

HIGH CV, HIGH TEMPERATURE, RADIAL LEADS, POLARIZED

FEATURES

- EXTENDED VALUE AND HIGH VOLTAGE
- NEW REDUCED SIZES

CHARACTERISTICS

Rated Voltage Range				6.3 ~ 50Vdc				160 ~ 250Vdc				350 ~ 450Vdc				
Capacitance Range				100 ~ 10,000μF				4.7 ~ 220μF				1.5 ~ 68μF				
Operating Temperature Range				-55 ~ +105°C				-40 ~ +105°C				-25 ~ +105°C				
Capacitance Tolerance				±20%(M)												
Max. Leakage Current @ 20°C				6.3 ~ 50Vdc				160 ~ 450Vdc								
				0.01CV or 3μA whichever is greater after 2 minutes				CV≤1,000μF				CV>1,000μF				
								0.1CV + 40μA (1 min.)				0.04CV + 100μA (1 min.)				
								.03CV + 15μA (5 min.)				0.02CV + 25μA (5 min.)				
Max. Tan δ @ 120Hz/20°C		Case Diameter	8 ~ 10	W.V. (Vdc)	6.3	10	16	25	35	50	160	200	250	350	400	450
				S.V. (Vdc)	8.0	13	20	32	44	63	200	250	300	400	450	500
				C≤1,000μF	0.30	0.26	0.20	0.18	0.14	0.12	0.20	0.20	0.20	0.20	0.20	0.25
		12 ~ 18	W.V. (Vdc)	6.3	10	16	25	35	50	160	200	250	350	400	450	
			C≤1,000μF	0.26	0.22	0.18	0.16	0.14	0.12	0.20	0.20	0.20	0.20	0.20	0.25	
			C=2,000μF	0.28	0.24	0.20	0.18	0.16	0.14	-	-	-	-	-	-	
			C=3,300μF	0.30	0.26	0.22	0.20	0.18	-	-	-	-	-	-	-	
			C=4,700μF	0.32	0.28	0.24	0.22	-	-	-	-	-	-	-	-	
			C=6,800μF	0.36	0.32	0.28	-	-	-	-	-	-	-	-	-	
C=10,000μF	0.44	0.40	-	-	-	-	-	-	-	-	-	-				
Low Temperature Stability Impedance Ratio @ 120Hz		W.V. (Vdc)		6.3	10	16	25	35	50	160	200	250	350	400	450	
		Z-25°C/Z+20°C		4	3	2	2	2	2	3	3	3	6	6	6	
		Z-40°C/Z+20°C		8	6	4	4	3	3	-	-	-	-	-	-	
Load Life Test at Rated W.V. +105°C 2,000 Hours				Capacitance Change				Within ±25% of initial measured value								
				Tan δ				Less than 200% of specified maximum value								
				Leakage Current				Less than specified maximum value								

STANDARD PRODUCT AND CASE SIZE TABLE Dφ x L (mm)

Cap. (μF)	Code	Working Voltage (Vdc)											
		6.3	10	16	25	35	50	160	200	250	350	400	450
1.5	1R5	-	-	-	-	-	-	-	-	-	-	-	8x9
2.2	2R2	-	-	-	-	-	-	-	-	-	-	8x9	10x9
3.3	3R3	-	-	-	-	-	-	-	-	-	8x9	10x9	-
4.7	4R7	-	-	-	-	-	-	8x9	8x9	8x9	10x9	10x9	-
6.8	6R8	-	-	-	-	-	-	8x9	8x9	10x9	12.5x16	12.5x16	12.5x16
10	100	-	-	-	-	-	-	10x9	10x9	-	12.5x16	12.5x16	16x16
22	220	-	-	-	-	-	-	-	12.5x16	12.5x16	18x16	16x20	16x20
33	330	-	-	-	-	-	-	12.5x16	12.5x16	16x16	16x20	16x20	18x25
47	470	-	-	-	-	-	-	16x16	16x16	18x16	18x20	18x20	18x25
68	680	-	-	-	-	-	-	18x16	16x20	16x20	18x25	-	-
100	101	-	-	-	-	-	8x9	16x20	16x20	18x25	-	-	-
150	151	-	-	-	-	8x9	10x9	18x20	18x25	-	-	-	-
220	221	-	-	-	8x9	10x9	-	18x25	-	-	-	-	-
330	331	-	-	8x9	10x9	10x9	-	-	-	-	-	-	-
470	471	8x9	8x9	8x9	10x9	-	12.5x16	-	-	-	-	-	-
680	681	8x9	10x9	10x9	12.5x16	12.5x16	16x16	-	-	-	-	-	-
1000	102	10x9	10x9	-	12.5x16	16x16	16x20	-	-	-	-	-	-
2200	222	12.5x16	12.5x16	16x16	16x20	18x20	18x25	-	-	-	-	-	-
3300	332	16x16	16x16	16x20	18x20	18x25	-	-	-	-	-	-	-
4700	472	18x16	16x20	18x20	18x25	-	-	-	-	-	-	-	-
6800	682	16x20	18x20	18x25	-	-	-	-	-	-	-	-	-
10000	103	18x20	18x25	-	-	-	-	-	-	-	-	-	-

LEAD SPACING AND DIAMETER (mm)

Case Dia. (Dφ)	8	10	12.5	16	18
Lead Dia. (dφ)	0.6	0.6	0.6	0.8	0.8
Lead Spacing (F)	3.5	5.0	5.0	7.5	7.5
Dim. α	0.5	0.5	0.5	0.5	0.5



STANDARD VALUES, SPECIFICATIONS AND CASE SIZES (mm)

Part Number	Cap. (μ F)	W.V. (Vdc)	Dissipation Factor +20°C/120Hz	Ripple Current Rating (mA) +105°C/120Hz	Load Life Hours @ +105°C
NRE-HS471M6.3V8x9F	470	6.3	0.30	270	2,000
NRE-HS681M6.3V8x9F	680		0.30	300	2,000
NRE-HS102M6.3V10x9F	1000		0.30	460	2,000
NRE-HS222M6.3V12.5x16F	2200		0.28	770	2,000
NRE-HS332M6.3V16x16F	3300		0.30	930	2,000
NRE-HS472M6.3V18x16F	4700		0.32	1000	2,000
NRE-HS682M6.3V16x20F	6800		0.36	1200	2,000
NRE-HS103M6.3V18x20F	10000		0.44	1430	2,000
NRE-HS471M10V8x9F	470	10	0.26	295	2,000
NRE-HS681M10V10x9F	680		0.26	350	2,000
NRE-HS102M10V10x9F	1000		0.26	460	2,000
NRE-HS222M10V12.5x16F	2200		0.24	770	2,000
NRE-HS332M10V16x16F	3300		0.26	930	2,000
NRE-HS472M10V16x20F	4700		0.28	1200	2,000
NRE-HS682M10V18x20F	6800		0.32	1330	2,000
NRE-HS103M10V18x25F	10000		0.40	1680	2,000
NRE-HS331M16V8x9F	330	16	0.20	270	2,000
NRE-HS471M16V8x9F	470		0.20	310	2,000
NRE-HS681M16V10x9F	680		0.20	370	2,000
NRE-HS222M16V16x16F	2200		0.20	930	2,000
NRE-HS332M16V16x20F	3300		0.22	1200	2,000
NRE-HS472M16V18x20F	4700		0.24	1330	2,000
NRE-HS682M16V18x25F	6800		0.28	1680	2,000
NRE-HS221M25V8x9F	220	25	0.18	240	2,000
NRE-HS331M25V10x9F	330		0.18	310	2,000
NRE-HS471M25V10x9F	470		0.18	370	2,000
NRE-HS681M25V12.5x16F	680		0.16	640	2,000
NRE-HS102M25V12.5x16F	1000		0.16	670	2,000
NRE-HS222M25V16x20F	2200		0.18	1100	2,000
NRE-HS332M25V18x20F	3300		0.20	1200	2,000
NRE-HS472M25V18x25F	4700		0.22	1490	2,000
NRE-HS151M35V8x9F	150	35	0.14	250	2,000
NRE-HS221M35V10x9F	220		0.14	300	2,000
NRE-HS331M35V10x9F	330		0.14	360	2,000
NRE-HS681M35V12.5x16F	680		0.14	640	2,000
NRE-HS102M35V16x16F	1000		0.14	850	2,000
NRE-HS222M35V18x20F	2200		0.16	1200	2,000
NRE-HS332M35V18x25F	3300		0.18	1490	2,000
NRE-HS101M50V8x9F	100	50	0.12	200	2,000
NRE-HS151M50V10x9F	150		0.12	300	2,000
NRE-HS471M50V12.5x16F	470		0.12	570	2,000
NRE-HS681M50V16x16F	680		0.12	710	2,000
NRE-HS102M50V16x20F	1000		0.12	890	2,000
NRE-HS222M50V18x25F	2200		0.14	1320	2,000
NRE-HS4R7M160V8x9F	4.7	160	0.20	54	2,000
NRE-HS6R8M160V8x9F	6.8		0.20	60	2,000
NRE-HS100M160V10x9F	10		0.20	85	2,000
NRE-HS330M160V12.5x16F	33		0.20	175	2,000
NRE-HS470M160V16x16F	47		0.20	245	2,000
NRE-HS680M160V18x16F	68		0.20	305	2,000
NRE-HS101M160V16x20F	100		0.20	381	2,000
NRE-HS151M160V18x20F	150		0.20	464	2,000
NRE-HS221M160V18x25F	220		0.20	602	2,000
NRE-HS4R7M200V8x9F	4.7	200	0.20	54	2,000
NRE-HS6R6M200V8x9F	6.8		0.20	60	2,000
NRE-HS100M200V10x9F	10		0.20	85	2,000
NRE-HS220M200V12.5x16F	22		0.20	156	2,000
NRE-HS330M200V12.5x16F	33		0.20	175	2,000
NRE-HS470M200V16x16F	47		0.20	250	2,000
NRE-HS680M200V16x20F	68		0.20	355	2,000
NRE-HS101M200V16x20F	100		0.20	381	2,000
NRE-HS151M200V18x25F	150		0.20	532	2,000



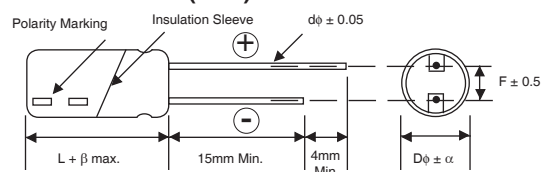
STANDARD VALUES, SPECIFICATIONS AND CASE SIZES (mm)

Part Number	Cap. (μF)	W.V. (Vdc)	Dissipation Factor +20°C/120Hz	Ripple Current Rating (mA) +105°C/120Hz	Load Life Hours @ +105°C
NRE-HS4R7M250V8x9F	4.7	250	0.20	54	2,000
NRE-HS6R8M250V10x9F	6.8		0.20	69	2,000
NRE-HS220M250V12.5x16F	22		0.20	156	2,000
NRE-HS330M250V16x16F	33		0.20	238	2,000
NRE-HS470M250V18x16F	47		0.20	309	2,000
NRE-HS680M250V16x20F	68		0.20	397	2,000
NRE-HS101M250V18x25F	100		0.20	451	2,000
NRE-HS3R3M350V8x9F	3.3	350	0.20	37	2,000
NRE-HS4R7M350V10x9F	4.7		0.20	49	2,000
NRE-HS6R8M350V12.5x16F	6.8		0.20	94	2,000
NRE-HS100M350V12.5x16F	10		0.20	100	2,000
NRE-HS220M350V18x16F	22		0.20	183	2,000
NRE-HS330M350V16x20F	33		0.20	238	2,000
NRE-HS470M350V18x20F	47		0.20	309	2,000
NRE-HS680M350V18x25F	68		0.20	397	2,000
NRE-HS2R2M400V8x9F	2.2	400	0.20	35	2,000
NRE-HS3R3M400V10x9F	3.3		0.20	40	2,000
NRE-HS4R7M400V10x9F	4.7		0.20	49	2,000
NRE-HS6R8M400V12.5x16F	6.8		0.20	94	2,000
NRE-HS100M400V12.5x16F	10		0.20	100	2,000
NRE-HS220M400V16x20F	22		0.20	187	2,000
NRE-HS330M400V16x20F	33		0.20	238	2,000
NRE-HS470M400V18x20F	47		0.20	309	2,000
NRE-HS1R5M450V8x9F	1.5	450	0.25	19	2,000
NRE-HS2R2M450V10x9F	2.2		0.25	29	2,000
NRE-HS6R8M450V12.5x16F	6.8		0.25	77	2,000
NRE-HS100M450V16x16F	10		0.25	109	2,000
NRE-HS220M450V16x20F	22		0.25	170	2,000
NRE-HS330M450V18x25F	33		0.25	238	2,000
NRE-HS470M450V18x25F	47		0.25	275	2,000

RIPPLE CURRENT FREQUENCY CORRECTION FACTORS

Frequency (Hz)	60	120	500	1K	10K ≥
1.5 ~ 6.8μF	0.65	1.00	1.20	1.30	1.50
10 ~ 68μF	0.80	1.00	1.20	1.30	1.50
100 ~ 1000μF	0.80	1.00	1.10	1.15	1.20
2200 ~ 10000μF	0.80	1.00	1.05	1.10	1.15

DIMENSIONS (mm)



β max. $L \leq 16\text{mm} = 1.5\text{mm}$, $L \geq 20\text{mm} = 2.0\text{mm}$

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

PART NUMBER SYSTEM

NRE-HS 331 M 35V 10X9 TB F

- Series
- Capacitance Code: First 2 characters significant, third character is multiplier
- Tolerance Code (M=20%)
- Working Voltage (Vdc)
- Case Size (Dφ x L)
- TB = Tape & Box*
- RoHS Compliant

*see taping specifications for details

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

If in doubt or uncertainty, please review your specific application - process details with NIC's technical support personnel: tpmg@niccomp.com

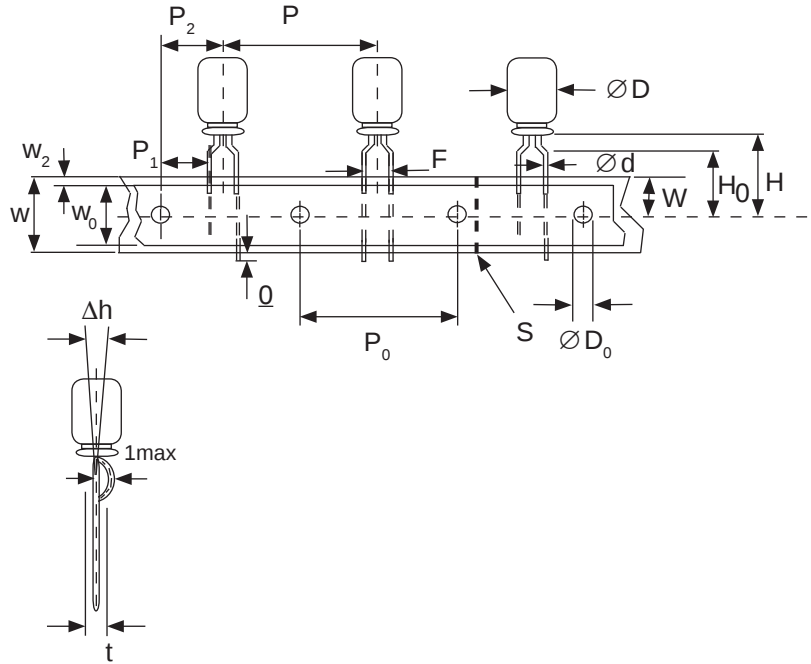


Miniature Aluminum Electrolytic Capacitors Taping Specifications

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

Taping Dimensions (mm)

Case Dia. (D ϕ)	4	5	6.3	8
Case Size	4x5	5x5	6.3x5	8x11.5
Dim.	4x7	5x7	6.3x7	8x11.5
d ϕ ± 0.05	0.45	0.45	0.45	0.6
H ± 0.75	17.5	17.5	17.5	20.0
F $+0.8 \sim -0.2$	5.0 $-0.2 \sim +0.8$			
P	12.7 ± 1.0			
P ₀	12.7 ± 0.2			
P ₁	3.85 ± 0.5 (at end of tape)			
P ₂	6.35 ± 1.0			
W	18.0 ± 0.5			
W ₀	11.5 min.			
W ₁	9.0 ± 0.5			
W ₂	0 ~ 2.5			
H ₀	16.0 ± 0.5			
l	1.0 max.			
D ₀ ϕ	4.0 ± 0.2			
Δh	0 ± 1.0 (at top of can)			
t	0.7 ± 0.2 (not including lead)			



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

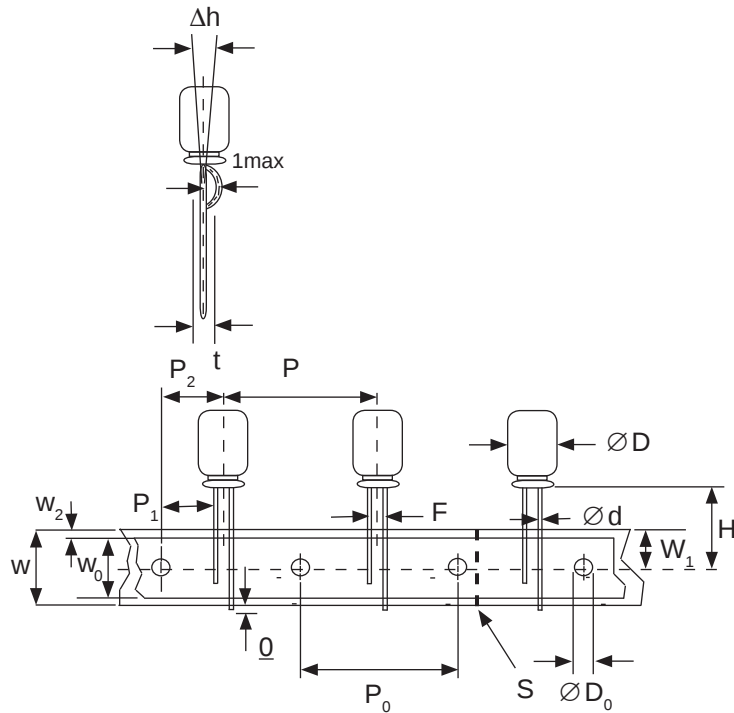
Taping Dimensions (mm)

Case Dia. (D ϕ)	10	12.5
Case Size	All	All
Dim.	All	All
d ϕ ± 0.05	0.6	0.6
H ± 0.75	19.0	19.0
F $+0.8 \sim -0.2$	5.0	5.0
P ± 1.0	25.4*	
P ₀	12.7 ± 0.2	
P ₁	3.85	
P ₂	6.35 ± 1.0	
W	18.0 ± 0.5	
W ₀	11.5 min	
W ₁	9.0 ± 0.5	
W ₂	0 ~ 2.5	
H ₀	16.0 ± 0.5	
l	1.0 max.	
D ₀ ϕ	4.0 ± 0.2	
Δh	0 ± 1.0 (at top of can)	
t	0.7 ± 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, P₁ = 5.0mm,
P₀ = 15.0mm & P₂ = 7.5mm (P/N Suffix: TB15MMP)



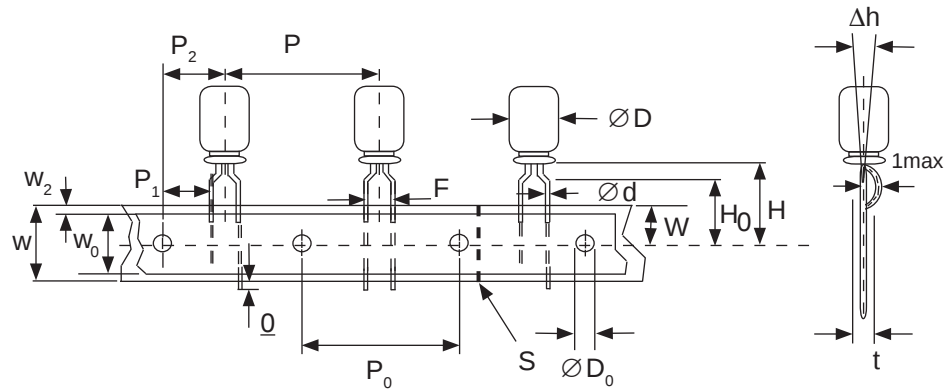
NOTE: ANODE (+) LEAD FEEDS OFF FIRST.
FOR OPTION OF NEGATIVE (-) LEAD FIRST,
SPECIFY "TBN".



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

Taping Dimensions (mm)

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

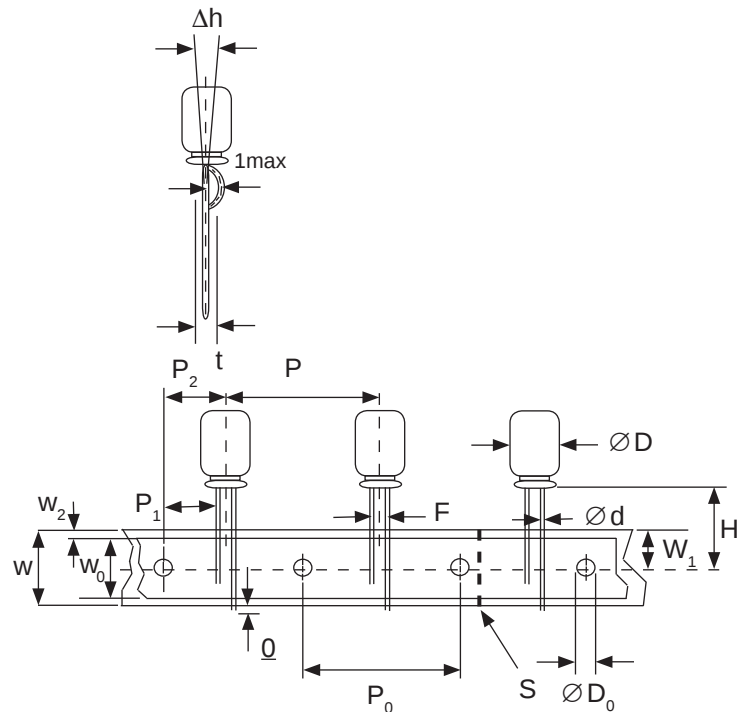


SPECIAL STRAIGHT LEAD TAPING TBST

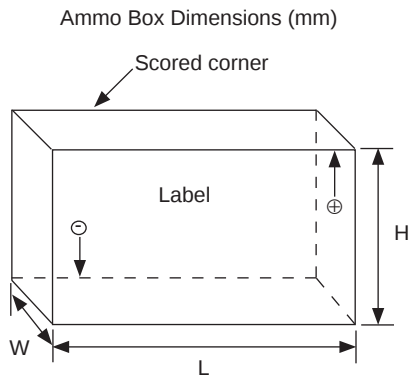
Taping Dimensions (mm)

Case Dia. (D ϕ)	4	5		6.3		8
Case Size	4x5	5x5	5x11	6.3x5	6.3x11	8x11.5
Dim.	4x7	5x7		6.3x7		
d $\phi \pm 0.05$	0.45	0.45	0.5	0.45	0.5	0.6
H ± 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 ± 1.0	12.7 ± 0.2					
P ₀	12.7 ± 0.2					
P ₁	5.1	5.1	5.1	5.1	5.1	4.6
P ₂	6.35 ± 1.0					
W	18.0 ± 0.5					
W ₀	11.5 min.					
W ₁	9.0 ± 0.5					
W ₂	0 ~ 2.5					
H ₀	16.0 ± 0.5					
l	1.0 max.					
D ₀ ϕ	4.0 ± 0.2					
Δh	0 ± 1.0 (at top of can)					
t	0.7 ± 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 ϕ) 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