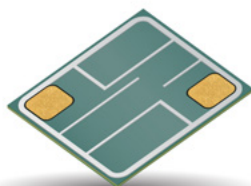
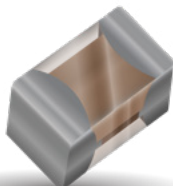
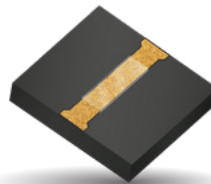
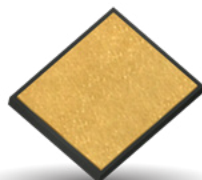
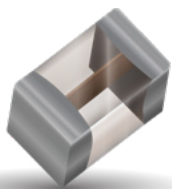




# Specialty Thin Film Products

Formerly Known as Passive Micro Components



## IMPORTANT INFORMATION/DISCLAIMER

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# Specialty Thin Film Products

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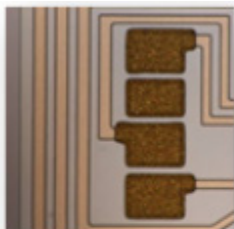
# Specialty Thin Film Products

## General Information

### PROCESS CAPABILITIES ELECTRONIC MATERIALS

Passive Element	Resistors		Capacitors			Inductors
Material	TaN	SiCr	SiON	SiO2	BCB	CU
Sheet Resistance or Specific Capacitance	10-100 Ω/sq	700-1400 Ω/sq	100 pf/mm <sup>2</sup>	35 pf/mm <sup>2</sup>	25 pf/mm <sup>2</sup>	N/A
Typical Ranges	0.47-1MΩ	47-30MΩ	1-500pF	1-500pF	1-50pF	0.5-20nH
Breakdown Conditions	> 350°C	> 400°C	≤ 600 (V/μm)	≤ 1000 (V/μm)	≤ 300 (V/μm)	NA
Minimum Tolerance	± 0.1%	± 0.1%	> 0.5% trimmed; ± 4% untrimmed	> 0.5% trimmed; ± 4% untrimmed	± 10% untrimmed	±5%
Performance NOTE TCR in ppm/°C	TCR -150 to -100	TCR Tunable to ±25 (±250 Typical)	K 6.1; TCC 60	K 4.0; TCC 30	K 2.7; TCC 42	Q≤80

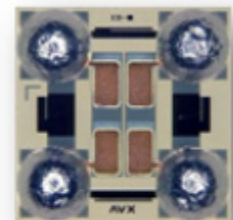
AU WIRE-BOND



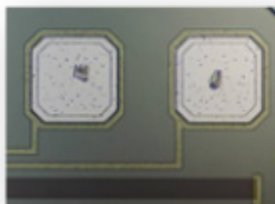
SURFACE MOUNT (SINGLE I/O PAIR)



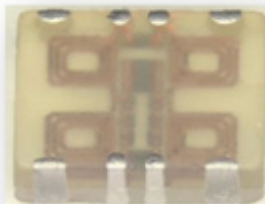
BALL GRID ARRAY



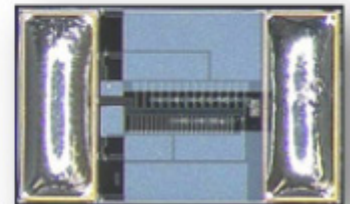
Al WIRE-BOND



SURFACE MOUNT (STRIPED, MULTIPLE I/Os)



LAND GRID ARRAY



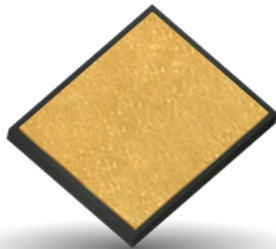
Substrate	Thickness	Comment
P-Si Boron doped	5-25 mil	15 Ω-cm
N++ Si Arsenic Doped	5-25 mil	0.002 Ω-cm
Glass	5-25 mil	10 <sup>13</sup> Ω-cm
Aluminum Nitride	10-60 mil	Lapped or Polished
Alumina	5-50 mil	Lapped or Polished
Fused Silica	5-25 mil	10 <sup>14</sup> Ω-cm
BeO	10-60 mil	Lapped or Polished

Material	Thickness	Comment
Al	150-40kÅ	Also with 4% Cu or 1% Si
Au	500-20kÅ	
Au (plated)	0.5-20μm	Electro And Electro-less
Cr	150-5kÅ	600Å Typical
Cu	2k-25kÅ	
Cu (plated)	0.5-100μm	
Ni (V)	500-10kÅ	
Ni (plated)	0.5 - 4μm	
Pd	500-5kÅ	
Pt	1k-4kÅ	2500Å Typical
TaN	300-1.5kÅ	
Ti	500-5kÅ	600Å Typical
TiW	300-2kÅ	500Å Typical

# MS Series

## MOS (Metal Oxide Semiconductor) Capacitors

## MIS (Metal Insulator Semiconductor) Capacitors



### GENERAL DESCRIPTION

For applications in RF, microwave, and GHz ranges, KYOCERA AVX now offers MOS and MIS Capacitors. MOS Capacitors are Single Layer Capacitors (SLCs) that use silicon dioxide to produce small, high Q, temperature stable, high breakdown voltage, low leakage capacitors. To ease assembly, KYOCERA AVX offers a wide range of termination styles for epoxy or solder die attach and subsequent Gold or Aluminum wire thermosonic and ultrasonic bonding. Custom applications and designs are welcome. Please contact your local representative.

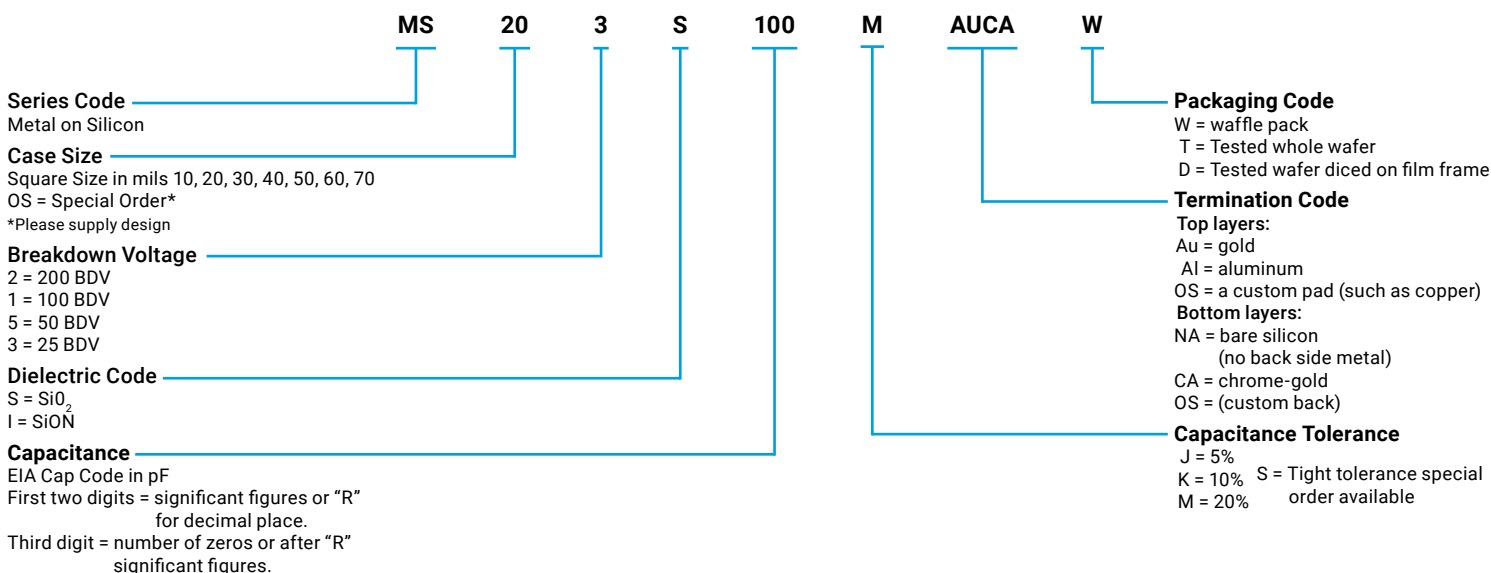
### FEATURES

- Small Size: .010 to .070 inches square
- Capacitance Range: 1.0 to 1000pF
- High Q
- DC to 20GHz operation

### APPLICATIONS

- Hybrid circuits
- Bias Networks
- Test and Measurement Equipment
- Aerospace
- TOSA and ROSA applications

### HOW TO ORDER



### MIL TEST METHODS

Standard Test Method	MIL Reference	MIL Section
Bond Strength	MIL-STD-883	2011.7
Shear Strength	MIL-STD-883	2019
Thermal Shock	MIL-STD-202	107
Life	MIL-STD-202	108
Load Humidity (THB)	MIL-STD-202	103 @rated VDC

### TYPICAL ELECTRICAL SPECIFICATIONS

<b>Material</b>	MOS(SiO <sub>2</sub> )
<b>pF/mm<sup>2</sup> Typical</b>	85 @ 50V rated
<b>TCC</b>	±30 ppm/°C
<b>Breakdown Voltage</b>	≤200
<b>Peak Voltage at +25°C</b>	1.5 x BDV
<b>BDV</b>	≤0.1%
<b>Operating Temp. Range</b>	-55°C to 125°C
<b>Thickness</b>	0.25mm (9.85mil)
<b>Size Tolerance</b>	±0.076mm (±3mil)

# MS Series

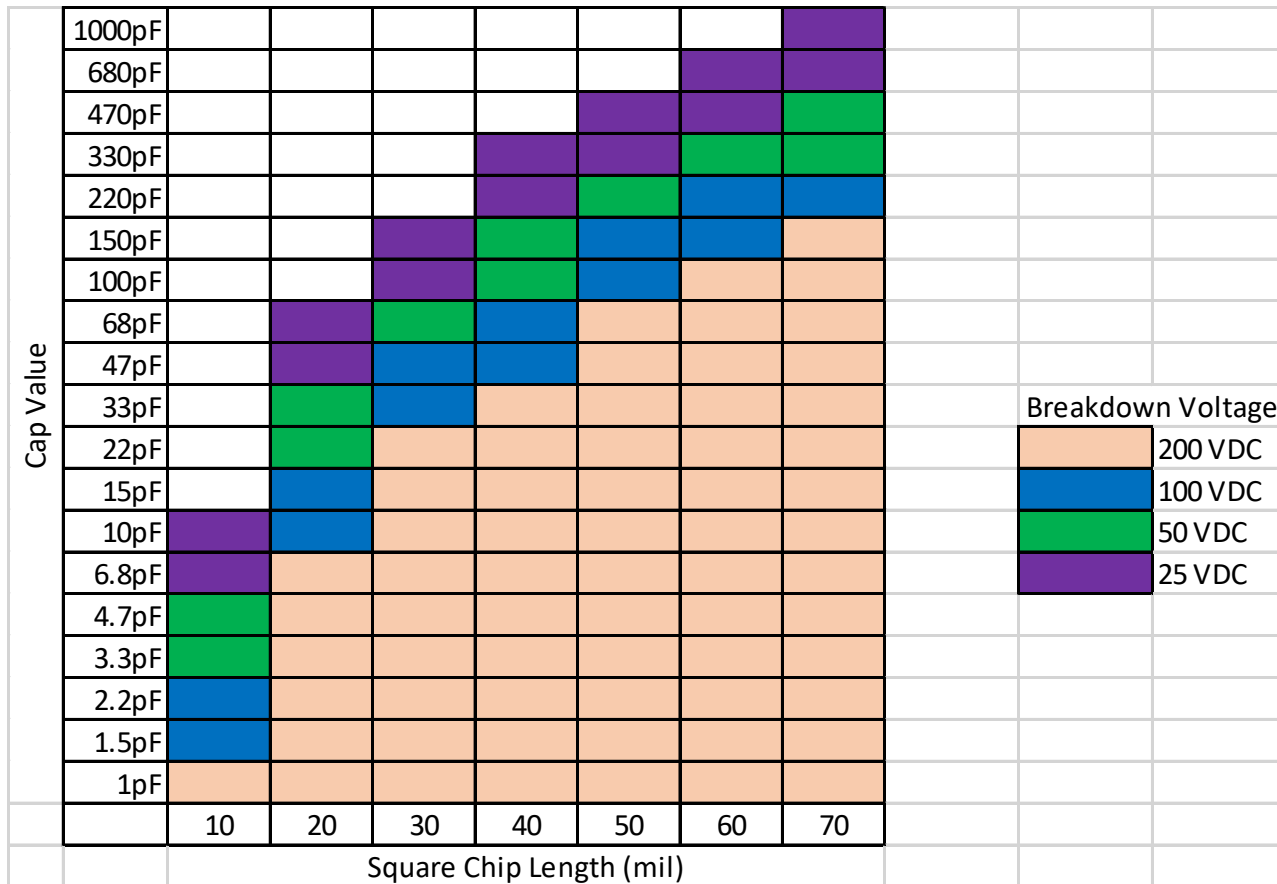
## MOS (Metal Oxide Semiconductor) Capacitors

## MIS (Metal Insulator Semiconductor) Capacitors



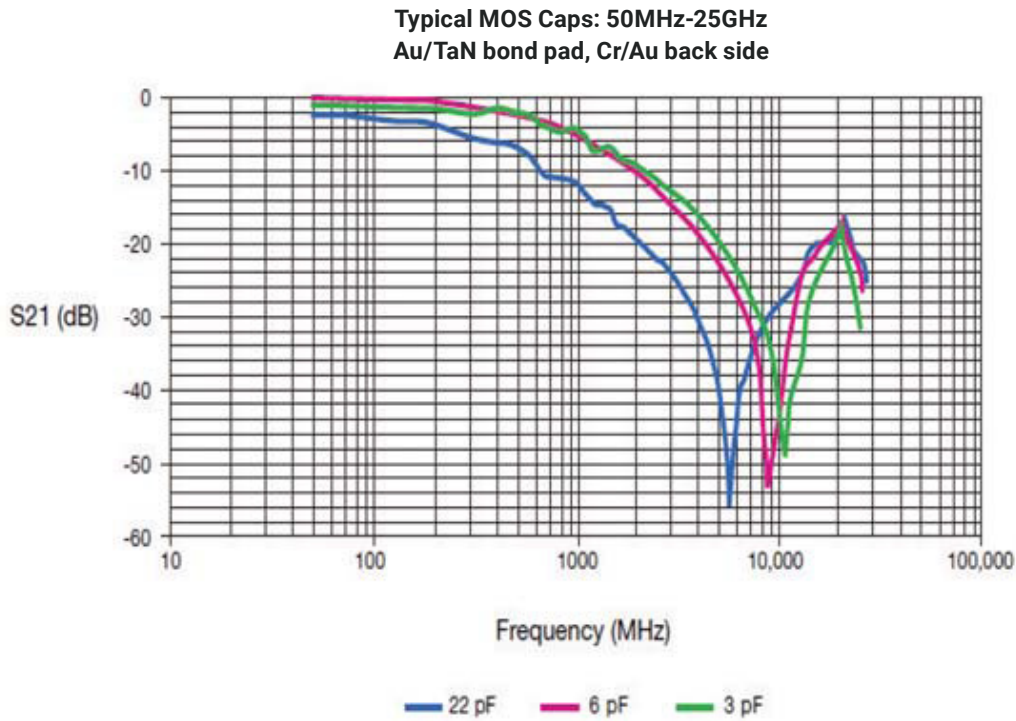
### STANDARD VALUES

Part Number	Length mil (mm)	Width mil (mm)	Value (pF)	BDV
MS102S0R1MAUCAW	10 (.254)	10 (.254)	0.1	200
MS102SR15MAUCAW	10 (.254)	10 (.254)	0.15	200
MS102SR22MAUCAW	10 (.254)	10 (.254)	0.22	200
MS102SR33MAUCAW	10 (.254)	10 (.254)	0.33	200
MS102SR47MAUCAW	10 (.254)	10 (.254)	0.47	200
MS102SR68MAUCAW	10 (.254)	10 (.254)	0.68	200
MSOS2S1R0MAUCAW	10 (.254)	20 (.508)	1	200
MSOS2S1R5MAUCAW	10 (.254)	20 (.508)	1.5	200
MS202S2R2MAUCAW	20 (.508)	20 (.508)	2.2	200
MS202S3R3MAUCAW	20 (.508)	20 (.508)	3.3	200
MS103S4R7KAUCAW	10 (.254)	10 (.254)	4.7	25
MSOS2S4R7KAUCAW	30 (.762)	20 (.508)	4.7	200
MSOS2S6R8KAUCAW	30 (.762)	20 (.508)	6.8	200
MS103S100KAUCAW	10 (.254)	10 (.254)	10	25
MS302S100KAUCAW	30 (.762)	30 (.762)	10	200
MSOS3S220KAUCAW	10 (.254)	20 (.508)	22	25
MS203S470KAUCAW	20 (.508)	20 (.508)	47	25
MS303S101KAUCAW	30 (.762)	30 (.762)	100	25
MS503S471KAUCAW	50 (1.27)	50 (1.27)	470	25
MS703S102KAUCAW	70 (1.778)	70 (1.778)	1000	25

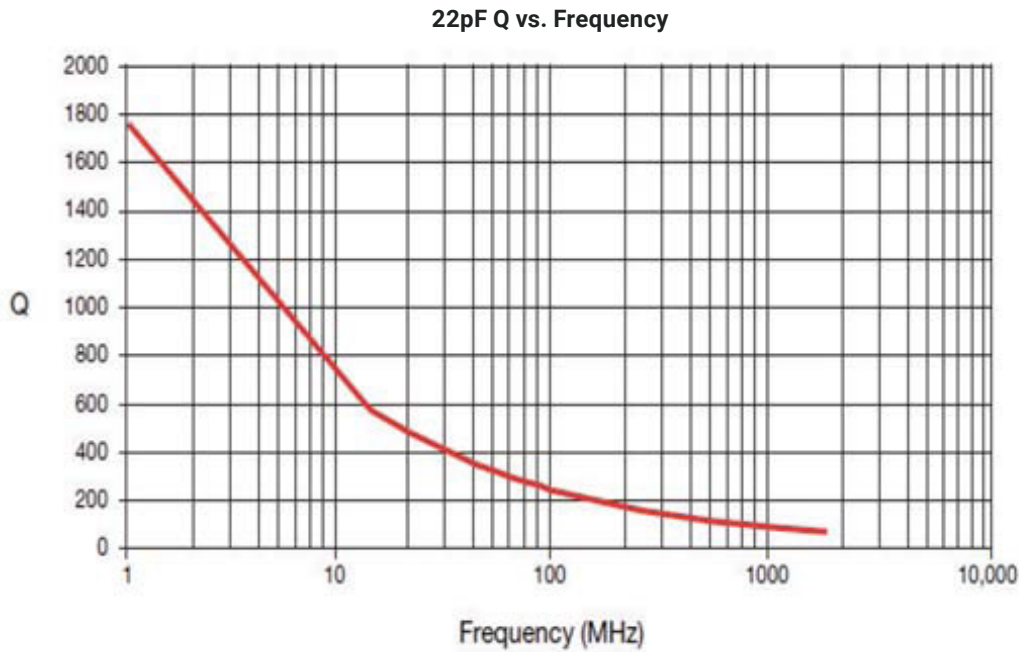




### S21 AND Q VERSUS FREQUENCY



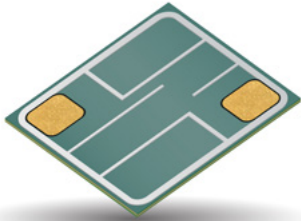
Tested on Alumina Test Board with Agilent VNA



Tested on Alumina Test Board with Agilent VNA

# Thin Film WBR (Wire Bond Resistor)

## Top Contact



### GENERAL DESCRIPTION

Top Contact Precision wire bondable resistors are ultra-stable with high reliability. Resistors are laser trimmed to tight tolerance. Customizable value and unique marking of that value. This device is built in 0202 chip outline and is ideal for but not limited to hybrid circuit applications.

These are designed specifically for applications that require thermo-compression, epoxy or ultra-sonic attachment.

### APPLICATIONS

- Medical Implantable
- Military / Defense
- Hybrid Designs
- Multi-Chip Module (MCM)
- Test & Measurement Instrumentation
- High-Rel Microelectronics
- RF / Microwave communications

### BENEFITS

- Top Contact/ Bottom Isolated
- Ultra High Stability
- High Reliability
- Extremely Tight Tolerance
- Unique Value Marking
- 250 mW Power Rating
- Small package size

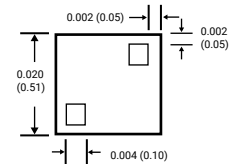
### HOW TO ORDER

WBR	0202	S	D	1R051	F	G	W
<b>Series Code</b> WBR = Wire Bond Resistor	<b>Case Size</b> 0202 = 0202 0S0S = Special Request Please supply Design or contact factory	<b>Material</b> S = Silicon G = Glass C = Custom	<b>TCR (ppm/°C)</b> D = ±150 S = Special Request supply design or contact factory	<b>Resistance</b> 1R500 = 1.5 ohm 1R051 = 10.5ohm 1R052 = 105ohm 1R053 = 1,050ohm 2R553 = 2,550ohm 1R054 = 10,500ohm 1R007 = 10Megohm <small>Not standard values, values shown for intrusion purposes only</small>	<b>Tolerance</b> F = 1% G = 2% J = 5% S = Special Request supply design or contact factory	<b>Termination Code</b> G = Bondable Gold A = Aluminum	<b>Packaging</b> W = Waffle Pack

### MECHANICAL DIMENSIONS INCHES (MM)

Size	Length (L)	Width(W)	Minimum Bond Area
0202	0.020 ± 0.003 (0.51 ± 0.076)	0.020 ± 0.003 (0.51 ± 0.076)	0.0038 ± 0.0038 (0.09 x 0.09)

Other sizes available upon request



### GENERAL CHARACTERISTICS

<b>Operating Temperature</b>	-55°C ± 125°C
<b>Insulation Resistance</b>	10 <sup>9</sup> MOhm

### ENVIRONMENTAL TESTS

Test	Limits	Specification
Life Test/ Stability	±0.25% Max Δ R/R	MIL-STD-202 MTD 108, 1000hrs, 125°C, 50mW
Thermal Shock	±0.25% Max Δ R/R	MIL-STD-202 MTD 107
High Temperature Exposure	±0.25% Max Δ R/R	100 Hrs @ 150°C
Moisture Resistance	±0.25% Max Δ R/R	MIL-STD-202 MTD 106
Wire Bond Test	4 Gram Min (1.25 Mil Wire)	MIL -PRF-55342
Short Time Overload	±0.25% Max Δ R/R	MIL -PRF-55342

### STANDARD VALUES

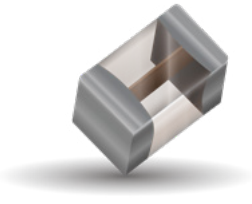
Part Number	Value (ohm)
WBR0202SD1R001FGW	10Ω
WBR0202SD2R001FGW	20Ω
WBR0202SD4R701FGW	47Ω
WBR0202SD1R002FGW	100Ω
WBR0202SD1R302FGW	130Ω
WBR0202SD2R202FGW	220Ω
WBR0202SD3R302FGW	330Ω
WBR0202SD6R802FGW	680Ω
WBR0202SD1R003FGW	1kΩ
WBR0202SD3R013FGW	3.01kΩ
WBR0202SD4R703FGW	4.7kΩ
WBR0202SD5R003FGW	5kΩ
WBR0202SD1R004FGW	10kΩ
WBR0202SD1R005FGW	100kΩ
WBR0202SD1R006FGW	1MΩ
WBR0202SD1R007FGW	10MΩ

Custom values available from 1 to 10M Ohm available upon request



# HR02 Series

## High Reliability Resistors



### GENERAL DESCRIPTION

The HR Series is the next generation of surface mount High Value Resistors. This product was designed with our proprietary Glass Sandwich FLEXITERM® Technology. The FLEXITERM® is a surface mountable automotive and medically qualified termination that adds an extra margin against damage due to flexure during installation. The HR Series has been designed with high quality selected materials that yield excellent performance in a small size. Resistor is designed to be embedded in glass sandwich to avoid environmental conditions, and provide low burst noise at high thin film resistance values. This product is ideal for use in applications requiring surface mountable small outline EIA resistors.

### FEATURES

- EIA 0402 Size
- Power Rating: 125 mW
- Low Current Consumption
- High Voltage
- Operating Temperature -40°C to +125°C
- Low Burst Noise

### APPLICATIONS

- Multi Chip Module (MCM)
- Bias Networks
- Test and Measurement Equipment
- Aerospace
- Medical
- Automotive

### HOW TO ORDER

<b>HR02</b>	<b>A</b>	<b>5R1</b>	<b>D</b>	<b>Z</b>	<b>TR</b>
Size	TCR	Resistance (Ohms)	Tolerance	Termination	Packaging
HR02 = 0402	A = ± 150 S = Special Request supply design or contact factory	1R1 = 1.1 Ω 100 = 10 Ω 101 = 100 Ω 102 = 1,000 Ω 103 = 10,000 Ω 104 = 100,000 Ω 105 = 1,000,000 Ω 106 = 10,000,000 Ω	D = ±0.5%* F = 1% G = 2% J = 5%  *Non-standard tolerance values per special request	7 = Nickel Gold* Z = Nickel Tin  *Non-standard termination per special request	TR = Tape & Reel W = Waffle Pack

### MECHANICAL DIMENSIONS mm (inches)

<b>Length (L)</b>	1.00±0.10 (0.039±0.004)	
<b>Width (W)</b>	0.50±0.10 (0.020±0.004)	
<b>Thickness (T)</b>	0.50±0.10 (0.020±0.004)	
<b>Terminal (t)</b>	0.25±0.15 (0.010±0.006)	

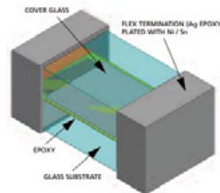
### 0402 TYPICAL CHARACTERISTICS

Resistor	Detail
Outline	EIA 0402
Package	Glass wafer sandwich
Termination	FLEXITERM® (Ag/Epoxy), plated
Power Rating	125 mW
Operating Temperature Range	-40°C to +125°C

Resistors from 1k to 30M Ohms available upon request

### STANDARD VALUES

Part Number	Value (ohm)
HR02A102FZTR	1000
HR02A222FZTR	2200
HR02A472FZTR	4700
HR02A103FZTR	10000
HR02A223FZTR	22000
HR02A473FZTR	47000
HR02A104FZTR	100000
HR02A224FZTR	220000
HR02A474FZTR	470000
HR02A105FZTR	1000000
HR02A225FZTR	2200000
HR02A475FZTR	4700000
HR02A106FZTR	10000000
HR02A226FZTR	22000000
HR02A306FZTR	30000000

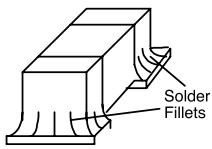


# HR02 Series

## High Reliability Resistors

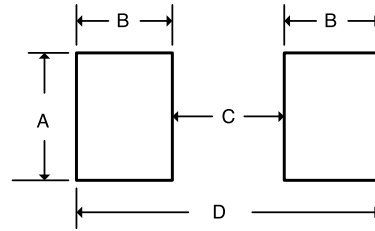


### SUGGESTED MOUNTING PAD DIMENSIONS



Normal Pads

W = Chip Width L = Chip Length T = Chip Thickness



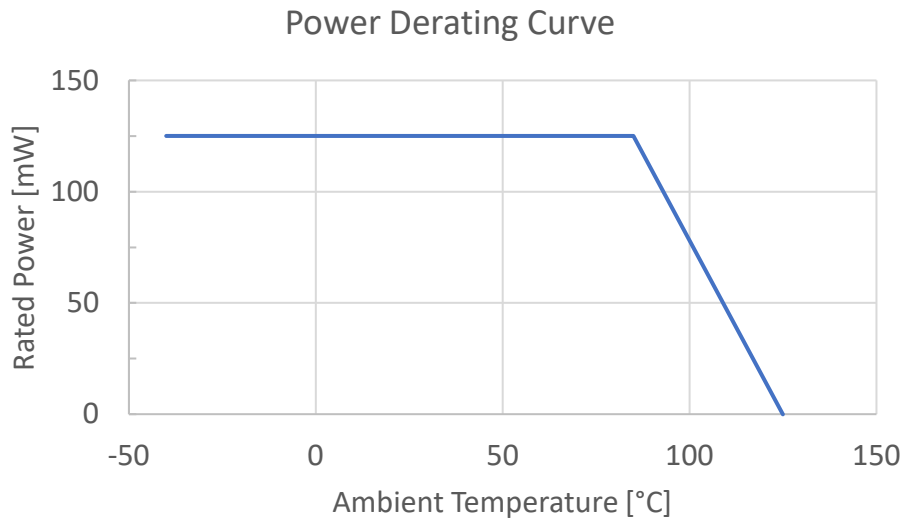
Case Size	A Min.	B Min.	C Min.	D Min.
0402	0.54 (0.0213)	0.3175 (0.0125)	0.523 (0.0206)	1.107 (0.0436)

mm (inches)

### NOTES:

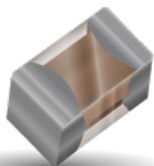
Mounting will allow the solder fillet to travel up approximately 0.015" of the chip's end and side termination surface. Heavier fillets require a predeposition of solder paste and or an increase in pad dimensions. Typical solder paste application is a .008" to 0.01" thickness with >50% of volume in solder alloy. Can be mounted in both vertical and horizontal orientation without changing electrical performance

### POWER DERATING



# UBR Series

## Ultra-Broadband Resistors



### GENERAL DESCRIPTION

Passive Micro Component group is pleased to introduce the UBR Series of next generation of surface mount Ultra-Broadband Resistors. This product was designed utilizing our proprietary Glass Sandwich Flexiterm® Technology, (GSFT). The Flexiterm® is a surface mountable automotive qualified termination that adds an extra margin against damage due to flexure during installation.

The UBR Series has been designed with high quality selected materials that yield excellent performance. This product is ideal for use in Optical Transceiver Modules or any application requiring excellent ultra-broadband performance. The use of glass sandwich technology and precision laser trimming reduces parasitic noise up to 40 GHz.

### FEATURES

- Frequency Range: DC to 40 GHz
- EIA 0402 Case Size
- Power Rating: 125 mW
- Operating Temperature: -40°C to +125°C
- 100% Laser Trimming for Tight Tolerances
- RoHS Compliant

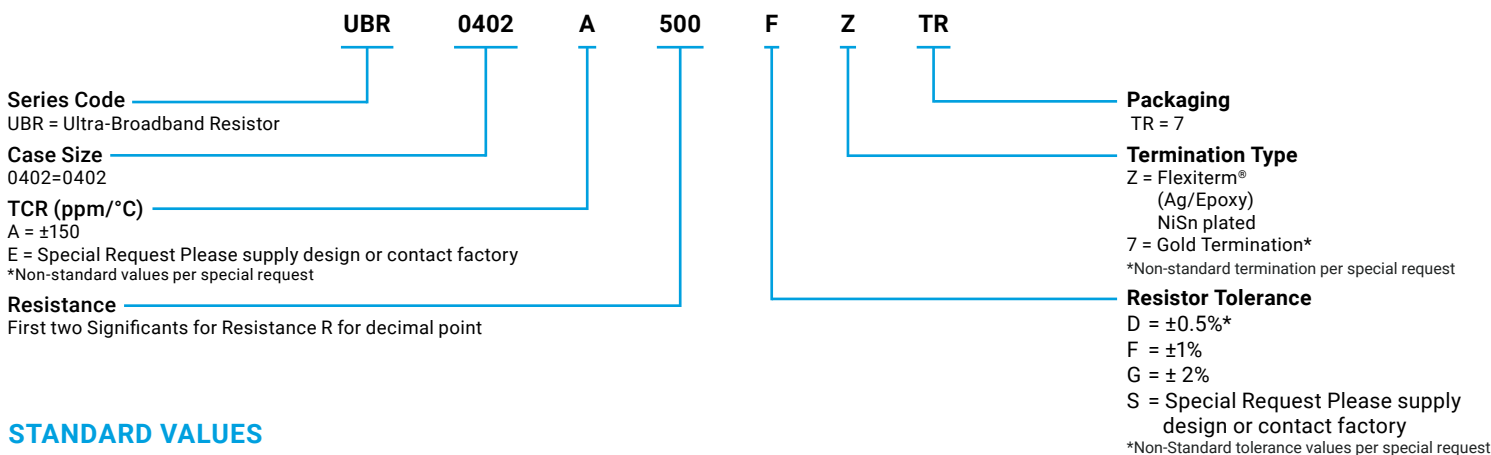
### APPLICATIONS

- Optical Transceiver Modules
- Broadband Receiver
- TOSA / ROSA
- Wideband Test Equipment
- Low Noise Amplifier
- MMIC Amplifiers
- Mixers
- Directional Couplers
- Ultra-Broadband Splitters and Combiners

### MARKETS

- Opto-electronics
- Automotive
- Telecom
- Broadband Jamming for EW
- Satellite Communication

### HOW TO ORDER



### STANDARD VALUES

Part Number	Value(ohm)
UBR0402A250FZTR	25Ω
UBR0402A35R7FZTR	37.5Ω
UBR0402A430FZTR	43Ω
UBR0402A500FZTR	50Ω
UBR0402A750FZTR	75Ω
UBR0402A101FZTR	100Ω
UBR0402A201FZTR	200Ω

Resistors from 10 to 1k Ohm available upon request



**CLICK HERE TO DOWNLOAD DATA FILES**

\*Data files contain DXF and S2P files



LEAD-FREE  
LEAD-FREE COMPATIBLE  
COMPONENT



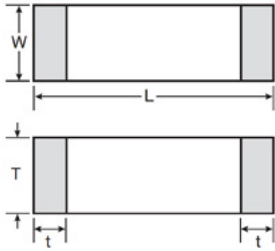
For RoHS compliant products, please select correct termination style

# UBR Series

## Ultra-Broadband Resistors

### MECHANICAL DIMENSIONS

mm (inches)

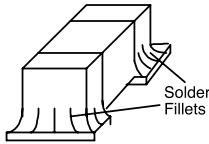


<b>Length (L)</b>	1.00±0.10 (0.039±0.004)
<b>Width (W)</b>	0.50±0.10 (0.020±0.004)
<b>Thickness (T)</b>	0.50±0.10 (0.020±0.004)
<b>Terminal (t)</b>	0.25±0.15 (0.010±0.006)

### 0402 TYPICAL CHARACTERISTICS

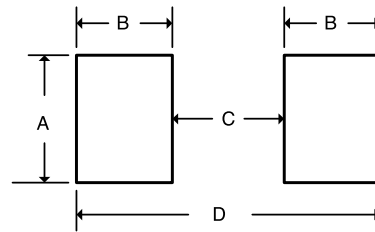
Resistor	Detail
Outline	EIA 0402
Package	Glass wafer sandwich
Maximum Voltage	1 KV
Termination	FLEXITERM® (Ag/Epoxy), plated
Power Rating	125 mW
Operating Temperature Range	-40°C to +125°C

### SUGGESTED MOUNTING PAD DIMENSIONS



Normal Pads

W = Chip Width L = Chip Length T = Chip Thickness



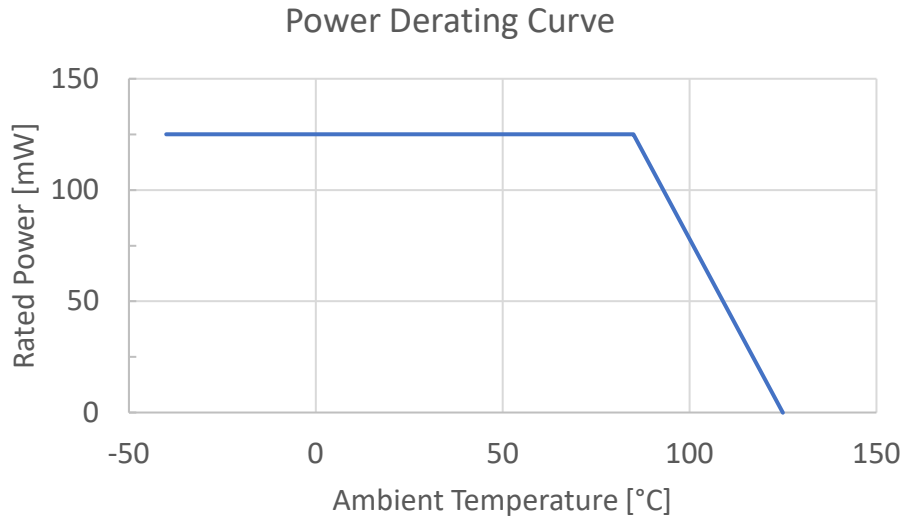
Case Size	A Min.	B Min.	C Min.	D Min.
0402	0.54 (0.0213)	0.3175 (0.0125)	0.523 (0.0206)	1.107 (0.0436)

Dimensions are in inches.

### NOTES:

Mounting will allow the solder fillet to travel up approximately 0.015" of the chip's end and side termination surface. Heavier fillets require a predeposition of solder paste and or an increase in pad dimensions. Typical solder paste application is a .008" to 0.01" thickness with >50% of volume in solder alloy. Can be mounted in both vertical and horizontal orientation without changing electrical performance

**POWER DERATING**



**ENVIRONMENTAL TEST**

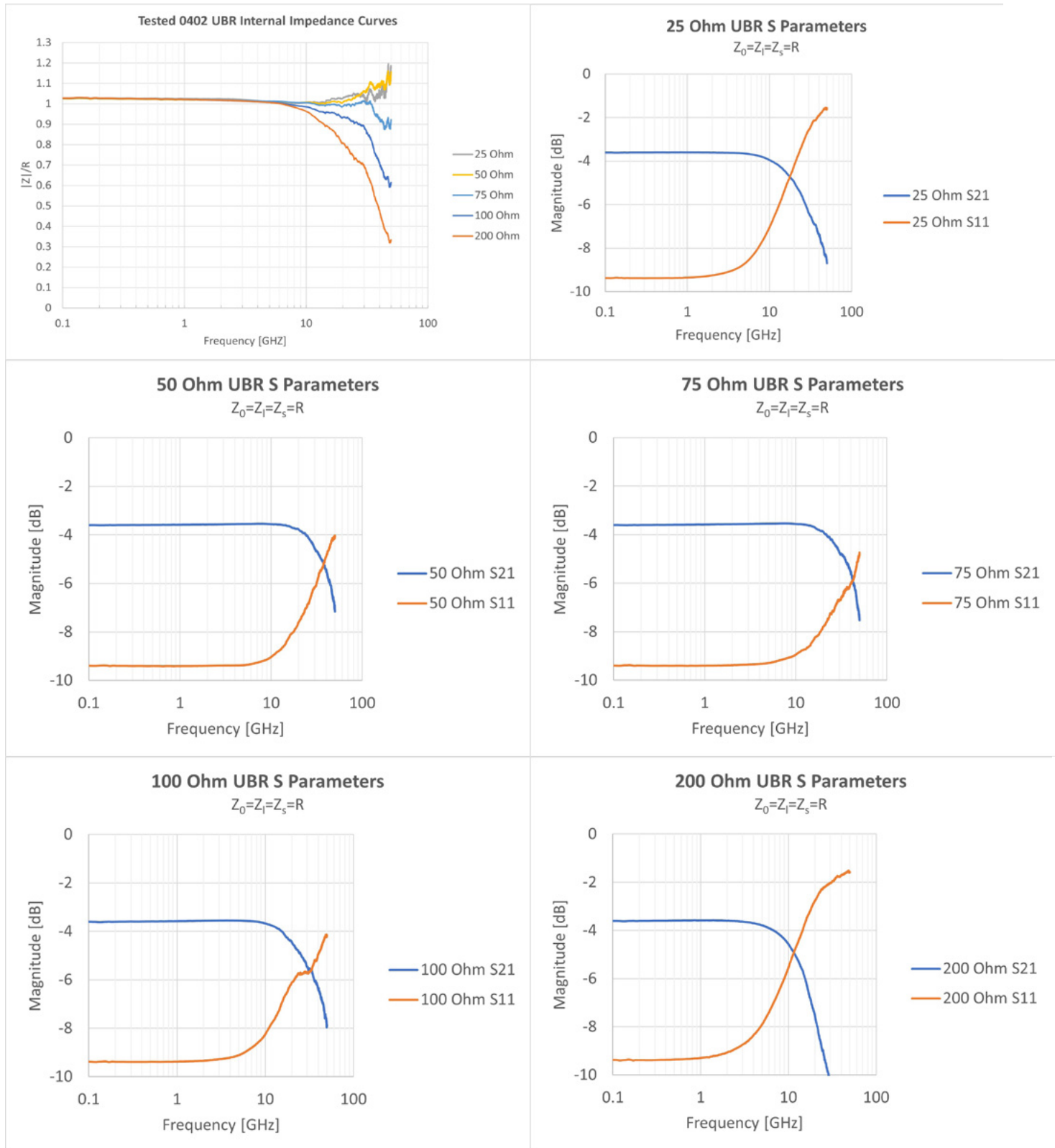
Test	Limits	Specification
Life Test/Stability	±0.25% Max Δ R/R	MIL-STD-202 MTD 108, 1000hrs, 125°C, 50mW
Thermal Shock	±0.25% Max Δ R/R	MIL-STD-202 MTD 107
High Temperature Exposure	±0.25% Max Δ R/R	100 Hrs @ 150°C
Moisture Resistance	±0.25% Max Δ R/R	MIL-STD-202 MTD 106

# UBR Series

## Ultra-Broadband Resistors



### INTERNAL IMPEDANCE CURVES



NOTES: All testing done by Modelithics



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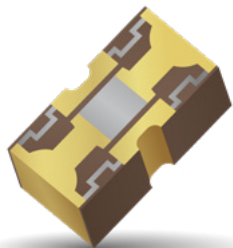
TDS-STFP-0006 | Rev 1

- SPECIALTY THIN FILM PRODUCTS -



# Thin Film RF Solutions - Attenuator

## AT Series - 0603



### GENERAL DESCRIPTION

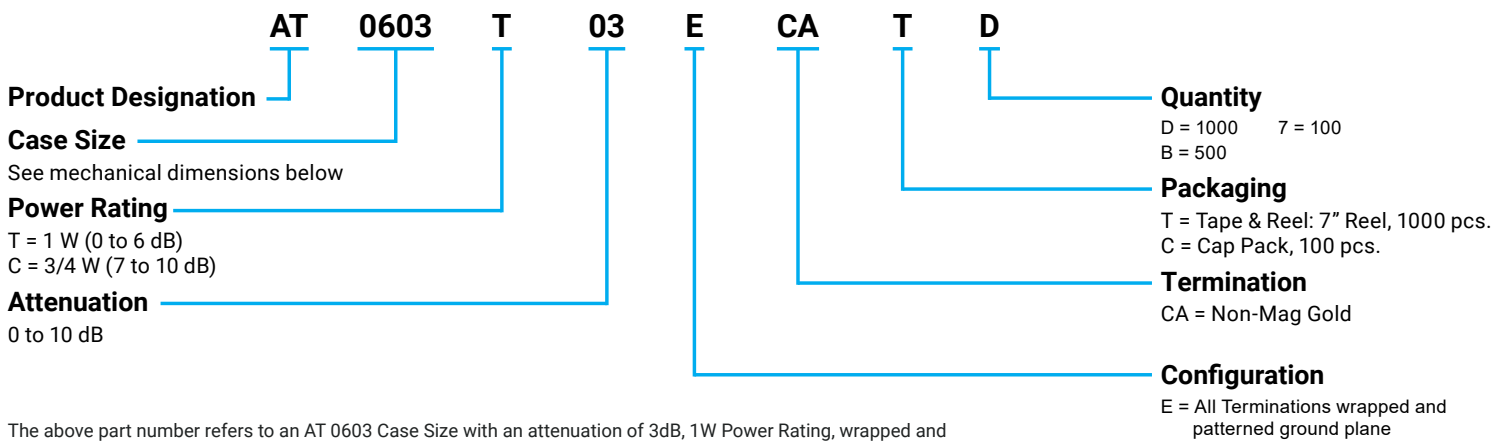
KYOCERA AVX's new PMC SMT Attenuator Series (AT) is manufactured with the highest quality materials for reliable and repeatable performance. These devices are constructed with Aluminum Nitride (AlN) and are available in a standard EIA 0603 case size. The AT Series exhibits excellent performance characteristics for the most demanding PMC applications.

The AT series provides virtually flat loss over a broad frequency spectrum. Thin film metalization provides for very stable characteristics over temperature and time. Its balanced PI design provides even current distribution and accurate attenuation characteristics from DC to 20 GHz. It is designed to meet a wide range of RF and microwave large and small signal level applications. The AT is ideal for impedance matching, input padding, signal level tuning, and many other critical PMC applications. The AT is rated highest power in class and is suitable for microstrip and CPW applications.

The non-magnetic termination is available to provide bonding with conductive epoxies. The AT is fully compatible with high speed automated pick-and-place processing.

Note: Consult Factory for other attenuation values, termination style and case sizes.

### HOW TO ORDER



The above part number refers to an AT 0603 Case Size with an attenuation of 3dB, 1W Power Rating, wrapped and patterned ground plane configuration with Solderable Gold Termination and tape and reel packaging, 1000 pcs.

### FEATURES

- Thin Film Design
- Power Rating Up to 1 Watt
- Frequency Response  $\pm 0.5$ dB
- Characterized to 20 GHz
- CPW and Microstrip Applications
- EIA 0603 SMT
- Highest Power in Class
- AlN construction
- Balanced Pi design
- Non-Magnetic Versions Available
- RoHs compliant

### APPLICATIONS

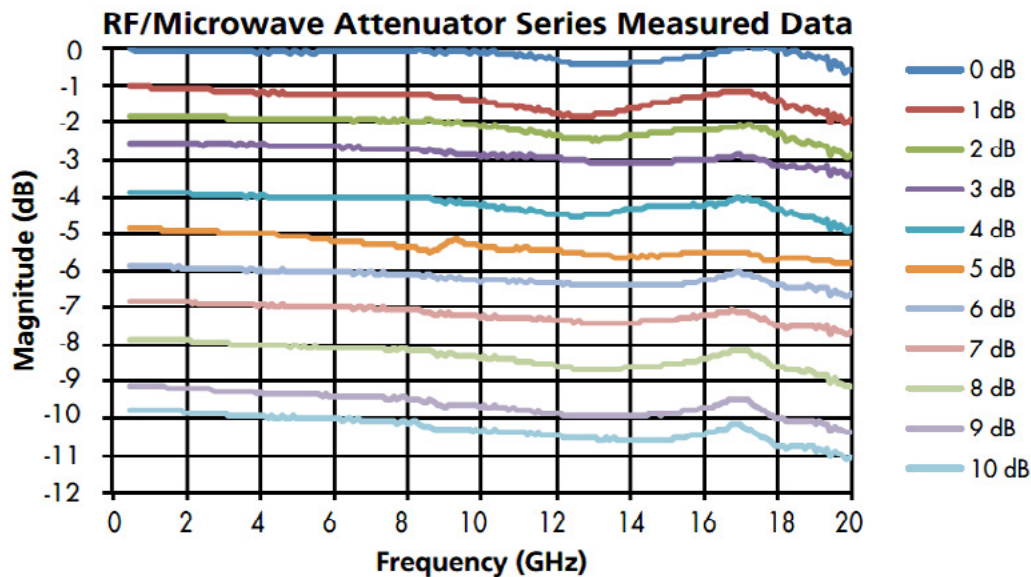
- Telecommunications
- Satellite Communications
- Cellular Base Stations
- Microwave Radio
- ISM
- RF/Microwave Power
- Military/Aerospace
- Test and Measurement
- Impedance Matching
- Input Padding
- Signal Level Tuning
- Signal Conditioning
- MRI

### AVAILABLE ATTENUATOR VALUES

Part Number	dB	Impedance	Frequency Range	Power	Case Size
AT0603T00ECATD	0	50	DC - 20 Ghz	1	0603
AT0603T01ECATD	1	50	DC - 20 Ghz	1	0603
AT0603T02ECATD	2	50	DC - 20 Ghz	1	0603
AT0603T03ECATD	3	50	DC - 20 Ghz	1	0603
AT0603T04ECATD	4	50	DC - 20 Ghz	1	0603
AT0603T05ECATD	5	50	DC - 20 Ghz	1	0603
AT0603T06ECATD	6	50	DC - 20 Ghz	1	0603
AT0603C07ECATD	7	50	DC - 20 Ghz	0.75	0603
AT0603C08ECATD	8	50	DC - 20 Ghz	0.75	0603
AT0603C09ECATD	9	50	DC - 20 Ghz	0.75	0603
AT0603C10ECATD	10	50	DC - 20 Ghz	0.75	0603

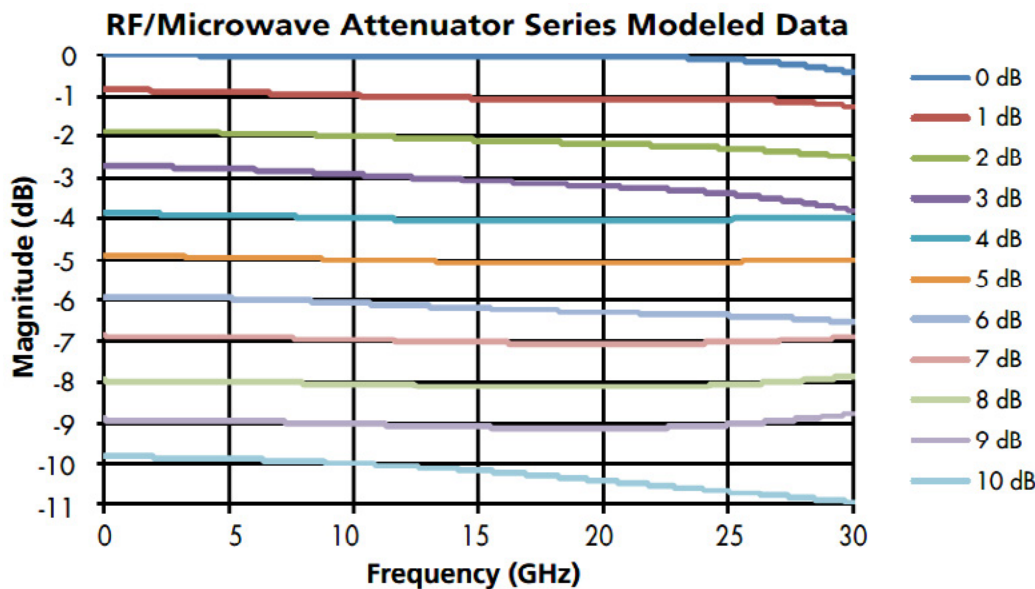
Click on part number to see full specifications





### RF/MICROWAVE ATTENUATOR TEST CONDITION DESCRIPTION

All testing performed on 13.3-mil-thick Rogers RO4350 microstrip board, with the UUT subtending a 44 mil gap in 30 mil-wide center trace (nominal 50-ohm characteristic impedance). Measurements were made using a four-receiver architecture. Measurements have been de-embedded to the edges of the UUT using a standard TRL calibration procedure.

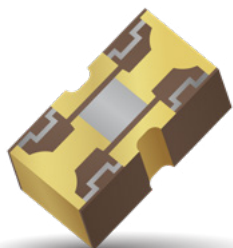


### RF/MICROWAVE ATTENUATOR MODELED DATA DESCRIPTION

Models were simulated using Ansoft HFSS version 14 in a perfect 50 ohm environment with ideal ports placed at the edge of the pads to ground. The boundary condition was set to be a radiating boundary in air.

# Thin Film RF Solutions - Attenuator

## AT0603T00ECATD - 0dB

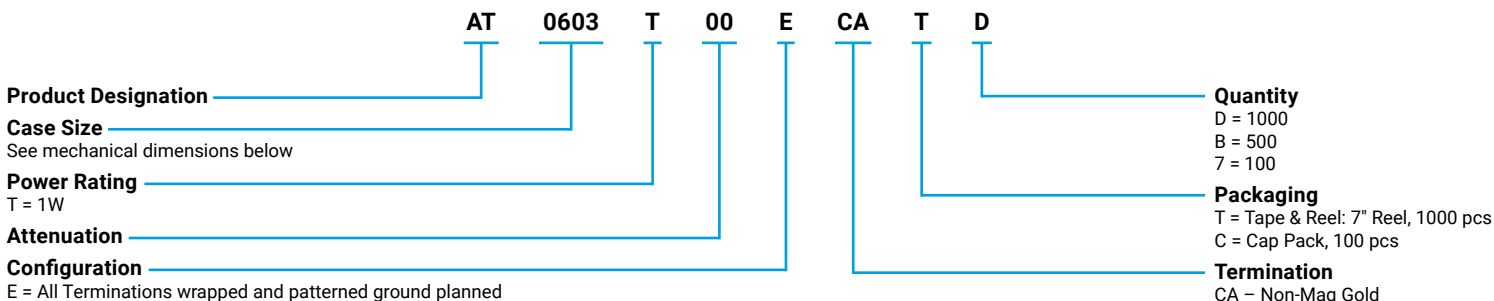


### QUALIFICATION TEST SUMMARY

<b>Input Power CW:</b>	1W	<b>Tolerance (dB):</b>	D.C. to 10 GHz:±0.50 dB >10GHz: ±dB
<b>Frequency Range:</b>	DC to 20 GHz	<b>Resistors:</b>	Tantalum Nitride
<b>VSMR:</b>	1.25:1 Typical	<b>Terminal:</b>	Thin Film Metalstack, Au
<b>Nominal Impedance:</b>	50 Ohms	<b>Substrate Material:</b>	AlN
<b>Operating Temperature:</b>	-55°C to + 150°C	<b>Inspection:</b>	100% Per MIL-STD-883

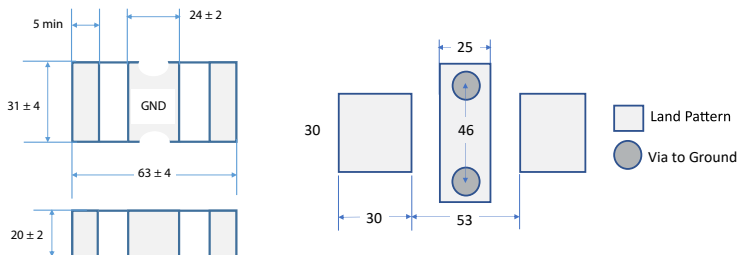
[Click here to go back to main table](#)

### HOW TO ORDER



### MECHANICAL DIMENSIONS

Dimensions are in mils, Bottom View

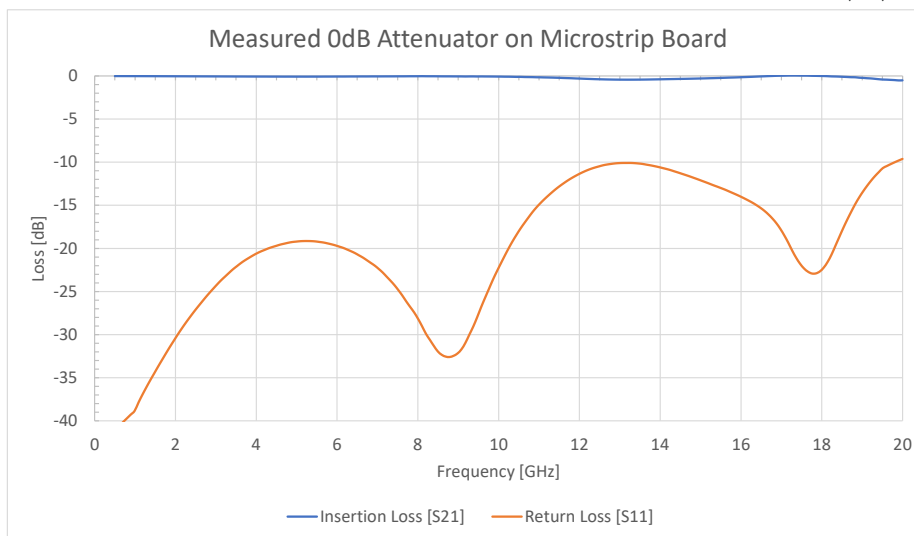


For RoHS compliant products, please select correct termination style



**CLICK HERE TO DOWNLOAD DATA FILES**

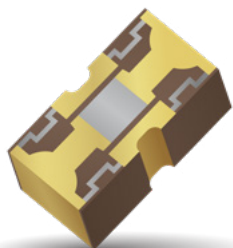
\*Data files contain DXF, S2P, and HFSS files



All testing performed on 13.3-mil-thick Rogers RO4350 microstrip board, with the UUT subtending a 44 mil gap in 30 mil-wide center trace (nominal 50-ohm characteristic impedance). Measurements were made using a four-receiver architecture. Measurements have been de-embedded to the edges of the UUT using a standard TRL calibration procedure.

# Thin Film RF Solutions - Attenuator

## AT0603T01ECATD - 1dB

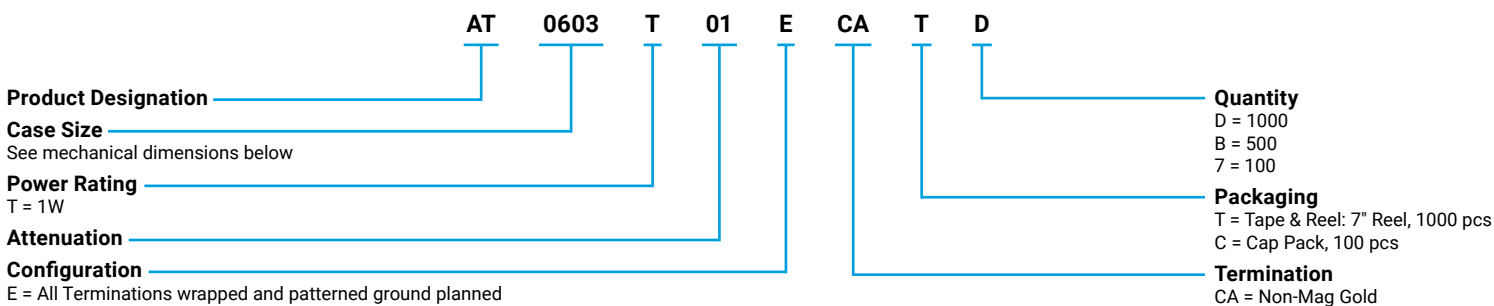


### QUALIFICATION TEST SUMMARY

<b>Input Power CW:</b>	1W	<b>Tolerance (dB):</b>	D.C. to 10 GHz:±0.50 dB >10GHz: ±dB
<b>Frequency Range:</b>	DC to 20 GHz	<b>Resistors:</b>	Tantalum Nitride
<b>VSMR:</b>	1.25:1 Typical	<b>Terminal:</b>	Thin Film Metalstack, Au
<b>Nominal Impedance:</b>	50 Ohms	<b>Substrate Material:</b>	AlN
<b>Operating Temperature:</b>	-55°C to + 150°C	<b>Inspection:</b>	100% Per MIL-STD-883

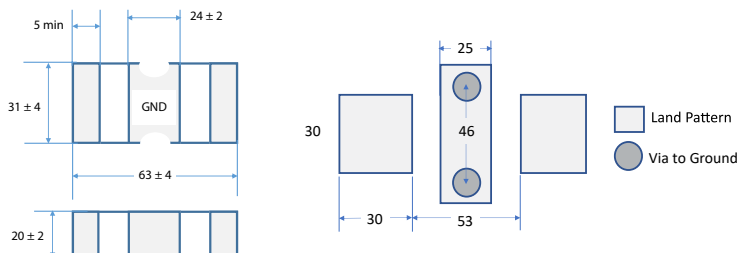
[Click here to go back to main table](#)

### HOW TO ORDER



### MECHANICAL DIMENSIONS

Dimensions are in mils, Bottom View

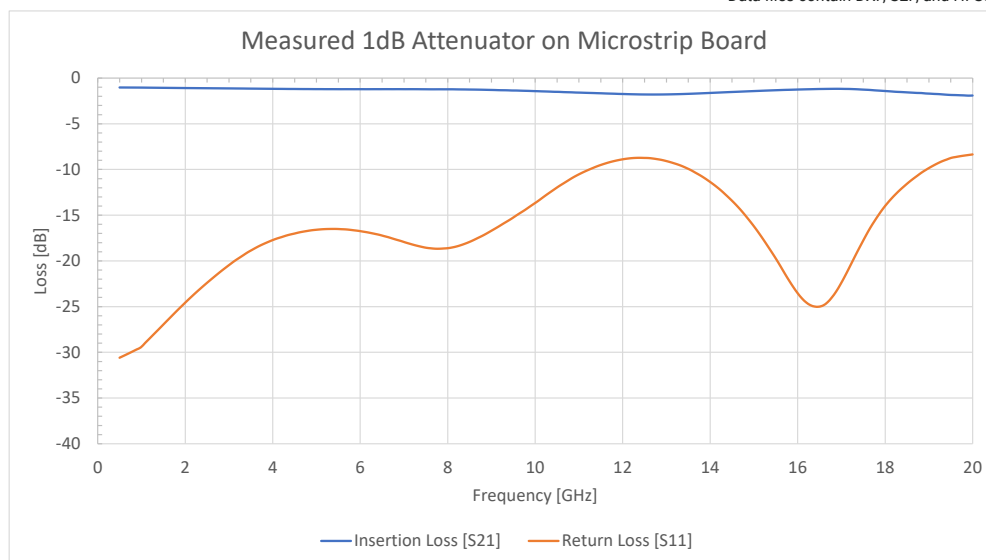


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\*Data files contain DXF, S2P, and HFSS files



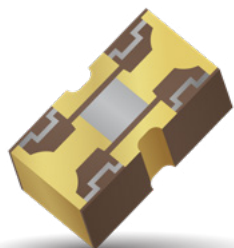
All testing performed on 13.3-mil-thick Rogers RO4350 microstrip board, with the UUT subtending a 44 mil gap in 30 mil-wide center trace (nominal 50-ohm characteristic impedance). Measurements were made using a four-receiver architecture. Measurements have been de-embedded to the edges of the UUT using a standard TRL calibration procedure.



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# Thin Film RF Solutions - Attenuator

## AT0603T02ECATD - 2dB

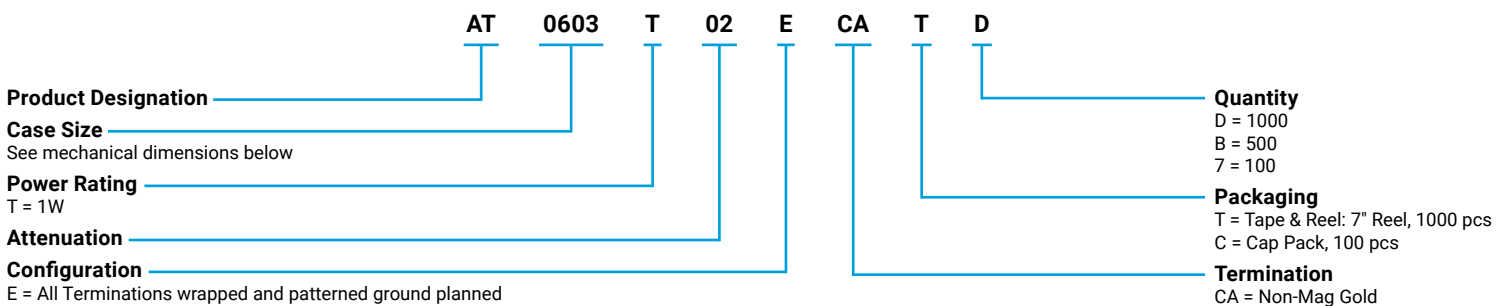


### QUALIFICATION TEST SUMMARY

<b>Input Power CW:</b>	1W	<b>Tolerance (dB):</b>	D.C. to 10 GHz:±0.50 dB >10GHz: ±dB
<b>Frequency Range:</b>	DC to 20 GHz	<b>Resistors:</b>	Tantalum Nitride
<b>VSMR:</b>	1.25:1 Typical	<b>Terminal:</b>	Thin Film Metalstack, Au
<b>Nominal Impedance:</b>	50 Ohms	<b>Substrate Material:</b>	AlN
<b>Operating Temperature:</b>	-55°C to + 150°C	<b>Inspection:</b>	100% Per MIL-STD-883

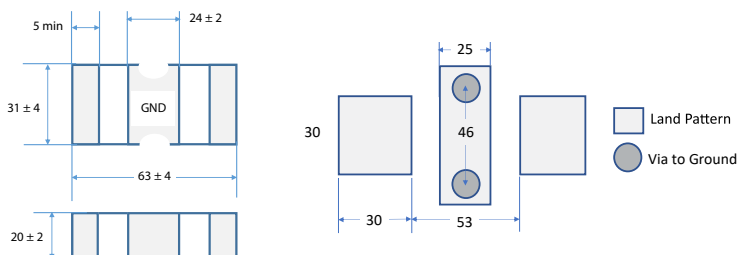
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### HOW TO ORDER



### MECHANICAL DIMENSIONS

Dimensions are in mils, Bottom View

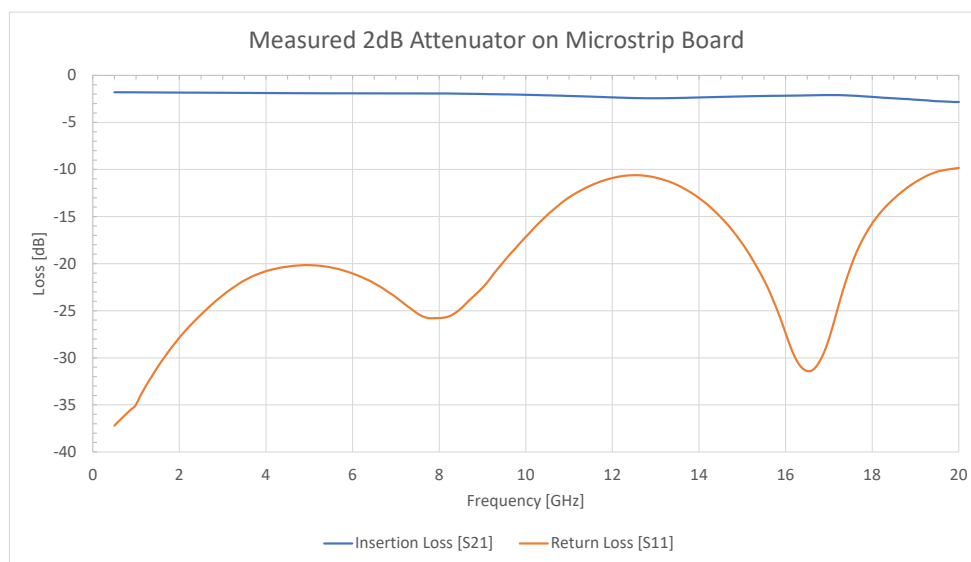


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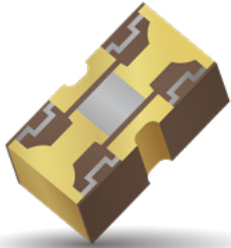
\*Data files contain DXF, S2P, and HFSS files



All testing performed on 13.3-mil-thick Rogers RO4350 microstrip board, with the UUT subtending a 44 mil gap in 30 mil-wide center trace (nominal 50-ohm characteristic impedance). Measurements were made using a four-receiver architecture. Measurements have been de-embedded to the edges of the UUT using a standard TRL calibration procedure.

# Thin Film RF Solutions - Attenuator

## AT0603T03ECATD - 3dB

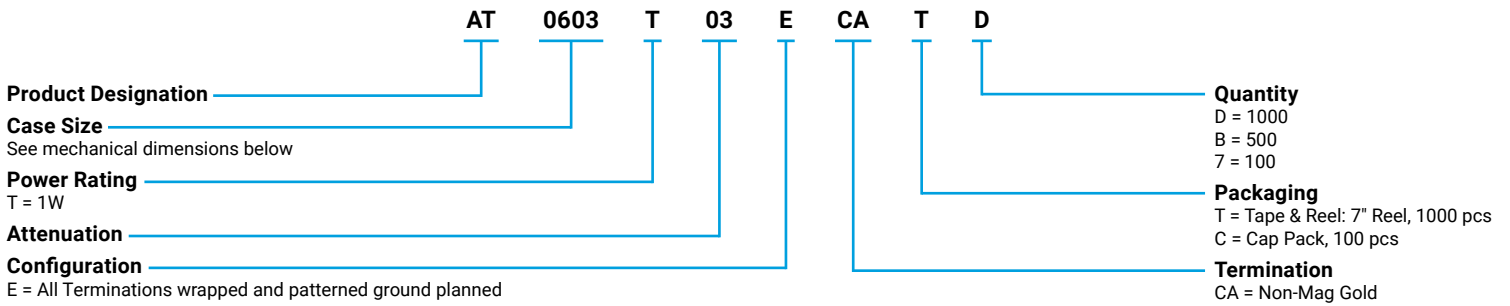


### QUALIFICATION TEST SUMMARY

<b>Input Power CW:</b>	1W	<b>Tolerance (dB):</b>	D.C. to 10 GHz:±0.50 dB >10GHz: ±dB
<b>Frequency Range:</b>	DC to 20 GHz	<b>Resistors:</b>	Tantalum Nitride
<b>VSMR:</b>	1.25:1 Typical	<b>Terminal:</b>	Thin Film Metalstack, Au
<b>Nominal Impedance:</b>	50 Ohms	<b>Substrate Material:</b>	AlN
<b>Operating Temperature:</b>	-55°C to + 150°C	<b>Inspection:</b>	100% Per MIL-STD-883

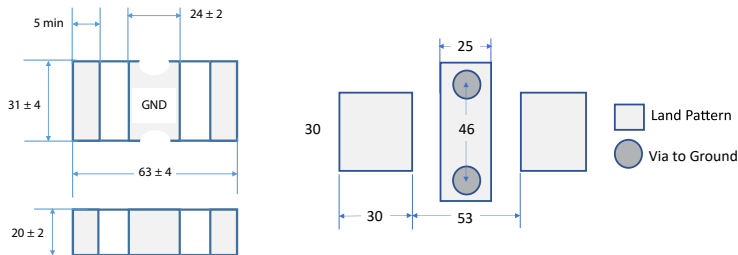
[Click here to go back to main table](#)

### HOW TO ORDER



### MECHANICAL DIMENSIONS

Dimensions are in mils, Bottom View

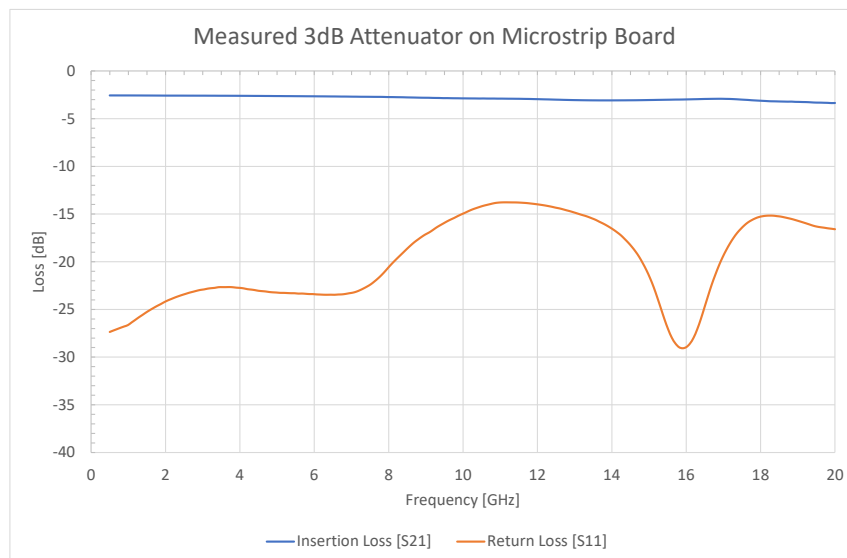


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**CLICK HERE TO DOWNLOAD DATA FILES**

\*Data files contain DXF, S2P, and HFSS files

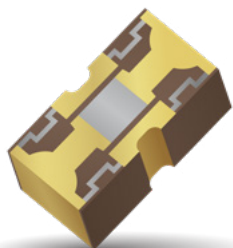


All testing performed on 13.3-mil-thick Rogers RO4350 microstrip board, with the UUT subtending a 44 mil gap in 30 mil-wide center trace (nominal 50-ohm characteristic impedance). Measurements were made using a four-receiver architecture. Measurements have been de-embedded to the edges of the UUT using a standard TRL calibration procedure.



# Thin Film RF Solutions - Attenuator

## AT0603T04ECATD - 4dB

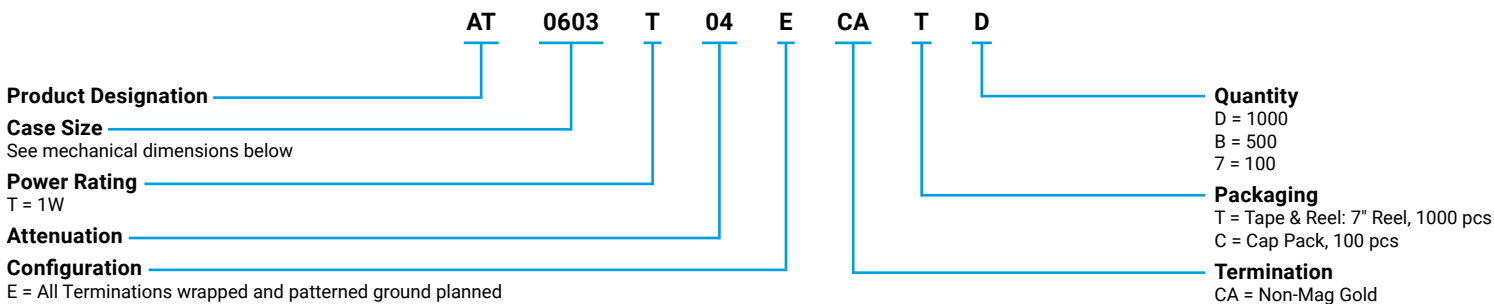


### QUALIFICATION TEST SUMMARY

<b>Input Power CW:</b>	1W	<b>Tolerance (dB):</b>	D.C. to 10 GHz:±0.50 dB >10GHz: ±dB
<b>Frequency Range:</b>	DC to 20 GHz	<b>Resistors:</b>	Tantalum Nitride
<b>VSMR:</b>	1.25:1 Typical	<b>Terminal:</b>	Thin Film Metalstack, Au
<b>Nominal Impedance:</b>	50 Ohms	<b>Substrate Material:</b>	AlN
<b>Operating Temperature:</b>	-55°C to +150°C	<b>Inspection:</b>	100% Per MIL-STD-883

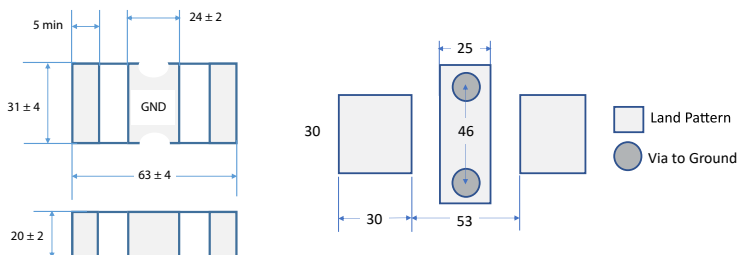
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### HOW TO ORDER



### MECHANICAL DIMENSIONS

Dimensions are in mils, Bottom View



LEAD-FREE  
LEAD-FREE COMPATIBLE  
COMPONENT

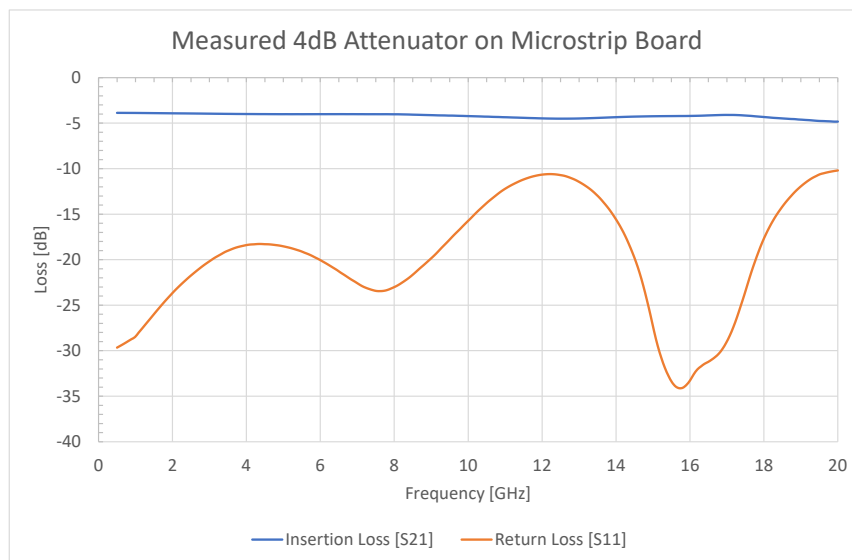


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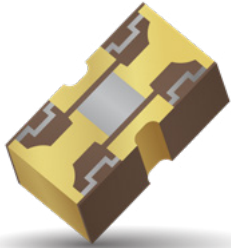
\*Data files contain DXF, S2P, and HFSS files



All testing performed on 13.3-mil-thick Rogers RO4350 microstrip board, with the UUT subtending a 44 mil gap in 30 mil-wide center trace (nominal 50-ohm characteristic impedance). Measurements were made using a four-receiver architecture. Measurements have been de-embedded to the edges of the UUT using a standard TRL calibration procedure.

# Thin Film RF Solutions - Attenuator

## AT0603T05ECATD - 5dB

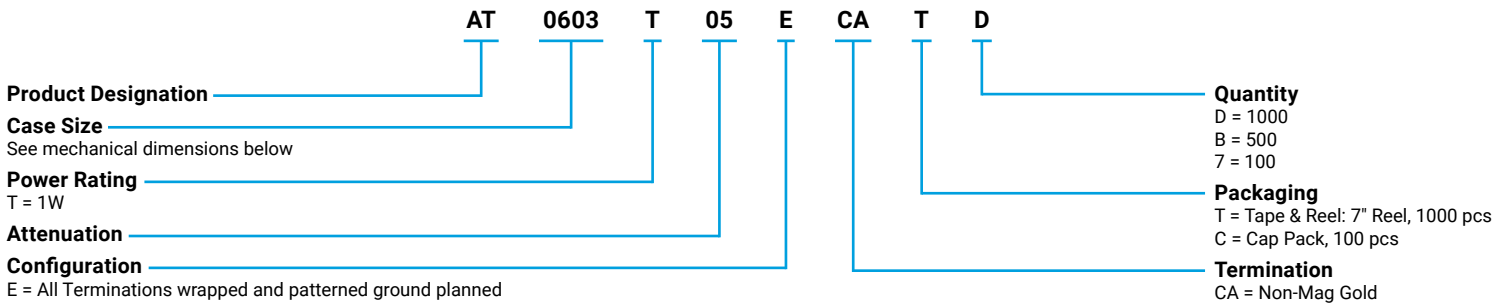


### QUALIFICATION TEST SUMMARY

<b>Input Power CW:</b>	1W	<b>Tolerance (dB):</b>	D.C. to 10 GHz:±0.50 dB >10GHz: ±dB
<b>Frequency Range:</b>	DC to 20 GHz	<b>Resistors:</b>	Tantalum Nitride
<b>VSMR:</b>	1.25:1 Typical	<b>Terminal:</b>	Thin Film Metalstack, Au
<b>Nominal Impedance:</b>	50 Ohms	<b>Substrate Material:</b>	AlN
<b>Operating Temperature:</b>	-55°C to + 150°C	<b>Inspection:</b>	100% Per MIL-STD-883

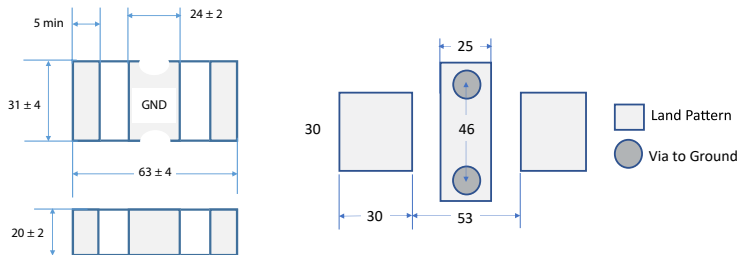
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### HOW TO ORDER



### MECHANICAL DIMENSIONS

Dimensions are in mils, Bottom View

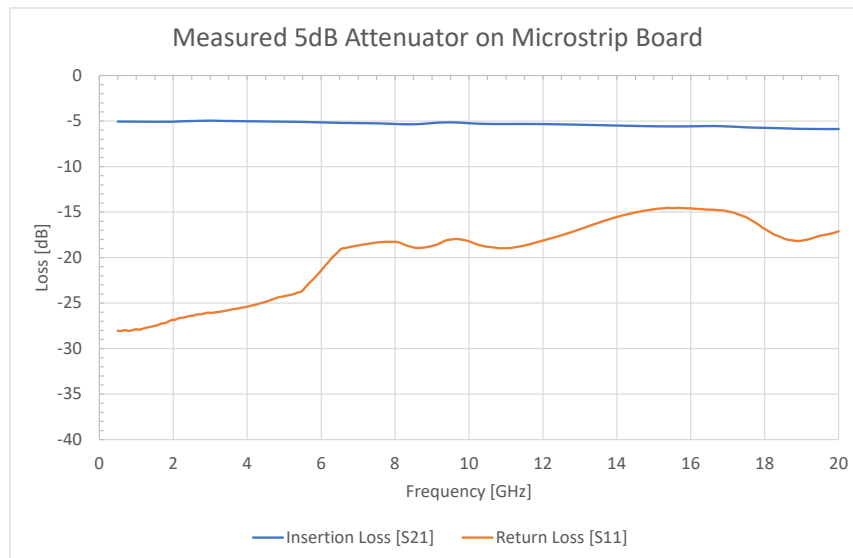


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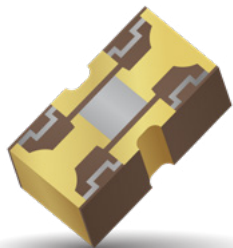
\*Data files contain DXF, S2P, and HFSS files



All testing performed on 13.3-mil-thick Rogers RO4350 microstrip board, with the UUT subtending a 44 mil gap in 30 mil-wide center trace (nominal 50-ohm characteristic impedance). Measurements were made using a four-receiver architecture. Measurements have been de-embedded to the edges of the UUT using a standard TRL calibration procedure.

# Thin Film RF Solutions - Attenuator

## AT0603T06ECATD - 6dB

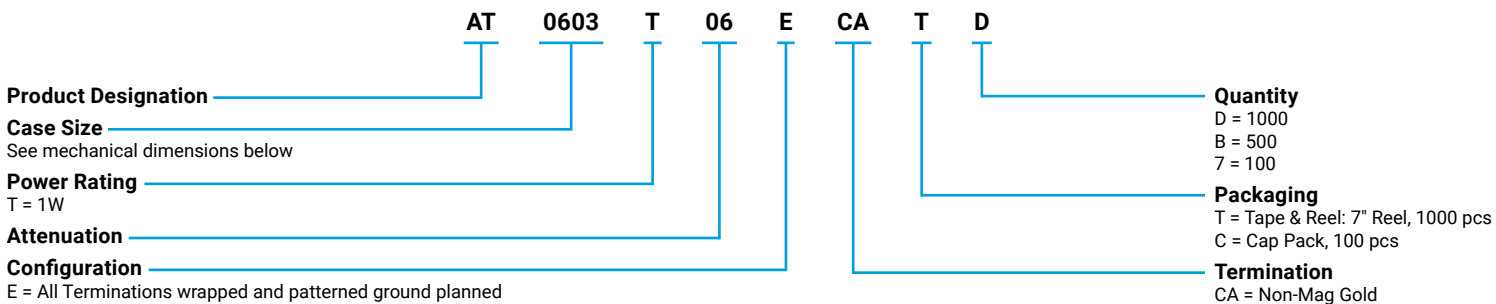


### QUALIFICATION TEST SUMMARY

<b>Input Power CW:</b>	1W	<b>Tolerance (dB):</b>	D.C. to 10 GHz:±0.50 dB >10GHz: ±dB
<b>Frequency Range:</b>	DC to 20 GHz	<b>Resistors:</b>	Tantalum Nitride
<b>VSMR:</b>	1.25:1 Typical	<b>Terminal:</b>	Thin Film Metalstack, Au
<b>Nominal Impedance:</b>	50 Ohms	<b>Substrate Material:</b>	AlN
<b>Operating Temperature:</b>	-55°C to + 150°C	<b>Inspection:</b>	100% Per MIL-STD-883

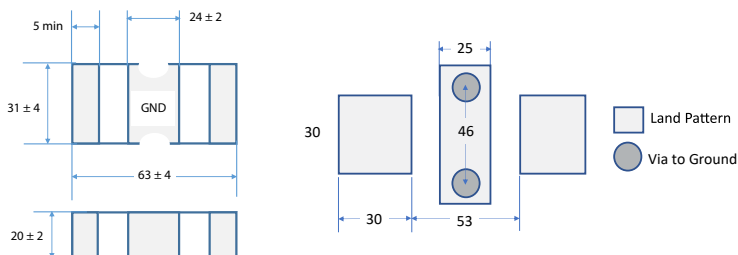
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### HOW TO ORDER



### MECHANICAL DIMENSIONS

Dimensions are in mils, Bottom View

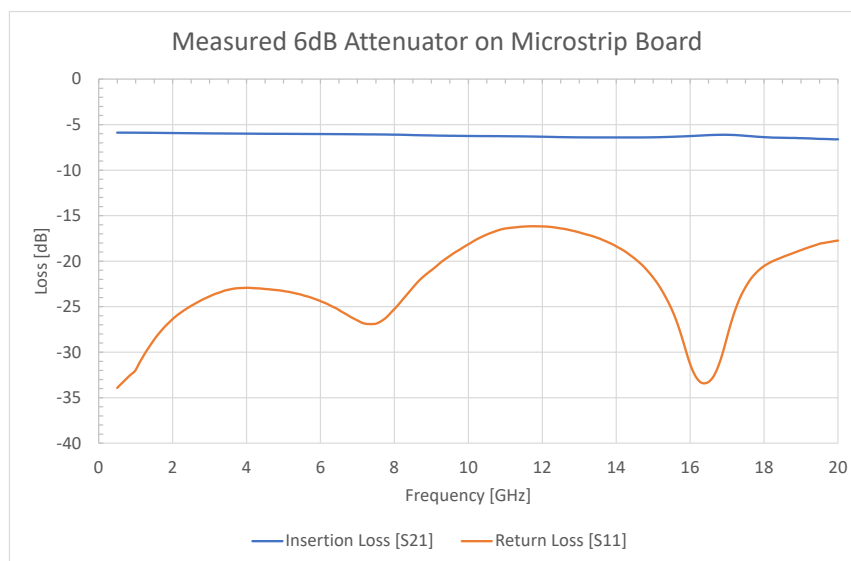


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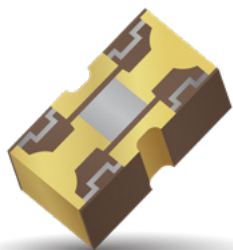
\*Data files contain DXF, S2P, and HFSS files



All testing performed on 13.3-mil-thick Rogers RO4350 microstrip board, with the UUT subtending a 44 mil gap in 30 mil-wide center trace (nominal 50-ohm characteristic impedance). Measurements were made using a four-receiver architecture. Measurements have been de-embedded to the edges of the UUT using a standard TRL calibration procedure.

# Thin Film RF Solutions - Attenuator

## AT0603C07ECATD - 7dB

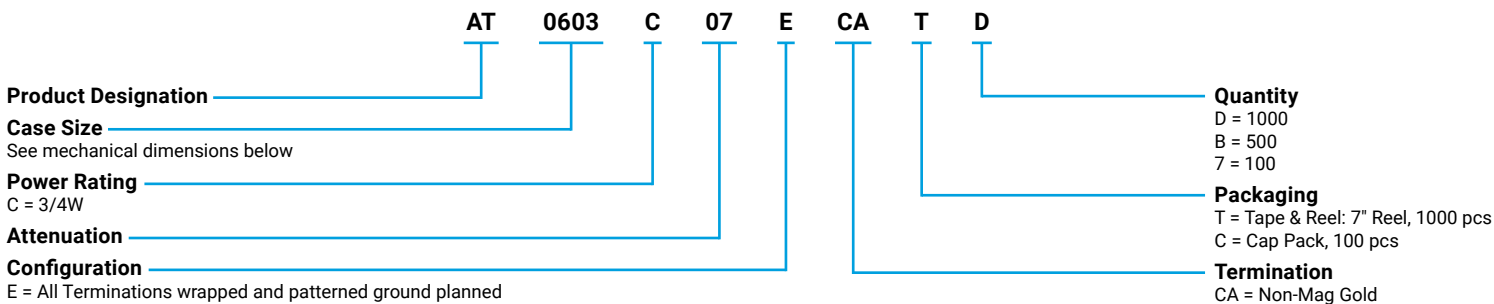


### QUALIFICATION TEST SUMMARY

<b>Input Power CW:</b>	3/4W	<b>Tolerance (dB):</b>	D.C. to 10 GHz:±0.50 dB >10GHz: ±dB
<b>Frequency Range:</b>	DC to 20 GHz	<b>Resistors:</b>	Tantalum Nitride
<b>VSMR:</b>	1.25:1 Typical	<b>Terminal:</b>	Thin Film Metalstack, Au
<b>Nominal Impedance:</b>	50 Ohms	<b>Substrate Material:</b>	AlN
<b>Operating Temperature:</b>	-55°C to +150°C	<b>Inspection:</b>	100% Per MIL-STD-883

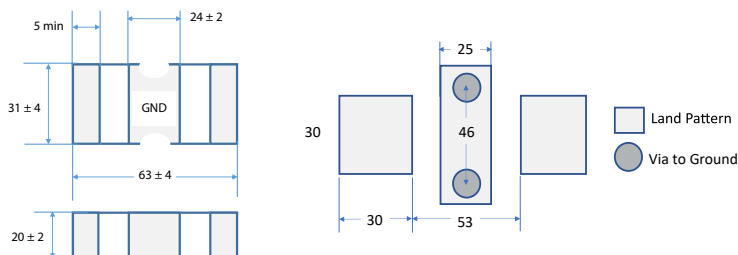
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### HOW TO ORDER



### MECHANICAL DIMENSIONS

Dimensions are in mils, Bottom View



LEAD-FREE  
LEAD-FREE COMPATIBLE  
COMPONENT

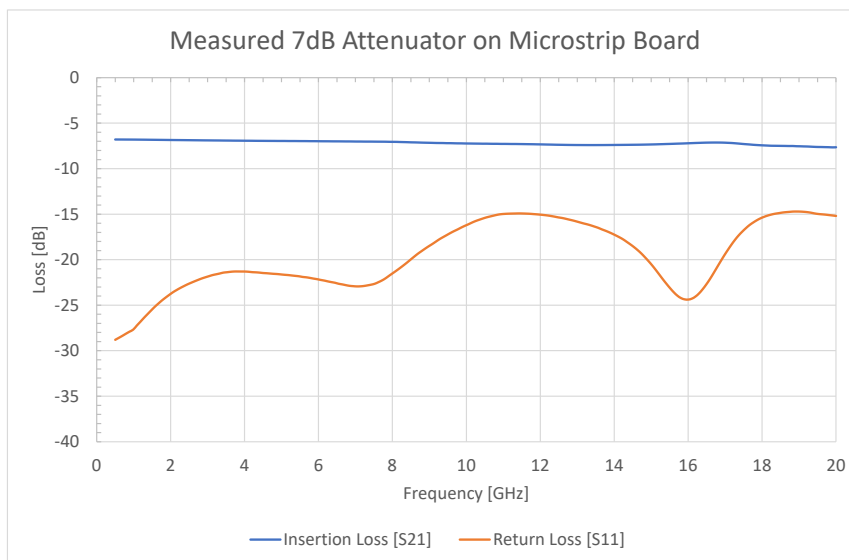


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\*Data files contain DXF, S2P, and HFSS files



All testing performed on 13.3-mil-thick Rogers RO4350 microstrip board, with the UUT subtending a 44 mil gap in 30 mil-wide center trace (nominal 50-ohm characteristic impedance). Measurements were made using a four-receiver architecture. Measurements have been de-embedded to the edges of the UUT using a standard TRL calibration procedure.



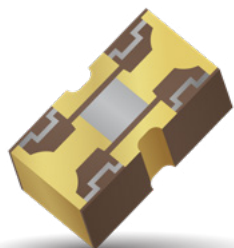
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TDS-STFP-0001 | Rev 1

– SPECIALTY THIN FILM PRODUCTS –

# Thin Film RF Solutions - Attenuator

## AT0603C08ECATD - 8dB

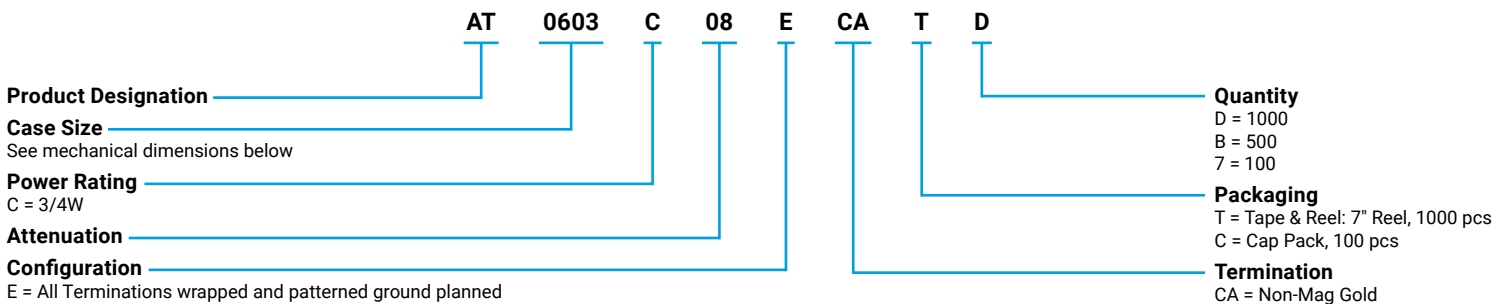


### QUALIFICATION TEST SUMMARY

<b>Input Power CW:</b>	3/4W	<b>Tolerance (dB):</b>	D.C. to 10 GHz:±0.50 dB >10GHz: ±dB
<b>Frequency Range:</b>	DC to 20 GHz	<b>Resistors:</b>	Tantalum Nitride
<b>VSMR:</b>	1.25:1 Typical	<b>Terminal:</b>	Thin Film Metalstack, Au
<b>Nominal Impedance:</b>	50 Ohms	<b>Substrate Material:</b>	AlN
<b>Operating Temperature:</b>	-55°C to + 150°C	<b>Inspection:</b>	100% Per MIL-STD-883

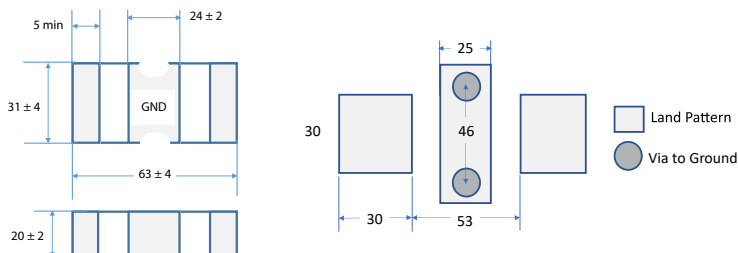
[Click here to go back to main table](#)

### HOW TO ORDER



### MECHANICAL DIMENSIONS

Dimensions are in mils, Bottom View

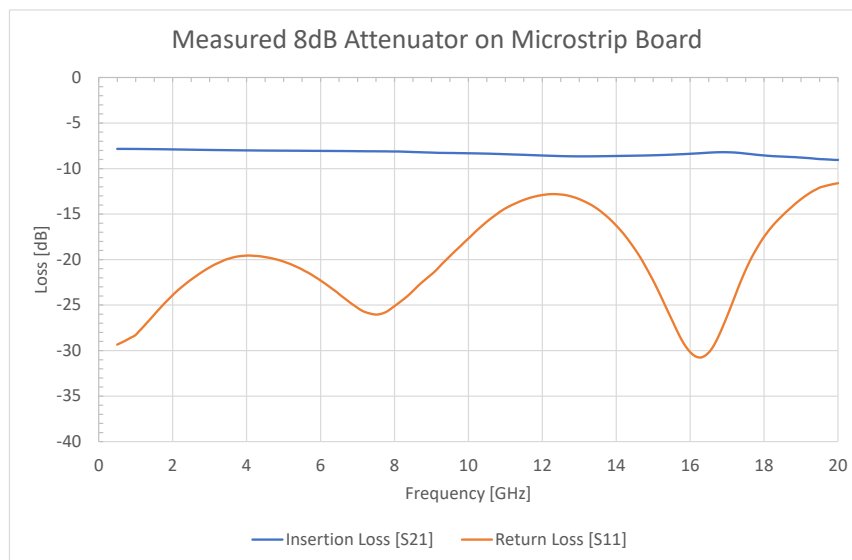


For RoHS compliant products, please select correct termination style



**CLICK HERE TO DOWNLOAD DATA FILES**

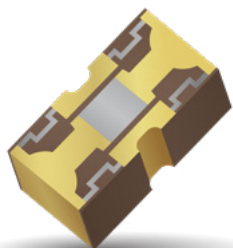
\*Data files contain DXF, S2P, and HFSS files



All testing performed on 13.3-mil-thick Rogers RO4350 microstrip board, with the UUT subtending a 44 mil gap in 30 mil-wide center trace (nominal 50-ohm characteristic impedance). Measurements were made using a four-receiver architecture. Measurements have been de-embedded to the edges of the UUT using a standard TRL calibration procedure.

# Thin Film RF Solutions - Attenuator

## AT0603C09ECATD - 9dB

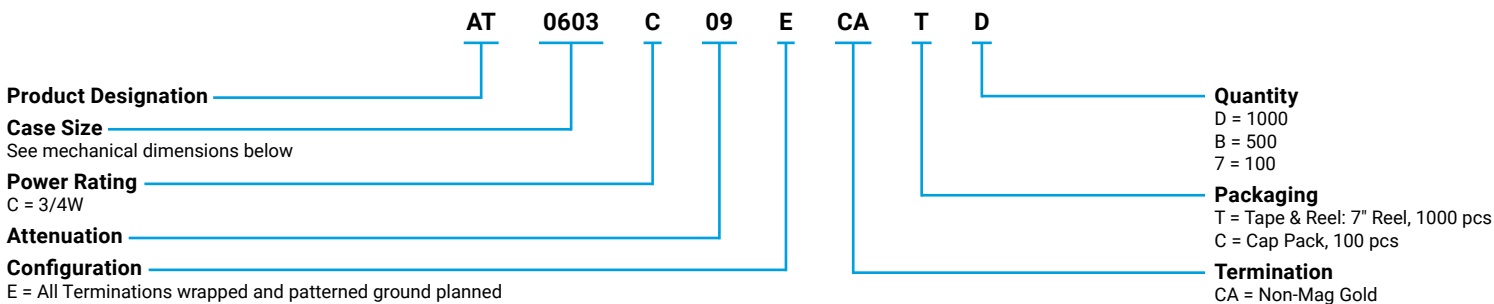


### QUALIFICATION TEST SUMMARY

<b>Input Power CW:</b>	3/4W	<b>Tolerance (dB):</b>	D.C. to 10 GHz:±0.50 dB >10GHz: ±dB
<b>Frequency Range:</b>	DC to 20 GHz	<b>Resistors:</b>	Tantalum Nitride
<b>VSMR:</b>	1.25:1 Typical	<b>Terminal:</b>	Thin Film Metalstack, Au
<b>Nominal Impedance:</b>	50 Ohms	<b>Substrate Material:</b>	AlN
<b>Operating Temperature:</b>	-55°C to + 150°C	<b>Inspection:</b>	100% Per MIL-STD-883

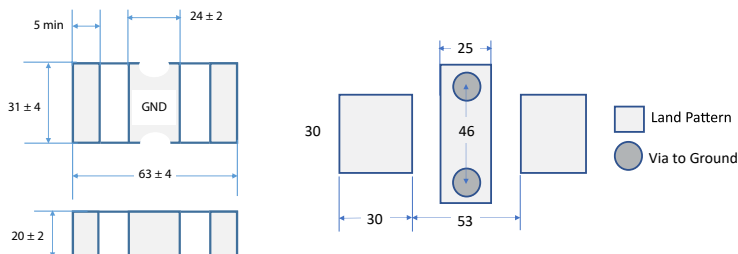
[Click here to go back to main table](#)

### HOW TO ORDER



### MECHANICAL DIMENSIONS

Dimensions are in mils, Bottom View



LEAD-FREE  
LEAD-FREE COMPATIBLE  
COMPONENT

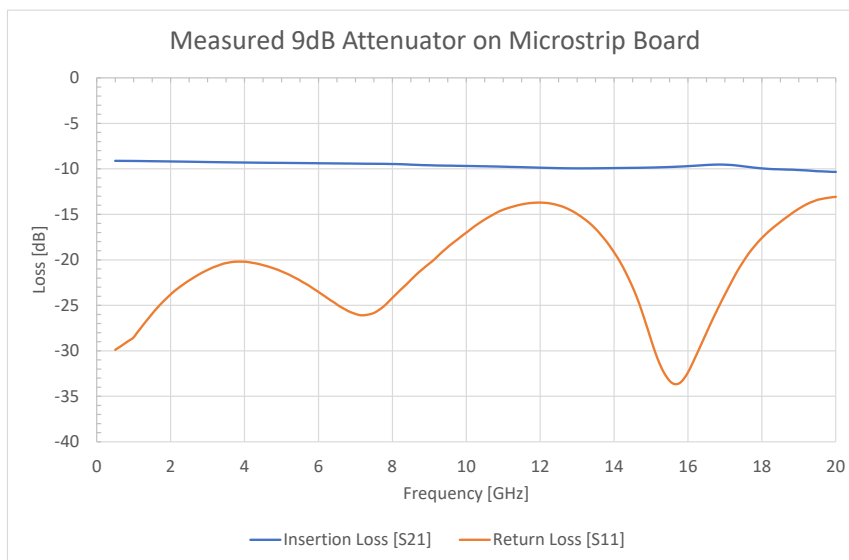


For RoHS compliant products, please  
select correct termination style



**CLICK HERE TO  
DOWNLOAD DATA FILES**

\*Data files contain DXF, S2P, and HFSS files



All testing performed on 13.3-mil-thick Rogers RO4350 microstrip board, with the UUT subtending a 44 mil gap in 30 mil-wide center trace (nominal 50-ohm characteristic impedance). Measurements were made using a four-receiver architecture. Measurements have been de-embedded to the edges of the UUT using a standard TRL calibration procedure.

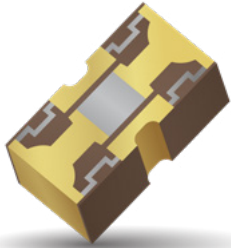


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# Thin Film RF Solutions - Attenuator

## AT0603C10ECATD - 10dB

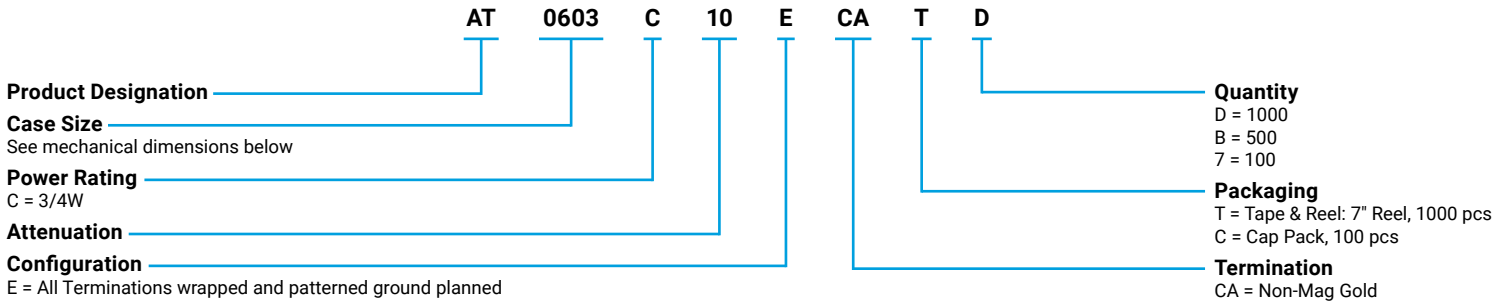


### QUALIFICATION TEST SUMMARY

<b>Input Power CW:</b>	3/4W	<b>Tolerance (dB):</b>	D.C. to 10 GHz:±0.50 dB >10GHz: ±dB
<b>Frequency Range:</b>	DC to 20 GHz	<b>Resistors:</b>	Tantalum Nitride
<b>VSMR:</b>	1.25:1 Typical	<b>Terminal:</b>	Thin Film Metalstack, Au
<b>Nominal Impedance:</b>	50 Ohms	<b>Substrate Material:</b>	AlN
<b>Operating Temperature:</b>	-55°C to +150°C	<b>Inspection:</b>	100% Per MIL-STD-883

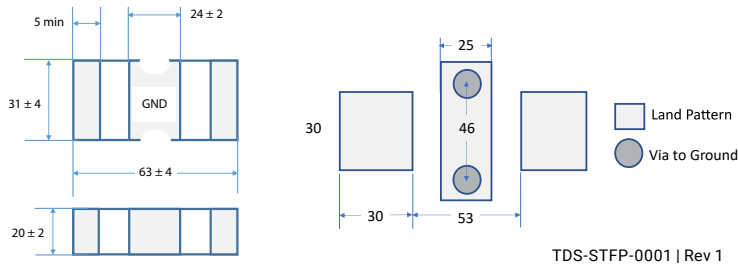
[Click here to go back to main table](#)

### HOW TO ORDER



### MECHANICAL DIMENSIONS

Dimensions are in mils, Bottom View

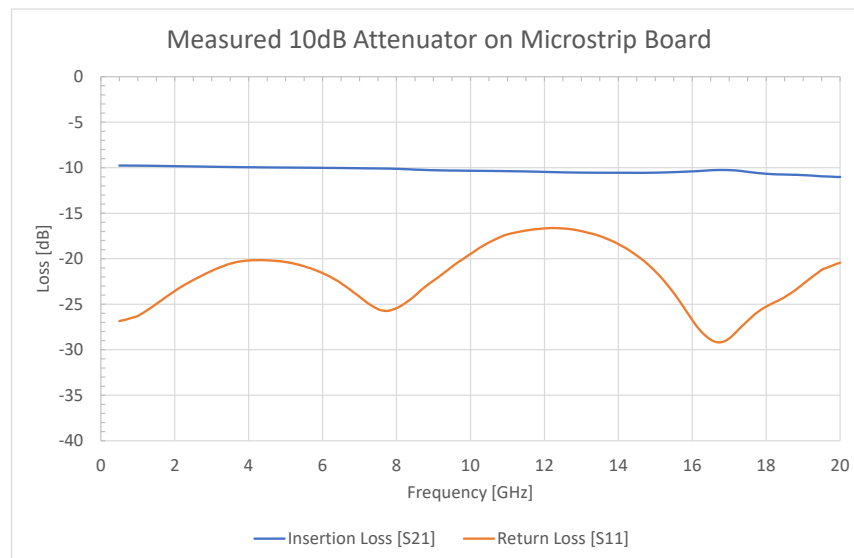


For RoHS compliant products, please select correct termination style



**CLICK HERE TO DOWNLOAD DATA FILES**

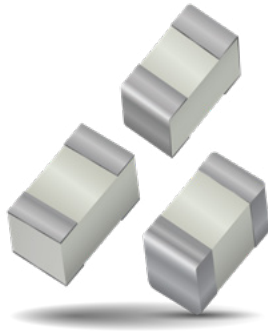
\*Data files contain DXF, S2P, and HFSS files



All testing performed on 13.3-mil-thick Rogers RO4350 microstrip board, with the UUT subtending a 44 mil gap in 30 mil-wide center trace (nominal 50-ohm characteristic impedance). Measurements were made using a four-receiver architecture. Measurements have been de-embedded to the edges of the UUT using a standard TRL calibration procedure.

# Q Bridge Thermal Conductor

## GENERAL DESCRIPTION



Kyocera AVX's new Q-Bridge Thermal Conductor is manufactured with the highest quality materials for reliable and repeatable performance providing a cost effective thermal management solution. These devices are constructed with Aluminum Nitride (AlN) or Beryllium Oxide (BeO) and are available in standard EIA form factors.

Q-Bridge provides the designer with the ability to manage thermal conditions by directing heat to a thermal ground plane, heat sink or any other specific thermal point of interest. The inherently low capacitance makes this device virtually transparent at RF/microwave frequencies. This device has the added benefit of offering additional layers of protection to adjacent components from hot spot thermal loads.

Q-Bridge provides the benefit of increased overall circuit reliability. Kyocera AVX's Q-Bridge is manufactured using one-piece construction, providing a RoHS compliant SMT package that is fully compatible with high speed automated pick-and-place processing. It is available in multiple different EIA case sizes. Custom configurations are also available

## APPLICATIONS

- High Thermal Conductivity
- Low Thermal Resistance
- Low Capacitance
- Increases Circuit Reliability
- RoHS Compliant
- More efficient thermal management

## FEATURES

- GaN Power Amplifiers
- High RF Power Amplifiers
- Filters
- Synthesizers
- Industrial Computers
- Switch Mode Power Supplies
- Pin & Laser Diodes

## FUNCTIONAL APPLICATIONS

- Between active device and adjacent ground planes
- Specific contact pad to case
- Contact pad to contact pad
- Direct component contact to via pad or trace
- Edges fully metalized

## HOW TO ORDER

**QB 0603 A 25 W Y T**

**Q-Bridge** ————— QB

**Case Size** ————— 0603  
Please see 'Case Size' Column of Typical Characteristics Table Below

**Substrate** ————— A  
A = AlN  
B = BeO

**Thickness** ————— 25  
(mils)

**Termination** ————— Y T  
Y = Silver Platinum, Non-Magnetic Termination  
S = Silver over Magnetic Termination  
J\* = 60Sn/40Pb Solder Plated over Nickel over Silver Platinum  
T = Tin plated over Nickel over Silver Platinum

**Packaging** ————— T  
T = 1000pcs., 7" reel  
T\500 = 500pcs., 7" reel  
C = Matrix Tray

**Style** ————— W  
W = Edge Wrap  
E = No Wrap

**RoHS COMPLIANT**

TDS-STFP-0001 | Rev 1

## TERMINATION MATERIALS

Termination Code	Termination Materials
T	Tin plated over Nickel over Silver Platinum <span style="border: 1px solid green; padding: 2px;">RoHS Compliant</span>
Y	Silver Platinum Non-Magnetic Termination <span style="border: 1px solid green; padding: 2px;">RoHS Compliant</span>
S	Silver over Magnetic Termination <span style="border: 1px solid green; padding: 2px;">RoHS Compliant</span>
J	Solder Plated over Nickel over Silver Platinum <span style="border: 1px solid red; padding: 2px;">Not RoHS Compliant</span>

Note: Non-edge wrapped style in all case sizes is supplied with S termination  
Edge wrapped style in case sizes 0302 through 1111 is supplied with S termination  
Edge wrapped style in case sizes 2010 through 3737 are supplied with S termination

# Q Bridge Thermal Conductor

## TYPICAL CHARACTERISTICS Inches (mm)

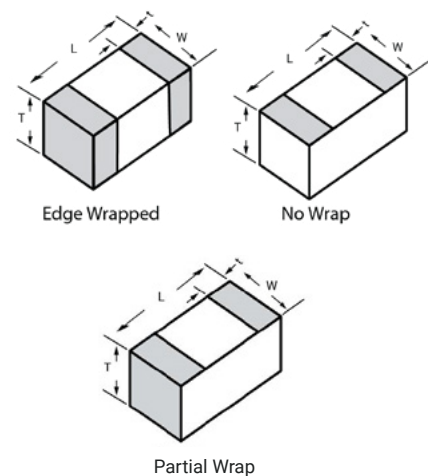
Case Size	Length (L)	Width (W)	Thickness (T)	Terminal (t)	Voltage Rating (V)	Thermal Resistance (°C/W)		Thermal Conductivity (mW/°C)		Available Configurations	
						AlN	BeO	AlN	BeO	Style	Termination
0302	.030 ± .002 (.77 ± .051)	.020 ± .002 (0.51 ± .051)	0.02 (0.51 ± .05)	0.01 (0.25)	100	19	12	53	81	W	Y, T, J
										E	S
0402	.040 ± .002 (1.02 ± .051)	.020 ± .002 (0.51 ± .051)	0.02 (0.51 ± .05)	0.01 (0.25)	200	25	16	40	61	W	Y, T, J
										E	S
0505	.050 ± .002 (1.27 ± .051)	.050 ± .002 (1.27 ± .051)	.25 (0.64 ± .05)	0.015 (0.38)	250	10	7	100	153	W	Y, T, J
										E	S
0603	.060 ± .002 (1.52 ± .051)	.030 ± .002 (.77 ± .051)	0.025 (0.64 ± .05)	0.015 (0.38)	250	20	13	50	76	W	Y, T, J
										E	S
0805	.080 ± .002 (2.03 ± .051)	.050 ± .002 (1.27 ± .051)	0.04 (1.02 ± .05)	0.02 (0.51)	250	10	7	100	153	W	Y, T, J
										E	S
1005	.100 ± .002 (2.54 ± .051)	.050 ± .002 (1.27 ± .051)	0.04 (1.02 ± .05)	0.02 (0.51)	500	13	8	77	122	W	Y, T, J
										E	S
1020	.100 ± .002 (2.54 ± .051)	.200 ± .002 (5.08 ± .051)	0.04 (1.02 ± .05)	0.02 (0.51)	500	3	2	320	508	W	Y, T, J
										E	S
1111	.110 ± .002 (2.79 ± .051)	.110 ± .002 (2.79 ± .051)	0.04 (1.02 ± .05)	0.02 (0.51)	500	7	4	153	240	W	Y, T, J
										E	S
2010	.195 ± .010 (4.95 ± .254)	.095 ± .010 (2.41 ± .254)	0.06 (1.52 ± .05)	0.03 (0.77)	2000	10	6	100	159	W	S
										E	S
2525	.240 ± .010 (6.10 ± .254)	.250 ± .010 (6.35 ± .254)	0.06 (1.52 ± .05)	0.04 (1.02)	3000	4	3	240	380	W	S
										E	S
3725	.370 ± .010 (9.40 ± .254)	.245 ± .010 (6.22 ± .254)	0.06 (1.52 ± .05)	0.05 (1.27)	4000	6	4	160	254	W	S
										E	S
3737	.365 ± .010 (9.27 ± .254)	.375 ± .010 (9.53 ± .254)	0.06 (1.52 ± .05)	0.05 (1.27)	4000	4	3	240	380	W	S
										E	S

Note: Thermal conductivity is normalized to chip size. All values are approximate. Consult factory for extended thermal conductivity options.

## CAPACITANCE

Case Size	Part Number	Capacitance (pF)	Case Size	Part Number	Capacitance (pF)
0302	QB0302A20WY/T/J	0.039	1020	QB1020A40WY/T/J	0.204
	QB0302A20ES	0.011		QB1020A40ES	0.121
	QB0302B20WY/T/J	0.028		QB1020B40WY/T/J	0.158
	QB0302B20ES	0.006		QB1020B40ES	0.092
0402	QB0402A20WY/T/J	0.028	1111	QB1111A40WY/T/J	0.096
	QB0402A20ES	0.018		QB1111A40ES	0.042
	QB0402B20WY/T/J	0.025		QB1111B40WY/T/J	0.078
	QB0402B20ES	0.009		QB1111B40ES	0.031
0505	QB0505A20WY/T/J	0.070	2010	QB2010A60WS	0.070
	QB0505A20ES	0.032		QB2010A60ES	0.042
	QB0505B20WY/T/J	0.061		QB2010B60WS	0.055
	QB0505B20ES	0.027		QB2010B60ES	0.086
0603	QB0603A25/WY/T/J	0.035	2525	QB2525A60WS	0.156
	QB0603A25ES	0.007		QB2525A60ES	0.114
	QB0603B25WY/T/J	0.029		QB2525B60WS	0.122
	QB0603B25ES	0.007		QB2525B60ES	0.075
0805	QB0805A40WY/T/J	0.081	3725	QB3725A60WS	0.105
	QB0805A40ES	0.018		QB3725A60ES	0.076
	QB0805B40WY/T/J	0.055		QB3725B60WS	0.080
	QB0805B40ES	0.015		QB3725B60ES	0.058
1005	QB1005A40WY/T/J	0.046	3737	QB3737A60W	0.164
	QB1005A40ES	0.008		QB3737A60ES	0.130
	QB1005B40WY/T/J	0.038		QB3737B60WS	0.126
	QB1005B40ES	0.007		QB3737B60ES	0.099

## MECHANICAL CONFIGURATIONS

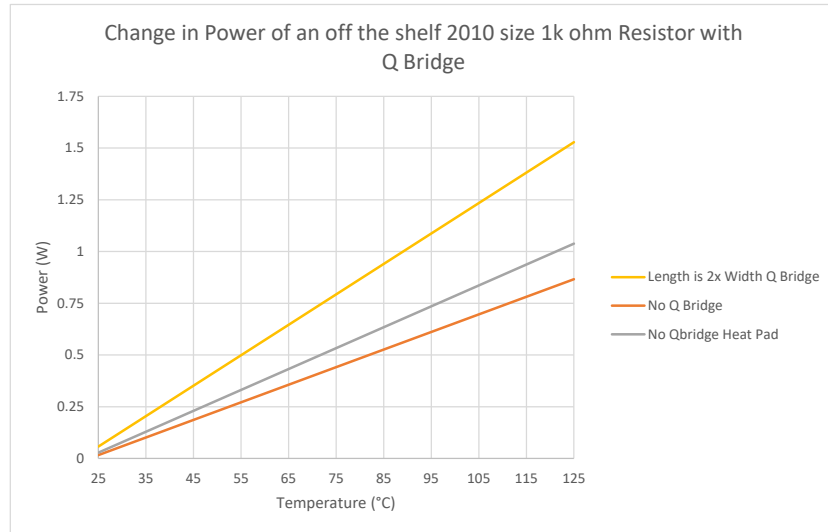


# Q Bridge Thermal Conductor

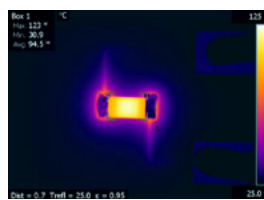
## RECOMMENDED Q BRIDGE SIZING

For optimal results in power handling we recommend using a Q Bridge that matches the component footprint that you are attempting to pull heat away from for a standard surface mount component. For a device that has pins that you are attempting to remove heat from, the suggested Q Bridge would match the width of the Q Bridge with the length of the pad for those pins.

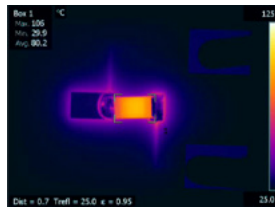
## MEASURED Q BRIDGE PERFORMANCE



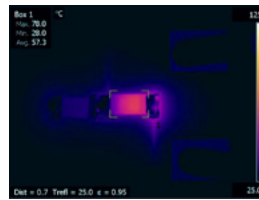
Test performed at room temperature (25C) with resistor mounted on test board as baseline, using a metal pad heat sync of the same board space required for a Q Bridge, and the Q Bridge that matches the footprint of the resistor itself



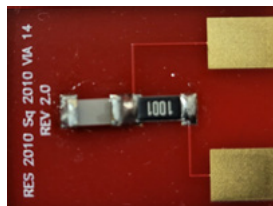
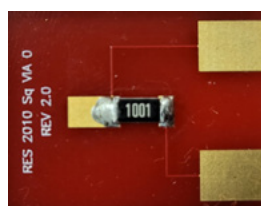
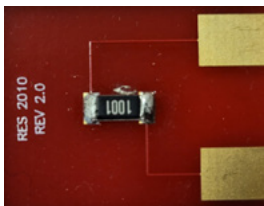
Resistor without any added heat removal, power output 841mW



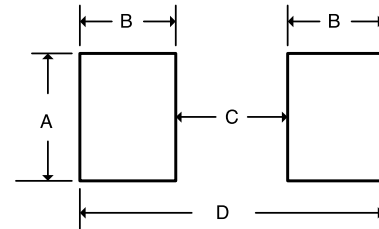
Resistor with added metal heat sync, power output 841mW



Resistor with added 2010 Q Bridge, power output 841mW



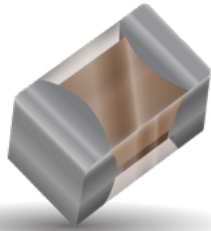
## SUGGESTED FOOTPRINT



Case Size	A Min.	B Min.	C Min.	D Min.
0302	0.0216 (0.55)	0.02 (0.51)	0.01 (0.25)	0.05 (1.27)
0402	0.0216 (0.55)	0.02 (0.51)	0.0197 (0.50)	0.06 (1.52)
0505	0.0512 (1.3)	0.0275 (0.7)	0.02 (0.5)	0.075 (1.9)
0603	0.0315 (0.8)	0.0275 (0.7)	0.0275 (0.7)	0.0825 (2.1)
0805	0.0512 (1.3)	0.039 (1)	0.039 (1)	0.118 (3)
1005	0.0512 (1.3)	0.039 (1)	0.059 (1.5)	0.138 (3.5)
1020	0.212 (5.4)	0.039 (1)	0.059 (1.5)	0.138 (3.5)
1111	0.118 (3)	0.039 (1)	0.063 (1.6)	0.142 (3.6)
2010	0.118 (3)	0.059 (1.5)	0.126 (3.2)	0.244 (6.2)
2525	0.252 (6.4)	0.079 (2)	0.15 (3.81)	0.3075 (7.81)
3725	0.252 (6.4)	0.1 (2.54)	0.266 (6.75)	0.466 (11.83)
3737	0.386 (9.8)	0.1 (2.54)	0.266 (6.75)	0.466 (11.83)

Recommend max filled via density for your board in the pad of the Q Bridge going to ground/heat sync

# Gain Equalizer - RC Network



## GENERAL DESCRIPTION

These ruggedly constructed, ultraminiature (EIA 0402, 1005 metric) equalizers combine high-performance tantalum nitride resistive elements and silicon/oxygen/nitrogen capacitive elements with KYOCERA AVX's proprietary, glass-sandwich FLEXITERM® surface-mount technology, which provides an extra measure of protection against flexure damage during installation. The new GEQ Series equalizers are also manufactured with 100% laser trimming to achieve tight tolerances and offer a low 0.5mm profile, a 125mW power rating, resistance values spanning 10–50Ω, and capacitance values extending from 1–50pF.

Rated for a wide range of operating temperatures (-55°C to +125°C) and compliant with RoHS, ideal applications for the series extend across the optoelectronic, telecommunications, broadband, military, electronic warfare, space, test, and instrumentation markets and include optical transceiver modules, broadband receivers, and transmission and receiver optical subassemblies (TOSA and ROSA).

## FEATURES

- EIA 0402 Case Size
- Resistance Range: 10 to 50 Ω typ.
- Capacitance Range: 1 to 50 pF typ.
- Parallel Configurations
- Power Rating: 125 mW
- Operating Temperature: -55°C to +125°C
- Laser Trimmed Resistors
- RoHS Compliant

\*For other RC Combinations and EIA Sizes contact factory

## APPLICATIONS

- Optical Transceiver Modules
- Broadband Receiver
- TOSA / ROSA

## MARKETS

- Opto-electronics
- Telecom
- Broadband Jamming for EW
- Military
- Instrumentation and Test



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## HOW TO ORDER

**RCN**

**Series**  
0402

**25R0**

**Resistance Value (Ω)**

3 significant digits  
R = decimal point

**F**

**Resistance Tolerance**

F = 1%

**05R0**

**Capacitance Value (pF)**

3 significant digits  
R = decimal point

**J**

**Capacitance Tolerance**

J\* = 5%  
K\* = 10%  
M\* = 20%  
\*Minimum tolerance = +/- 0.1pF

**T**

**Terminations**

T = NiSn Plated

**TR**

**Packaging**

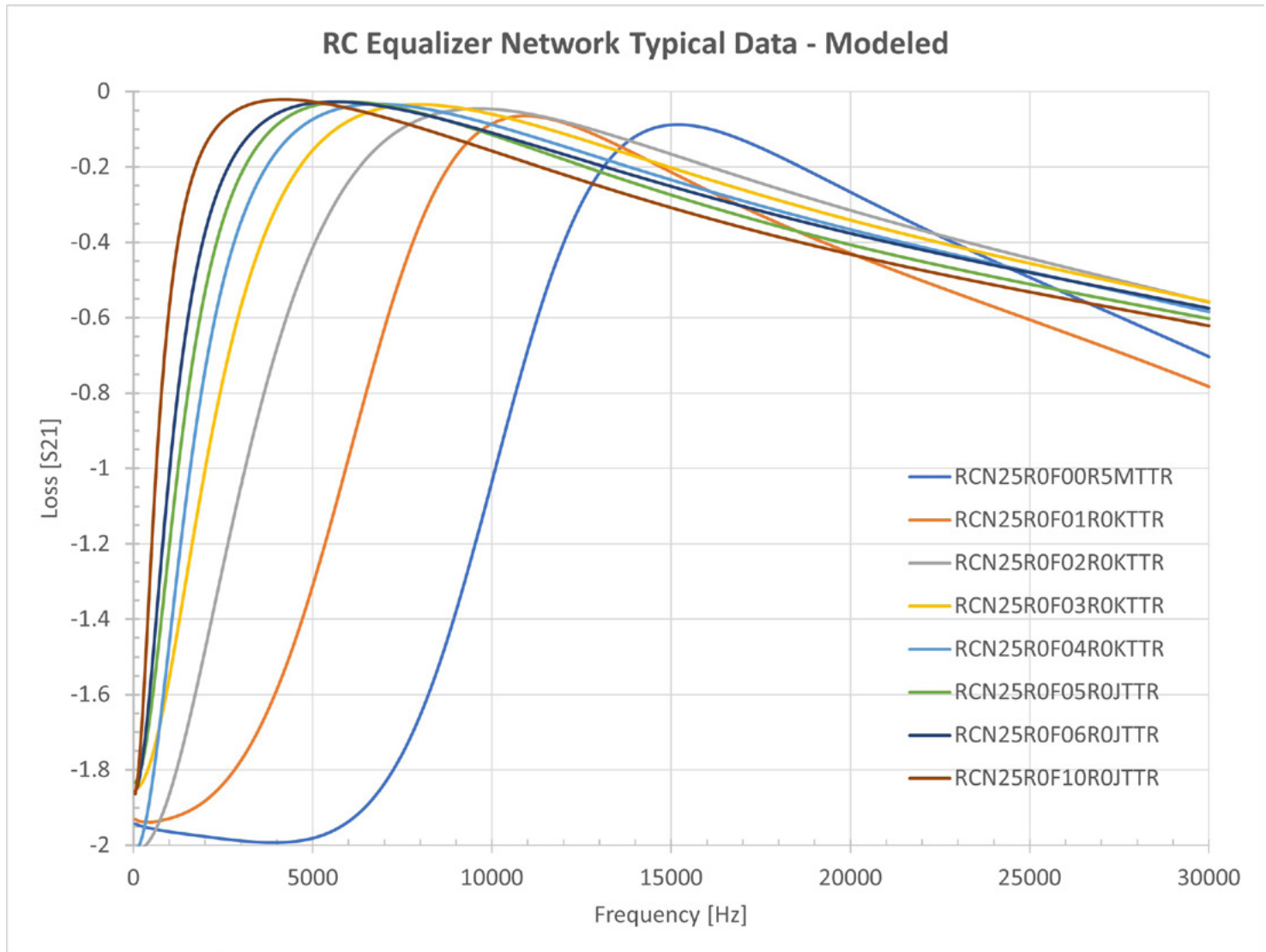
TR = Tape & Reel



## EQUALIZER GAIN SLOPE TABLE

Part Number	Starting Frequency (Typical) (GHz)	Loss at Starting Frequency (Typical) (dB)	End Frequency (Typical) (GHz)	Loss at End Frequency (Typical) (dB)	Bandwidth (Typical) (GHz)	Gain (Typical) (dB)
RCN25R0F00R5MTTR	5	-1.5	16	-0.2	11	1.3
RCN25R0F01R0MTTR	0	-1.8	12	-0.15	12	1.65
RCN25R0F02R0MTTR	0	-1.8	10	-0.15	10	1.65
RCN25R0F03R0MTTR	0	-1.8	7	-0.15	7	1.65
RCN25R0F04R0MTTR	0	-1.8	6	-0.15	6	1.65
RCN25R0F05R0MTTR	0	-1.8	5	-0.15	5	1.65
RCN25R0F06R0MTTR	0	-1.8	4.5	-0.15	4.5	1.65
RCN25R0F10R0MTTR	0	-1.8	3.5	-0.15	3.5	1.65

# Gain Equalizer - RC Network



Tested on Rogers material microstrip board with an Agilent VNA.



# Gain Equalizer - RC Network

## SPECIFICATIONS

**Package Size:** EIA 0402

**Design:** Glass wafer sandwich

**Termination:** NiSn plated

**Power Rating:** 125 mW

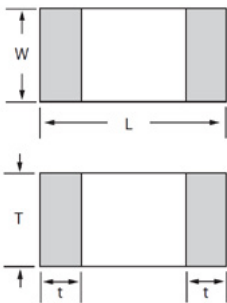
**Operating Temperature Range:** -55°C to +125°C

**Tolerance: Resistor:** 1-5%, **Capacitor:** 5-20%

**Resistance Range:** 10 to 50 Ω (typical)

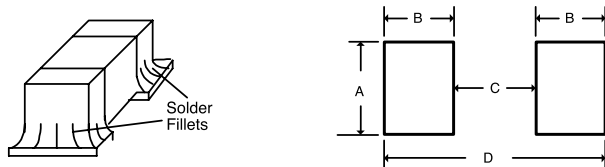
**Capacitance Range:** 1 to 50 pF (typical)

## DIMENSIONS



Size (EIA)	Length (L)	Width (W)	Thickness (T)	Termination (t)
0402	1.02 ± 0.051 (0.040 ± 0.002)	0.51 ± 0.051 (0.020 ± 0.002)	0.50 ± 0.10 (.020 ± .004)	0.25 ± 0.051 (0.010 ± 0.002)

## SUGGESTED MOUNTING PAD DIMENSIONS



**Normal Pads**

W = Chip Width L = Chip Length T = Chip Thickness

Case Size	A Min.	B Min.	C Min.	D Min.
0402	0.0213	0.0125	0.0206	0.0436

Dimensions are in inches.

## NOTES:

Mounting will allow the solder fillet to travel up approximately 0.015" of the chip's end and side termination surface. Heavier fillets require a predeposition of solder paste and or an increase in pad dimensions. Typical solder paste application is a .008" to 0.01" thickness with >50% of volume in solder alloy. Can be mounted in both vertical and horizontal orientation without changing electrical performance

## RESISTOR MATERIAL

Thin Film Resistors	TaN
Typical Sheet Resistivity (ohm/sq)	10 to 100
TCR (ppm/°C, -25 to 125°C)	-100 to -150
Stability (Change after 1000 hours @ 125°C)	1.0%

## CAPACITOR MATERIAL

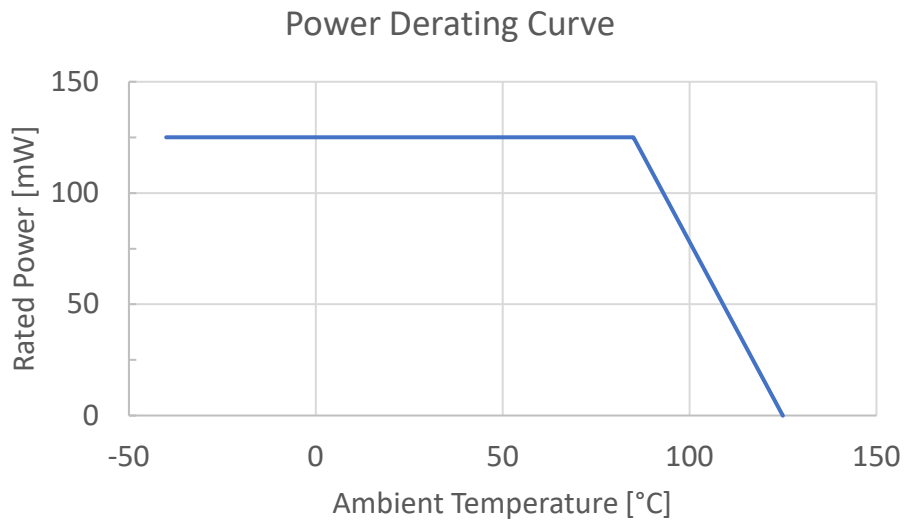
Material	SiON
pF/mm Typical	50 to 100
BDV (v/μm)	600
DF	≤0.1%
TCC (ppm/°C, -25 to 125°C)	±60

## ENVIRONMENTAL TESTS

Reliability Test	Criteria
Life Test	1000 Hrs. @ 125°C @ 50 mW
85/85 Temp./ Humidity Breakdown	1080 Hrs. @ 50 mW
Thermal Cycle	100 cycles @ -40 to 125°C
Termination Strength	200 g for 50 seconds (Dage Tester)x

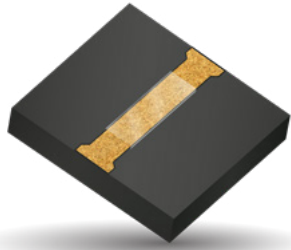
# Gain Equalizer - RC Network

## POWER DERATING



# Transmission Line MIM Capacitor (Metal-Insulator-Metal)

## GENERAL DESCRIPTION



Thin Film Technologies is pleased to introduce a novel MIM (Metal-Insulator-Metal) capacitor using a transmission line wire bond pad structure with backside ground.

The TL MIM can be supplied on quartz, alumina, glass and other substrates to minimize losses. Copper traces are used for optimal conductivity. Front and backside gold metalization make this device suitable epoxy, gold wire bond/ribbon bond attachments.

## BENEFITS

- HFSS Design Unique for every device
- Gold Wirebondable
- Copper Conductor Design for improved Circuit Conductivity
- Designs Optimized for RF/Performance
- ROHS Compliant

## SUBSTRATE MATERIALS

- Alumina (Al<sub>2</sub>O<sub>3</sub>)
- Quartz

## APPLICATIONS

- DC Blocking at UHF
- High Frequency Link
- RF Microwave applications

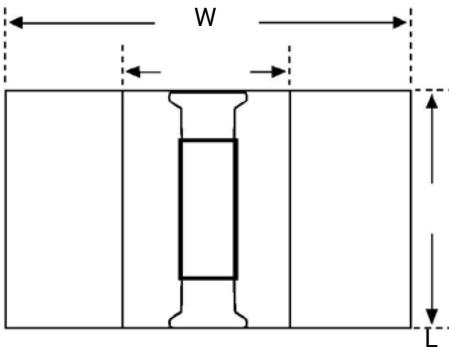
## CAPACITOR MATERIALS

Rated Voltage	Specific Capacitance	Dissipation Factor	TCC (ppm/°C)
<100	50 - 100 * pf/mm <sup>2</sup>	<0.1%	±60

\*Actual maximum capacitance values depend on transmission line dimensions

## MECHANICAL DIMENSIONS

Based on Transmission Line Design Request



Length is determined by transmission line

## TEST METHODS

Specification		Limit
MIL-STD-883-2011.10	BOND STRENGTH	> 3 gm min. w/0.001" Au Wire
MIL-STD-883-2019.10	SHEAR STRENGTH	Size Dependent See Procedure
MIL-STD-202-108	LIFE	1000 hrs @ 125°C

## HOW TO ORDER

<b>MV</b>	<b>04</b>	<b>02</b>	<b>C</b>	<b>A</b>	<b>150</b>	<b>M</b>	<b>Q</b>	<b>A</b>	<b>W</b>
<b>Series Code</b>	<b>Substrate Length</b>	<b>Substrate Width</b>	<b>Breakdown Voltage</b>	<b>Standard Impedance</b>	<b>Capacitance</b>	<b>Capacitance Tolerance</b>	<b>Substrate</b>	<b>Substrate Thickness (mils)</b>	<b>Packaging</b>
MV = TL MIM	in tens of mils	in tens of mils	C = 100 BDV	A = 50Ω X = Other Contact Factory	capacitance code in pF First two digits = significant figures or R for decimal place. Third digit - number of zero or after "R" significant figures.	M = ± 20%	A = Alumina Q = Quartz X = Other	A = 5 mils B = 10 mils C = 15 mils X = Contact Factory	W = anti-static waffle pack T = tested, undiced D = Tested and diced on tape

# Transmission Line MIM Capacitor

## (Metal-Insulator-Metal)

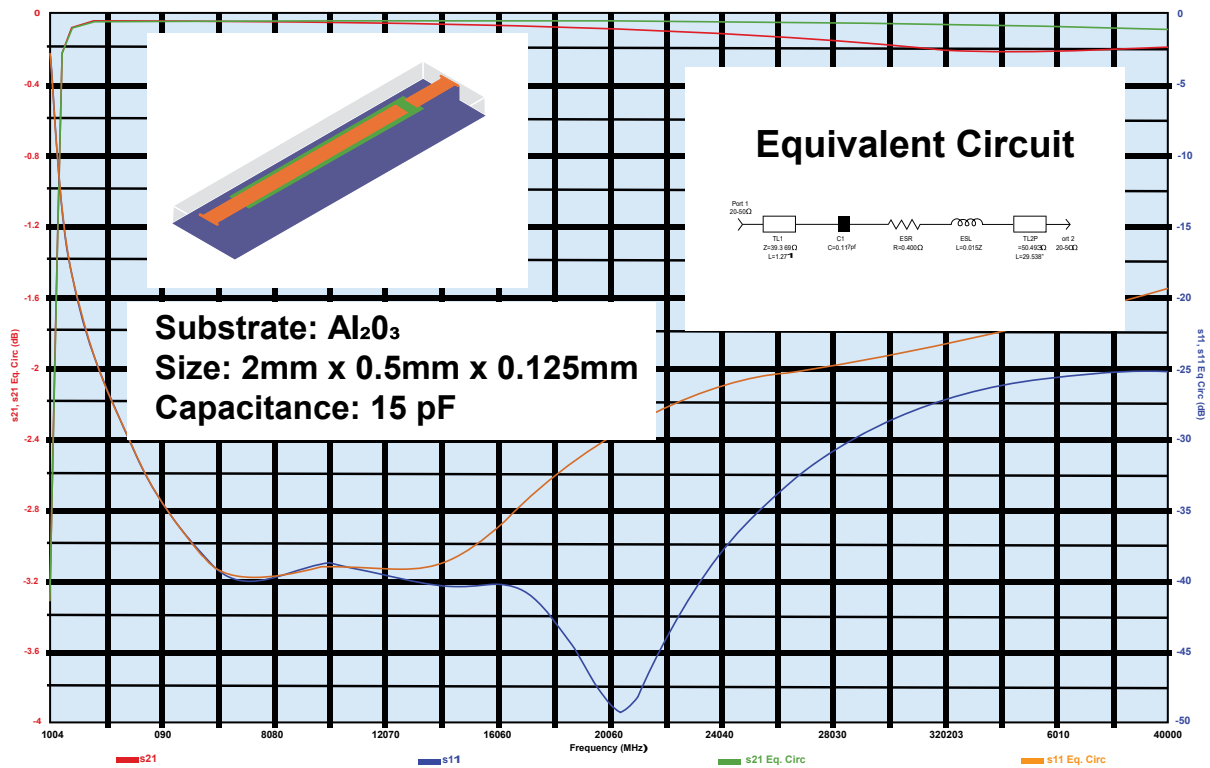
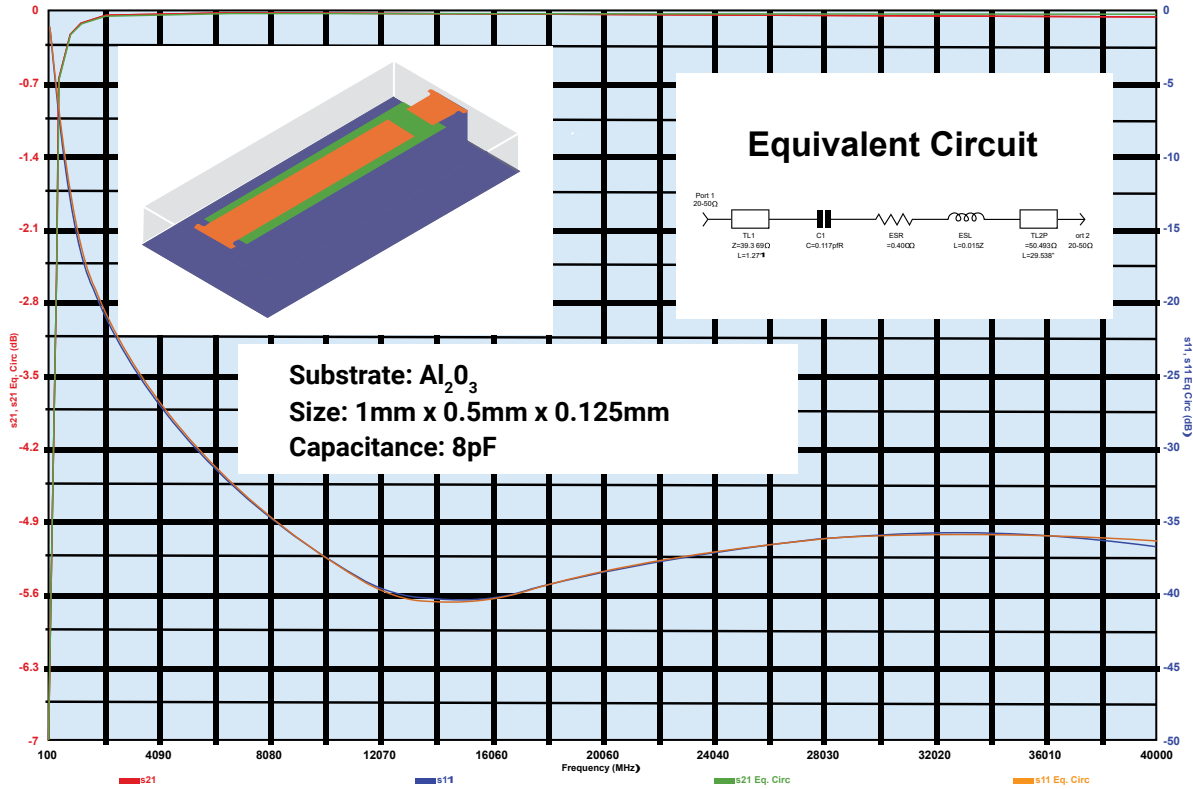
### GENERAL CHARACTERISTICS

CHARACTERISTIC	DESIGN DEPENDENT
Capacitor Range	0.3 - 15 pF (typical)
Tolerance	± 20%
Backing	Gold Metalization
Termination Type	Gold Wire Bond

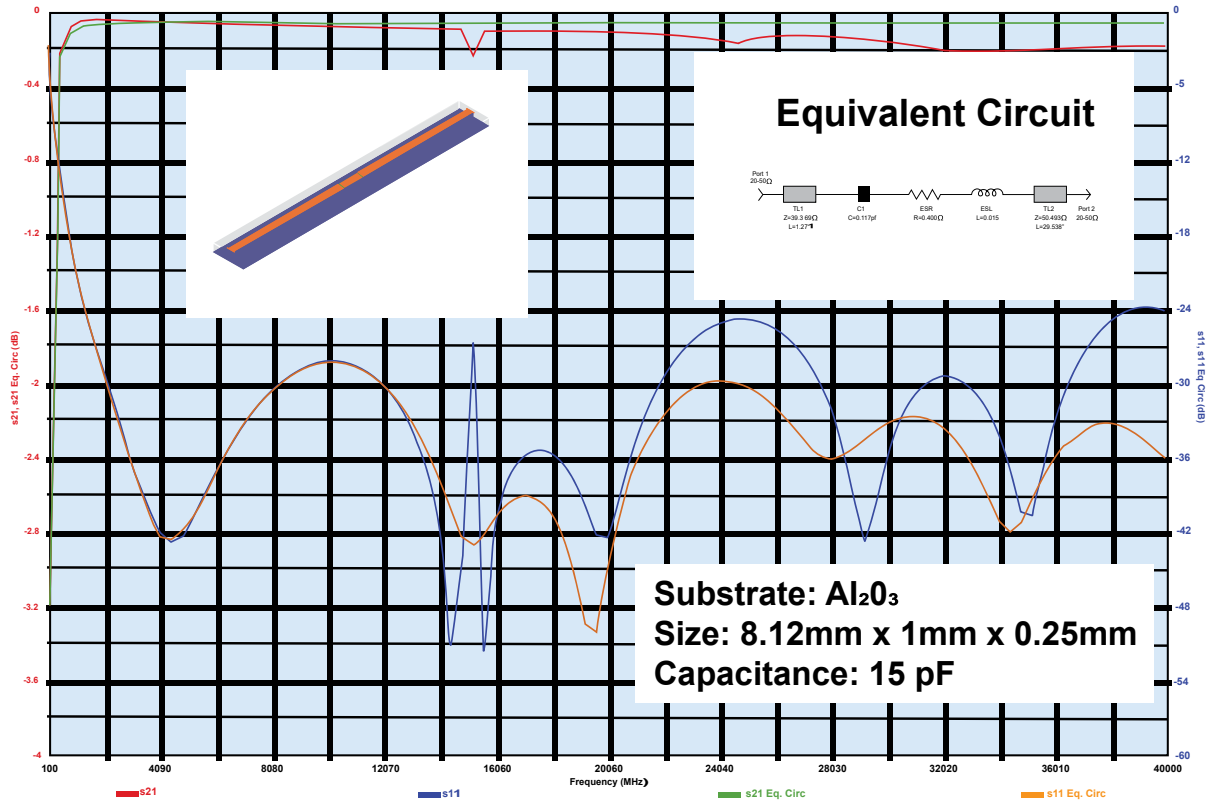
### STANDARD

Part Number	Substrate	Length (mils)	Width (mils)	Thickness (mils)	Cap Value (pF)
MV0402CA1R0MQAW	Quartz	40	20	5	1
MV0404CA1R0MQAW	Quartz	40	40	5	1
MV0402CA5R0MQAW	Quartz	40	20	5	5
MV0404CA5R0MQAW	Quartz	40	40	5	5
MV0404CA150MQAW	Quartz	40	40	5	15
MV0402CA150MAAW	Alumina	40	20	5	15
MV0404CA150MABW	Alumina	40	40	10	15
MV0304CA150MABW	Alumina	30	40	10	15
MV0804CA150MABW	Alumina	80	40	10	15

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