

RADIAL LEADS, POLARIZED, NEW FURTHER REDUCED CASE SIZING,  
FROM NRWS WIDE TEMPERATURE RANGE

EXTENDED TEMPERATURE  
**NRWS** → **NRWP**  
(today's standard) (reduced sizes)

**RoHS**  
**Compliant**  
includes all homogeneous materials

\*See Part Number System for Details



### CHARACTERISTICS

Rated Voltage Range	6.3 ~ 100VDC									
Capacitance Range	33 ~ 33,000 $\mu$ F									
Operating Temperature Range	-55°C ~ +105°C									
Capacitance Tolerance	$\pm 20\%$ (M)									
Maximum Leakage Current After 2 minutes	0.01CV or 3 $\mu$ A whichever is greater									
Max. Tan $\delta$ at 120Hz/20°C	W.V. (Vdc)	6.3	10	16	25	35	50	63	100	
	S.V. (Vdc)	8	13	20	32	44	63	79	125	
	C $\leq$ 1,000 $\mu$ F	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	
	C = 2,200 $\mu$ F	0.30	0.26	0.22	0.18	0.16	0.14	0.12	-	
	C = 3,300 $\mu$ F	0.32	0.28	0.24	0.20	0.18	0.16	-	-	
	C = 4,700 $\mu$ F	0.34	0.30	0.26	0.22	0.20	-	-	-	
	C = 6,800 $\mu$ F	0.38	0.34	0.30	0.26	0.24	-	-	-	
	C = 10,000 $\mu$ F	0.46	0.42	0.38	0.34	-	-	-	-	
	C = 15,000 $\mu$ F	0.56	0.52	0.48	-	-	-	-	-	
Low Temperature Stability Impedance Ratio @ 120Hz	Z-40°C/Z+20°C	5	4	3	2	2	2	2	2	
	Z-55°C/Z+20°C	10	8	6	4	3	3	3	3	
Load Life Test @ 105°C	Duration	$\phi D \leq 8$ : 1,000 hours, $\phi D \geq 10$ : 2,000 hours								
	$\Delta$ Capacitance	Within $\pm 25\%$ of initial measured value								
	$\Delta$ Tan $\delta$	Less than 200% of specified value								
	$\Delta$ LC	Less than specified value								

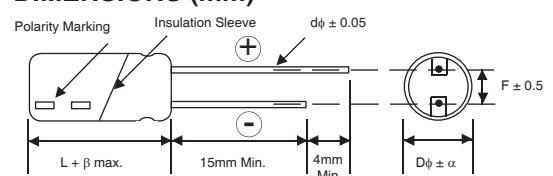
### STANDARD PRODUCT AND CASE SIZE TABLE D $\phi$ xL (mm)

Capacitance ( $\mu$ F)	Code	Working Voltage (Vdc)							
		6.3	10	16	25	35	50	63	100
33	330	-	-	-	-	-	-	-	8x11.5
47	470	-	-	-	-	-	-	-	8x11.5
100	101	-	-	-	-	-	8x11.5	8x11.5	10x16
220	221	-	-	-	6.3x11	8x11.5	10x12.5	10x16	12.5x20
330	331	-	-	6.3x11	8x11.5	10x12.5	10x16	10x20	12.5x25
470	471	-	6.3x11	8x11.5	8x11.5	10x12.5	10x20	12.5x20	16x25
680	681	6.3x11	8x11.5	8x11.5	10x12.5	10x16	12.5x20	12.5x25	16x31.5
1,000	102	8x11.5	8x11.5	10x12.5	10x16	10x20	12.5x25	16x25	18x35.5
2,200	222	10x16	10x16	10x20	12.5x20	16x25	16x31.5	18x31.5	-
3,300	332	10x20	10x20	12.5x20	16x25	16x25	18x35.5	-	-
4,700	472	12.5x20	12.5x20	12.5x25	16x25	16x35.5	-	-	-
6,800	682	12.5x25	16x25	16x25	16x35.5	18x35.5	-	-	-
10,000	103	16x25	16x25	16x31.5	18x35.5	-	-	-	-
15,000	153	16x31.5	16x35.5	18x35.5	-	-	-	-	-
22,000	223	18x31.5	18x35.5	-	-	-	-	-	-
33,000	333	18x40	-	-	-	-	-	-	-

### LEAD SPACING AND DIAMETER (mm)

Case Dia. (D $\phi$ )	5	6.3	8	10	12.5	16	18
Lead Dia. (D $\phi$ )	0.5	0.5	0.6	0.6	0.6	0.8	0.8
Lead Spacing (F)	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Dim. $\alpha$	0.5	0.5	0.5	0.5	0.5	0.5	0.5

### DIMENSIONS (mm)



$\beta = D < 16\text{mm} = 1.5\text{mm}$ ,  $L \geq 16\text{mm} = 2.0\text{mm}$

Drawing is representative of parts as supplied in bulk or straight lead format, please see taping specification for details on taped format packaging.



### STANDARD VALUES, SPECIFICATIONS AND CASE SIZES (mm)

Part Number	Cap. (μF)	W.V. (Vdc)	Dissipation Factor +20°C/120Hz	Ripple Current Rating (mA) +105°C/120Hz	Max. ESR (Ω) +20°C/120Hz	Load Life Hours @+105°C
NRWP681M6.3V6.3x11F	680	6.3	0.28	285	0.68	1,000
NRWP102M6.3V8x11.5F	1,000		0.28	460	0.46	1,000
NRWP222M6.3V10x16F	2,200		0.30	775	0.23	2,000
NRWP332M6.3V10x20F	3,300		0.32	985	0.16	2,000
NRWP472M6.3V12.5x20F	4,700		0.34	1150	0.12	2,000
NRWP682M6.3V12.5x25F	6,800		0.38	1480	0.09	2,000
NRWP103M6.3V16x25F	10,000		0.46	1700	0.08	2,000
NRWP153M6.3V16x31.5F	15,000		0.56	2090	0.06	2,000
NRWP223M6.3V18x31.5F	22,000		0.70	2280	0.05	2,000
NRWP333M6.3V18x40F	33,000		0.92	2350	0.05	2,000
NRWP471M10V6.3x11F	470	10	0.24	295	0.85	1,000
NRWP681M10V8x11.5F	680		0.24	430	0.59	1,000
NRWP102M10V8x11.5F	1,000		0.24	500	0.40	1,000
NRWP222M10V10x16F	2,200		0.26	860	0.20	2,000
NRWP332M10V10x20F	3,300		0.28	1100	0.14	2,000
NRWP472M10V12.5x20F	4,700		0.30	1350	0.11	2,000
NRWP682M10V16x25F	6,800		0.34	1700	0.08	2,000
NRWP103M10V16x25F	10,000		0.42	1950	0.07	2,000
NRWP153M10V16x35.5F	15,000		0.52	2090	0.06	2,000
NRWP223M10V18x35.5F	22,000		0.66	2180	0.05	2,000
NRWP331M16V6.3x11F	330	16	0.20	270	1.01	1,000
NRWP471M16V8x11.5F	470		0.20	375	0.71	1,000
NRWP681M16V8x11.5F	680		0.20	480	0.49	1,000
NRWP102M16V10x12.5F	1,000		0.20	640	0.33	2,000
NRWP222M16V10x20F	2,200		0.22	1050	0.17	2,000
NRWP332M16V12.5x20F	3,300		0.24	1300	0.12	2,000
NRWP472M16V12.5x25F	4,700		0.26	1650	0.09	2,000
NRWP682M16V16x25F	6,800		0.30	1900	0.07	2,000
NRWP103M16V16x31.5F	10,000		0.38	1950	0.06	2,000
NRWP153M16V18x35.5F	15,000		0.48	2070	0.05	2,000
NRWP221M25V6.3x11F	220	25	0.16	240	1.21	1,000
NRWP331M25V8x11.5F	330		0.16	335	0.80	1,000
NRWP471M25V8x11.5F	470		0.16	440	0.56	1,000
NRWP681M25V10x12.5F	680		0.16	630	0.39	2,000
NRWP102M25V10x16F	1,000		0.16	740	0.27	2,000
NRWP222M25V12.5x20F	2,200		0.18	1090	0.14	2,000
NRWP332M25V16x25F	3,300		0.20	1500	0.10	2,000
NRWP472M25V16x25F	4,700		0.22	1800	0.08	2,000
NRWP682M25V16x35.5F	6,800		0.26	1910	0.06	2,000
NRWP103M25V18x35.5F	10,000		0.34	2050	0.06	2,000
NRWP221M35V8x11.5F	220	35	0.14	300	1.06	1,000
NRWP331M35V10x12.5F	330		0.14	400	0.70	2,000
NRWP471M35V10x12.5F	470		0.14	525	0.49	2,000
NRWP681M35V10x16F	680		0.14	760	0.34	2,000
NRWP102M35V10x20F	1,000		0.14	865	0.23	2,000
NRWP222M35V16x25F	2,200		0.16	1370	0.12	2,000
NRWP332M35V16x25F	3,300		0.18	1680	0.09	2,000
NRWP472M35V16x35.5F	4,700		0.20	1870	0.07	2,000
NRWP682M35V18x35.5F	6,800		0.24	1920	0.06	2,000
NRWP101M50V8x11.5F	100		50	0.12	200	1.99
NRWP221M50V10x12.5F	220	0.12		360	0.90	2,000
NRWP331M50V10x16F	330	0.12		470	0.60	2,000
NRWP471M50V10x20F	470	0.12		600	0.42	2,000
NRWP681M50V12.5x20F	680	0.12		980	0.29	2,000
NRWP102M50V12.5x25F	1,000	0.12		1060	0.20	2,000
NRWP222M50V16x31.5F	2,200	0.14		1600	0.11	2,000
NRWP332M50V18x35.5F	3,300	0.16		1780	0.08	2,000



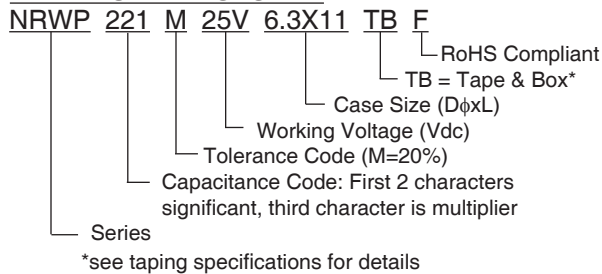
### STANDARD VALUES, SPECIFICATIONS AND CASE SIZES (mm)

Part Number	Cap. (μF)	W.V. (Vdc)	Dissipation Factor +20°C/120Hz	Ripple Current Rating (mA) +105°C/120Hz	Max. ESR (Ω) +20°C/120Hz	Load Life Hours @ +105°C
NRWP101M63V8x11.5F	100	63	0.10	230	1.66	1,000
NRWP221M63V10x16F	220		0.10	390	0.75	2,000
NRWP331M63V10x20F	330		0.10	540	0.50	2,000
NRWP471M63V12.5x20F	470		0.10	700	0.35	2,000
NRWP681M63V12.5x25F	680		0.10	800	0.24	2,000
NRWP102M63V16x25F	1,000		0.10	1200	0.17	2,000
NRWP222M63V18x31.5F	2,200		0.12	1400	0.09	2,000
NRWP330M100V8x11.5F	33	100	0.08	140	4.02	1,000
NRWP470M100V8x11.5F	47		0.08	185	2.82	1,000
NRWP101M100V10x16F	100		0.08	290	1.33	2,000
NRWP221M100V12.5x20F	220		0.08	560	0.60	2,000
NRWP331M100V12.5x25F	330		0.08	690	0.40	2,000
NRWP471M100V16x25F	470		0.08	880	0.28	2,000
NRWP681M100V16x31.5F	680		0.08	900	0.20	2,000
NRWP102M100V18x35.5F	1,000		0.08	985	0.13	2,000

### RIPPLE CURRENT FREQUENCY CORRECTION FACTOR

Cap. (μF)	60Hz	120Hz	500Hz	1KHz	10KHz ~ up
33 ~ 47	0.80	1.00	1.20	1.30	1.50
100 ~ 1,000	0.80	1.00	1.10	1.10	1.20
2,200 ~ 33,000	0.80	1.00	1.05	1.10	1.15

### PART NUMBER SYSTEM



### PRECAUTIONS

Please review the notes on correct use, safety and precautions found on pages T10 & T11 of NIC's **Electrolytic Capacitor catalog**.  
 Also found at [www.niccomp.com/precautions](http://www.niccomp.com/precautions)  
 If in doubt or uncertainty, please review your specific application - process details with NIC's technical support personnel: [tpmg@niccomp.com](mailto:tpmg@niccomp.com)

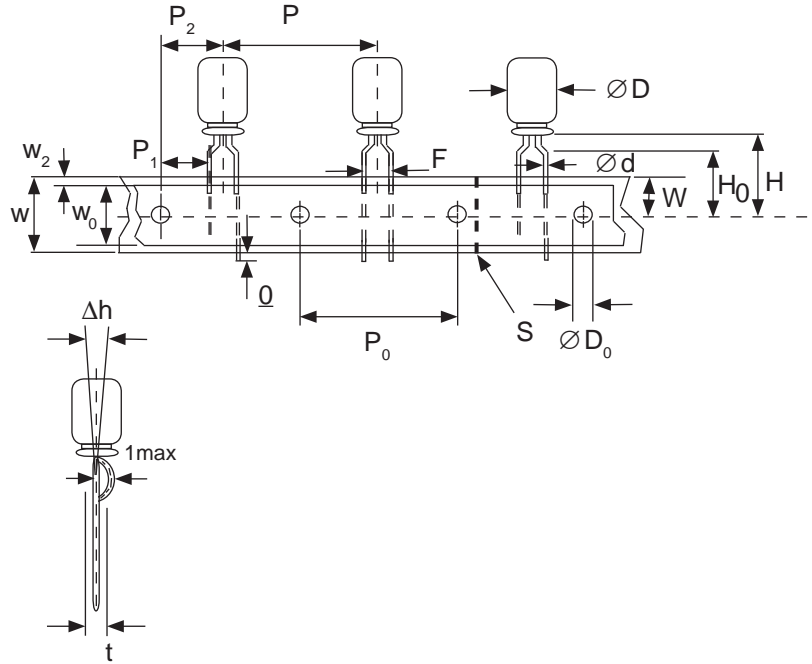


# Miniature Aluminum Electrolytic Capacitors Taping Specifications

## STANDARD RADIAL TAPING (5mm LEAD SPACING, FORMED LEADS) TB

Taping Dimensions (mm)

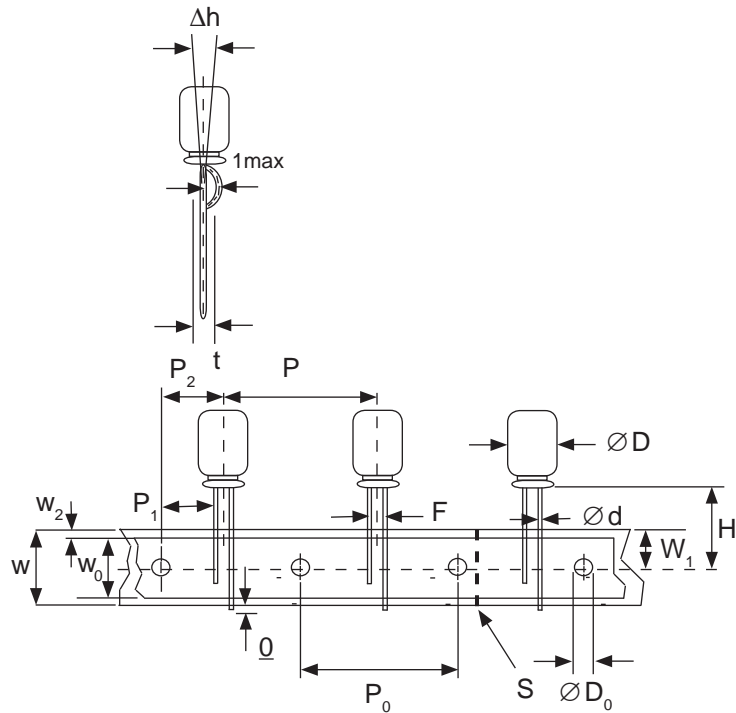
Case Dia. (D $\phi$ )	4	5	6.3	8
Case Size	4x5 4x7	5x5 5x7	5x11	6.3x5 6.3x7 6.3x11 8x11.5
d $\phi$ $\pm$ 0.05	0.45	0.45	0.5	0.45
H $\pm$ 0.75	17.5	17.5	18.5	17.5
F +0.8 ~ -0.2	5.0 -0.2 ~ +0.8			
P	12.7 $\pm$ 1.0			
P <sub>0</sub>	12.7 $\pm$ 0.2			
P <sub>1</sub>	3.85 $\pm$ 0.5 (at end of tape)			
P <sub>2</sub>	6.35 $\pm$ 1.0			
W	18.0 $\pm$ 0.5			
W <sub>0</sub>	11.5 min.			
W <sub>1</sub>	9.0 $\pm$ 0.5			
W <sub>2</sub>	0 ~ 2.5			
H <sub>0</sub>	16.0 $\pm$ 0.5			
l	1.0 max.			
D <sub>0</sub> $\phi$	4.0 $\pm$ 0.2			
$\Delta$ h	0 $\pm$ 1.0 (at top of can)			
t	0.7 $\pm$ 0.2 (not including lead)			



## STANDARD RADIAL TAPING (5mm LEAD SPACING, STRAIGHT LEADS) TB

Taping Dimensions (mm)

Case Dia. (D $\phi$ )	10	12.5
Case Size	All	All
d $\phi$ $\pm$ 0.05	0.6	0.6
H $\pm$ 0.75	19.0	19.0
F +0.8 ~ -0.2	5.0	5.0
P $\pm$ 1.0	25.4*	
P <sub>0</sub>	12.7 $\pm$ 0.2	
P <sub>1</sub>	3.85	
P <sub>2</sub>	6.35 $\pm$ 1.0	
W	18.0 $\pm$ 0.5	
W <sub>0</sub>	11.5 min	
W <sub>1</sub>	9.0 $\pm$ 0.5	
W <sub>2</sub>	0 ~ 2.5	
H <sub>0</sub>	16.0 $\pm$ 0.5	
l	1.0 max.	
D <sub>0</sub> $\phi$	4.0 $\pm$ 0.2	
$\Delta$ h	0 $\pm$ 1.0 (at top of can)	
t	0.7 $\pm$ 0.2 (not including lead)	



### \*Optional Taping Specifications

10mm diameter available with P dim. = 12.7mm  
(P/N Suffix: TB12.7MMP)

12.5mm diameter available with P dim. = 15mm, P<sub>1</sub> = 5.0mm,  
P<sub>0</sub> = 15.0mm & P<sub>2</sub> = 7.5mm (P/N Suffix: TB15MMP)

**NOTE:** ANODE (+) LEAD FEEDS OFF FIRST.  
FOR OPTION OF NEGATIVE (-) LEAD FIRST,  
SPECIFY "TBN".

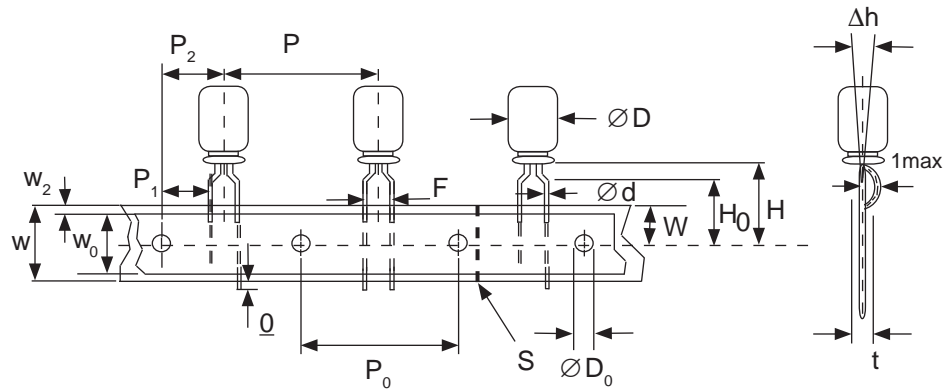


# Miniature Aluminum Electrolytic Capacitors Taping Specifications

## SPECIAL RADIAL TAPING (2.5mm LEAD SPACING, FORMED LEADS) TBF1

Taping Dimensions (mm)

Case Dia. (D $\phi$ )	4	5	
Case Size Dim.	4x5 4x7	5x5 5x7	5x11
d $\phi$ $\pm$ 0.05	0.45	0.45	0.5
H $\pm$ 0.75	17.5	17.5	18.5
H <sub>0</sub> $\pm$ 0.5	16.0	-	-
F	2.5 -0.2 ~ +0.8		
P	12.7 $\pm$ 1.0		
P <sub>0</sub>	12.7 $\pm$ 0.2		
P <sub>1</sub>	5.1 $\pm$ 0.5		
P <sub>2</sub>	6.35 $\pm$ 1.0		
W	18.0 $\pm$ 0.5		
W <sub>0</sub>	11.5 min.		
W <sub>1</sub>	9.0 $\pm$ 0.5		
W <sub>2</sub>	0 ~ 1.5		
l	1.0 max.		
D <sub>0</sub> $\phi$	4.0 $\pm$ 0.2		
$\Delta$ h	0 $\pm$ 1.0		
t	0.7 $\pm$ 0.2		

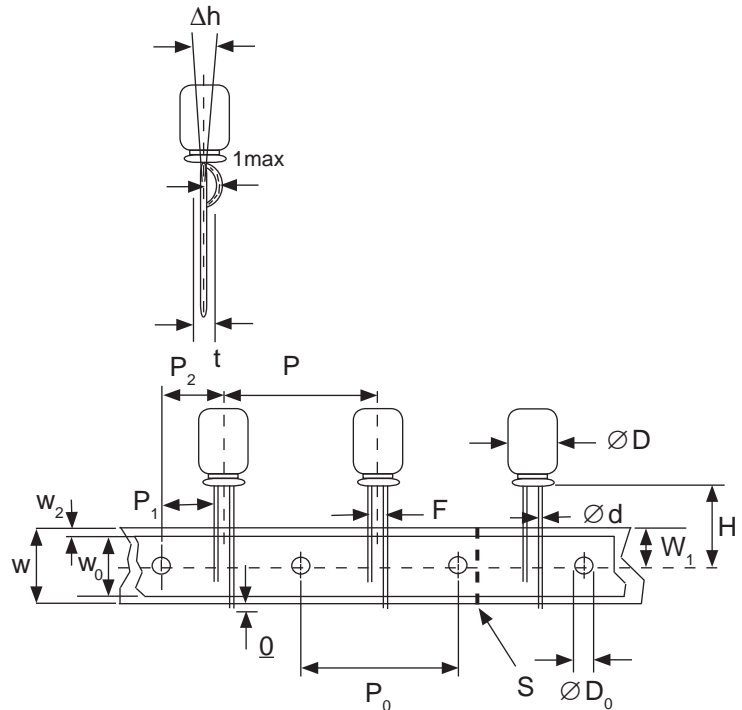


## SPECIAL STRAIGHT LEAD TAPING TBST

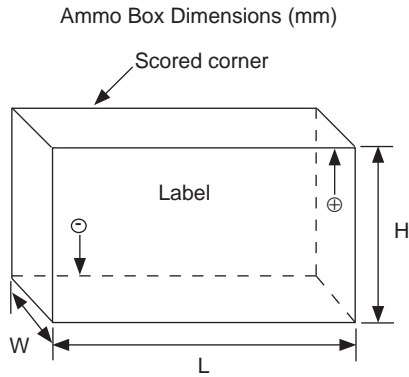
Taping Dimensions (mm)

Case Dia. (D $\phi$ )	4	5			6.3		8
Case Size Dim.	4x5 4x7	5x5 5x7	5x11	6.3x5 6.3x7	6.3x11	8x11.5	
d $\phi$ $\pm$ 0.05	0.45	0.45	0.5	0.45	0.5	0.6	
H $\pm$ 0.75	17.5	17.5	18.5	17.5	18.5	20.0	
F +0.8 ~ -0.2	2.0*	2.0	2.0	2.5	2.5	3.5	
P $\pm$ 1.0	12.7 $\pm$ 0.2						
P <sub>0</sub>	12.7 $\pm$ 0.2						
P <sub>1</sub>	5.1	5.1	5.1	5.1	5.1	4.6	
P <sub>2</sub>	6.35 $\pm$ 1.0						
W	18.0 $\pm$ 0.5						
W <sub>0</sub>	11.5 min.						
W <sub>1</sub>	9.0 $\pm$ 0.5						
W <sub>2</sub>	0 ~ 2.5						
H <sub>0</sub>	16.0 $\pm$ 0.5						
l	1.0 max.						
D <sub>0</sub> $\phi$	4.0 $\pm$ 0.2						
$\Delta$ h	0 $\pm$ 1.0 (at top of can)						
t	0.7 $\pm$ 0.2 (not including lead)						

\* Parts with 4mm diameter are taped with a slight flare in the lead and a 2.0mm lead-space.



## RADIAL TAPED PACKAGING



Ammo Box (Tape & Box) TB, TBF1, TBST

Size of box and component quantity

Case Dia (D $\phi$ ) or Case Size	Q'ty per Box (pcs)	Dim. L	Dim. H	Dim. W
4x5, 4x7	2,000	331	175	43
5x5, 5x7	2,000	331	220	43
5x11	2,000	340	255	55
6.3x5, 6.3x7	2,000	331	280	43
6.3x11	2,000	331	280	48
8x11.5, 8x12.5	1,000	335	235	53
10x12.5*	500	335	190	53
10x16*	500	335	300	53
10x20*	500	335	300	55
12.x20*	500	335	300	55
12.5x25*	500	335	300	61

\*Special Taping Consult Factory For Availability