.0	46	25	- 64	+ 17.5	+ 20	1825
430.0	T3	5	0038	0258	0478	2.0	14.0	46	25	- 64	+ 17.5	+ 20	1825
850.0	T4	20	0039	0259	0479	4.0	16.0	60	22	- 80	+ 25	+ 25	2330
850.0	T4	10	0040	0260	0480	4.0	16.0	60	22	- 80	+ 25	+ 25	2330
10 WVDC at + 85 °C . . . 7 WVDC at + 125 °C													
20.0	T1	20	0041	0261	0481	1.0	2.0	6	175	- 32	+ 10.5	+ 12	820
20.0	T1	10	0042	0262	0482	1.0	2.0	6	175	- 32	+ 10.5	+ 12	820
20.0	T1	5	0043	0263	0483	1.0	2.0	6	175	- 32	+ 10.5	+ 12	820
47.0	T1	20	0044	0264	0484	1.0	2.0	13	100	- 36	+ 14	+ 16	855
47.0	T1	10	0045	0265	0485	1.0	2.0	13	100	- 36	+ 14	+ 16	855
47.0	T1	5	0046	0266	0486	1.0	2.0	13	100	- 36	+ 14	+ 16	855
100.0	T2	20	0047	0267	0487	1.0	4.0	15	60	- 36	+ 14	+ 16	1200
100.0	T2	10	0048	0268	0488	1.0	4.0	15	60	- 36	+ 14	+ 16	1200
100.0	T2	5	0049	0269	0489	1.0	4.0	15	60	- 36	+ 14	+ 16	1200
180.0	T2	20	0050	0270	0490	1.0	7.0	30	40	- 36	+ 14	+ 16	1365

Notes

* Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).

** For ripple current limits at various temperatures, voltages and frequencies, see Ripple Current Table.



STANDARD/EXTENDED RATINGS: CLR79, M39006/22-XXXX													
CAPACITANCE (µF)	CASE CODE	CAP. TOL. (± %)	PART NO. M39006/22-*			MAX. DCL (µA)		MAX. DF at + 25 °C	MAX. IMP. at - 55 °C	MAX. CAPACITANCE CHANGE (%) at			MAX.** RIPPLE CURRENT at + 85 °C 40 kHz (mA)
			FAILURE RATE LEVEL (%/1000 h)			at				at			
			M	P	R	+ 25 °C	+ 85 °C + 125 °C	+ 25 °C	- 55 °C	- 55 °C	+ 85 °C	+ 125 °C	
10 WVDC at + 85 °C . . . 7 WVDC at + 125 °C													
180.0	T2	10	0051	0271	0491	1.0	7.0	30	40	- 36	+ 14	+ 16	1365
180.0	T2	5	0052	0272	0492	1.0	7.0	30	40	- 36	+ 14	+ 16	1365
250.0	T3	20	0053	0273	0493	2.0	10.0	30	30	- 40	+ 14	+ 16	1720
250.0	T3	10	0054	0274	0494	2.0	10.0	30	30	- 40	+ 14	+ 16	1720
250.0	T3	5	0055	0275	0495	2.0	10.0	30	30	- 40	+ 14	+ 16	1720
390.0	T3	20	0056	0276	0496	2.0	16.0	44	25	- 64	+ 17.5	+ 20	1800
390.0	T3	10	0057	0277	0497	2.0	16.0	44	25	- 64	+ 17.5	+ 20	1800
390.0	T3	5	0058	0278	0498	2.0	16.0	44	25	- 64	+ 17.5	+ 20	1800
750.0	T4	20	0059	0279	0499	4.0	16.0	50	23	- 80	+ 25	+ 25	2360
750.0	T4	10	0060	0280	0500	4.0	16.0	50	23	- 80	+ 25	+ 25	2360
15 WVDC at + 85 °C . . . 10 WVDC at + 125 °C													
15.0	T1	20	0061	0281	0501	1.0	2.0	5	155	- 24	+ 10.5	+ 12	780
15.0	T1	10	0062	0282	0502	1.0	2.0	5	155	- 24	+ 10.5	+ 12	780
15.0	T1	5	0063	0283	0503	1.0	2.0	5	155	- 24	+ 10.5	+ 12	780
33.0	T1	20	0064	0284	0504	1.0	2.0	10	90	- 28	+ 14	+ 16	820
33.0	T1	10	0065	0285	0505	1.0	2.0	10	90	- 28	+ 14	+ 16	820
33.0	T1	5	0066	0286	0506	1.0	2.0	10	90	- 28	+ 14	+ 16	820
70.0	T2	20	0067	0287	0507	1.0	4.0	13	75	- 28	+ 14	+ 16	1150
70.0	T2	10	0068	0288	0508	1.0	4.0	13	75	- 28	+ 14	+ 16	1150
70.0	T2	5	0069	0289	0509	1.0	4.0	13	75	- 28	+ 14	+ 16	1150
120.0	T2	20	0070	0290	0510	1.0	7.0	18	50	- 28	+ 17.5	+ 20	1450
120.0	T2	10	0071	0291	0511	1.0	7.0	18	50	- 28	+ 17.5	+ 20	1450
120.0	T2	5	0072	0292	0512	1.0	7.0	18	50	- 28	+ 17.5	+ 20	1450
170.0	T3	20	0073	0293	0513	2.0	10.0	25	35	- 32	+ 14	+ 16	1480
170.0	T3	10	0074	0294	0514	2.0	10.0	25	35	- 32	+ 14	+ 16	1480
170.0	T3	5	0075	0295	0515	2.0	10.0	25	35	- 32	+ 14	+ 16	1480
270.0	T3	20	0076	0296	0516	2.0	16.0	32	30	- 56	+ 17.5	+ 20	1740
270.0	T3	10	0077	0297	0517	2.0	16.0	32	30	- 56	+ 17.5	+ 20	1740
270.0	T3	5	0078	0298	0518	2.0	16.0	32	30	- 56	+ 17.5	+ 20	1740
540.0	T4	20	0079	0299	0519	6.0	24.0	40	23	- 80	+ 25	+ 25	2330
540.0	T4	10	0080	0300	0520	6.0	24.0	40	23	- 80	+ 25	+ 25	2330
25 WVDC at + 85 °C . . . 15 WVDC at + 125 °C													
10.0	T1	20	0081	0301	0521	1.0	2.0	4	220	- 16	+ 8	+ 9	715
10.0	T1	10	0082	0302	0522	1.0	2.0	4	220	- 16	+ 8	+ 9	715
10.0	T1	5	0083	0303	0523	1.0	2.0	4	220	- 16	+ 8	+ 9	715
22.0	T1	20	0084	0304	0524	1.0	2.0	6.6	140	- 20	+ 10.5	+ 12	825
22.0	T1	10	0085	0305	0525	1.0	2.0	6.6	140	- 20	+ 10.5	+ 12	825
22.0	T1	5	0086	0306	0526	1.0	2.0	6.6	140	- 20	+ 10.5	+ 12	825
50.0	T2	20	0087	0307	0527	1.0	2.0	11.0	70	- 28	+ 13	+ 15	1130
50.0	T2	10	0088	0308	0528	1.0	2.0	11.0	70	- 28	+ 13	+ 15	1130
50.0	T2	5	0089	0309	0529	1.0	2.0	11.0	70	- 28	+ 13	+ 15	1130
100.0	T2	20	0090	0310	0530	1.0	10.0	15	50	- 28	+ 13	+ 15	1435
100.0	T2	10	0091	0311	0531	1.0	10.0	15	50	- 28	+ 13	+ 15	1435
100.0	T2	5	0092	0312	0532	1.0	10.0	15	50	- 28	+ 13	+ 15	1435
120.0	T3	20	0093	0313	0533	2.0	6.0	21	38	- 32	+ 13	+ 15	1450
120.0	T3	10	0094	0314	0534	2.0	6.0	21	38	- 32	+ 13	+ 15	1450
120.0	T3	5	0095	0315	0535	2.0	6.0	21	38	- 32	+ 13	+ 15	1450
180.0	T3	20	0096	0316	0536	2.0	18.0	26	32	- 48	+ 13	+ 15	1525
180.0	T3	10	0097	0317	0537	2.0	18.0	26	32	- 48	+ 13	+ 15	1525
180.0	T3	5	0098	0318	0538	2.0	18.0	26	32	- 48	+ 13	+ 15	1525
350.0	T4	20	0099	0319	0539	7.0	28.0	35	24	- 70	+ 25	+ 25	1970
350.0	T4	10	0100	0320	0540	7.0	28.0	35	24	- 70	+ 25	+ 25	1970

Notes

* Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).

** For ripple current limits at various temperatures, voltages and frequencies, see Ripple Current Table.



STANDARD/EXTENDED RATINGS: CLR79, M39006/22-XXXX													
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PART NO. M39006/22-* FAILURE RATE LEVEL (%/1000 h)			MAX. DCL (μ A) at		MAX. DF	MAX. IMP.	MAX. CAPACITANCE CHANGE (%) at			MAX.** RIPPLE CURRENT
			M	P	R			at	at				at + 85 °C
			1.0	0.1	0.01	+ 25 °C	+ 85 °C + 125 °C	+ 25 °C (%)	- 55 °C (Ω)	- 55 °C	+ 85 °C	+ 125 °C	40 kHz (mA)
30 WVDC at + 85 °C . . . 20 WVDC at + 125 °C													
8.0	T1	20	0101	0321	0541	1.0	2.0	4	275	- 16	+ 8	+ 12	640
8.0	T1	10	0102	0322	0542	1.0	2.0	4	275	- 16	+ 8	+ 12	640
8.0	T1	5	0103	0323	0543	1.0	2.0	4	275	- 16	+ 8	+ 12	640
15.0	T1	20	0104	0324	0544	1.0	2.0	5	175	- 20	+ 10.5	+ 12	780
15.0	T1	10	0105	0325	0545	1.0	2.0	5	175	- 20	+ 10.5	+ 12	780
15.0	T1	5	0106	0326	0546	1.0	2.0	5	175	- 20	+ 10.5	+ 12	780
40.0	T2	20	0107	0327	0547	1.0	5.0	10	65	- 24	+ 10.5	+ 12	1120
40.0	T2	10	0108	0328	0548	1.0	5.0	10	65	- 24	+ 10.5	+ 12	1120
40.0	T2	5	0109	0329	0549	1.0	5.0	10	65	- 24	+ 10.5	+ 12	1120
68.0	T2	20	0110	0330	0550	1.0	8.0	13	60	- 24	+ 13	+ 15	1285
68.0	T2	10	0111	0331	0551	1.0	8.0	13	60	- 24	+ 13	+ 15	1285
68.0	T2	5	0112	0332	0552	1.0	8.0	13	60	- 24	+ 13	+ 15	1285
100.0	T3	20	0113	0333	0553	2.0	12.0	17	40	- 28	+ 10.5	+ 12	1450
100.0	T3	10	0114	0334	0554	2.0	12.0	17	40	- 28	+ 10.5	+ 12	1450
100.0	T3	5	0115	0335	0555	2.0	12.0	17	40	- 28	+ 10.5	+ 12	1450
150.0	T3	20	0116	0336	0556	2.0	18.0	23	35	- 48	+ 13	+ 15	1525
150.0	T3	10	0117	0337	0557	2.0	18.0	23	35	- 48	+ 13	+ 15	1525
150.0	T3	5	0118	0338	0558	2.0	18.0	23	35	- 48	+ 13	+ 15	1525
300.0	T4	20	0119	0339	0559	8.0	32.0	31	25	- 60	+ 25	+ 25	1950
300.0	T4	10	0120	0340	0560	8.0	32.0	31	25	- 60	+ 25	+ 25	1950
50 WVDC at + 85 °C . . . 30 WVDC at + 125 °C													
5.0	T1	20	0121	0341	0561	1.0	2.0	3	400	- 16	+ 5	+ 6	580
5.0	T1	10	0122	0342	0562	1.0	2.0	3	400	- 16	+ 5	+ 6	580
5.0	T1	5	0123	0343	0563	1.0	2.0	3	400	- 16	+ 5	+ 6	580
10.0	T1	20	0124	0344	0564	1.0	2.0	4	250	- 24	+ 8	+ 9	715
10.0	T1	10	0125	0345	0565	1.0	2.0	4	250	- 24	+ 8	+ 9	715
10.0	T1	5	0126	0346	0566	1.0	2.0	4	250	- 24	+ 8	+ 9	715
25.0	T2	20	0127	0347	0567	1.0	5.0	8	95	- 20	+ 10.5	+ 12	1005
25.0	T2	10	0128	0348	0568	1.0	5.0	8	95	- 20	+ 10.5	+ 12	1005
25.0	T2	5	0129	0349	0569	1.0	5.0	8	95	- 20	+ 10.5	+ 12	1005
47.0	T2	20	0130	0350	0570	1.0	9.0	11	70	- 28	+ 13	+ 15	1155
47.0	T2	10	0131	0351	0571	1.0	9.0	11	70	- 28	+ 13	+ 15	1155
47.0	T2	5	0132	0352	0572	1.0	9.0	11	70	- 28	+ 13	+ 15	1155
60.0	T3	20	0133	0353	0573	2.0	12.0	12	45	- 16	+ 10.5	+ 12	1335
60.0	T3	10	0134	0354	0574	2.0	12.0	12	45	- 16	+ 10.5	+ 12	1335
60.0	T3	5	0135	0355	0575	2.0	12.0	12	45	- 16	+ 10.5	+ 12	1335
82.0	T3	20	0136	0356	0576	2.0	16.0	15	45	- 32	+ 13	+ 15	1400
82.0	T3	10	0137	0357	0577	2.0	16.0	15	45	- 32	+ 13	+ 15	1400
82.0	T3	5	0138	0358	0578	2.0	16.0	15	45	- 32	+ 13	+ 15	1400
160.0	T4	20	0139	0359	0579	8.0	32.0	17	27	- 50	+ 25	+ 25	1900
160.0	T4	10	0140	0360	0580	8.0	32.0	17	27	- 50	+ 25	+ 25	1900
60 WVDC at + 85 °C . . . 40 WVDC at + 125 °C													
4.0	T1	20	0141	0361	0581	1.0	2.0	2.8	550	- 16	+ 5	+ 6	525
4.0	T1	10	0142	0362	0582	1.0	2.0	2.8	550	- 16	+ 5	+ 6	525
4.0	T1	5	0143	0363	0583	1.0	2.0	2.8	550	- 16	+ 5	+ 6	525
8.2	T1	20	0144	0364	0584	1.0	2.0	4	275	- 24	+ 8	+ 9	625
8.2	T1	10	0145	0365	0585	1.0	2.0	4	275	- 24	+ 8	+ 9	625
8.2	T1	5	0146	0366	0586	1.0	2.0	4	275	- 24	+ 8	+ 9	625
20.0	T2	20	0147	0367	0587	1.0	5.0	7	105	- 16	+ 10.5	+ 12	930
20.0	T2	10	0148	0368	0588	1.0	5.0	7	105	- 16	+ 10.5	+ 12	930
20.0	T2	5	0149	0369	0589	1.0	5.0	7	105	- 16	+ 10.5	+ 12	930
39.0	T2	20	0150	0370	0590	1.0	9.0	10	90	- 28	+ 10.5	+ 12	1110

Notes

* Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).

** For ripple current limits at various temperatures, voltages and frequencies, see Ripple Current Table.



STANDARD/EXTENDED RATINGS: CLR79, M39006/22-XXXX													
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PART NO. M39006/22-* FAILURE RATE LEVEL (%/1000 h)			MAX. DCL (μ A) at		MAX. DF	MAX. IMP.	MAX. CAPACITANCE CHANGE (%) at			MAX.** RIPPLE CURRENT
			M	P	R	+ 25 °C		+ 25 °C	- 55 °C	- 55 °C	+ 85 °C	+ 125 °C	at + 85 °C
			1.0	0.1	0.01	+ 25 °C	+ 85 °C + 125 °C	(%)	(Ω)	- 55 °C	+ 85 °C	+ 125 °C	40 kHz (mA)
60 WVDC at + 85 °C . . . 40 WVDC at + 125 °C													
39.0	T2	10	0151	0371	0591	1.0	9.0	10	90	- 28	+ 10.5	+ 12	1110
39.0	T2	5	0152	0372	0592	1.0	9.0	10	90	- 28	+ 10.5	+ 12	1110
50.0	T3	20	0153	0373	0593	2.0	12.0	10	50	- 16	+ 10.5	+ 12	1330
50.0	T3	10	0154	0374	0594	2.0	12.0	10	50	- 16	+ 10.5	+ 12	1330
50.0	T3	5	0155	0375	0595	2.0	12.0	10	50	- 16	+ 10.5	+ 12	1330
68.0	T3	20	0156	0376	0596	2.0	16.0	13	50	- 32	+ 10.5	+ 12	1365
68.0	T3	10	0157	0377	0597	2.0	16.0	13	50	- 32	+ 10.5	+ 12	1365
68.0	T3	5	0158	0378	0598	2.0	16.0	13	50	- 32	+ 10.5	+ 12	1365
140.0	T4	20	0159	0379	0599	8.0	32.0	16	28	- 40	+ 20	+ 20	1850
140.0	T4	10	0160	0380	0600	8.0	32.0	16	28	- 40	+ 20	+ 20	1850
75 WVDC at + 85 °C . . . 50 WVDC at + 125 °C													
3.5	T1	20	0161	0381	0601	1.0	2.0	2.5	650	- 16	+ 5	+ 6	525
3.5	T1	10	0162	0382	0602	1.0	2.0	2.5	650	- 16	+ 5	+ 6	525
3.5	T1	5	0163	0383	0603	1.0	2.0	2.5	650	- 16	+ 5	+ 6	525
6.8	T1	20	0164	0384	0604	1.0	2.0	3.5	300	- 20	+ 8	+ 9	610
6.8	T1	10	0165	0385	0605	1.0	2.0	3.5	300	- 20	+ 8	+ 9	610
6.8	T1	5	0166	0386	0606	1.0	2.0	3.5	300	- 20	+ 8	+ 9	610
15.0	T2	20	0167	0387	0607	1.0	5.0	6	150	- 16	+ 8	+ 9	890
15.0	T2	10	0168	0388	0608	1.0	5.0	6	150	- 16	+ 8	+ 9	890
15.0	T2	5	0169	0389	0609	1.0	5.0	6	150	- 16	+ 8	+ 9	890
33.0	T2	20	0170	0390	0610	1.0	10.0	10	90	- 24	+ 10.5	+ 15	1000
33.0	T2	10	0171	0391	0611	1.0	10.0	10	90	- 24	+ 10.5	+ 15	1000
33.0	T2	5	0172	0392	0612	1.0	10.0	10	90	- 24	+ 10.5	+ 15	1000
40.0	T3	20	0173	0393	0613	2.0	12.0	9	60	- 16	+ 10.5	+ 12	1250
40.0	T3	10	0174	0394	0614	2.0	12.0	9	60	- 16	+ 10.5	+ 12	1250
40.0	T3	5	0175	0395	0615	2.0	12.0	9	60	- 16	+ 10.5	+ 12	1250
56.0	T3	20	0176	0396	0616	2.0	17.0	11	60	- 28	+ 10.5	+ 15	1335
56.0	T3	10	0177	0397	0617	2.0	17.0	11	60	- 28	+ 10.5	+ 15	1335
56.0	T3	5	0178	0398	0618	2.0	17.0	11	60	- 28	+ 10.5	+ 15	1335
110.0	T4	20	0179	0399	0619	9.0	36.0	12	29	- 35	+ 20	+ 20	1850
110.0	T4	10	0180	0400	0620	9.0	36.0	12	29	- 35	+ 20	+ 20	1850
100 WVDC at + 85 °C . . . 65 WVDC at + 125 °C													
2.5	T1	20	0181	0401	0621	1.0	2.0	2	950	- 16	+ 7	+ 8	505
2.5	T1	10	0182	0402	0622	1.0	2.0	2	950	- 16	+ 7	+ 8	505
2.5	T1	5	0183	0403	0623	1.0	2.0	2	950	- 16	+ 7	+ 8	505
4.7	T1	20	0184	0404	0624	1.0	2.0	3	500	- 16	+ 7	+ 8	565
4.7	T1	10	0185	0405	0625	1.0	2.0	3	500	- 16	+ 7	+ 8	565
4.7	T1	5	0186	0406	0626	1.0	2.0	3	500	- 16	+ 7	+ 8	565
11.0	T2	20	0187	0407	0627	1.0	4.0	5	200	- 16	+ 8	+ 8	835
11.0	T2	10	0188	0408	0628	1.0	4.0	5	200	- 16	+ 8	+ 8	835
11.0	T2	5	0189	0409	0629	1.0	4.0	5	200	- 16	+ 8	+ 8	835
22.0	T2	20	0190	0410	0630	1.0	9.0	7.5	100	- 16	+ 8	+ 8	965
22.0	T2	10	0191	0411	0631	1.0	9.0	7.5	100	- 16	+ 8	+ 8	965
22.0	T2	5	0192	0412	0632	1.0	9.0	7.5	100	- 16	+ 8	+ 8	965
30.0	T3	20	0193	0413	0633	2.0	12.0	7	80	- 16	+ 8	+ 8	1240
30.0	T3	10	0194	0414	0634	2.0	12.0	7	80	- 16	+ 8	+ 8	1240
30.0	T3	5	0195	0415	0635	2.0	12.0	7	80	- 16	+ 8	+ 8	1240
43.0	T3	20	0196	0416	0636	2.0	17.0	8.5	70	- 20	+ 8	+ 8	1335
43.0	T3	10	0197	0417	0637	2.0	17.0	8.5	70	- 20	+ 8	+ 8	1335
43.0	T3	5	0198	0418	0638	2.0	17.0	8.5	70	- 20	+ 8	+ 8	1335
86.0	T4	20	0199	0419	0639	9.0	36.0	10	30	- 25	+ 15	+ 15	1800
86.0	T4	10	0200	0420	0640	9.0	36.0	10	30	- 25	+ 15	+ 15	1800

Notes

* Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).

** For ripple current limits at various temperatures, voltages and frequencies, see Ripple Current Table.



STANDARD/EXTENDED RATINGS: CLR79, M39006/22-XXXX													
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PART NO. M39006/22-* FAILURE RATE LEVEL (%/1000 h)			MAX. DCL (μ A) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX.** RIPPLE CURRENT at + 85 °C 40 kHz (mA)
			M	P	R	+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C	
			1.0	0.1	0.01								
125 WVDC at + 85 °C . . . 85 WVDC at + 125 °C													
1.7	T1	20	0201	0421	0641	1.0	2.0	2	1250	- 16	+ 7	+ 8	415
1.7	T1	10	0202	0422	0642	1.0	2.0	2	1250	- 16	+ 7	+ 8	415
1.7	T1	5	0203	0423	0643	1.0	2.0	2	1250	- 16	+ 7	+ 8	415
3.6	T1	20	0204	0424	0644	1.0	2.0	2.7	600	- 16	+ 7	+ 8	520
3.6	T1	10	0205	0425	0645	1.0	2.0	2.7	600	- 16	+ 7	+ 8	520
3.6	T1	5	0206	0426	0646	1.0	2.0	2.7	600	- 16	+ 7	+ 8	520
9.0	T2	20	0207	0427	0647	1.0	5.0	5	240	- 16	+ 7	+ 8	755
9.0	T2	10	0208	0428	0648	1.0	5.0	5	240	- 16	+ 7	+ 8	755
9.0	T2	5	0209	0429	0649	1.0	5.0	5	240	- 16	+ 7	+ 8	755
14.0	T2	20	0210	0430	0650	1.0	7.0	6	167	- 16	+ 7	+ 8	860
14.0	T2	10	0211	0431	0651	1.0	7.0	6	167	- 16	+ 7	+ 8	860
14.0	T2	5	0212	0432	0652	1.0	7.0	6	167	- 16	+ 7	+ 8	860
18.0	T3	20	0213	0433	0653	2.0	9.0	5	129	- 16	+ 7	+ 8	1130
18.0	T3	10	0214	0434	0654	2.0	9.0	5	129	- 16	+ 7	+ 8	1130
18.0	T3	5	0215	0435	0655	2.0	9.0	5	129	- 16	+ 7	+ 8	1130
25.0	T3	20	0216	0436	0656	2.0	13.0	6	93	- 16	+ 7	+ 8	1200
25.0	T3	10	0217	0437	0657	2.0	13.0	6	93	- 16	+ 7	+ 8	1200
25.0	T3	5	0218	0438	0658	2.0	13.0	6	93	- 16	+ 7	+ 8	1200
56.0	T4	20	0219	0439	0659	10.0	40.0	6.5	32	- 25	+ 15	+ 15	1800
56.0	T4	10	0220	0440	0660	10.0	40.0	6.5	32	- 25	+ 15	+ 15	1800

Notes

* Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).

** For ripple current limits at various temperatures, voltages and frequencies, see Ripple Current Table.

STANDARD/EXTENDED RATINGS: CLR81, M39006/25-XXXX													
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PART NO. M39006/25-* FAILURE RATE LEVEL (%/1000 h)			MAX. DCL (μ A) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX.** RIPPLE CURRENT at + 85 °C 40 kHz (mA)
			M	P	R	+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C	
			1.0	0.1	0.01								
6 WVDC at + 85 °C . . . 4 WVDC at + 125 °C													
220.0	T1	20	0001	0089	0177	2.0	9.0	50	36	- 64	+ 13	+ 16	1000
220.0	T1	10	0002	0090	0178	2.0	9.0	50	36	- 64	+ 13	+ 16	1000
820.0	T2	20	0003	0091	0179	3.0	14.0	155	18	- 88	+ 16	+ 20	1500
820.0	T2	10	0004	0092	0180	3.0	14.0	155	18	- 88	+ 16	+ 20	1500
1500.0	T3	20	0005	0093	0181	5.0	20.0	172	18	- 90	+ 20	+ 25	1900
1500.0	T3	10	0006	0094	0182	5.0	20.0	172	18	- 90	+ 20	+ 25	1900
2200.0	T4	20	0007	0095	0183	6.0	24.0	170	13	- 90	+ 25	+ 30	2300
2200.0	T4	10	0008	0096	0184	6.0	24.0	170	13	- 90	+ 25	+ 30	2300
8 WVDC at + 85 °C . . . 5 WVDC at + 125 °C													
180.0	T1	20	0009	0097	0185	2.0	9.0	41	45	- 60	+ 13	+ 16	1000
180.0	T1	10	0010	0098	0186	2.0	9.0	41	45	- 60	+ 13	+ 16	1000
680.0	T2	20	0011	0099	0187	3.0	14.0	130	22	- 83	+ 16	+ 20	1500
680.0	T2	10	0012	0100	0188	3.0	14.0	130	22	- 83	+ 16	+ 20	1500
1500.0	T3	20	0013	0101	0189	5.0	20.0	170	18	- 90	+ 20	+ 25	1900
1500.0	T3	10	0014	0102	0190	5.0	20.0	170	18	- 90	+ 20	+ 25	1900
1800.0	T4	20	0015	0103	0191	7.0	25.0	138	14	- 90	+ 25	+ 30	2300
1800.0	T4	10	0016	0104	0192	7.0	25.0	138	14	- 90	+ 25	+ 30	2300

Notes

* Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).

** For ripple current limits at various temperatures, voltages and frequencies, see Ripple Current Table.



STANDARD/EXTENDED RATINGS: CLR81, M39006/25-XXXX													
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PART NO. M39006/25-* FAILURE RATE LEVEL (%/1000 h)			MAX. DCL (μ A) at		MAX. DF at + 25 °C	MAX. IMP. at - 55 °C	MAX. CAPACITANCE CHANGE (%) at			MAX.** RIPPLE CURRENT at + 85 °C 40 kHz (mA)
			M	P	R	+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C	
			1.0	0.1	0.01				(%)	(Ω)			
10 WVDC at + 85 °C . . . 7 WVDC at + 125 °C													
150.0	T1	20	0017	0105	0193	2.0	9.0	34	54	- 55	+ 13	+ 16	900
150.0	T1	10	0018	0106	0194	2.0	9.0	34	54	- 55	+ 13	+ 16	900
560.0	T2	20	0019	0107	0195	3.0	16.0	106	27	- 77	+ 16	+ 20	1450
560.0	T2	10	0020	0108	0196	3.0	16.0	106	27	- 77	+ 16	+ 20	1450
1200.0	T3	20	0021	0109	0197	5.0	20.0	137	18	- 88	+ 20	+ 25	1850
1200.0	T3	10	0022	0110	0198	5.0	20.0	137	18	- 88	+ 20	+ 25	1850
1500.0	T4	20	0023	0111	0199	7.0	25.0	114	15	- 88	+ 25	+ 30	2300
1500.0	T4	10	0024	0112	0200	7.0	25.0	114	15	- 88	+ 25	+ 30	2300
15 WVDC at + 85 °C . . . 10 WVDC at + 125 °C													
100.0	T1	20	0025	0113	0201	2.0	9.0	30	72	- 44	+ 13	+ 16	900
100.0	T1	10	0026	0114	0202	2.0	9.0	30	72	- 44	+ 13	+ 16	900
390.0	T2	20	0027	0115	0203	3.0	16.0	74	31	- 66	+ 16	+ 20	1450
390.0	T2	10	0028	0116	0204	3.0	16.0	74	31	- 66	+ 16	+ 20	1450
820.0	T3	20	0029	0117	0205	6.0	24.0	111	22	- 77	+ 20	+ 25	1800
820.0	T3	10	0030	0118	0206	6.0	24.0	111	22	- 77	+ 20	+ 25	1800
1000.0	T4	20	0031	0119	0207	8.0	32.0	92	17	- 77	+ 25	+ 30	2300
1000.0	T4	10	0032	0120	0208	8.0	32.0	92	17	- 77	+ 25	+ 30	2300
25 WVDC at + 85 °C . . . 15 WVDC at + 125 °C													
68.0	T1	20	0033	0121	0209	2.0	9.0	22	90	- 40	+ 12	+ 15	850
68.0	T1	10	0034	0122	0210	2.0	9.0	22	90	- 40	+ 12	+ 15	850
270.0	T2	20	0035	0123	0211	3.0	16.0	55	33	- 62	+ 13	+ 16	1400
270.0	T2	10	0036	0124	0212	3.0	16.0	55	33	- 62	+ 13	+ 16	1400
560.0	T3	20	0037	0125	0213	7.0	28.0	76	24	- 72	+ 20	+ 25	1750
560.0	T3	10	0038	0126	0214	7.0	28.0	76	24	- 72	+ 20	+ 25	1750
680.0	T4	20	0039	0127	0215	8.0	32.0	63	19	- 72	+ 25	+ 30	2100
680.0	T4	10	0040	0128	0216	8.0	32.0	63	19	- 72	+ 25	+ 30	2100
30 WVDC at + 85 °C . . . 20 WVDC at + 125 °C													
56.0	T1	20	0041	0129	0217	2.0	9.0	22	100	- 38	+ 12	+ 15	800
56.0	T1	10	0042	0130	0218	2.0	9.0	22	100	- 38	+ 12	+ 15	800
220.0	T2	20	0043	0131	0219	3.0	16.0	42	36	- 60	+ 13	+ 16	1200
220.0	T2	10	0044	0132	0220	3.0	16.0	42	36	- 60	+ 13	+ 16	1200
470.0	T3	20	0045	0133	0221	8.0	32.0	64	25	- 65	+ 20	+ 25	1500
470.0	T3	10	0046	0134	0222	8.0	32.0	64	25	- 65	+ 20	+ 25	1500
560.0	T4	20	0047	0135	0223	9.0	36.0	55	20	- 65	+ 25	+ 30	2000
560.0	T4	10	0048	0136	0224	9.0	36.0	55	20	- 65	+ 25	+ 30	2000
50 WVDC at + 85 °C . . . 30 WVDC at + 125 °C													
33.0	T1	20	0049	0137	0225	2.0	9.0	12.3	135	- 29	+ 10	+ 12	700
33.0	T1	10	0050	0138	0226	2.0	9.0	12.3	135	- 29	+ 10	+ 12	700
120.0	T2	20	0051	0139	0227	4.0	24.0	22.5	49	- 42	+ 12	+ 15	1200
120.0	T2	10	0052	0140	0228	4.0	24.0	22.5	49	- 42	+ 12	+ 15	1200
270.0	T3	20	0053	0141	0229	8.0	32.0	37	29	- 46	+ 20	+ 25	1450
270.0	T3	10	0054	0142	0230	8.0	32.0	37	29	- 46	+ 20	+ 25	1450
330.0	T4	20	0055	0143	0231	9.0	36.0	38	22	- 46	+ 25	+ 30	1900
330.0	T4	10	0056	0144	0232	9.0	36.0	38	22	- 46	+ 25	+ 30	1900
60 WVDC at + 85 °C . . . 40 WVDC at + 125 °C													
27.0	T1	20	0057	0145	0233	3.0	12.0	10.2	144	- 24	+ 10	+ 12	700
27.0	T1	10	0058	0146	0234	3.0	12.0	10.2	144	- 24	+ 10	+ 12	700
100.0	T2	20	0059	0147	0235	4.0	20.0	19	54	- 36	+ 12	+ 15	1100
100.0	T2	10	0060	0148	0236	4.0	20.0	19	54	- 36	+ 12	+ 15	1100
220.0	T3	20	0061	0149	0237	8.0	32.0	30	29	- 40	+ 16	+ 20	1400
220.0	T3	10	0062	0150	0238	8.0	32.0	30	29	- 40	+ 16	+ 20	1400
270.0	T4	20	0063	0151	0239	9.0	36.0	27	23	- 45	+ 20	+ 25	1850
270.0	T4	10	0064	0152	0240	9.0	36.0	27	23	- 45	+ 20	+ 25	1850

Notes

* Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).

** For ripple current limits at various temperatures, voltages and frequencies, see Ripple Current Table.



STANDARD/EXTENDED RATINGS: CLR81, M39006/25-XXXX													
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PART NO. M39006/25-*			MAX. DCL (μ A)		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX.. CAPACITANCE CHANGE (%) at			MAX.** RIPPLE CURRENT at + 85 °C 40 kHz (mA)
			FAILURE RATE LEVEL (%/1000 h)			at				+			
			M	P	R	+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C	
75 WVDC at + 85 °C . . . 50 WVDC at + 125 °C													
22.0	T1	20	0065	0153	0241	3.0	12.0	8.5	157	- 19	+ 10	+ 12	600
22.0	T1	10	0066	0154	0242	3.0	12.0	8.5	157	- 19	+ 10	+ 12	600
82.0	T2	20	0067	0155	0243	4.0	24.0	15.2	63	- 30	+ 12	+ 15	1000
82.0	T2	10	0068	0156	0244	4.0	24.0	15.2	63	- 30	+ 12	+ 15	1000
180.0	T3	20	0069	0157	0245	9.0	36.0	24.4	30	- 35	+ 16	+ 20	1300
180.0	T3	10	0070	0158	0246	9.0	36.0	24.4	30	- 35	+ 16	+ 20	1300
220.0	T4	20	0071	0159	0247	10.0	40.0	37.0	24	- 40	+ 20	+ 25	1800
220.0	T4	10	0072	0160	0248	10.0	40.0	37.0	24	- 40	+ 20	+ 25	1800
100 WVDC at + 85 °C . . . 65 WVDC at + 125 °C													
10.0	T1	20	0073	0161	0249	3.0	12.0	4.5	200	- 17	+ 10	+ 12	800
10.0	T1	10	0074	0162	0250	3.0	12.0	4.5	200	- 17	+ 10	+ 12	800
39.0	T2	20	0075	0163	0251	5.0	24.0	10.4	80	- 20	+ 12	+ 15	1300
39.0	T2	10	0076	0164	0252	5.0	24.0	10.4	80	- 20	+ 12	+ 15	1300
68.0	T3	20	0077	0165	0253	10.0	40.0	11.3	40	- 30	+ 14	+ 16	1600
68.0	T3	10	0078	0166	0254	10.0	40.0	11.3	40	- 30	+ 14	+ 16	1600
120.0	T4	20	0079	0167	0255	12.0	48.0	25	30	- 35	+ 15	+ 17	2000
120.0	T4	10	0080	0168	0256	12.0	48.0	25	30	- 35	+ 15	+ 17	2000
125 WVDC at + 85 °C . . . 85 WVDC at + 125 °C													
6.8	T1	20	0081	0169	0257	3.0	12.0	6.0	300	- 14	+ 10	+ 12	700
6.8	T1	10	0082	0170	0258	3.0	12.0	6.0	300	- 14	+ 10	+ 12	700
27.0	T2	20	0083	0171	0259	5.0	24.0	7.2	90	- 18	+ 12	+ 15	1200
27.0	T2	10	0084	0172	0260	5.0	24.0	7.2	90	- 18	+ 12	+ 15	1200
47.0	T3	20	0085	0173	0261	10.0	40.0	7.9	50	- 26	+ 14	+ 16	1500
47.0	T3	10	0086	0174	0262	10.0	40.0	7.9	50	- 26	+ 14	+ 16	1500
82.0	T4	20	0087	0175	0263	12.0	48.0	17.4	32	- 30	+ 15	+ 17	1900
82.0	T4	10	0088	0176	0264	12.0	48.0	17.4	32	- 30	+ 15	+ 17	1900

Notes

- * Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- ** For ripple current limits at various temperatures, voltages and frequencies, see Ripple Current Table.

CLR79, CLR81 RIPPLE CURRENT MULTIPLIERS VS. FREQUENCY, TEMPERATURE AND APPLIED PEAK VOLTAGE																									
FREQUENCY OF APPLIED RIPPLE CURRENT		120 Hz				800 Hz				1 kHz				10 kHz				40 kHz				100 kHz			
AMBIENT STILL AIR		TEMP °C				TEMP °C				TEMP °C				TEMP °C				TEMP °C							
		\leq 55	85	105	125	\leq 55	85	105	125	\leq 55	85	105	125	\leq 55	85	105	125	\leq 55	85	105	125				
% of APPLIED VOLTAGE	100 %	0.60	0.39	-	-	0.71	0.43	-	-	0.72	0.46	-	-	0.88	0.55	-	-	1.0	0.63	-	-	1.1	0.69	-	-
	90 %	0.60	0.46	-	-	0.71	0.55	-	-	0.72	0.55	-	-	0.88	0.67	-	-	1.0	0.77	-	-	1.1	0.85	-	-
	80 %	0.60	0.52	0.35	-	0.71	0.62	0.42	-	0.72	0.62	0.42	-	0.88	0.76	0.52	-	1.0	0.87	0.59	-	1.1	0.96	0.65	-
	70 %	0.60	0.58	0.44	-	0.71	0.69	0.52	-	0.72	0.70	0.52	-	0.88	0.85	0.64	-	1.0	0.97	0.73	-	1.1	1.07	0.80	-
	66 2/3 %	0.60	0.60	0.46	0.27	0.71	0.71	0.55	0.32	0.72	0.72	0.55	0.32	0.88	0.88	0.68	0.40	1.0	1.0	0.77	0.45	1.1	1.1	0.85	0.50

Notes

- At + 125 °C the rated voltage of the capacitors decreases to 66 2/3 percent of the + 85 °C rated voltage.
- The peak of the applied AC ripple voltage plus the applied DC voltage must not exceed the DC voltage rating of the capacitor either forward or reverse.
- The ripple current listed represents a rating calculated using a maximum internal temperature rise (Δ T) of + 50 °C at 40 kHz at + 85 °C ambient with a maximum peak rated voltage of 66 2/3 percent of the + 85 °C peak voltage rating.
- The maximum allowable internal temperature rise (Δ T) decreases linearly to a calculated + 10 °C rise at + 125 °C ambient.
- The internal temperature rise is directly proportional to the equivalent series resistance of the capacitor and equivalent series resistance increases with decreasing frequency.



STANDARD/EXTENDED RATINGS: CLR90, M39006/30-XXXX													
CAPACITANCE (µF)	CASE CODE	CAP. TOL. (± %)	PART NO. M39006/30-* FAILURE RATE LEVEL (%/1000 h)			MAX. DCL (µA) at		MAX. DF at +25 °C (%)	MAX. IMP. at -55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX. ESR at +25 °C 120 Hz (Ω)
			M	P	R	+25 °C	+85 °C +125 °C			-55 °C	+85 °C	+125 °C	
			1.0	0.1	0.01								
6 WVDC at +85 °C . . . 4 WVDC at +125 °C													
30.0	T1	20	0001	0221	0441	1.0	2.0	4.5	100	-40	+10.5	+12	1.99
30.0	T1	10	0002	0222	0442	1.0	2.0	4.5	100	-40	+10.5	+12	1.99
30.0	T1	5	0003	0223	0443	1.0	2.0	4.5	100	-40	+10.5	+12	1.99
68.0	T1	20	0004	0224	0444	1.0	2.0	7.5	60	-40	+14	+16	1.58
68.0	T1	10	0005	0225	0445	1.0	2.0	7.5	60	-40	+14	+16	1.58
68.0	T1	5	0006	0226	0446	1.0	2.0	7.5	60	-40	+14	+16	1.58
140.0	T2	20	0007	0227	0447	1.0	3.0	10.5	40	-40	+14	+16	0.99
140.0	T2	10	0008	0228	0448	1.0	3.0	10.5	40	-40	+14	+16	0.99
140.0	T2	5	0009	0229	0449	1.0	3.0	10.5	40	-40	+14	+16	0.99
270.0	T2	20	0010	0230	0450	1.0	6.5	22.5	25	-44	+17.5	+20	1.11
270.0	T2	10	0011	0231	0451	1.0	6.5	22.5	25	-44	+17.5	+20	1.11
270.0	T2	5	0012	0232	0452	1.0	6.5	22.5	25	-44	+17.5	+20	1.11
330.0	T3	20	0013	0233	0453	2.0	7.9	18.0	20	-44	+14	+16	0.73
330.0	T3	10	0014	0234	0454	2.0	7.9	18.0	20	-44	+14	+16	0.73
330.0	T3	5	0015	0235	0455	2.0	7.9	18.0	20	-44	+14	+16	0.73
560.0	T3	20	0016	0236	0456	2.0	13.0	27.5	25	-64	+17.5	+20	0.65
560.0	T3	10	0017	0237	0457	2.0	13.0	27.5	25	-64	+17.5	+20	0.65
560.0	T3	5	0018	0238	0458	2.0	13.0	27.5	25	-64	+17.5	+20	0.65
1200.0	T4	20	0019	0239	0459	3.0	14.0	45.0	20	-80	+25	+25	0.50
1200.0	T4	10	0020	0240	0460	3.0	14.0	45.0	20	-80	+25	+25	0.50
8 WVDC at +85 °C . . . 5 WVDC at +125 °C													
25	T1	20	0021	0241	0461	1.0	2.0	3.75	100	-40	+10.5	+12	1.99
25	T1	10	0022	0242	0462	1.0	2.0	3.75	100	-40	+10.5	+12	1.99
25	T1	5	0023	0243	0463	1.0	2.0	3.75	100	-40	+10.5	+12	1.99
56	T1	20	0024	0244	0464	1.0	2.0	7.0	59	-40	+14	+16	1.66
56	T1	10	0025	0245	0465	1.0	2.0	7.0	59	-40	+14	+16	1.66
56	T1	5	0026	0246	0466	1.0	2.0	7.0	59	-40	+14	+16	1.66
120	T2	20	0027	0247	0467	1.0	2.0	10.0	50	-44	+17.5	+20	1.11
120	T2	10	0028	0248	0468	1.0	2.0	10.0	50	-44	+17.5	+20	1.11
120	T2	5	0029	0249	0469	1.0	2.0	10.0	50	-44	+17.5	+20	1.11
220	T2	20	0030	0250	0470	1.0	7.0	18.5	30	-44	+17.5	+20	1.12
220	T2	10	0031	0251	0471	1.0	7.0	18.5	30	-44	+17.5	+20	1.12
220	T2	5	0032	0252	0472	1.0	7.0	18.5	30	-44	+17.5	+20	1.12
290	T3	20	0033	0253	0473	2.0	6.0	17.0	25	-64	+17.5	+20	0.78
290	T3	10	0034	0254	0474	2.0	6.0	17.0	25	-64	+17.5	+20	0.78
290	T3	5	0035	0255	0475	2.0	6.0	17.0	25	-64	+17.5	+20	0.78
430	T3	20	0036	0256	0476	2.0	14.0	23.0	25	-64	+17.5	+20	0.71
430	T3	10	0037	0257	0477	2.0	14.0	23.0	25	-64	+17.5	+20	0.71
430	T3	5	0038	0258	0478	2.0	14.0	23.0	25	-64	+17.5	+20	0.71
850	T4	20	0039	0259	0479	4.0	16.0	30.0	22	-80	+25	+25	0.47
850	T4	10	0040	0260	0480	4.0	16.0	30.0	22	-80	+25	+25	0.47
10 WVDC at +85 °C . . . 7 WVDC at +125 °C													
20	T1	20	0041	0261	0481	1.0	2.0	3.0	175	-32	+10.5	+12	1.99
20	T1	10	0042	0262	0482	1.0	2.0	3.0	175	-32	+10.5	+12	1.99
20	T1	5	0043	0263	0483	1.0	2.0	3.0	175	-32	+10.5	+12	1.99
47	T1	20	0044	0264	0484	1.0	2.0	6.5	100	-36	+14	+16	1.84
47	T1	10	0045	0265	0485	1.0	2.0	6.5	100	-36	+14	+16	1.84
47	T1	5	0046	0266	0486	1.0	2.0	6.5	100	-36	+14	+16	1.84
100	T2	20	0047	0267	0487	1.0	4.0	7.5	60	-36	+14	+16	0.99
100	T2	10	0048	0268	0488	1.0	4.0	7.5	60	-36	+14	+16	0.99
100	T2	5	0049	0269	0489	1.0	4.0	7.5	60	-36	+14	+16	0.99
180	T2	20	0050	0270	0490	1.0	7.0	15.0	40	-36	+14	+16	1.11
180	T2	10	0051	0271	0491	1.0	7.0	15.0	40	-36	+14	+16	1.11
180	T2	5	0052	0272	0492	1.0	7.0	15.0	40	-36	+14	+16	1.11
250	T3	20	0053	0273	0493	2.0	10.0	15.0	30	-40	+14	+16	0.80
250	T3	10	0054	0274	0494	2.0	10.0	15.0	30	-40	+14	+16	0.80
250	T3	5	0055	0275	0495	2.0	10.0	15.0	30	-40	+14	+16	0.80
390	T3	20	0056	0276	0496	2.0	16.0	22.0	25	-64	+17.5	+20	0.75

Note

* Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).



STANDARD/EXTENDED RATINGS: CLR90, M39006/30-XXXX													
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PART NO. M39006/30-* FAILURE RATE LEVEL (%/1000 h)			MAX. DCL (μ A) at		MAX. DF at	MAX. IMP. at	MAX. CAPACITANCE CHANGE (%) at			MAX. ESR at + 25 °C
			M	P	R	+ 25 °C	+ 85 °C + 125 °C	+ 25 °C (%)	- 55 °C (Ω)	- 55 °C	+ 85 °C	+ 125 °C	120 Hz (Ω)
			1.0	0.1	0.01								
10 WVDC at + 85 °C . . . 7 WVDC at + 125 °C													
390	T3	10	0057	0277	0497	2.0	16.0	22.0	25	- 64	+ 17.5	+ 20	0.75
390	T3	5	0058	0278	0498	2.0	16.0	22.0	25	- 64	+ 17.5	+ 20	0.75
750	T4	20	0059	0279	0499	4.0	16.0	25.0	23	- 80	+ 25	+ 25	0.44
750	T4	10	0060	0280	0500	4.0	16.0	25.0	23	- 80	+ 25	+ 25	0.44
15 WVDC at + 85 °C . . . 10 WVDC at + 125 °C													
15	T1	20	0061	0281	0501	1.0	2.0	2.5	155	- 24	+ 10.5	+ 12	1.99
15	T1	10	0062	0282	0502	1.0	2.0	2.5	155	- 24	+ 10.5	+ 12	1.99
15	T1	5	0063	0283	0503	1.0	2.0	2.5	155	- 24	+ 10.5	+ 12	1.99
33	T1	20	0064	0284	0504	1.0	2.0	5.0	90	- 28	+ 14	+ 16	1.66
33	T1	10	0065	0285	0505	1.0	2.0	5.0	90	- 28	+ 14	+ 16	1.66
33	T1	5	0066	0286	0506	1.0	2.0	5.0	90	- 28	+ 14	+ 16	1.66
70	T2	20	0067	0287	0507	1.0	4.0	6.5	75	- 28	+ 14	+ 16	1.11
70	T2	10	0068	0288	0508	1.0	4.0	6.5	75	- 28	+ 14	+ 16	1.11
70	T2	5	0069	0289	0509	1.0	4.0	6.5	75	- 28	+ 14	+ 16	1.11
120	T2	20	0070	0290	0510	1.0	7.0	9.0	50	- 28	+ 17.5	+ 20	1.12
120	T2	10	0071	0291	0511	1.0	7.0	9.0	50	- 28	+ 17.5	+ 20	1.12
120	T2	5	0072	0292	0512	1.0	7.0	9.0	50	- 28	+ 17.5	+ 20	1.12
170	T3	20	0073	0293	0513	2.0	10.0	12.5	35	- 32	+ 14	+ 16	0.78
170	T3	10	0074	0294	0514	2.0	10.0	12.5	35	- 32	+ 14	+ 16	0.78
170	T3	5	0075	0295	0515	2.0	10.0	12.5	35	- 32	+ 14	+ 16	0.78
270	T3	20	0076	0296	0516	2.0	16.0	16.0	30	- 56	+ 17.5	+ 20	0.71
270	T3	10	0077	0297	0517	2.0	16.0	16.0	30	- 56	+ 17.5	+ 20	0.71
270	T3	5	0078	0298	0518	2.0	16.0	16.0	30	- 56	+ 17.5	+ 20	0.71
540	T4	20	0079	0299	0519	6.0	24.0	20.0	23	- 80	+ 25	+ 25	0.47
540	T4	10	0080	0300	0520	6.0	24.0	20.0	23	- 80	+ 25	+ 25	0.47
25 WVDC at + 85 °C . . . 15 WVDC at + 125 °C													
10	T1	20	0081	0301	0521	1.0	2.0	2.0	220	- 16	+ 8	+ 9	2.66
10	T1	10	0082	0302	0522	1.0	2.0	2.0	220	- 16	+ 8	+ 9	2.66
10	T1	5	0083	0303	0523	1.0	2.0	2.0	220	- 16	+ 8	+ 9	2.66
22	T1	20	0084	0304	0524	1.0	2.0	3.3	140	- 20	+ 10.5	+ 12	1.99
22	T1	10	0085	0305	0525	1.0	2.0	3.3	140	- 20	+ 10.5	+ 12	1.99
22	T1	5	0086	0306	0526	1.0	2.0	3.3	140	- 20	+ 10.5	+ 12	1.99
50	T2	20	0087	0307	0527	1.0	2.0	5.5	70	- 28	+ 13	+ 15	1.46
50	T2	10	0088	0308	0528	1.0	2.0	5.5	70	- 28	+ 13	+ 15	1.46
50	T2	5	0089	0309	0529	1.0	2.0	5.5	70	- 28	+ 13	+ 15	1.46
100	T2	20	0090	0310	0530	1.0	10.0	7.5	50	- 28	+ 13	+ 15	0.99
100	T2	10	0091	0311	0531	1.0	10.0	7.5	50	- 28	+ 13	+ 15	0.99
100	T2	5	0092	0312	0532	1.0	10.0	7.5	50	- 28	+ 13	+ 15	0.99
120	T3	20	0093	0313	0533	2.0	6.0	10.5	38	- 32	+ 13	+ 15	1.16
120	T3	10	0094	0314	0534	2.0	6.0	10.5	38	- 32	+ 13	+ 15	1.16
120	T3	5	0095	0315	0535	2.0	6.0	10.5	38	- 32	+ 13	+ 15	1.16
180	T3	20	0096	0316	0536	2.0	18.0	13.0	32	- 48	+ 13	+ 15	0.96
180	T3	10	0097	0317	0537	2.0	18.0	13.0	32	- 48	+ 13	+ 15	0.96
180	T3	5	0098	0318	0538	2.0	18.0	13.0	32	- 48	+ 13	+ 15	0.96
350	T4	20	0099	0319	0539	7.0	28.0	17.5	24	- 70	+ 25	+ 25	0.67
350	T4	10	0100	0320	0540	7.0	28.0	17.5	24	- 70	+ 25	+ 25	0.67
30 WVDC at + 85 °C . . . 20 WVDC at + 125 °C													
8	T1	20	0101	0321	0541	1.0	2.0	2.0	275	- 16	+ 8	+ 12	3.32
8	T1	10	0102	0322	0542	1.0	2.0	2.0	275	- 16	+ 8	+ 12	3.32
8	T1	5	0103	0323	0543	1.0	2.0	2.0	275	- 16	+ 8	+ 12	3.32
15	T1	20	0104	0324	0544	1.0	2.0	2.5	175	- 20	+ 10.5	+ 12	2.21
15	T1	10	0105	0325	0545	1.0	2.0	2.5	175	- 20	+ 10.5	+ 12	2.21
15	T1	5	0106	0326	0546	1.0	2.0	2.5	175	- 20	+ 10.5	+ 12	2.21
40	T2	20	0107	0327	0547	1.0	5.0	5.0	65	- 24	+ 10.5	+ 12	1.66
40	T2	10	0108	0328	0548	1.0	5.0	5.0	65	- 24	+ 10.5	+ 12	0.66
40	T2	5	0109	0329	0549	1.0	5.0	5.0	65	- 24	+ 10.5	+ 12	0.66
68	T2	20	0110	0330	0550	1.0	8.0	6.5	60	- 24	+ 13	+ 15	1.27

Note

* Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).



STANDARD/EXTENDED RATINGS: CLR90, M39006/30-XXXX													
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PART NO. M39006/30-* FAILURE RATE LEVEL (%/1000 h)			MAX. DCL (μ A) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX. ESR at + 25 °C 120 Hz (Ω)
			M	P	R	+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C	
			1.0	0.1	0.01								
30 WVDC at + 85 °C . . . 20 WVDC at + 125 °C													
68	T2	10	0111	0331	0551	1.0	8.0	6.5	60	- 24	+ 13	+ 15	1.27
68	T2	5	0112	0332	0552	1.0	8.0	6.5	60	- 24	+ 13	+ 15	1.27
100	T3	20	0113	0333	0553	2.0	12.0	8.5	40	- 28	+ 10.5	+ 12	1.13
100	T3	10	0114	0334	0554	2.0	12.0	8.5	40	- 28	+ 10.5	+ 12	1.13
100	T3	5	0115	0335	0555	2.0	12.0	8.5	40	- 28	+ 10.5	+ 12	1.13
150	T3	20	0116	0336	0556	2.0	18.0	11.5	35	- 48	+ 13	+ 15	1.02
150	T3	10	0117	0337	0557	2.0	18.0	11.5	35	- 48	+ 13	+ 15	1.02
150	T3	5	0118	0338	0558	2.0	18.0	11.5	35	- 48	+ 13	+ 15	1.02
300	T4	20	0119	0339	0559	8.0	32.0	15.5	25	- 60	+ 25	+ 25	0.69
300	T4	10	0120	0340	0560	8.0	32.0	15.5	25	- 60	+ 25	+ 25	0.69
50 WVDC at + 85 °C . . . 30 WVDC at + 125 °C													
5	T1	20	0121	0341	0561	1.0	2.0	1.5	400	- 16	+ 5	+ 6	3.98
5	T1	10	0122	0342	0562	1.0	2.0	1.5	400	- 16	+ 5	+ 6	3.98
5	T1	5	0123	0343	0563	1.0	2.0	1.5	400	- 16	+ 5	+ 6	3.98
10	T1	20	0124	0344	0564	1.0	2.0	2.0	250	- 24	+ 8	+ 9	2.66
10	T1	10	0125	0345	0565	1.0	2.0	2.0	250	- 24	+ 8	+ 9	2.66
10	T1	5	0126	0346	0566	1.0	2.0	2.0	250	- 24	+ 8	+ 9	2.66
25	T2	20	0127	0347	0567	1.0	5.0	4.0	95	- 20	+ 10.5	+ 12	2.13
25	T2	10	0128	0348	0568	1.0	5.0	4.0	95	- 20	+ 10.5	+ 12	2.13
25	T2	5	0129	0349	0569	1.0	5.0	4.0	95	- 20	+ 10.5	+ 12	2.13
47	T2	20	0130	0350	0570	1.0	9.0	5.0	70	- 28	+ 13	+ 15	1.56
47	T2	10	0131	0351	0571	1.0	9.0	5.0	70	- 28	+ 13	+ 15	1.56
47	T2	5	0132	0352	0572	1.0	9.0	5.0	70	- 28	+ 13	+ 15	1.56
60	T3	20	0133	0353	0573	2.0	12.0	6.0	45	- 16	+ 10.5	+ 12	1.33
60	T3	10	0134	0354	0574	2.0	12.0	6.0	45	- 16	+ 10.5	+ 12	1.33
60	T3	5	0135	0355	0575	2.0	12.0	6.0	45	- 16	+ 10.5	+ 12	1.33
82	T3	20	0136	0356	0576	2.0	16.0	7.5	45	- 32	+ 13	+ 15	1.22
82	T3	10	0137	0357	0577	2.0	16.0	7.5	45	- 32	+ 13	+ 15	1.22
82	T3	5	0138	0358	0578	2.0	16.0	7.5	45	- 32	+ 13	+ 15	1.22
160	T4	20	0139	0359	0579	6.0	32.0	8.5	27	- 50	+ 25	+ 25	0.71
160	T4	10	0140	0360	0580	6.0	32.0	8.5	27	- 50	+ 25	+ 25	0.71
60 WVDC at + 85 °C . . . 40 WVDC at + 125 °C													
4	T1	20	0141	0361	0581	1.0	2.0	1.4	550	- 16	+ 5	+ 6	4.65
4	T1	10	0142	0362	0582	1.0	2.0	1.4	550	- 16	+ 5	+ 6	4.65
4	T1	5	0143	0363	0583	1.0	2.0	1.4	550	- 16	+ 5	+ 6	4.65
8.2	T1	20	0144	0364	0584	1.0	2.0	2.0	275	- 24	+ 8	+ 9	3.24
8.2	T1	10	0145	0365	0585	1.0	2.0	2.0	275	- 24	+ 8	+ 9	3.24
8.2	T1	5	0146	0366	0586	1.0	2.0	2.0	275	- 24	+ 8	+ 9	3.24
20	T2	20	0147	0367	0587	1.0	5.0	3.5	105	- 16	+ 10.5	+ 12	2.32
20	T2	10	0148	0368	0588	1.0	5.0	3.5	105	- 16	+ 10.5	+ 12	2.32
20	T2	5	0149	0369	0589	1.0	5.0	3.5	105	- 16	+ 10.5	+ 12	2.32
39	T2	20	0150	0370	0590	1.0	9.0	5.0	90	- 28	+ 10.5	+ 12	1.70
39	T2	10	0151	0371	0591	1.0	9.0	5.0	90	- 28	+ 10.5	+ 12	1.70
39	T2	5	0152	0372	0592	1.0	9.0	5.0	90	- 28	+ 10.5	+ 12	1.70
50	T3	20	0153	0373	0593	2.0	12.0	5.0	50	- 16	+ 10.5	+ 12	1.33
50	T3	10	0154	0374	0594	2.0	12.0	5.0	50	- 16	+ 10.5	+ 12	1.33
50	T3	5	0155	0375	0595	2.0	12.0	5.0	50	- 16	+ 10.5	+ 12	1.33
68	T3	20	0156	0376	0596	2.0	16.0	6.5	50	- 32	+ 10.5	+ 12	1.27
68	T3	10	0157	0377	0597	2.0	16.0	6.5	50	- 32	+ 10.5	+ 12	1.27
68	T3	5	0158	0378	0598	2.0	16.0	6.5	50	- 32	+ 10.5	+ 12	1.27
140	T4	20	0159	0379	0599	8.0	32.0	8.0	28	- 40	+ 20	+ 20	0.76
140	T4	10	0160	0380	0600	8.0	32.0	8.0	28	- 40	+ 20	+ 20	0.76
75 WVDC at + 85 °C . . . 50 WVDC at + 125 °C													
3.5	T1	20	0161	0381	0601	1.0	2.0	1.25	650	- 16	+ 5	+ 6	4.74
3.5	T1	10	0162	0382	0602	1.0	2.0	1.25	650	- 16	+ 5	+ 6	4.74
3.5	T1	5	0163	0383	0603	1.0	2.0	1.25	650	- 16	+ 5	+ 6	4.74
6.8	T1	20	0164	0384	0604	1.0	2.0	1.75	300	- 20	+ 8	+ 9	3.42

Note

* Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).



STANDARD/EXTENDED RATINGS: CLR90, M39006/30-XXXX													
CAPACITANCE (µF)	CASE CODE	CAP. TOL. (± %)	PART NO. M39006/30-*			MAX. DCL (µA)		MAX. DF	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX. ESR at + 25 °C 120 Hz (Ω)
			FAILURE RATE LEVEL (%/1000 h)			at		at		MAX. CAPACITANCE CHANGE (%) at			
			M	P	R	+ 25 °C	+ 85 °C + 125 °C	+ 25 °C (%)		- 55 °C	- 55 °C	+ 85 °C	
75 WVDC at + 85 °C . . . 50 WVDC at + 125 °C													
6.8	T1	10	0165	0385	0605	1.0	2.0	1.75	300	- 20	+ 8	+ 9	3.42
6.8	T1	5	0166	0386	0606	1.0	2.0	1.75	300	- 20	+ 8	+ 9	3.42
15	T2	20	0167	0387	0607	1.0	5.0	3.0	150	- 16	+ 8	+ 9	2.66
15	T2	10	0168	0388	0608	1.0	5.0	3.0	150	- 16	+ 8	+ 9	2.66
15	T2	5	0169	0389	0609	1.0	5.0	3.0	150	- 16	+ 8	+ 9	2.66
33	T2	20	0170	0390	0610	1.0	10.0	5.0	90	- 24	+ 10.5	+ 15	2.01
33	T2	10	0171	0391	0611	1.0	10.0	5.0	90	- 24	+ 10.5	+ 15	2.01
33	T2	5	0172	0392	0612	1.0	10.0	5.0	90	- 24	+ 10.5	+ 15	2.01
40	T3	20	0173	0393	0613	2.0	12.0	4.5	60	- 16	+ 10.5	+ 12	1.50
40	T3	10	0174	0394	0614	2.0	12.0	4.5	60	- 16	+ 10.5	+ 12	1.50
40	T3	5	0175	0395	0615	2.0	12.0	4.5	60	- 16	+ 10.5	+ 12	1.50
56	T3	20	0176	0396	0616	2.0	17.0	5.5	60	- 28	+ 10.5	+ 15	1.31
56	T3	10	0177	0397	0617	2.0	17.0	5.5	60	- 28	+ 10.5	+ 15	1.31
56	T3	5	0178	0398	0618	2.0	17.0	5.5	60	- 28	+ 10.5	+ 15	1.31
110	T4	20	0179	0399	0619	9.0	36.0	6.0	29	- 35	+ 20	+ 20	0.73
110	T4	10	0180	0400	0620	9.0	36.0	6.0	29	- 35	+ 20	+ 20	0.73
100 WVDC at + 85 °C . . . 65 WVDC at + 125 °C													
2.5	T1	20	0181	0401	0621	1.0	2.0	1.0	950	- 16	+ 7	+ 8	5.31
2.5	T1	10	0182	0402	0622	1.0	2.0	1.0	950	- 16	+ 7	+ 8	5.31
2.5	T1	5	0183	0403	0623	1.0	2.0	1.0	950	- 16	+ 7	+ 8	5.31
4.7	T1	20	0184	0404	0624	1.0	2.0	1.5	500	- 16	+ 7	+ 8	4.24
4.7	T1	10	0185	0405	0625	1.0	2.0	1.5	500	- 16	+ 7	+ 8	4.24
4.7	T1	5	0186	0406	0626	1.0	2.0	1.5	500	- 16	+ 7	+ 8	4.24
11.0	T2	20	0187	0407	0627	1.0	4.0	2.5	200	- 16	+ 8	+ 8	3.02
11.0	T2	10	0188	0408	0628	1.0	4.0	2.5	200	- 16	+ 8	+ 8	3.02
11.0	T2	5	0189	0409	0629	1.0	4.0	2.5	200	- 16	+ 8	+ 8	3.02
22.0	T2	20	0190	0410	0630	1.0	9.0	3.75	100	- 16	+ 8	+ 8	2.26
22.0	T2	10	0191	0411	0631	1.0	9.0	3.75	100	- 16	+ 8	+ 8	2.26
22.0	T2	5	0192	0412	0632	1.0	9.0	3.75	100	- 16	+ 8	+ 8	2.26
30.0	T3	20	0193	0413	0633	2.0	12.0	3.5	80	- 16	+ 8	+ 8	1.55
30.0	T3	10	0194	0414	0634	2.0	12.0	3.5	80	- 16	+ 8	+ 8	1.55
30.0	T3	5	0195	0415	0635	2.0	12.0	3.5	80	- 16	+ 8	+ 8	1.55
43.0	T3	20	0196	0416	0636	2.0	17.0	4.25	70	- 20	+ 8	+ 8	1.31
43.0	T3	10	0197	0417	0637	2.0	17.0	4.25	70	- 20	+ 8	+ 8	1.31
43.0	T3	5	0198	0418	0638	2.0	17.0	4.25	70	- 20	+ 8	+ 8	1.31
86.0	T4	20	0199	0419	0639	9.0	36.0	5.0	30	- 25	+ 15	+ 15	0.77
86.0	T4	10	0200	0420	0640	9.0	36.0	5.0	30	- 25	+ 15	+ 15	0.77
125 WVDC at + 85 °C . . . 85 WVDC at + 125 °C													
1.7	T1	20	0201	0421	0641	1.0	2.0	1.0	1250	- 16	+ 7	+ 8	7.81
1.7	T1	10	0202	0422	0642	1.0	2.0	1.0	1250	- 16	+ 7	+ 8	7.81
1.7	T1	5	0203	0423	0643	1.0	2.0	1.0	1250	- 16	+ 7	+ 8	7.81
3.6	T1	20	0204	0424	0644	1.0	2.0	1.35	600	- 24	+ 7	+ 8	4.98
3.6	T1	10	0205	0425	0645	1.0	2.0	1.35	600	- 16	+ 7	+ 8	4.98
3.6	T1	5	0206	0426	0646	1.0	2.0	1.35	600	- 16	+ 7	+ 8	4.98
9.0	T2	20	0207	0427	0647	1.0	5.0	2.5	240	- 16	+ 7	+ 8	3.69
9.0	T2	10	0208	0428	0648	1.0	5.0	2.5	240	- 16	+ 7	+ 8	3.69
9.0	T2	5	0209	0429	0649	1.0	5.0	2.5	240	- 16	+ 7	+ 8	3.69
14.0	T2	20	0210	0430	0650	1.0	7.0	3.0	167	- 16	+ 7	+ 8	2.85
14.0	T2	10	0211	0431	0651	1.0	7.0	3.0	167	- 16	+ 7	+ 8	2.85
14.0	T2	5	0212	0432	0652	1.0	7.0	3.0	167	- 16	+ 7	+ 8	2.85
18.0	T3	20	0213	0433	0653	2.0	9.0	2.5	129	- 16	+ 7	+ 8	1.85
18.0	T3	10	0214	0434	0654	2.0	9.0	2.5	129	- 16	+ 7	+ 8	1.85
18.0	T3	5	0215	0435	0655	2.0	9.0	2.5	129	- 16	+ 7	+ 8	1.85
25.0	T3	20	0216	0436	0656	2.0	13.0	3.0	93	- 16	+ 7	+ 8	1.59
25.0	T3	10	0217	0437	0657	2.0	13.0	3.0	93	- 16	+ 7	+ 8	1.59
25.0	T3	5	0218	0438	0658	2.0	13.0	3.0	93	- 16	+ 7	+ 8	1.59
56.0	T4	20	0219	0439	0659	10.0	40.0	3.25	32	- 25	+ 15	+ 15	0.77
56.0	T4	10	0220	0440	0660	10.0	40.0	3.25	32	- 25	+ 15	+ 15	0.77

Note

* Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).



STANDARD/EXTENDED RATINGS: CLR91, M39006/31-XXXX													
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PART NO. M39006/31-*			MAX. DCL (μ A)		MAX. DF at + 25 °C	MAX. IMP. at - 55 °C	MAX.. CAPACITANCE CHANGE (%) at			MAX. ESR at + 25 °C 120 Hz (Ω)
			FAILURE RATE LEVEL (%/1000 h)			at				+ 25 °C + 85 °C + 125 °C			
			M 1.0	P 0.1	R 0.01								
6 WVDC at + 85 °C . . . 4 WVDC at + 125 °C													
220	T1	20	0001	0089	0177	2	9	25	36	- 64	13	16	1.51
220	T1	10	0002	0090	0178	2	9	25	36	- 64	13	16	1.51
820	T2	20	0003	0091	0179	3	14	77.5	18	- 88	16	20	1.26
820	T2	10	0004	0092	0180	3	14	77.5	18	- 88	16	20	1.26
1500	T3	20	0005	0093	0181	5	20	86	18	- 90	20	25	0.76
1500	T3	10	0006	0094	0182	5	20	86	18	- 90	20	25	0.76
2200	T4	20	0007	0095	0183	6	24	85	13	- 90	25	30	0.52
2200	T4	10	0008	0096	0184	6	24	85	13	- 90	25	30	0.52
8 WVDC at + 85 °C . . . 5 WVDC at + 125 °C													
180	T1	20	0009	0097	0185	2	9	20.5	45	- 60	13	16	1.51
180	T1	10	0010	0098	0186	2	9	20.5	45	- 60	13	16	1.51
680	T2	20	0011	0099	0187	3	14	65	22	- 83	16	20	1.27
680	T2	10	0012	0100	0188	3	14	65	22	- 83	16	20	1.27
1500	T3	20	0013	0101	0189	5	20	85	18	- 90	20	25	0.75
1500	T3	10	0014	0102	0190	5	20	85	18	- 90	20	25	0.75
1800	T4	20	0015	0103	0191	7	25	69	14	- 90	25	30	0.51
1800	T4	10	0016	0104	0192	7	25	69	14	- 90	25	30	0.51
10 WVDC at + 85 °C . . . 7 WVDC at + 125 °C													
150	T1	20	0017	0105	0193	2	9	17	54	- 55	13	16	1.51
150	T1	10	0018	0106	0194	2	9	17	54	- 55	13	16	1.51
560	T2	20	0019	0107	0195	3	16	53	27	- 77	16	20	1.26
560	T2	10	0020	0108	0196	3	16	53	27	- 77	16	20	1.26
1200	T3	20	0021	0109	0197	5	20	68.5	18	- 88	20	25	0.76
1200	T3	10	0022	0110	0198	5	20	68.5	18	- 88	20	25	0.76
1500	T4	20	0023	0111	0199	7	25	57	15	- 88	25	30	0.51
1500	T4	10	0024	0112	0200	7	25	57	15	- 88	25	30	0.51
15 WVDC at + 85 °C . . . 10 WVDC at + 125 °C													
100	T1	20	0025	0113	0201	2	9	15	72	- 44	13	16	1.99
100	T1	10	0026	0114	0202	2	9	15	72	- 44	13	16	1.99
390	T2	20	0027	0115	0203	3	16	37	31	- 66	16	20	1.26
390	T2	10	0028	0116	0204	3	16	37	31	- 66	16	20	1.26
820	T3	20	0029	0117	0205	6	24	55.5	22	- 77	20	25	0.9
820	T3	10	0030	0118	0206	6	24	55.5	22	- 77	20	25	0.9
1000	T4	20	0031	0119	0207	8	32	46	17	- 77	25	30	0.61
1000	T4	10	0032	0120	0208	8	32	46	17	- 77	25	30	0.61
25 WVDC at + 85 °C . . . 15 WVDC at + 125 °C													
68	T1	20	0033	0121	0209	2	9	11	90	- 40	12	15	2.15
68	T1	10	0034	0122	0210	2	9	11	90	- 40	12	15	2.15
270	T2	20	0035	0123	0211	3	16	27.5	33	- 62	13	16	1.35
270	T2	10	0036	0124	0212	3	16	27.5	33	- 62	13	16	1.35
560	T3	20	0037	0125	0213	7	28	38	24	- 72	20	25	0.9
560	T3	10	0038	0126	0214	7	28	38	24	- 72	20	25	0.9
680	T4	20	0039	0127	0215	8	32	31.5	19	- 72	25	30	0.62
680	T4	10	0040	0128	0216	8	32	31.5	19	- 72	25	30	0.62
30 WVDC at + 85 °C . . . 20 WVDC at + 125 °C													
56	T1	20	0041	0129	0217	2	9	11	100	- 38	12	15	2.61
56	T1	10	0042	0130	0218	2	9	11	100	- 38	12	15	2.61
220	T2	20	0043	0131	0219	3	16	21	36	- 60	13	16	1.27
220	T2	10	0044	0132	0220	3	16	21	36	- 60	13	16	1.27
470	T3	20	0045	0133	0221	8	32	32	25	- 65	20	25	0.91
470	T3	10	0046	0134	0222	8	32	32	25	- 65	20	25	0.91
560	T4	20	0047	0135	0223	9	36	27.5	20	- 65	25	30	0.65
560	T4	10	0048	0136	0224	9	36	27.5	20	- 65	25	30	0.65

Note

* Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).

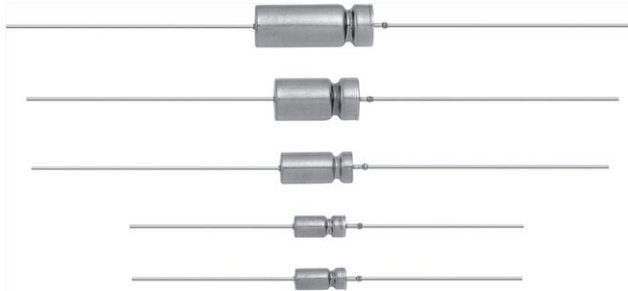


STANDARD/EXTENDED RATINGS: CLR91, M39006/31-XXXX													
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PART NO. M39006/31-* FAILURE RATE LEVEL (%/1000 h)			MAX. DCL (μ A) at		MAX. DF	MAX. IMP.	MAX. CAPACITANCE CHANGE (%) at			MAX. ESR
			M	P	R	+ 25 °C		+ 25 °C	at	- 55 °C + 85 °C + 125 °C			at + 25 °C
			1.0	0.1	0.01	+ 25 °C	+ 85 °C + 125 °C	(%)	- 55 °C (Ω)				(Ω)
50 WVDC at + 85 °C . . . 30 WVDC at + 125 °C													
33	T1	20	0049	0137	0225	2	9	6.15	135	- 29	10	12	2.48
33	T1	10	0050	0138	0226	2	9	6.15	135	- 29	10	12	2.48
120	T2	20	0051	0139	0227	4	24	11.3	49	- 42	12	15	1.25
120	T2	10	0052	0140	0228	4	24	11.3	49	- 42	12	15	1.25
270	T3	20	0053	0141	0229	8	32	18.5	29	- 46	20	25	0.91
270	T3	10	0054	0142	0230	8	32	18.5	29	- 46	20	25	0.91
330	T4	20	0055	0143	0231	9	36	19	22	- 46	25	30	0.77
330	T4	10	0056	0144	0232	9	36	19	22	- 46	25	30	0.77
60 WVDC at + 85 °C . . . 40 WVDC at + 125 °C													
27	T1	20	0057	0145	0233	3	12	5.1	144	- 24	10	12	2.51
27	T1	10	0058	0146	0234	3	12	5.1	144	- 24	10	12	2.51
100	T2	20	0059	0147	0235	4	20	9.5	54	- 36	12	15	1.26
100	T2	10	0060	0148	0236	4	20	9.5	54	- 36	12	15	1.26
220	T3	20	0061	0149	0237	8	32	15	29	- 40	16	20	0.91
220	T3	10	0062	0150	0238	8	32	15	29	- 40	16	20	0.91
270	T4	20	0063	0151	0239	9	36	13.5	23	- 45	20	25	0.67
270	T4	10	0064	0152	0240	9	36	13.5	23	- 45	20	25	0.67
75 WVDC at + 85 °C . . . 50 WVDC at + 125 °C													
22	T1	20	0065	0153	0241	3	12	4.25	157	- 19	10	12	2.57
22	T1	10	0066	0154	0242	3	12	4.25	157	- 19	10	12	2.57
82	T2	20	0067	0155	0243	4	24	7.6	63	- 30	12	15	1.23
82	T2	10	0068	0156	0244	4	24	7.6	63	- 30	12	15	1.23
180	T3	20	0069	0157	0245	9	36	12.2	30	- 35	16	20	0.9
180	T3	10	0070	0158	0246	9	36	12.2	30	- 35	16	20	0.9
220	T4	20	0071	0159	0247	10	40	18.5	24	- 40	20	25	1.12
220	T4	10	0072	0160	0248	10	40	18.5	24	- 40	20	25	1.12
100 WVDC at + 85 °C . . . 65 WVDC at + 125 °C													
10	T1	20	0073	0161	0249	3	12	2.25	200	- 17	10	12	2.99
10	T1	10	0074	0162	0250	3	12	2.25	200	- 17	10	12	2.99
39	T2	20	0075	0163	0251	5	24	5.2	80	- 20	12	15	1.77
39	T2	10	0076	0164	0252	5	24	5.2	80	- 20	12	15	1.77
68	T3	20	0077	0165	0253	10	40	5.65	40	- 30	14	16	1.11
68	T3	10	0078	0166	0254	10	40	5.65	40	- 30	14	16	1.11
120	T4	20	0079	0167	0255	12	48	12.5	30	- 35	15	17	1.38
120	T4	10	0080	0168	0256	12	48	12.5	30	- 35	15	17	1.38
125 WVDC at + 85 °C . . . 85 WVDC at + 125 °C													
6.8	T1	20	0081	0169	0257	3	12	3	300	- 14	10	12	5.86
6.8	T1	10	0082	0170	0258	3	12	3	300	- 14	10	12	5.86
27	T2	20	0083	0171	0259	5	24	3.6	90	- 18	12	15	1.77
27	T2	10	0084	0172	0260	5	24	3.6	90	- 18	12	15	1.77
47	T3	20	0085	0173	0261	10	40	3.95	50	- 26	14	16	1.12
47	T3	10	0086	0174	0262	10	40	3.95	50	- 26	14	16	1.12
82	T4	20	0087	0175	0263	12	48	8.7	32	- 30	15	17	1.41
82	T4	10	0088	0176	0264	12	48	8.7	32	- 30	15	17	1.41

Note

* Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).

Wet Tantalum Capacitors Tantalum-Case with Glass-to-Tantalum Hermetic Seal for - 55 °C to + 125 °C Operation, Low ESR



FEATURES

- Military specification MIL-PRF-39006/30 and 39006/31. Model 136D capacitors are commercial equivalents of Military style CLR90 and CLR91.
- Capacitors to meet the MIL-specs must be ordered by M39006 part numbers shown in the relative specification.
- Terminations: standard tin/lead (SnPb), 100 % tin (RoHS compliant) available
- Standard and extended ratings
- Low ESR
- Compliant to RoHS Directive 2002/95/EC



Note

* Pb containing terminations are not RoHS compliant, exemptions may apply

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 85 °C
(To + 125 °C with voltage derating)

Capacitance Tolerance: At 120 Hz, + 25 °C. ± 20 % standard. ± 10 %, ± 5 % available as special.

DC Leakage Current (DCL Max.): At + 25 °C and above: Leakage current shall not exceed the values listed in the Standard Ratings Tables.

Life Test: Capacitors are capable of withstanding a 2000 h life test at a temperature of + 85 °C or + 125 °C at the applicable rated DC working voltage.

Following life test:

1. DCL, measured at + 85 °C rated voltage, shall not be in excess of the original requirement.
2. The equivalent series resistance shall not exceed 150 % of the initial requirement.
3. Change in capacitance shall not exceed 10 % from the initial measurement.

ORDERING INFORMATION						
136D	306	X0	006	C	2	E3
MODEL	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	CASE CODE	STYLE NUMBER	RoHS COMPLIANT
	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow	X0 = ± 20 % X9 = ± 10 % X5 = ± 5 %	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	See Ratings and Case Codes table	Std. temperature (max. + 125 °C) 0 = No insulating sleeve 2 = Polyester insulation sleeve 3 = High temperature film insulation	E3 = 100 % tin termination (RoHS compliant design) Blank = SnPb termination (standard design)

Note

- Packaging: The use of formed plastic trays for packaging these axial lead components is standard. Tape and reel is not recommended due to the unit weight.

DIMENSIONS in inches [millimeters]						
<p>0.0253 ± 0.002 [0.64 ± 0.05] Dia. (NO. 22 AWG tinned nickel leads solderable and weldable)</p> <p>Weld Tantalum</p>						
CASE CODE		D	L ₁	L ₂ (Max.)	E	WEIGHT (g) (Max.)
TYPE 136D	CLR 90/91 EQUIV.					
C	T1	0.188 ± 0.016 [4.78 ± 0.41]	0.453 + 0.031/- 0.016 [11.51 + 0.79/- 0.41]	0.734 [18.64]	1.500 ± 0.250 [38.10 ± 6.35]	2.6
F	T2	0.281 ± 0.016 [7.14 ± 0.41]	0.641 + 0.031/- 0.016 [16.28 + 0.79/- 0.41]	0.922 [23.42]	2.250 ± 0.250 [57.15 ± 6.35]	6.2
T	T3	0.375 ± 0.016 [9.53 ± 0.41]	0.766 + 0.031/- 0.016 [19.46 + 0.79/- 0.41]	1.047 [26.59]	2.250 ± 0.250 [57.15 ± 6.35]	11.6
K	T4	0.375 ± 0.016 [9.53 ± 0.41]	1.062 + 0.031/- 0.016 [26.97 + 0.79/- 0.41]	1.343 [34.11]	2.250 ± 0.250 [57.15 ± 6.35]	17.7

Note

- For insulated parts, add 0.015" [0.38] to the diameter. The insulation shall lap over the ends of the capacitor body.

STANDARD RATINGS										
CAPACITANCE (μF)	CASE CODE	PART NUMBER ⁽¹⁾	MAX. ESR	MAX. IMP.	MAX. DCL (μA)		MAX. CAPACITANCE CHANGE			MAX. RIPPLE
			AT + 25 °C 120 Hz (Ω)	AT - 55 °C 120 Hz (Ω)	AT + 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	40 kHz I _{RMS} (mA)
6 V_{DC} AT + 85 °C; 4 V_{DC} AT + 125 °C										
30	C	136D306X0006C2	1.99	100	1.0	2.0	- 40	+ 10.5	+ 12	820
68	C	136D686X0006C2	1.58	60	1.0	2.0	- 40	+ 14	+ 16	960
140	F	136D147X0006F2	0.99	40	1.0	3.0	- 40	+ 14	+ 16	1200
270	F	136D277X0006F2	1.11	25	1.0	6.5	- 44	+ 17.5	+ 20	1375
330	T	136D337X0006T2	0.73	20	2.0	7.9	- 44	+ 14	+ 16	1800
560	T	136D567X0006T2	0.65	25	2.0	13.0	- 64	+ 17.5	+ 20	1900
1200	K	136D128X0006K2	0.50	20	3.0	14.0	- 80	+ 25	+ 25	2265
8 V_{DC} AT + 85 °C; 5 V_{DC} AT + 125 °C										
25	C	136D256X0008C2	1.99	100	1.0	2.0	- 40	+ 10.5	+ 12	820
56	C	136D566X0008C2	1.66	59	1.0	2.0	- 40	+ 14	+ 16	900
120	F	136D127X0008F2	1.11	50	1.0	2.0	- 44	+ 17.5	+ 20	1230
220	F	136D227X0008F2	1.12	30	1.0	7.0	- 44	+ 17.5	+ 20	1370
290	T	136D297X0008T2	0.78	25	2.0	6.0	- 64	+ 17.5	+ 20	1770
430	T	136D437X0008T2	0.71	25	2.0	14.0	- 64	+ 17.5	+ 20	1825
850	K	136D857X0008K2	0.47	22	4.0	16.0	- 80	+ 25	+ 25	2330
10 V_{DC} AT + 85 °C; 7 V_{DC} AT + 125 °C										
20	C	136D206X0010C2	1.99	175	1.0	2.0	- 32	+ 10.5	+ 12	820
47	C	136D476X0010C2	1.84	100	1.0	2.0	- 36	+ 14	+ 16	855
100	F	136D107X0010F2	0.99	60	1.0	4.0	- 36	+ 14	+ 16	1200
180	F	136D187X0010F2	1.11	40	1.0	7.0	- 36	+ 14	+ 16	1365
250	T	136D257X0010T2	0.80	30	2.0	10.0	- 40	+ 14	+ 16	1720
390	T	136D397X0010T2	0.75	25	2.0	16.0	- 64	+ 17.5	+ 20	1800
750	K	136D757X0010K2	0.44	23	4.0	16.0	- 80	+ 25	+ 25	2360

Note

- ⁽¹⁾ Part numbers listed are for units with ± 20 % capacitance tolerance insulated capacitors. For ± 10 % tolerance capacitors, change the digit following the letter "X" from "0" to "9"; for ± 5 %, change the digit following the letter "X" from "0" to "5". For capacitors without outer polyester-film insulation, change the last digit in the part number from "2" to "0". For capacitors with a high temperature insulating sleeve, change the last digit in the part number from "2" to "3". For RoHS compliant add "E3".



STANDARD RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER (1)	MAX. ESR	MAX. IMP.	MAX. DCL (μ A)		MAX. CAPACITANCE CHANGE			MAX. RIPPLE
			AT + 25 °C 120 Hz (Ω)	AT - 55 °C 120 Hz (Ω)	AT		(% AT)			40 kHz I_{RMS} (mA)
					+ 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
15 V_{DC} AT + 85 °C; 10 V_{DC} AT + 125 °C										
15	C	136D156X0015C2	1.99	155	1.0	2.0	- 24	+ 10.5	+ 12	780
33	C	136D336X0015C2	1.66	90	1.0	2.0	- 28	+ 14	+ 16	820
70	F	136D706X0015F2	1.11	75	1.0	4.0	- 28	+ 14	+ 16	1150
120	F	136D127X0015F2	1.12	50	1.0	7.0	- 28	+ 17.5	+ 20	1450
170	T	136D177X0015T2	0.78	35	2.0	10.0	- 32	+ 14	+ 16	1480
270	T	136D277X0015T2	0.71	30	2.0	16.0	- 56	+ 17.5	+ 20	1740
540	K	136D547X0015K2	0.47	23	6.0	24.0	- 80	+ 25	+ 25	2330
25 V_{DC} AT + 85 °C; 15 V_{DC} AT + 125 °C										
10	C	136D106X0025C2	2.66	220	1.0	2.0	- 16	+ 8	+ 9	715
22	C	136D226X0025C2	1.99	140	1.0	2.0	- 20	+ 10.5	+ 12	800
50	F	136D506X0025F2	1.46	70	1.0	2.0	- 28	+ 13	+ 15	1130
100	F	136D107X0025F2	0.99	50	1.0	10.0	- 28	+ 13	+ 15	1435
120	T	136D127X0025T2	1.16	38	2.0	6.0	- 32	+ 13	+ 15	1450
180	T	136D187X0025T2	0.96	32	2.0	18.0	- 48	+ 13	+ 15	1525
350	K	136D357X0025K2	0.67	24	7.0	28.0	- 70	+ 25	+ 25	1970
30 V_{DC} AT + 85 °C; 20 V_{DC} AT + 125 °C										
8	C	136D805X0030C2	3.32	275	1.0	2.0	- 16	+ 8	+ 12	640
15	C	136D156X0030C2	2.21	175	1.0	2.0	- 20	+ 10.5	+ 12	780
40	F	136D406X0030F2	1.66	65	1.0	5.0	- 24	+ 10.5	+ 12	1120
68	F	136D686X0030F2	1.27	60	1.0	8.0	- 24	+ 13	+ 15	1285
100	T	136D107X0030T2	1.13	40	2.0	12.0	- 28	+ 10.5	+ 12	1450
150	T	136D157X0030T2	1.02	35	2.0	18.0	- 48	+ 13	+ 15	1525
300	K	136D307X0030K2	0.69	25	8.0	32.0	- 60	+ 25	+ 25	1950
35 V_{DC} AT + 85 °C; 22 V_{DC} AT + 125 °C										
15	C	136D156X0035C2	3.10	175	0.75	1.5	- 20	+ 10.5	+ 12	660
68	F	136D686X0035F2	1.45	60	1.0	2.0	- 24	+ 13	+ 15	1195
270	K	136D277X0035K2	0.70	26	3.0	12.0	- 58	+ 25	+ 25	1950
50 V_{DC} AT + 85 °C; 30 V_{DC} AT + 125 °C										
5	C	136D505X0050C2	3.98	400	1.0	2.0	- 16	+ 5	+ 6	580
10	C	136D106X0050C2	2.66	250	1.0	2.0	- 24	+ 8	+ 9	715
25	F	136D256X0050F2	2.13	95	1.0	5.0	- 20	+ 10.5	+ 12	1005
47	F	136D476X0050F2	1.56	70	1.0	9.0	- 28	+ 13	+ 15	1155
60	T	136D606X0050T2	1.33	45	2.0	12.0	- 16	+ 10.5	+ 12	1335
82	T	136D826X0050T2	1.22	45	2.0	16.0	- 32	+ 13	+ 15	1400
160	K	136D167X0050K2	0.71	27	8.0	32.0	- 50	+ 25	+ 25	1900

Note

(1) Part numbers listed are for units with $\pm 20\%$ capacitance tolerance insulated capacitors. For $\pm 10\%$ tolerance capacitors, change the digit following the letter "X" from "0" to "9"; for $\pm 5\%$, change the digit following the letter "X" from "0" to "5". For capacitors without outer polyester-film insulation, change the last digit in the part number from "2" to "0". For capacitors with a high temperature insulating sleeve, change the last digit in the part number from "2" to "3". For RoHS compliant add "E3".



STANDARD RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER (1)	MAX. ESR	MAX. IMP.	MAX. DCL (μ A)		MAX. CAPACITANCE CHANGE			MAX. RIPPLE 40 kHz I_{RMS} (mA)
			AT + 25 °C 120 Hz (Ω)	AT - 55 °C 120 Hz (Ω)	AT		(% AT)			
					+ 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
60 V_{DC} AT + 85 °C; 40 V_{DC} AT + 125 °C										
4	C	136D405X0060C2	4.65	550	1.0	2.0	- 16	+ 5	+ 6	525
8.2	C	136D825X0060C2	3.24	275	1.0	2.0	- 24	+ 8	+ 9	625
20	F	136D206X0060F2	2.32	105	1.0	5.0	- 16	+ 8	+ 12	930
39	F	136D396X0060F2	1.70	90	1.0	9.0	- 28	+ 10.5	+ 12	1110
50	T	136D506X0060T2	1.33	50	2.0	12.0	- 16	+ 10.5	+ 12	1330
68	T	136D686X0060T2	1.27	50	2.0	16.0	- 32	+ 10.5	+ 15	1365
140	K	136D147X0060K2	0.76	28	8.0	32.0	- 40	+ 20	+ 20	1850
75 V_{DC} AT + 85 °C; 50 V_{DC} AT + 125 °C										
3.5	C	136D355X0075C2	4.74	650	1.0	2.0	- 16	+ 5	+ 6	525
6.8	C	136D685X0075C2	3.42	300	1.0	2.0	- 20	+ 8	+ 9	610
15	F	136D156X0075F2	2.66	150	1.0	5.0	- 16	+ 10.5	+ 9	890
33	F	136D336X0075F2	2.01	90	1.0	10.0	- 24	+ 10.5	+ 15	1000
40	T	136D406X0075T2	1.50	60	2.0	12.0	- 16	+ 10.5	+ 12	1250
56	T	136D566X0075T2	1.31	60	2.0	17.0	- 28	+ 10.5	+ 15	1335
110	K	136D117X0075K2	0.73	29	9.0	36.0	- 35	+ 20	+ 20	1850
100 V_{DC} AT + 85 °C; 65 V_{DC} AT + 125 °C										
2.5	C	136D255X0100C2	5.31	950	1.0	4.0	- 16	+ 8	+ 8	505
4.7	C	136D475X0100C2	4.24	500	1.0	2.0	- 16	+ 7	+ 8	565
11	F	136D116X0100F2	3.02	200	1.0	4.0	- 16	+ 7	+ 8	835
22	F	136D226X0100F2	2.26	100	1.0	9.0	- 16	+ 7	+ 8	965
25	T	136D256X0100T2	1.60	93	2.0	13.0	- 16	+ 7	+ 8	1200
30	T	136D306X0100T2	1.55	80	2.0	12.0	- 16	+ 8	+ 8	1240
43	T	136D436X0100T2	1.31	70	2.0	17.0	- 20	+ 8	+ 8	1335
56	K	136D566X0100K2	0.80	32	10.0	40.0	- 25	+ 15	+ 15	1800
86	K	136D866X0100K2	0.77	30	9.0	36.0	- 25	+ 15	+ 15	1800
125 V_{DC} AT + 85 °C; 85 V_{DC} AT + 125 °C										
1.7	C	136D175X0125C2	7.81	1250	1.0	2.0	- 16	+ 7	+ 8	415
3.6	C	136D365X0125C2	4.98	600	1.0	2.0	- 16	+ 7	+ 8	520
9	F	136D905X0125F2	3.69	240	1.0	5.0	- 16	+ 7	+ 8	755
14	F	136D146X0125F2	2.85	167	1.0	7.0	- 16	+ 7	+ 8	860
18	T	136D186X0125T2	1.85	129	2.0	9.0	- 16	+ 7	+ 8	1130
25	T	136D256X0125T2	1.59	93	2	13	- 16	+ 7	+ 8	1200
56	K	136D566X0125K2	0.77	32	10	40	- 25	+ 15	+ 15	1800

Note

(1) Part numbers listed are for units with $\pm 20\%$ capacitance tolerance insulated capacitors. For $\pm 10\%$ tolerance capacitors, change the digit following the letter "X" from "0" to "9"; for $\pm 5\%$, change the digit following the letter "X" from "0" to "5". For capacitors without outer polyester-film insulation, change the last digit in the part number from "2" to "0". For capacitors with a high temperature insulating sleeve, change the last digit in the part number from "2" to "3". For RoHS compliant add "E3".



EXTENDED RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER (1)	MAX. ESR	MAX. IMP.	MAX. DCL (μ A)		MAX. CAPACITANCE CHANGE			MAX.
			AT + 25 °C	AT - 55 °C	AT		(%) AT			RIPPLE
			120 Hz	120 Hz	+ 25 °C	+ 85 °C	- 55 °C	+ 85 °C	+ 125 °C	40 kHz
			(Ω)	(Ω)		+ 125 °C				I _{RMS}
										(mA)
6 V_{DC} AT + 85 °C; 4 V_{DC} AT + 125 °C										
220	C	136D227X0006C2	1.50	36	2	9	- 64	+ 13	+ 16	1000
560	F	136D567X0006F2	1.25	21	3	9	- 77	+ 16	+ 20	1500
820	F	136D827X0006F2	1.25	18	3	14	- 88	+ 16	+ 20	1500
1200	T	136D128X0006T2	0.75	18	5	18	- 88	+ 20	+ 25	1900
1500	T	136D158X0006T2	0.75	18	5	20	- 90	+ 20	+ 25	1900
2200	K	136D228X0006K2	0.50	13	6	24	- 90	+ 25	+ 30	2300
8 V_{DC} AT + 85 °C; 5 V_{DC} AT + 125 °C										
180	C	136D187X0008C2	1.50	45	2	9	- 60	+ 13	+ 16	1000
680	F	136D687X0008F2	1.25	22	3	14	- 83	+ 16	+ 20	1500
1500	T	136D158X0008T2	0.75	18	5	20	- 90	+ 20	+ 25	1900
1800	K	136D188X0008K2	0.50	14	7	25	- 90	+ 25	+ 30	2300
10 V_{DC} AT + 85 °C; 7 V_{DC} AT + 125 °C										
120	C	136D127X0010C2	1.60	54	2	6	- 40	+ 14	+ 16	900
150	C	136D157X0010C2	1.50	54	2	9	- 55	+ 13	+ 16	900
390	F	136D397X0010F2	1.25	27	3	9	- 66	+ 16	+ 20	1450
560	F	136D567X0010F2	1.25	27	3	16	- 77	+ 16	+ 20	1450
1200	T	136D128X0010T2	0.75	18	5	20	- 88	+ 20	+ 25	1850
1500	K	136D158X0010K2	0.50	15	7	25	- 88	+ 25	+ 30	2300
15 V_{DC} AT + 85 °C; 10 V_{DC} AT + 125 °C										
82	C	136D826X0015C2	0.95	72	2	6	- 35	+ 12	+ 16	900
100	C	136D107X0015C2	0.95	72	2	9	- 44	+ 13	+ 16	900
270	F	136D277X0015F2	1.25	31	3	9	- 62	+ 16	+ 15	1450
390	F	136D397X0015F2	1.25	31	3	16	- 66	+ 16	+ 20	1450
680	T	136D687X0015T2	0.90	22	6	18	- 74	+ 20	+ 25	1800
820	T	136D827X0015T2	0.90	22	6	24	- 77	+ 20	+ 25	1800
1000	K	136D108X0015K2	0.60	17	8	32	- 77	+ 25	+ 30	2330
25 V_{DC} AT + 85 °C; 15 V_{DC} AT + 125 °C										
47	C	136D476X0025C2	2.60	100	2	6	- 23	+ 12	+ 15	800
56	C	136D566X0025C2	2.15	90	2	6	- 25	+ 12	+ 15	850
68	C	136D686X0025C2	2.15	90	2	9	- 40	+ 12	+ 15	850
180	F	136D187X0025F2	1.35	33	3	9	- 54	+ 13	+ 15	1400
270	F	136D277X0025F2	1.35	33	3	16	- 62	+ 13	+ 16	1400
470	T	136D477X0025T2	0.90	24	6	18	- 65	+ 18	+ 25	1750
560	T	136D567X0025T2	0.90	24	7	28	- 72	+ 20	+ 25	1750
680	K	136D687X0025K2	0.60	19	8	32	- 72	+ 25	+ 30	2100
30 V_{DC} AT + 85 °C; 20 V_{DC} AT + 125 °C										
47	C	136D476X0030C2	2.60	100	2	6	- 23	+ 12	+ 15	800
56	C	136D566X0030C2	2.60	100	2	9	- 38	+ 12	+ 15	800
150	F	136D157X0030F2	1.25	36	3	9	- 42	+ 13	+ 15	1200
220	F	136D227X0030F2	1.25	36	3	16	- 60	+ 13	+ 16	1200
390	T	136D397X0030T2	0.90	25	6	18	- 55	+ 18	+ 25	1500
470	T	136D477X0030T2	0.90	25	8	32	- 65	+ 20	+ 25	1500
560	K	136D567X0030K2	0.65	20	9	36	- 65	+ 25	+ 30	2000

Note

(1) Part numbers listed are for units with \pm 20 % capacitance tolerance insulated capacitors. For \pm 10 % tolerance capacitors, change the digit following the letter "X" from "0" to "9"; for \pm 5 %, change the digit following the letter "X" from "0" to "5". For capacitors without outer polyester-film insulation, change the last digit in the part number from "2" to "0". For capacitors with a high temperature insulating sleeve, change the last digit in the part number from "2" to "3". For RoHS compliant add "E3".



EXTENDED RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER ⁽¹⁾	MAX. ESR	MAX. IMP.	MAX. DCL (μ A)		MAX. CAPACITANCE CHANGE			MAX.
			AT + 25 °C	AT - 55 °C	AT		(%) AT			RIPPLE
			120 Hz	120 Hz	+ 25 °C	+ 85 °C	- 55 °C	+ 85 °C	+ 125 °C	40 kHz
			(Ω)	(Ω)		+ 125 °C				I_{RMS}
										(mA)
35 V_{DC} AT + 85 °C; 22 V_{DC} AT + 125 °C										
39	C	136D396X0035C2	2.05	61	2	6	- 22	+ 12	+ 14	820
120	F	136D127X0035F2	1.25	31	3	10	- 40	+ 13	+ 15	1315
330	T	136D337X0035T2	0.90	20	6	18	- 50	+ 16	+ 25	1640
370	K	136D377X0035K2	0.65	15	9	36	- 60	+ 25	+ 30	2040
40 V_{DC} AT + 85 °C; 25 V_{DC} AT + 125 °C										
39	C	136D396X0040C2	2.05	61	2	6	- 22	+ 12	+ 14	820
50 V_{DC} AT + 85 °C; 30 V_{DC} AT + 125 °C										
33	C	136D336X0050C2	2.50	135	2	9	- 29	+ 10	+ 12	700
100	F	136D107X0050F2	1.40	49	4	12	- 36	+ 13	+ 15	1200
120	F	136D127X0050F2	1.25	49	4	24	- 42	+ 12	+ 15	1200
270	T	136D277X0050T2	1.00	30	8	32	- 46	+ 20	+ 25	1450
330	K	136D337X0050K2	0.75	30	9	36	- 46	+ 25	+ 30	1900
60 V_{DC} AT + 85 °C; 40 V_{DC} AT + 125 °C										
18	C	136D186X0060C2	3.50	160	2	12	- 20	+ 7	+ 8	700
27	C	136D276X0060C2	2.51	144	3	12	- 24	+ 10	+ 12	700
82	F	136D826X0060F2	1.45	54	4	16	- 30	+ 15	+ 15	1100
100	F	136D107X0060F2	1.25	54	4	20	- 36	+ 12	+ 15	1100
220	T	136D227X0060T2	0.90	29	8	32	- 40	+ 16	+ 20	1400
270	K	136D277X0060K2	0.70	23	9	36	- 45	+ 20	+ 25	1850
330	K	136D337X0060K2	0.65	31	10	40	- 72	+ 25	+ 25	1850
63 V_{DC} AT + 85 °C; 40 V_{DC} AT + 125 °C										
100	F	136D107X0063F2	1.25	54	2	12	- 36	+ 12	+ 15	1100
75 V_{DC} AT + 85 °C; 50 V_{DC} AT + 125 °C										
12	C	136D126X0075C2	2.55	157	3	12	- 19	+ 10	+ 12	600
22	C	136D226X0075C2	2.57	157	3	12	- 19	+ 10	+ 12	600
68	F	136D686X0075F2	1.50	63	4	16	- 25	+ 12	+ 15	1000
82	F	136D826X0075F2	1.23	63	4	24	- 30	+ 12	+ 15	1000
180	T	136D187X0075T2	0.90	30	9	36	- 35	+ 16	+ 20	1300
220	K	136D227X0075K2	1.12	24	10	40	- 40	+ 20	+ 25	1800
300	K	136D307X0075K2	0.90	32	12	48	- 60	+ 22	+ 22	2000
100 V_{DC} AT + 85 °C; 65 V_{DC} AT + 125 °C										
10	C	136D106X0100C2	2.99	200	3	12	- 17	+ 10	+ 12	800
39	F	136D396X0100F2	1.77	80	5	24	- 20	+ 12	+ 15	1300
68	T	136D686X0100T2	1.11	40	10	40	- 30	+ 14	+ 16	1600
120	K	136D127X0100K2	1.38	30	12	48	- 35	+ 15	+ 17	2000
125 V_{DC} AT + 85 °C; 85 V_{DC} AT + 125 °C										
6.8	C	136D685X0125C2	5.86	300	3	12	- 14	+ 10	+ 12	700
27	F	136D276X0125F2	1.77	90	5	24	- 18	+ 12	+ 15	1200
47	T	136D476X0125T2	1.12	50	10	40	- 26	+ 14	+ 16	1500
68	K	136D686X0125K2	1.10	32	11	44	- 28	+ 15	+ 16	1850
82	K	136D826X0125K2	1.41	32	12	48	- 30	+ 15	+ 17	1900

Note

⁽¹⁾ Part numbers listed are for units with $\pm 20\%$ capacitance tolerance insulated capacitors. For $\pm 10\%$ tolerance capacitors, change the digit following the letter "X" from "0" to "9"; for $\pm 5\%$, change the digit following the letter "X" from "0" to "5". For capacitors without outer polyester-film insulation, change the last digit in the part number from "2" to "0". For capacitors with a high temperature insulating sleeve, change the last digit in the part number from "2" to "3". For RoHS compliant add "E3".



Tantalum Case Extended Capacitance

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SuperTan® Wet Tantalum Capacitors with Hermetic Seal



Vishay ST represents a major breakthrough in wet tantalum capacitor technology. Its unique cathode system provides the highest capacitance per unit volume. The design facilitates a doubling of capacitance, lower ESR and higher ripple current rating compared with conventional wet tantalum products. Moreover, the ST has the capacitance stability of a solid tantalum capacitor and there are no circuit impedance restrictions.

The ST is housed in an all tantalum, hermetically sealed case and is manufactured to withstand hazardous environments. The ST is used widely in the defense and aerospace industries and whenever there is a space problem.

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 85 °C (to + 125 °C with voltage derating)

Capacitance Tolerance: At 120 Hz, + 25 °C. ± 20 % standard. ± 10 % available as special.

FEATURES

- Very high capacitance
- 10 μF to 1800 μF
- 25 V_{DC} to 125 V_{DC}
- Very low ESR
- High ripple current
- All Tantalum case
- Hermetically sealed
- Low DCL
- Axial through-hole terminations: Standard tin/lead (Sn/Pb) 100 % tin (RoHS compliant) available
- Compliant to RoHS Directive 2002/95/EC



Note

* Pb containing terminations are not RoHS compliant, exemptions may apply

APPLICATION NOTES

- No continuous reverse voltage permissible.
- The peak of the applied AC ripple and the applied DC voltage must not exceed the DC voltage rating of the capacitor.
- Ripple current ratings by part number at 85 °C and 40 kHz are included in the table. Ripple current correction factors for other temperatures and frequencies are given on the next page.
- Transient reverse voltage surges are acceptable under the following conditions:
The peak reverse voltage does not exceed 1.5 V and the peak current times the duration of the reverse transient does not exceed 0.05 As. In addition, the repetition frequency of the reverse voltage surge is less than 10 Hz.

DIMENSIONS in inches [millimeters]				
CASE CODE	D ± 0.016 [0.41]	MAX. INSULATED (DIA.)	L ₁ + 0.031 [0.79] UNINSULATED	E ± 0.250 [6.3] MAX.
T1	0.188 [4.78]	0.219 [5.56]	0.453 [11.51]	1.500 [38.10]
T2	0.281 [7.14]	0.312 [7.92]	0.641 [16.28]	2.250 [57.15]
L2	0.281 [7.14]	0.312 [7.92]	1.008 [25.60]	2.250 [57.15]
T3	0.375 [9.52]	0.406 [10.31]	0.766 [19.46]	2.250 [57.15]
T4	0.375 [9.52]	0.406 [10.31]	1.062 [26.97]	2.250 [57.15]

Notes

- Material at egress is Tantalum
- Insulation sleeving will lap over the ends of the capacitor case
- Tinned nickel leads, solderable and weldable
- Approx. weight: T1: 2.3 g, T2: 5.7 g, T3: 9.4 g, T4: 14.8 g



ORDERING INFORMATION						
ST Super Tan® COMMERCIAL CAP. TYPE	220 CAPACITANCE μF	100 85 °C RATED DC VOLTAGE	T4 CASE CODE	M CAPACITANCE TOLERANCE	I INSULATING SLEEVE	E3 RoHS compliant
				M = ± 20 % K = ± 10 %	I = Insulated X = Uninsulated	E3 = 100 % tin termination (RoHS compliant) Blank = SnPb termination (standard design)

STANDARD RATINGS										
CAPACITANCE AT 25 °C AND 120 Hz (μF)	CASE CODE	MAX. ESR 120 Hz (Ω)	MAX. DCL AT		MAX. IMP. AT - 55 °C AND 120 Hz (Ω)	MAX. CAPACITANCE CHANGE AT			AC RIPPLE 85 °C 40 kHz (mA) RMS	PART NUMBER
			+ 25 °C (μA)	+ 85 °C/ + 125 °C (μA)		- 55 °C (%)	+ 85 °C (%)	+ 125 °C (%)		
25 V_{DC} AT 85 °C; 15 V_{DC} AT 125 °C										
120	T1	1.3	1	5	25	- 42	+ 8	+ 12	1250	ST120-25T1MI
560	T2	0.83	2	10	12	- 65	+ 10	+ 15	2100	ST560-25T2MI
1100	L2	0.5	3	25	7	- 60	+ 20	+ 45	3200	ST1100-25L2MI
1200	T3	0.65	5	20	7	- 70	+ 12	+ 18	2600	ST1200-25T3MI
1800	T4	0.5	6	25	7	- 72	+ 12	+ 20	3100	ST1800-25T4MI
30 V_{DC} AT 85 °C; 20 V_{DC} AT 125 °C										
100	T1	1.3	1	5	25	- 38	+ 8	+ 12	1200	ST100-30TMI
470	T2	0.85	2	10	15	- 65	+ 10	+ 18	1800	ST470-30T2MI
950	L2	0.5	5	30	7	- 55	+ 18	+ 35	3200	ST950-30L2MI
1000	T3	0.7	7	25	7	- 70	+ 10	+ 18	2500	ST1000-30T3MI
1500	T4	0.6	12	35	6	- 72	+ 10	+ 20	3000	ST1500-30T4MI
50 V_{DC} AT 85 °C; 30 V_{DC} AT 125 °C										
68	T1	1.5	1	5	35	- 25	+ 8	+ 15	1050	ST68-50T1MI
220	T2	0.9	2	10	17.5	- 50	+ 8	+ 15	1800	ST220-50T2MI
450	L2	0.6	3	25	7.5	- 45	+ 12	+ 30	2900	ST450-50L2MI
470	T3	0.75	3	25	10	- 45	+ 8	+ 15	2100	ST470-50T3MI
680	T4	0.7	5	40	8	- 58	+ 10	+ 20	2750	ST680-50T4MI
60 V_{DC} AT 85 °C; 40 V_{DC} AT 125 °C										
47	T1	2.0	1	5	44	- 25	+ 8	+ 12	1050	ST47-60T1MI
150	T2	1.1	2	10	20	- 40	+ 8	+ 15	1800	ST150-60T2MI
370	L2	0.6	3	25	9	- 33	+ 9	+ 20	2900	ST370-60L2MI
390	T3	0.9	3	25	15	- 45	+ 8	+ 15	2100	ST390-60T3MI
560	T4	0.8	5	40	10	- 58	+ 8	+ 15	2750	ST560-60T4MI
75 V_{DC} AT 85 °C; 50 V_{DC} AT 125 °C										
33	T1	2.5	1	5	66	- 25	+ 5	+ 9	1050	ST33-75T1MI
110	T2	1.3	2	10	24	- 35	+ 6	+ 10	1650	ST110-75T2MI
250	L2	0.8	5	30	12	- 30	+ 6	+ 15	2500	ST250-75L2MI
330	T3	1.0	3	30	12	- 45	+ 6	+ 10	2100	ST330-75T3MI
470	T4	0.9	5	50	12	- 50	+ 6	+ 10	2750	ST470-75T4MI

Notes

- (K = ± 10 %, M = ± 20 %) and insulation letter (I = Insulation, X = Uninsulated)
- Part numbers shown are for units with ± 20 % capacitance tolerance and uninsulated capacitors. For ± 10 units, change the digit following the letter "X" from "0" to "9". For units with outer plastic-film insulation, substitute "2" for "0" at the end of the part number
- For RoHS compliant add "E3" for suffix



STANDARD RATINGS											
CAPACITANCE AT 25 °C AND 120 Hz (μF)	CASE CODE	MAX. ESR 120 Hz (Ω)	MAX. DCL AT		MAX. IMP. AT - 55 °C AND 120 Hz (Ω)	MAX. CAPACITANCE CHANGE AT			AC RIPPLE 85 °C 40 kHz (mA) RMS	PART NUMBER	
			+ 25 °C (μA)	+ 85 °C/ + 125 °C (μA)		- 55 °C (%)	+ 85 °C (%)	+ 125 °C (%)			
100 V_{DC} AT 85 °C; 65 V_{DC} AT 125 °C											
15	T1	3.5	1	5	125	- 18	+ 3	+ 10	1050	ST15-100T1MI	
68	T2	2.1	2	10	37	- 30	+ 4	+ 12	1650	ST68-100T2MI	
120	L2	1.0	3	25	20.5	- 30	+ 4	+ 12	2200	ST120-100L2MI	
150	T3	1.6	3	25	22	- 35	+ 6	+ 12	2100	ST150-100T3MI	
220	T4	1.2	5	50	15	- 40	+ 6	+ 12	2750	ST220-100T4MI	
125 V_{DC} AT 85 °C; 85 V_{DC} AT 125 °C											
10	T1	5.5	1	5	175	- 15	+ 3	+ 10	1050	ST10-125T1MI	
47	T2	2.3	2	10	47	- 25	+ 5	+ 12	1650	ST47-125T2MI	
90	L2	1.3	5	25	25	- 22	+ 4	+ 15	2000	ST90-125L2MI	
82	T3	<i>Preliminary value, contact marketing</i>									ST82-125T3MI
100	T3	1.8	3	25	35	- 35	+ 5	+ 12	2100	ST100-125T3MI	
150	T4	1.6	5	50	20	- 35	+ 6	+ 12	2750	ST150-125T4MI	

Notes

- (K = ± 10 %, M = ± 20 %) and insulation letter (I = Insulation, X = Uninsulated)
- Part numbers shown are for units with ± 20 % capacitance tolerance and uninsulated capacitors. For ± 10 units, change the digit following the letter “X” from “0” to “9”. For units with outer plastic-film insulation, substitute “2” for “0” at the end of the part number
- For RoHS compliant add “E3” for suffix

RIPPLE CURRENT MULTIPLIERS VS. FREQUENCY, TEMPERATURE AND APPLIES PEAK VOLTAGE																									
FREQUENCY OF APPLIED RIPPLE CURRENT		120 Hz				800 Hz				1 kHz				10 kHz				40 kHz				100 kHz			
		≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125
% of 85 °C rated peak voltage	100 %	0.60	0.39	-	-	0.71	0.43	-	-	0.72	0.46	-	-	0.88	0.55	-	-	1.0	0.63	-	-	1.1	0.69	-	-
	90 %	0.60	0.46	-	-	0.71	0.55	-	-	0.72	0.55	-	-	0.88	0.67	-	-	1.0	0.77	-	-	1.1	0.85	-	-
	80 %	0.60	0.52	0.35	-	0.71	0.62	0.42	-	0.72	0.62	0.42	-	0.88	0.76	0.52	-	1.0	0.87	0.59	-	1.1	0.96	0.65	-
	70 %	0.60	0.58	0.44	-	0.71	0.69	0.52	-	0.72	0.70	0.52	-	0.88	0.85	0.64	-	1.0	0.97	0.73	-	1.1	1.07	0.80	-
	66 2/3 %	0.60	0.60	0.46	0.27	0.71	0.71	0.55	0.32	0.72	0.72	0.55	0.32	0.88	0.88	0.68	0.40	1.0	1.0	0.77	0.45	1.1	1.1	0.85	0.50

Wet Tantalum Capacitors with Hermetic Seal



Vishay STA represents a major breakthrough in Wet Tantalum capacitor technology. Its unique cathode system, also used in the ST, provides the highest capacitance per unit volume available. The STA combines the inherent reliability of wet tantalum with the capacitance stability of solid tantalum, and there are no circuit impedance restrictions. The range is exceptionally well suited for low voltage filtering and energy storage applications.

FEATURES

- Very high capacitance
- 150 μF to 4700 μF
- 6 V_{DC} to 15 V_{DC}
- - 55 $^{\circ}\text{C}$ to + 125 $^{\circ}\text{C}$

APPLICATIONS NOTES

- No continuous reverse voltage permissible.
- Transient reverse voltage surges are acceptable under the following conditions:
The peak reverse voltage does not exceed 1.5 V and the peak current times the duration of the reverse transient does not exceed 0.05 As. In addition, the repetition frequency of the reverse voltage surge is less than 10 Hz.
- The peak of the applied AC ripple and the applied DC voltage must not exceed the DC voltage rating of the capacitor.
- Ripple current ratings by part number at 85 $^{\circ}\text{C}$ and 40 kHz are included in the table. Ripple current correction factors for other temperatures and frequencies are given on the next page.

DIMENSIONS in inches [millimeters]				
CASE CODE	D MAX. INSULATED	D \pm 0.016 (0.41) UNINSULATED	L + 0.031 - 0.016 (- 0.41)	E \pm 0.250 (6.35)
T1	0.219 (5.56)	0.188 (4.78)	0.453 (11.51)	1.500 (38.10)
T2	0.312 (7.92)	0.281 (7.14)	0.641 (16.28)	0.250 (57.15)
T3	0.406 (10.31)	0.375 (9.52)	0.766 (19.46)	2.250 (57.15)
T4	0.406 (10.31)	0.375 (9.52)	1.062 (26.97)	2.250 (57.15)

Notes

- Material at egress is tantalum
- Insulation sleeving will lap over the ends of the capacitor case.
- Tinned nickel leads, solderable and weldable.
- Approx. weight
T1: 2.3 g, T2: 5.7 g
T3: 9.4 g, T4: 14.8 g

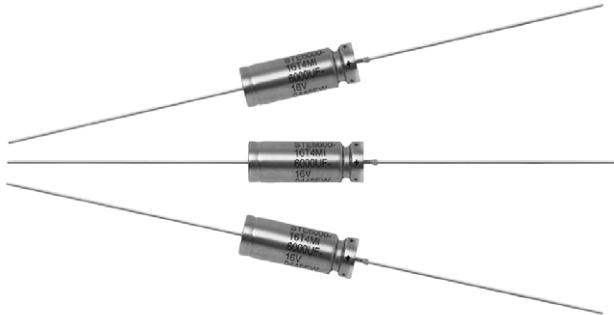
ORDERING INFORMATION					
<u>STA</u> STYLE	<u>2700</u> CAPACITANCE μF	<u>15</u> 85 $^{\circ}\text{C}$ RATED DC VOLTAGE	<u>T4</u> CASE CODE	<u>M</u> CAPACITANCE TOLERANCE	<u>I</u> INSULATING SLEEVE
				M = \pm 20 % K = \pm 10 %	I = Insulated X = Uninsulated



STANDARD RATINGS											
CAPACITANCE AT 25 °C 120 Hz (μ F)	CASE CODE	MAX. ESR (Ω)		MAX. DCL (μ A)		MAX. DF AT 120 Hz (%)	MAX. ESR AT - 55 °C AND 120 Hz (Ω)	MAX. CAPACITANCE CHANGE (%)		AC RIPPLE 85 °C 40 kHz (mA) RMS	PART NUMBER
		120 Hz	140 Hz	25 °C	85 °C			- 55 °C	85 °C		
6 V_{DC} AT 85 °C											
470	T1	0.9	0.4	1	3	46	12	- 75	+ 10	1500	STA470-6T1MI
1500	T2	0.7	0.3	3	8	101	9	- 80	+ 10	2200	STA1500-6T2MI
3300	T3	0.5	0.2	8	30	150	7	- 90	+ 18	2800	STA3300-6T3MI
4700	T4	0.3	0.2	10	35	155	5	- 90	+ 18	3500	STA4700-6T4MI
10 V_{DC} AT 85 °C											
330	T1	1.0	0.5	1	3	35	15	- 70	+ 8	1400	STA330-10T1MI
1000	T2	0.8	0.3	3	10	70	8	- 80	+ 10	2200	STA1000-10T2MI
2200	T3	0.5	0.3	5	30	109	6	- 85	+ 15	2800	STA2200-10T3MI
3300	T4	0.4	0.2	8	30	119	3	- 85	+ 18	3500	STA3300-10T4MI
15 V_{DC} AT 85 °C											
150	T1	1.1	0.5	1	3	16	25	- 45	+ 8	1400	STA150-15T1MI
680	T2	0.8	0.3	2	10	49	10	- 65	+ 10	2200	STA680-15T2MI
1500	T3	0.6	0.2	5	25	81	9	- 80	+ 10	2700	STA1500-15T3MI
2700	T4	0.4	0.2	4	25	109	4	- 80	+ 15	3400	STA2700-15T4MI

RIPPLE CURRENT MULTIPLIERS VERSUS FREQUENCY, TEMPERATURE AND APPLIES PEAK VOLTAGE																									
FREQUENCY OF APPLIED RIPPLE CURRENT		120 Hz				800 Hz				1 kHz				10 kHz				40 kHz				100 kHz			
		≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125
% of 85 °C rated peak voltage	100 %	0.60	0.39	-	-	0.71	0.43	-	-	0.72	0.46	-	-	0.88	0.55	-	-	1.0	0.63	-	-	1.1	0.69	-	-
	90 %	0.60	0.46	-	-	0.71	0.55	-	-	0.72	0.55	-	-	0.88	0.67	-	-	1.0	0.77	-	-	1.1	0.85	-	-
	80 %	0.60	0.52	0.35	-	0.71	0.62	0.42	-	0.72	0.62	0.42	-	0.88	0.76	0.52	-	1.0	0.87	0.59	-	1.1	0.96	0.65	-
	70 %	0.60	0.58	0.44	-	0.71	0.69	0.52	-	0.72	0.70	0.52	-	0.88	0.85	0.64	-	1.0	0.97	0.73	-	1.1	1.07	0.80	-
	66 2/3 %	0.60	0.60	0.46	0.27	0.71	0.71	0.55	0.32	0.72	0.72	0.55	0.32	0.88	0.88	0.68	0.40	1.0	1.0	0.77	0.45	1.1	1.1	0.85	0.50

SuperTan[®] Extended (STE) Capacitors, Wet Tantalum Capacitors with Hermetic Seal



FEATURES

Vishay SuperTan[®] Extended (STE) represents a major breakthrough in wet tantalum capacitor technology. Its unique cathode system, also used in the ST, provides the highest capacitance per unit volume available. The STE combines the inherent reliability of wet tantalum with the capacitance stability of solid tantalum, and there are no circuit impedance restrictions. The range is exceptionally well suited for low voltage filtering and energy storage applications. Ideal for designs targeting the military and aerospace industry.

The SuperTan[®] Extended (STE) is housed in an all tantalum, hermetically sealed case and is manufactured to withstand high stress and hazardous environments.

- Axial through-hole terminations: Standard tin/lead (Sn/Pb) 100 % tin (RoHS compliant) available
- Compliant to RoHS Directive 2002/95/EC

Note

* Pb containing terminations are not RoHS compliant, exemptions may apply



PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 85 °C (to + 125 °C with voltage derating)

Capacitance Tolerance: At 120 Hz, + 25 °C. ± 20 % standard. ± 10 % available as special.

DC Leakage Current (DCL Max.): At + 25 °C and above: Leakage current shall not exceed the values listed in the Standard Ratings Tables.

Life Test: Capacitors are capable of withstanding a 2000 h life test at a temperature of + 85 °C at the applicable rated DC working voltage.

ORDERING INFORMATION

STE	6000	16	T4	M	I	E3
TYPE	CAPACITANCE μF	DC VOLTAGE RATING AT + 85 °C	CASE SIZE	CAPACITANCE TOLERANCE	INSULATING SLEEVE	RoHS COMPLIANT
				M = ± 20 % K = ± 10 %	I = Insulated X = Uninsulated	E3 = 100 % tin termination (RoHS compliant) Blank = SnPb termination (standard design)

Note

- Packaging: The use of formed plastic trays for packaging this type of axial lead component is standard. Tape and reel is not recommended due to the unit weight.

DIMENSIONS in inches [millimeters]				
CASE CODE	D ± 0.016 [0.41]	MAX. INSULATED (DIA.)	L ₁ + 0.031 [0.79] UNINSULATED	E ± 0.250 [6.35] MAX.
T1	0.188 [4.78]	0.219 [5.56]	0.453 [11.51]	1.500 [38.10]
T2	0.281 [7.14]	0.312 [7.92]	0.641 [16.28]	2.250 [57.15]
T3	0.375 [9.52]	0.406 [10.31]	0.766 [19.46]	2.250 [57.15]
T4	0.375 [9.52]	0.406 [10.31]	1.062 [26.97]	2.250 [57.15]

Notes

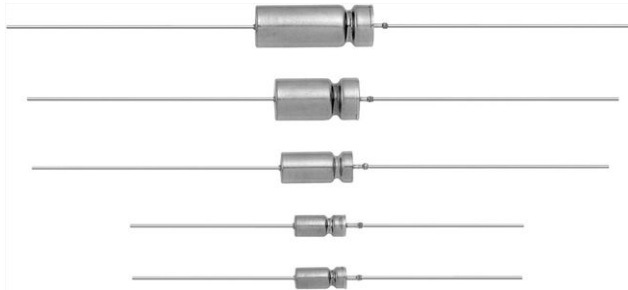
- Material at egress is tantalum
- Insulation sleeving will lap over the ends of the capacitor case
- Tinned nickel leads, solderable and weldable
- Approx. weight:
T1: 2.3 g, T2: 5.7 g
T3: 9.4 g, T4: 14.8 g

STANDARD RATINGS													
CAPACITANCE (μF)	VOLTAGE	CASE CODE	PART NUMBER	MAX. ESR AT	TYP. ESR AT	MAX. DCL AT		MAX. CAPACITANCE CHANGE AT			MAX. IMP. AT	AC RIPPLE	
				+ 25 °C 120 Hz (Ω)	+ 25 °C 1 kHz (Ω)	+ 25 °C (μA)	+ 85 °C/ + 125 °C (μA)	- 55 °C (%)	+ 85 °C (%)	+ 125 °C (%)	- 55 °C 120 Hz (Ω)	85 °C 40 kHz mA RMS	
10 V_{DC} at + 85 °C; 7 V_{DC} at + 125 °C													
680	10	T1		<i>Preliminary value, contact marketing</i>									
2000	10	T2		<i>Preliminary value, contact marketing</i>									
4700	10	T3	STE4700-10T3MI	0.35	< 0.200	16	100	- 80	10	20	3.5	4000	
10 000	10	T4	STE10000-10T4MI	0.25	< 0.100	25	150	- 85	20	35	3.0	5000	
16 V_{DC} at + 85 °C; 11 V_{DC} at + 125 °C													
430	16	T1		<i>Preliminary value, contact marketing</i>									
1200	16	T2		<i>Preliminary value, contact marketing</i>									
3300	16	T3	STE3300-16T3MI	0.35	< 0.200	16	100	- 80	10	15	3.50	4000	
6000	16	T4	STE6000-16T4MI	0.30	< 0.150	25	150	- 80	15	20	3.00	4500	
25 V_{DC} at + 85 °C; 15 V_{DC} at + 125 °C													
270	25	T1		<i>Preliminary value, contact marketing</i>									
1000	25	T2		<i>Preliminary value, contact marketing</i>									
2200	25	T3		<i>Preliminary value, contact marketing</i>									
4000	25	T4	STE4000-25T4MI	0.35	< 0.150	25	125	- 80	15	20	5.00	4250	
30 V_{DC} at + 85 °C; 20 V_{DC} at + 125 °C													
220	30	T1		<i>Preliminary value, contact marketing</i>									
820	30	T2		<i>Preliminary value, contact marketing</i>									
1800	30	T3		<i>Preliminary value, contact marketing</i>									
3300	30	T4	STE3300-30T4MI	0.35	< 0.200	25	125	- 80	20	25	4.00	2750	
35 V_{DC} at + 85 °C; 22 V_{DC} at + 125 °C													
180	35	T1		<i>Preliminary value, contact marketing</i>									
680	35	T2		<i>Preliminary value, contact marketing</i>									
1500	35	T3		<i>Preliminary value, contact marketing</i>									
2800	35	T4		<i>Preliminary value, contact marketing</i>									



STANDARD RATINGS														
CAPACITANCE (μ F)	VOLTAGE	CASE CODE	PART NUMBER	MAX. ESR AT		TYP. ESR AT		MAX. DCL AT		MAX. CAPACITANCE CHANGE AT			MAX. IMP. AT - 55 °C 120 Hz (Ω)	AC RIPPLE 85 °C 40 kHz mA RMS
				+ 25 °C 120 Hz (Ω)	+ 25 °C 1 kHz (Ω)	+ 25 °C (μ A)	+ 85 °C/ + 125 °C (μ A)	- 55 °C (%)	+ 85 °C (%)	+ 125 °C (%)				
50 V_{DC} at + 85 °C; 30 V_{DC} at + 125 °C														
110	50	T1				<i>Preliminary value, contact marketing</i>								
350	50	T2				<i>Preliminary value, contact marketing</i>								
900	50	T3				<i>Preliminary value, contact marketing</i>								
1500	50	T4	STE1500-50T4MI	0.35	< 0.215	15	110	- 70	20	20	6.00	3500		
2200	50	T4	STE2200-50T4MI	0.60	< 0.400	25	125	- 80	25	30	4.50	3000		
60 V_{DC} at + 85 °C; 40 V_{DC} at + 125 °C														
68	60	T1				<i>Preliminary value, contact marketing</i>								
220	60	T2				<i>Preliminary value, contact marketing</i>								
560	60	T3				<i>Preliminary value, contact marketing</i>								
1000	60	T4	STE1000-60T4MI	0.50	< 0.300	20	120	- 40	10	15	5.50	3500		
75 V_{DC} at + 85 °C; 50 V_{DC} at + 125 °C														
56	75	T1				<i>Preliminary value, contact marketing</i>								
180	75	T2	STE180-75T2MI	1.50	< 0.500	5	25	- 35	15	20	30.00	2000		
470	75	T3	STE470-75T3MI	0.60	< 0.325	25	100	- 45	10	25	10.00	3000		
750	75	T4	STE750-75T4MI	0.50	< 0.400	20	120	- 35	10	15	6.50	3500		
100 V_{DC} at + 85 °C; 65 V_{DC} at + 125 °C														
27	100	T1				<i>Preliminary value, contact marketing</i>								
86	100	T2				<i>Preliminary value, contact marketing</i>								
220	100	T3				<i>Preliminary value, contact marketing</i>								
400	100	T4	STE400-100T4MI	0.70	< 0.400	10	120	- 40	6	12	15.00	3000		
125 V_{DC} at + 85 °C; 85 V_{DC} at + 125 °C														
18	125	T1				<i>Preliminary value, contact marketing</i>								
56	125	T2				<i>Preliminary value, contact marketing</i>								
150	125	T3				<i>Preliminary value, contact marketing</i>								
240	125	T4	STE240-125T4MI	0.80	< 0.600	15	150	- 35	6	12	20.00	2500		

Wet Tantalum HI TMP[®] Capacitors Tantalum-Case with Glass-to-Tantalum Hermetic Seal for - 55 °C to + 200 °C Operation



FEATURES

Vishay 134D HI TMP[®] represents a major breakthrough in wet tantalum capacitor technology for high temperature (+ 200 °C) applications such as that seen in the petroleum exploration industry. Its unique design provides for the highest capacitance per unit volume. The design facilitates a doubling of capacitance when compared with conventional wet tantalum products.

The 134D is housed in an all tantalum, hermetically sealed case and is manufactured to withstand high stress and hazardous environments.

- Terminations: Standard tin/lead (SnPb)
- 100 % tin (RoHS compliant) available
- Compliant to RoHS Directive 2002/95/EC

Note

* Pb containing terminations are not RoHS compliant, exemptions may apply



PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 85 °C (to + 200 °C with voltage derating)

Capacitance Tolerance: At 120 Hz, + 25 °C; ± 20 % standard; ± 10 %

DC Leakage Current (DCL Max.): At + 25 °C and above: Leakage current shall not exceed the values listed in the Standard Ratings tables.

Life Test: Capacitors are capable of withstanding a 500 h life test at a temperature of + 200 °C at the applicable derated DC working voltage.

ORDERING INFORMATION						
134D	227	X0	100	K	6	E3
TYPE	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	CASE CODE	STYLE NUMBER	RoHS COMPLIANT
	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow	X0 = ± 20 % X9 = ± 10 %	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	See Ratings and Case Codes table	High temperature 8 = No outer insulating sleeve 6 = High temperature film insulation (above + 125 °C)	E3 = 100 % tin termination (RoHS compliant design) Blank = SnPb termination (standard design)

Note

- Packaging: The use of formed plastic trays for packaging this type of axial lead component is standard. Tape and reel is not recommended due to the unit weight.

DIMENSIONS in inches [millimeters]						
CASE CODE		D	L ₁	L ₂ (Max.)	E	WEIGHT (g) (Max.)
TYPE 134D	CLR 79/81 EQUIV.					
C	T1	0.188 ± 0.016 [4.78 ± 0.41]	0.453 + 0.031/- 0.016 [11.51 + 0.79/- 0.41]	0.734 [18.64]	1.500 ± 0.250 [38.10 ± 6.35]	2.6
F	T2	0.281 ± 0.016 [7.14 ± 0.41]	0.641 + 0.031/- 0.016 [16.28 + 0.79/- 0.41]	0.922 [23.42]	2.250 ± 0.250 [57.15 ± 6.35]	6.2
T	T3	0.375 ± 0.016 [9.53 ± 0.41]	0.766 + 0.031/- 0.016 [19.46 + 0.79/- 0.41]	1.047 [26.59]	2.250 ± 0.250 [57.15 ± 6.35]	11.6
K	T4	0.375 ± 0.016 [9.53 ± 0.41]	1.062 + 0.031/- 0.016 [26.97 + 0.79/- 0.41]	1.343 [34.11]	2.250 ± 0.250 [57.15 ± 6.35]	17.7

STANDARD RATINGS											
CAPACITANCE AT 25 °C 120 Hz (μF)	CASE CODE	MAX. 120 Hz ESR (Ω)	MAX. DCL AT 25 °C (μA)	MAX. DCL AT 85 °C/ 125 °C (μA)	MAX. IMP, Z AT - 25 °C (Ω)	MAX. ΔCAP. AT - 25 °C (%)	TYP. IMP., Z AT - 55 °C (Ω)	TYP. ΔCAP. AT - 55 °C (%)	TYP. ΔCAP. + 85 °C (%)	TYP. ΔCAP. + 125 °C (%)	AC RIPPLE ⁽¹⁾ 85 °C 40 kHz (mA) RMS
50 V_{DC} AT 85 °C; 30 V_{DC} AT 125 °C; 30 V_{DC} AT 200 °C											
68	C	1.50	1	5	22	- 6	25	- 11	12	55	1400
220	F	0.90	2	10	9	- 15	10	- 25	13	50	2300
470	T	0.75	3	25	6	- 24	8	- 50	10	25	2650
680	K	0.70	5	40	4	- 22	5	- 40	12	40	2900
60 V_{DC} AT 85 °C; 40 V_{DC} AT 125 °C; 36 V_{DC} AT 200 °C											
47	C	2.00	1	5	34	- 8	40	- 20	8	12	1250
150	F	1.10	2	10	13	- 11	15	- 25	10	30	2050
390	T	0.90	3	25	7	- 27	10	- 50	10	25	2450
560	K	0.80	5	40	5	- 21	6	- 40	12	40	2700
75 V_{DC} AT 85 °C; 50 V_{DC} AT 125 °C; 45 V_{DC} AT 200 °C											
33	C	2.50	1	5	45	- 3.5	50	- 6	8	25	1100
110	F	1.30	2	10	16	- 8	20	- 18	8	30	1900
330	T	1.00	3	30	8	- 30	12	- 50	10	25	2300
470	K	0.90	5	50	6	- 20	7	- 40	10	40	2550
100 V_{DC} AT 85 °C; 65 V_{DC} AT 125 °C; 60 V_{DC} AT 200 °C											
15	C	3.50	1	5	95	- 2.5	100	- 4	8	25	950
68	F	2.10	2	10	25	- 6	30	- 14	8	25	1500
150	T	1.60	3	25	14	- 12	18	- 30	8	22	1800
220	K	1.20	5	50	13	- 44	16	- 55	8	15	2200
125 V_{DC} AT 85 °C; 85 V_{DC} AT 125 °C; 75 V_{DC} AT 200 °C											
10	C	5.50	1	5	145	- 2.5	150	- 4	8	20	750
47	F	2.30	2	10	35	- 5	40	- 12	7	20	1450
50	F	2.30	3	10	35	- 5	40	- 12	7	20	1450
100	T	1.80	3	25	24	- 20	30	- 35	8	20	1700
150	K	1.60	5	50	13	- 10	16	- 28	6	12	1900

Note

⁽¹⁾ For insulated parts, add 0.015 inches [0.38] to the diameter. The insulation shall lap over the ends of the capacitor body.

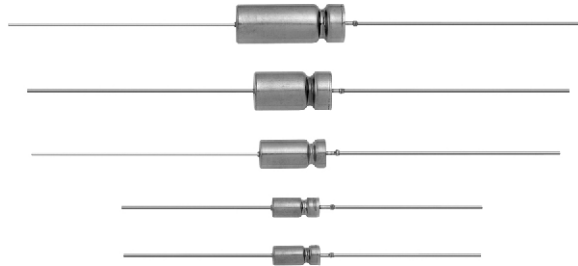


EXTENDED RATINGS											
CAPACITANCE AT 25 °C 120 Hz (μF)	CASE CODE	MAX. 120 Hz ESR (Ω)	MAX. DCL AT 25 °C (μA)	MAX. DCL AT 85 °C/ 125 °C (μA)	MAX. IMP, Z AT - 25 °C (Ω)	MAX. ΔCAP. AT - 25 °C (%)	TYP. IMP., Z AT - 55 °C (Ω)	TYP. ΔCAP. AT - 55 °C (%)	TYP. ΔCAP. + 85 °C (%)	TYP. ΔCAP. + 125 °C (%)	AC RIPPLE (1) 85 °C 40 kHz (mA) RMS
50 V_{DC} AT 85 °C; 30 V_{DC} AT 125 °C; 30 V_{DC} AT 200 °C											
	C										
	F										
	T										
	K										
60 V_{DC} AT 85 °C; 40 V_{DC} AT 125 °C; 36 V_{DC} AT 200 °C											
	C										
	F										
	T										
1000	K										
<i>Preliminary rating</i>						<i>Contact marketing for information</i>					
75 V_{DC} AT 85 °C; 50 V_{DC} AT 125 °C; 45 V_{DC} AT 200 °C											
180	C										
	F	1.50	5	25			30	- 35	+ 15	+ 20	2000
	T										
750	K										
<i>Preliminary rating</i>						<i>Contact marketing for information</i>					
100 V_{DC} AT 85 °C; 65 V_{DC} AT 125 °C; 60 V_{DC} AT 200 °C											
	C										
	F										
	T										
400	K	0.70	10	120	5	- 15	15	- 55	10	15	3250
125 V_{DC} AT 85 °C; 85 V_{DC} AT 125 °C; 75 V_{DC} AT 200 °C											
	C										
	F										
	T										
	K										

Note

(1) For insulated parts, add 0.015 inches [0.38] to the diameter. The insulation shall lap over the ends of the capacitor body.

Wet Tantalum Capacitors, Extended Capacitance, Tantalum-Case with Glass-to-Tantalum Hermetic Seal for - 55 °C to + 125 °C


FEATURES

- Enhanced performance, high reliability design
- Terminations: Standard tin/lead (SnPb), 100 % tin available
- Model T16 tantalum-case electrolytic capacitors provide all the advantages of Vishay's SuperTan® series devices, while offering improved reverse voltage and vibration capability
- Increased thermal shock capability of 300 cycles
- Mounting: Through-hole axial
- Designed for the avionics and aerospace applications
- Compliant to RoHS Directive 2002/95/EC


RoHS*
COMPLIANT

PERFORMANCE CHARACTERISTICS

Refer to: Typical Performance Characteristics

Operating Temperature: - 55 °C to + 85 °C
(To + 125 °C with voltage derating)

Capacitance Tolerance: ± 10 %, ± 20 % standard

DC Leakage Current (DCL Max.): At + 25 °C and above:
Leakage current shall not exceed the values listed in the Standard Ratings table.

ORDERING INFORMATION

T16	D	220	M	100	E	Z	S	S
MODEL	CASE CODE	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	TERMINATION AND PACKAGING	RELIABILITY LEVEL	INSULATING SLEEVE	ESR
	See Ratings and Case Codes Table	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow	K = ± 10 % M = ± 20 %	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating	E = Tin/lead, bulk, standard C = 100 % tin, bulk	Z = Non-ER	S = Sleeved U = Unsleeved	S = Std.

Note
Packaging: The use of formed plastic trays for packing bulk components is standard.

DIMENSIONS in inches [millimeters]

0.0253 ± 0.002 [0.64 ± 0.05] DIA.
(NO. 22 AWG) TINNED NICKEL LEADS
SOLDERABLE AND WELDABLE

CASE CODE		D	L ₁	L ₂ (max.)	E	WEIGHT (g) (max.)
TYPE T16	ST					
A	T1	0.188 ± 0.016 [4.78 ± 0.41]	0.453 + 0.031 - 0.016 [11.51 + 0.79 - 0.41]	0.734 [18.64]	1.500 ± 0.250 [38.10 ± 6.35]	2.6
B	T2	0.281 ± 0.016 [7.14 ± 0.41]	0.641 + 0.031 - 0.016 [16.28 + 0.79 - 0.41]	0.922 [23.42]	2.250 ± 0.250 [57.15 ± 6.35]	6.2
C	T3	0.375 ± 0.016 [9.53 ± 0.41]	0.766 + 0.031 - 0.016 [19.46 + 0.79 - 0.41]	1.047 [26.59]	2.250 ± 0.250 [57.15 ± 6.35]	11.6
D	T4	0.375 ± 0.016 [9.53 ± 0.41]	1.062 + 0.031 - 0.016 [26.97 + 0.79 - 0.41]	1.343 [34.11]	2.250 ± 0.250 [57.15 ± 6.35]	17.7

Note

- For insulated parts, add 0.015" [0.38 mm] to the diameter. The insulation shall lap over the ends of the capacitor body.

* Pb containing terminations are not RoHS compliant, exemptions may apply

Vishay Wet Tantalum Capacitors, Extended Capacitance, Tantalum-Case
with Glass-to-Tantalum Hermetic Seal for - 55 °C to + 125 °C

STANDARD RATINGS										
CAPACITANCE AT + 25 °C 120 Hz (μ F)	CASE CODE	PART NUMBER	MAX. ESR AT + 25 °C 120 Hz (Ω)	MAX. IMP. AT - 55 °C 120 Hz (Ω)	MAX. DCL (μ A) AT		MAX. CAPACITANCE CHANGE (%)			AC RIPPLE + 85 °C 40 kHz (mA _{RMS})
					+ 25 °C	+ 85 °C AND + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
50 V_{DC} AT 85 °C, 30 V_{DC} AT 125 °C										
680	D	T16D687(1)050(2)(3)(4)	0.70	5	5	40	- 40	+ 12	+ 40	2900
60 V_{DC} AT 85 °C, 40 V_{DC} AT 125 °C										
560	D	T16D567(1)060(2)(3)(4)	0.80	6	5	40	- 40	+ 12	+ 40	2700
75 V_{DC} AT 85 °C, 50 V_{DC} AT 125 °C										
470	D	T16D477(1)075(2)(3)(4)	0.90	7	5	50	- 40	+ 10	+ 40	2550
100 V_{DC} AT 85 °C, 65 V_{DC} AT 125 °C										
220	D	T16D227(1)100(2)(3)(4)	1.20	16	5	50	- 55	+ 8	+ 15	2200
125 V_{DC} AT 85 °C, 85 V_{DC} AT 125 °C										
150	D	T16D157(1)125(2)(3)(4)	1.60	16	5	50	- 28	+ 6	+ 12	1900

Notes

- (1) Capacitance tolerance: K, M
(2) Termination/packaging: C = 100 % tin, bulk, E = Std., tin/lead, bulk
(3) Reliability level: Z = Non-ER
(4) Insulating sleeve: S = Sleeved; U = Unsleeved
(5) ESR: S = Std.

TYPICAL PERFORMANCE CHARACTERISTICS OF T16 CAPACITORS

ELECTRICAL CHARACTERISTICS	
ITEM	PERFORMANCE CHARACTERISTICS
Operating Temperature Range	- 55 °C to + 85 °C (to + 125 °C with voltage derating)
Capacitor Tolerance	\pm 20 %, \pm 10 % at 120 Hz, at + 25 °C
Capacitor Change by Temperature	Limit per Standard Ratings table
ESR	Limit per Standard Ratings table, at + 25 °C, 100 kHz
Impedance	Limit per Standard Ratings table, at - 55 °C, 120 Hz
DCL (Leakage Current)	Limit per Standard Ratings table
AC Ripply Current	Limit per Standard Ratings table, at + 85 °C and 40 kHz
Reverse Voltage	Surge voltage shall be in accordance with MIL-PRF-39006, paragraphs 3.23 and 4.8.19, except DC potential will be maximum of 1.5 V.
Surge Voltage	Reverse voltage shall be in accordance with MIL-PRF-39006 and Table II of DSCC93026. The DC rated surge voltage is the maximum voltage to which the capacitors can be subjected under any conditions including transients and peak ripple at the highest line voltage. The DC surge voltage is 115 % of rated DC voltage.

PERFORMANCE CHARACTERISTICS	
ITEM	PERFORMANCE CHARACTERISTICS
Life Testing	Capacitors shall be capable of withstanding a 2000 h life test at a temperature + 85 °C at rated voltage, or a 2000 h life test at 125 °C test at derated voltage. After the test, the capacitors shall meet the following requirements: a) DC leakage at 85 °C and 125 °C shall not exceed 125 % of the specified value b) DC leakage at 25 °C shall not exceed the specified value c) Capacitance shall be within + 10 %, - 20 % of initial value d) ESR shall not exceed 200 % of the specified value



Wet Tantalum Capacitors, Extended Capacitance, Tantalum-Case with Glass-to-Tantalum Hermetic Seal for - 55 °C to + 125 °C

ENVIRONMENTAL CHARACTERISTICS		
ITEM	CONDITION	COMMENTS
Seal	MIL-PRF-39006	When the capacitors are tested as specified in MIL-PRF-39006, there shall be no evidence of leakage
Moisture Resistance	MIL-PRF-39006	Moisture resistance shall be in accordance with MIL-PRF-39006. Number of cycles: 10 continuous cycles
Barometric Pressure (Reduced)	MIL-STD-202, Method 105 Condition F	Altitude 150 000 feet

MECHANICAL CHARACTERISTICS		
ITEM	CONDITION	COMMENTS
Shock (Specified Pulse)	MIL-STD-202, Method 213, Condition I (100 g)	The capacitors shall meet the requirements of MIL-PRF-39006
Vibration, High Frequency	MIL-STD-202, Method 204, Condition D (20 g peak)	The capacitors shall meet the requirements of MIL-PRF-39006
Random Vibration	MIL-STD-202, Method 214, Condition II-G (Overall RMS 27.78 g)	The capacitors shall meet the requirements of MIL-PRF-39006
Thermal Shock	MIL-STD-202, Method 107, Condition A	Thermal shock shall be in accordance with MIL-PRF-39006 when tested for 300 cycles
Solderability	MIL-STD-202, Method 208, ANSI/J-STD-002, Test A	Solderability shall be in accordance with MIL-PRF-39006
Terminal Strength	MIL-STD-202, Method 211	Terminal strength shall be in accordance with MIL-PRF-39006
Resistance to Solder Heat	MIL-STD-202, Method 210, Condition C	The capacitors shall meet the requirements of MIL-PRF-39006
Terminals	MIL-STD-1276	Terminals shall be as specified in MIL-STD-1276. The length and diameter of the terminals shall be as specified in Dimensions table. All terminals shall be permanently secured internally and externally, as applicable. All external joints shall be welded.
Marking	MIL-STD-1285	Marking of capacitors conforms to Method I of MIL-STD-1285 and include capacitance (in μF), capacitance tolerance letter, rated voltage, date code, lot symbol and Vishay trademark

SELECTOR GUIDES	
Tantalum Selector Guide	www.vishay.com/doc?49375
Parameter Comparison Guide	www.vishay.com/doc?42088



High Temperature

Contents

134D	96
135D	37
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XTH-K-L-M-V	103

Wet Tantalum Capacitors Cylindrical Body, Hermetically Sealed


FEATURES

- High temperature
- High voltage
- High capacitance
- Withstands high frequency vibration to 2000 Hz
- Hermetically sealed
- Long shelf life
- DSCC drawings 04032 and 04033

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 175 °C with proper derating

Voltage Range: 8 V_{DC} to 630 V_{DC} at 85 °C

Reverse Voltage: None

Capacitance Range: 2 μF to 2200 μF

Tolerance Range:

- 15 % to + 50 % (standard for XTK, XTM, XTV)
- 15 % to + 75 % (standard for XTH, XTL)
- ± 20 % (special order)

ORDERING INFORMATION						
XTV MODEL	126 CAPACITANCE CODE	T CAPACITANCE TOLERANCE	630 DC VOLTAGE RATING	P CASE CODE	0 INSULATION	A TERMINAL CONFIGURATION
XTH XTK XTL XTM XTV	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow.	T = - 15 % to + 50 % (XTK, XTM, XTV standard) U = - 15 % to + 75 % (XTH, XTL standard) M = ± 20 % (special order)	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating.	P = Polar (case negative) R = Reverse polarity (case positive)	0 = Uninsulated (standard) 4 = Teflon (+ 175 °C limit)	See Styles

Note

- For styles, terminal configurations, mounting methods and hardware, please see pages following standard ratings table

DIMENSIONS in inches [millimeters]	
<p>XTH-XTL-XTV</p>	<p>XTK-XTM</p>
TYPE	D
XTK - XTM	0.656
XTL - XTH	0.875
XTV	1.125
	H
	0.438 to 1.781
	0.540 to 4.062
	0.600 to 2.810



STANDARD RATINGS AND DIMENSIONS															
CAPACITANCE (μ F)	MAX. WORKING VOLTAGE		TYP. ESR (Ω)	MAX. DCL AT MAX. V_{DC} (μ A)			MAX. Z - 55 °C (Ω)	MAX. % CAP. CHANGE FROM ROOM TEMP.			APPROX. WEIGHT (g)	MAX. RIPPLE 120 Hz RMS - 55 °C TO + 175 °C (mA)	SIZE		PART NUMBER
	+ 125 °C + 175 °C			+ 85 °C + 125 °C + 175 °C				- 55 °C + 85 °C + 175 °C					D + 0.031 TO - 0.015	H + 0.062 - 0.062	
8 V_{DC} AT + 85 °C															
70	7	5	10.0	30	45	60	60	- 60	+ 30	+ 30	14	137	0.656	0.438	XTK706(1)008POA
140	7	5	5.0	50	75	100	30	- 60	+ 30	+ 30	15	213	0.656	0.562	XTM147(1)008POA
10 V_{DC} AT + 85 °C															
50	8.5	7	10.0	25	37	50	75	- 60	+ 30	+ 30	14	137	0.656	0.438	XTK506(1)010POA
100	8.5	7	5.0	45	67	90	40	- 60	+ 30	+ 30	15	213	0.656	0.562	XTM107(1)010POA
12 V_{DC} AT + 85 °C															
580	10	8	1.5	135	197	270	20	- 90	+ 20	+ 35	48	550	1.125	0.600	XTV587(1)012POA
850	10	8	1.5	135	197	270	20	- 90	+ 20	+ 35	50	550	1.125	0.600	XTV857(1)012POA
1100	10	8	1.5	135	197	270	20	- 90	+ 20	+ 35	60	694	1.125	1.100	XTV118(1)012POA
2200	10	8	1.5	135	197	270	20	- 90	+ 20	+ 35	82	694	1.125	1.100	XTV228(1)012POA
18 V_{DC} AT + 85 °C															
35	15	12	10.0	30	45	60	85	- 60	+ 30	+ 30	14	137	0.656	0.438	XTK356(1)018POA
70	15	12	5.0	50	75	100	45	- 60	+ 30	+ 30	15	213	0.656	0.562	XTM706(1)018POA
120	15	12	2.8	50	75	100	30	- 60	+ 15	+ 40	26	328	0.875	0.540	XTL127(1)018POA
240	15	12	2.5	80	120	160	20	- 60	+ 15	+ 40	32	390	0.875	0.732	XTH247(1)018POA
390	15	12	1.5	165	227	330	20	- 85	+ 20	+ 35	48	550	1.125	0.600	XTV397(1)018POA
560	15	12	1.5	165	227	330	20	- 85	+ 20	+ 35	50	550	1.125	0.600	XTV567(1)018POA
900	15	12	1.5	165	227	330	20	- 85	+ 20	+ 35	68	694	1.125	1.100	XTV907(1)018POA
1800	15	12	1.5	165	227	330	20	- 85	+ 20	+ 35	82	694	1.125	1.100	XTV188(1)018POA
20 V_{DC} AT + 85 °C															
28	17.5	13	10.0	30	45	60	85	- 60	+ 30	+ 30	14	137	0.656	0.438	XTK286(1)020POA
56	17.5	13	5.0	50	75	100	45	- 60	+ 30	+ 30	15	213	0.656	0.562	XTM566(1)020POA
100	17.5	13	2.8	50	75	100	30	- 60	+ 15	+ 40	26	328	0.875	0.540	XTL107(1)020POA
200	17.5	13	2.5	80	120	160	20	- 60	+ 15	+ 40	32	390	0.875	0.732	XTH207(1)020POA
30 V_{DC} AT + 85 °C															
20	25	20	10.0	35	52	70	125	- 40	+ 20	+ 20	14	137	0.656	0.438	XTK206(1)030POA
40	25	20	5.0	60	90	120	75	- 40	+ 20	+ 20	15	213	0.656	0.562	XTM406(1)030POA
75	25	20	2.7	55	82	110	45	- 45	+ 15	+ 30	26	333	0.875	0.540	XTL756(1)030POA
150	25	20	2.7	90	135	180	30	- 45	+ 15	+ 30	32	375	0.875	0.732	XTH157(1)030POA
250	25	20	2.5	195	287	390	20	- 65	+ 20	+ 35	48	427	1.125	0.600	XTV257(1)030POA
370	25	20	1.5	125	170	215	15	- 65	+ 20	+ 35	50	550	1.125	0.600	XTV377(1)030POA
650	25	20	1.5	145	202	250	15	- 85	+ 20	+ 35	68	694	1.125	1.100	XTV657(1)030POA
1300	25	20	1.5	190	282	375	10	- 85	+ 20	+ 35	82	694	1.125	1.100	XTV138(1)030POA
35 V_{DC} AT + 85 °C															
20	30	23	10.0	35	52	72	125	- 40	+ 20	+ 20	14	137	0.656	0.438	XTK206(1)035POA
40	30	23	5.0	60	90	120	75	- 40	+ 20	+ 20	15	213	0.656	0.562	XTM406(1)035POA
60	30	23	2.7	55	82	110	45	- 45	+ 10	+ 30	26	333	0.875	0.540	XTL606(1)035POA

Note

- Part number definitions:
 - (1) Tolerance code:
 - T = - 15 % to + 50 % (standard for XTK, XTM, XTV)
 - U = -15 % to + 75 % (standard for XTH, XTL)
 - M = \pm 20 % (available by special order)



STANDARD RATINGS AND DIMENSIONS															
CAPACITANCE (μ F)	MAX. WORKING VOLTAGE		TYP. ESR (Ω)	MAX. DCL AT MAX. V _{DC} (μ A)			MAX. Z -55 °C (Ω)	MAX. % CAP. CHANGE FROM ROOM TEMP.			APPROX. WEIGHT (g)	MAX. RIPPLE 120 Hz RMS -55 °C TO +175 °C (mA)	SIZE		PART NUMBER
	+125 °C	+175 °C		+85 °C	+125 °C	+175 °C		-55 °C	+85 °C	+175 °C			D +0.031 -0.015	H +0.062 -0.062	
40 V_{DC} AT +85 °C															
190	34	27	2.5	195	297	400	20	-55	+20	+35	48	427	1.125	0.600	XTV197(1)040POA
290	34	27	2.5	200	300	400	20	-55	+20	+35	50	427	1.125	0.600	XTV297(1)040POA
500	34	27	1.5	200	300	400	20	-75	+20	+35	68	694	1.125	1.100	XTV507(1)040POA
1000	34	27	1.5	195	297	400	20	-75	+20	+35	82	694	1.125	1.100	XTV108(1)040POA
50 V_{DC} AT +85 °C															
900	44	32	1.5	195	297	400	25	-85	+20	+35	82	694	1.125	1.100	XTV907(1)050POA
60 V_{DC} AT +85 °C															
12	50	40	10.0	35	52	70	180	-30	+20	+20	14	137	0.656	0.438	XTK126(1)060POA
25	50	40	5.0	60	90	120	90	-30	+20	+20	15	213	0.656	0.562	XTM256(1)060POA
40	50	40	2.7	60	90	120	65	-35	+10	+20	26	333	0.875	0.540	XTL406(1)060POA
70	50	40	2.7	90	135	180	40	-35	+10	+20	32	375	0.875	0.732	XTH706(1)060POA
80	50	40	2.7	95	142	190	35	-35	+10	+20	32	375	0.875	0.732	XTH806(1)060POA
130	50	40	2.5	210	315	420	30	-50	+20	+35	48	427	1.125	0.600	XTV137(1)060POA
200	50	40	1.5	135	182	230	30	-50	+20	+35	50	550	1.125	0.600	XTV207(1)060POA
350	50	40	1.5	155	210	265	25	-70	+20	+35	68	694	1.125	1.100	XTV357(1)060POA
700	50	40	1.5	200	275	350	15	-70	+20	+35	82	694	1.125	1.100	XTV707(1)060POA
750	50	40	1.5	200	275	350	29	-70	+20	+35	82	694	1.125	1.100	XTV757(1)060POA
90 V_{DC} AT +85 °C															
8.0	80	60	10.0	35	52	70	250	-30	+20	+20	14	137	0.656	0.438	XTK805(1)090POA
16	80	60	5.0	60	90	120	125	-30	+20	+20	15	213	0.656	0.562	XTM166(1)090POA
25	80	60	2.7	55	82	110	90	-35	+10	+20	26	333	0.875	0.540	XTL256(1)090POA
50	80	60	2.7	90	135	180	45	-35	+10	+20	32	375	0.875	0.732	XTH506(1)090POA
84	80	60	2.5	195	287	390	40	-40	+20	+35	48	427	1.125	0.600	XTV846(1)090POA
120	80	60	1.5	135	182	230	40	-40	+20	+35	50	550	1.125	0.600	XTV127(1)090POA
220	80	60	1.5	145	202	250	30	-60	+20	+35	68	694	1.125	1.100	XTV227(1)090POA
450	80	60	1.5	195	215	235	25	-60	+20	+35	82	694	1.125	1.100	XTV457(1)090POA
180 V_{DC} AT +85 °C															
2.0	160	120	20.0	75	112	150	850	-30	+20	+20	21	108	0.656	0.719	XTK205(1)180POA
4.0	160	120	20.0	35	52	70	500	-30	+20	+20	21	117	0.656	0.719	XTK405(1)180POA
8.0	160	120	10.0	60	90	120	250	-30	+20	+20	23	186	0.656	0.938	XTM805(1)180POA
12	160	120	5.6	55	82	110	180	-35	+10	+20	44	282	0.875	0.920	XTL126(1)180POA
25	160	120	5.3	90	135	180	90	-35	+10	+20	56	341	0.875	1.300	XTH256(1)180POA
42	160	120	5.0	120	162	205	75	-40	+20	+35	74	363	1.125	0.976	XTV426(1)180POA
60	160	120	3.0	135	182	230	60	-40	+20	+35	78	363	1.125	0.976	XTV606(1)180POA
110	160	120	3.0	145	202	250	60	-60	+20	+35	114	631	1.125	1.938	XTV117(1)180POA
230	160	120	3.0	200	275	350	50	-60	+20	+35	142	631	1.125	1.938	XTV237(1)180POA

Note

- Part number definitions:
 - (1) Tolerance code:
 - T = -15 % to +50 % (standard for XTK, XTM, XTV)
 - U = -15 % to +75 % (standard for XTH, XTL)
 - M = \pm 20 % (available by special order)



STANDARD RATINGS AND DIMENSIONS															
CAPACITANCE (μ F)	MAX. WORKING VOLTAGE + 125 °C + 175 °C	TYP. ESR (Ω)	MAX. DCL AT MAX. V _{DC} (μ A)			MAX. Z - 55 °C (Ω)	MAX. % CAP. CHANGE FROM ROOM TEMP.			APPROX. WEIGHT (g)	MAX. RIPPLE 120 Hz RMS - 55 °C TO + 175 °C (mA)	SIZE		PART NUMBER	
			+ 85 °C	+ 125 °C	+ 175 °C		- 55 °C	+ 85 °C	+ 175 °C			D + 0.031 - 0.015	H + 0.062 - 0.062		
270 V_{DC} AT + 85 °C															
2.5	240	180	30.0	35	52	70	750	- 30	+ 20	+ 20	28	112	0.656	1.031	XTK255(1)270POA
5.0	240	180	15.0	55	82	110	375	- 30	+ 20	+ 20	31	179	0.656	1.375	XTM505(1)270POA
8.0	240	180	8.3	55	82	110	270	- 35	+ 10	+ 20	62	266	0.875	1.270	XTL805(1)270POA
16	240	180	8.3	90	135	180	135	- 35	+ 10	+ 20	81	320	0.875	1.865	XTH166(1)270POA
28	240	180	7.5	120	162	205	80	- 40	+ 20	+ 35	100	339	1.125	1.350	XTV286(1)270POA
40	240	180	7.5	135	182	230	100	- 40	+ 20	+ 35	104	339	1.125	1.350	XTV406(1)270POA
75	240	180	4.5	145	202	250	90	- 60	+ 20	+ 35	160	608	1.125	2.812	XTV756(1)270POA
150	240	180	4.5	195	215	235	75	- 60	+ 20	+ 35	202	608	1.125	2.812	XTV157(1)270POA
360 V_{DC} AT + 85 °C															
2.0	320	240	40.0	35	52	70	1000	- 30	+ 20	+ 20	37	108	0.656	1.312	XTK205(1)360POA
4.0	320	240	20.0	60	90	120	500	- 30	+ 20	+ 20	41	175	0.656	1.781	XTM405(1)360POA
6.0	320	240	11.0	55	82	110	360	- 35	+ 10	+ 20	80	258	0.875	1.635	XTL605(1)360POA
12	320	240	11.0	90	135	180	180	- 35	+ 10	+ 20	105	314	0.875	2.420	XTH126(1)360POA
22	320	240	10.0	125	170	215	100	- 40	+ 20	+ 35	126	323	1.125	1.705	XTV226(1)360POA
30	320	240	10.0	135	182	230	120	- 40	+ 20	+ 35	133	323	1.125	1.705	XTV306(1)360POA
450 V_{DC} AT + 85 °C															
5.0	400	300	13.0	55	82	110	450	- 35	+ 10	+ 20	98	262	0.875	2.000	XTL505(1)450POA
10	400	300	13.0	90	135	180	225	- 35	+ 10	+ 20	130	318	0.875	2.980	XTH106(1)450POA
17	400	300	12.5	125	170	215	130	- 40	+ 20	+ 35	152	315	1.125	2.080	XTV176(1)450POA
25	400	300	12.5	135	182	230	150	- 40	+ 20	+ 35	164	315	1.125	2.080	XTV256(1)450POA
540 V_{DC} AT + 85 °C															
4.0	480	360	16.6	55	82	110	540	- 35	+ 10	+ 20	114	250	0.875	2.365	XTL405(1)540POA
8.0	480	360	16.6	90	135	180	270	- 35	+ 10	+ 20	154	306	0.875	3.532	XTH805(1)540POA
14	480	300	15.0	120	162	205	160	- 40	+ 20	+ 35	178	309	1.125	2.435	XTV146(1)540POA
20	480	300	15.0	135	182	230	170	- 40	+ 20	+ 35	196	309	1.125	2.435	XTV206(1)540POA
630 V_{DC} AT + 85 °C															
3.5	560	420	18.9	55	82	110	630	- 35	+ 10	+ 20	133	249	0.875	2.720	XTL355(1)630POA
7.0	560	420	18.9	90	135	180	315	- 35	+ 10	+ 20	179	308	0.875	4.062	XTH705(1)630POA
12	560	420	17.5	120	162	205	180	- 40	+ 20	+ 35	204	306	1.125	2.810	XTV126T630POA
18	560	420	17.5	135	182	230	200	- 40	+ 20	+ 35	225	306	1.125	2.810	XTV186(1)630POA

Note

- Part number definitions:
 - (1) Tolerance code:
 - T = - 15 % to + 50 % (standard for XTK, XTM, XTV)
 - U = - 15 % to + 75 % (standard for XTH, XTL)
 - M = \pm 20 % (available by special order)



XTH-L-V STYLES		
<p>STYLE A</p> <p>Top Bottom</p>	<p>STYLE B</p> <p>Top Bottom</p>	<p>STYLE C</p> <p>Top Bottom</p>
<p>STYLE D</p> <p>Top Bottom</p> <p>Negative screw lug is for indexing and negative connection only</p>	<p>STYLE E</p> <p>Top Bottom</p> <p>See Detail C in Mounting Methods table for suggested mounting methods</p>	<p>STYLE F</p> <p>Top Bottom</p> <p>See Detail D in Mounting Methods table for suggested mounting method</p>
<p>STYLE G</p> <p>Top Bottom</p> <p>Negative screw lug is for index and negative connection only</p>	<p>STYLE H</p> <p>Top Bottom</p> <p>See Detail C in Mounting Methods table for suggested mounting methods</p>	<p>STYLE J</p> <p>Top Bottom</p> <p>See Detail D in Mounting Methods table for suggested mounting methods</p>
<p>STYLE K</p> <p>Top Bottom</p> <p>See Details B and E in Mounting Methods table for suggested mounting methods</p>	<p>STYLE L</p> <p>Top Bottom</p> <p>See Detail B and E in Mounting Methods table for suggested mounting methods</p>	<p>STYLE M</p> <p>Top Bottom</p> <p>* Extends 0.125 on 0.875 DIA. units only</p>

XTK-M STYLES			
STYLE A 	STYLE B 	STYLE C 	STYLE D
STYLE E 	STYLE F 	STYLE G 	STYLE H

POSITIVE TERMINALS FOR XTK AND XTM			
STYLE A 	STYLE B, C AND D 	STYLE E, G AND H 	STYLE F

NEGATIVE TERMINALS FOR XTK AND XTM			
STYLE A 	STYLE B, E AND F 	STYLE C AND G 	STYLE D AND H



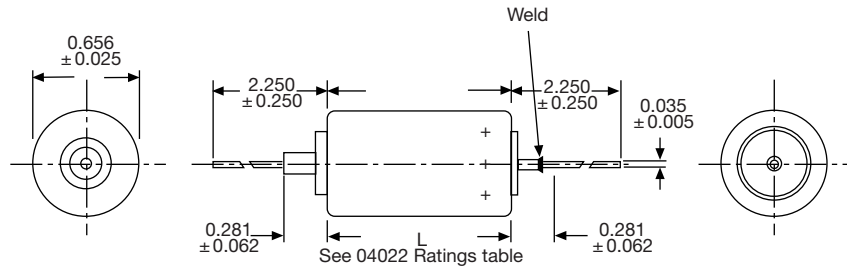
04022 RATINGS AND CASE CODES													
DSCC DRAWING 04022 PIN	CAP. (NOM.) (µF)	CAP. TOLERANCE (%)	DC LEAKAGE MAX. (µA)			ESR MAX. 120 Hz 25 °C (Ω)	IMPEDANCE MAX. (Ω)	CAPACITANCE CHANGE (%)			RIPPLE CURRENT 1/ (mA)	DIMENSION L ± 0.062 (1.57) (INCHES)	FIGURE
			+ 25 °C	+ 85 °C	+ 125 °C			- 55 °C	+ 85 °C	+ 125 °C			
60 V_{DC} AT + 85 °C RATED; 69 V_{DC} AT + 85 °C SURGE													
09	12	+ 50, - 15	7	35	56	12	180	- 30	+ 20	+ 20	137	0.438 (11.13)	1A
10	25	+ 50, - 15	12	60	96	6	90	- 30	+ 20	+ 20	213	0.562 (14.27)	1A
90 V_{DC} AT + 85 °C RATED; 103 V_{DC} AT + 85 °C SURGE													
11	8.0	+ 50, - 15	7	35	56	12	250	- 30	+ 20	+ 20	137	0.438 (11.13)	1A
12	16	+ 50, - 15	12	60	96	5.9	125	- 30	+ 20	+ 20	213	0.562 (14.27)	1A
180 V_{DC} AT + 85 °C RATED; 207 V_{DC} AT + 85 °C SURGE													
13	4.0	+ 50, - 15	7	35	56	24	500	- 30	+ 20	+ 20	117	0.719 (18.26)	1A
14	8.0	+ 50, - 15	12	60	96	12	250	- 30	+ 20	+ 20	186	0.938 (23.83)	1A
270 V_{DC} AT + 85 °C RATED; 310 V_{DC} AT + 85 °C SURGE													
15	2.5	+ 50, - 15	7	35	56	36	750	- 30	+ 20	+ 20	112	1.031 (26.19)	1A
16	5.0	+ 50, - 15	11	55	88	18	375	- 30	+ 20	+ 20	179	1.375 (34.93)	1A
360 V_{DC} AT + 85 °C RATED; 414 V_{DC} AT + 85 °C SURGE													
17	2.0	+ 50, - 15	7	35	56	48	1000	- 30	+ 20	+ 20	108	1.312 (33.32)	1A
18	4.0	+ 50, - 15	12	60	96	24	500	- 30	+ 20	+ 20	175	1.781 (45.24)	1A
20 V_{DC} AT + 85 °C RATED; 23 V_{DC} AT + 85 °C SURGE													
19	100	+ 50, - 15	10	50	80	3.3	30	- 60	+ 15	+ 20	333	0.540 (13.72)	1B
20	200	+ 75, - 15	16	80	128	2.8	20	- 60	+ 15	+ 20	375	0.732 (18.59)	1B
30 V_{DC} AT + 85 °C RATED; 34.5 V_{DC} AT + 85 °C SURGE													
21	75	+ 75, - 15	11	55	88	3.1	45	- 45	+ 10	+ 10	333	0.540 (13.72)	1B
22	150	+ 75, - 15	13	90	104	3	30	- 45	+ 10	+ 10	375	0.732 (18.59)	1B
60 V_{DC} AT + 85 °C RATED; 69 V_{DC} AT + 85 °C SURGE													
23	40	+ 75, - 15	12	60	96	3.2	65	- 35	+ 10	+ 10	333	0.540 (13.72)	1B
24	80	+ 75, - 15	19	95	152	3.1	35	- 35	+ 10	+ 10	375	0.732 (18.59)	1B
90 V_{DC} AT + 85 °C RATED; 103 V_{DC} AT + 85 °C SURGE													
25	25	+ 75, - 15	11	55	88	3.2	90	- 35	+ 10	+ 10	333	0.540 (13.72)	1B
26	50	+ 75, - 15	18	90	144	3.1	45	- 35	+ 10	+ 10	375	0.732 (18.59)	1B
180 V_{DC} AT + 85 °C RATED; 207 V_{DC} AT + 85 °C SURGE													
27	12	+ 75, - 15	11	55	88	6.6	180	- 35	+ 10	+ 10	282	0.920 (23.37)	1B
28	25	+ 75, - 15	18	90	144	6.2	90	- 35	+ 10	+ 10	341	1.300 (33.02)	1B
270 V_{DC} AT + 85 °C RATED; 310 V_{DC} AT + 85 °C SURGE													
29	8.0	+ 75, - 15	11	55	88	9.9	270	- 35	+ 10	+ 10	266	1.270 (32.36)	1B
30	16	+ 75, - 15	18	90	144	9.8	135	- 35	+ 10	+ 10	320	1.865 (47.37)	1B
360 V_{DC} AT + 85 °C RATED; 414 V_{DC} AT + 85 °C SURGE													
31	6.0	+ 75, - 15	11	55	88	13	360	- 35	+ 10	+ 10	258	1.635 (41.53)	1B
32	12	+ 75, - 15	18	90	144	13	180	- 35	+ 10	+ 10	314	2.420 (61.47)	1B
450 V_{DC} AT + 85 °C RATED; 518 V_{DC} AT + 85 °C SURGE													
33	5.0	+ 75, - 15	11	55	88	15	450	- 35	+ 10	+ 10	252	2.000 (50.80)	1B
34	10	+ 75, - 15	18	90	144	15	225	- 35	+ 10	+ 10	308	2.980 (75.69)	1B
540 V_{DC} AT + 85 °C RATED; 621 V_{DC} AT + 85 °C SURGE													
35	4.0	+ 75, - 15	11	55	88	20	540	- 35	+ 10	+ 10	250	2.365 (60.07)	1B
36	8.0	+ 75, - 15	18	90	144	20	270	- 35	+ 10	+ 10	308	3.532 (89.71)	1B
630 V_{DC} AT + 85 °C RATED; 724 V_{DC} AT + 85 °C SURGE													
37	3.5	+ 75, - 15	11	55	88	22	630	- 35	+ 10	+ 10	250	2.720 (69.09)	1B



04022 RATINGS AND CASE CODES													
DSCC DRAWING 04022 PIN	CAP. (NOM.) (µF)	CAP. TOLERANCE (%)	DC LEAKAGE MAX. (µA)			ESR MAX. 120 Hz 25 °C (Ω)	IMPEDANCE MAX. (Ω)	CAPACITANCE CHANGE (%)			RIPPLE CURRENT 1/ (mA)	DIMENSION L ± 0.062 (1.57) (INCHES)	FIGURE
			+ 25 °C	+ 85 °C	+ 125 °C			- 55 °C	+ 85 °C	+ 125 °C			
			30 V _{DC} AT + 85 °C RATED; 34.5 V _{DC} AT + 85 °C SURGE										
39	370	± 20	18	125	180	1.7	15	- 65	+ 20	+ 25	550	0.600 (15.24)	1C
40	370	+ 50, - 15	18	125	180	1.7	15	- 65	+ 20	+ 25	550	0.600 (15.24)	1C
41	650	± 20	21	145	210	1.8	15	- 85	+ 20	+ 25	694	1.100 (27.94)	1C
42	650	+ 50, - 15	21	145	210	1.8	15	- 85	+ 20	+ 25	694	1.100 (27.94)	1C
43	1300	± 20	27	190	270	1.8	10	- 85	+ 20	+ 25	694	1.100 (27.94)	1C
44	1300	+ 50, - 15	27	190	270	1.8	10	- 85	+ 20	+ 25	694	1.100 (27.94)	1C
60 V _{DC} AT + 85 °C RATED; 69 V _{DC} AT + 85 °C SURGE													
45	200	± 20	19	135	190	1.8	30	- 50	+ 20	+ 25	550	0.600 (15.24)	1C
46	200	+ 50, - 15	19	135	190	1.8	30	- 50	+ 20	+ 25	550	0.600 (15.24)	1C
47	350	± 20	22	155	220	1.8	25	- 70	+ 20	+ 25	694	1.100 (27.94)	1C
48	350	+ 50, - 15	22	155	220	1.8	25	- 70	+ 20	+ 25	694	1.100 (27.94)	1C
49	700	± 20	29	200	290	1.8	15	- 70	+ 20	+ 25	694	1.100 (27.94)	1C
50	700	+ 50, - 15	29	200	290	1.8	15	- 70	+ 20	+ 25	694	1.100 (27.94)	1C
90 V _{DC} AT + 85 °C RATED; 103 V _{DC} AT + 85 °C SURGE													
51	120	± 20	19	135	190	1.7	40	- 40	+ 20	+ 25	550	0.600 (15.24)	1C
52	120	+ 50, - 15	19	135	190	1.7	40	- 40	+ 20	+ 25	550	0.600 (15.24)	1C
53	220	± 20	21	145	210	1.8	30	- 60	+ 20	+ 25	694	1.100 (27.94)	1C
54	220	+ 50, - 15	21	145	210	1.8	30	- 60	+ 20	+ 25	694	1.100 (27.94)	1C
55	450	± 20	29	195	290	1.7	35	- 60	+ 20	+ 25	694	1.100 (27.94)	1C
56	450	+ 50, - 15	29	195	290	1.7	35	- 60	+ 20	+ 25	694	1.100 (27.94)	1C
180 V _{DC} AT + 85 °C RATED; 207 V _{DC} AT + 85 °C SURGE													
57	42	± 20	17	120	170	6	75	- 40	+ 20	+ 25	363	0.976 (24.79)	1C
58	42	+ 50, - 15	17	120	170	6	75	- 40	+ 20	+ 25	363	0.976 (24.79)	1C
59	60	± 20	19	135	190	3.4	60	- 40	+ 20	+ 25	363	0.976 (24.79)	1C
60	60	+ 50, - 15	19	135	190	3.4	60	- 40	+ 20	+ 25	363	0.976 (24.79)	1C
61	110	± 20	21	145	210	3.5	60	- 60	+ 20	+ 25	631	1.938 (49.23)	1C
62	110	+ 50, - 15	21	145	210	3.5	60	- 60	+ 20	+ 25	631	1.938 (49.23)	1C
63	230	± 20	29	200	290	3.5	50	- 60	+ 20	+ 25	631	1.938 (49.23)	1C
64	230	+ 50, - 15	29	200	290	3.5	50	- 60	+ 20	+ 25	631	1.938 (49.23)	1C
270 V _{DC} AT + 85 °C RATED; 310 V _{DC} AT + 85 °C SURGE													
65	28	± 20	19	120	190	9	80	- 40	+ 20	+ 25	339	1.350 (34.29)	1C
66	28	+ 50, - 15	19	120	190	9	80	- 40	+ 20	+ 25	339	1.350 (34.29)	1C
67	40	± 20	19	135	190	8.8	100	- 40	+ 20	+ 25	339	1.350 (34.29)	1C
68	40	+ 50, - 15	19	135	190	8.8	100	- 40	+ 20	+ 25	339	1.350 (34.29)	1C
69	75	± 20	21	145	210	5.2	90	- 60	+ 20	+ 25	608	2.812 (71.42)	1C
70	75	+ 50, - 15	21	145	210	5.2	90	- 60	+ 20	+ 25	608	2.812 (71.42)	1C
71	150	± 20	28	195	280	5.4	75	- 60	+ 20	+ 25	608	2.812 (71.42)	1C
72	150	+ 50, - 15	28	195	280	5.4	75	- 60	+ 20	+ 25	608	2.812 (71.42)	1C
360 V _{DC} AT + 85 °C RATED; 414 V _{DC} AT + 85 °C SURGE													
73	22	± 20	18	125	180	11.4	100	- 40	+ 20	+ 25	323	1.705 (43.31)	1C
74	22	+ 50, - 15	18	125	180	11.6	100	- 40	+ 20	+ 25	323	1.705 (43.31)	1C
75	30	± 20	19	135	190	11.7	120	- 40	+ 20	+ 25	323	1.705 (43.31)	1C
76	30	+ 50, - 15	19	135	190	11.7	120	- 40	+ 20	+ 25	323	1.705 (43.31)	1C
450 V _{DC} AT + 85 °C RATED; 518 V _{DC} AT + 85 °C SURGE													
77	17	± 20	18	125	180	15	130	- 40	+ 20	+ 25	315	2.080 (52.83)	1C
78	17	+ 50, - 15	18	125	180	15	130	- 40	+ 20	+ 25	315	2.080 (52.83)	1C
79	25	± 20	19	135	190	15	150	- 40	+ 20	+ 25	315	2.080 (52.83)	1C
80	25	+ 50, - 15	19	135	190	15	150	- 40	+ 20	+ 25	315	2.080 (52.83)	1C
540 V _{DC} AT + 85 °C RATED; 621 V _{DC} AT + 85 °C SURGE													
81	14	± 20	17	120	170	18	160	- 40	+ 20	+ 25	309	2.435 (61.85)	1C
82	14	+ 50, - 15	17	120	170	18	160	- 40	+ 20	+ 25	309	2.435 (61.85)	1C
83	20	± 20	19	135	190	18	170	- 40	+ 20	+ 25	309	2.435 (61.85)	1C
84	20	+ 50, - 15	19	135	190	18	170	- 40	+ 20	+ 25	309	2.435 (61.85)	1C
630 V _{DC} AT + 85 °C RATED; 724 V _{DC} AT + 85 °C SURGE													
85	12	± 20	17	120	170	16	180	- 40	+ 20	+ 25	306	2.810 (71.37)	1C
86	12	+ 50, - 15	17	120	170	16	180	- 40	+ 20	+ 25	306	2.810 (71.37)	1C
87	18	± 20	19	135	190	16	200	- 40	+ 20	+ 25	306	2.810 (71.37)	1C
88	18	+ 50, - 15	19	135	190	16	200	- 40	+ 20	+ 25	306	2.810 (71.37)	1C

FIGURES

FIGURE 1A



CASE CIRCUIT DIAGRAM

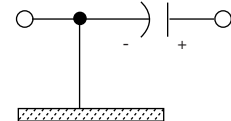
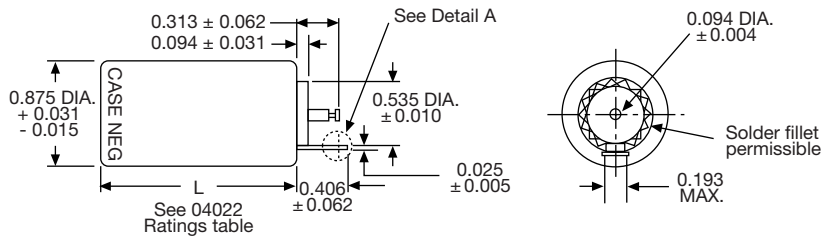


FIGURE 1B



**DETAIL A
SOLDER LUG
TERMINAL**

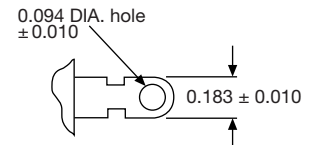
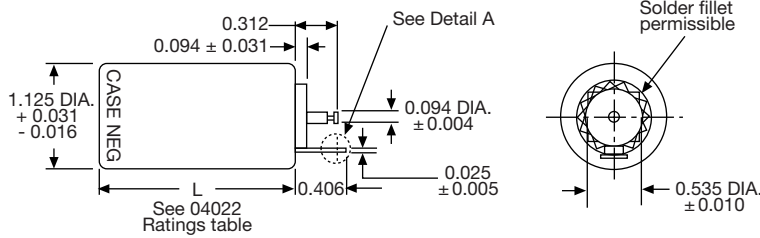


FIGURE 1C





Contents

HE3 114

High Energy

Wet Tantalum Capacitors, Tantalum-Case with Glass-to-Tantalum Hermetic Seal for - 55 °C to + 125 °C Operation



FEATURES

Vishay HE3 represents a major breakthrough in wet tantalum capacitor technology for high-energy applications. The unique case design provides for the highest capacitance per unit volume. The HE3 also utilizes the proven hybrid technology of our SuperTan® product.



The HE3 is housed in an all tantalum, hermetically sealed case, and is manufactured to withstand high stress and hazardous environments. The design provides a unique double seal for improved reliability and performance.

- Compliant to RoHS Directive 2002/95/EC

Note

* Pb containing terminations are not RoHS compliant, exemptions may apply

PERFORMANCE CHARACTERISTICS

Operating Temperature:

- 55 °C to + 85 °C (to + 125 °C with voltage derating)

Capacitance Tolerance:

At 120 Hz, + 25 °C ± 20 % standard
± 10 % available as special

Contact marketing for availability of 10 % tolerance

DC Leakage Current (DCL Max.):

At + 25 °C: Leakage current shall not exceed the values listed in the Standard Ratings tables.

Life Test:

Capacitors are capable of withstanding a 1000 h life test at a temperature of + 85 °C at the applicable rated DC working voltage.

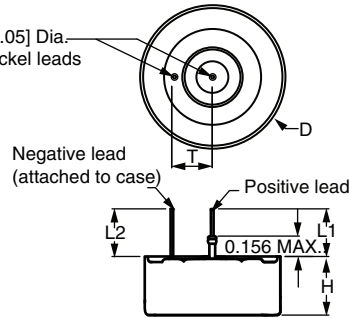
ORDERING INFORMATION								
HE3	C	543	K	025	B	Z	S	S
TYPE	CASE CODE	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	TERMINATION AND PACKAGING	RELIABILITY LEVEL	TEMPERATURE	ESR
	See Ratings and Case Codes table	This is expressed in microfarads. The first two digits are the significant figures. The third is the number of zeros to follow.	K = 10 % ⁽¹⁾ M = 20 %	This is expressed in V. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	A = 100 % tin (RoHS compliant) B = Tin/lead and bulk	Z = Non-ER	S = Standard (- 55 °C to + 85 °C)	S = Standard

Note

⁽¹⁾ Contact marketing for availability of 10 % tolerance

DIMENSIONS in inches [millimeters]

0.0253 ± 0.002 [0.64 ± 0.05] Dia.
(No. 22 AWG) Tinned Nickel leads
solderable and weldable



CASE CODE	D	HEIGHT	L2 (MIN.)	L1 (MIN.)	T	WEIGHT (g) (TYPICAL)
TYPE HE3						
A	1.400 ± 0.005 [35.56 ± 0.127]	0.350 ± 0.015 [8.89 ± 0.381]	0.500 [12.70]	0.500 [12.70]	0.40 ± 0.015 [10.2 ± 0.38]	48.0
B	1.400 ± 0.005 [35.56 ± 0.127]	0.488 ± 0.015 [12.395 ± 0.381]	0.500 [12.70]	0.500 [12.70]	0.40 ± 0.015 [10.2 ± 0.38]	73.0
C	1.400 ± 0.005 [35.56 ± 0.127]	0.615 ± 0.015 [15.6 ± 0.4]	0.500 [12.70]	0.500 [12.70]	0.40 ± 0.015 [10.2 ± 0.38]	95.0

STANDARD RATINGS

CAPACITANCE (μF)	CASE CODE	PART NUMBER	MAX. ESR AT + 25 °C, 1 kHz (Ω)	MAX. DCL AT + 25 °C (μA)
25 V_{DC} AT + 85 °C; 15 V_{DC} AT + 125 °C				
18 000	A	HE3A183(1)025(2)(3)(4)(5)	0.060	150
24 000	A	HE3A243(1)025(2)(3)(4)(5)	0.060	150
36 000	B	HE3B363(1)025(2)(3)(4)(5)	0.045	200
48 000	B	HE3B483(1)025(2)(3)(4)(5)	0.045	200
54 000	C	HE3C543(1)025(2)(3)(4)(5)	0.035	300
72 000	C	HE3C723(1)025(2)(3)(4)(5)	0.035	350
50 V_{DC} AT + 85 °C; 30 V_{DC} AT + 125 °C				
8000	A	HE3A802(1)050(2)(3)(4)(5)	0.075	170
16 000	B	HE3B163(1)050(2)(3)(4)(5)	0.045	270
24 000	C	HE3C243(1)050(2)(3)(4)(5)	0.035	400
63 V_{DC} AT + 85 °C; 40 V_{DC} AT + 125 °C				
4000	A	HE3A402(1)063(2)(3)(4)(5)	0.100	170
8000	B	HE3B802(1)063(2)(3)(4)(5)	0.055	270
12 000	C	HE3C123(1)063(2)(3)(4)(5)	0.035	400
80 V_{DC} AT + 85 °C; 50 V_{DC} AT + 125 °C				
3000	A	HE3A302(1)080(2)(3)(4)(5)	0.100	300
6000	B	HE3B602(1)080(2)(3)(4)(5)	0.065	400
9000	C	HE3C902(1)080(2)(3)(4)(5)	0.040	500
100 V_{DC} AT + 85 °C; 65 V_{DC} AT + 125 °C				
1900	A	HE3A192(1)100(2)(3)(4)(5)	0.085	300
3800	B	HE3B382(1)100(2)(3)(4)(5)	0.065	400
5700	C	HE3C572(1)100(2)(3)(4)(5)	0.050	500
125 V_{DC} AT + 85 °C; 85 V_{DC} AT + 125 °C				
1100	A	HE3A112(1)125(2)(3)(4)(5)	0.100	300
2200	B	HE3B222(1)125(2)(3)(4)(5)	0.085	400
3300	C	HE3C332(1)125(2)(3)(4)(5)	0.075	500

Note

- Part number definitions:
 - Standard capacitance tolerance is 20 % or "M". Contact marketing for availability of 10 % or "K".
 - Standard termination is "B" or tin/lead. RoHS compliant or 100 % tin is available as "A".
 - Standard reliability is "Z" or non-established reliability.
 - Standard temperature range is "S" or - 55 °C to + 125 °C.
 - Standard ESR is "S".



PERFORMANCE CHARACTERISTICS OF HIGH ENERGY CAPACITORS

ELECTRICAL PERFORMANCE CHARACTERISTICS	
ITEM	PERFORMANCE CHARACTERISTICS
Operating temperature range	- 55 °C to + 85 °C (to + 125 °C with voltage derating)
Capacitor tolerance	± 20 % ± 10 % at 120 Hz
ESR	Limits per Standard Ratings table
DC leakage current (DCL max.)	At 25 °C the leakage current shall not exceed values listed in the Standard Rating table.
Reverse voltage	No continuous reverse voltage permitted
Surge voltage	The test shall be at 1000 cycles at 110 % of rated voltage at 85 °C. A cycle consists of a one and one half (1.5) min charge and a four and one half (4.5) min discharge through 100 Ω resistor.
Life test at + 85 °C	1000 h at + 85 °C

ENVIRONMENTAL CHARACTERISTICS		
ITEM	TEST AND CONDITIONS	COMMENTS
Hermeticity	MIL-STD-202, method 112 C/IIIa	The capacitor shall be hermetically sealed such that the case does not leak electrolyte or vent any gas when exposed to a vacuum.
Moisture resistance	MIL-STD-202, method 106	
Altitude	MIL-STD-202, method 105 C, test condition D	100 000 feet test

MECHANICAL PERFORMANCE CHARACTERISTICS		
ITEM	TEST AND CONDITIONS	COMMENTS
Thermal shock	MIL-STD-202, method 107 G	
Shock	MIL-STD-202, method 213 B test condition G	11 ms, 50 g
Vibration - high frequency	MIL-STD-202, method 204 D test condition D	12 sweeps/axis, 20 g peak
Vibration - random	MIL-STD-202, method 214 A test condition I, letter D	1.5 h/axis, 12 g
Resistance to solder heat	MIL-STD-202, method 210 F	The capacitor must withstand solder dipping of the terminals at 260 °C for 10 s. The capacitor must not be visibly damaged and the electrical characteristics must not be affected.
Solderability	ANSI J-STD-002	
Terminal strength	MIL-STD-202, method 211 A	The capacitor terminals must withstand a 5 pound pull test for 5 s to 10 s. The capacitor must not be visibly damaged and the electrical characteristics must not be affected.
Part markings	MIL-STD-202, method 215 J	The capacitor shall be permanently and legibly marked on the circumference of the case. The markings shall be resistant to solvents.
Weight (mass)		See dimensions table

HE3 MOUNTING OPTIONS

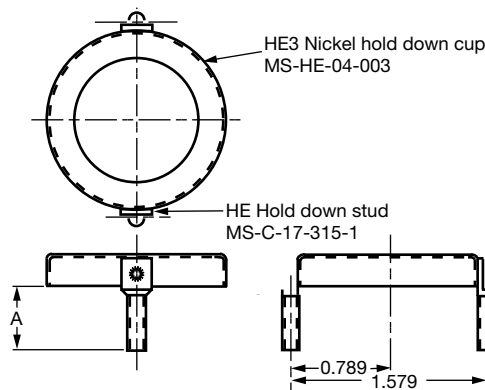
The HE3 capacitor can be mounted with many commercially available methods. Vishay offers the optional mounting hardware outlined below.

THROUGH-HOLE

If mounted through-hole, the glass-to-metal seal must be protected from potential mounting and application stress. The HE3 can be mounted termination down through the HE3SPC001 spacer into the PCB. The proper size bracket HE3BKT00* can then be utilized to hold the HE3 rigidly to the PCB.

TERMINATIONS UP

If mounted with terminations facing up for attachment to wiring, the spacer is not needed. The HE3 can be reverse with terminations facing upward through the center of the HE3BKT00* bracket, which is then mounted through the PCB.



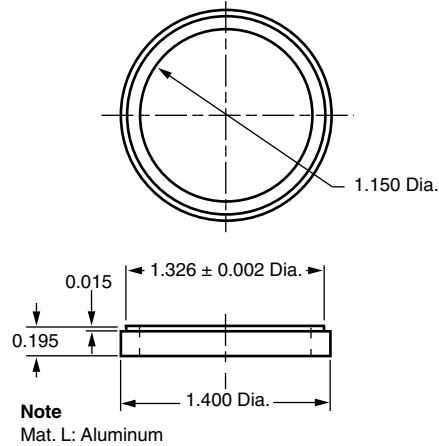
Notes

- Spot weld, 2 places
- Mounting bolt:
 1. Material - Stainless steel
 2. Thread - 6-32 NC-2A

PART NUMBER ⁽¹⁾	STUD	A ± 0.010
HE3BKT001	HE3A	0.391
HE3BKT002	HE3B	0.518
HE3BKT003	HE3C	0.605
HE3BKT004	HE3A W/spacer	0.572
HE3BKT005	HE3B W/spacer	0.699
HE3BKT006	HE3C W/spacer	0.831

Note

⁽¹⁾ The part numbers shown are for ordering the mounting bracket and/or spacer. The HE3 capacitor must be ordered separately using the correct part number as outlined in ORDERING INFORMATION and in the STANDARD RATINGS table.



Note

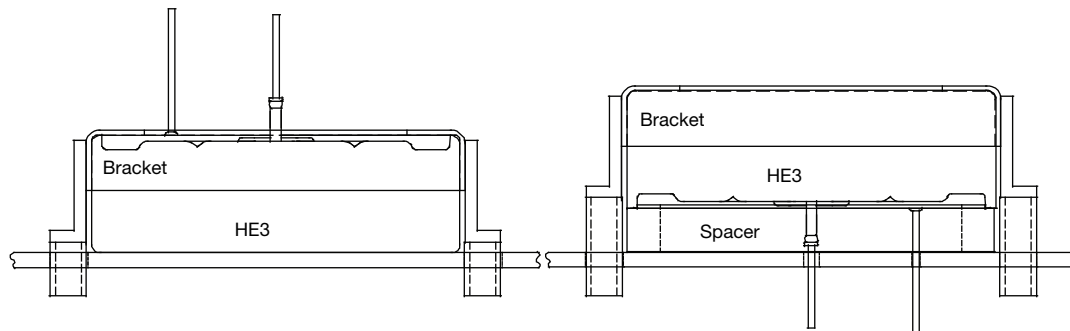
- Mat. L: Aluminum

PART NUMBER ⁽¹⁾
HE3SPC001

Note

⁽¹⁾ The part numbers shown are for ordering the mounting bracket and/or spacer. The HE3 capacitor must be ordered separately using the correct part number as outlined in ORDERING INFORMATION and in the STANDARD RATINGS table.

HE3 PC BOARD MOUNTED





Assemblies Arrays Modules

Contents

200D, 202D.....	120
211D	130
285D	132
XTH-K-L-M-V	103
MC2	135
MT2.....	140

Wet Tantalum Capacitors Wet Sintered Anode TANTALEX[®] Components TANTAPAK[®] Capacitor Assemblies



FEATURES

TANTAPAK[®] Wet Sintered Anode capacitor assemblies are widely used in filter, coupling, bypass and time-delay circuits in computers, missiles, airborne equipment, radar and fire control systems.

TANTAPAK[®] capacitor assemblies are available in 3 standard case styles and 13 case codes. Type 200D units are constructed with the negative terminal connected to the case; they are available only in the "A" case, in five case codes. Model 202D capacitors are the commercial equivalent of Tansitor Style RW, Mallory-NACC Style TL and are designed to meet MIL-DTL-3965 and DSCC DWG 04021.

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 125 °C.

Capacitance Tolerance: At 120 Hz, + 25 °C. ± 20 % standard. ± 10 % available.

DC Leakage Current (DCL Max.):

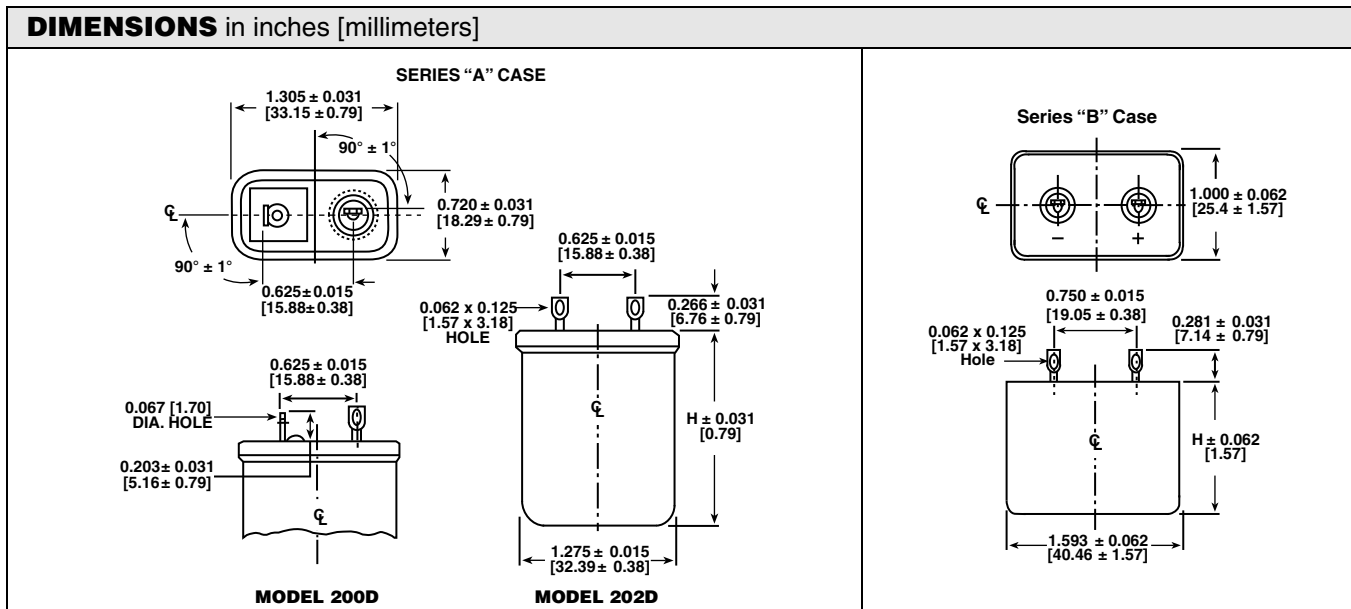
At + 25 °C: Leakage current shall not exceed the values listed in the Standard Ratings Tables.

Life Test: Capacitors shall withstand 2000 hours at a temperature of + 85 °C or + 125 °C at the rated DC working voltage.

Following the life test:

1. DCL shall not exceed the original requirement.
2. ESR shall not be more than 130 % of the initial requirement.
3. Capacitance shall not change more than ± 25 %.

ORDERING INFORMATION				
202D	318	X0	006	A1
MODEL	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	CASE CODE
200D = Negative terminal connected to case (Available only in 'A' Cases) 202D = Both terminals insulated from case	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow	X0 = ± 20 % X9 = ± 10 %	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating	See Dimensional Configurations





Wet Tantalum Capacitors
Wet Sintered Anode TANTALEX[®] Components
TANTAPAK[®] Capacitor Assemblies

DIMENSIONS in inches [millimeters]			
	CASE CODE	H CASE HEIGHT	TYPICAL WEIGHT (g)
	A1	1.062 [26.97]	45
	A2	1.375 [34.93]	60
	A3	1.625 [41.28]	80
	A4	2.000 [50.80]	100
	A5	2.500 [63.50]	125
	B1	1.500 [38.10]	170
	B2	1.875 [47.63]	210
	B3	2.250 [57.15]	250
	B4	2.625 [66.68]	290
	B5	3.000 [76.20]	335
	B6	3.375 [85.73]	380
	B7	3.750 [95.25]	420
D3	1.625 [41.28]	120	

STANDARD RATINGS						
CAPACITANCE (µF)	CASE CODE	PART NUMBER (1) TYPE 200D	PART NUMBER (1) TYPE 202D	MAX. ESR at + 25 °C (Ω)	MAX. IMP. at - 55 °C (Ω)	MAX. RMS RIPPLE 120 Hz (A)
15 WVDC at + 85 °C . . . 10 WVDC at + 125 °C						
960.0	A1	200D967X0015A1	202D967X0015A1	0.25	3.1	1.17
1200.0	A2	200D128X0015A2	202D128X0015A2	0.21	2.3	1.45
1400.0	A3	200D148X0015A3	202D148X0015A3	0.18	1.7	1.67
1600.0	A1	200D168X0015A1	202D168X0015A1	0.25	4.2	1.20
2100.0	A2	200D218X0015A2	202D218X0015A2	0.19	3.1	1.52
2100.0	A4	200D218X0015A4	202D218X0015A4	0.12	1.3	2.22
2200.0	D3	-	202D228X0015D3	0.30	5.8	1.14
2400.0	A5	200D248X0015A5	202D248X0015A5	0.10	1.15	2.66
2700.0	A3	200D278X0015A3	202D278X0015A3	0.15	2.5	1.83
3200.0	A4	200D328X0015A4	202D328X0015A4	0.13	2.1	2.13
3300.0	B1	-	202D338X0015B1	0.14	3.2	2.17
4300.0	A5	200D438X0015A5	202D438X0015A5	0.095	1.6	2.73
4500.0	B2	-	202D458X0015B2	0.11	2.4	2.65
5600.0	B3	-	202D568X0015B3	0.085	1.9	3.24
6700.0	B4	-	202D678X0015B4	0.070	1.6	3.80
7800.0	B5	-	202D788X0015B5	0.061	1.4	4.28
9000.0	B6	-	202D908X0015B6	0.053	1.2	4.84
10 000.0	B7	-	202D109X0015B7	0.047	1.1	5.38
20 WVDC at + 85 °C . . . 13 WVDC at + 125 °C						
1300.0	A1	200D138X0020A1	202D138X0020A1	0.25	5.0	1.20
1700.0	A2	200D178X0020A2	202D178X0020A2	0.19	3.8	1.52
1900.0	D3	-	202D198X0020D3	0.21	5.0	1.36
2200.0	A3	200D228X0020A3	202D228X0020A3	0.15	3.0	1.83
2700.0	A4	200D278X0020A4	202D278X0020A4	0.13	2.5	2.13
2800.0	B1	-	202D288X0020B1	0.14	3.3	2.17
3500.0	A5	200D358X0020A5	202D358X0020A5	0.094	1.9	2.75
3800.0	B2	-	202D388X0020B2	0.11	2.5	2.65
4700.0	B3	-	202D478X0020B3	0.085	2.0	3.24
5600.0	B4	-	202D568X0020B4	0.071	1.7	3.77
6600.0	B5	-	202D668X0020B5	0.061	1.4	4.28
7500.0	B6	-	202D758X0020B6	0.053	1.3	4.84
8500.0	B7	-	202D858X0020B7	0.047	1.1	5.38

Note

(1) The Part Numbers listed are for ± 20 % tolerance. To specify ± 10 % tolerance, change the digit following "X" from "0" to "9". For requirements or ratings other than those listed, please contact a Vishay representative.

Wet Tantalum Capacitors
Wet Sintered Anode TANTALEX[®] Components
TANTAPAK[®] Capacitor Assemblies

STANDARD RATINGS						
CAPACITANCE (μ F)	CASE CODE	PART NUMBER (1) TYPE 200D	PART NUMBER (1) TYPE 202D	MAX. ESR at + 25 °C (Ω)	MAX. IMP. at - 55 °C (Ω)	MAX. RMS RIPPLE 120 Hz (A)
25 WVDC at + 85 °C . . . 15 WVDC at + 125 °C						
1100.0	A1	200D118X0025A1	202D118X0025A1	0.30	5.3	1.10
1400.0	A2	200D148X0025A2	202D148X0025A2	0.23	4.0	1.38
1600.0	D3	-	202D168X0025D3	0.21	5.3	1.36
1800.0	A3	200D188X0025A3	202D188X0025A3	0.18	3.2	1.67
2200.0	A4	200D228X0025A4	202D228X0025A4	0.15	2.7	1.98
2300.0	B1	-	202D238X0025B1	0.14	3.5	2.17
2900.0	A5	200D298X0025A5	202D298X0025A5	0.11	2.0	2.54
3100.0	B2	-	202D318X0025B2	0.11	2.6	2.65
3900.0	B3	-	202D398X0025B3	0.085	2.1	3.24
4700.0	B4	-	202D478X0025B4	0.071	1.8	3.77
5500.0	B5	-	202D558X0025B5	0.061	1.5	4.28
6200.0	B6	-	202D628X0025B6	0.053	1.3	4.84
7000.0	B7	-	202D708X0025B7	0.047	1.2	5.38
30 WVDC at + 85 °C . . . 20 WVDC at + 125 °C						
520.0	A1	200D527X0030A1	202D527X0030A1	0.48	5.3	0.87
660.0	A2	200D667X0030A2	202D667X0030A2	0.38	4.2	1.08
820.0	A3	200D827X0030A3	202D827X0030A3	0.31	2.9	1.27
900.0	A1	200D907X0030A1	202D907X0030A1	0.37	5.8	0.99
1200.0	A2	200D128X0030A2	202D128X0030A2	0.27	4.4	1.28
1200.0	A4	200D128X0030A4	202D128X0030A4	0.21	2.3	1.68
1300.0	A5	200D138X0030A5	202D138X0030A5	0.19	2.1	1.93
1300.0	D3	-	202D138X0030D3	0.26	5.5	1.22
1500.0	A3	200D158X0030A3	202D158X0030A3	0.22	3.5	1.50
1800.0	A4	200D188X0030A4	202D188X0030A4	0.18	2.9	1.81
2000.0	B1	-	202D208X0030B1	0.17	1.7	1.97
2400.0	A5	200D248X0030A5	202D248X0030A5	0.14	2.2	2.25
2600.0	B2	-	202D268X0030B2	0.13	2.8	2.43
3300.0	B3	-	202D338X0030B3	0.10	2.2	2.98
4000.0	B4	-	202D408X0030B4	0.085	1.8	3.45
4600.0	B5	-	202D468X0030B5	0.073	1.6	3.92
5300.0	B6	-	202D538X0030B6	0.064	1.4	4.40
6000.0	B7	-	202D608X0030B7	0.057	1.2	4.88
35 WVDC at + 85 °C . . . 22 WVDC at + 125 °C						
720.0	A1	200D727X0035A1	202D727X0035A1	0.37	6.3	0.99
960.0	A2	200D967X0035A2	202D967X0035A2	0.27	4.7	1.28
1100.0	D3	-	202D118X0035D3	0.30	5.7	1.14
1200.0	A3	200D128X0035A3	202D128X0035A3	0.22	3.8	1.51
1400.0	A4	200D148X0035A4	202D148X0035A4	0.18	3.2	1.81
1600.0	B1	-	202D168X0035B1	0.20	3.8	1.82
1900.0	A5	200D198X0035A5	202D198X0035A5	0.14	2.4	2.25
2200.0	B2	-	202D228X0035B2	0.15	2.9	2.27
2700.0	B3	-	202D278X0035B3	0.12	2.3	2.72
3200.0	B4	-	202D328X0035B4	0.10	1.9	3.18
3800.0	B5	-	202D388X0035B5	0.085	1.6	3.63
4300.0	B6	-	202D438X0035B6	0.075	1.4	4.07
4900.0	B7	-	202D498X0035B7	0.067	1.3	4.51

Note

(1) The Part Numbers listed are for $\pm 20\%$ tolerance. To specify $\pm 10\%$ tolerance, change the digit following "X" from "0" to "9". For requirements or ratings other than those listed, please contact a Vishay representative.



Wet Tantalum Capacitors
Wet Sintered Anode TANTALEX® Components
TANTAPAK® Capacitor Assemblies

STANDARD RATINGS						
CAPACITANCE (μ F)	CASE CODE	PART NUMBER ⁽¹⁾ TYPE 200D	PART NUMBER ⁽¹⁾ TYPE 202D	MAX. ESR at + 25 °C (Ω)	MAX. IMP. at - 55 °C (Ω)	MAX. RMS RIPPLE 120 Hz (A)
40 WVDC at + 85 °C . . . 25 WVDC at + 125 °C						
600.0	A1	200D607X0040A1	202D607X0040A1	0.33	6.7	1.04
800.0	A2	200D807X0040A2	202D807X0040A2	0.25	5.0	1.33
880.0	D3	-	202D887X0040D3	0.30	6.0	1.14
1000.0	A3	200D108X0040A3	202D108X0040A3	0.20	4.0	1.58
1200.0	A4	200D128X0040A4	202D128X0040A4	0.17	3.3	1.86
1300.0	B1	-	202D138X0040B1	0.20	4.0	1.82
1600.0	A5	200D168X0040A5	202D168X0040A5	0.13	2.5	2.34
1800.0	B2	-	202D188X0040B2	0.15	3.0	2.27
2200.0	B3	-	202D228X0040B3	0.12	2.4	2.72
2600.0	B4	-	202D268X0040B4	0.10	2.0	3.18
3100.0	B5	-	202D318X0040B5	0.086	1.7	3.61
3500.0	B6	-	202D358X0040B6	0.075	1.5	4.07
4000.0	B7	-	202D408X0040B7	0.057	1.3	4.51
50 WVDC at + 85 °C . . . 35 WVDC at + 125 °C						
400.0	A1	200D407X0050A1	202D407X0050A1	0.50	7.2	0.85
430.0	A1	200D437X0050A1	202D437X0050A1	0.58	6.4	0.79
490.0	A1	200D497X0050A1	202D497X0050A1	0.33	7.2	1.04
500.0	A2	200D507X0050A2	202D507X0050A2	0.40	5.6	1.05
600.0	A3	200D607X0050A3	202D607X0050A3	0.33	4.1	1.23
660.0	A2	200D667X0050A2	202D667X0050A2	0.25	5.4	1.33
720.0	D3	-	202D727X0050D3	0.30	6.2	1.14
800.0	A4	200D807X0050A4	202D807X0050A4	0.25	3.1	1.54
820.0	A3	200D827X0050A3	202D827X0050A3	0.20	4.3	1.58
980.0	A4	200D987X0050A4	202D987X0050A4	0.17	3.6	1.86
1000.0	A5	200D108X0050A5	202D108X0050A5	0.25	2.8	2.84
1100.0	B1	-	202D118X0050B1	0.20	4.2	1.82
1300.0	A5	200D138X0050A5	202D138X0050A5	0.13	2.7	2.34
1400.0	B2	-	202D148X0050B2	0.15	3.1	2.27
1800.0	B3	-	202D188X0050B3	0.12	2.5	2.72
2200.0	B4	-	202D228X0050B4	0.10	2.0	3.18
2500.0	B5	-	202D258X0050B5	0.086	1.8	3.61
2900.0	B6	-	202D298X0050B6	0.075	1.6	4.07
3200.0	B7	-	202D328X0050B7	0.067	1.4	4.51
60 WVDC at + 85 °C . . . 40 WVDC at + 125 °C						
410.0	A1	200D417X0060A1	202D417X0060A1	0.33	7.5	1.04
550.0	A2	200D557X0060A2	202D557X0060A2	0.25	5.6	1.33
600.0	D3	-	202D607X0060A2	0.33	6.5	1.09
680.0	A3	200D687X0060A3	202D687X0060A3	0.20	4.5	1.58
820.0	A4	200D827X0060A4	202D827X0060A4	0.17	3.7	1.86
900.0	B1	-	202D907X0060A2	0.22	4.3	1.73
1100.0	A5	200D118X0060A5	202D118X0060A5	0.13	2.8	2.34
1200.0	B2	-	202D128X0060B2	0.16	3.3	2.19
1500.0	B3	-	202D158X0060B3	0.13	2.6	2.62
1800.0	B4	-	202D188X0060B4	0.11	2.2	3.03
2100.0	B5	-	202D218X0060B4	0.093	1.9	3.47
2400.0	B6	-	202D248X0060B6	0.081	1.6	3.9
2700.0	B7	-	202D278X0060B7	0.072	1.4	4.35

Note

⁽¹⁾ The Part Numbers listed are for ± 20 % tolerance. To specify ± 10 % tolerance, change the digit following "X" from "0" to "9". For requirements or ratings other than those listed, please contact a Vishay representative.

Wet Tantalum Capacitors
Wet Sintered Anode TANTALEX[®] Components
TANTAPAK[®] Capacitor Assemblies

STANDARD RATINGS						
CAPACITANCE (μ F)	CASE CODE	PART NUMBER ⁽¹⁾ TYPE 200D	PART NUMBER ⁽¹⁾ TYPE 202D	MAX. ESR at + 25 °C (Ω)	MAX. IMP. at - 55 °C (Ω)	MAX. RMS RIPPLE 120 Hz (A)
75 WVDC at + 85 °C . . . 50 WVDC at + 125 °C						
270.0	A1	200D277X0075A1	202D277X0075A1	0.56	8.5	0.80
330.0	A2	200D337X0075A2	202D337X0075A2	0.46	7.0	0.98
400.0	A1	200D407X0075A1	202D407X0075A1	0.26	7.5	1.18
400.0	A3	200D407X0075A3	202D407X0075A3	0.38	5.0	1.15
530.0	A2	200D537X0075A2	202D537X0075A2	0.20	5.6	1.48
480.0	D3	-	202D487X0075D3	0.42	6.8	0.96
660.0	A3	200D667X0075A3	202D667X0075A3	0.16	4.5	1.77
600.0	A4	200D607X0075A4	202D607X0075A4	0.25	3.65	1.54
660.0	A5	200D667X0075A5	202D667X0075A5	0.23	3.5	1.76
790.0	A4	200D797X0075A4	202D797X0075A4	0.13	3.7	2.13
720.0	B1	-	202D727X0075B1	0.28	4.5	1.54
110.0	A5	200D118X0075A5	202D118X0075A5	0.096	2.8	2.72
960.0	B2	-	202D967X0075B2	0.21	3.4	1.91
1200.0	B3	-	202D128X0075B3	0.17	2.7	2.29
1400.0	B4	-	202D148X0075B4	0.14	2.1	2.69
1700.0	B5	-	202D178X0075B5	0.12	1.9	3.06
1900.0	B6	-	202D198X0075B6	0.11	1.7	3.36
2200.0	B7	-	202D228X0075B7	0.095	1.5	3.78
85 WVDC at + 85 °C . . . 60 WVDC at + 125 °C						
280.0	A1	200D287X0085A1	202D287X0085A1	0.33	9.2	1.04
370.0	A2	200D377X0085A2	202D377X0085A2	0.25	6.9	1.33
400.0	D3	-	202D407X0085D3	0.42	7.0	0.96
470.0	A3	200D477X0085A3	202D477X0085A3	0.20	5.5	1.58
570.0	A4	200D577X0085A4	202D577X0085A4	0.17	4.6	1.86
600.0	B1	-	202D607X0085B1	0.28	4.7	1.54
750.0	A5	200D757X0085A5	202D757X0085A5	0.13	3.4	2.34
85 WVDC at + 85 °C . . . 60 WVDC at + 125 °C						
800.0	B2	-	202D807X0085B2	0.21	3.5	1.91
1000.0	B3	-	202D108X0085B3	0.17	2.8	2.29
1200.0	B4	-	202D128X0085B4	0.14	2.4	2.69
1400.0	B5	-	202D148X0085B5	0.12	2.0	3.06
1600.0	B6	-	202D168X0085B6	0.11	1.8	3.36
1800.0	B7	-	202D188X0085B7	0.095	1.6	3.78

Note

⁽¹⁾ The Part Numbers listed are for ± 20 % tolerance. To specify ± 10 % tolerance, change the digit following "X" from "0" to "9". For requirements or ratings other than those listed, please contact a Vishay representative.



Wet Tantalum Capacitors
Wet Sintered Anode TANTALEX® Components
TANTAPAK® Capacitor Assemblies

STANDARD RATINGS						
CAPACITANCE (μ F)	CASE CODE	PART NUMBER ⁽¹⁾ TYPE 200D	PART NUMBER ⁽¹⁾ TYPE 202D	MAX. ESR at + 25 °C (Ω)	MAX. IMP. at - 55 °C (Ω)	MAX. RMS RIPPLE 120 Hz (A)
85 WVDC at + 85 °C . . . 60 WVDC at + 125 °C						
280.0	A1	200D287X0085A1	202D287X0085A1	0.33	9.2	1.04
370.0	A2	200D377X0085A2	202D377X0085A2	0.25	6.9	1.33
400.0	D3	-	202D407X0085D3	0.42	7.0	0.96
470.0	A3	200D477X0085A3	202D477X0085A3	0.20	5.5	1.58
570.0	A4	200D577X0085A4	202D577X0085A4	0.17	4.6	1.86
600.0	B1	-	202D607X0085B1	0.28	4.7	1.54
750.0	A5	200D757X0085A5	202D757X0085A5	0.13	3.4	2.34
800.0	B2	-	202D807X0085B2	0.21	3.5	1.91
1000.0	B3	-	202D108X0085B3	0.17	2.8	2.29
1200.0	B4	-	202D128X0085B4	0.14	2.4	2.69
1400.0	B5	-	202D148X0085B5	0.12	2.0	3.06
1600.0	B6	-	202D168X0085B6	0.11	1.8	3.36
1800.0	B7	-	202D188X0085B7	0.095	1.6	3.78
100 WVDC at + 85 °C . . . 70 WVDC at + 125 °C						
170.0	A1	200D177X0100A1	202D177X0100A1	0.94	15.0	0.62
220.0	A2	200D227X0100A2	202D227X0100A2	0.72	11.6	0.78
260.0	A1	200D267X0100A1	202D267X0100A1	0.40	8.3	0.95
260.0	A3	200D267X0100A3	202D267X0100A3	0.61	8.0	0.91
340.0	D3	-	202D347X0100D3	0.75	7.5	0.72
350.0	A2	200D357X0100A2	202D357X0100A2	0.30	6.2	1.21
350.0	A4	200D357X0100A4	202D357X0100A4	0.45	6.5	1.15
440.0	A3	200D447X0100A3	202D447X0100A3	0.24	5.0	1.44
440.0	A5	200D447X0100A5	202D447X0100A5	0.36	5.8	1.40
510.0	B1	-	202D517X0100B1	0.28	4.8	1.54
530.0	A4	200D537X0100A4	202D537X0100A4	0.20	4.2	1.72
680.0	B2	-	202D687X0100B2	0.21	3.6	1.91
700.0	A5	200D707X0100A5	202D707X0100A5	0.15	3.1	2.18
850.0	B3	-	202D857X0100B3	0.17	2.9	2.29
1000.0	B4	-	202D108X0100B4	0.14	2.4	2.69
1200.0	B5	-	202D128X0100B5	0.12	2.1	3.06
1400.0	B6	-	202D148X0100B6	0.11	1.8	3.36
1500.0	B7	-	202D158X0100B7	0.095	1.6	3.78
125 WVDC at + 85 °C . . . 80 WVDC at + 125 °C						
170.0	A1	200D177X0125A1	202D177X0125A1	0.40	15.0	0.95
220.0	A2	200D227X0125A2	202D227X0125A2	0.30	12.0	1.21
220.0	D3	-	202D227X0125D3	0.42	8.0	0.96
280.0	A3	200D287X0125A3	202D287X0125A3	0.24	9.0	1.44
340.0	A4	200D347X0125A4	202D347X0125A4	0.20	7.5	1.72
340.0	B1	-	202D347X0125B1	0.28	5.4	1.54
560.0	B3	-	202D567X0125B3	0.17	3.2	2.29
670.0	B4	-	202D677X0125B4	0.14	2.7	2.69
790.0	B5	-	202D797X0125B5	0.12	2.4	3.06
900.0	B6	-	202D907X0125B6	0.11	2.0	3.38
1000.0	B7	-	202D108X0125B7	0.095	1.8	3.78
150 WVDC at + 85 °C . . . 100 WVDC at + 125 °C						
70.0	A1	200D706X0150A1	202D706X0150A1	2.27	28.8	0.40
90.0	A2	200D906X0150A2	202D906X0150A2	1.77	22.4	0.50
100.0	A3	200D107X0150A3	202D107X0150A3	1.59	16.4	0.56
140.0	A4	200D147X0150A4	202D147X0150A4	1.14	12.4	0.72
180.0	A5	200D187X0150A5	202D187X0150A5	0.88	11.2	0.90

Note

⁽¹⁾ The Part Numbers listed are for ± 20 % tolerance. To specify ± 10 % tolerance, change the digit following "X" from "0" to "9". For requirements or ratings other than those listed, please contact a Vishay representative.

Wet Tantalum Capacitors
Wet Sintered Anode TANTALEX[®] Components
TANTAPAK[®] Capacitor Assemblies

EXTENDED RATINGS						
CAPACITANCE (μ F)	CASE CODE	PART NUMBER ⁽¹⁾ TYPE 200D	PART NUMBER ⁽¹⁾ TYPE 202D	MAX. ESR at + 25 °C (Ω)	MAX. IMP. at - 55 °C (Ω)	MAX. RMS RIPPLE 120 Hz (A)
6 WVDC at + 85 °C . . . 4 WVDC at + 125 °C						
6600.0	A1	200D668X0006A1	202D668X0006A1	0.28	2.3	1.13
8200.0	A2	200D828X0006A2	202D828X0006A2	0.22	1.8	1.41
9900.0	A3	200D998X0006A3	202D998X0006A3	0.18	1.5	1.67
12 000.0	B1	-	202D129X0006B1	0.11	0.90	2.54
13 000.0	A4	200D139X0006A4	202D139X0006A4	0.14	1.1	2.05
15 000.0	A5	-	202D159X0006A5	0.12	1.8	2.35
8 WVDC at + 85 °C . . . 5 WVDC at + 125 °C						
5400.0	A1	200D548X0008A1	202D548X0008A1	0.28	2.8	1.13
6800.0	A2	200D688X0008A2	202D688X0008A2	0.22	2.2	1.41
8200.0	A3	200D828X0008A3	202D828X0008A3	0.18	1.8	1.67
9600.0	B1	-	202D968X0008B1	0.12	1.8	2.54
11000.0	A4	200D119X0008A4	202D119X0008A4	0.14	1.4	2.05
12 000.0	B2	-	202D129X0008B2	0.086	1.3	2.99
14 000.0	A5	200D149X0008A5	202D149X0008A5	0.11	1.1	2.35
10 WVDC at + 85 °C . . . 7 WVDC at + 125 °C						
4500.0	A1	200D458X0010A1	202D458X0010A1	0.28	3.4	1.13
5600.0	A2	200D568X0010A2	202D568X0010A2	0.22	2.7	1.41
6800.0	A3	200D688X0010A3	202D688X0010A3	0.18	2.2	1.67
9000.0	A4	200D908X0010A4	202D908X0010A4	0.14	1.7	2.05
9600.0	B1	-	202D968X0010B1	0.12	1.8	2.54
11 000.0	A5	200D119X0010A5	202D119X0010A5	0.11	1.4	2.35
15 WVDC at + 85 °C . . . 10 WVDC at + 125 °C						
3100.0	A1	200D318X0015A1	202D318X0015A1	0.28	3.9	1.13
3900.0	A2	200D398X0015A2	202D398X0015A2	0.22	3.1	1.41
4700.0	A3	200D478X0015A3	202D478X0015A3	0.18	2.6	1.67
6200.0	A4	200D628X0015A4	202D628X0015A4	0.14	1.9	2.05
6560.0	B1	-	202D668X0015B1	0.16	2.2	2.03
7800.0	A5	200D788X0015A5	202D788X0015A5	0.11	1.6	2.54
20 WVDC at + 85 °C . . . 13 WVDC at + 125 °C						
2600.0	A1	200D268X0020A1	202D268X0020A1	0.28	3.9	1.13
3300.0	A2	200D338X0020A2	202D338X0020A2	0.22	3.1	1.41
4000.0	A3	200D408X0020A3	202D408X0020A3	0.18	2.6	1.67
5300.0	A4	200D538X0020A4	202D538X0020A4	0.14	1.9	2.05
6600.0	A5	200D668X0020A5	202D668X0020A5	0.11	1.6	2.54
25 WVDC at + 85 °C . . . 15 WVDC at + 125 °C						
2200.0	A1	200D228X0025A1	202D228X0025A1	0.28	4.1	1.13
2700.0	A2	200D278X0025A2	202D278X0025A2	0.22	3.3	1.41
3200.0	A3	200D328X0025A3	202D328X0025A3	0.18	2.8	1.67
4300.0	A4	200D438X0025A4	202D438X0025A4	0.14	2.1	2.05
5400.0	A5	200D548X0025A5	202D548X0025A5	0.11	1.7	2.54

Note

⁽¹⁾ The Part Numbers listed are for $\pm 20\%$ tolerance. To specify $\pm 10\%$ tolerance, change the digit following "X" from "0" to "9". For requirements or ratings other than those listed, please contact a Vishay representative.



Wet Tantalum Capacitors
Wet Sintered Anode TANTALEX[®] Components
TANTAPAK[®] Capacitor Assemblies

EXTENDED RATINGS						
CAPACITANCE (μ F)	CASE CODE	PART NUMBER (1) TYPE 200D	PART NUMBER (1) TYPE 202D	MAX. ESR at + 25 °C (Ω)	MAX. IMP. at - 55 °C (Ω)	MAX. RMS RIPPLE 120 Hz (A)
30 WVDC at + 85 °C . . . 20 WVDC at + 125 °C						
1800.0	A1	200D188X0030A1	202D188X0030A1	0.28	4.5	1.13
2200.0	A2	200D228X0030A2	202D228X0030A2	0.22	3.6	1.41
2600.0	A3	200D268X0030A3	202D268X0030A3	0.18	3.0	1.67
3500.0	A4	200D358X0030A4	202D358X0030A4	0.14	2.3	2.05
4400.0	A5	200D448X0030A5	202D448X0030A5	0.11	1.8	2.54
35 WVDC at + 85 °C . . . 22 WVDC at + 125 °C						
1400.0	A1	200D148X0035A1	202D148X0035A1	0.28	5.1	1.13
1800.0	A2	200D188X0035A2	202D188X0035A2	0.22	4.1	1.41
2200.0	A3	200D228X0035A3	202D228X0035A3	0.18	3.4	1.67
2900.0	A4	200D298X0035A4	202D298X0035A4	0.14	2.6	2.05
3600.0	A5	200D368X0035A5	202D368X0035A5	0.11	2.1	2.54
3900.0	B1	-	202D398X0035B1	0.16	2.7	2.03
5500.0	B2	-	202D558X0035B2	0.11	1.9	2.64
7000.0	B3	-	202D708X0035B3	0.089	1.5	3.16
8600.0	B4	-	202D868X0035B4	0.073	1.2	3.72
10 000.0	B5	-	202D109X0035B5	0.062	1.0	4.25
12 000.0	B6	-	202D129X0035B6	0.053	0.90	4.84
13 000.0	B7	-	202D139X0035B7	0.047	0.79	5.38
40 WVDC at + 85 °C . . . 25 WVDC at + 125 °C						
1200.0	A1	200D128X0040A1	202D128X0040A1	0.28	5.5	1.13
1500.0	A2	200D158X0040A2	202D158X0040A2	0.22	4.4	1.41
1800.0	A3	200D188X0040A3	202D188X0040A3	0.18	3.7	1.67
2400.0	A4	200D248X0040A4	202D248X0040A4	0.14	2.8	2.05
3000.0	A5	200D308X0040A5	202D308X0040A5	0.11	2.3	2.54
50 WVDC at + 85 °C . . . 35 WVDC at + 125 °C						
960.0	A1	200D967X0050A1	202D967X0050A1	0.28	6.1	1.13
1200.0	A2	200D128X0050A2	202D128X0050A2	0.22	4.9	1.14
1300.0	D3	-	202D138X0050D3	0.38	5.5	1.01
1400.0	A3	200D148X0050A3	202D148X0050A3	0.18	4.1	1.67
1900.0	A4	200D198X0050A4	202D198X0050A4	0.14	3.1	2.05
2400.0	A5	200D248X0050A5	202D248X0050A5	0.11	2.5	2.54
60 WVDC at + 85 °C . . . 40 WVDC at + 125 °C						
800.0	A1	200D807X0060A1	202D807X0060A1	0.28	6.8	1.13
1000.0	A2	200D108X0060A2	202D108X0060A2	0.22	5.4	1.41
1100.0	D3	-	202D118X0060D3	0.38	5.8	1.01
1200.0	A3	200D128X0060A3	202D128X0060A3	0.18	4.5	1.67
1600.0	A4	200D168X0060A4	202D168X0060A4	0.14	3.4	2.05
2000.0	A5	200D208X0060A5	202D208X0060A5	0.11	2.7	2.54
75 WVDC at + 85 °C . . . 50 WVDC at + 125 °C						
650.0	A1	200D657X0075A1	202D657X0075A1	0.28	7.9	1.13
820.0	A2	200D827X0075A2	202D827X0075A2	0.22	6.3	1.41
880.0	D3	-	202D887X0075D3	0.55	6.0	0.84
980.0	A3	200D987X0075A3	202D987X0075A3	0.18	5.2	1.64
1300.0	A4	200D138X0075A4	202D138X0075A4	0.14	3.9	2.05
1600.0	A5	200D168X0075A5	202D168X0075A5	0.11	3.2	2.54

Note

(1) The Part Numbers listed are for $\pm 20\%$ tolerance. To specify $\pm 10\%$ tolerance, change the digit following "X" from "0" to "9". For requirements or ratings other than those listed, please contact a Vishay representative.

Wet Tantalum Capacitors
Wet Sintered Anode TANTALEX[®] Components
TANTAPAK[®] Capacitor Assemblies

04021 RATINGS AND CASE CODES					
DSCC DRAWING 04021	CAPACITANCE (μ F)	CASE CODE	MAX. DCL μ A		MAX. IMPEDANCE Ω
			25 °C	85 °C and 125 °C	
15 VDC at 85 °C RATED		17.2 VDC at 85 °C SURGE		10 VDC at 125 °C DERATED	
04021-01	960	A1	7	58	3.10
04021-02	1200	A2	9	72	2.30
04021-03	1400	A3	11	84	1.70
04021-04	2100	A4	16	126	1.30
04021-05	2400	A5	18	144	1.15
30 VDC at 85 °C RATED		34.5 VDC at 85 °C SURGE		20 VDC at 125 °C DERATED	
04021-06	520	A1	8	63	5.30
04021-07	660	A2	10	80	4.20
04021-08	820	A3	13	99	2.90
04021-09	1200	A4	18	144	2.30
04021-10	1300	A5	20	156	2.10
50 VDC at 85 °C RATED		57.5 VDC at 85 °C SURGE		30 VDC at 125 °C DERATED	
04021-11	400	A1	10	80	7.20
04021-12	430	A1	10	78	6.40
04021-13	500	A2	13	100	5.60
04021-14	600	A3	15	120	4.10
04021-15	800	A4	20	160	3.10
04021-16	1000	A5	23	180	2.80
75 VDC at 85 °C RATED		86.2 VDC at 85 °C SURGE		50 VDC at 125 °C DERATED	
04021-17	270	A1	9	81	8.50
04021-18	330	A2	12	99	7.00
04021-19	400	A3	15	119	5.00
04021-20	600	A4	20	180	3.65
04021-21	660	A5	23	198	3.50
100 VDC at 85 °C RATED		115.0 VDC at 85 °C SURGE		65 VDC at 125 °C DERATED	
04021-22	170	A1	9	68	15.00
04021-23	220	A2	11	88	11.60
04021-24	260	A3	13	104	8.00
04021-25	350	A4	18	140	6.50
04021-26	440	A5	22	176	5.80
150 VDC at 85 °C RATED		172.0 VDC at 85 °C SURGE		100 VDC at 125 °C DERATED	
04021-27	70	A1	6	42	28.80
04021-28	90	A2	7	54	22.40
04021-29	100	A3	9	60	16.40
04021-30	140	A4	11	84	12.40
04021-31	180	A5	14	104	11.20

ORDERING INFORMATION - DSCC PART NUMBER

04021	-29
DSCC DRAWING NUMBER	DASH NUMBER

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	DRAWING NO. 04021
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Wet Tantalum Capacitors
Wet Sintered Anode TANTALEX® Components
TANTAPAK® Capacitor Assemblies

MILITARY SPECIFICATION TANTAPAK® CAPACITOR ASSEMBLIES - CROSS REFERENCE					
CAPACITANCE (μF)	RATED VOLTAGE at + 85 °C	CASE CODE	VISHAY PART NUMBER	(DISCONTINUED) CL55 TYPE (1) DESIGNATION	(NEW) DSCC DRAWING (1) 04021
960.0	15	A1	202D967X0015A1	CL55BE961MPG	04021-01
1200.0	15	A2	202D128X0015A2	CL55BE122MPG	04021-02
1400.0	15	A3	202D148X0015A3	CL55BE142MPG	04021-03
2100.0	15	A4	202D218X0015A4	CL55BE212MPG	04021-04
2400.0	15	A5	202D248X0015A5	CL55BE242MPG	04021-05
520.0	30	A1	202D527X0030A1	CL55BH521MPG	04021-06
660.0	30	A2	202D667X0030A2	CL55BH661MPG	04021-07
820.0	30	A3	202D827X0030A3	CL55BH821MPG	04021-08
1200.0	30	A4	202D128X0030A4	CL55BH122MPG	04021-09
1300.0	30	A5	202D138X0030A5	CL55BH132MPG	04021-10
400.0	50	A1	202D407X0050A1	CL55BJ401MPG	04021-11
430.0	50	A1	202D437X0050A1	CL55BJ431MPG	04021-12
500.0	50	A2	202D507X0050A2	CL55BJ501MPG	04021-13
600.0	50	A3	202D607X0050A3	CL55BJ601MPG	04021-14
800.0	50	A4	202D807X0050A4	CL55BJ801MPG	04021-15
1000.0	50	A5	202D108X0050A5	CL55BJ102MPG	04021-16
270.0	75	A1	202D277X0075A1	CL55BL271MPG	04021-17
330.0	75	A2	202D337X0075A2	CL55BL331MPG	04021-18
400.0	75	A3	202D407X0075A3	CL55BL401MPG	04021-19
600.0	75	A4	202D607X0075A4	CL55BL601MPG	04021-20
660.0	75	A5	202D667X0075A5	CL55BL661MPG	04021-21
170.0	100	A1	202D177X0100A1	CL55BN171MPG	04021-22
220.0	100	A2	202D227X0100A2	CL55BN221MPG	04021-23
260.0	100	A3	202D267X0100A3	CL55BN261MPG	04021-24
350.0	100	A4	202D357X0100A4	CL55BN351MPG	04021-25
440.0	100	A5	202D447X0100A5	CL55BN441MPG	04021-26
70.0	150	A1	202D706X0150A1	CL55BQ700MPG	04021-27
90.0	150	A2	202D906X0150A2	CL55BQ900MPG	04021-28
100.0	150	A3	202D107X0150A3	CL55BQ101MPG	04021-29
140.0	150	A4	202D147X0150A4	CL55BQ141MPG	04021-30
180.0	150	A5	202D187X0150A5	CL55BQ181MPG	04021-31

Note

(1) Vishay is no longer qualified to provide military CL55 type which has been discontinued.
It has been replaced by an equivalent product built to DSCC Drawing 04021

Type 211D Wet Tantalum Capacitor Array with Tantalum Cased Tantalum Internal Components for - 55 °C to + 125 °C Operation



FEATURES

Vishay 211D series was designed as an upgrade to the older and mature 200D and 202D Tantalpak® Capacitor assemblies. The 211D is constructed using tantalum capacitors, similar to the Vishay 135D series or the MIL-PRF-39006/22 or /25 styles. This enables the 211D to exhibit the improved performance characteristics of the tantalum-cased capacitors. Capable of withstanding 3.0 V reverse. The 211D has applicability in new designs when used for energy storage, filtering and similar functions.

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 125 °C

Capacitance Tolerance: At 120 Hz, + 25 °C, ± 20 %

Standard: ± 10 % available

DC Leakage Current (DCL maximum):

At + 25 °C: Leakage current shall not exceed the values listed in the Standard Ratings table.

Life Test: Capacitors shall withstand 2000 h at a temperature of + 85 °C or + 125 °C at the rated DC working voltage. Following the life test:

1. DCL shall not exceed the original requirement
2. ESR shall not exceed the original requirement
3. Capacitance shall not change more than ± 10 %

ORDERING INFORMATION				
<u>211D</u> MODEL	<u>228</u> CAPACITANCE	<u>X</u> CAPACITANCE TOLERANCE	<u>030</u> DC VOLTAGE RATING AT + 85 °C	<u>A5</u> CASE CODE
	This is expressed in picofarads. The first two digits are significant figures. The third is the number of zeros.	X0 = ± 20 % X9 = ± 10 %	This is expressed in volts. To complete the three digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V).	See dimensional configurations

DIMENSIONS		CASE CODE	H CASE HEIGHT
SERIES "A" CASE 	SERIES "B" CASE 		
		A1	1.062 [26.97]
		A2	1.375 [34.93]
		A3	1.625 [41.28]
		A4	2.000 [50.60]
		A5	2.500 [63.50]
		B1	1.500 [38.10]
		B2	1.875 [47.63]
		B3	2.250 [57.15]
		B4	2.625 [66.68]
		B5	3.000 [76.20]
		B6	3.375 [85.73]
		B7	3.750 [95.25]



STANDARD RATINGS							
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAXIMUM ESR AT + 25 °C (Ω)	MAXIMUM IMPEDANCE AT - 55 °C (Ω)	DCL AT + 25 °C (μ A)	DCL AT + 85 °C/ + 125 °C (μ A)	MAXIMUM RMS RIPPLE 40 kHz (A)
10 V_{DC} AT + 85 °C; 6.7 V_{DC} AT + 125 °C							
4500	B1	211D458X010B1	0.150	3.8	24	96	11
7500	B3	211D758X010B3	0.090	2.3	40	160	19
10 000	B5	211D109X010B5	0.063	1.64	56	224	26
14 000	B7	211D149X010B7	0.049	1.28	72	288	34
30 V_{DC} AT + 85 °C; 20 V_{DC} AT + 125 °C							
1200	A2	211D128X030A2	0.31	3.9	21	63	7.8
1300	A4	211D138X030A4	0.42	6.0	18	96	5.8
1800	A5	211D188X030A5	0.45	6.3	32	128	4.8
1800	B1	211D188X930B1	0.23	4.2	48	192	9.4
50 V_{DC} AT + 85 °C; 35 V_{DC} AT + 125 °C							
700	A4	211D707X050A4	0.23	8.2	24	144	5.8
1000	A5	211D108X050A5	0.51	7.3	27	108	4.6
3300	B5	211D338X050B5	0.150	2.2	90	360	15
5200	B6	211D528X050B6	0.096	1.38	144	576	24
5900	B7	211D598X050B7	0.085	1.22	162	648	27
75 V_{DC} AT + 85 °C; 50 V_{DC} AT + 125 °C							
120	A2	211D127X075A2	0.99	20	6	36	3.0
200	A4	211D207X075A4	0.67	15.0	6	60	2.4
220	A5	211D227X075A5	0.49	10.0	12	72	6.0
400	A3	211D407X075A3	0.50	13.0	20	120	4.0
480	A4	211D487X075A4	0.41	10.5	24	144	4.8
660	A5	211D667X075A5	0.60	8.0	30	120	4.3
880	B2	211D887X075B2	0.180	3.6	72	288	12
1100	B3	211D118X075B3	0.150	2.9	90	360	15
4000	B7	211D408X075B7	0.100	1.33	180	720	26
100 V_{DC} AT + 85 °C; 70 V_{DC} AT + 125 °C							
540	A5	211D547X0100A5	0.25	5.7	70	336	15
1200	B3	211D128X0100B3	0.28	3.0	120	480	16
1600	B7	211D168X0100B7	0.085	1.66	162	648	26
125 V_{DC} AT + 85 °C; 80 V_{DC} AT + 125 °C							
380	A5	211D387X0125A5	0.25	6.4	70	336	13
1100	B5	211D118X0125B5	0.20	2.3	168	672	21
1400	B7	211D148X0125B7	0.160	1.78	216	864	27
150 V_{DC} AT + 85 °C; 100 V_{DC} AT + 125 °C							
70	A2	211D706X0150A2	1.90	45	4	40	2.9
550	B3	211D118X0150B3	0.32	4.8	50	200	7

Note

- Other ratings are available. Contact factory with your specific requirements.



Tantalum-Cased-Tantalum Sintered Anode TANTALEX[®] Capacitors for Operation to + 125 °C



FEATURES

- High ripple current capability
- Extended temperature range
- Very low impedances over wide frequency ranges
- Long history of reliable operation

Type 285D capacitors are commercial replacements for Military Style M39006/01, 02, 03, 04, 16, 17 and are designed to meet the performance requirements of Military Specification MIL-C-39006. Internal cells are M39006/22 and M39006/25.

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 85 °C
(To + 125 °C with voltage derating)

Capacitance Tolerance: At 120 Hz, + 25 °C. ± 20 % standard, ± 10 %, ± 5 % available as special

DC Leakage Current (DCL Max.):
At + 25 °C, + 85 °C, + 125 °C: Leakage current shall not exceed the values listed in the Standard Ratings Tables

Life Test: Capacitors are capable of withstanding a 2000 h life test at a temperature of + 85 °C or + 125 °C at the applicable DC working voltage.

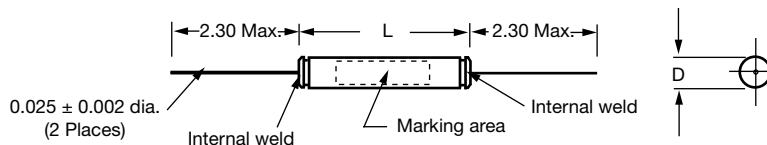
Following the life test:

1. DCL shall not exceed the initial requirement.
2. Dissipation factor shall meet the initial requirement.
3. Change in capacitance shall not exceed 10 % from the initial measurement. For capacitors with voltage ratings of 15 V_{DC} and below, change in capacitance shall not exceed + 10 %, - 25 % from the initial measurement.

ORDERING INFORMATION						
285D	126	X0	250	B	0	
MODEL	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	CASE CODE	STYLE NUMBER	POLARITY
	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow.	X0 = ± 20 % X9 = ± 10 %	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating.	See Ratings and Case Codes table	0 = No outer tube 2 = Outer polyester-film insulation	P = Polar N = Non Polar

DIMENSIONS in inches [millimeters]

Case material: Aluminum
Case neutral



CASE CODE	BARE CASE		WITH INSULATION SLEEVE	
	D ± 0.010	L ± 0.062	D (MAX.)	L
A	0.385	1.850	0.406	(Sleeve will extend over both ends of the case)
B	0.385	2.250	0.406	
C	0.385	2.700	0.406	
D	0.385	3.000	0.406	
E	0.478	1.950	0.500	
F	0.478	2.380	0.500	
G	0.478	3.060	0.500	
H	0.478	3.500	0.500	



STANDARD RATINGS POLAR CAPACITORS												
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	DC LEAKAGE (μ A)			Z MAX. IMPEDANCE AT - 55 °C 120 Hz (Ω)	CAPACITANCE CHANGE (%)			DF (%)	RIPPLE CURRENT ⁽¹⁾ (mA)	
			25 °C	85 °C	125 °C		- 55 °C	85 °C	125 °C			
150 V_{DC} AT 85 °C; 100 V_{DC} AT + 125 °C												
55	B	285D556(1)150B(2)P	2	10	10	48	- 35	6	10	10	1650	
200 V_{DC} AT 85 °C; 135 V_{DC} AT + 125 °C												
1.5	A	285D155(1)200A(2)P	1	2	2	1420	- 16	7	8	3	400	
2.3	A	285D235(1)200A(2)P	1	2	2	995	- 16	7	8	3	565	
11	B	285D116(1)200B(2)P	1	9	9	200	- 16	8	8	8	970	
21	F	285D216(1)200F(2)P	2	17	17	140	- 20	8	8	8.5	1335	
43	G	285D436(1)200G(2)P	9	36	36	60	- 25	15	15	10	1800	
250 V_{DC} AT 85 °C; 165 V_{DC} AT + 125 °C												
1.8	A	285D185(1)250A(2)P	1	2	2	1200	- 16	7	8	3	520	
3.4	B	285D345(1)250B(2)P	3	12	12	600	- 14	10	12	6	700	
13	B	285D136(1)250B(2)P	5	24	24	180	- 18	12	15	7.2	1200	
23	F	285D236(1)250F(2)P	10	40	40	100	- 26	14	16	8	1500	
41	G	285D416(1)250G(2)P	12	48	48	64	- 30	15	17	17.4	1900	
300 V_{DC} AT 85 °C; 200 V_{DC} AT + 125 °C												
1.0	C	285D105(1)300C(2)P	1	2	2	2130	- 16	7	8	2.8	400	
13	D	285D136(1)300D(2)P	5	24	24	240	- 20	12	15	10	1300	
14	H	285D146(1)300H(2)P	2	17	17	210	- 20	8	8	8.5	1335	

Notes

- Part number definitions:
 - Capacitance tolerance:
 - X0 = 20 %
 - X9 = 10 %
 - Style number or case insulation:
 - 0 = No insulation,
 - 2 = Polyester film insulation
- Ripple current is at 40 kHz and is govern by the ripple current multipliers associated with MIL-PRF-39006/22 and MIL-PRF-39006/25. All capacitance, DF and Z measurements are based on 120 Hz frequency and equivalent series circuit measuring equipment settings. Other ratings are available. Contact factory with inquiry.



STANDARD RATINGS NON-POLAR CAPACITORS											
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	DC LEAKAGE (μ A)			Z MAX. IMPEDANCE AT - 55 °C 120 Hz (Ω)	CAPACITANCE CHANGE (%)			DF (%)	RIPPLE CURRENT ⁽¹⁾ (mA)
			25 °C	85 °C	125 °C		- 55 °C	85 °C	125 °C		
6 V _{DC} AT 85 °C; 4 V _{DC} AT + 125 °C											
410	B	285D417(1)006B(2)N	3	14	14	36	- 88	16	20	155	1500
15 V _{DC} AT 85 °C; 10 V _{DC} AT + 125 °C											
410	F	285D417(1)015F(2)N	6	24	24	44	- 77	20	25	3.6	1800
25 V _{DC} AT 85 °C; 15 V _{DC} AT + 125 °C											
34	A	285D346(1)025A(2)N	2	9	9	180	- 40	12	15	22	850
135	B	285D147(1)025B(2)N	3	16	16	66	- 62	13	16	55	1400
30 V _{DC} AT 85 °C; 20 V _{DC} AT + 125 °C											
58	A	285D586(1)030A(2)N	1	5	5	60	- 38	8	12	12	1200
235	B	285D247(1)030B(2)N	2	10	10	30	- 65	10	18	30	1800
50 V _{DC} AT 85 °C; 30 V _{DC} AT + 125 °C											
34	A	285D346(1)050A(2)N	1	5	5	66	- 25	8	15	7.6	1050
60	B	285D606(1)050B(2)N	4	24	24	98	- 42	12	15	23	1200
235	F	285D247(1)050F(2)N	3	25	25	20	- 45	8	15	31	2100
340	G	285D347(1)050G(2)N	5	40	40	16	- 58	10	20	35	2750
75 V _{DC} AT 85 °C; 50 V _{DC} AT + 125 °C											
11	A	285D116(1)075A(2)N	3	12	12	314	- 19	10	12	8.5	600
41	B	285D416(1)075B(2)N	4	24	24	126	- 30	12	15	15.2	1000
55	G	285D556(1)075G(2)N	9	36	36	58	- 35	20	20	12	1850
100 V _{DC} AT 85 °C; 65 V _{DC} AT + 125 °C											
5	A	285D504(1)100A(2)N	3	12	12	400	- 35	16	20	4.5	800
11	B	285D116(1)100B(2)N	1	9	9	200	- 16	8	8	7.5	965
15	F	285D156(1)100F(2)N	2	12	12	160	- 16	8	8	7	1240
125 V _{DC} AT 85 °C; 87 V _{DC} AT + 125 °C											
1.8	A	285D185(1)125A(2)N	1	2	2	1200	- 16	7	8	2.7	520
7.0	B	285D705(1)125B(2)N	1	7	7	334	- 16	7	8	6	860
23.5	F	285D246(1)125F(2)N	10	40	40	100	- 26	14	16	7.9	1200
28	G	285D286(1)125G(2)N	10	40	40	64	- 25	15	15	6.5	1800
150 V _{DC} AT 85 °C; 100 V _{DC} AT + 125 °C											
8.3	E	285D835(1)150E(2)N	1	5	5	264	- 25	5	9	10	1050
200 V _{DC} AT 85 °C; 150 V _{DC} AT + 125 °C											
1.2	E	285D125(1)200E(2)N	1	2	2	2260	- 16	7	8	3	600
250 V _{DC} AT 85 °C; 165 V _{DC} AT + 125 °C											
1.7	E	285D175(1)250E(2)N	3	12	12	1200	- 14	10	12	6	700

Notes

- Part number definitions:
 - (1) Capacitance tolerance:
 - X0 = 20 %
 - X9 = 10 %
 - (2) Style number or case insulation:
 - 0 = No insulation,
 - 2 = Polyester film insulation
- (1) Ripple current is at 40 kHz and is govern by the ripple current multipliers associated with MIL-PRF-39006/22 and MIL-PRF-39006/25. All capacitance, DF and Z measurements are based on 120 Hz frequency and equivalent series circuit measuring equipment settings. Other ratings are available. Contact factory with inquiry.

Wet Tantalum Capacitor, Assembly or Array, All-Tantalum Case, - 55 °C to 125 °C Operation



INTRODUCTION

The module series of capacitors comprise five individual button units which are connected in parallel to give a very high capacitance.

The epoxy resin encapsulation within an epoxy resin box, measuring approx. 50 mm x 50 mm x 10 mm gives an extremely robust construction which lends itself to bank mounting.

The MC module incorporated CA2 or CE2 style buttons. These button capacitor styles are of all-tantalum construction using a tantalum anode and tantalum cathode with a non-solid electrolyte. This well-proven construction with its highly efficient seal combined with the resin encapsulation gives an extremely robust module of long life and high reliability under military and avionic environments with the capability of withstanding 3 V in reverse, and of handling high levels of ripple current.

APPLICATIONS

These units are designed for use in general military, space avionics and professional applications. For example: Power supply smoothing, filter network, timer functions.

WEIGHT

The approximate weight of a module is 130 g.

FEATURES

- All-Tantalum electrodes eliminate silver migration
- Withstands high ripple current
- Long life reliability
- Reverse voltage capability
- Stackable
- Mounting: Solder tag

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 125 °C

Voltage Range: 6 V_{DC} to 125 V_{DC}

Capacitance Range: 235 µF to 9100 µF

SPECIFICATIONS

Environmental classification: 55/125/56

Vibration: 10 Hz to 2000 Hz, 0.75 mm or 99 m/s², 30 h

Bump: 320 m/s², 4000 bumps

Shock: -

Acceleration: -

Low air pressure: 1 kPa

REVERSE VOLTAGE CAPABILITY

Module units are polar capacitors which allow the application of reverse potentials not exceeding 3 V at temperatures up to 125 °C.

SURGE VOLTAGE

The surge voltage capability is 115 % of the voltage rating at the relevant temperature.

TEMPERATURE RANGE

The capacitor is designed for operation between - 55 °C and + 125 °C, with linear voltage derating above + 85 °C to 66 % of the rated voltage at + 125 °C.

CAPACITANCE TOLERANCE

The standard capacitance tolerance is ± 20 % although special tolerances are available by arrangement.

APPLICATION INFORMATION

Capacitors may be operated at less than the rated voltage, resulting in significantly reduced leakage current values.

In timing circuits, or other applications where the device is subjected only to a DC voltage, the ballistic or DC capacitance will be somewhat larger than measured at 50 Hz.

The parametric information must necessarily be brief, although additional comprehensive data is available on request, and the tests tailored to customers' requirements can be made.

RELIABILITY

All capacitors are subjected to burn-in. This is to remove infant mortalities and ensure reliability. The capacitor lifetime is enhanced when the unit is subjected to a reduced ripple current, a low ambient temperature, and is externally cooled. The use of a heat sink is recommended.

STACKING

The units are suitable for stacking by use of through bolts. It is strongly recommended that a metal heat sink is used between each unit in order to eliminate the possibility of hot spots.

ESTABLISHED FAILURE RATE

The MT range incorporates 735D capacitors which are structurally similar to and subjected to the same processes as our 135D and MIL-PRF-39006 range which is to an established failure rate of level R, 0.01 % per 1000 h at a 60 % confidence level. The CECC system of testing does not readily yield data to prove these levels, but in-house testing supports this figure.

Although failure rates derived from life tests are a useful guide, in practice capacitors rarely see conditions of a steady DC voltage and temperature. The construction of the MT module gives an ability to handle the high ripple currents at high frequencies, reverse voltages up to 3 V, and extremes of temperature likely to be encountered in modern circuitry.

ALTERNATIVE CONSTRUCTION

Alternative constructions based on the module range with differing terminal configurations and capacitor combinations including series connected units are available.

ORDERING PROCEDURE

Example: MC2D (910 μ F, 75 V_{DC})

Vishay Part Number: MC2D917M075S

ORDERING INFORMATION						
MC2 MODEL	D CASE CODE	917 CAPACITANCE	M TOLERANCE	075 VOLTAGE	S TERMINATION AND PACKAGING	-
	See Ratings and Case Codes Table	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow	M = 20 % (std) K = 10 % (special order)	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	S = Standard	Blank = Standard (tin/lead coating) E3 = RoHS compliant (100 % tin coating)

DIMENSIONS in millimeters						
MC2 styles						
A max.	B max.	C crs.	D crs.	E dia.	H min.	H max.
51.2	11.3	19.0	38.1	4.8	2.41	2.56



STANDARD RATINGS										
VISHAY PART NUMBERS	CASE CODE	CAPACITANCE AT 50 Hz (μ F)	DISSIPATION FACTOR AT		MAX. ESR AT 25 °C	MAX. ESR AT - 55 °C	MAX. DC AT 25 °C	MAX. DC AT 125 °C	Δ C AT 50 Hz	
			50 Hz	50 Hz	100 kHz	100 kHz	(μ A)	(μ A)	(%)	(%)
			25 °C	125 °C	(Ω)	(Ω)			- 55 °C	125 °C
6 V_{DC} AT 85 °C; 4 V_{DC} AT 125 °C										
MC2D608M006S	D	6000	75.0	95.0	0.6	3	75	250	- 80.0	25.0
6.3 V_{DC} AT 85 °C; 4 V_{DC} AT 125 °C										
MC2D918M6R3S	D	9100	85.0	108.0	0.6	9	75	250	- 80.0	30.0
MC2D758M6R3S	D	7500	80.0	101.0	0.6	9	75	250	- 80.0	30.0
8 V_{DC} AT 85 °C; 5.3 V_{DC} AT 125 °C										
MC2D508M008S	D	5000	65.0	85.0	0.6	3	50	250	- 75.0	25.0
10 V_{DC} AT 85 °C; 6.6 V_{DC} AT 125 °C										
MC2D628M010S	D	6200	75.0	95.0	0.6	9	75	250	- 80.0	30.0
MC2D518M010S	D	5100	65.0	83.0	0.6	9	50	250	- 80.0	30.0
MC2D418M010S	D	4100	55.0	70.0	0.6	3	50	250	- 70.0	20.0
15 V_{DC} AT 85 °C; 10 V_{DC} AT 125 °C										
MC2D348M015S	D	3400	45.0	55.0	0.6	3	40	250	- 65.0	20.0
16 V_{DC} AT 85 °C; 10 V_{DC} AT 125 °C										
MC2D398M016S	D	3900	60.0	76.0	0.6	9	50	250	- 75.0	25.0
MC2D338M016S	D	3300	45.0	57.0	0.6	9	40	250	- 70.0	25.0
20 V_{DC} AT 85 °C; 13.4 V_{DC} AT 125 °C										
MC2D288M020S	D	2800	35.0	45.0	0.6	3	25	250	- 60.0	15.0
MC2D248M020S	D	2350	30.0	40.0	0.6	3	25	250	- 55.0	15.0
MC2D208M020S	D	1950	25.0	30.0	0.6	3	25	250	- 50.0	15.0
25 V_{DC} AT 85 °C; 16 V_{DC} AT 125 °C										
MC2D278M025S	D	2700	40.0	50.0	0.6	9	25	250	- 65.0	20.0
MC2D248M025S	D	2400	35.0	44.0	0.6	9	25	250	- 60.0	20.0
30 V_{DC} AT 85 °C; 20 V_{DC} AT 125 °C										
MC2D178M030S	D	1650	20.0	25.0	0.6	3	25	250	- 50.0	10.0
MC2D148M030S	D	1350	17.0	20.0	0.6	3	25	250	- 45.0	10.0
40 V_{DC} AT 85 °C; 25 V_{DC} AT 125 °C										
MC2D208M040S	D	2000	30.0	38.0	0.6	9	25	250	- 55.0	20.0
MC2D168M040S	D	1600	22.0	28.0	0.6	9	25	250	- 50.0	12.5
MC2D138M040S	D	1300	18.0	23.0	0.6	9	25	250	- 50.0	12.5
50 V_{DC} AT 85 °C; 33.3 V_{DC} AT 125 °C										
MC2D118M050S	D	1100	14.0	18.0	0.6	3	15	250	- 40.0	10.0
MC2D907M050S	D	900	11.5	15.0	0.6	3	15	250	- 35.0	10.0
MC2D757M050S	D	750	9.5	12.0	0.6	3	15	250	- 30.0	10.0
63 V_{DC} AT 85 °C; 40 V_{DC} AT 125 °C										
MC2D118M063S	D	1100	15.0	19.0	0.6	9	20	250	- 45.0	12.5
75 V_{DC} AT 85 °C; 50 V_{DC} AT 125 °C										
MC2D917M075S	D	910	13.0	16.5	0.6	9	20	250	- 40.0	12.5
MC2D757M075S	D	750	11.0	14.0	0.6	9	20	250	- 35.0	12.5
MC2D607M075S	D	600	7.5	10.0	0.6	3	15	250	- 25.0	7.5
MC2D507M075S	D	500	7.0	9.0	0.6	3	15	250	- 20.0	7.5
MC2D417M075S	D	410	5.5	7.0	0.6	3	15	250	- 17.5	7.5
100 V_{DC} AT 85 °C; 66.7 V_{DC} AT 125 °C										
MC2D627M100S	D	620	9.0	11.0	0.6	9	20	250	- 28.0	10.0
MC2D477M100S	D	470	7.5	9.5	0.6	9	20	250	- 22.0	10.0
MC2D287M100S	D	280	3.5	4.5	0.6	3	15	250	- 12.5	7.5
125 V_{DC} AT 85 °C; 83.3 V_{DC} AT 125 °C										
MC2D397M125S	D	390	7.0	9.0	0.6	9	20	250	- 20.0	10.0
MC2D247M125S	D	235	3.0	4.0	0.6	3	15	250	- 10.0	7.5

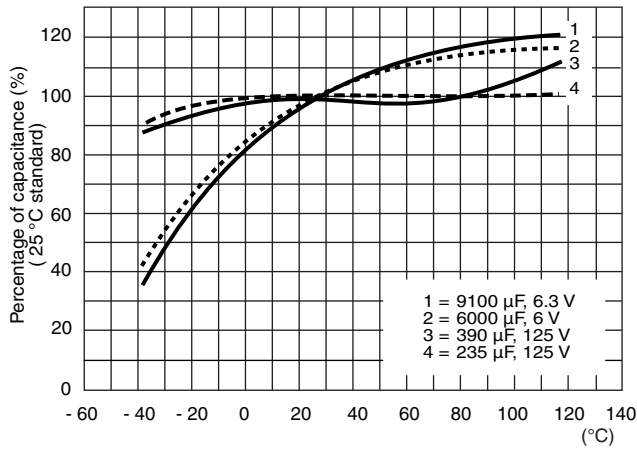
Notes

- Capacitance tolerance:
M= 20 % standard
K= 10 % special order
- Termination type:
S= Standard

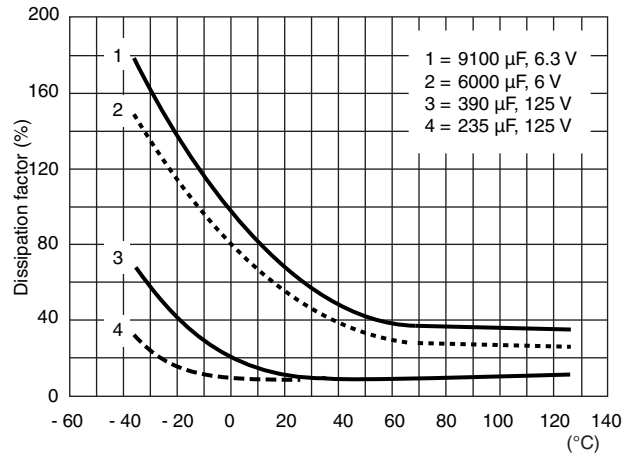


PERFORMANCE CURVES

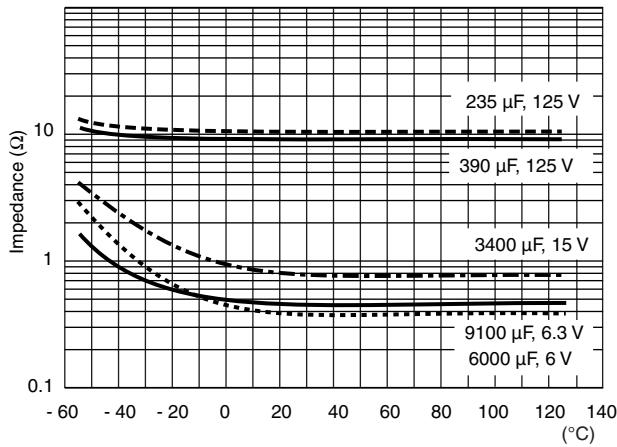
Capacitance/temperature at 50 Hz



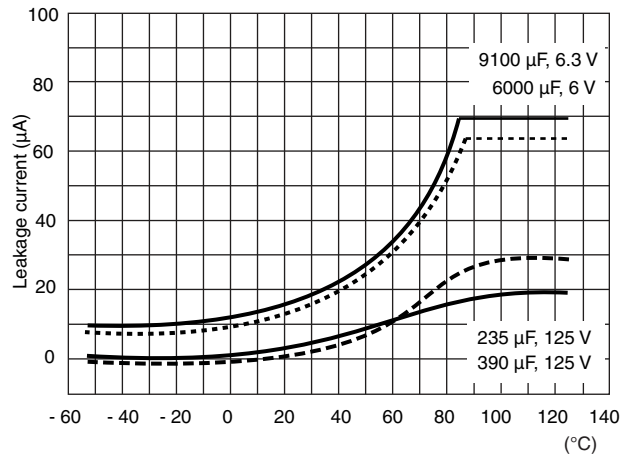
Dissipation factor/temperature at 50 Hz



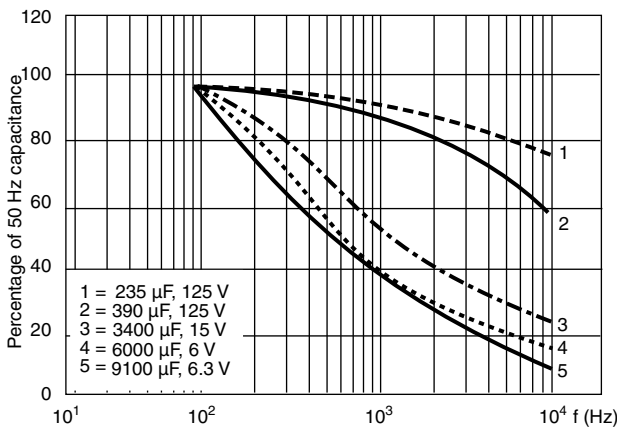
Impedance/temperature at 50 Hz



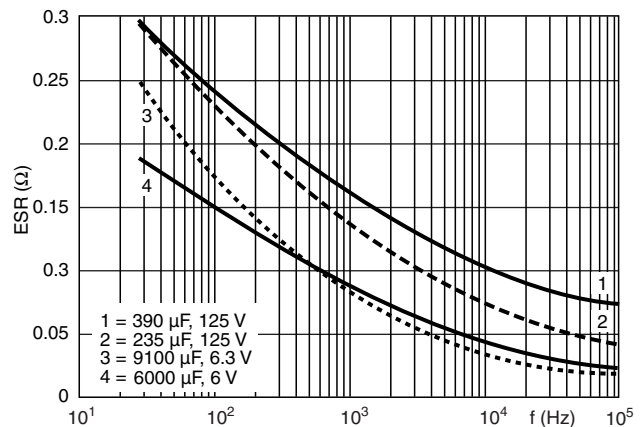
Leakage current/temperature at maximum voltage



Capacitance/frequency at 25 °C

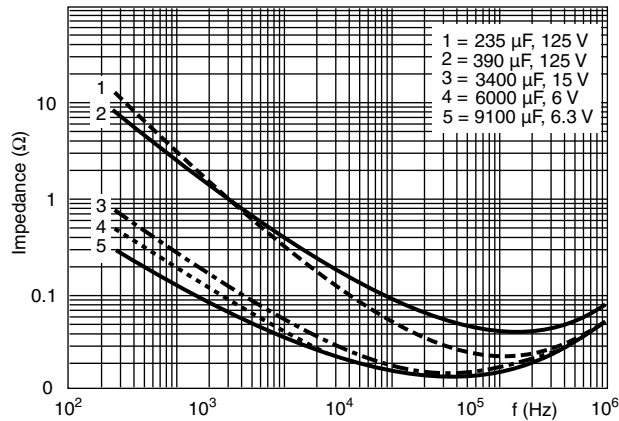


ESR/frequency at 25 °C



PERFORMANCE CURVES

Impedance/frequency at 25 °C


Note

- All performance curves are provided from historic Arcotronics module series M/ME datasheet information

CROSS REFERENCE

VISHAY PART NUMBER	ARCOTRONICS PART NUMBER	KEMET PART NUMBER
MC2D397M125S	402/1/50165/023	T298E397M125AU
MC2D247M125S	402/1/50165/003	T298M237M125AU
MC2D627M100S	402/1/50165/025	T298E627M100AU
MC2D477M100S	402/1/50165/024	T298E477M100AU
MC2D287M100S	402/1/50165/004	T298M287M100AU
MC2D917M075S	402/1/50165/027	T298E917M075AU
MC2D757M075S	402/1/50165/026	T298E757M075AU
MC2D607M075S	402/1/50165/008	T298M607M075AU
MC2D507M075S	402/1/50165/007	T298M507M075AU
MC2D417M075S	402/1/50165/006	T298M417M075AU
MC2D118M063S	402/1/50165/028	T298E118M063AU
MC2D118M050S	402/1/50165/011	T298M118M050AU
MC2D907M050S	402/1/50165/010	T298M907M050AU
MC2D757M050S	402/1/50165/009	T298M757M050AU
MC2D208M040S	402/1/50165/031	T298E208M040AU
MC2D168M040S	402/1/50165/030	T298E168M040AU
MC2D138M040S	402/1/50165/029	T298E138M040AU
MC2D178M030S	402/1/50165/013	T298M168M030AU
MC2D148M030S	402/1/50165/012	T298M138M030AU
MC2D278M025S	402/1/50165/033	T298E278M025AU
MC2D248M025S	402/1/50165/032	T298E248M025AU
MC2D288M020S	402/1/50165/016	T298M288M020AU
MC2D248M020S	402/1/50165/015	T298M238M020AU
MC2D208M020S	402/1/50165/014	T298M198M020AU
MC2D398M016S	402/1/50165/035	T298E398M016AU
MC2D338M016S	402/1/50165/034	T298E338M016AU
MC2D348M015S	402/1/50165/017	T298M348M015AU
MC2D628M010S	402/1/50165/037	T298E628M010AU
MC2D518M010S	402/1/50165/036	T298E518M010AU
MC2D418M010S	402/1/50165/018	T298M418M010AU
MC2D508M008S	402/1/50165/019	T298M508M008AU
MC2D918M6R3S	402/1/50165/039	T298E918M006AU
MC2D758M6R3S	402/1/50165/038	T298E758M006AU
MC2D608M006S	402/1/50165/020	T298M608M006AU

Wet Tantalum Capacitor, Assembly or Array, All-Tantalum Case, - 55 °C to + 125 °C Operation



INTRODUCTION

By use of the latest techniques of manufacture, Vishay is able to offer a new range of modules giving a size and weight advantage over the well proven MC range while still retaining a very high CV rating.

The MT2 series is an epoxy resin encapsulation of hermetically sealed units to give a robust construction of long life and high reliability under military and avionic environments.

In common with all Castanet capacitors of the “all-tantalum” construction they are capable of withstanding 3 V in reverse, and of handling high levels of ripple current.

The modules incorporate parallel connected 735D series, tubular “all-tantalum” construction capacitors already fully tested to the requirements of BS CECC 30 202 001.

Mounting is by bolting through two 3 mm clearance holes, and the units are stackable.

Metal heatsinks between the modules are recommended if the units are stacked.

APPLICATIONS

The MT2 is ideal for use in military and professional applications, including power supply “smoothing”, filter networks, and timer functions.

WEIGHT

The approximate weight of a module is 65 g.

FEATURES

- High volumetric efficiency
- Withstands high ripple current
- Long life reliability
- Reverse voltage capability
- Stackable
- No silver migration problems
- Mounting: Solder tag

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 125 °C

Voltage Range: 6 V_{DC} to 125 V_{DC}

Capacitance Range: 220 µF to 6000 µF

SPECIFICATIONS

Environmental classification: -

Vibration: -

Bump: -

Shock: -

Acceleration: -

Low air pressure: -

APPROVALS

These capacitors are available released to:

- BS CECC 30 202 009

REVERSE VOLTAGE CAPABILITY

The MT2 series employ tantalum cathodes which allow the continuous application of reverse potentials not exceeding 3 V over the whole temperature range.

SURGE VOLTAGE

The surge voltage capability is 115 % of the voltage rating at the relevant temperature.

TEMPERATURE RANGE

The capacitor is designed for operation between - 55 °C and + 125 °C, with linear voltage derating above + 85 °C to 66 % of the rated voltage at + 125 °C.

CAPACITANCE TOLERANCE

The standard capacitance tolerance is ± 20 % although special tolerances are available by arrangement.

APPLICATION INFORMATION

Capacitors may be operated at less than the rated voltage, resulting in significantly reduced leakage current values.

In timing circuits, or other applications where the device is subjected only to a DC voltage, the ballistic or DC capacitance will be somewhat larger than measured at 50 Hz.

The parametric information must necessarily be brief, although additional comprehensive data is available on request, and the tests tailored to customers' requirements can be made.

RELIABILITY

All capacitors are subjected to burn-in. This is to remove infant mortalities and ensure reliability. The capacitor lifetime is enhanced when the unit is subjected to a reduced ripple current, a low ambient temperature, and is externally cooled. The use of a heat sink is recommended.

STACKING

The units are suitable for stacking by use of through bolts. It is strongly recommended that a metal heat sink is used between each unit in order to eliminate the possibility of hot spots.

ESTABLISHED FAILURE RATE

The MT range incorporates 735D capacitors which are structurally similar to and subjected to the same processes as our 135D and MIL-PRF-39006 range which is to an established failure rate of level R, 0.01 % per 1000 h at a 60 % confidence level. The CECC system of testing does not readily yield data to prove these levels, but in-house testing supports this figure.

Although failure rates derived from life tests are a useful guide, in practice capacitors rarely see conditions of a steady DC voltage and temperature. The construction of the MT module gives an ability to handle the high ripple currents at high frequencies, reverse voltages up to 3 V, and extremes of temperature likely to be encountered in modern circuitry.

ALTERNATIVE CONSTRUCTION

Alternative constructions based on the module range with differing terminal configurations and capacitor combinations including series connected units are available.

ORDERING PROCEDURE

Example: MT2B (300 μ F, 100 V_{DC})

Vishay Part Number: MT2B307M100S

ORDERING INFORMATION						
MT2	B	307	M	100	S	-
MODEL	CASE CODE	CAPACITANCE	TOLERANCE	VOLTAGE	TERMINATION AND PACKAGING	
See Ratings and Case Codes Table	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow	M = 20 % (std) K = 10 % (special order)	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	S = Standard (center, 2 terminals)	Blank = Standard (tin/lead coating) E3 = RoHS compliant (100 % tin coating)	

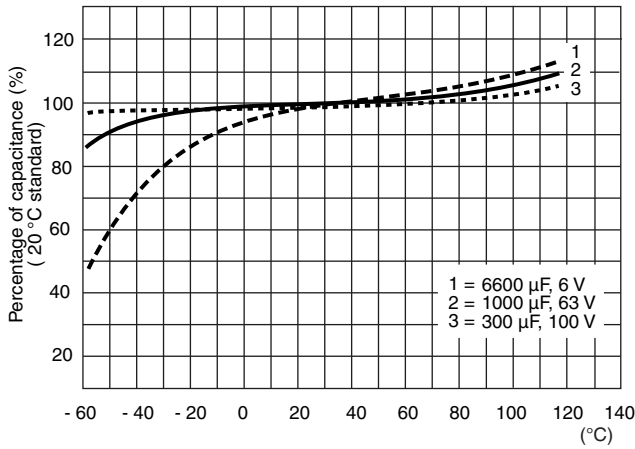
DIMENSIONS in millimeters						
MT2 styles						
	A	B	C	D	E	F
Max.	42.4	31.4	11.3	35.2	24.2	3.32
Min.	41.6	30.6	-	34.8	23.8	3.20



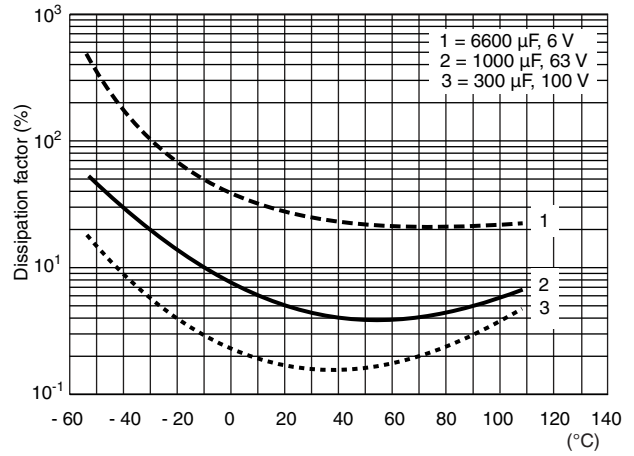
STANDARD RATINGS											
VISHAY PART NUMBERS	CASE CODE	CAPACITANCE AT 100 Hz (μF)	DISSIPATION FACTOR AT 100 Hz (%)			MAX. ESR AT 100 kHz (Ω)	MAX. DCL (μA)			ΔC AT 50 Hz (%)	
			20 °C	125 °C	- 55 °C		20 °C	85 °C/125 °C	- 55 °C	85 °C	125 °C
			6 V _{DC} AT 85 °C; 4 V _{DC} AT 125 °C								
MT2B608M006S	B	6000	170	170	22	18	54	- 90	25	25	
6.3 V _{DC} AT 85 °C; 4 V _{DC} AT 125 °C											
MT2B568M6R3S	B	5600	170	170	22	18	54	- 90	25	25	
8 V _{DC} AT 85 °C; 5 V _{DC} AT 125 °C											
MT2B508M008S	B	5000	138	138	24	21	75	- 88	25	25	
10 V _{DC} AT 85 °C; 7 V _{DC} AT 125 °C											
MT2B398M010S	B	3900	114	114	23	21	75	- 88	25	25	
MT2B418M010S	B	4100	114	114	23	21	75	- 88	25	25	
MT2B478M010S	B	4700	114	114	23	21	75	- 88	25	25	
MT2B518M010S	B	5100	138	138	24	21	75	- 88	25	25	
15 V _{DC} AT 85 °C; 10 V _{DC} AT 125 °C											
MT2B348M015S	B	3400	103	103	25	24	96	- 84	25	25	
16 V _{DC} AT 85 °C; 10 V _{DC} AT 125 °C											
MT2B338M016S	B	3300	103	103	25	24	96	- 84	25	25	
20 V _{DC} AT 85 °C; 13 V _{DC} AT 125 °C											
MT2B248M020S	B	2350	60	60	24	24	96	- 80	25	25	
MT2B278M020S	B	2700	95	95	26	24	96	- 80	25	25	
MT2B268M020S	B	2600	95	95	26	24	96	- 80	25	25	
25 V _{DC} AT 85 °C; 16 V _{DC} AT 125 °C											
MT2B158M025S	B	1500	60	60	24	24	96	- 80	25	25	
MT2B168M025S	B	1600	60	60	24	24	96	- 80	25	25	
MT2B208M025S	B	1950	60	60	24	24	96	- 80	25	25	
MT2B228M025S	B	2200	60	60	24	24	96	- 80	25	25	
MT2B248M025S	B	2400	95	95	26	24	96	- 80	25	25	
30 V _{DC} AT 85 °C; 20 V _{DC} AT 125 °C											
MT2B148M030S	B	1350	45	45	30	27	108	- 80	25	25	
MT2B178M030S	B	1650	40	40	30	27	108	- 80	25	25	
40 V _{DC} AT 85 °C; 25 V _{DC} AT 125 °C											
MT2B128M040S	B	1200	43	43	30	24	96	- 75	25	25	
MT2B138M040S	B	1300	45	45	30	27	108	- 80	25	25	
50 V _{DC} AT 85 °C; 30 V _{DC} AT 125 °C											
MT2B907M050S	B	900	40	40	33	27	108	- 70	25	25	
MT2B118M050S	B	1100	40	40	30	27	108	- 70	25	25	
63 V _{DC} AT 85 °C; 40 V _{DC} AT 125 °C											
MT2B757M063S	B	750	40	40	33	27	108	- 70	24	25	
MT2B827M063S	B	820	40	40	33	27	108	- 70	24	25	
MT2B108M063S	B	1000	32	32	31	30	120	- 72	25	25	
75 V _{DC} AT 85 °C; 50 V _{DC} AT 125 °C											
MT2B337M075S	B	330	11	13	29	9	72	- 35	20	20	
MT2B347M075S	B	340	11	13	29	9	72	- 35	20	20	
MT2B397M075S	B	390	12	13	28	9	72	- 36	20	20	
MT2B417M075S	B	410	17	18	30	27	108	- 48	21	22	
MT2B477M075S	B	470	17	18	30	27	108	- 48	21	22	
MT2B507M075S	B	500	17	18	30	27	108	- 48	21	22	
MT2B587M075S	B	580	37	37	32	30	120	- 60	22	22	
MT2B607M075S	B	600	37	37	32	30	120	- 60	22	22	
MT2B687M075S	B	680	37	37	32	30	120	- 60	22	22	
MT2B757M075S	B	750	40	40	33	30	120	- 68	24	25	
100 V _{DC} AT 85 °C; 65 V _{DC} AT 125 °C											
MT2B277M100S	B	270	10	12	30	9	72	- 24	20	20	
MT2B287M100S	B	280	11	13	36	9	72	- 35	20	20	
MT2B307M100S	B	300	11	13	36	9	72	- 35	20	20	
125 V _{DC} AT 85 °C; 85 V _{DC} AT 125 °C											
MT2B227M125S	B	220	8	11	42	9	72	- 24	15	15	
MT2B247M125S	B	235	10	12	39	9	72	- 24	18	18	

PERFORMANCE CURVES

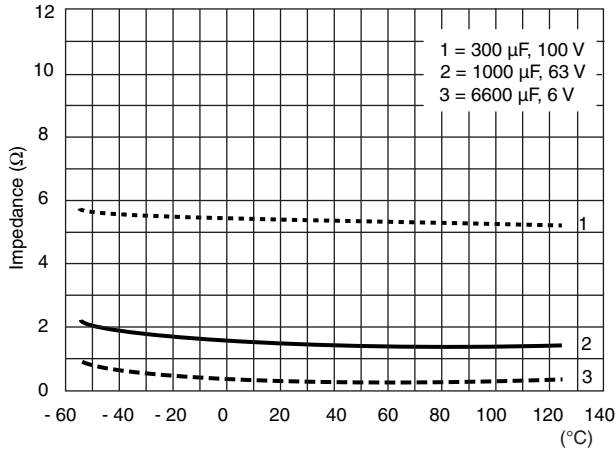
Capacitance/temperature at 100 Hz



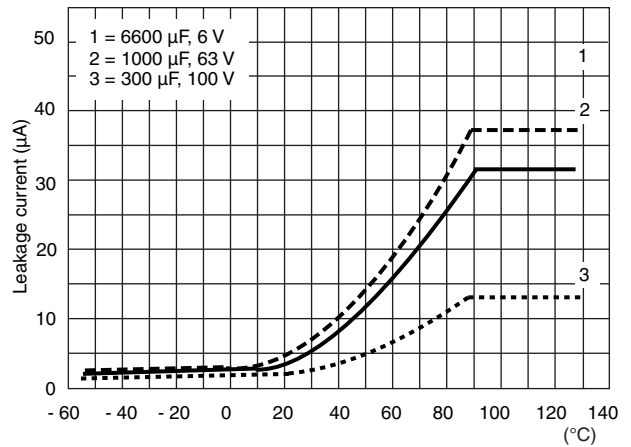
Dissipation factor/temperature at 100 Hz



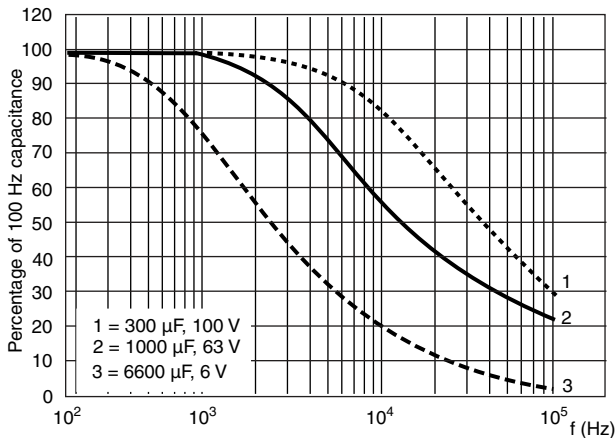
Impedance/temperature at 100 Hz



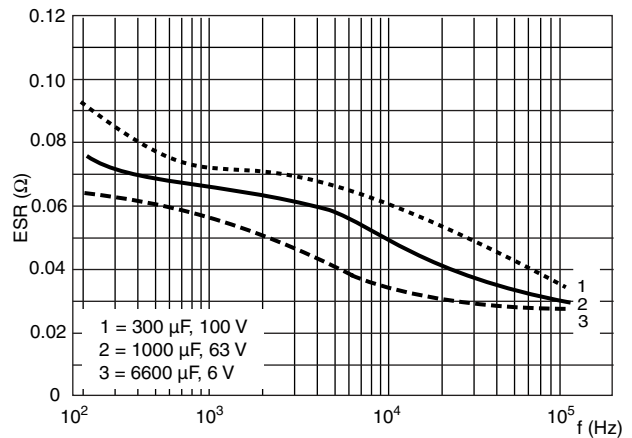
Leakage current/temperature at maximum permitted voltage

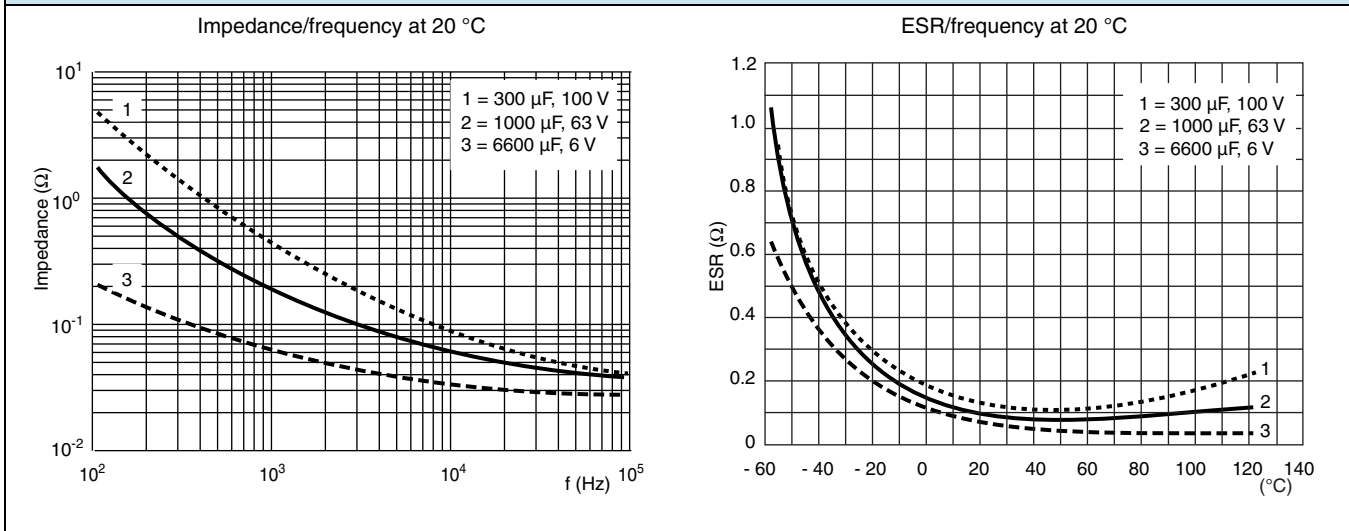


Capacitance/frequency at 20 °C



ESR/frequency at 20 °C



PERFORMANCE CURVES

Note

- All performance curves are provided from historic Arcotronics module series TM datasheet information

CROSS REFERENCE

VISHAY PART NUMBER	ARCOTRONICS PART NUMBER
MT2B227M125S	402/1/80115/011
MT2B247M125S	402/1/80115/012
MT2B277M100S	402/1/80114/013
MT2B287M100S	402/1/80114/014
MT2B307M100S	402/1/80114/015
MT2B337M075S	402/1/80113/016
MT2B347M075S	402/1/80113/017
MT2B397M075S	402/1/80113/018
MT2B417M075S	402/1/80113/019
MT2B477M075S	402/1/80113/020
MT2B507M075S	402/1/80113/021
MT2B587M075S	402/1/80113/022
MT2B607M075S	402/1/80113/023
MT2B687M075S	402/1/80113/024
MT2B757M075S	402/1/80113/025
MT2B757M063S	402/1/80112/025
MT2B827M063S	402/1/80112/026
MT2B907M050S	402/1/80111/027
MT2B108M063S	402/1/80112/028
MT2B118M050S	402/1/80111/029
MT2B128M040S	402/1/80110/030
MT2B138M040S	402/1/80110/031
MT2B148M030S	402/1/80109/032
MT2B158M025S	402/1/80108/033



CROSS REFERENCE	
VISHAY PART NUMBER	ARCOTRONICS PART NUMBER
MT2B178M030S	402/1/80109/034
MT2B168M025S	402/1/80108/035
MT2B208M025S	402/1/80108/036
MT2B228M025S	402/1/80108/037
MT2B248M020S	402/1/80107/038
MT2B248M025S	402/1/80108/039
MT2B278M020S	402/1/80107/040
MT2B268M020S	402/1/80107/041
MT2B338M016S	402/1/80106/042
MT2B348M015S	402/1/80105/043
MT2B398M010S	402/1/80104/044
MT2B418M010S	402/1/80104/045
MT2B478M010S	402/1/80104/046
MT2B508M008S	402/1/80103/047
MT2B518M010S	402/1/80104/048
MT2B568M6R3S	402/1/80102/049
MT2B608M006S	402/1/80101/050

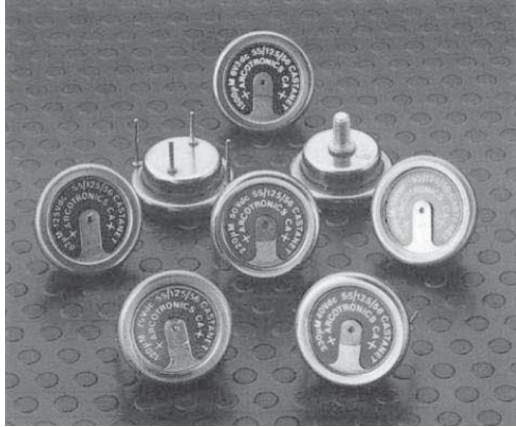


Tantalum Case Button Capacitor

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CA2.....	147
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Wet Tantalum Capacitor, Button, All-Tantalum Case, - 55 °C to + 125 °C Operation



INTRODUCTION

This conveniently-packaged polar button unit employs a non-solid electrolyte, and has a sintered tantalum anode. The anode is produced from a high capacitance powder resulting in a capacitor of small size and large CV product.

The cathode is also of tantalum and overcomes the restrictions of a silver cathode system in allowing a high ripple current rating and application of a 3 V reverse potential. This all-tantalum construction results in a non-catastrophic wear-out mechanism.

The seal is a high efficient system comprising a PTFE gasket clamped between coined plates of tantalum by a work-hardened nickel ring. This type of seal, common to all button styles, is largely responsible for their long life and high reliability and severe military environments.

The CA2 series ranges are available in several termination options. These include a mounting stud and pins for circuit mounting.

APPLICATIONS

The CA2 series are designed for use in general military and professional applications. For example: Power supply "smoothing" filter networks, switching, by-pass, timer functions and where reverse potentials occur.

WEIGHT

The CA2 style with a stud termination weighs approximately 18.1 g, including the nut. The CA2 styles, which has a printed circuit board mounting, weighs approximately 17.3 g.

FEATURES

- All-Tantalum electrodes eliminate silver migration
- Withstands high ripple current
- Long life reliability
- Reverse voltage capability
- Instant use after long storage
- Mounting: Through-hole

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 125 °C

Voltage Range: 6 V_{DC} to 125 V_{DC}

Capacitance Range: 47 µF to 1800 µF

SPECIFICATIONS

Environmental classification: 55/125/56

Vibration: 10 Hz to 2000 Hz, 0.75 mm or 98 m/s², 15 h

Bump: 390 m/s², 4000 bumps

Shock: 981 m/s²

Acceleration: 981 m/s²

Low air pressure: 1 kPa

APPROVALS

These capacitors are available released to:

- BS CECC 30 202 002

RIPPLE CURRENT CAPABILITY

The maximum allowable ripple current is 1 A_{RMS} up to 85 °C and 750 mA_{RMS} to 125 °C. These values apply under normal cooling conditions and are irrespective of frequency or waveform. The algebraic sum of the AC peak and DC voltages must not exceed the forward or reverse voltage ratings at the relevant temperature.

At certain frequency/temperature/DC voltage combinations higher levels of ripple current may be used. The applications department should be contacted before the above levels are exceeded.

REVERSE VOLTAGE CAPABILITY

The CA2 series employ tantalum cathodes which allow the continuous application of reverse potentials not exceeding 3 V over the whole temperature range.

SURGE VOLTAGE

The surge voltage capability is 115 % of the voltage rating at the relevant temperature.

TEMPERATURE RANGE

The capacitor is designed for operation between - 55 °C and + 125 °C, with linear voltage derating above + 85 °C to 66 % of the rated voltage at + 125 °C.

CAPACITANCE TOLERANCE

The standard capacitance tolerance is ± 20 % although special tolerances are available by arrangement.

APPLICATION INFORMATION

Capacitors may be operated at less than the rated voltage, resulting in significantly reduced leakage current values.

In timing circuits, or other applications where the device is subjected only to a DC voltage, the ballistic or DC capacitance will be somewhat larger than measured at 50 Hz.

The parametric information must necessarily be brief, although additional comprehensive data is available on request, and the tests tailored to customers' requirements can be made.

RELIABILITY

All capacitors are subjected to burn-in. This is to remove infant mortalities and ensure reliability. The capacitor lifetime is enhanced when the unit is subjected to a reduced ripple current, a low ambient temperature, and is externally cooled. The use of a heat sink is recommended.

ORDERING PROCEDURE

Example: CA2C (220 μ F, 50 V_{DC})

Vishay Part Number: CA2C227M050P

ORDERING INFORMATION						
CA2	C	227	M	100	A	-
MODEL	CASE CODE	CAPACITANCE	TOLERANCE	VOLTAGE	TERMINATION AND PACKAGING	
	See Ratings and Case Codes Table	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow	M = 20 % (std) K = 10 % (special order)	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	A = Stud B = PC mount pins C = Twin tag or ribbon D = Panel or potting tag	Blank = Standard (tin/lead coating)

DIMENSIONS in millimeters																					
The CA2 series is comprised of two case sizes, differing in depth of cup only. The case size dimensions are shown in the table. Four mounting styles are available in both case sizes.																					
A	B max.	C	D	E	F	G	H	J	K crs.	L crs.	M dia.	N nom.	P	Q dia.	R	S	T dia.	U crs.	V dia.	W nom.	
3.6	8.5 ⁽¹⁾	21.8	8.4 ⁽²⁾	8.4	16.2	8.4	1.8	0.8	20.3	10.2	1.1	2.4	13.1	1.0	7.5	10.7	1.6	13.0	3.5	0.30	

Notes

- All dimensions are in mm, and are maximum unless otherwise stated
- (1) For B case size, case height is 6.7 mm
- (2) Width of anode tag 4.22 mm max.



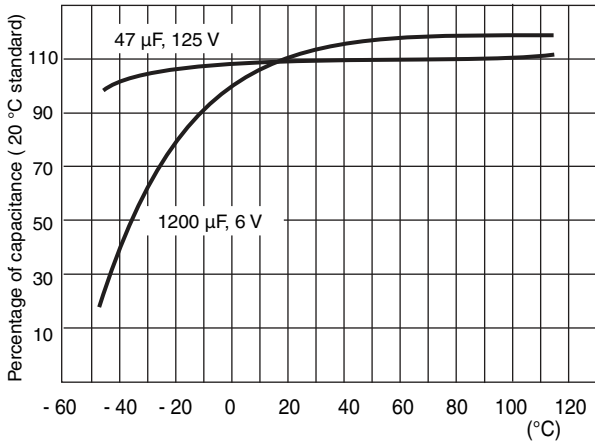
STANDARD RATINGS										
VISHAY PART NUMBERS	CASE CODE	CAPACITANCE AT 50 Hz (μ F)	DISSIPATION FACTOR AT 50 Hz (%)		MAX. ESR AT 20 °C 100 kHz (Ω)	MAX. ESR AT - 55 °C 100 kHz (Ω)	MAX. DC AT 20 °C (μ A)	MAX. DC AT 125 °C (μ A)	Δ C AT 50 Hz (%)	
			20 °C	125 °C					- 55 °C	125 °C
			6 V_{DC} AT 85 °C; 4 V_{DC} AT 125 °C							
CA2C128(1)006(2)	C	1200	75.0	95.0	1.0	5.0	15.0	50	- 80	25.0
8 V_{DC} AT 85 °C; 5.3 V_{DC} AT 125 °C										
CA2C108(1)008(2)	C	1000	65.0	85.0	1.0	5.0	10.0	50	- 75	25.0
10 V_{DC} AT 85 °C; 6.6 V_{DC} AT 125 °C										
CA2C827(1)010(2)	C	820	55.0	70.0	1.0	5.0	10.0	50	- 70	20.0
15 V_{DC} AT 85 °C; 10 V_{DC} AT 125 °C										
CA2C687(1)015(2)	C	680	45.0	55.0	1.0	5.0	8.0	50	- 65	20.0
20 V_{DC} AT 85 °C; 13.4 V_{DC} AT 125 °C										
CA2C397(1)020(2)	C	390	25.0	30.0	1.0	5.0	5.0	50	- 50	15.0
CA2C477(1)020(2)	C	470	30.0	40.0	1.0	5.0	5.0	50	- 55	15.0
CA2C567(1)020(2)	C	560	35.0	45.0	1.0	5.0	5.0	50	- 60	15.0
30 V_{DC} AT 85 °C; 20 V_{DC} AT 125 °C										
CA2C277(1)030(2)	C	270	17.0	20.0	1.0	5.0	5.0	50	- 45	10.0
CA2C337(1)030(2)	C	330	20.0	25.0	1.0	5.0	5.0	50	- 50	10.0
50 V_{DC} AT 85 °C; 33.3 V_{DC} AT 125 °C										
CA2C157(1)050(2)	C	150	9.5	12.0	1.0	5.0	3.0	50	- 30	10.0
CA2C187(1)050(2)	C	180	1.5	15.0	1.0	5.0	3.0	50	- 35	10.0
CA2C227(1)050(2)	C	220	14.0	18.0	1.0	5.0	3.0	50	- 40	10.0
75 V_{DC} AT 85 °C; 50 V_{DC} AT 125 °C										
CA2C686(1)075(2)	C	68	5.0	6.5	1.0	5.0	3.0	50	- 15.0	7.5
CA2C826(1)075(2)	C	82	5.5	7.0	1.0	5.0	3.0	50	- 17.5	7.5
CA2C107(1)075(2)	C	100	7.0	9.0	1.0	5.0	3.0	50	- 20	7.5
CA2C127(1)075(2)	C	120	7.5	10.0	1.0	5.0	3.0	50	- 25	7.5
100 V_{DC} AT 85 °C; 66.7 V_{DC} AT 125 °C										
CA2C566(1)100(2)	C	56	3.5	4.5	1.0	5.0	3.0	50	- 12.5	7.5
125 V_{DC} AT 85 °C; 83.3 V_{DC} AT 125 °C										
CA2C476(1)125(2)	C	47	3.0	4.0	1.0	5.0	3.0	50	- 10.0	7.5

Note

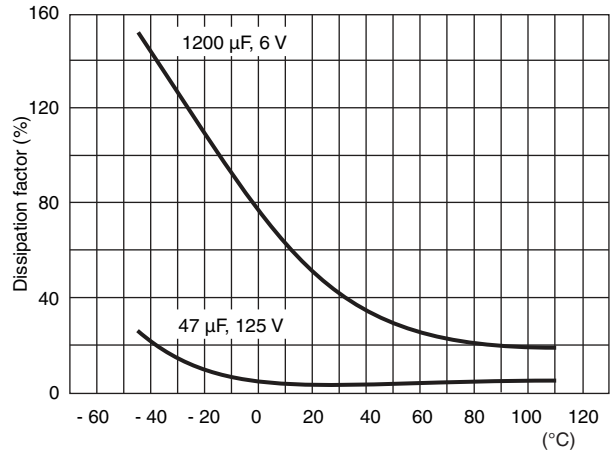
- Part number definitions:
 - Capacitance tolerance: M= 20 % standard, K = 10 % special order
 - Termination type: A = Stud or bolt, B = Pins for PCB, C = Twin tags or ribbons, D = Potting tag

PERFORMANCE CURVES

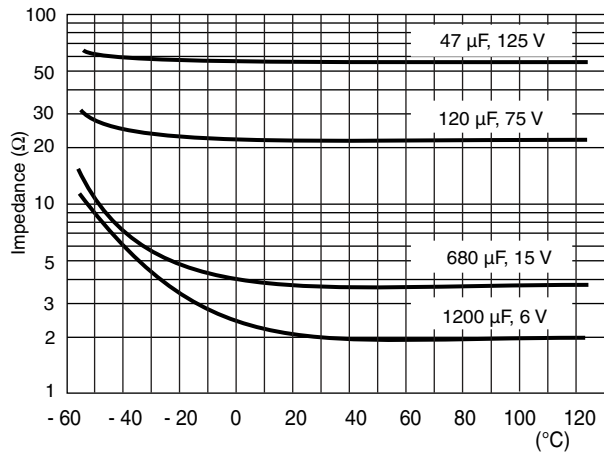
Capacitance/temperature at 50 Hz



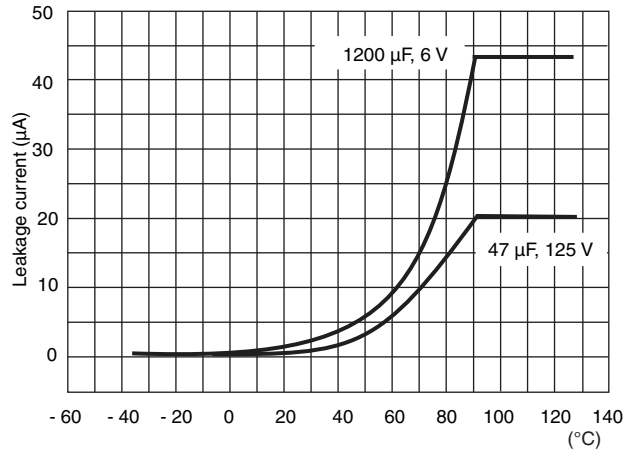
Dissipation factor/temperature at 50 Hz



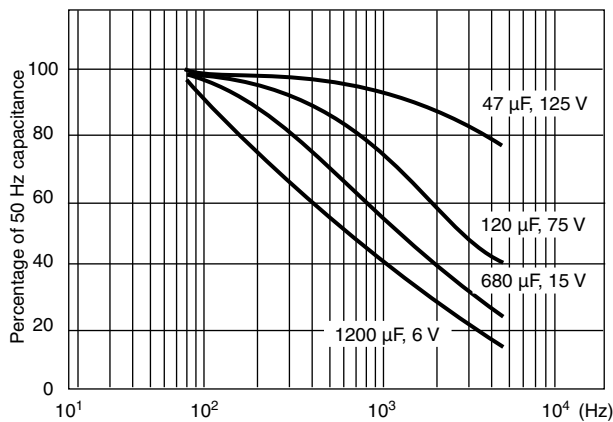
Impedance/temperature at 50 Hz



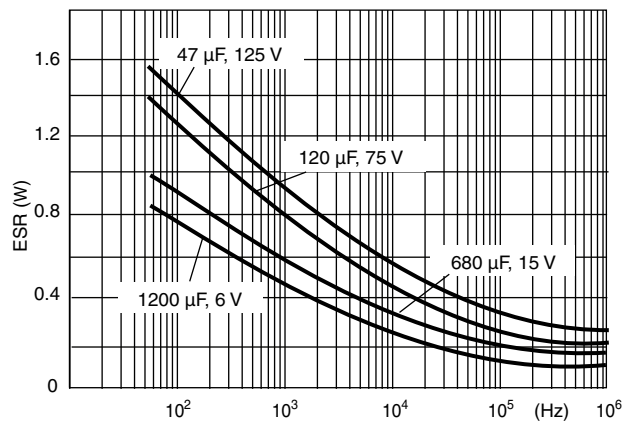
Leakage current/temperature at maximum voltage



Capacitance/frequency at 20 °C

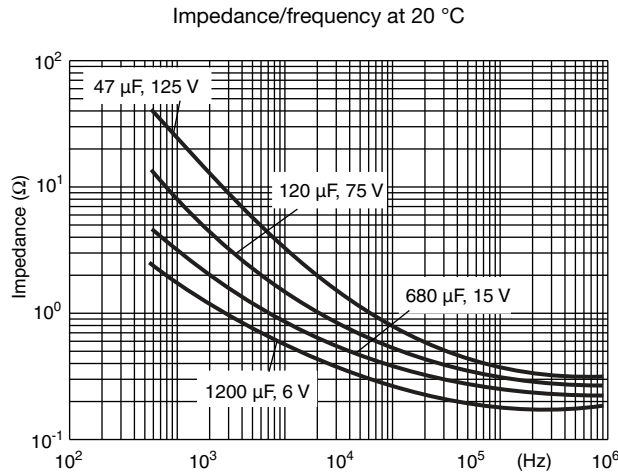


ESR/frequency at 20 °C





PERFORMANCE CURVES



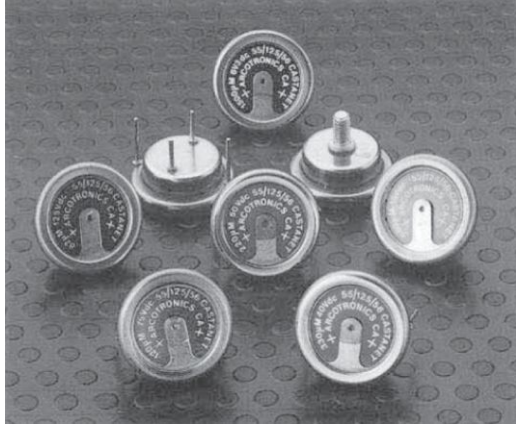
Note

- All performance curves are provided from historic Arcotronics style CA/CAE datasheet information

CROSS REFERENCE

VISHAY PART NUMBER	ARCOTRONICS PART NUMBER	NATO PART NUMBER
CA		
CA2C476M125A	402/1/50157/003	5910-99017-2755
CA2C566M100A	402/1/50157/004	5910-99017-2754
CA2C686M075A	402/1/50157/005	5910-99017-2750
CA2C826M075A	402/1/50157/006	5910-99017-2751
CA2C107M075A	402/1/50157/007	5910-99017-2752
CA2C127M075A	402/1/50157/008	5910-99017-2753
CA2C157M050A	402/1/50157/009	5910-99017-2747
CA2C187M050A	402/1/50157/010	5910-99017-2748
CA2C227M050A	402/1/50157/011	5910-99017-2749
CA2C277M030A	402/1/50157/012	5910-99017-2745
CA2C337M030A	402/1/50157/013	5910-99017-2746
CA2C397M020A	402/1/50157/014	5910-99017-2742
CA2C477M020A	402/1/50157/015	5910-99017-2743
CA2C567M020A	402/1/50157/016	5910-99017-2744
CA2C687M015A	402/1/50157/017	5910-99017-2741
CA2C827M010A	402/1/50157/018	5910-99017-2740
CA2C108M008A	402/1/50157/019	5910-99017-2739
CA2C128M006A	402/1/50157/020	5910-99017-2738
CAPC		
CA2C476M125B	402/1/50158/003	5910-99017-2773
CA2C566M100B	402/1/50158/004	5910-99017-2772
CA2C686M075B	402/1/50158/005	5910-99017-2756
CA2C826M075B	402/1/50158/006	5910-99017-2769
CA2C107M075B	402/1/50158/007	5910-99017-2770
CA2C127M075B	402/1/50158/008	5910-99017-2771
CA2C157M050B	402/1/50158/009	5910-99017-2765
CA2C187M050B	402/1/50158/010	5910-99017-2766
CA2C227M050B	402/1/50158/011	5910-99017-2767
CA2C277M030B	402/1/50158/012	5910-99017-2763
CA2C337M030B	402/1/50158/013	5910-99017-2764
CA2C397M020B	402/1/50158/014	5910-99017-2760
CA2C477M020B	402/1/50158/015	5910-99017-2761
CA2C567M020B	402/1/50158/016	5910-99017-2762
CA2C687M015B	402/1/50158/017	5910-99017-2759
CA2C827M010B	402/1/50158/018	5910-99017-2758
CA2C108M008B	402/1/50158/019	5910-99017-2757
CA2C128M006B	402/1/50158/020	5910-99017-2756

Wet Tantalum Capacitor, Button, All-Tantalum Case, - 55 °C to + 125 °C Operation



INTRODUCTION

This conveniently-packaged polar button unit employs a non-solid electrolyte, and has a sintered tantalum anode. The anode is produced from a high capacitance powder resulting in a capacitor of small size and large CV product.

The cathode is also of tantalum and overcomes the restrictions of a silver cathode system in allowing a high ripple current rating and application of a 3 V reverse potential. This all-tantalum construction results in a non-catastrophic wear-out mechanism.

The seal is a high efficient system comprising a PTFE gasket clamped between coined plates of tantalum by a work-hardened nickel ring. This type of seal, common to all button styles, is largely responsible for their long life and high reliability and severe military environments.

The CE2 series is an extension of the CA2 series with the anode produced from selected powder of very high capacitance giving a higher CV product.

The CE2 series ranges are available in several termination options. These include a mounting stud and pins for circuit mounting.

APPLICATIONS

The CE2 series are designed for use in general military and professional applications. For example: Power supply "smoothing" filter networks, switching, by-pass, timer functions and where reverse potentials occur.

WEIGHT

The CE2 style with a stud termination weighs approximately 18.1 g, including the nut. The CE2 styles, which has a printed circuit board mounting, weighs approximately 17.3 g.

FEATURES

- All-Tantalum electrodes eliminate silver migration
- Withstands high ripple current
- Long life reliability
- Reverse voltage capability
- Instant use after long storage
- Mounting: Through-hole

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 125 °C

Voltage Range: 6.3 V_{DC} to 125 V_{DC}

Capacitance Range: 82 µF to 1800 µF

SPECIFICATIONS

Environmental classification: 55/125/56

Vibration: 10 Hz to 2000 Hz, 0.75 mm or 98 m/s², 15 h

Bump: 390 m/s², 4000 bumps

Shock: 981 m/s²

Acceleration: 981 m/s²

Low air pressure: 1 kPa

APPROVALS

These capacitors are available released to:

- BS CECC 30 202 002

RIPPLE CURRENT CAPABILITY

The maximum allowable ripple current is 1 A_{RMS} up to 85 °C and 750 mA_{RMS} to 125 °C. These values apply under normal cooling conditions and are irrespective of frequency or waveform. The algebraic sum of the AC peak and DC voltages must not exceed the forward or reverse voltage ratings at the relevant temperature.

At certain frequency/temperature/DC voltage combinations higher levels of ripple current may be used. The applications department should be contacted before the above levels are exceeded.

REVERSE VOLTAGE CAPABILITY

The CE2 series employ tantalum cathodes which allow the continuous application of reverse potentials not exceeding 3 V over the whole temperature range.

SURGE VOLTAGE

The surge voltage capability is 115 % of the voltage rating at the relevant temperature.

TEMPERATURE RANGE

The capacitor is designed for operation between - 55 °C and + 125 °C, with linear voltage derating above + 85 °C to 66 % of the rated voltage at + 125 °C.

CAPACITANCE TOLERANCE

The standard capacitance tolerance is ± 20 % although special tolerances are available by arrangement.

APPLICATION INFORMATION

Capacitors may be operated at less than the rated voltage, resulting in significantly reduced leakage current values.

In timing circuits, or other applications where the device is subjected only to a DC voltage, the ballistic or DC capacitance will be somewhat larger than measured at 50 Hz.

The parametric information must necessarily be brief, although additional comprehensive data is available on request, and the tests tailored to customers' requirements can be made.

RELIABILITY

All capacitors are subjected to burn-in. This is to remove infant mortalities and ensure reliability. The capacitor lifetime is enhanced when the unit is subjected to a reduced ripple current, a low ambient temperature, and is externally cooled. The use of a heat sink is recommended.

ORDERING PROCEDURE

Example: CE2C (270 μ F, 40 V_{DC})

Vishay Part Number: CE2C277M040P

ORDERING INFORMATION						
CE2	C	227	M	100	A	-
MODEL	CASE CODE	CAPACITANCE	TOLERANCE	VOLTAGE	TERMINATION AND PACKAGING	
	See Ratings and Case Codes Table	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow	M = 20 % (std) K = 10 % (special order)	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	A = Stud B = PC mount pins C = Twin tag or ribbon D = Panel or potting tag	Blank = Standard (tin/lead coating)

DIMENSIONS in millimeters																				
The CE2 series is comprised of two case sizes, differing in depth of cup only. The case size dimensions are shown in the table. Four mounting styles are available in both case sizes.																				
A	B max.	C	D	E	F	G	H	J	K crs.	L crs.	M dia.	N nom.	P	Q dia.	R	S	T dia.	U crs.	V dia.	W nom.
3.6	8.5 ⁽¹⁾	21.8	8.4 ⁽²⁾	8.4	16.2	8.4	1.8	0.8	20.3	10.2	1.1	2.4	13.1	1.0	7.5	10.7	1.6	13.0	3.5	0.30

Notes

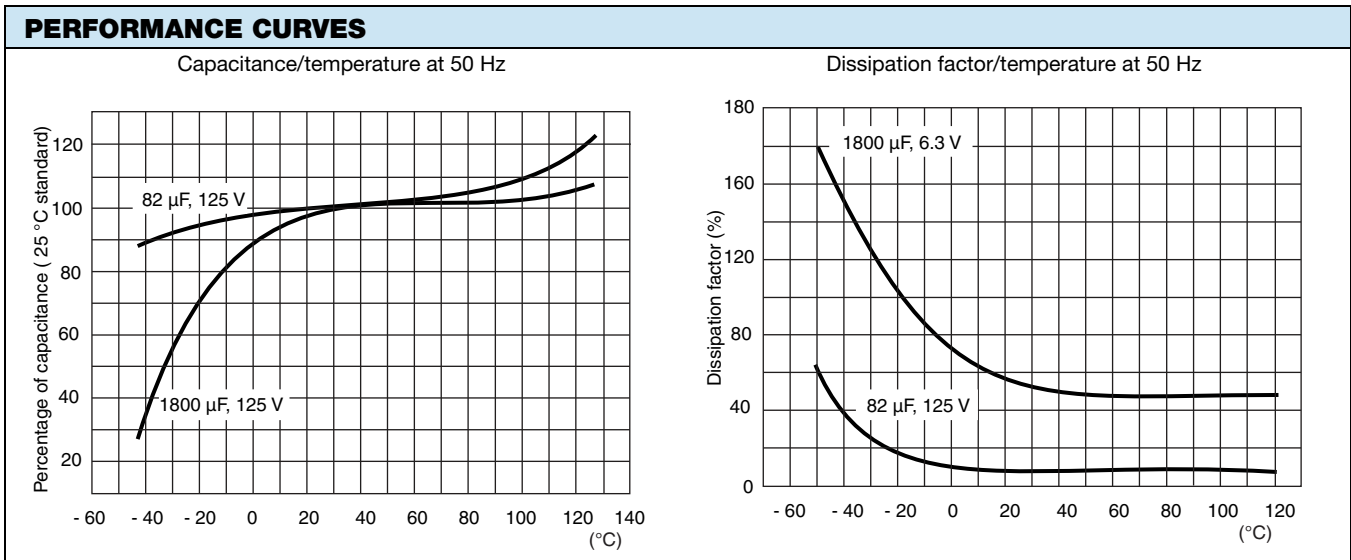
- (1) All dimensions are in mm, and are maximum unless otherwise stated
- (2) For B case size, case height is 6.7 mm
- (3) Width of anode tag 4.22 mm max.



STANDARD RATINGS										
VISHAY PART NUMBERS	CASE CODE	CAPACITANCE AT 50 Hz (μF)	DISSIPATION FACTOR AT 50 Hz (%)		MAX. ESR AT 20 °C 100 kHz (Ω)	MAX. ESR AT - 55 °C 100 kHz (Ω)	MAX. DCL AT 20 °C (μA)	MAX. DCL AT 125 °C (μA)	ΔC AT 50 Hz (%)	
			20 °C	125 °C					- 55 °C	125 °C
6.3 V_{DC} AT 85 °C; 4 V_{DC} AT 125 °C										
CE2C158(1)6R3(2)	C	1500	80.0	80.0	1.0	15.0	15.0	50	- 80	30.0
CE2C188(1)6R3(2)	C	1800	85.0	85.0	1.0	15.0	15.0	50	- 80	30.0
10 V_{DC} AT 85 °C; 6.6 V_{DC} AT 125 °C										
CE2C108(1)010(2)	C	1000	65.0	65.0	1.0	15.0	10.0	50	- 80	30.0
CE2C128(1)010(2)	C	1200	75.0	75.0	1.0	15.0	15.0	50	- 80	30.0
16 V_{DC} AT 85 °C; 10 V_{DC} AT 125 °C										
CE2C687(1)016(2)	C	680	45.0	45.0	1.0	15.0	8.0	50	- 70	25.0
CE2C827(1)016(2)	C	820	60.0	60.0	1.0	15.0	10.0	50	- 75	25.0
25 V_{DC} AT 85 °C; 16 V_{DC} AT 125 °C										
CE2C477(1)025(2)	C	470	35.0	35.0	1.0	15.0	5.0	50	- 60	20.0
CE2C567(1)025(2)	C	560	40.0	40.0	1.0	15.0	5.0	50	- 65	20.0
40 V_{DC} AT 85 °C; 25 V_{DC} AT 125 °C										
CE2C277(1)040(2)	C	270	18.0	18.0	1.0	15.0	5.0	50	- 50	12.5
CE2C337(1)040(2)	C	330	22.0	22.0	1.0	15.0	5.0	50	- 50	12.5
CE2C397(1)040(2)	C	390	30.0	30.0	1.0	15.0	5.0	50	- 55	20.0
63 V_{DC} AT 85 °C; 40 V_{DC} AT 125 °C										
CE2C227(1)063(2)	C	220	15.0	15.0	1.0	15.0	4.0	50	- 45	12.5
75 V_{DC} AT 85 °C; 50 V_{DC} AT 125 °C										
CE2C157(1)075(2)	C	150	11.0	11.0	1.0	15.0	4.0	50	- 35	12.5
CE2C187(1)075(2)	C	180	13.0	13.0	1.0	15.0	4.0	50	- 40	12.5
100 V_{DC} AT 85 °C; 66.7 V_{DC} AT 125 °C										
CE2C107(1)100(2)	C	100	7.5	7.5	1.0	15.0	4.0	50	- 22	10.0
CE2C127(1)100(2)	C	120	9.0	9.0	1.0	15.0	4.0	50	- 28	10.0
125 V_{DC} AT 85 °C; 83.3 V_{DC} AT 125 °C										
CE2C826(1)125(2)	C	82	7.0	7.0	1.0	15.0	4.0	50	- 20	10.0

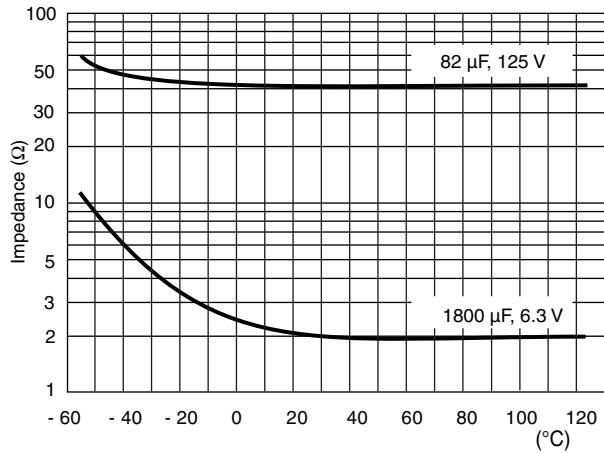
Note

- Part number definitions:
 - (1) Capacitance tolerance
M = 20 % standard
K = 10 % special order
 - (2) Termination type
A = Stud or bolt
B = Pins for PCB
C = Twin tags or ribbons
D = Potting tag

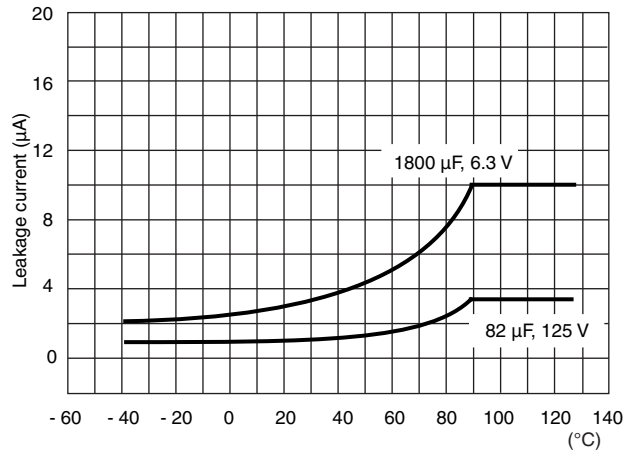


PERFORMANCE CURVES

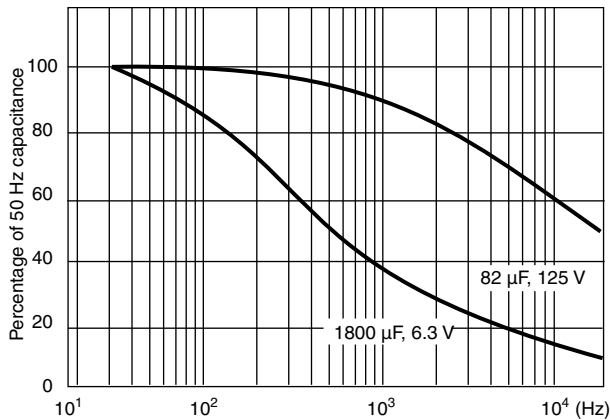
Impedance/temperature at 50 Hz



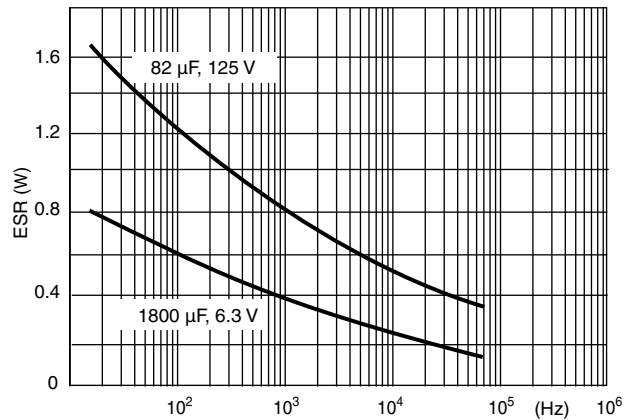
Leakage current/temperature at maximum voltage



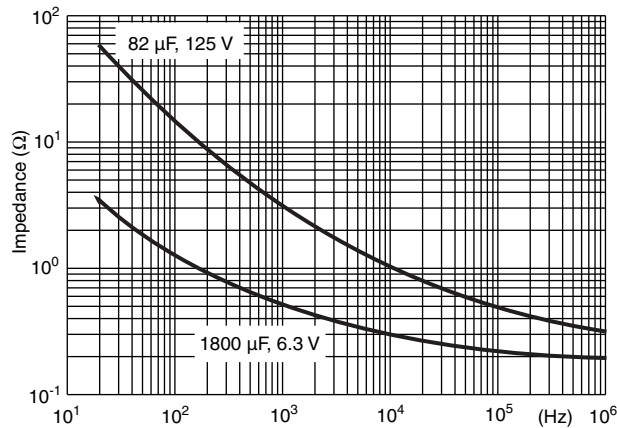
Capacitance/frequency at 25 °C



ESR/frequency at 25 °C



Impedance/frequency at 25 °C



Note

- All performance curves are provided from historic Arcotronics style CA/CAE datasheet information



CROSS REFERENCE		
VISHAY PART NUMBER	ARCOTRONICS PART NUMBER	NATO PART NUMBER
CE		
CE2C826M125A	402/1/50157/050	To be allocated
CE2C107M100A	402/1/50157/051	
CE2C127M100A	402/1/50157/052	
CE2C157M075A	402/1/50157/053	
CE2C187M075A	402/1/50157/054	
CE2C227M063A	402/1/50157/055	
CE2C277M040A	402/1/50157/056	
CE2C337M040A	402/1/50157/057	
CE2C397M040A	402/1/50157/058	
CE2C477M025A	402/1/50157/059	
CE2C567M025A	402/1/50157/060	
CE2C687M016A	402/1/50157/061	
CE2C827M016A	402/1/50157/062	
CE2C108M010A	402/1/50157/063	
CE2C128M010A	402/1/50157/064	
CE2C158M6R3A	402/1/50157/065	
CE2C188M6R3A	402/1/50157/066	
CEPC		
CE2C826M125B	402/1/50158/050	To be allocated
CE2C107M100B	402/1/50158/051	
CE2C127M100B	402/1/50158/052	
CE2C157M075B	402/1/50158/053	
CE2C187M075B	402/1/50158/054	
CE2C227M063B	402/1/50158/055	
CE2C277M040B	402/1/50158/056	
CE2C337M040B	402/1/50158/057	
CE2C397M040B	402/1/50158/058	
CE2C477M025B	402/1/50158/059	
CE2C567M025B	402/1/50158/060	
CE2C687M016B	402/1/50158/061	
CE2C827M016B	402/1/50158/062	
CE2C108M010B	402/1/50158/063	
CE2C128M010B	402/1/50158/064	
CE2C158M6R3B	402/1/50158/065	
CE2C188M6R3B	402/1/50158/066	

Wet Tantalum Capacitor, Button, All-Tantalum Case, - 55 °C to + 150 °C Operation



INTRODUCTION

This conveniently-packaged polar button unit employs a non-solid electrolyte, and has a sintered tantalum anode. The anode is produced from a medium capacitance powder and the lower CV product allows a tighter specification of capacitance stability, dissipation factor and leakage current. The cathode is also of tantalum, and overcomes the restrictions of a silver cathode system in allowing a high ripple current rating and application of a 3 V reverse potential.

Both anode and cathode consists of sintered compacts of high purity tantalum powder. The dielectric layer of tantalum pentoxid electrolytically formed on each compact is completely stable. The system is enclosed between a tantalum plate and a tantalum cup, with an outer nickel case.

The seal is a highly efficient system comprising a PTFE gasket clamped between coined plates of tantalum by a work-hardened nickel ring. This type of seal, common to all button styles, is largely responsible for their long life and high reliability under severe military environments.

The combination of the tantalum pentoxide dielectric stability and the extremely efficient seal has been shown to ensure that there is no significant difference in electrical parameters or instant use behaviour after 10 years storage or longer. A shelf life in excess of 20 years is confidently expected.

There are four types of terminations and mounting options are available. These include a treated stud or bolt, PCB pins, a tab for panels, and ribbons leads slotted through-holes. These are illustrated in the photograph, and dimensional table drawing.

APPLICATIONS

The CH2 series is designed for use in general military and professional applications. For example: Power supply "smoothing", filter networks, switching, by-pass, timer functions, and where reverse potential occur.

WEIGHT

The CH2 style with a stud termination weighs approximately 18.1 g, including the nut. The CH2 styles, which has a printed circuit board mounting, weighs approximately 17.3 g.

FEATURES

- All-Tantalum electrodes eliminate silver migration
- Withstands high ripple current
- Long life reliability
- Reverse voltage capability
- Mounting: Through-hole

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 150 °C

Voltage Range: 3 V_{DC} to 75 V_{DC}

Capacitance Range: 33 µF to 470 µF

SPECIFICATIONS

Environmental classification: 55/150/56

Vibration: 10 Hz to 2000 Hz, 0.75 mm or 98 m/s², 150 h

Bump: 390 m/s², 4000 bumps

Shock: 981 m/s²

Acceleration: 981 m/s²

Low air pressure: 1 kPa

REVERSE VOLTAGE CAPABILITY

The CH2 series employ tantalum cathodes which allow the continuous application of reverse potentials not exceeding 3 V over the whole temperature range.

SURGE VOLTAGE

The surge voltage capability is 115 % of the voltage rating at the relevant temperature.

TEMPERATURE RANGE

The capacitor is designed for operation between - 55 °C and + 150 °C.

CAPACITANCE TOLERANCE

The standard capacitance tolerance is ± 20 % although special tolerances are available by arrangement.

RIPPLE CURRENT CAPABILITY

The maximum allowable ripple current is 750 mA_{RMS}. This value applies under normal cooling conditions and is irrespective of frequency or waveform. The algebraic sum of the AC peak and DC voltages must not exceed the forward or reverse voltage ratings at the relevant temperature.

APPLICATION INFORMATION

Capacitors may be operated at less than the rated voltage, resulting in significantly reduced leakage current values.

In timing circuits, or other applications where the device is subjected only to a DC voltage, the ballistic or DC capacitance will be somewhat larger than measured at 50 Hz.

The parametric information must necessarily be brief, although additional comprehensive data is available on request, and the tests tailored to customers' requirements can be made.

RELIABILITY

All capacitors are subjected to burn-in. This is to remove infant mortalities and ensure reliability. The capacitor lifetime is enhanced when the unit is subjected to a reduced ripple current, a low ambient temperature, and is externally cooled. The use of a heat sink is recommended.

ORDERING PROCEDURE

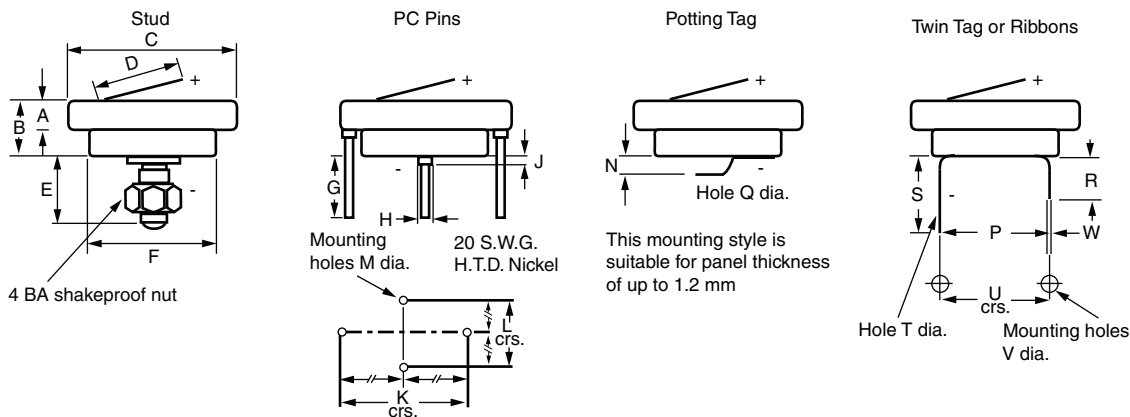
Example: CH2C (220 μ F, 15 V_{DC})

Vishay Part Number: CH2C227M015A

ORDERING INFORMATION						
CH2	C	227	M	100	A	-
MODEL	CASE CODE	CAPACITANCE	TOLERANCE	VOLTAGE	TERMINATION AND PACKAGING	
	See Ratings and Case Codes Table	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow	M = 20 % (std) K = 10 % (special order)	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	A = Stud B = PC mount pins C = Twin tag or ribbon D = Panel or potting tag	Blank = Standard (tin/lead coating)

DIMENSIONS in millimeters

The CH2 series is comprised of two case sizes, differing in depth of cup only. The case size dimensions are shown in the table. Four mounting styles are available in both case sizes.



A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W
									crs.	crs.	dia.	nom.		dia.			dia.	crs.	dia.	nom.
3.6	6.7 ⁽¹⁾	21.8	8.4 ⁽²⁾	8.4	16.2	8.4	1.8	0.8	20.3	10.2	1.1	2.4	13.1	1.0	7.5	10.7	1.6	13.0	3.5	0.30

Notes

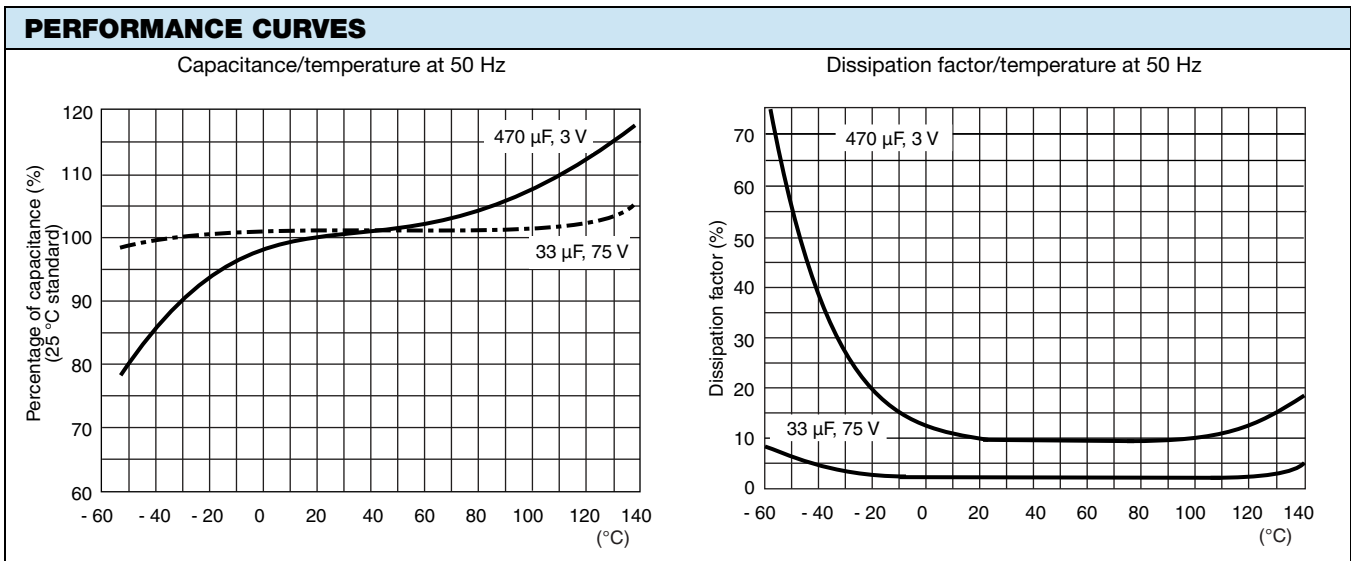
- (1) All dimensions are in mm, and are maximum unless otherwise stated
- (2) For C case size, case height is 8.5 mm
- (3) Width of anode tag 4.22 mm max.



STANDARD RATINGS										
VISHAY PART NUMBERS	CASE CODE	CAPACITANCE AT 50 Hz (μF)	DISSIPATION FACTOR AT 50 Hz (%)		MAX. ESR AT 20 °C 100 kHz (Ω)	MAX. ESR AT -55 °C 100 kHz (Ω)	MAX. DC AT 20 °C (μA)	MAX. DC AT 150 °C (μA)	ΔC AT 50 Hz (%)	
			20 °C	125 °C					-55 °C	150 °C
3 V_{DC} AT 150 °C										
CH2B337(1)003(2)	B	330	15.0	18.0	1.0	5.0	2.0	100	-40.0	30.0
CH2C477(1)003(2)	C	470	20.0	23.0	1.0	5.0	2.0	100	-50.0	40.0
6 V_{DC} AT 150 °C										
CH2B227(1)006(2)	B	220	12.5	15.0	1.0	5.0	2.0	100	-35.0	25.0
CH2C337(1)006(2)	C	330	15.0	18.0	1.0	5.0	2.0	100	-35.0	25.0
15 V_{DC} AT 150 °C										
CH2B157(1)015(2)	B	150	10.0	12.0	1.0	5.0	2.0	100	-30.0	20.0
CH2C227(1)015(2)	C	220	12.5	15.0	1.0	5.0	2.0	100	-30.0	20.0
25 V_{DC} AT 150 °C										
CH2B107(1)025(2)	B	100	6.0	7.5	1.0	5.0	2.0	100	-20.0	15.0
CH2C157(1)025(2)	C	150	9.0	11.0	1.0	5.0	2.0	100	-20.0	15.0
35 V_{DC} AT 150 °C										
CH2B686(1)035(2)	B	68	5.0	6.5	1.0	5.0	2.0	100	-15.0	12.5
CH2C107(1)035(2)	C	100	7.5	9.0	1.0	5.0	2.0	100	-15.0	12.5
50 V_{DC} AT 150 °C										
CH2B476(1)050(2)	B	47	4.0	5.0	1.0	5.0	2.0	100	-10.0	10.0
CH2C686(1)050(2)	C	68	6.0	7.5	1.0	5.0	2.0	100	-10.0	10.0
75 V_{DC} AT 150 °C										
CH2B336(1)075(2)	B	33	2.0	3.0	1.0	5.0	2.0	100	-5.0	7.5
CH2C476(1)075(2)	C	47	2.5	3.5	1.0	5.0	2.0	100	-5.0	7.5

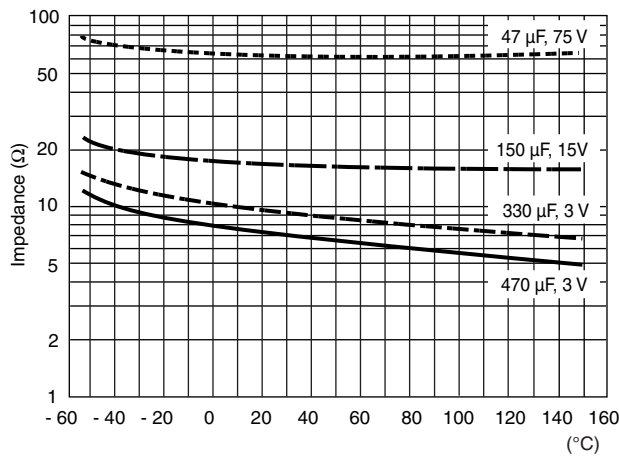
Note

- Part number definitions:
 - (1) Capacitance tolerance:
 - M = 20 % standard
 - K = 10 % special order
 - (2) Termination type:
 - A = Stud or bolt
 - B = Pins for PCB
 - C = Twin tags or ribbons
 - D = Potting tag

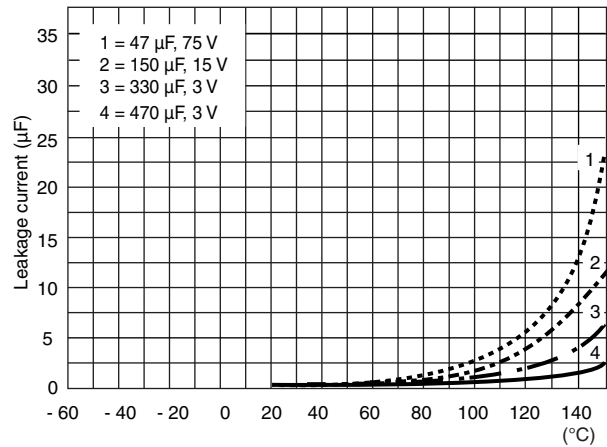


PERFORMANCE CURVES

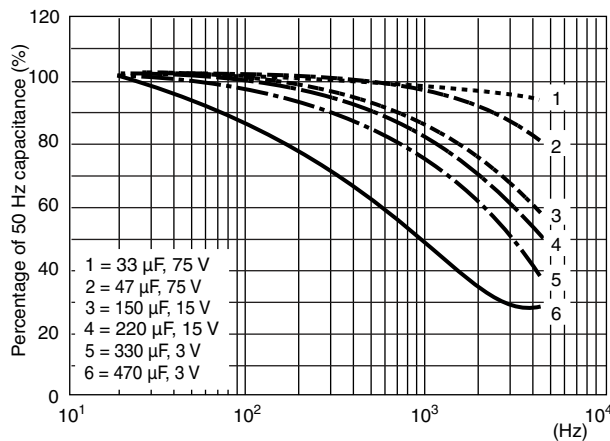
Impedance/temperature at 50 Hz



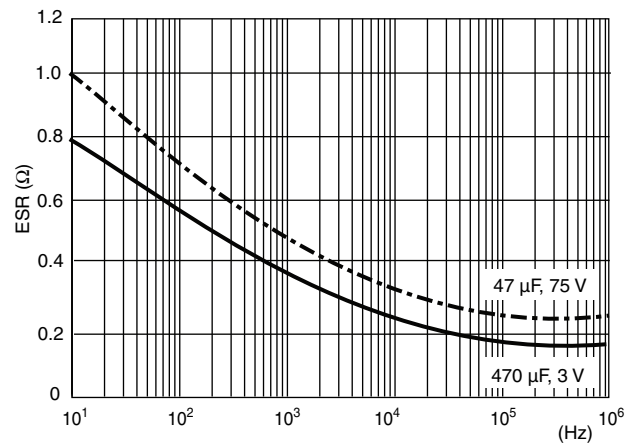
Leakage current/temperature at maximum voltage



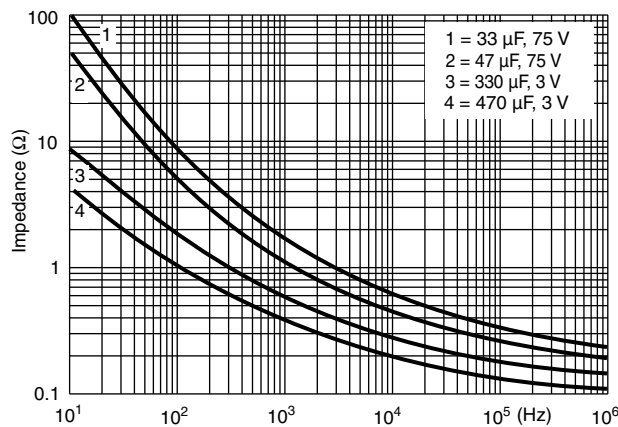
Capacitance/frequency at 25 °C



ESR/frequency at 25 °C



Impedance/frequency at 25 °C



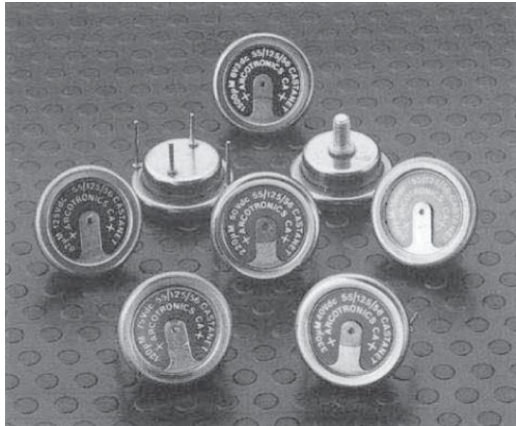
Note

- All performance curves are provided from historic Arcotronics style AHS datasheet information



CROSS REFERENCE		
VISHAY PART NUMBER	ARCOTRONICS PART NUMBER	NATO PART NUMBER
CH2C476M075A	402/1/50028/004	5910-99-014-3024
CH2B336M075A	402/1/50027/003	5910-99-014-3023
CH2C686M050A	402/1/50028/005	5910-99-014-3026
CH2B476M050A	402/1/50027/004	5910-99-014-3025
CH2C107M035A	402/1/50028/006	5910-99-014-3028
CH2B686M035A	402/1/50027/005	5910-99-014-3027
CH2C157M025A	402/1/50028/007	5910-99-014-3030
CH2B107M025A	402/1/50027/006	5910-99-014-3029
CH2C227M015A	402/1/50028/008	5910-99-014-3032
CH2B157M015A	402/1/50027/007	5910-99-014-3031
CH2C337M006A	402/1/50028/009	5910-99-014-3034
CH2B227M006A	402/1/50027/008	5910-99-014-3033
CH2C477M003A	402/1/50028/010	5910-99-014-3036
CH2B337M003A	402/1/50027/009	5910-99-014-3035
CH2C476M075B	402/1/50148/004	5910-99-014-3056
CH2B336M075B	402/1/50147/003	5910-99-014-3055
CH2C686M050B	402/1/50148/005	5910-99-014-3058
CH2B476M050B	402/1/50147/004	5910-99-014-3057
CH2C107M035B	402/1/50148/006	5910-99-014-3060
CH2B686M035B	402/1/50147/005	5910-99-014-3059
CH2C157M025B	402/1/50148/007	5910-99-014-3062
CH2B107M025B	402/1/50147/006	5910-99-014-3061
CH2C227M015B	402/1/50148/008	5910-99-014-3064
CH2B157M015B	402/1/50147/007	5910-99-014-3063
CH2C337M006B	402/1/50148/009	5910-99-014-3066
CH2B227M006B	402/1/50147/008	5910-99-014-3065
CH2C477M003B	402/1/50148/010	5910-99-014-3068
CH2B337M003B	402/1/50147/009	5910-99-014-3067
CH2C476M075D	402/1/50030/004	5910-99-014-3088
CH2B336M075D	402/1/50029/003	5910-99-014-3087
CH2C686M050D	402/1/50030/005	5910-99-014-3090
CH2B476M050D	402/1/50029/004	5910-99-014-3089
CH2C107M035D	402/1/50030/006	5910-99-014-3092
CH2B686M035D	402/1/50029/005	5910-99-014-3091
CH2C157M025D	402/1/50030/007	5910-99-014-3094
CH2B107M025D	402/1/50029/006	5910-99-014-3093
CH2C227M015D	402/1/50030/008	5910-99-014-3096
CH2B157M015D	402/1/50029/007	5910-99-014-3095
CH2C337M006D	402/1/50030/009	5910-99-014-3098
CH2B227M006D	402/1/50029/008	5910-99-014-3097
CH2C477M003D	402/1/50030/010	5910-99-014-3100
CH2B337M003D	402/1/50029/009	5910-99-014-3099
CH2C476M075C	402/1/50032/004	5910-99-651-4349
CH2B336M075C	402/1/50031/003	5910-99-651-4348
CH2C686M050C	402/1/50032/005	5910-99-651-4347
CH2B476M050C	402/1/50031/004	5910-99-651-4346
CH2C107M035C	402/1/50032/006	5910-99-651-4345
CH2B686M035C	402/1/50031/005	5910-99-651-4344
CH2C157M025C	402/1/50032/007	5910-99-651-4343
CH2B107M025C	402/1/50031/006	5910-99-651-4342
CH2C227M015C	402/1/50032/008	5910-99-651-4341
CH2B157M015C	402/1/50031/007	5910-99-651-4340
CH2C337M006C	402/1/50032/009	5910-99-651-4339
CH2B227M006C	402/1/50031/008	5910-99-651-4338
CH2C477M003C	402/1/50032/010	5910-99-651-4337
CH2B337M003C	402/1/50031/009	5910-99-651-4336

Wet Tantalum Capacitor, Button, All-Tantalum Case, - 55 °C to + 125 °C Operation



INTRODUCTION

The design employs a non-solid electrolyte and a sintered tantalum anode.

The cathode is also of tantalum and overcomes the restriction of the silver cathode system in allowing a high ripple current rating and application of a 3 V reverse potential. This all-tantalum construction results in a non-catastrophic wear-out mechanism.

The seal is a high efficient system comprising a PTFE gasket clamped between coined plates of tantalum by a work-hardened nickel ring. This type of seal is common to all button styles it is largely responsible for their long life and high reliability and severe military environment.

APPLICATIONS

The CS2 series are designed as a direct replacement for the obsolete 'A' series, where there is no standard CA unit at the required capacitance, and voltage, or when the standard CA unit (8.5 mm) is not acceptable.

It should be noted that the upper category temperature of the CS2 unit is 125 °C for the 'A' unit.

WEIGHT

The approximate weights (in grams) for the CS2 capacitors is 14.5 g.

FEATURES

- All-Tantalum electrodes eliminate silver migration
- Withstands high ripple current
- Long life reliability
- Reverse voltage capability
- Replacement for "A" series range of silver cased buttons
- Mounting: Through-hole

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 125 °C

Voltage Range: 3 V_{DC} to 70 V_{DC}

Capacitance Range: 50 µF to 750 µF

SPECIFICATIONS

Environmental classification: 55/125/56

Vibration: 10 Hz to 2000 Hz, 0.75 mm or 98 m/s², 15 h

Bump: 390 m/s², 4000 bumps

Shock: 981 m/s²

Acceleration: 981 m/s²

Low air pressure: 1 kPa

REVERSE VOLTAGE CAPABILITY

The CS2 series employs tantalum cathodes which allow the continuous application of reverse potentials not exceeding 3 V over the whole temperature range.

SURGE VOLTAGE

The surge voltage capability is 115 % of the voltage rating at the relevant temperature.

TEMPERATURE RANGE

The capacitor is designed for operation between - 55 °C and + 125 °C, with linear voltage derating above + 85 °C to 66 % of the rated voltage at + 125 °C.

CAPACITANCE TOLERANCE

The standard capacitance tolerance is ± 20 % although special tolerances are available by arrangement.

APPLICATION INFORMATION

Capacitors may be operated at less than the rated voltage, resulting in significantly reduced leakage current values.

In timing circuits, or other applications where the device is subjected only to a DC voltage, the ballistic or DC capacitance will be somewhat larger than measured at 50 Hz.

The parametric information must necessarily be brief, although additional comprehensive data is available on request, and the tests tailored to customers' requirements can be made.

RELIABILITY

All capacitors are subjected to burn-in. This is to remove infant mortalities and ensure reliability. The capacitor lifetime is enhanced when the unit is subjected to a reduced ripple current, a low ambient temperature, and is externally cooled.

ORDERING PROCEDURE

Example: CS2C (220 μ F, 50 V_{DC})

Vishay Part Number: CS2C227M050P

ORDERING INFORMATION						
CS2	C	227	M	050	P	-
MODEL	CASE CODE	CAPACITANCE	TOLERANCE	VOLTAGE	TERMINATION AND PACKAGING	
	See Ratings and Case Codes Table	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow	M = 20 % (std) K = 10 % (special order)	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	A = Stud B = PC mount pins C = Twin tag or ribbon D = Panel or potting tag	Blank = Standard (tin/lead coating)

DIMENSIONS in millimeters

A	B max.	C	D	E	F	G	H	J	K crs.	L crs.	M dia.	N nom.	P	Q dia.	R	S	T dia.	U crs.	V dia.	W nom.
3.6	6.7	21.8	8.4 ⁽¹⁾	8.1	16.2	8.4	1.8	0.8	20.3	10.2	1.1	2.4	12.9	1.0	6.5	9.7	1.6	13.0	3.5	0.30

Notes

- All dimensions are in mm, and are maximum unless otherwise stated
- ⁽¹⁾ Width of anode tag 4.22 mm max.



STANDARD RATINGS										
VISHAY PART NUMBERS	CASE CODE	CAP. AT 50 Hz (μF)	DISSIPATION FACTOR AT 50 Hz (%)		MAX. ESR AT 25 °C 100 kHz (Ω)	MAX. ESR AT - 55 °C 100 kHz (Ω)	MAX. DCL AT 25 °C (μA)	MAX. DCL AT 125 °C (μA)	ΔC AT 50 Hz (%)	
			20 °C	125 °C					- 55 °C	125 °C
70 V_{DC} AT 85 °C; 54 V_{DC} AT 125 °C										
CS2B506(1)070(2)	B	50	5.0	-	1.0	5.0	3.0	50	10	-
30 V_{DC} AT 85 °C; 23 V_{DC} AT 125 °C										
CS2B147(1)030(2)	B	140	15	-	1.0	5.0	3.0	50	30	-
15 V_{DC} AT 85 °C; 11.3 V_{DC} AT 125 °C										
CS2B257(1)015(2)	B	250	25	-	1.0	5.0	3.0	50	50	-
6 V_{DC} AT 85 °C; 4.6 V_{DC} AT 125 °C										
CS2B507(1)006(2)	B	500	40	-	1.0	5.0	3.0	50	60	-
3 V_{DC} AT 85 °C; 2.3 V_{DC} AT 125 °C										
CS2B757(1)003(2)	B	750	50	-	1.0	5.0	3.0	50	75	-

Notes

- Part number definitions:
 - (1) Capacitance tolerance
 - M = 20 % standard
 - K = 10 % special order
 - (2) Termination type
 - A = Stud or bolt
 - B = Pins for PCB
 - C = Twin tags or ribbons
 - D = Potting tag

CROSS REFERENCE	
VISHAY PART NUMBER	ARCOTRONICS PART NUMBER
CS2 (STUD)	
CS2B506M070A	402/1/50159/001
CS2B147M030A	402/1/50159/002
CS2B257M015A	402/1/50159/004
CS2B507M006A	402/1/50159/007
CS2B757M003A	402/1/50159/005
Contact marketing ⁽¹⁾	402/1/50159/012
CS2 (PC PINS)	
CS2B506M070B	402/1/50175/001
CS2B147M030B	402/1/50175/002
CS2B257M015B	402/1/50175/004
CS2B507M006B	402/1/50175/007
CS2B757M003B	402/1/50175/005
Contact marketing ⁽¹⁾	402/1/50175/012
CS2 (TWIN TAGS)	
CS2B506M070C	402/1/50183/001
CS2B147M030C	402/1/50183/002
CS2B257M015C	402/1/50183/004
CS2B507M006C	402/1/50183/007
CS2B757M003C	402/1/50183/005
Contact marketing ⁽¹⁾	402/1/50183/012
CS2 (PANEL TAG)	
CS2B506M070D	402/1/50169/001
CS2B147M030D	402/1/50169/002
CS2B257M015D	402/1/50169/004
CS2B507M006D	402/1/50169/007
CS2B757M003D	402/1/50169/005
Contact marketing ⁽¹⁾	402/1/50169/012

Note

⁽¹⁾ Special tolerance of + 20 % to 0 %



Surface Mount Wet Tantalum Capacitor

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Wet Tantalum Capacitors Surface Mount, Molded Case



PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 85 °C
(to + 125 °C with voltage derating)

Capacitance Tolerance: At 120 Hz, + 25 °C, ± 20 % standard, ± 10 %

DC Leakage Current (DCL Max.): At + 25 °C and above: Leakage current shall not exceed the values listed in the Standard Ratings table.

Life Test: Capacitors are capable of withstanding a 2000 h life test at a temperature of + 85 °C or + 125 °C at the applicable rated DC working voltage.

Following life test:

1. DCL, measured at + 85 °C rated voltage, shall not be in excess of the original requirement.
2. The equivalent series resistance shall not exceed 150 % of the initial requirement.
3. Change in capacitance shall not exceed 10 % from the initial measurement.

FEATURES

- Terminations: standard tin/lead (SnPb), 100 % tin (RoHS compliant) terminations available
- Very high capacitance, 10 µF to 470 µF
6 V to 125 V, - 55 °C to + 125 °C
- Very low ESR
- High ripple current capability
- Low DCL
- Model M34 wet tantalum electrolytic chip capacitors incorporate the advantages of all the varieties of electrolytic capacitors and eliminate most of the disadvantages. These units have a transient reverse voltage capability and a higher ripple current capability than any other electrolytic type with similar combinations of capacitance and case size.
- Compliant to RoHS Directive 2002/95/EC



RoHS*
COMPLIANT

Note

* Pb containing terminations are not RoHS compliant, exemptions may apply

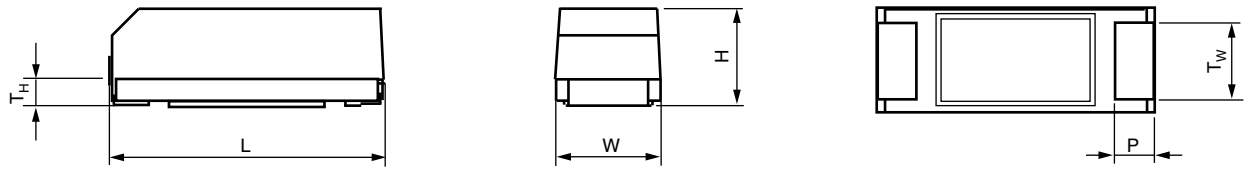
APPLICATION NOTES

- a) No continuous reverse voltage permissible.
- b) Transient reverse voltage surges are acceptable under the following conditions:
The peak reverse voltage does not exceed 1.5 V and the peak current times the duration of the reverse transient does not exceed 0.05 A. In addition, the repetition frequency of the reverse voltage surge is less than 10 Hz.
- c) The peak of the applied AC ripple and the applied DC voltage must not exceed the DC voltage rating of the capacitor.

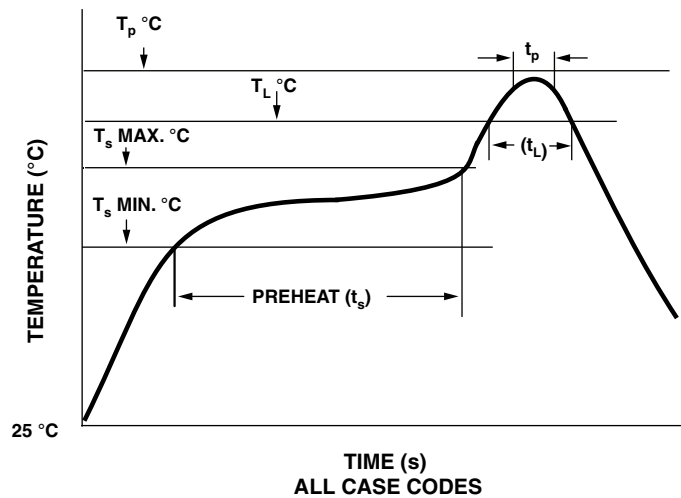
ORDERING INFORMATION								
M34	C	826	M	125	B	Z	S	S
MODEL	CASE CODE	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	TERMINATION AND PACKAGING	RELIABILITY LEVEL	TEMP	ESR
	See Ratings and Case Codes table	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow.	K = ± 10 % M = ± 20 %	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating.	A = 100 % tin (RoHS compliant), bulk B = Std, tin/lead, bulk	Z = Non-ER	S = Std.	S = Std.

Note

- Packaging: The use of formed plastic tubes for packing bulk components is standard

DIMENSIONS in inches [millimeters]


CASE CODE	L (MAX.)	W	H	P (MIN.)	T _w	T _H (MIN.)
C	0.835 [21.2]	0.315 ± 0.012 [8 ± 0.3]	0.295 ± 0.012 [7.5 ± 0.3]	0.118 [3.0]	0.236 ± 0.012 [6.0 ± 0.3]	0.075 [1.9]

RECOMMENDED REFLOW PROFILES


T _p	T _p	t _p	T _L	T _L	T _s MIN.	T _s MIN.	T _s MAX.	T _s MAX.	t _s	t _s	t _L
Lead (Pb)-free	Sn/Pb		Lead (Pb)-free	Sn/Pb	Lead (Pb)-free	Sn/Pb	Lead (Pb)-free	Sn/Pb	Lead (Pb)-free	Sn/Pb	
245 °C	220 °C	10	217 °C	183 °C	150 °C	100 °C	200 °C	150 °C	60 to 150	60 to 90	60

MOUNTING

Due to the size and weight of these capacitors, we recommend that a supplemental mounting restraint to be used in printed circuit board attachment in addition to the reflowed solder.

One recommendation is to use an adhesive such as defined in the J-STD-001DS.

This is the Space Application Electronic Hardware Addendum to J-STD-001 (Requirements for Solder Electrical and Electronic Assemblies).



STANDARD RATINGS											
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. ESR	MAX. ESR	MAX. DCL (μ A) AT		MAX. CAPACITANCE CHANGE (%) AT			MAX. RIPPLE 40 kHz RMS (mA)	
			AT +25 °C 120 Hz (Ω)	AT -55 °C 120 Hz (Ω)	+25 °C	+85 °C +125 °C	-55 °C	+85 °C	+125 °C		
6 V_{DC} AT +85 °C; 4 V_{DC} AT +125 °C											
470	C	M34C477(1)006(2)ZSS	0.9	12	1.0	3.0	-75	+10	+20	1500	
10 V_{DC} AT +85 °C; 7 V_{DC} AT +125 °C											
330	C	M34C337(1)010(2)ZSS	1.0	15	1.0	3.0	-70	+8	+20	1400	
15 V_{DC} AT +85 °C; 10 V_{DC} AT +125 °C											
150	C	M34C157(1)015(2)ZSS	1.1	25	1.0	3.0	-45	+8	+20	1400	
25 V_{DC} AT +85 °C; 15 V_{DC} AT +125 °C											
120	C	M34C127(1)025(2)ZSS	1.3	25	1.0	5.0	-42	+8	+12	1250	
30 V_{DC} AT +85 °C; 20 V_{DC} AT +125 °C											
100	C	M34C107(1)030(2)ZSS	1.3	25	1.0	5.0	-38	+8	+12	1200	
50 V_{DC} AT +85 °C; 30 V_{DC} AT +125 °C											
68	C	M34C686(1)050(2)ZSS	1.5	35	1.0	5.0	-25	+8	+15	1050	
60 V_{DC} AT +85 °C; 40 V_{DC} AT +125 °C											
47	C	M34C476(1)060(2)ZSS	2.0	44	1.0	5.0	-25	+8	+12	1050	
75 V_{DC} AT +85 °C; 50 V_{DC} AT +125 °C											
33	C	M34C336(1)075(2)ZSS	2.5	66	1.0	5.0	-25	+5	+9	1050	
100 V_{DC} AT +85 °C; 65 V_{DC} AT +125 °C											
15	C	M34C156(1)100(2)ZSS	3.5	125	1.0	5.0	-18	+3	+10	1050	
125 V_{DC} AT +85 °C; 85 V_{DC} AT +125 °C											
10	C	M34C106(1)125(2)ZSS	5.5	175	1.0	5.0	-15	+3	+10	1050	

Note

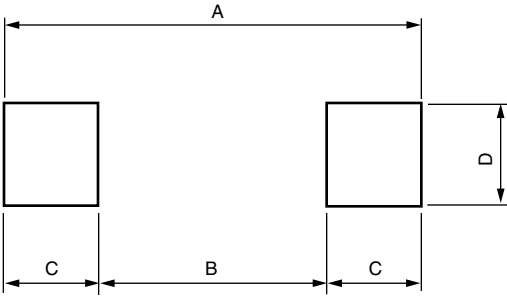
- Part number definitions:
 - (1) Capacitance tolerance: K, M
 - (2) Termination/packaging: A = 100 % tin (RoHS compliant), bulk; B = Std, tin/lead, bulk
- Reliability level: Z = Non-ER
- Temperature: S = STD
- ESR: S = STD

PERFORMANCE CHARACTERISTICS OF M34 CAPACITORS

ELECTRICAL CHARACTERISTICS	
ITEM	PERFORMANCE CHARACTERISTICS
Operating temperature range	-55 °C to +125 °C
Capacitor tolerance	$\pm 20\%$, $\pm 10\%$, at 120 Hz
Capacitance change (maximum)	Limits per standard ratings table
ESR	Limits per standard ratings table
AC ripple current	Limits per standard ratings table
DCL (maximum leakage current)	Limits per standard ratings table
Impedance (maximum)	Limits per standard ratings table
Reverse voltage	Reverse voltage shall be in accordance with DSCC drawing 93026. There shall be no continuous reverse voltage. Transient reverse voltage surges are acceptable under the following conditions: <ul style="list-style-type: none"> a) Peak reverse voltage is equal to or less than 1.5 V and the product of the peak current times the duration of the reverse transient is 0.05 A or less. b) The repetition rate of the reverse voltage surges is less than 10 Hz.
Surge voltage	Surge voltage shall be in accordance with MIL-PRF-39006 and Table II of DSCC93026. The DC rated surge voltage is the maximum voltage to which the capacitors should be subjected under any conditions. This includes transients and ripple at the highest line voltage. The surge voltage is 115 % of rated DC working voltage.
Life test	The capacitors shall be capable of withstanding a 2000 h life test at 85 °C at rated voltage

ENVIRONMENTAL CHARACTERISTICS		
ITEM	CONDITION	COMMENTS
Hermeticity	MIL-PRF-39006	There shall be no evidence of leakage after testing to MIL-PRF-39006 specifications.
Moisture resistance	MIL-PRF-39006	Tested in accordance to MIL-PRF-39006 for 30 cycles.
Altitude	MIL-STD-202G, method 105 D	100 000 feet test

MECHANICAL CHARACTERISTICS		
ITEM	CONDITION	COMMENTS
Thermal shock	MIL-STD-202G, method 107 A	Per M39006 and DSCC93026, 30 cycles
Shock	MIL-STD-202G, method 213 I	Per M39006 and DSCC93026, 100 g
Vibration (high frequency)	MIL-STD-202G, method 204 D	Per M39006 and DSCC93026, 20 g
Resistance to solder heat	MIL-STD-202G, method 210 F	Terminals at 260 °C for 10 s. The capacitor must not be visibly damaged and the electrical characteristics must not be affected.
Solderability	ANSI J-STD-002	The terminations must be solderable per the MIL standard.
Terminals	MIL-STD-1276	All terminals shall be permanently secured internally and externally, as applicable. All external joints shall be welded.
Part markings	MIL-STD-1285	The part marking shall include Vishay name, trademark, capacitance, voltage, date code and lot symbol.
Weight (typical) in g	3.5	

PAD DIMENSIONS in millimeters				
				
CASE CODE	A (MIN.)	B (NOM.)	C (NOM.)	D (NOM.)
C	22.7	14.7	4.0	6.4

STANDARD PACKAGING QUANTITY		
SERIES	CASE CODE	BULK/TUBE
M34	C	10 pcs

Wet Tantalum Capacitors Surface Mount, Molded Case



FEATURES

- Molded surface mountable design
- Terminations: standard tin/lead (SnPb), 100 % tin (RoHS compliant) available
- Industry standard ratings
- Model M35 wet tantalum electrolytic chip capacitors incorporate the advantages of all the varieties of electrolytic capacitors and eliminate most of the disadvantages. These units have a 3 V reverse voltage capability at + 85 °C and a higher ripple current capability than any other electrolytic type with similar combinations of capacitance and case size.
- Compliant to RoHS Directive 2002/95/EC


RoHS*
COMPLIANT

Note

* Pb containing terminations are not RoHS compliant, exemptions may apply

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 85 °C (to + 125 °C with voltage derating)

Capacitance Tolerance: At 120 Hz, + 25 °C. ± 20 % standard. ± 10 %, ± 5 % available as special.

DC Leakage Current (DCL Max.): At + 25 °C and above: Leakage current shall not exceed the values listed in the Standard Ratings Tables.

Life Test: Capacitors are capable of withstanding a 2000 h life test at a temperature of + 85 °C or + 125 °C at the applicable rated DC working voltage.

Following life test:

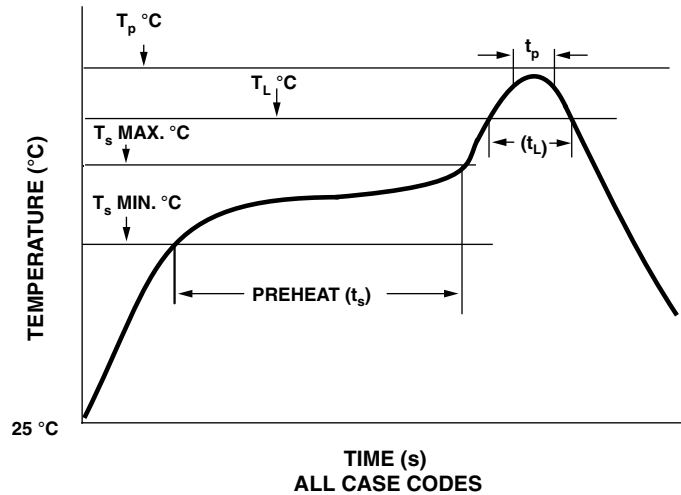
1. DCL, measured at + 85 °C rated voltage, shall not be in excess of the original requirement.
2. The equivalent series resistance shall not exceed 150 % of the initial requirement.
3. Change in capacitance shall not exceed 10 % from the initial measurement.

ORDERING INFORMATION									
M35	C	826	M	125	B	Z	S	L	
MODEL	CASE CODE	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	TERMINATION AND PACKAGING	RELIABILITY LEVEL	TEMP	ESR	
	See Ratings and Case Codes table	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow.	K = ± 10 % M = ± 20 %	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	A = 100 % tin (RoHS compliant), bulk B = Std, tin/lead, bulk	Z = Non-ER	S = Std	S = Std. L = Low	

Note

- Packaging: The use of formed plastic tubes for packing bulk components is standard

DIMENSIONS in inches [millimeters]						
CASE CODE	L (MAX.)	W	H	P (MIN.)	T _w	T _H (MIN.)
C	0.835 [21.2]	0.315 ± 0.012 [8 ± 0.3]	0.295 ± 0.012 [7.5 ± 0.3]	0.118 [3.0]	0.236 ± 0.012 [6.0 ± 0.3]	0.075 [1.9]

RECOMMENDED REFLOW PROFILES


ALL CASE CODES

T_p Lead (Pb)-free	T_p Sn/Pb	t_p	T_L Lead (Pb)-free	T_L Sn/Pb	T_s MIN. Lead (Pb)-free	T_s MIN. Sn/Pb	T_s MAX. Lead (Pb)-free	T_s MAX. Sn/Pb	t_s Lead (Pb)-free	t_s Sn/Pb	t_L
260 °C	240 °C	10	217 °C	183 °C	150 °C	100 °C	200 °C	150 °C	60 to 150	60 to 90	60

MOUNTING

Due to the size and weight of these capacitors, we recommend that a supplemental mounting restraint to be used in printed circuit board attachment in addition to the reflowed solder.

One recommendation is to use an adhesive such as defined in the J-STD-001DS.

This is the Space Application Electronic Hardware Addendum to J-STD-001 (Requirements for Solder Electrical and Electronic Assemblies).

STANDARD RATINGS

CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. ESR AT + 25 °C	MAX. ESR AT - 55 °C	MAX. DCL (μ A) AT		MAX. CAPACITANCE CHANGE (%) AT			MAX. RIPPLE 40 kHz RMS (mA)
					+ 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
6 V_{DC} AT + 85 °C; 4 V_{DC} AT + 125 °C										
30	C	M35C306(1)006(2)ZS(3)	4.0	100	1.0	2.0	- 40	+ 10.5	+ 12	820
68	C	M35C686(1)006(2)ZS(3)	3.2	60	1.0	2.0	- 40	+ 14	+ 16	960
220	C	M35C227(1)006(2)ZS(3)	3.0	36	2.0	9.0	- 64	+ 13	+ 16	1000
8 V_{DC} AT + 85 °C; 5 V_{DC} AT + 125 °C										
25	C	M35C256(1)008(2)ZS(3)	4.0	100	1.0	2.0	- 40	+ 10.5	+ 12	820
56	C	M35C566(1)008(2)ZS(3)	3.3	59	1.0	2.0	- 40	+ 14	+ 16	900
180	C	M35C187(1)008(2)ZS(3)	3.0	45	2.0	9.0	- 60	+ 13	+ 16	1000
10 V_{DC} AT + 85 °C; 7 V_{DC} AT + 125 °C										
20	C	M35C206(1)010(2)ZS(3)	4.0	120	1.0	2.0	- 32	+ 10.5	+ 12	820
47	C	M35C476(1)010(2)ZS(3)	3.7	90	1.0	2.0	- 36	+ 14	+ 16	855
120	C	M35C127(1)010(2)ZS(3)	3.2	54	2.0	6.0	- 40	+ 14	+ 16	900
150	C	M35C157(1)010(2)ZS(3)	3.0	54	2.0	9.0	- 55	+ 13	+ 16	900

Note

- Part number definitions:
 - Capacitance tolerance: K, M
 - Termination/packaging: (see Ordering Information)
 - Reliability level: Z = Non-ER
 - Temperature: S = STD
 - ESR: S = STD, L = Low (1/2 standard ESR value)



STANDARD RATINGS											
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. ESR AT + 25 °C	MAX. ESR AT - 55 °C	MAX. DCL (μ A) AT		MAX. CAPACITANCE CHANGE (%) AT			MAX. RIPPLE 40 kHz RMS (mA)	
					+ 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C		
15 V_{DC} AT + 85 °C; 10 V_{DC} AT + 125 °C											
15	C	M35C156(1)015(2)ZS(3)	4.4	155	1.0	2.0	- 24	+ 10.5	+ 12	780	
33	C	M35C336(1)015(2)ZS(3)	4.0	90	1.0	2.0	- 28	+ 14	+ 16	820	
82	C	M35C826(1)015(2)ZS(3)	3.9	72	2.0	6.0	- 35	+ 12	+ 16	900	
100	C	M35C107(1)015(2)ZS(3)	3.9	72	2.0	9.0	- 44	+ 13	+ 16	900	
25 V_{DC} AT + 85 °C; 15 V_{DC} AT + 125 °C											
10	C	M35C106(1)025(2)ZS(3)	5.3	220	1.0	2.0	- 16	+ 8	+ 9	715	
22	C	M35C226(1)025(2)ZS(3)	4.2	140	1.0	2.0	- 20	+ 10.5	+ 12	800	
56	C	M35C566(1)025(2)ZS(5)	4.3	90	2.0	6.0	- 25	+ 12	+ 15	850	
68	C	M35C686(1)025(2)ZS(5)	4.3	90	2.0	9.0	- 40	+ 12	+ 15	850	
30 V_{DC} AT + 85 °C; 20 V_{DC} AT + 125 °C											
8	C	M35C805(1)030(2)ZS(3)	6.6	275	1.0	2.0	- 16	+ 8	+ 12	640	
15	C	M35C156(1)030(2)ZS(3)	6.2	175	1.0	2.0	- 20	+ 10.5	+ 12	780	
47	C	M35C476(1)030(2)ZS(3)	5.2	100	2.0	6.0	- 23	+ 12	+ 15	800	
56	C	M35C566(1)030(2)ZS(3)	5.2	100	2.0	9.0	- 38	+ 12	+ 15	800	
35 V_{DC} AT + 85 °C; 22 V_{DC} AT + 125 °C											
15	C	M35C156(1)035(2)ZS(3)	6.2	175	0.75	1.5	- 20	+ 10.5	+ 12	660	
39	C	M35C396(1)035(2)ZS(3)	4.1	61	2.0	6.0	- 22	+ 12	+ 14	820	
50 V_{DC} AT + 85 °C; 30 V_{DC} AT + 125 °C											
5	C	M35C505(1)050(2)ZS(3)	8.0	400	1.0	2.0	- 16	+ 5	+ 6	580	
10	C	M35C106(1)050(2)ZS(3)	6.4	250	1.0	2.0	- 24	+ 8	+ 9	715	
33	C	M35C336(1)050(2)ZS(3)	5.0	135	2.0	9.0	- 29	+ 10	+ 12	700	
60 V_{DC} AT + 85 °C; 40 V_{DC} AT + 125 °C											
4	C	M35C405(1)060(2)ZS(3)	9.3	550	1.0	2.0	- 16	+ 5	+ 6	525	
8.2	C	M35C825(1)060(2)ZS(3)	6.6	275	1.0	2.0	- 24	+ 8	+ 9	625	
27	C	M35C276(1)060(2)ZS(3)	5.0	144	3.0	12	- 24	+ 10	+ 12	700	
75 V_{DC} AT + 85 °C; 50 V_{DC} AT + 125 °C											
3.5	C	M35C355(1)075(2)ZS(3)	9.5	650	1.0	2.0	- 16	+ 5	+ 6	525	
6.8	C	M35C685(1)075(2)ZS(3)	6.8	300	1.0	2.0	- 20	+ 8	+ 9	610	
22	C	M35C226(1)075(2)ZS(3)	5.1	157	3.0	12	- 19	+ 10	+ 12	600	
100 V_{DC} AT + 85 °C; 65 V_{DC} AT + 125 °C											
2.5	C	M35C255(1)100(2)ZS(3)	10.6	950	1.0	2.0	- 16	+ 7	+ 8	505	
4.7	C	M35C475(1)100(2)ZS(3)	8.5	500	1.0	2.0	- 16	+ 7	+ 8	565	
10	C	M35C106(1)100(2)ZS(3)	5.9	200	3.0	12	- 17	+ 10	+ 12	800	
125 V_{DC} AT + 85 °C; 85 V_{DC} AT + 125 °C											
1.7	C	M35C175(1)125(2)ZS(3)	15.6	1250	1.0	2.0	- 16	+ 7	+ 8	415	
3.6	C	M35C365(1)125(2)ZS(3)	10.0	600	1.0	2.0	- 16	+ 7	+ 8	520	
6.8	C	M35C685(1)125(2)ZS(3)	11.7	300	3.0	12	- 14	+ 10	+ 12	700	

Note

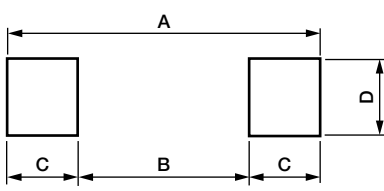
- Part number definitions:
 - Capacitance tolerance: K, M
 - Termination/packaging: (see Ordering Information)
 - Reliability level: Z = Non-ER
 Temperature: S = STD
- ESR: S = STD, L = Low (1/2 standard ESR value)

PERFORMANCE CHARACTERISTICS OF M35 CAPACITORS

ELECTRICAL CHARACTERISTICS	
ITEM	PERFORMANCE CHARACTERISTICS
Operating temperature range	- 55 °C to + 125 °C
Capacitor tolerance	± 20 %, ± 10 % at 120 Hz
Capacitance change (maximum)	Limits per Standard Ratings table. Measured per requirements of MIL-PRF-39006.
ESR	
AC ripple current	
DCL (maximum leakage current)	
Impedance (maximum)	
Reverse voltage	Reverse voltage shall be in accordance with MIL-PRF-39006/22. Units are capable of withstanding 3 V in reverse at + 85 °C for 125 h.
Surge voltage	Surge voltage shall be in accordance with MIL-PRF-39006. The DC rated surge voltage is the maximum voltage to which the capacitors should be subjected under any conditions. This includes transients and peak ripple at the highest line voltage. The surge voltage is 115 % of rated DC working voltage.
Life test	The capacitors shall be capable of withstanding a 2000 h life test at 85 °C at rated voltage.

ENVIRONMENTAL CHARACTERISTICS		
ITEM	CONDITION	COMMENTS
Hermeticity	MIL-PRF-39006	The internal component has been tested to be compliant to the hermeticity requirements of MIL-PRF-39006/22. The internal component has been tested to be compliant to the moisture resistance requirements of MIL-PRF-39006/22. The internal component has been tested to be compliant to the altitude or reduced barometric pressure requirements of MIL-PRF-39006/22 (150 000 feet).
Moisture resistance	MIL-PRF-39006	
Altitude/barometric pressure (reduced)	MIL-PRF-39006	

MECHANICAL CHARACTERISTICS		
ITEM	CONDITION	COMMENTS
Thermal shock	MIL-STD-202, Method 107, A	Per MIL-PRF-39006, 30 cycles
Shock	MIL-STD-202, Method 213	Per MIL-PRF-39006, 500 g
Vibration (high frequency)	MIL-STD-202, Method 204	Per MIL-PRF-39006, 80 g
Vibration (random)	MIL-STD-202, Method 214	Per MIL-PRF-39006, 53.79 g
Resistance to solder heat	MIL-STD-202, Method 210	The capacitor must withstand solder dipping of the terminals at 260 °C for 10 s. The capacitor must not be visibly damaged and the electrical characteristics must not be affected.
Solderability	ANSI J-STD-002	The terminations must be solderable per the requirements of MIL-PRF-55365 para. 4.10
Part markings	MIL-STD-1285	The part marking shall include Vishay name, trademark, capacitance, voltage, date code and lot symbol.
Weight (typical) in g	3.5	

PAD DIMENSIONS in millimeters				
				
CASE CODE	A (MIN.)	B (NOM.)	C (NOM.)	D (NOM.)
C	22.7	14.7	4.0	6.4

STANDARD PACKAGING QUANTITY		
SERIES	CASE CODE	BULK/TUBE
M35	C	10 pcs



Tantalum Military

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DSCC 93026 SuperTan® Wet Tantalum Capacitors



Vishay's DSCC 93026 capacitor represents a major breakthrough in wet tantalum technology. Its unique cathode system provides the highest capacitance per unit volume. The design facilitates a doubling of capacitance, lower ESR and higher ripple current rating compared with conventional wet tantalum products. Moreover, the DSCC 93026 has the capacitance stability of a solid tantalum capacitor and there are no circuit impedance restrictions.

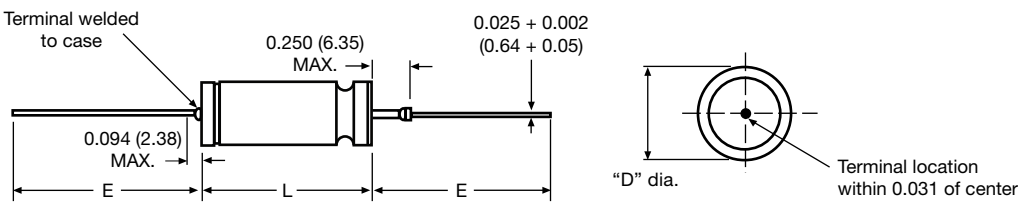
The DSCC 93026 is housed in an all tantalum, hermetically sealed case and is manufactured to withstand hazardous environments. The DSCC 93026 is used widely in the defense and aerospace industries and whenever there is a space problem.

FEATURES

- Terminations: Standard tin/lead (Sn/Pb)
- Very high capacitance
- 10 μF to 1800 μF
- 25 V_{DC} to 125 V_{DC}
- - 55 $^{\circ}\text{C}$ to + 125 $^{\circ}\text{C}$
- Very low ESR
- High ripple current
- All tantalum case
- Hermetically sealed
- Low DCL

APPLICATION NOTES

- No continuous reverse voltage permissible.
- The peak of the applied AC ripple and the applied DC voltage must not exceed the DC voltage rating of the capacitor.
- Ripple current ratings by part number at 85 $^{\circ}\text{C}$ and 40 kHz are included in the table. Ripple current correction factors for other temperatures and frequencies are given on the next page.
- Transient reverse voltage surges are acceptable under the following conditions:
The peak reverse voltage does not exceed 1.5 V and the peak current times the duration of the reverse transient does not exceed 0.05 As. In addition, the repetition frequency of the reverse voltage surge is less than 10 Hz.

DIMENSIONS in inches [millimeters]				
				
CASE CODE	D MAX. INSULATED	D \pm 0.016 (0.41)	L + 0.031 (0.79) UNINSULATED	E \pm 0.250 (6.35) MAX.
T1	0.219 (5.56)	0.188 (4.78)	0.453 (11.51)	1.500 (38.10)
T2	0.312 (7.92)	0.281 (7.14)	0.641 (16.28)	2.250 (57.15)
L2	0.312 (7.92)	0.281 (7.14)	1.008 (25.60)	2.250 (57.15)
T3	0.406 (10.31)	0.375 (9.52)	0.766 (19.46)	2.250 (57.15)
T4	0.406 (10.31)	0.375 (9.52)	1.062 (26.97)	2.250 (57.15)

Notes

- Material at egress is tantalum
- Insulation sleeving will lap over the ends of the capacitor case
- Tinned nickel leads, solderable and weldable
- Approx. weight
T1: 2.3 g, T2: 5.7 g
T3: 9.4 g, T4: 14.8 g



ORDERING INFORMATION			
93026	-29	K	S
DSCC DRAWING NUMBER	DASH NUMBER	CAPACITANCE TOLERANCE	Sleeved/Un sleeved
		K = ± 10 % M = ± 20 %	S = Sleeved U = Unsleeved

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	DRAWING NO. 93026
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STANDARD RATINGS										
CAPACITANCE AT 25 °C 120 Hz (µF)	CASE CODE	MAX. ESR 120 Hz (Ω)	MAX. DCL (µA)		MAX. IMP. AT - 55 °C 120 Hz (Ω)	MAX. CAPACITANCE CHANGE (%)			AC RIPPLE 85 °C 40 kHz (mA) RMS	PART NUMBER
			25 °C	85 °C/ 125 °C		- 55 °C	85 °C	125 °C		
25 V_{DC} AT 85 °C; 15 V_{DC} AT 125 °C										
120	T1	1.3	1	5	25	- 42	+ 8	+ 12	1250	93026-29(1)(2)
560	T2	0.83	2	10	12	- 65	+ 10	+ 15	2100	93026-30(1)(2)
1100	L2	0.5	3	25	7	- 60	+ 20	+ 45	3200	93026-57(1)(2)
1200	T3	0.65	5	20	7	- 70	+ 12	+ 18	2600	93026-31(1)(2)
1800	T4	0.5	6	25	7	- 75	+ 12	+ 20	3100	93026-32(1)(2)
30 V_{DC} AT 85 °C; 20 V_{DC} AT 125 °C										
100	T1	1.3	1	5	25	- 38	+ 8	+ 12	1200	93026-33(1)(2)
470	T2	0.85	2	10	15	- 65	+ 10	+ 18	1800	93026-34(1)(2)
950	L2	0.5	5	30	7	- 55	+ 18	+ 35	3200	93026-58(1)(2)
1000	T3	0.7	7	25	7	- 70	+ 10	+ 18	2500	93026-35(1)(2)
1500	T4	0.6	12	35	6	- 72	+ 10	+ 20	3000	93026-36(1)(2)
50 V_{DC} AT 85 °C; 30 V_{DC} AT 125 °C										
68	T1	1.5	1	5	35	- 25	+ 8	+ 15	1050	93026-37(1)(2)
220	T2	0.9	2	10	17.5	- 50	+ 8	+ 15	1800	93026-38(1)(2)
450	L2	0.6	3	25	7.5	- 45	+ 12	+ 30	2900	93026-59(1)(2)
470	T3	0.75	3	25	10	- 50	+ 8	+ 15	2100	93026-39(1)(2)
680	T4	0.7	5	40	8	- 58	+ 10	+ 20	2750	93026-40(1)(2)
60 V_{DC} AT 85 °C; 40 V_{DC} AT 125 °C										
47	T1	2.0	1	5	44	- 25	+ 8	+ 12	1050	93026-41(1)(2)
150	T2	1.1	2	10	20	- 40	+ 8	+ 15	1650	93026-42(1)(2)
370	L2	0.6	3	25	9	- 33	+ 9	+ 20	2900	93026-60(1)(2)
390	T3	0.9	3	25	15	- 60	+ 8	+ 15	2100	93026-43(1)(2)
560	T4	0.8	5	40	10	- 58	+ 8	+ 15	2750	93026-44(1)(2)
75 V_{DC} AT 85 °C; 50 V_{DC} AT 125 °C										
33	T1	2.5	1	5	66	- 25	+ 5	+ 9	1050	93026-45(1)(2)
110	T2	1.3	2	10	24	- 35	+ 6	+ 10	1650	93026-46(1)(2)
250	L2	0.8	5	30	12	- 30	+ 6	+ 15	2500	93026-61(1)(2)
330	T3	1.0	3	30	12	- 45	+ 6	+ 10	2100	93026-47(1)(2)
470	T4	0.9	5	50	12	- 55	+ 6	+ 10	2750	93026-48(1)(2)

Note

- Part number definitions:
 - (1) Capacitance tolerance. K = 10 %, M = 20 %
 - (2) Case or body insulation. S = Sleeved, U = Unsleeved



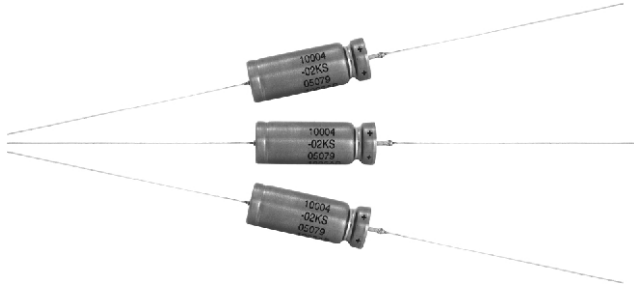
STANDARD RATINGS										
CAPACITANCE AT 25 °C 120 Hz (μ F)	CASE CODE	MAX. ESR 120 Hz (Ω)	MAX. DCL (μ A)		MAX. IMP. AT - 55 °C 120 Hz (Ω)	MAX. CAPACITANCE CHANGE (%)			AC RIPPLE 85 °C 40 kHz (mA) RMS	PART NUMBER
			25 °C	85 °C/ 125 °C		- 55 °C	85 °C	125 °C		
100 V_{DC} AT 85 °C; 65 V_{DC} AT 125 °C										
15	T1	3.5	1	5	125	- 18	+ 3	+ 10	1050	93026-49(1)(2)
68	T2	2.1	2	10	37	- 30	+ 4	+ 12	1650	93026-50(1)(2)
120	L2	1.0	3	25	20.5	- 30	+ 4	+ 12	2200	93026-62(1)(2)
150	T3	1.6	3	25	22	- 35	+ 6	+ 12	2100	93026-51(1)(2)
220	T4	1.2	5	50	15	- 40	+ 6	+ 12	2750	93026-52(1)(2)
125 V_{DC} AT 85 °C; 85 V_{DC} AT 125 °C										
10	T1	5.5	1	5	175	- 15	+ 3	+ 10	1050	93026-53(1)(2)
47	T2	2.3	2	10	47	- 25	+ 5	+ 12	1650	93026-54(1)(2)
90	L2	1.3	5	25	25	- 22	+ 4	+ 15	2000	93026-63(1)(2)
100	T3	1.8	3	25	35	- 35	+ 5	+ 12	2100	93026-55(1)(2)
150	T4	1.6	5	50	20	- 35	+ 6	+ 12	2750	93026-56(1)(2)

Note

- Part number definitions:
 - Capacitance tolerance. K = 10 %, M = 20 %
 - Case or body insulation. S = Sleeved, U = Unsleeved

RIPPLE CURRENT MULTIPLIERS VERSUS FREQUENCY, TEMPERATURE AND APPLIES PEAK VOLTAGE																									
FREQUENCY OF APPLIED RIPPLE CURRENT		120 Hz				800 Hz				1 kHz				10 kHz				40 kHz				100 kHz			
		\leq 55	85	105	125	\leq 55	85	105	125	\leq 55	85	105	125	\leq 55	85	105	125	\leq 55	85	105	125	\leq 55	85	105	125
% of 85 °C rated peak voltage	100 %	0.60	0.39	-	-	0.71	0.43	-	-	0.72	0.46	-	-	0.88	0.55	-	-	1.0	0.63	-	-	1.1	0.69	-	-
	90 %	0.60	0.46	-	-	0.71	0.55	-	-	0.72	0.55	-	-	0.88	0.67	-	-	1.0	0.77	-	-	1.1	0.85	-	-
	80 %	0.60	0.52	0.35	-	0.71	0.62	0.42	-	0.72	0.62	0.42	-	0.88	0.76	0.52	-	1.0	0.87	0.59	-	1.1	0.96	0.65	-
	70 %	0.60	0.58	0.44	-	0.71	0.69	0.52	-	0.72	0.70	0.52	-	0.88	0.85	0.64	-	1.0	0.97	0.73	-	1.1	1.07	0.80	-
	66 2/3 %	0.60	0.60	0.46	0.27	0.71	0.71	0.55	0.32	0.72	0.72	0.55	0.32	0.88	0.88	0.68	0.40	1.0	1.0	0.77	0.45	1.1	1.1	0.85	0.50

SuperTan® Extended (10004) Capacitors, Wet Tantalum Capacitors with Hermetic Seal



FEATURES

Vishay SuperTan® Extended (10004) represents a major breakthrough in wet tantalum capacitor technology. Its unique cathode system, also used in the ST, provides the highest capacitance per unit volume available. The 10004 combines the inherent reliability of wet tantalum with the capacitance stability of solid tantalum, and there are no circuit impedance restrictions. The range is exceptionally well suited for low voltage filtering and energy storage applications. Ideal for designs targeting the military and aerospace industry.

The SuperTan Extended (10004) is housed in an all tantalum, hermetically sealed case and is manufactured to withstand high stress and hazardous environments.

- Axial through-hole terminations: Standard tin/lead (Sn/Pb)

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 85 °C (to + 125 °C with voltage derating)

Capacitance Tolerance: At 120 Hz, + 25 °C. ± 20 % standard. ± 10 % available as special.

DC Leakage Current (DCL Max.): At + 25 °C and above: Leakage current shall not exceed the values listed in the Standard Ratings Tables.

Life Test: Capacitors are capable of withstanding a 2000 h life test at a temperature of + 85 °C at the applicable rated DC working voltage.

ORDERING INFORMATION			
<u>10004</u> DSCC DRAWING NUMBER	<u>-29</u> DASH NUMBER	<u>K</u> CAPACITANCE TOLERANCE	<u>S</u>
		K = ± 10 % M = ± 20 %	S = Sleeved U = Unsleeved
DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO		Drawing no. 10004	

DIMENSIONS in inches [millimeters]				
CASE CODE	D ± 0.016 [0.41]	MAX. INSULATED (DIA.)	L ₁ + 0.031 [0.79] UNINSULATED	E ± 0.250 [6.35] MAX.
T1	0.188 [4.78]	0.219 [5.56]	0.453 [11.51]	1.500 [38.10]
T2	0.281 [7.14]	0.312 [7.92]	0.641 [16.28]	2.250 [57.15]
T3	0.375 [9.52]	0.406 [10.31]	0.766 [19.46]	2.250 [57.15]
T4	0.375 [9.52]	0.406 [10.31]	1.062 [26.97]	2.250 [57.15]

Notes

- Material at egress is Tantalum
- Insulation sleeving will lap over the ends of the capacitor case
- Tinned nickel leads, solderable and weldable
- Approx. weight: T1: 2.3 g, T2: 5.7 g, T3: 9.4 g, T4: 14.8 g



STANDARD RATINGS													
CAPACITANCE (μ F)	VOLTAGE	CASE CODE	MAX. ESR AT		MAX. DCL AT			MAX. CAPACITANCE CHANGE AT			Z - 55 °C (Ω)	AC RIPPLE 85 °C 40 kHz mA RMS	PART NUMBER
			120 Hz (Ω)	1 kHz (Ω)	+ 25 °C (μ A)	+ 85 °C/ + 125 °C (μ A)	- 55 °C (%)	+ 85 °C (%)	+ 125 °C (%)				
10 V _{DC} AT + 85 °C, SURGE = 11.5 V _{DC} ; 7 V _{DC} AT + 125 °C													
4700	10	T3	0.35	< 0.200	16	100	- 80	10	20	3.50	4000	10004-01(1)(2)	
10 000	10	T4	0.25	< 0.100	25	150	- 85	20	35	3.00	5000	10004-02(1)(2)	
16 V _{DC} AT + 85 °C, SURGE = 18.4 V _{DC} ; 11 V _{DC} AT + 125 °C													
3300	16	T3	0.35	< 0.200	16	100	- 80	10	15	3.50	4000	10004-03(1)(2)	
6000	16	T4	0.30	< 0.150	25	150	- 80	15	20	3.00	4500	10004-04(1)(2)	
25 V _{DC} AT + 85 °C, SURGE = 28.8 V _{DC} ; 15 V _{DC} AT + 125 °C													
4000	25	T4	0.35		25	125	- 80	15	20	5.00	4250	10004-05(1)(2)	
30 V _{DC} AT + 85 °C, SURGE = 34.5 V _{DC} ; 20 V _{DC} AT + 125 °C													
3300	30	T4	0.35	< 0.200	25	125	- 80	20	25	4.00	2750	10004-06(1)(2)	
35 V _{DC} AT + 85 °C, SURGE = 40.3 V _{DC} ; 22 V _{DC} AT + 125 °C													
2500	35	T4	<i>Preliminary value, contact marketing</i>									n/a	
50 V _{DC} AT + 85 °C, SURGE = 57.5 V _{DC} ; 30 V _{DC} AT + 125 °C													
1500	50	T4	0.35	< 0.215	15	110	- 70	20	20	6.00	3500	10004-08(1)(2)	
2200	50	T4	0.60	< 0.400	25	125	- 80	25	30	4.50	3000	10004-15(1)(2)	
60 V _{DC} AT + 85 °C, SURGE = 69 V _{DC} ; 40 V _{DC} AT + 125 °C													
1000	60	T4	0.50	< 0.300	20	120	- 40	10	15	5.50	3500	10004-09(1)(2)	
75 V _{DC} AT + 85 °C, SURGE = 86.3 V _{DC} ; 50 V _{DC} AT + 125 °C													
180	75	T2	1.50	< 0.500	5	25	- 35	15	20	30.00	2000	10004-10(1)(2)	
470	75	T3	0.60	< 0.325	25	100	- 45	10	25	10.00	3000	10004-11(1)(2)	
750	75	T4	0.50	< 0.400	20	120	- 35	10	15	6.50	3500	10004-12(1)(2)	
100 V _{DC} AT + 85 °C, SURGE = 115 V _{DC} ; 65 V _{DC} AT + 125 °C													
400	100	T4	0.70	< 0.400	10	120	- 40	6	12	15.00	3000	10004-13(1)(2)	
125 V _{DC} AT + 85 °C, SURGE = 144 V _{DC} ; 85 V _{DC} AT + 125 °C													
240	125	T4	0.80	< 0.600	15	150	- 35	6	12	20.00	2500	10004-14(1)(2)	

Note

- Part number definitions:
 - (1) K = 10 %
 - M = 20 %
 - (2) D = sleeved or insulated
 - U = unsleeved

RIPPLE CURRENT MULTIPLIERS VS. FREQUENCY, TEMPERATURE AND APPLIES PEAK VOLTAGE																									
FREQUENCY OF APPLIED RIPPLE CURRENT	120 Hz				800 Hz				1 kHz				10 kHz				40 kHz				100 kHz				
	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	
% of 85 °C rated peak voltage	100 %	0.60	0.39	-	-	0.71	0.43	-	-	0.72	0.46	-	-	0.88	0.55	-	-	1.0	0.63	-	-	1.1	0.69	-	-
	90 %	0.60	0.46	-	-	0.71	0.55	-	-	0.72	0.55	-	-	0.88	0.67	-	-	1.0	0.77	-	-	1.1	0.85	-	-
	80 %	0.60	0.52	0.35	-	0.71	0.62	0.42	-	0.72	0.62	0.42	-	0.88	0.76	0.52	-	1.0	0.87	0.59	-	1.1	0.96	0.65	-
	70 %	0.60	0.58	0.44	-	0.71	0.69	0.52	-	0.72	0.70	0.52	-	0.88	0.85	0.64	-	1.0	0.97	0.73	-	1.1	1.07	0.80	-
	66 2/3 %	0.60	0.60	0.46	0.27	0.71	0.71	0.55	0.32	0.72	0.72	0.55	0.32	0.88	0.88	0.68	0.40	1.0	1.0	0.77	0.45	1.1	1.1	0.85	0.50



Wet Tantalum Capacitors, Tantalum-Case with Glass-to-Tantalum Hermetic Seal for - 55 °C to + 125 °C Operation



FEATURES

Vishay's DSCC 10011 capacitor represents a major breakthrough in wet tantalum technology for high-energy applications. The unique case design provides for the highest capacitance per unit volume. Vishay's DSCC 10011 capacitor also utilizes the proven hybrid technology of our SuperTan® product.

Vishay's DSCC 10011 capacitor is housed in an all tantalum, hermetically sealed case, and is manufactured to withstand high stress and hazardous environments. The Vishay design provides a unique double seal for improved reliability and performance.

Vishay's DSCC 10011 capacitor is of the same basic design and construction as the Vishay HE3 high energy capacitor series, datasheet 42089.

PERFORMANCE CHARACTERISTICS

Operating Temperature:

- 55 °C to + 85 °C (to + 125 °C with voltage derating)

Capacitance Tolerance:

At 120 Hz, + 25 °C ± 20 % standard

DC Leakage Current (DCL Max.):

At + 25 °C: Leakage current shall not exceed the values listed in the Standard Ratings tables.

Life Test:

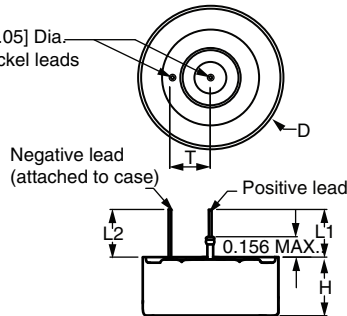
Capacitors are capable of withstanding a 1000 h life test at a temperature of + 85 °C at the applicable rated DC working voltage.

ORDERING INFORMATION	
<u>10011</u>	<u>-01</u>
DSCC DRAWING NUMBER	DASH NUMBER

Defense Supply Center, Columbus Columbus, Ohio	Drawing Number 10011
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DIMENSIONS in inches [millimeters]

0.0253 ± 0.002 [0.64 ± 0.05] Dia.
(No. 22 AWG) Tinned Nickel leads
solderable and weldable



CASE CODE	D	HEIGHT	L2 (MIN.)	L1 (MIN.)	T	WEIGHT (g) (TYPICAL)
TYPE DSCC 10011						
A	1.400 ± 0.005 [35.56 ± 0.127]	0.350 ± 0.015 [8.89 ± 0.381]	0.500 [12.70]	0.500 [12.70]	0.40 ± 0.015 [10.2 ± 0.38]	48.0
B	1.400 ± 0.005 [35.56 ± 0.127]	0.488 ± 0.015 [15.60 ± 0.381]	0.500 [12.70]	0.500 [12.70]	0.40 ± 0.015 [10.2 ± 0.38]	73.0
C	1.400 ± 0.005 [35.56 ± 0.127]	0.615 ± 0.015 [15.6 ± 0.4]	0.500 [12.70]	0.500 [12.70]	0.40 ± 0.015 [10.2 ± 0.38]	95.0

STANDARD RATINGS

CAPACITANCE (μF)	CASE CODE	MAX. ESR AT + 25 °C MAX. 1 kHz (Ω)	MAX. DCL AT + 25 °C (μA)	PART NUMBER
25 V_{DC} AT + 85 °C; 15 V_{DC} AT + 125 °C				
24 000	A	0.060	150	10011-05
18 000	A	0.060	150	10011-06
48 000	B	0.045	200	10011-03
36 000	B	0.045	200	10011-04
72 000	C	0.035	350	10011-01
54 000	C	0.035	300	10011-02
50 V_{DC} AT + 85 °C; 30 V_{DC} AT + 125 °C				
8000	A	0.060	170	10011-09
16 000	B	0.045	270	10011-08
24 000	C	0.035	400	10011-07
63 V_{DC} AT + 85 °C; 40 V_{DC} AT + 125 °C				
4000	A	0.060	170	10011-12
8000	B	0.045	270	10011-11
12 000	C	0.035	400	10011-10
80 V_{DC} AT + 85 °C; 50 V_{DC} AT + 125 °C				
3000	A	0.075	300	10011-16
6000	B	0.060	400	10011-15
9000	C	0.040	500	10011-13
100 V_{DC} AT + 85 °C; 65 V_{DC} AT + 125 °C				
1900 ⁽¹⁾	A	0.075	300	10011-
3800 ⁽¹⁾	B	0.06	400	10011-
5700 ⁽¹⁾	C	0.05	500	10011-
125 V_{DC} AT + 85 °C; 85 V_{DC} AT + 125 °C				
1100 ⁽¹⁾	A	0.100	300	10011-
2200 ⁽¹⁾	B	0.085	400	10011-
3300 ⁽¹⁾	C	0.075	500	10011-

Note

⁽¹⁾ Preliminary rating and electrical values. Contact marketing for availability.



PERFORMANCE CHARACTERISTICS OF HIGH ENERGY CAPACITORS

ELECTRICAL PERFORMANCE CHARACTERISTICS	
ITEM	PERFORMANCE CHARACTERISTICS
Operating temperature range	- 55 °C to + 85 °C (to + 125 °C with voltage derating)
Capacitor tolerance	± 20 % at 120 Hz
ESR	Limits per Standard Ratings table
DC leakage current (DCL max.)	At 25 °C the leakage current shall not exceed values listed in the Standard Rating table.
Reverse voltage	No continuous reverse voltage permitted
Surge voltage	The test shall be at 1000 cycles at 110 % of rated voltage at 85 °C. A cycle consists of a 30 s charge and a 330 s discharge through 100 W resistor.
Life test at + 85 °C	1000 h at + 85 °C

ENVIRONMENTAL CHARACTERISTICS		
ITEM	TEST AND CONDITIONS	COMMENTS
Hermeticity	MIL-STD-202, method 112 C/IIIa	The capacitor shall be hermetically sealed such that the case does not leak electrolyte or vent any gas when exposed to a vacuum.
Moisture resistance	MIL-STD-202, method 106	6 V polarity
Altitude	MIL-STD-202, method 105 C, test condition D	100 000 feet test

MECHANICAL PERFORMANCE CHARACTERISTICS		
ITEM	TEST AND CONDITIONS	COMMENTS
Thermal shock	MIL-STD-202, method 107 G	Test condition A
Shock	MIL-STD-202, method 213 B test condition G	11 ms, 50 g
Vibration - high frequency	MIL-STD-202, method 204 D test condition D	12 sweeps/axis, 20 g peak
Vibration - random	MIL-STD-202, method 214 A test condition I, D	1.5 h/axis, 12 g
Resistance to solder heat	MIL-STD-202, method 210 F	The capacitor must withstand solder dipping of the terminals at 260 °C for 10 s. The capacitor must not be visibly damaged and the electrical characteristics must not be affected.
Solderability	MIL-STD-202, method 208	
Terminal strength	MIL-STD-202, method 211 A	The capacitor terminals must withstand a 5 pound pull test for 5 s to 10 s. The capacitor must not be visibly damaged and the electrical characteristics must not be affected.
Resistance to solvents	MIL-STD-202, method 215 J	The capacitor shall be permanently and legibly marked on the circumference of the case. The markings shall be resistant to solvents.
Weight (mass)		See dimensions table

DSCC 10011 MOUNTING OPTIONS

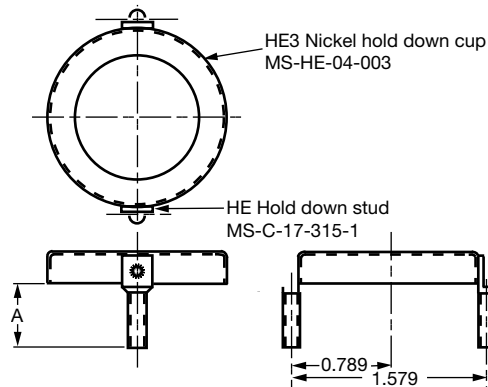
The DSCC 10011 capacitor can be mounted with many commercially available methods. Vishay offers the optional mounting hardware outlined below.

THROUGH-HOLE

If mounted through-hole, the glass-to-metal seal must be protected from potential mounting and application stress. The HE3 can be mounted termination down through the HE3 SPC001 spacer into the PCB. The proper size bracket HE3BKT00* can then be utilized to hold the DSCC 10011 rigidly to the PCB.

TERMINATIONS UP

If mounted with terminations facing up for attachment to wiring, the spacer is not needed. The DSCC 10011 can be reverse with terminations facing upward through the center of the HE3BKT00* bracket, which is then mounted through the PCB.



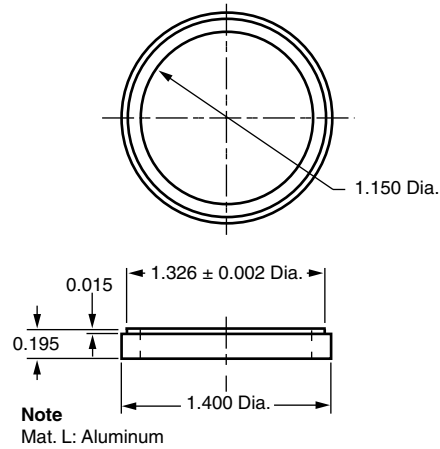
Notes

- Spot weld, 2 places
- Mounting bolt:
 1. Material - Stainless steel
 2. Thread - 6-32 NC-2A

PART NUMBER ⁽¹⁾	STUD	A ± 0.010
HE3BKT001	HE3A	0.391
HE3BKT002	HE3B	0.518
HE3BKT003	HE3C	0.605
HE3BKT004	HE3A W/spacer	0.572
HE3BKT005	HE3B W/spacer	0.699
HE3BKT006	HE3C W/spacer	0.831

Note

⁽¹⁾ The part numbers shown are for ordering the mounting bracket and/or spacer. The DSCC 10011 capacitor must be ordered separately using the correct part number as outlined in Ordering Information and in the Standard Ratings table.

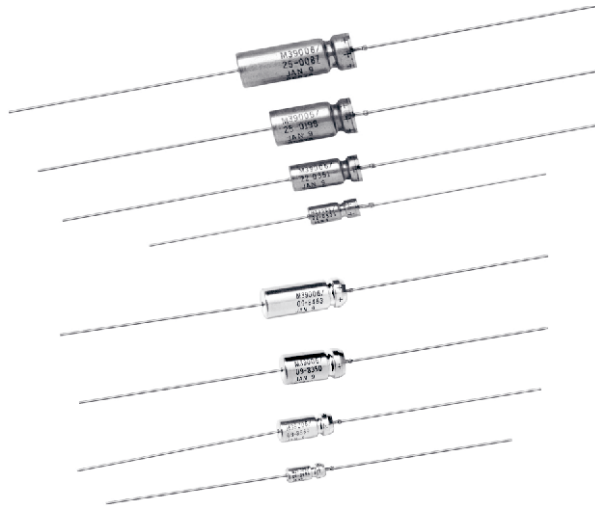


PART NUMBER ⁽¹⁾
HE3SPC001

Note

⁽¹⁾ The part numbers shown are for ordering the mounting bracket and/or spacer. The HE3 capacitor must be ordered separately using the correct part number as outlined in Ordering Information and in the Standard Ratings table.

**Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016**



FEATURES

- Screened for space level applications
- Tantalum case, hermetically sealed, axial leaded
- Screened M39006/22/25/30/31 capacitors
 - “R” or 0.001 %/1000 failure rate
 - “H” or high shock and vibration rated
 - Enhanced 100 % or group A testing
 - Enhanced production lot testing - Group b prior to shipment
- Stability
- Thermal shock
- 1000 h life at + 85 °C

CROSS REFERENCE		
DSCC DRAWING	MIL SPECIFICATION	STYLE
DSCC 06013	M39006/22	CLR79
DSCC 06014	M39006/25	CLR81
DSCC 06015	M39006/30	CLR90
DSCC 06016	M39006/31	CLR91

Established Reliability “Space Level” Wet Tantalum Capacitors:

In accordance with the DSCC drawings, all parts are up-screened from “R” failure rate, “H” characteristic, MIL-PRF-39006/22/25/30/31 capacitors. Parts are marked with the appropriate DSCC drawing number and PIN (dash number). For information on the exact performance of these capacitors, please refer to the latest issue of the DSCC drawing and appropriate military specification.

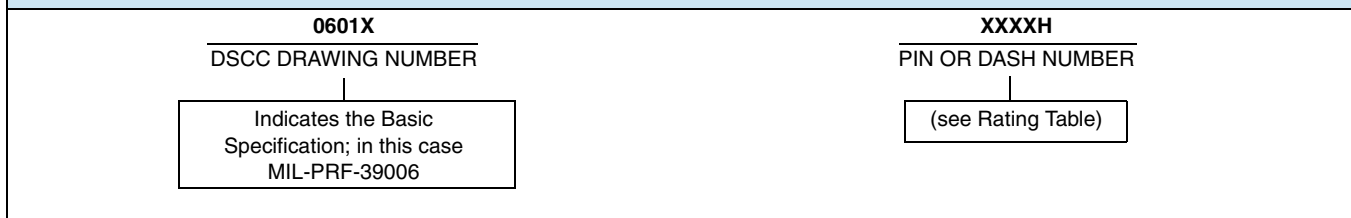
DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016



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Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016

ORDERING INFORMATION

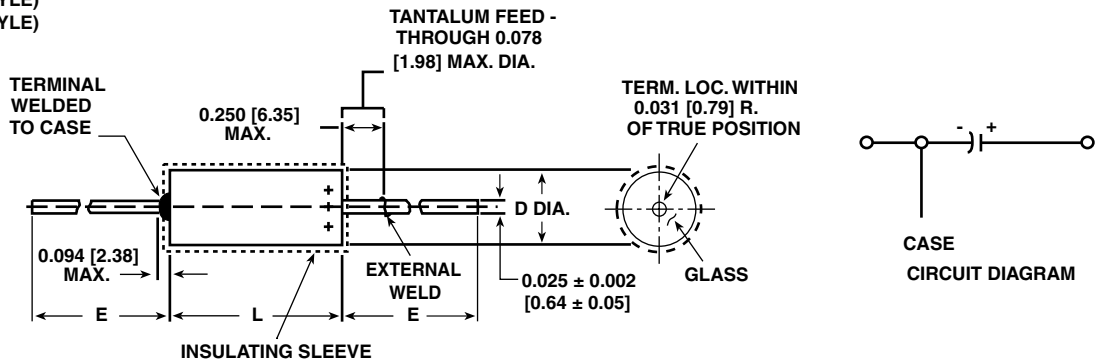


Note

- Material in this section has been abstracted from DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016.

DIMENSIONS in inches [millimeters]

DSCC 06013 (CLR79 STYLE)
DSCC 06014 (CLR81 STYLE)
DSCC 06015 (CLR90 STYLE)
DSCC 06016 (CLR91 STYLE)



CASE CODE	BARE CASE		WITH INSULATING SLEEVE		E LEAD LENGTH	WEIGHT (oz./g) (Max.)
	D	L	D (Max.)	L (Max.)		
T1	0.188 ± 0.016 [4.78 ± 0.41]	0.453 + 0.031 - 0.016 [11.51 + 0.79 - 0.41]	0.219 [5.56]	0.515 [13.08]	1.500 ± 0.250 [38.10 ± 6.35]	0.09 [2.6]
T2	0.281 ± 0.016 [7.14 ± 0.41]	0.641 + 0.031 - 0.016 [16.28 + 0.79 - 0.41]	0.312 [7.92]	0.704 [17.88]	2.250 ± 0.250 [57.15 ± 6.35]	0.22 [6.2]
T3	0.375 ± 0.016 [9.53 ± 0.41]	0.766 + 0.031 - 0.016 [19.46 + 0.79 - 0.41]	0.406 [10.31]	0.828 [21.03]	2.250 ± 0.250 [57.15 ± 6.35]	0.41 [11.6]
T4	0.375 ± 0.016 [9.53 ± 0.41]	1.062 + 0.031 - 0.016 [26.97 + 0.79 - 0.41]	0.406 [10.31]	1.126 [28.60]	2.250 ± 0.250 [57.15 ± 6.35]	0.62 [17.7]



DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016

Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016

Vishay

STANDARD RATINGS: DSCC 06013											
CAPACITANCE (μF)	CASE CODE	CAP. TOL. (\pm %)	PIN for DSCC 06013 (1)	MAX. DCL (μA) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX. RIPPLE CURRENT at + 85 °C 40 kHz (mA) (2)
				+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C	
6 WV_{DC} at + 85 °C . . . 4 WV_{DC} at + 125 °C											
30.0	T1	20	0441H	1.0	2.0	9	100	- 40	+ 10.5	+ 12	820
30.0	T1	10	0442H	1.0	2.0	9	100	- 40	+ 10.5	+ 12	820
30.0	T1	5	0443H	1.0	2.0	9	100	- 40	+ 10.5	+ 12	820
68.0	T1	20	0444H	1.0	2.0	15	60	- 40	+ 14	+ 16	960
68.0	T1	10	0445H	1.0	2.0	15	60	- 40	+ 14	+ 16	960
68.0	T1	5	0446H	1.0	2.0	15	60	- 40	+ 14	+ 16	960
140.0	T2	20	0447H	1.0	3.0	21	40	- 40	+ 14	+ 16	1200
140.0	T2	10	0448H	1.0	3.0	21	40	- 40	+ 14	+ 16	1200
140.0	T2	5	0449H	1.0	3.0	21	40	- 40	+ 14	+ 16	1200
270.0	T2	20	0450H	1.0	6.5	45	25	- 44	+ 17.5	+ 20	1375
270.0	T2	10	0451H	1.0	6.5	45	25	- 44	+ 17.5	+ 20	1375
270.0	T2	5	0452H	1.0	6.5	45	25	- 44	+ 17.5	+ 20	1375
330.0	T3	20	0453H	2.0	7.9	36	20	- 44	+ 14	+ 16	1800
330.0	T3	10	0454H	2.0	7.9	36	20	- 44	+ 14	+ 16	1800
330.0	T3	5	0455H	2.0	7.9	36	20	- 44	+ 14	+ 16	1800
560.0	T3	20	0456H	2.0	13.0	55	25	- 64	+ 17.5	+ 20	1900
560.0	T3	10	0457H	2.0	13.0	55	25	- 64	+ 17.5	+ 20	1900
560.0	T3	5	0458H	2.0	13.0	55	25	- 64	+ 17.5	+ 20	1900
1200.0	T4	20	0459H	3.0	14.0	90	20	- 80	+ 25	+ 25	2265
1200.0	T4	10	0460H	3.0	14.0	90	20	- 80	+ 25	+ 25	2265
8 WV_{DC} at + 85 °C . . . 5 WV_{DC} at + 125 °C											
25.0	T1	20	0461H	1.0	2.0	7.5	100	- 40	+ 10.5	+ 12	820
25.0	T1	10	0462H	1.0	2.0	7.5	100	- 40	+ 10.5	+ 12	820
25.0	T1	5	0463H	1.0	2.0	7.5	100	- 40	+ 10.5	+ 12	820
56.0	T1	20	0464H	1.0	2.0	14	59	- 40	+ 14	+ 16	900
56.0	T1	10	0465H	1.0	2.0	14	59	- 40	+ 14	+ 16	900
56.0	T1	5	0466H	1.0	2.0	14	59	- 40	+ 14	+ 16	900
120.0	T2	20	0467H	1.0	2.0	20	50	- 44	+ 17.5	+ 20	1220
120.0	T2	10	0468H	1.0	2.0	20	50	- 44	+ 17.5	+ 20	1220
120.0	T2	5	0469H	1.0	2.0	20	50	- 44	+ 17.5	+ 20	1220
220.0	T2	20	0470H	1.0	7.0	37	30	- 44	+ 17.5	+ 20	1370
220.0	T2	10	0471H	1.0	7.0	37	30	- 44	+ 17.5	+ 20	1370
220.0	T2	5	0472H	1.0	7.0	37	30	- 44	+ 17.5	+ 20	1370
290.0	T3	20	0473H	2.0	6.0	34	25	- 64	+ 17.5	+ 20	1770
290.0	T3	10	0474H	2.0	6.0	34	25	- 64	+ 17.5	+ 20	1770
290.0	T3	5	0475H	2.0	6.0	34	25	- 64	+ 17.5	+ 20	1770
430.0	T3	20	0476H	2.0	14.0	46	25	- 64	+ 17.5	+ 20	1825
430.0	T3	10	0477H	2.0	14.0	46	25	- 64	+ 17.5	+ 20	1825
430.0	T3	5	0478H	2.0	14.0	46	25	- 64	+ 17.5	+ 20	1825
850.0	T4	20	0479H	4.0	16.0	60	22	- 80	+ 25	+ 25	2330
850.0	T4	10	0480H	4.0	16.0	60	22	- 80	+ 25	+ 25	2330
10 WV_{DC} at + 85 °C . . . 7 WV_{DC} at + 125 °C											
20.0	T1	20	0481H	1.0	2.0	6	175	- 32	+ 10.5	+ 12	820
20.0	T1	10	0482H	1.0	2.0	6	175	- 32	+ 10.5	+ 12	820
20.0	T1	5	0483H	1.0	2.0	6	175	- 32	+ 10.5	+ 12	820
47.0	T1	20	0484H	1.0	2.0	13	100	- 36	+ 14	+ 16	855
47.0	T1	10	0485H	1.0	2.0	13	100	- 36	+ 14	+ 16	855
47.0	T1	5	0486H	1.0	2.0	13	100	- 36	+ 14	+ 16	855
100.0	T2	20	0487H	1.0	4.0	15	60	- 36	+ 14	+ 16	1200
100.0	T2	10	0488H	1.0	4.0	15	60	- 36	+ 14	+ 16	1200
100.0	T2	5	0489H	1.0	4.0	15	60	- 36	+ 14	+ 16	1200
180.0	T2	20	0490H	1.0	7.0	30	40	- 36	+ 14	+ 16	1365

Notes

- (1) Dash number will include the letter "H" to indicate the vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages and frequencies, see "Ripple Current" table.

DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016



Vishay

Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016

STANDARD RATINGS: DSCC 06013											
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PIN for DSCC 06013 (1)	MAX. DCL (μ A) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX. (2) RIPPLE CURRENT at + 85 °C 40 kHz (mA)
				+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C	
10 WV_{DC} at + 85 °C . . . 7 WV_{DC} at + 125 °C											
180.0	T2	10	0491H	1.0	7.0	30	40	- 36	+ 14	+ 16	1365
180.0	T2	5	0492H	1.0	7.0	30	40	- 36	+ 14	+ 16	1365
250.0	T3	20	0493H	2.0	10.0	30	30	- 40	+ 14	+ 16	1720
250.0	T3	10	0494H	2.0	10.0	30	30	- 40	+ 14	+ 16	1720
250.0	T3	5	0495H	2.0	10.0	30	30	- 40	+ 14	+ 16	1720
390.0	T3	20	0496H	2.0	16.0	44	25	- 64	+ 17.5	+ 20	1800
390.0	T3	10	0497H	2.0	16.0	44	25	- 64	+ 17.5	+ 20	1800
390.0	T3	5	0498H	2.0	16.0	44	25	- 64	+ 17.5	+ 20	1800
750.0	T4	20	0499H	4.0	16.0	50	23	- 80	+ 25	+ 25	2360
750.0	T4	10	0500H	4.0	16.0	50	23	- 80	+ 25	+ 25	2360
15 WV_{DC} at + 85 °C . . . 10 WV_{DC} at + 125 °C											
15.0	T1	20	0501H	1.0	2.0	5	155	- 24	+ 10.5	+ 12	780
15.0	T1	10	0502H	1.0	2.0	5	155	- 24	+ 10.5	+ 12	780
15.0	T1	5	0503H	1.0	2.0	5	155	- 24	+ 10.5	+ 12	780
33.0	T1	20	0504H	1.0	2.0	10	90	- 28	+ 14	+ 16	820
33.0	T1	10	0505H	1.0	2.0	10	90	- 28	+ 14	+ 16	820
33.0	T1	5	0506H	1.0	2.0	10	90	- 28	+ 14	+ 16	820
70.0	T2	20	0507H	1.0	4.0	13	75	- 28	+ 14	+ 16	1150
70.0	T2	10	0508H	1.0	4.0	13	75	- 28	+ 14	+ 16	1150
70.0	T2	5	0509H	1.0	4.0	13	75	- 28	+ 14	+ 16	1150
120.0	T2	20	0510H	1.0	7.0	18	50	- 28	+ 17.5	+ 20	1450
120.0	T2	10	0511H	1.0	7.0	18	50	- 28	+ 17.5	+ 20	1450
120.0	T2	5	0512H	1.0	7.0	18	50	- 28	+ 17.5	+ 20	1450
170.0	T3	20	0513H	2.0	10.0	25	35	- 32	+ 14	+ 16	1480
170.0	T3	10	0514H	2.0	10.0	25	35	- 32	+ 14	+ 16	1480
170.0	T3	5	0515H	2.0	10.0	25	35	- 32	+ 14	+ 16	1480
270.0	T3	20	0516H	2.0	16.0	32	30	- 56	+ 17.5	+ 20	1740
270.0	T3	10	0517H	2.0	16.0	32	30	- 56	+ 17.5	+ 20	1740
270.0	T3	5	0518H	2.0	16.0	32	30	- 56	+ 17.5	+ 20	1740
540.0	T4	20	0519H	6.0	24.0	40	23	- 80	+ 25	+ 25	2330
540.0	T4	10	0520H	6.0	24.0	40	23	- 80	+ 25	+ 25	2330
25 WV_{DC} at + 85 °C . . . 15 WV_{DC} at + 125 °C											
10.0	T1	20	0521H	1.0	2.0	4	220	- 16	+ 8	+ 9	715
10.0	T1	10	0522H	1.0	2.0	4	220	- 16	+ 8	+ 9	715
10.0	T1	5	0523H	1.0	2.0	4	220	- 16	+ 8	+ 9	715
22.0	T1	20	0524H	1.0	2.0	6.6	140	- 20	+ 10.5	+ 12	825
22.0	T1	10	0525H	1.0	2.0	6.6	140	- 20	+ 10.5	+ 12	825
22.0	T1	5	0526H	1.0	2.0	6.6	140	- 20	+ 10.5	+ 12	825
50.0	T2	20	0527H	1.0	2.0	11.0	70	- 28	+ 13	+ 15	1130
50.0	T2	10	0528H	1.0	2.0	11.0	70	- 28	+ 13	+ 15	1130
50.0	T2	5	0529H	1.0	2.0	11.0	70	- 28	+ 13	+ 15	1130
100.0	T2	20	0530H	1.0	10.0	15	50	- 28	+ 13	+ 15	1435
100.0	T2	10	0531H	1.0	10.0	15	50	- 28	+ 13	+ 15	1435
100.0	T2	5	0532H	1.0	10.0	15	50	- 28	+ 13	+ 15	1435
120.0	T3	20	0533H	2.0	6.0	21	38	- 32	+ 13	+ 15	1450
120.0	T3	10	0534H	2.0	6.0	21	38	- 32	+ 13	+ 15	1450
120.0	T3	5	0535H	2.0	6.0	21	38	- 32	+ 13	+ 15	1450
180.0	T3	20	0536H	2.0	18.0	26	32	- 48	+ 13	+ 15	1525
180.0	T3	10	0537H	2.0	18.0	26	32	- 48	+ 13	+ 15	1525
180.0	T3	5	0538H	2.0	18.0	26	32	- 48	+ 13	+ 15	1525
350.0	T4	20	0539H	7.0	28.0	35	24	- 70	+ 25	+ 25	1970
350.0	T4	10	0540H	7.0	28.0	35	24	- 70	+ 25	+ 25	1970

Notes

- (1) Dash number will include the letter "H" to indicate the vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages and frequencies, see "Ripple Current" table.



DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016

Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016

Vishay

STANDARD RATINGS: DSCC 06013											
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PIN for DSCC 06013 (1)	MAX. DCL (μ A) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX. (2) RIPPLE CURRENT at + 85 °C 40 kHz (mA)
				+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C	
30 WV_{DC} at + 85 °C . . . 20 WV_{DC} at + 125 °C											
8.0	T1	20	0541H	1.0	2.0	4	275	- 16	+ 8	+ 12	640
8.0	T1	10	0542H	1.0	2.0	4	275	- 16	+ 8	+ 12	640
8.0	T1	5	0543H	1.0	2.0	4	275	- 16	+ 8	+ 12	640
15.0	T1	20	0544H	1.0	2.0	5	175	- 20	+ 10.5	+ 12	780
15.0	T1	10	0545H	1.0	2.0	5	175	- 20	+ 10.5	+ 12	780
15.0	T1	5	0546H	1.0	2.0	5	175	- 20	+ 10.5	+ 12	780
40.0	T2	20	0547H	1.0	5.0	10	65	- 24	+ 10.5	+ 12	1120
40.0	T2	10	0548H	1.0	5.0	10	65	- 24	+ 10.5	+ 12	1120
40.0	T2	5	0549H	1.0	5.0	10	65	- 24	+ 10.5	+ 12	1120
68.0	T2	20	0550H	1.0	8.0	13	60	- 24	+ 13	+ 15	1285
68.0	T2	10	0551H	1.0	8.0	13	60	- 24	+ 13	+ 15	1285
68.0	T2	5	0552H	1.0	8.0	13	60	- 24	+ 13	+ 15	1285
100.0	T3	20	0553H	2.0	12.0	17	40	- 28	+ 10.5	+ 12	1450
100.0	T3	10	0554H	2.0	12.0	17	40	- 28	+ 10.5	+ 12	1450
100.0	T3	5	0555H	2.0	12.0	17	40	- 28	+ 10.5	+ 12	1450
150.0	T3	20	0556H	2.0	18.0	23	35	- 48	+ 13	+ 15	1525
150.0	T3	10	0557H	2.0	18.0	23	35	- 48	+ 13	+ 15	1525
150.0	T3	5	0558H	2.0	18.0	23	35	- 48	+ 13	+ 15	1525
300.0	T4	20	0559H	8.0	32.0	31	25	- 60	+ 25	+ 25	1950
300.0	T4	10	0560H	8.0	32.0	31	25	- 60	+ 25	+ 25	1950
50 WV_{DC} at + 85 °C . . . 30 WV_{DC} at + 125 °C											
5.0	T1	20	0561H	1.0	2.0	3	400	- 16	+ 5	+ 6	580
5.0	T1	10	0562H	1.0	2.0	3	400	- 16	+ 5	+ 6	580
5.0	T1	5	0563H	1.0	2.0	3	400	- 16	+ 5	+ 6	580
10.0	T1	20	0564H	1.0	2.0	4	250	- 24	+ 8	+ 9	715
10.0	T1	10	0565H	1.0	2.0	4	250	- 24	+ 8	+ 9	715
10.0	T1	5	0566H	1.0	2.0	4	250	- 24	+ 8	+ 9	715
25.0	T2	20	0567H	1.0	5.0	8	95	- 20	+ 10.5	+ 12	1005
25.0	T2	10	0568H	1.0	5.0	8	95	- 20	+ 10.5	+ 12	1005
25.0	T2	5	0569H	1.0	5.0	8	95	- 20	+ 10.5	+ 12	1005
47.0	T2	20	0570H	1.0	9.0	11	70	- 28	+ 13	+ 15	1155
47.0	T2	10	0571H	1.0	9.0	11	70	- 28	+ 13	+ 15	1155
47.0	T2	5	0572H	1.0	9.0	11	70	- 28	+ 13	+ 15	1155
60.0	T3	20	0573H	2.0	12.0	12	45	- 16	+ 10.5	+ 12	1335
60.0	T3	10	0574H	2.0	12.0	12	45	- 16	+ 10.5	+ 12	1335
60.0	T3	5	0575H	2.0	12.0	12	45	- 16	+ 10.5	+ 12	1335
82.0	T3	20	0576H	2.0	16.0	15	45	- 32	+ 13	+ 15	1400
82.0	T3	10	0577H	2.0	16.0	15	45	- 32	+ 13	+ 15	1400
82.0	T3	5	0578H	2.0	16.0	15	45	- 32	+ 13	+ 15	1400
160.0	T4	20	0579H	8.0	32.0	17	27	- 50	+ 25	+ 25	1900
160.0	T4	10	0580H	8.0	32.0	17	27	- 50	+ 25	+ 25	1900
60 WV_{DC} at + 85 °C . . . 40 WV_{DC} at + 125 °C											
4.0	T1	20	0581H	1.0	2.0	2.8	550	- 16	+ 5	+ 6	525
4.0	T1	10	0582H	1.0	2.0	2.8	550	- 16	+ 5	+ 6	525
4.0	T1	5	0583H	1.0	2.0	2.8	550	- 16	+ 5	+ 6	525
8.2	T1	20	0584H	1.0	2.0	4	275	- 24	+ 8	+ 9	625
8.2	T1	10	0585H	1.0	2.0	4	275	- 24	+ 8	+ 9	625
8.2	T1	5	0586H	1.0	2.0	4	275	- 24	+ 8	+ 9	625
20.0	T2	20	0587H	1.0	5.0	7	105	- 16	+ 10.5	+ 12	930
20.0	T2	10	0588H	1.0	5.0	7	105	- 16	+ 10.5	+ 12	930
20.0	T2	5	0589H	1.0	5.0	7	105	- 16	+ 10.5	+ 12	930
39.0	T2	20	0590H	1.0	9.0	10	90	- 28	+ 10.5	+ 12	1110

Notes

- (1) Dash number will include the letter "H" to indicate the vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages and frequencies, see "Ripple Current" table.

DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016



Vishay

Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016

STANDARD RATINGS: DSCC 06013											
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PIN for DSCC 06013 (1)	MAX. DCL (μ A) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX.(2) RIPPLE CURRENT at + 85 °C 40 kHz (mA)
				+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C	
60 WV_{DC} at + 85 °C . . . 40 WV_{DC} at + 125 °C											
39.0	T2	10	0591H	1.0	9.0	10	90	- 28	+ 10.5	+ 12	1110
39.0	T2	5	0592H	1.0	9.0	10	90	- 28	+ 10.5	+ 12	1110
50.0	T3	20	0593H	2.0	12.0	10	50	- 16	+ 10.5	+ 12	1330
50.0	T3	10	0594H	2.0	12.0	10	50	- 16	+ 10.5	+ 12	1330
50.0	T3	5	0595H	2.0	12.0	10	50	- 16	+ 10.5	+ 12	1330
68.0	T3	20	0596H	2.0	16.0	13	50	- 32	+ 10.5	+ 12	1365
68.0	T3	10	0597H	2.0	16.0	13	50	- 32	+ 10.5	+ 12	1365
68.0	T3	5	0598H	2.0	16.0	13	50	- 32	+ 10.5	+ 12	1365
140.0	T4	20	0599H	8.0	32.0	16	28	- 40	+ 20	+ 20	1850
140.0	T4	10	0600H	8.0	32.0	16	28	- 40	+ 20	+ 20	1850
75 WV_{DC} at + 85 °C . . . 50 WV_{DC} at + 125 °C											
3.5	T1	20	0601H	1.0	2.0	2.5	650	- 16	+ 5	+ 6	525
3.5	T1	10	0602H	1.0	2.0	2.5	650	- 16	+ 5	+ 6	525
3.5	T1	5	0603H	1.0	2.0	2.5	650	- 16	+ 5	+ 6	525
6.8	T1	20	0604H	1.0	2.0	3.5	300	- 20	+ 8	+ 9	610
6.8	T1	10	0605H	1.0	2.0	3.5	300	- 20	+ 8	+ 9	610
6.8	T1	5	0606H	1.0	2.0	3.5	300	- 20	+ 8	+ 9	610
15.0	T2	20	0607H	1.0	5.0	6	150	- 16	+ 8	+ 9	890
15.0	T2	10	0608H	1.0	5.0	6	150	- 16	+ 8	+ 9	890
15.0	T2	5	0609H	1.0	5.0	6	150	- 16	+ 8	+ 9	890
33.0	T2	20	0610H	1.0	10.0	10	90	- 24	+ 10.5	+ 15	1000
33.0	T2	10	0611H	1.0	10.0	10	90	- 24	+ 10.5	+ 15	1000
33.0	T2	5	0612H	1.0	10.0	10	90	- 24	+ 10.5	+ 15	1000
40.0	T3	20	0613H	2.0	12.0	9	60	- 16	+ 10.5	+ 12	1250
40.0	T3	10	0614H	2.0	12.0	9	60	- 16	+ 10.5	+ 12	1250
40.0	T3	5	0615H	2.0	12.0	9	60	- 16	+ 10.5	+ 12	1250
56.0	T3	20	0616H	2.0	17.0	11	60	- 28	+ 10.5	+ 15	1335
56.0	T3	10	0617H	2.0	17.0	11	60	- 28	+ 10.5	+ 15	1335
56.0	T3	5	0618H	2.0	17.0	11	60	- 28	+ 10.5	+ 15	1335
110.0	T4	20	0619H	9.0	36.0	12	29	- 35	+ 20	+ 20	1850
110.0	T4	10	0620H	9.0	36.0	12	29	- 35	+ 20	+ 20	1850
100 WV_{DC} at + 85 °C . . . 65 WV_{DC} at + 125 °C											
2.5	T1	20	0621H	1.0	2.0	2	950	- 16	+ 7	+ 8	505
2.5	T1	10	0622H	1.0	2.0	2	950	- 16	+ 7	+ 8	505
2.5	T1	5	0623H	1.0	2.0	2	950	- 16	+ 7	+ 8	505
4.7	T1	20	0624H	1.0	2.0	3	500	- 16	+ 7	+ 8	565
4.7	T1	10	0625H	1.0	2.0	3	500	- 16	+ 7	+ 8	565
4.7	T1	5	0626H	1.0	2.0	3	500	- 16	+ 7	+ 8	565
11.0	T2	20	0627H	1.0	4.0	5	200	- 16	+ 8	+ 8	835
11.0	T2	10	0628H	1.0	4.0	5	200	- 16	+ 8	+ 8	835
11.0	T2	5	0629H	1.0	4.0	5	200	- 16	+ 8	+ 8	835
22.0	T2	20	0630H	1.0	9.0	7.5	100	- 16	+ 8	+ 8	965
22.0	T2	10	0631H	1.0	9.0	7.5	100	- 16	+ 8	+ 8	965
22.0	T2	5	0632H	1.0	9.0	7.5	100	- 16	+ 8	+ 8	965
30.0	T3	20	0633H	2.0	12.0	7	80	- 16	+ 8	+ 8	1240
30.0	T3	10	0634H	2.0	12.0	7	80	- 16	+ 8	+ 8	1240
30.0	T3	5	0635H	2.0	12.0	7	80	- 16	+ 8	+ 8	1240
43.0	T3	20	0636H	2.0	17.0	8.5	70	- 20	+ 8	+ 8	1335
43.0	T3	10	0637H	2.0	17.0	8.5	70	- 20	+ 8	+ 8	1335
43.0	T3	5	0638H	2.0	17.0	8.5	70	- 20	+ 8	+ 8	1335
86.0	T4	20	0639H	9.0	36.0	10	30	- 25	+ 15	+ 15	1800
86.0	T4	10	0640H	9.0	36.0	10	30	- 25	+ 15	+ 15	1800

Notes

- (1) Dash number will include the letter "H" to indicate the vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages and frequencies, see "Ripple Current" table.



DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016

Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016

Vishay

STANDARD RATINGS: DSCC 06013											
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PIN for DSCC 06013 (1)	MAX. DCL (μ A) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX. (2) RIPPLE CURRENT at + 85 °C 40 kHz (mA)
				+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C	
125 WV _{DC} at + 85 °C . . . 85 WV _{DC} at + 125 °C											
1.7	T1	20	0641H	1.0	2.0	2	1250	- 16	+ 7	+ 8	415
1.7	T1	10	0642H	1.0	2.0	2	1250	- 16	+ 7	+ 8	415
1.7	T1	5	0643H	1.0	2.0	2	1250	- 16	+ 7	+ 8	415
3.6	T1	20	0644H	1.0	2.0	2.7	600	- 16	+ 7	+ 8	520
3.6	T1	10	0645H	1.0	2.0	2.7	600	- 16	+ 7	+ 8	520
3.6	T1	5	0646H	1.0	2.0	2.7	600	- 16	+ 7	+ 8	520
9.0	T2	20	0647H	1.0	5.0	5	240	- 16	+ 7	+ 8	755
9.0	T2	10	0648H	1.0	5.0	5	240	- 16	+ 7	+ 8	755
9.0	T2	5	0649H	1.0	5.0	5	240	- 16	+ 7	+ 8	755
14.0	T2	20	0650H	1.0	7.0	6	167	- 16	+ 7	+ 8	860
14.0	T2	10	0651H	1.0	7.0	6	167	- 16	+ 7	+ 8	860
14.0	T2	5	0652H	1.0	7.0	6	167	- 16	+ 7	+ 8	860
18.0	T3	20	0653H	2.0	9.0	5	129	- 16	+ 7	+ 8	1130
18.0	T3	10	0654H	2.0	9.0	5	129	- 16	+ 7	+ 8	1130
18.0	T3	5	0655H	2.0	9.0	5	129	- 16	+ 7	+ 8	1130
25.0	T3	20	0656H	2.0	13.0	6	93	- 16	+ 7	+ 8	1200
25.0	T3	10	0657H	2.0	13.0	6	93	- 16	+ 7	+ 8	1200
25.0	T3	5	0658H	2.0	13.0	6	93	- 16	+ 7	+ 8	1200
56.0	T4	20	0659H	10.0	40.0	6.5	32	- 25	+ 15	+ 15	1800
56.0	T4	10	0660H	10.0	40.0	6.5	32	- 25	+ 15	+ 15	1800

Notes

- (1) Dash number will include the letter "H" to indicate the vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages and frequencies, see "Ripple Current" table.

STANDARD RATINGS: DSCC 06014											
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PIN for DSCC 06014 (1)	MAX. DCL (μ A) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX. RIPPLE CURRENT at + 85 °C 40 kHz (mA) (2)
				+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C	
6 WV _{DC} at + 85 °C . . . 4 WV _{DC} at + 125 °C											
220.0	T1	20	0177H	2.0	9.0	50	36	- 64	+ 13	+ 16	1000
220.0	T1	10	0178H	2.0	9.0	50	36	- 64	+ 13	+ 16	1000
820.0	T2	20	0179H	3.0	14.0	155	18	- 88	+ 16	+ 20	1500
820.0	T2	10	0180H	3.0	14.0	155	18	- 88	+ 16	+ 20	1500
1500.0	T3	20	0181H	5.0	20.0	172	18	- 90	+ 20	+ 25	1900
1500.0	T3	10	0182H	5.0	20.0	172	18	- 90	+ 20	+ 25	1900
2200.0	T4	20	0183H	6.0	24.0	170	13	- 90	+ 25	+ 30	2300
2200.0	T4	10	0184H	6.0	24.0	170	13	- 90	+ 25	+ 30	2300
8 WV _{DC} at + 85 °C . . . 5 WV _{DC} at + 125 °C											
180.0	T1	20	0185H	2.0	9.0	41	45	- 60	+ 13	+ 16	1000
180.0	T1	10	0186H	2.0	9.0	41	45	- 60	+ 13	+ 16	1000
680.0	T2	20	0187H	3.0	14.0	130	22	- 83	+ 16	+ 20	1500
680.0	T2	10	0188H	3.0	14.0	130	22	- 83	+ 16	+ 20	1500
1500.0	T3	20	0189H	5.0	20.0	170	18	- 90	+ 20	+ 25	1900
1500.0	T3	10	0190H	5.0	20.0	170	18	- 90	+ 20	+ 25	1900
1800.0	T4	20	0191H	7.0	25.0	138	14	- 90	+ 25	+ 30	2300
1800.0	T4	10	0192H	7.0	25.0	138	14	- 90	+ 25	+ 30	2300

Notes

- (1) Dash number will include the letter "H" to indicate the vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages and frequencies, see "Ripple Current" table.

DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016



Vishay

Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016

STANDARD RATINGS: DSCC 06014											
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PIN for DSCC 06014 (1)	MAX. DCL (μ A) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX. (2) RIPPLE CURRENT at + 85 °C 40 kHz (mA)
				+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C	
10 WV_{DC} at + 85 °C . . . 7 WV_{DC} at + 125 °C											
150.0	T1	20	0193H	2.0	9.0	34	54	- 55	+ 13	+ 16	900
150.0	T1	10	0194H	2.0	9.0	34	54	- 55	+ 13	+ 16	900
560.0	T2	20	0195H	3.0	16.0	106	27	- 77	+ 16	+ 20	1450
560.0	T2	10	0196H	3.0	16.0	106	27	- 77	+ 16	+ 20	1450
1200.0	T3	20	0197H	5.0	20.0	137	18	- 88	+ 20	+ 25	1850
1200.0	T3	10	0198H	5.0	20.0	137	18	- 88	+ 20	+ 25	1850
1500.0	T4	20	0199H	7.0	25.0	114	15	- 88	+ 25	+ 30	2300
1500.0	T4	10	0200H	7.0	25.0	114	15	- 88	+ 25	+ 30	2300
15 WV_{DC} at + 85 °C . . . 10 WV_{DC} at + 125 °C											
100.0	T1	20	0201H	2.0	9.0	30	72	- 44	+ 13	+ 16	900
100.0	T1	10	0202H	2.0	9.0	30	72	- 44	+ 13	+ 16	900
390.0	T2	20	0203H	3.0	16.0	74	31	- 66	+ 16	+ 20	1450
390.0	T2	10	0204H	3.0	16.0	74	31	- 66	+ 16	+ 20	1450
820.0	T3	20	0205H	6.0	24.0	111	22	- 77	+ 20	+ 25	1800
820.0	T3	10	0206H	6.0	24.0	111	22	- 77	+ 20	+ 25	180 0
1000.0	T4	20	0207H	8.0	32.0	92	17	- 77	+ 25	+ 30	2300
1000.0	T4	10	0208H	8.0	32.0	92	17	- 77	+ 25	+ 30	2300
25 WV_{DC} at + 85 °C . . . 15 WV_{DC} at + 125 °C											
68.0	T1	20	0209H	2.0	9.0	22	90	- 40	+ 12	+ 15	850
68.0	T1	10	0210H	2.0	9.0	22	90	- 40	+ 12	+ 15	850
270.0	T2	20	0211H	3.0	16.0	55	33	- 62	+ 13	+ 16	1400
270.0	T2	10	0212H	3.0	16.0	55	33	- 62	+ 13	+ 16	1400
560.0	T3	20	0213H	7.0	28.0	76	24	- 72	+ 20	+ 25	1750
560.0	T3	10	0214H	7.0	28.0	76	24	- 72	+ 20	+ 25	1750
680.0	T4	20	0215H	8.0	32.0	63	19	- 72	+ 25	+ 30	2100
680.0	T4	10	0216H	8.0	32.0	63	19	- 72	+ 25	+ 30	2100
30 WV_{DC} at + 85 °C . . . 20 WV_{DC} at + 125 °C											
56.0	T1	20	0217H	2.0	9.0	22	100	- 38	+ 12	+ 15	800
56.0	T1	10	0218H	2.0	9.0	22	100	- 38	+ 12	+ 15	800
220.0	T2	20	0219H	3.0	16.0	42	36	- 60	+ 13	+ 16	1200
220.0	T2	10	0220H	3.0	16.0	42	36	- 60	+ 13	+ 16	1200
470.0	T3	20	0221H	8.0	32.0	64	25	- 65	+ 20	+ 25	1500
470.0	T3	10	0222H	8.0	32.0	64	25	- 65	+ 20	+ 25	1500
560.0	T4	20	0223H	9.0	36.0	55	20	- 65	+ 25	+ 30	2000
560.0	T4	10	0224H	9.0	36.0	55	20	- 65	+ 25	+ 30	2000
50 WV_{DC} at + 85 °C . . . 30 WV_{DC} at + 125 °C											
33.0	T1	20	0225H	2.0	9.0	12.3	135	- 29	+ 10	+ 12	700
33.0	T1	10	0226H	2.0	9.0	12.3	135	- 29	+ 10	+ 12	700
120.0	T2	20	0227H	4.0	24.0	22.5	49	- 42	+ 12	+ 15	1200
120.0	T2	10	0228H	4.0	24.0	22.5	49	- 42	+ 12	+ 15	1200
270.0	T3	20	0229H	8.0	32.0	37	29	- 46	+ 20	+ 25	1450
270.0	T3	10	0230H	8.0	32.0	37	29	- 46	+ 20	+ 25	1450
330.0	T4	20	0231H	9.0	36.0	38	22	- 46	+ 25	+ 30	1900
330.0	T4	10	0232H	9.0	36.0	38	22	- 46	+ 25	+ 30	1900
60 WV_{DC} at + 85 °C . . . 40 WV_{DC} at + 125 °C											
27.0	T1	20	0233H	3.0	12.0	10.2	144	- 24	+ 10	+ 12	700
27.0	T1	10	0234H	3.0	12.0	10.2	144	- 24	+ 10	+ 12	700
100.0	T2	20	0235H	4.0	20.0	19	54	- 36	+ 12	+ 15	1100
100.0	T2	10	0236H	4.0	20.0	19	54	- 36	+ 12	+ 15	1100
220.0	T3	20	0237H	8.0	32.0	30	29	- 40	+ 16	+ 20	1400
220.0	T3	10	0238H	8.0	32.0	30	29	- 40	+ 16	+ 20	1400
270.0	T4	20	0239H	9.0	36.0	27	23	- 45	+ 20	+ 25	1850
270.0	T4	10	0240H	9.0	36.0	27	23	- 45	+ 20	+ 25	1850

Notes

(1) Dash number will include the letter "H" to indicate the vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).

(2) For ripple current limits at various temperatures, voltages and frequencies, see "Ripple Current" table.



DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016

Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016

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STANDARD RATINGS: DSCC 06014											
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PIN for DSCC 06014 (1)	MAX. DCL (μ A) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX.. CAPACITANCE CHANGE (%) at			MAX.(2) RIPPLE CURRENT at + 85 °C 40 kHz (mA)
				+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C	
75 WV_{DC} at + 85 °C . . . 50 WV_{DC} at + 125 °C											
22.0	T1	20	0241H	3.0	12.0	8.5	157	- 19	+ 10	+ 12	600
22.0	T1	10	0242H	3.0	12.0	8.5	157	- 19	+ 10	+ 12	600
82.0	T2	20	0243H	4.0	24.0	15.2	63	- 30	+ 12	+ 15	1000
82.0	T2	10	0244H	4.0	24.0	15.2	63	- 30	+ 12	+ 15	1000
180.0	T3	20	0245H	9.0	36.0	24.4	30	- 35	+ 16	+ 20	1300
180.0	T3	10	0246H	9.0	36.0	24.4	30	- 35	+ 16	+ 20	1300
220.0	T4	20	0247H	10.0	40.0	37.0	24	- 40	+ 20	+ 25	1800
220.0	T4	10	0248H	10.0	40.0	37.0	24	- 40	+ 20	+ 25	1800
100 WV_{DC} at + 85 °C . . . 65 WV_{DC} at + 125 °C											
10.0	T1	20	0249H	3.0	12.0	4.5	200	- 17	+ 10	+ 12	800
10.0	T1	10	0250H	3.0	12.0	4.5	200	- 17	+ 10	+ 12	800
39.0	T2	20	0251H	5.0	24.0	10.4	80	- 20	+ 12	+ 15	1300
39.0	T2	10	0252H	5.0	24.0	10.4	80	- 20	+ 12	+ 15	1300
68.0	T3	20	0253H	10.0	40.0	11.3	40	- 30	+ 14	+ 16	1600
68.0	T3	10	0254H	10.0	40.0	11.3	40	- 30	+ 14	+ 16	1600
120.0	T4	20	0255H	12.0	48.0	25	30	- 35	+ 15	+ 17	2000
120.0	T4	10	0256H	12.0	48.0	25	30	- 35	+ 15	+ 17	2000
125 WV_{DC} at + 85 °C . . . 85 WV_{DC} at + 125 °C											
6.8	T1	20	0257H	3.0	12.0	6.0	300	- 14	+ 10	+ 12	700
6.8	T1	10	0258H	3.0	12.0	6.0	300	- 14	+ 10	+ 12	700
27.0	T2	20	0259H	5.0	24.0	7.2	90	- 18	+ 12	+ 15	1200
27.0	T2	10	0260H	5.0	24.0	7.2	90	- 18	+ 12	+ 15	1200
47.0	T3	20	0261H	10.0	40.0	7.9	50	- 26	+ 14	+ 16	1500
47.0	T3	10	0262H	10.0	40.0	7.9	50	- 26	+ 14	+ 16	1500
82.0	T4	20	0263H	12.0	48.0	17.4	32	- 30	+ 15	+ 17	1900
82.0	T4	10	0264H	12.0	48.0	17.4	32	- 30	+ 15	+ 17	1900

Notes

(1) Dash number will include the letter "H" to indicate the vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).

(2) For ripple current limits at various temperatures, voltages and frequencies, see "Ripple Current" table.

DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016



Vishay

Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016

STANDARD RATINGS: DSCC 06015												
CAPACITANCE (μF)	CASE CODE	CAP. TOL. (± %)	PIN for DSCC 06015 (1)	MAX. DCL (μA) at		MAX. DF at +25 °C (%)	MAX. IMP. at -55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX. ESR at +25 °C 120 Hz (Ω) (2)	MAX. 85 °C 40 kHz RIPPLE CURRENT 3 mA RMS (3)
				+25 °C	+85 °C +125 °C			-55 °C	+85 °C	+125 °C		
6 WV_{DC} at +85 °C . . . 4 WV_{DC} at +125 °C												
30.0	T1	20	0441H	1.0	2.0	4.5	100	-40	+10.5	+12	1.99	820
30.0	T1	10	0442H	1.0	2.0	4.5	100	-40	+10.5	+12	1.99	820
30.0	T1	5	0443H	1.0	2.0	4.5	100	-40	+10.5	+12	1.99	820
68.0	T1	20	0444H	1.0	2.0	7.5	60	-40	+14	+16	1.58	960
68.0	T1	10	0445H	1.0	2.0	7.5	60	-40	+14	+16	1.58	960
68.0	T1	5	0446H	1.0	2.0	7.5	60	-40	+14	+16	1.58	960
140.0	T2	20	0447H	1.0	3.0	10.5	40	-40	+14	+16	0.99	1200
140.0	T2	10	0448H	1.0	3.0	10.5	40	-40	+14	+16	0.99	1200
140.0	T2	5	0449H	1.0	3.0	10.5	40	-40	+14	+16	0.99	1200
270.0	T2	20	0450H	1.0	6.5	22.5	25	-44	+17.5	+20	1.11	1375
270.0	T2	10	0451H	1.0	6.5	22.5	25	-44	+17.5	+20	1.11	1375
270.0	T2	5	0452H	1.0	6.5	22.5	25	-44	+17.5	+20	1.11	1375
330.0	T3	20	0453H	2.0	7.9	18.0	20	-44	+14	+16	0.73	1800
330.0	T3	10	0454H	2.0	7.9	18.0	20	-44	+14	+16	0.73	1800
330.0	T3	5	0455H	2.0	7.9	18.0	20	-44	+14	+16	0.73	1800
560.0	T3	20	0456H	2.0	13.0	27.5	25	-64	+17.5	+20	0.65	1900
560.0	T3	10	0457H	2.0	13.0	27.5	25	-64	+17.5	+20	0.65	1900
560.0	T3	5	0458H	2.0	13.0	27.5	25	-64	+17.5	+20	0.65	1900
1200.0	T4	20	0459H	3.0	14.0	45.0	20	-80	+25	+25	0.50	2265
1200.0	T4	10	0460H	3.0	14.0	45.0	20	-80	+25	+25	0.50	2265
8 WV_{DC} at +85 °C . . . 5 WV_{DC} at +125 °C												
25	T1	20	0461H	1.0	2.0	3.75	100	-40	+10.5	+12	1.99	820
25	T1	10	0462H	1.0	2.0	3.75	100	-40	+10.5	+12	1.99	820
25	T1	5	0463H	1.0	2.0	3.75	100	-40	+10.5	+12	1.99	820
56	T1	20	0464H	1.0	2.0	7.0	59	-40	+14	+16	1.66	900
56	T1	10	0465H	1.0	2.0	7.0	59	-40	+14	+16	1.66	900
56	T1	5	0466H	1.0	2.0	7.0	59	-40	+14	+16	1.66	900
120	T2	20	0467H	1.0	2.0	10.0	50	-44	+17.5	+20	1.11	1220
120	T2	10	0468H	1.0	2.0	10.0	50	-44	+17.5	+20	1.11	1220
120	T2	5	0469H	1.0	2.0	10.0	50	-44	+17.5	+20	1.11	1220
220	T2	20	0470H	1.0	7.0	18.5	30	-44	+17.5	+20	1.12	1370
220	T2	10	0471H	1.0	7.0	18.5	30	-44	+17.5	+20	1.12	1370
220	T2	5	0472H	1.0	7.0	18.5	30	-44	+17.5	+20	1.12	1370
290	T3	20	0473H	2.0	6.0	17.0	25	-64	+17.5	+20	0.78	1770
290	T3	10	0474H	2.0	6.0	17.0	25	-64	+17.5	+20	0.78	1770
290	T3	5	0475H	2.0	6.0	17.0	25	-64	+17.5	+20	0.78	1770
430	T3	20	0476H	2.0	14.0	23.0	25	-64	+17.5	+20	0.71	1825
430	T3	10	0477H	2.0	14.0	23.0	25	-64	+17.5	+20	0.71	1825
430	T3	5	0478H	2.0	14.0	23.0	25	-64	+17.5	+20	0.71	1825
850	T4	20	0479H	4.0	16.0	30.0	22	-80	+25	+25	0.47	2330
850	T4	10	0480H	4.0	16.0	30.0	22	-80	+25	+25	0.47	2330

Notes

- (1) Dash number will include the letter "H" to indicate the vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages, and frequencies, see "Ripple Current" table.
- (3) Maximum ESR is calculated by the following equation:

$$ESR \text{ (max.)} = \frac{DF}{2\pi f C}, \text{ where}$$

DF = Maximum dissipation factor from "Standard Ratings" table
 f = 120 Hz
 C = Nominal capacitance



DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016

Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016

Vishay

STANDARD RATINGS: DSCC 06015												
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PIN for DSCC 06015 (1)	MAX. DCL (μ A) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX. ESR at + 25 °C 120 Hz (Ω) (2)	MAX. 85 °C 40 kHz RIPPLE CURRENT 3 mA RMS (3)
				+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C		
10 WV_{DC} at + 85 °C . . . 7 WV_{DC} at + 125 °C												
20	T1	20	0481H	1.0	2.0	3.0	175	- 32	+ 10.5	+ 12	1.99	820
20	T1	10	0482H	1.0	2.0	3.0	175	- 32	+ 10.5	+ 12	1.99	820
20	T1	5	0483H	1.0	2.0	3.0	175	- 32	+ 10.5	+ 12	1.99	820
47	T1	20	0484H	1.0	2.0	6.5	100	- 36	+ 14	+ 16	1.84	855
47	T1	10	0485H	1.0	2.0	6.5	100	- 36	+ 14	+ 16	1.84	855
47	T1	5	0486H	1.0	2.0	6.5	100	- 36	+ 14	+ 16	1.84	855
100	T2	20	0487H	1.0	4.0	7.5	60	- 36	+ 14	+ 16	0.99	1200
100	T2	10	0488H	1.0	4.0	7.5	60	- 36	+ 14	+ 16	0.99	1200
100	T2	5	0489H	1.0	4.0	7.5	60	- 36	+ 14	+ 16	0.99	1200
180	T2	20	0490H	1.0	7.0	15.0	40	- 36	+ 14	+ 16	1.11	1365
180	T2	10	0491H	1.0	7.0	15.0	40	- 36	+ 14	+ 16	1.11	1365
180	T2	5	0492H	1.0	7.0	15.0	40	- 36	+ 14	+ 16	1.11	1365
250	T3	20	0493H	2.0	10.0	15.0	30	- 40	+ 14	+ 16	0.80	1720
250	T3	10	0494H	2.0	10.0	15.0	30	- 40	+ 14	+ 16	0.80	1720
250	T3	5	0495H	2.0	10.0	15.0	30	- 40	+ 14	+ 16	0.80	1720
390	T3	20	0496H	2.0	16.0	22.0	25	- 64	+ 17.5	+ 20	0.75	1800
390	T3	10	0497H	2.0	16.0	22.0	25	- 64	+ 17.5	+ 20	0.75	1800
390	T3	5	0498H	2.0	16.0	22.0	25	- 64	+ 17.5	+ 20	0.75	1800
750	T4	20	0499H	4.0	16.0	25.0	23	- 80	+ 25	+ 25	0.44	2360
750	T4	10	0500H	4.0	16.0	25.0	23	- 80	+ 25	+ 25	0.44	2360
15 WV_{DC} at + 85 °C . . . 10 WV_{DC} at + 125 °C												
15	T1	20	0501H	1.0	2.0	2.5	155	- 24	+ 10.5	+ 12	1.99	780
15	T1	10	0502H	1.0	2.0	2.5	155	- 24	+ 10.5	+ 12	1.99	780
15	T1	5	0503H	1.0	2.0	2.5	155	- 24	+ 10.5	+ 12	1.99	780
33	T1	20	0504H	1.0	2.0	5.0	90	- 28	+ 14	+ 16	1.66	820
33	T1	10	0505H	1.0	2.0	5.0	90	- 28	+ 14	+ 16	1.66	820
33	T1	5	0506H	1.0	2.0	5.0	90	- 28	+ 14	+ 16	1.66	820
70	T2	20	0507H	1.0	4.0	6.5	75	- 28	+ 14	+ 16	1.11	1150
70	T2	10	0508H	1.0	4.0	6.5	75	- 28	+ 14	+ 16	1.11	1150
70	T2	5	0509H	1.0	4.0	6.5	75	- 28	+ 14	+ 16	1.11	1150
120	T2	20	0510H	1.0	7.0	9.0	50	- 28	+ 17.5	+ 20	1.12	1450
120	T2	10	0511H	1.0	7.0	9.0	50	- 28	+ 17.5	+ 20	1.12	1450
120	T2	5	0512H	1.0	7.0	9.0	50	- 28	+ 17.5	+ 20	1.12	1450
170	T3	20	0513H	2.0	10.0	12.5	35	- 32	+ 14	+ 16	0.78	1480
170	T3	10	0514H	2.0	10.0	12.5	35	- 32	+ 14	+ 16	0.78	1480
170	T3	5	0515H	2.0	10.0	12.5	35	- 32	+ 14	+ 16	0.78	1480
270	T3	20	0516H	2.0	16.0	16.0	30	- 56	+ 17.5	+ 20	0.71	1740
270	T3	10	0517H	2.0	16.0	16.0	30	- 56	+ 17.5	+ 20	0.71	1740
270	T3	5	0518H	2.0	16.0	16.0	30	- 56	+ 17.5	+ 20	0.71	1740
540	T4	20	0519 H	6.0	24.0	20.0	23	- 80	+ 25	+ 25	0.47	2330
540	T4	10	0520H	6.0	24.0	20.0	23	- 80	+ 25	+ 25	0.47	2330

Notes

- (1) Dash number will include the letter "H" to indicate the vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages, and frequencies, see "Ripple Current" table.
- (3) Maximum ESR is calculated by the following equation:

$$ESR \text{ (max.)} = \frac{DF}{2\pi f C}, \text{ where}$$

DF = Maximum dissipation factor from "Standard Ratings" table
 f = 120 Hz
 C = Nominal capacitance

DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016



Vishay

Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016

STANDARD RATINGS: DSCC 06015												
CAPACITANCE (μF)	CASE CODE	CAP. TOL. (± %)	PIN for DSCC 06015 (1)	MAX. DCL (μA) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX. ESR at + 25 °C 120 Hz (Ω) (2)	MAX. 85 °C 40 kHz RIPPLE CURRENT 3 mA RMS (3)
				+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C		
25 WV_{DC} at + 85 °C . . . 15 WV_{DC} at + 125 °C												
10	T1	20	0521H	1.0	2.0	2.0	220	- 16	+ 8	+ 9	2.66	715
10	T1	10	0522H	1.0	2.0	2.0	220	- 16	+ 8	+ 9	2.66	715
10	T1	5	0523H	1.0	2.0	2.0	220	- 16	+ 8	+ 9	2.66	715
22	T1	20	0524H	1.0	2.0	3.3	140	- 20	+ 10.5	+ 12	1.99	825
22	T1	10	0525H	1.0	2.0	3.3	140	- 20	+ 10.5	+ 12	1.99	825
22	T1	5	0526H	1.0	2.0	3.3	140	- 20	+ 10.5	+ 12	1.99	825
50	T2	20	0527H	1.0	2.0	5.5	70	- 28	+ 13	+ 15	1.46	1130
50	T2	10	0528H	1.0	2.0	5.5	70	- 28	+ 13	+ 15	1.46	1130
50	T2	5	0529H	1.0	2.0	5.5	70	- 28	+ 13	+ 15	1.46	1130
100	T2	20	0530H	1.0	10.0	7.5	50	- 28	+ 13	+ 15	0.99	1435
100	T2	10	0531H	1.0	10.0	7.5	50	- 28	+ 13	+ 15	0.99	1435
100	T2	5	0532H	1.0	10.0	7.5	50	- 28	+ 13	+ 15	0.99	1435
120	T3	20	0533H	2.0	6.0	10.5	38	- 32	+ 13	+ 15	1.16	1450
120	T3	10	0534H	2.0	6.0	10.5	38	- 32	+ 13	+ 15	1.16	1450
120	T3	5	0535H	2.0	6.0	10.5	38	- 32	+ 13	+ 15	1.16	1450
180	T3	20	0536H	2.0	18.0	13.0	32	- 48	+ 13	+ 15	0.96	1525
180	T3	10	0537H	2.0	18.0	13.0	32	- 48	+ 13	+ 15	0.96	1525
180	T3	5	0538H	2.0	18.0	13.0	32	- 48	+ 13	+ 15	0.96	1525
350	T4	20	0539H	7.0	28.0	17.5	24	- 70	+ 25	+ 25	0.67	1970
350	T4	10	0540H	7.0	28.0	17.5	24	- 70	+ 25	+ 25	0.67	1970
30 WV_{DC} at + 85 °C . . . 20 WV_{DC} at + 125 °C												
8	T1	20	0541H	1.0	2.0	2.0	275	- 16	+ 8	+ 12	3.32	640
8	T1	10	0542H	1.0	2.0	2.0	275	- 16	+ 8	+ 12	3.32	640
8	T1	5	0543H	1.0	2.0	2.0	275	- 16	+ 8	+ 12	3.32	640
15	T1	20	0544H	1.0	2.0	2.5	175	- 20	+ 10.5	+ 12	2.21	780
15	T1	10	0545H	1.0	2.0	2.5	175	- 20	+ 10.5	+ 12	2.21	780
15	T1	5	0546H	1.0	2.0	2.5	175	- 20	+ 10.5	+ 12	2.21	780
40	T2	20	0547H	1.0	5.0	5.0	65	- 24	+ 10.5	+ 12	1.66	1120
40	T2	10	0548H	1.0	5.0	5.0	65	- 24	+ 10.5	+ 12	0.66	1120
40	T2	5	0549H	1.0	5.0	5.0	65	- 24	+ 10.5	+ 12	0.66	1120
68	T2	20	0550H	1.0	8.0	6.5	60	- 24	+ 13	+ 15	1.27	1285
68	T2	10	0551H	1.0	8.0	6.5	60	- 24	+ 13	+ 15	1.27	1285
68	T2	5	0552H	1.0	8.0	6.5	60	- 24	+ 13	+ 15	1.27	1285
100	T3	20	0553H	2.0	12.0	8.5	40	- 28	+ 10.5	+ 12	1.13	1450
100	T3	10	0554H	2.0	12.0	8.5	40	- 28	+ 10.5	+ 12	1.13	1450
100	T3	5	0555H	2.0	12.0	8.5	40	- 28	+ 10.5	+ 12	1.13	1450
150	T3	20	0556H	2.0	18.0	11.5	35	- 48	+ 13	+ 15	1.02	1525
150	T3	10	0557H	2.0	18.0	11.5	35	- 48	+ 13	+ 15	1.02	1525
150	T3	5	0558H	2.0	18.0	11.5	35	- 48	+ 13	+ 15	1.02	1525
300	T4	20	0559H	8.0	32.0	15.5	25	- 60	+ 25	+ 25	0.69	1950
300	T4	10	0560H	8.0	32.0	15.5	25	- 60	+ 25	+ 25	0.69	1950

Notes

- (1) Dash number will include the letter "H" to indicate the vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages, and frequencies, see "Ripple Current" table.
- (3) Maximum ESR is calculated by the following equation:

$$ESR (max.) = \frac{DF}{2\pi f C}, \text{ where}$$

DF = Maximum dissipation factor from "Standard Ratings" table
 f = 120 Hz
 C = Nominal capacitance



DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016

Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016

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STANDARD RATINGS: DSCC 06015												
CAPACITANCE (µF)	CASE CODE	CAP. TOL. (± %)	PIN for DSCC 06015 ⁽¹⁾	MAX. DCL (µA) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX. ESR at + 25 °C 120 Hz (Ω) ⁽²⁾	MAX. 85 °C 40 kHz RIPPLE CURRENT 3 mA RMS ⁽³⁾
				+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C		
50 WV_{DC} at + 85 °C . . . 30 WV_{DC} at + 125 °C												
5	T1	20	0561H	1.0	2.0	1.5	400	- 16	+ 5	+ 6	3.98	580
5	T1	10	0562H	1.0	2.0	1.5	400	- 16	+ 5	+ 6	3.98	580
5	T1	5	0563H	1.0	2.0	1.5	400	- 16	+ 5	+ 6	3.98	580
10	T1	20	0564H	1.0	2.0	2.0	250	- 24	+ 8	+ 9	2.66	715
10	T1	10	0565H	1.0	2.0	2.0	250	- 24	+ 8	+ 9	2.66	715
10	T1	5	0566H	1.0	2.0	2.0	250	- 24	+ 8	+ 9	2.66	715
25	T2	20	0567H	1.0	5.0	4.0	95	- 20	+ 10.5	+ 12	2.13	1005
25	T2	10	0568H	1.0	5.0	4.0	95	- 20	+ 10.5	+ 12	2.13	1005
25	T2	5	0569H	1.0	5.0	4.0	95	- 20	+ 10.5	+ 12	2.13	1005
47	T2	20	0570H	1.0	9.0	5.0	70	- 28	+ 13	+ 15	1.56	1155
47	T2	10	0571H	1.0	9.0	5.0	70	- 28	+ 13	+ 15	1.56	1155
47	T2	5	0572H	1.0	9.0	5.0	70	- 28	+ 13	+ 15	1.56	1155
60	T3	20	0573H	2.0	12.0	6.0	45	- 16	+ 10.5	+ 12	1.33	1335
60	T3	10	0574H	2.0	12.0	6.0	45	- 16	+ 10.5	+ 12	1.33	1335
60	T3	5	0575H	2.0	12.0	6.0	45	- 16	+ 10.5	+ 12	1.33	1335
82	T3	20	0576H	2.0	16.0	7.5	45	- 32	+ 13	+ 15	1.22	1400
82	T3	10	0577H	2.0	16.0	7.5	45	- 32	+ 13	+ 15	1.22	1400
82	T3	5	0578H	2.0	16.0	7.5	45	- 32	+ 13	+ 15	1.22	1400
160	T4	20	0579H	6.0	32.0	8.5	27	- 50	+ 25	+ 25	0.71	1900
160	T4	10	0580H	6.0	32.0	8.5	27	- 50	+ 25	+ 25	0.71	1900
60 WV_{DC} at + 85 °C . . . 40 WV_{DC} at + 125 °C												
4	T1	20	0581H	1.0	2.0	1.4	550	- 16	+ 5	+ 6	4.65	525
4	T1	10	0582H	1.0	2.0	1.4	550	- 16	+ 5	+ 6	4.65	525
4	T1	5	0583H	1.0	2.0	1.4	550	- 16	+ 5	+ 6	4.65	525
8.2	T1	20	0584H	1.0	2.0	2.0	275	- 24	+ 8	+ 9	3.24	625
8.2	T1	10	0585H	1.0	2.0	2.0	275	- 24	+ 8	+ 9	3.24	625
8.2	T1	5	0586H	1.0	2.0	2.0	275	- 24	+ 8	+ 9	3.24	625
20	T2	20	0587H	1.0	5.0	3.5	105	- 16	+ 10.5	+ 12	2.32	930
20	T2	10	0588H	1.0	5.0	3.5	105	- 16	+ 10.5	+ 12	2.32	930
20	T2	5	0589H	1.0	5.0	3.5	105	- 16	+ 10.5	+ 12	2.32	930
39	T2	20	0590H	1.0	9.0	5.0	90	- 28	+ 10.5	+ 12	1.70	1110
39	T2	10	0591H	1.0	9.0	5.0	90	- 28	+ 10.5	+ 12	1.70	1110
39	T2	5	0592H	1.0	9.0	5.0	90	- 28	+ 10.5	+ 12	1.70	1110
50	T3	20	0593H	2.0	12.0	5.0	50	- 16	+ 10.5	+ 12	1.33	1330
50	T3	10	0594H	2.0	12.0	5.0	50	- 16	+ 10.5	+ 12	1.33	1330
50	T3	5	0595H	2.0	12.0	5.0	50	- 16	+ 10.5	+ 12	1.33	1330
68	T3	20	0596H	2.0	16.0	6.5	50	- 32	+ 10.5	+ 12	1.27	1365
68	T3	10	0597H	2.0	16.0	6.5	50	- 32	+ 10.5	+ 12	1.27	1365
68	T3	5	0598H	2.0	16.0	6.5	50	- 32	+ 10.5	+ 12	1.27	1365
140	T4	20	0599H	8.0	32.0	8.0	28	- 40	+ 20	+ 20	0.76	1850
140	T4	10	0600H	8.0	32.0	8.0	28	- 40	+ 20	+ 20	0.76	1850

Notes

- (1) Dash number will include the letter "H" to indicate the vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages, and frequencies, see "Ripple Current" table.
- (3) Maximum ESR is calculated by the following equation:

$$ESR (max.) = \frac{DF}{2\pi f C}, \text{ where}$$

DF = Maximum dissipation factor from "Standard Ratings" table
 f = 120 Hz
 C = Nominal capacitance

DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016



Vishay

Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016

STANDARD RATINGS: DSCC 06015												
CAPACITANCE (μF)	CASE CODE	CAP. TOL. (± %)	PIN for DSCC 06015 (1)	MAX. DCL (μA) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX. ESR at + 25 °C 120 Hz (Ω) (2)	MAX. 85 °C 40 kHz RIPPLE CURRENT 3 mA RMS (3)
				+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C		
75 WV_{DC} at + 85 °C . . . 50 WV_{DC} at + 125 °C												
3.5	T1	20	0601H	1.0	2.0	1.25	650	- 16	+ 5	+ 6	4.74	525
3.5	T1	10	0602H	1.0	2.0	1.25	650	- 16	+ 5	+ 6	4.74	525
3.5	T1	5	0603H	1.0	2.0	1.25	650	- 16	+ 5	+ 6	4.74	525
6.8	T1	20	0604H	1.0	2.0	1.75	300	- 20	+ 8	+ 9	3.42	610
6.8	T1	10	0605H	1.0	2.0	1.75	300	- 20	+ 8	+ 9	3.42	610
6.8	T1	5	0606H	1.0	2.0	1.75	300	- 20	+ 8	+ 9	3.42	610
15	T2	20	0607H	1.0	5.0	3.0	150	- 16	+ 8	+ 9	2.66	890
15	T2	10	0608H	1.0	5.0	3.0	150	- 16	+ 8	+ 9	2.66	890
15	T2	5	0609H	1.0	5.0	3.0	150	- 16	+ 8	+ 9	2.66	890
33	T2	20	0610H	1.0	10.0	5.0	90	- 24	+ 10.5	+ 15	2.01	1000
33	T2	10	0611H	1.0	10.0	5.0	90	- 24	+ 10.5	+ 15	2.01	1000
33	T2	5	0612H	1.0	10.0	5.0	90	- 24	+ 10.5	+ 15	2.01	1000
40	T3	20	0613H	2.0	12.0	4.5	60	- 16	+ 10.5	+ 12	1.50	1250
40	T3	10	0614H	2.0	12.0	4.5	60	- 16	+ 10.5	+ 12	1.50	1250
40	T3	5	0615H	2.0	12.0	4.5	60	- 16	+ 10.5	+ 12	1.50	1250
56	T3	20	0616H	2.0	17.0	5.5	60	- 28	+ 10.5	+ 15	1.31	1335
56	T3	10	0617H	2.0	17.0	5.5	60	- 28	+ 10.5	+ 15	1.31	1335
56	T3	5	0618H	2.0	17.0	5.5	60	- 28	+ 10.5	+ 15	1.31	1335
110	T4	20	0619H	9.0	36.0	6.0	29	- 35	+ 20	+ 20	0.73	1850
110	T4	10	0620H	9.0	36.0	6.0	29	- 35	+ 20	+ 20	0.73	1850
100 WV_{DC} at + 85 °C . . . 65 WV_{DC} at + 125 °C												
2.5	T1	20	0621H	1.0	2.0	1.0	950	- 16	+ 7	+ 8	5.31	505
2.5	T1	10	0622H	1.0	2.0	1.0	950	- 16	+ 7	+ 8	5.31	505
2.5	T1	5	0623H	1.0	2.0	1.0	950	- 16	+ 7	+ 8	5.31	505
4.7	T1	20	0624H	1.0	2.0	1.5	500	- 16	+ 7	+ 8	4.24	565
4.7	T1	10	0625H	1.0	2.0	1.5	500	- 16	+ 7	+ 8	4.24	565
4.7	T1	5	0626H	1.0	2.0	1.5	500	- 16	+ 7	+ 8	4.24	565
11.0	T2	20	0627H	1.0	4.0	2.5	200	- 16	+ 8	+ 8	3.02	835
11.0	T2	10	0628H	1.0	4.0	2.5	200	- 16	+ 8	+ 8	3.02	835
11.0	T2	5	0629H	1.0	4.0	2.5	200	- 16	+ 8	+ 8	3.02	835
22.0	T2	20	0630H	1.0	9.0	3.75	100	- 16	+ 8	+ 8	2.26	965
22.0	T2	10	0631H	1.0	9.0	3.75	100	- 16	+ 8	+ 8	2.26	965
22.0	T2	5	0632H	1.0	9.0	3.75	100	- 16	+ 8	+ 8	2.26	965
30.0	T3	20	0633H	2.0	12.0	3.5	80	- 16	+ 8	+ 8	1.55	1240
30.0	T3	10	0634H	2.0	12.0	3.5	80	- 16	+ 8	+ 8	1.55	1240
30.0	T3	5	0635H	2.0	12.0	3.5	80	- 16	+ 8	+ 8	1.55	1240
43.0	T3	20	0636H	2.0	17.0	4.25	70	- 20	+ 8	+ 8	1.31	1335
43.0	T3	10	0637H	2.0	17.0	4.25	70	- 20	+ 8	+ 8	1.31	1335
43.0	T3	5	0638H	2.0	17.0	4.25	70	- 20	+ 8	+ 8	1.31	1335
86.0	T4	20	0639H	9.0	36.0	5.0	30	- 25	+ 15	+ 15	0.77	1800
86.0	T4	10	0640H	9.0	36.0	5.0	30	- 25	+ 15	+ 15	0.77	1800

Notes

- (1) Dash number will include the letter "H" to indicate the vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages, and frequencies, see "Ripple Current" table.
- (3) Maximum ESR is calculated by the following equation:

$$ESR \text{ (max.)} = \frac{DF}{2\pi f C}, \text{ where}$$

DF = Maximum dissipation factor from "Standard Ratings" table
 f = 120 Hz
 C = Nominal capacitance



DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016

Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016

Vishay

STANDARD RATINGS: DSCC 06015												
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PIN for DSCC 06015 (1)	MAX. DCL (μ A) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX. ESR at + 25 °C 120 Hz (Ω) (2)	MAX. 85 °C 40 kHz RIPPLE CURRENT 3 mA RMS (3)
				+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C		
125 WV _{DC} at + 85 °C . . . 85 WV _{DC} at + 125 °C												
1.7	T1	20	0641H	1.0	2.0	1.0	1250	- 16	+ 7	+ 8	7.81	415
1.7	T1	10	0642H	1.0	2.0	1.0	1250	- 16	+ 7	+ 8	7.81	415
1.7	T1	5	0643H	1.0	2.0	1.0	1250	- 16	+ 7	+ 8	7.81	415
3.6	T1	20	0644H	1.0	2.0	1.35	600	- 24	+ 7	+ 8	4.98	520
3.6	T1	10	0645H	1.0	2.0	1.35	600	- 16	+ 7	+ 8	4.98	520
3.6	T1	5	0646H	1.0	2.0	1.35	600	- 16	+ 7	+ 8	4.98	520
9.0	T2	20	0647H	1.0	5.0	2.5	240	- 16	+ 7	+ 8	3.69	755
9.0	T2	10	0648H	1.0	5.0	2.5	240	- 16	+ 7	+ 8	3.69	755
9.0	T2	5	0649H	1.0	5.0	2.5	240	- 16	+ 7	+ 8	3.69	755
14.0	T2	20	0650H	1.0	7.0	3.0	167	- 16	+ 7	+ 8	2.85	860
14.0	T2	10	0651H	1.0	7.0	3.0	167	- 16	+ 7	+ 8	2.85	860
14.0	T2	5	0652H	1.0	7.0	3.0	167	- 16	+ 7	+ 8	2.85	860
18.0	T3	20	0653H	2.0	9.0	2.5	129	- 16	+ 7	+ 8	1.85	1130
18.0	T3	10	0654H	2.0	9.0	2.5	129	- 16	+ 7	+ 8	1.85	1130
18.0	T3	5	0655H	2.0	9.0	2.5	129	- 16	+ 7	+ 8	1.85	1130
25.0	T3	20	0656H	2.0	13.0	3.0	93	- 16	+ 7	+ 8	1.59	1200
25.0	T3	10	0657H	2.0	13.0	3.0	93	- 16	+ 7	+ 8	1.59	1200
25.0	T3	5	0658H	2.0	13.0	3.0	93	- 16	+ 7	+ 8	1.59	1200
56.0	T4	20	0659 H	10.0	40.0	3.25	32	- 25	+ 15	+ 15	0.77	1800
56.0	T4	10	0660H	10.0	40.0	3.25	32	- 25	+ 15	+ 15	0.77	1800

Notes

- (1) Dash number will include the letter "H" to indicate the vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages, and frequencies, see "Ripple Current" table.
- (3) Maximum ESR is calculated by the following equation:

$$ESR \text{ (max.)} = \frac{DF}{2\pi fC}, \text{ where}$$

DF = Maximum dissipation factor from "Standard Ratings" table
 f = 120 Hz
 C = Nominal capacitance

DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016



Vishay

Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016

STANDARD RATINGS: DSCC 06016												
CAPACITANCE (μF)	CASE CODE	CAP. TOL. (± %)	PIN for DSCC 06016 (1)	MAX. DCL (μA) at		MAX. DF at +25 °C (%)	MAX. IMP. at -55 °C (Ω)	MAX.. CAPACITANCE CHANGE (%) at			MAX. ESR at +25 °C 120 Hz (Ω) (2)	MAX. 85 °C 40 kHz RIPPLE CURRENT 3 mA RMS (3)
				+25 °C	+85 °C +125 °C			-55 °C	+85 °C	+125 °C		
6 WV_{DC} at +85 °C . . . 4 WV_{DC} at +125 °C												
220	T1	20	0177H	2	9	25	36	-64	13	16	1.51	1000
220	T1	10	0178H	2	9	25	36	-64	13	16	1.51	1000
820	T2	20	0179H	3	14	77.5	18	-88	16	20	1.26	1500
820	T2	10	0180H	3	14	77.5	18	-88	16	20	1.26	1500
1500	T3	20	0181H	5	20	86	18	-90	20	25	0.76	1900
1500	T3	10	0182H	5	20	86	18	-90	20	25	0.76	1900
2200	T4	20	0183H	6	24	85	13	-90	25	30	0.52	2300
2200	T4	10	0184H	6	24	85	13	-90	25	30	0.52	2300
8 WV_{DC} at +85 °C . . . 5 WV_{DC} at +125 °C												
180	T1	20	0185H	2	9	20.5	45	-60	13	16	1.51	1000
180	T1	10	0186H	2	9	20.5	45	-60	13	16	1.51	1000
680	T2	20	0187H	3	14	65	22	-83	16	20	1.27	1500
680	T2	10	0188H	3	14	65	22	-83	16	20	1.27	1500
1500	T3	20	0189H	5	20	85	18	-90	20	25	0.75	1900
1500	T3	10	0190H	5	20	85	18	-90	20	25	0.75	1900
1800	T4	20	0191H	7	25	69	14	-90	25	30	0.51	2300
1800	T4	10	0192H	7	25	69	14	-90	25	30	0.51	2300
10 WV_{DC} at +85 °C . . . 7 WV_{DC} at +125 °C												
150	T1	20	0193H	2	9	17	54	-55	13	16	1.51	900
150	T1	10	0194	2	9	17	54	-55	13	16	1.51	900
560	T2	20	0195H	3	16	53	27	-77	16	20	1.26	1450
560	T2	10	0196H	3	16	53	27	-77	16	20	1.26	1450
1200	T3	20	0197H	5	20	68.5	18	-88	20	25	0.76	1850
1200	T3	10	0198H	5	20	68.5	18	-88	20	25	0.76	1850
1500	T4	20	0199H	7	25	57	15	-88	25	30	0.51	2300
1500	T4	10	0200H	7	25	57	15	-88	25	30	0.51	2300
15 WV_{DC} at +85 °C . . . 10 WV_{DC} at +125 °C												
100	T1	20	0201H	2	9	15	72	-44	13	16	1.99	900
100	T1	10	0202H	2	9	15	72	-44	13	16	1.99	900
390	T2	20	0203H	3	16	37	31	-66	16	20	1.26	1450
390	T2	10	0204H	3	16	37	31	-66	16	20	1.26	1450
820	T3	20	0205H	6	24	55.5	22	-77	20	25	0.9	1800
820	T3	10	0206H	6	24	55.5	22	-77	20	25	0.9	1800
1000	T4	20	0207H	8	32	46	17	-77	25	30	0.61	2300
1000	T4	10	0208H	8	32	46	17	-77	25	30	0.61	2300
25 WV_{DC} at +85 °C . . . 15 WV_{DC} at +125 °C												
68	T1	20	0209H	2	9	11	90	-40	12	15	2.15	850
68	T1	10	0210H	2	9	11	90	-40	12	15	2.15	850
270	T2	20	0211H	3	16	27.5	33	-62	13	16	1.35	1400
270	T2	10	0212H	3	16	27.5	33	-62	13	16	1.35	1400
560	T3	20	0213H	7	28	38	24	-72	20	25	0.9	1750
560	T3	10	0214H	7	28	38	24	-72	20	25	0.9	1750
680	T4	20	0215H	8	32	31.5	19	-72	25	30	0.62	2100
680	T4	10	0216H	8	32	31.5	19	-72	25	30	0.62	2100

Notes

- (1) Dash number will include the letter "H" to indicate the vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages, and frequencies, see "Ripple Current" table.
- (3) Maximum ESR is calculated by the following equation:

$$ESR \text{ (max.)} = \frac{DF}{2\pi f C}, \text{ where}$$

DF = Maximum dissipation factor from "Standard Ratings" table
 f = 120 Hz
 C = Nominal capacitance



DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016

Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016

Vishay

STANDARD RATINGS: DSCC 06016												
CAPACITANCE (μ F)	CASE CODE	CAP. TOL. (\pm %)	PIN for DSCC 06016 (1)	MAX. DCL (μ A) at		MAX. DF at + 25 °C (%)	MAX. IMP. at - 55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX. ESR at + 25 °C 120 Hz (Ω) (2)	MAX. 85 °C 40 kHz RIPPLE CURRENT 3 mA RMS (3)
				+ 25 °C	+ 85 °C + 125 °C			- 55 °C	+ 85 °C	+ 125 °C		
30 WV_{DC} at + 85 °C . . . 20 WV_{DC} at + 125 °C												
56	T1	20	0217H	2	9	11	100	- 38	12	15	2.61	800
56	T1	10	0218H	2	9	11	100	- 38	12	15	2.61	800
220	T2	20	0219H	3	16	21	36	- 60	13	16	1.27	1200
220	T2	10	0220H	3	16	21	36	- 60	13	16	1.27	1200
470	T3	20	0221H	8	32	32	25	- 65	20	25	0.91	1500
470	T3	10	0222H	8	32	32	25	- 65	20	25	0.91	1500
560	T4	20	0223H	9	36	27.5	20	- 65	25	30	0.65	2000
560	T4	10	0224H	9	36	27.5	20	- 65	25	30	0.65	2000
50 WV_{DC} at + 85 °C . . . 30 WV_{DC} at + 125 °C												
33	T1	20	0225H	2	9	6.15	135	- 29	10	12	2.48	700
33	T1	10	0226H	2	9	6.15	135	- 29	10	12	2.48	700
120	T2	20	0227H	4	24	11.3	49	- 42	12	15	1.25	1200
120	T2	10	0228H	4	24	11.3	49	- 42	12	15	1.25	1200
270	T3	20	0229H	8	32	18.5	29	- 46	20	25	0.91	1450
270	T3	10	0230H	8	32	18.5	29	- 46	20	25	0.91	1450
330	T4	20	0231H	9	36	19	22	- 46	25	30	0.77	1900
330	T4	10	0232H	9	36	19	22	- 46	25	30	0.77	1900
60 WV_{DC} at + 85 °C . . . 40 WV_{DC} at + 125 °C												
27	T1	20	0233H	3	12	5.1	144	- 24	10	12	2.51	700
27	T1	10	0234H	3	12	5.1	144	- 24	10	12	2.51	700
100	T2	20	0235H	4	20	9.5	54	- 36	12	15	1.26	1100
100	T2	10	0236H	4	20	9.5	54	- 36	12	15	1.26	1100
220	T3	20	0237H	8	32	15	29	- 40	16	20	0.91	1400
220	T3	10	0238H	8	32	15	29	- 40	16	20	0.91	1400
270	T4	20	0239H	9	36	13.5	23	- 45	20	25	0.67	1850
270	T4	10	0240H	9	36	13.5	23	- 45	20	25	0.67	1850
75 WV_{DC} at + 85 °C . . . 50 WV_{DC} at + 125 °C												
22	T1	20	0241H	3	12	4.25	157	- 19	10	12	2.57	600
22	T1	10	0242H	3	12	4.25	157	- 19	10	12	2.57	600
82	T2	20	0243H	4	24	7.6	63	- 30	12	15	1.23	1000
82	T2	10	0244H	4	24	7.6	63	- 30	12	15	1.23	1000
180	T3	20	0245H	9	36	12.2	30	- 35	16	20	0.9	1300
180	T3	10	0246H	9	36	12.2	30	- 35	16	20	0.9	1300
220	T4	20	0247H	10	40	18.5	24	- 40	20	25	1.12	1800
220	T4	10	0248H	10	40	18.5	24	- 40	20	25	1.12	1800

Notes

- (1) Dash number will include the letter "H" to indicate the vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages, and frequencies, see "Ripple Current" table.
- (3) Maximum ESR is calculated by the following equation:

$$ESR \text{ (max.)} = \frac{DF}{2\pi f C}, \text{ where}$$

DF = Maximum dissipation factor from "Standard Ratings" table
 f = 120 Hz
 C = Nominal capacitance

DSCC 06013, DSCC 06014, DSCC 06015, DSCC 06016



Vishay

Wet Tantalum Capacitors, Space Level, Established Reliability,
DSCC Drawings 06013, 06014, 06015, 06016

STANDARD RATINGS: DSCC 06016												
CAPACITANCE (μF)	CASE CODE	CAP. TOL. (± %)	PIN for DSCC 06016 (1)	MAX. DCL (μA) at		MAX. DF at +25 °C (%)	MAX. IMP. at -55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) at			MAX. ESR at +25 °C 120 Hz (Ω) (2)	MAX. 85 °C 40 kHz RIPPLE CURRENT 3 mA RMS (3)
				+25 °C	+85 °C +125 °C			+25 °C	-55 °C	+85 °C		
100 WV_{DC} at +85 °C . . . 65 WV_{DC} at +125 °C												
10	T1	20	0249H	3	12	2.25	200	-17	10	12	2.99	800
10	T1	10	0250H	3	12	2.25	200	-17	10	12	2.99	800
39	T2	20	0251H	5	24	5.2	80	-20	12	15	1.77	1300
39	T2	10	0252H	5	24	5.2	80	-20	12	15	1.77	1300
68	T3	20	0253H	10	40	5.65	40	-30	14	16	1.11	1600
68	T3	10	0254H	10	40	5.65	40	-30	14	16	1.11	1600
120	T4	20	0255H	12	48	12.5	30	-35	15	17	1.38	2000
120	T4	10	0256H	12	48	12.5	30	-35	15	17	1.38	2000
125 WV_{DC} at +85 °C . . . 85 WV_{DC} at +125 °C												
6.8	T1	20	0257H	3	12	3	300	-14	10	12	5.86	700
6.8	T1	10	0258H	3	12	3	300	-14	10	12	5.86	700
27	T2	20	0259H	5	24	3.6	90	-18	12	15	1.77	1200
27	T2	10	0260H	5	24	3.6	90	-18	12	15	1.77	1200
47	T3	20	0261H	10	40	3.95	50	-26	14	16	1.12	1500
47	T3	10	0262H	10	40	3.95	50	-26	14	16	1.12	1500
82	T4	20	0263H	12	48	8.7	32	-30	15	17	1.41	1900
82	T4	10	0264H	12	48	8.7	32	-30	15	17	1.41	1900

Notes

- (1) Dash number will include the letter "H" to indicate the vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages, and frequencies, see "Ripple Current" table.
- (3) Maximum ESR is calculated by the following equation:

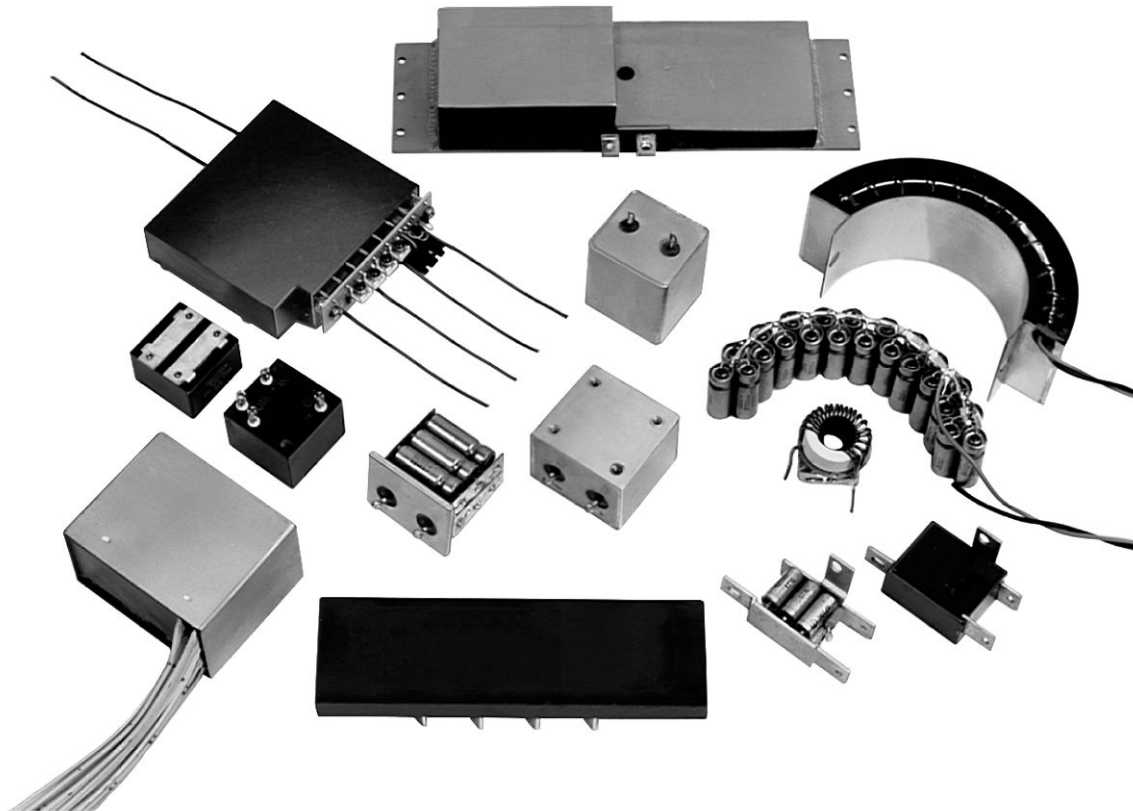
$$ESR \text{ (max.)} = \frac{DF}{2\pi f C}, \text{ where}$$

DF = Maximum dissipation factor from "Standard Ratings" table
 f = 120 Hz
 C = Nominal capacitance

DSCC 06013, 06014, 06015, 06016 RIPPLE CURRENT MULTIPLIERS VS. FREQUENCY, TEMPERATURE AND APPLIED PEAK VOLTAGE																									
Frequency of applied ripple current		120 Hz				800 Hz				1 kHz				10 kHz				40 kHz				100 kHz			
		TEMP °C				TEMP °C				TEMP °C				TEMP °C				TEMP °C				TEMP °C			
Ambient still air		≤55	85	105	125	≤55	85	105	125	≤55	85	105	125	≤55	85	105	125	≤55	85	105	125	≤55	85	105	125
% of Applied voltage	100 %	0.60	0.39	-	-	0.71	0.43	-	-	0.72	0.46	-	-	0.88	0.55	-	-	1.0	0.63	-	-	1.1	0.69	-	-
	90 %	0.60	0.46	-	-	0.71	0.55	-	-	0.72	0.55	-	-	0.88	0.67	-	-	1.0	0.77	-	-	1.1	0.85	-	-
	80 %	0.60	0.52	0.35	-	0.71	0.62	0.42	-	0.72	0.62	0.42	-	0.88	0.76	0.52	-	1.0	0.87	0.59	-	1.1	0.96	0.65	-
	70 %	0.60	0.58	0.44	-	0.71	0.69	0.52	-	0.72	0.70	0.52	-	0.88	0.85	0.64	-	1.0	0.97	0.73	-	1.1	1.07	0.80	-
	66 2/3	0.60	0.60	0.46	0.27	0.71	0.71	0.55	0.32	0.72	0.72	0.55	0.32	0.88	0.88	0.68	0.40	1.0	1.0	0.77	0.45	1.1	1.1	0.85	0.50

- 1. At +125 °C the rated voltage of the capacitors decreases to 66 2/3 percent of the +85 °C rated voltage.
- 2. The peak of the applied AC ripple voltage plus the applied DC voltage must not exceed the DC voltage rating of the capacitor either forward or reverse.
- 3. The ripple current listed represents a rating calculated using a maximum internal temperature rise (ΔT) of +50 °C at 40 kHz at +85 °C ambient with a maximum peak rated voltage of 66 2/3 percent of the +85 °C peak voltage rating.
- 4. The maximum allowable internal temperature rise (ΔT) decreases linearly to a calculated +10 °C rise at +125 °C ambient.
- 5. The internal temperature rise is directly proportional to the equivalent series resistance of the capacitor and equivalent series resistance increases with decreasing frequency.

Custom Design, Component Assemblies TANTAPAK®



Vishay offers expert design service and applications assistance to produce custom design capacitor banks and a virtually unlimited variety of component assemblies. Custom TANTAPAK® assemblies can be designed to take advantage of the superior performance, stability and reliability of Vishay Sprague tantalum capacitors, assembled in unique packages and in configurations that will perform in extraordinary environmental conditions.

The Vishay family of tantalum capacitors, solids and wet slug can be electrically and physically configured for your application. In addition, any of a wide variety of electronic components can be incorporated in TANTAPAK® modules. There are few limitations to the geometries or circuit functions available with TANTAPAK® assemblies. Terminal size, pin configurations, package dimensions, mounting

hardware, case markings and other special requirements are optional with these made-to-order units. TANTAPAK® assemblies can be designed to fit your specific requirements.

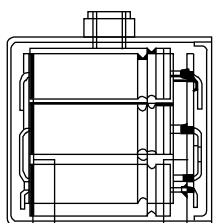
Vishay's skill in helping designers develop component assemblies is backed up by more than 25 years of experience in the production of TANTAPAK® modules.

TANTAPAK® assemblies now in service can withstand severe environmental conditions of high humidity, high altitude, severe shock and vibration. TANTAPAK® modules are rated for operation over the temperature range of - 55 °C to + 125 °C and with special design to + 200 °C.

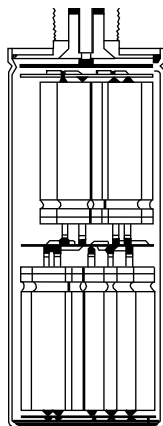
Inquiries should be directed to the factory.

DIMENSIONS

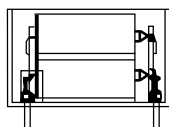
Typical TANTAPAK® Assemblies



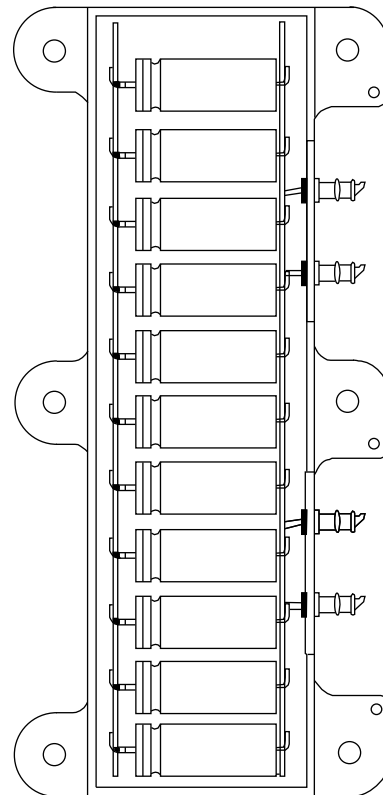
2600 µF, 75 V



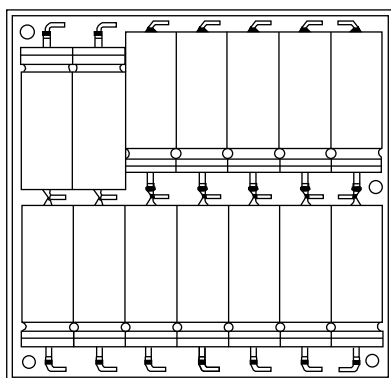
150 µF, 250 V



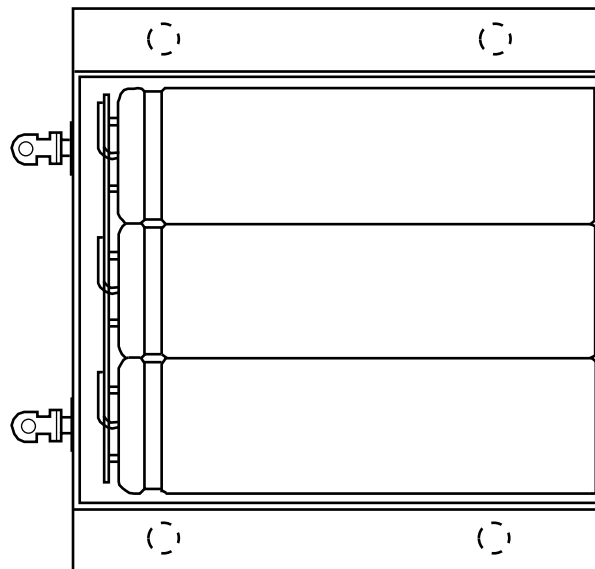
250 µF, 35 V



350 µF, 250 V



500 µF, 125 V
280 µF, 125 V



2800 µF, 200 V



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