

Miniature Aluminum Electrolytic Capacitors

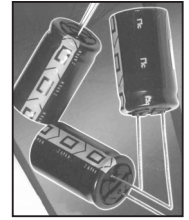
NRWP Series

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

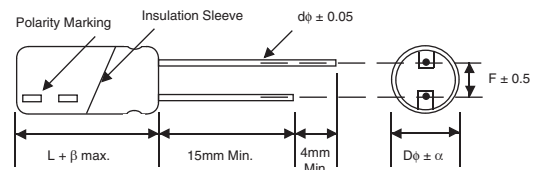
Rated Voltage Range	6.3 ~ 100VDC								
Capacitance Range	33 ~ 33,000 μ F								
Operating Temperature Range	-55°C ~ +105°C								
Capacitance Tolerance	\pm 20% (M)								
Maximum Leakage Current After 2 minutes	0.01CV or 3 μ A whichever is greater								
Max. Tan δ at 120Hz/20°C	W.V. (Vdc)	6.3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

STANDARD PRODUCT AND CASE SIZE TABLE D ϕ x L (mm)

Capacitance (μ F)	Code	Working Voltage (Vdc)							
		6.3	10	16	25	35	50	63	100
33	330	-	-	-	-	-	-	-	8 x 11.5
47	470	-	-	-	-	-	-	-	8 x 11.5
100	101	-	-	-	-	-	8 x 11.5	8 x 11.5	10 x 16
220	221	-	-	-	6.3 x 11	8 x 11.5	10 x 12.5	10 x 16	12.5 x 20
330	331	-	-	6.3 x 11	8 x 11.5	10 x 12.5	10 x 16	10 x 20	12.5 x 25
470	471	-	6.3 x 11	8 x 11.5	8 x 11.5	10 x 12.5	10 x 20	12.5 x 20	16 x 25
680	681	6.3 x 11	8 x 11.5	8 x 11.5	10 x 12.5	10 x 16	12.5 x 20	12.5 x 25	16 x 31.5
1,000	102	8 x 11.5	8 x 11.5	10 x 12.5	10 x 16	10 x 20	12.5 x 25	16 x 25	18 x 35.5
2,200	222	10 x 16	10 x 16	10 x 20	12.5 x 20	16 x 25	16 x 31.5	18 x 31.5	-
3,300	332	10 x 20	10 x 20	12.5 x 20	16 x 25	16 x 25	18 x 35.5	-	-
4,700	472	12.5 x 20	12.5 x 20	12.5 x 25	16 x 25	16 x 35.5	-	-	-
6,800	682	12.5 x 25	16 x 25	16 x 25	16 x 35.5	18 x 35.5	-	-	-
10,000	103	16 x 25	16 x 25	16 x 31.5	18 x 35.5	-	-	-	-
15,000	153	16 x 31.5	16 x 35.5	18 x 35.5	-	-	-	-	-
22,000	223	18 x 31.5	18 x 35.5	-	-	-	-	-	-
33,000	333	18 x 40	-	-	-	-	-	-	-

LEAD SPACING AND DIAMETER (mm)

Case Dia. (D ϕ)	5	6.3	8	10	12.5	16	18
Lead Dia. (D ϕ)	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. α	0.5	0.5	0.5	0.5	0.5	0.5	0.5



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

Drawing is representative of parts as supplied in bulk or straight lead format, please see taping specifications 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
NRWP681M6.3V6.3 x 11F	680	6.3	0.28	285	0.68	1,000
NRWP102M6.3V8 x 11.5F	1,000		0.28	460	0.46	1,000
NRWP222M6.3V10 x 16F	2,200		0.30	775	0.23	2,000
NRWP332M6.3V10 x 20F	3,300		0.32	985	0.16	2,000
NRWP472M6.3V12.5 x 20F	4,700		0.34	1150	0.12	2,000
NRWP682M6.3V12.5 x 25F	6,800		0.38	1480	0.09	2,000
NRWP103M6.3V16 x 25F	10,000		0.46	1700	0.08	2,000
NRWP153M6.3V16 x 31.5F	15,000		0.56	2090	0.06	2,000
NRWP223M6.3V18 x 31.5F	22,000		0.70	2280	0.05	2,000
NRWP333M6.3V18 x 40F	33,000		0.92	2350	0.05	2,000
NRWP471M10V6.3 x 11F	470	10	0.24	295	0.85	1,000
NRWP681M10V8 x 11.5F	680		0.24	430	0.59	1,000
NRWP102M10V8 x 11.5F	1,000		0.24	500	0.40	1,000
NRWP222M10V10 x 16F	2,200		0.26	860	0.20	2,000
NRWP332M10V10 x 20F	3,300		0.28	1100	0.14	2,000
NRWP472M10V12.5 x 20F	4,700		0.30	1350	0.11	2,000
NRWP682M10V16 x 25F	6,800		0.34	1700	0.08	2,000
NRWP103M10V16 x 25F	10,000		0.42	1950	0.07	2,000
NRWP153M10V16 x 35.5F	15,000		0.52	2090	0.06	2,000
NRWP223M10V18 x 35.5F	22,000		0.66	2180	0.05	2,000
NRWP331M16V6.3 x 11F	330	16	0.20	270	1.01	1,000
NRWP471M16V8 x 11.5F	470		0.20	375	0.71	1,000
NRWP681M16V8 x 11.5F	680		0.20	480	0.49	1,000
NRWP102M16V10 x 12.5F	1,000		0.20	640	0.33	2,000
NRWP222M16V10 x 20F	2,200		0.22	1050	0.17	2,000
NRWP332M16V12.5 x 20F	3,300		0.24	1300	0.12	2,000
NRWP472M16V12.5 x 25F	4,700		0.26	1650	0.09	2,000
NRWP682M16V16 x 25F	6,800		0.30	1900	0.07	2,000
NRWP103M16V16 x 31.5F	10,000		0.38	1950	0.06	2,000
NRWP153M16V18 x 35.5F	15,000		0.48	2070	0.05	2,000
NRWP221M25V6.3 x 11F	220	25	0.16	240	1.21	1,000
NRWP331M25V8 x 11.5F	330		0.16	335	0.80	1,000
NRWP471M25V8 x 11.5F	470		0.16	440	0.56	1,000
NRWP681M25V10 x 12.5F	680		0.16	630	0.39	2,000
NRWP102M25V10 x 16F	1,000		0.16	740	0.27	2,000
NRWP222M25V12.5 x 20F	2,200		0.18	1090	0.14	2,000
NRWP332M25V16 x 25F	3,300		0.20	1500	0.10	2,000
NRWP472M25V16 x 25F	4,700		0.22	1800	0.08	2,000
NRWP682M25V16 x 35.5F	6,800		0.26	1910	0.06	2,000
NRWP103M25V18 x 35.5F	10,000		0.34	2050	0.06	2,000
NRWP221M35V8 x 11.5F	220	35	0.14	300	1.06	2,000
NRWP331M35V10 x 12.5F	330		0.14	400	0.70	1,000
NRWP471M35V10 x 12.5F	470		0.14	525	0.49	2,000
NRWP681M35V10 x 16F	680		0.14	760	0.34	2,000
NRWP102M35V10 x 20F	1,000		0.14	865	0.23	2,000
NRWP222M35V16 x 25F	2,200		0.16	1370	0.12	2,000
NRWP332M35V16 x 25F	3,300		0.18	1680	0.09	2,000
NRWP472M35V16 x 35.5F	4,700		0.20	1870	0.07	2,000
NRWP682M35V18 x 35.5F	6,800		0.24	1920	0.06	2,000
NRWP101M50V8 x 11.5F	100		50	0.12	200	1.99
NRWP221M50V10 x 12.5F	220	0.12		360	0.90	1,000
NRWP331M50V10 x 16F	330	0.12		470	0.60	2,000
NRWP471M50V10 x 20F	470	0.12		600	0.42	2,000
NRWP681M50V12.5 x 20F	680	0.12		980	0.29	2,000
NRWP102M50V12.5 x 25F	1,000	0.12		1060	0.20	2,000
NRWP222M50V16 x 31.5F	2,200	0.14		1600	0.11	2,000
NRWP332M50V18 x 35.5F	3,300	0.16		1780	0.08	2,000



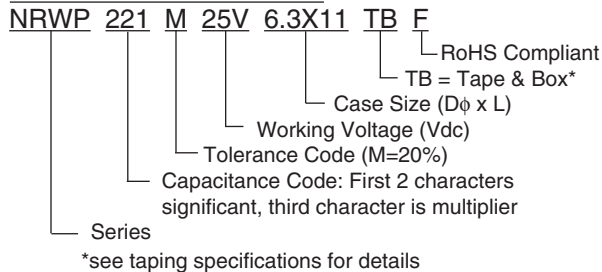
STANDARD VALUES, SPECIFICATIONS AND CASE SIZES (mm)

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
NRWP101M63V8 x 11.5F	100	63	0.10	230	1.66	1,000
NRWP221M63V10 x 16F	220		0.10	390	0.75	2,000
NRWP331M63V10 x 20F	330		0.10	540	0.50	2,000
NRWP471M63V12.5 x 20F	470		0.10	700	0.35	2,000
NRWP681M63V12.5 x 25F	680		0.10	800	0.24	2,000
NRWP102M63V16 x 25F	1,000		0.10	1200	0.17	2,000
NRWP222M63V18 x 31.5F	2,200		0.12	1400	0.09	2,000
NRWP330M100V8 x 11.5F	33	100	0.08	140	4.02	1,000
NRWP470M100V8 x 11.5F	47		0.08	185	2.82	1,000
NRWP101M100V10 x 16F	100		0.08	290	1.33	2,000
NRWP221M100V12.5 x 20F	220		0.08	560	0.60	2,000
NRWP331M100V12.5 x 25F	330		0.08	690	0.40	2,000
NRWP471M100V16 x 25F	470		0.08	880	0.28	2,000
NRWP681M100V16 x 31.5F	680		0.08	900	0.20	2,000
NRWP102M100V18 x 35.5F	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
 If in doubt or uncertainty, please review your specific application - process details with NIC's technical support personnel: tpmg@niccomp.com

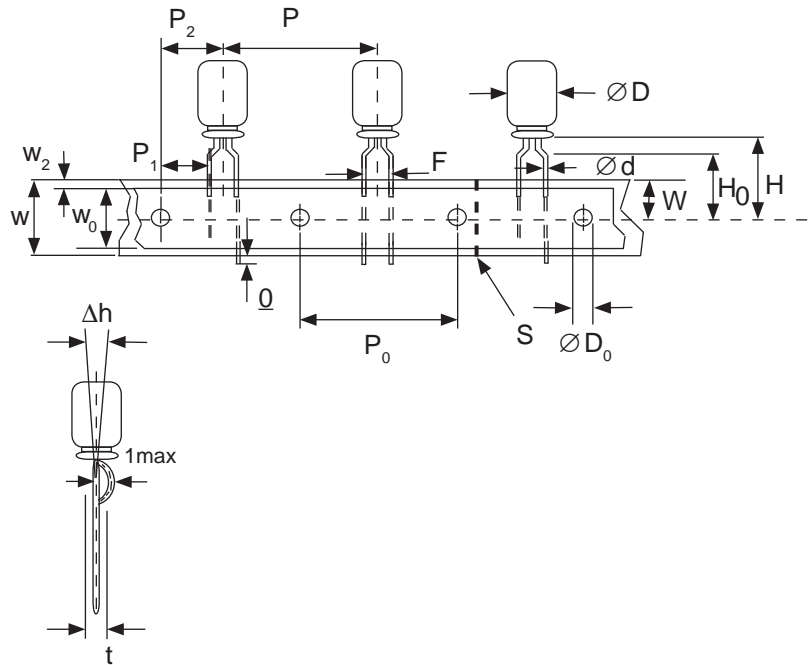


Miniature Aluminum Electrolytic Capacitors Taping Specifications

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

Taping Dimensions (mm)

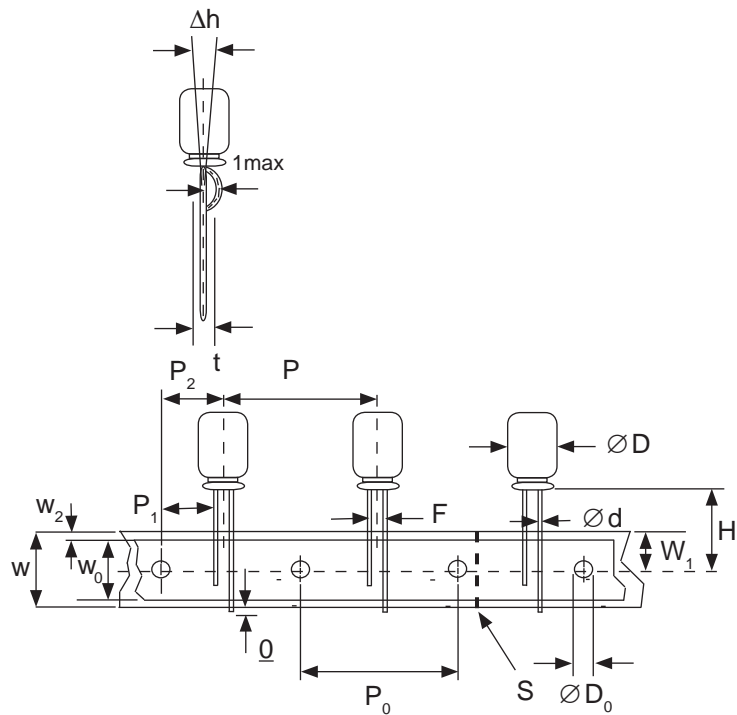
Case Dia. (D ϕ)	4	5	6.3	8
Case Size	4x5	5x5	6.3x5	8x11.5
Dim.	4x7	5x7	6.3x7	6.3x11
d ϕ \pm 0.05	0.45	0.45	0.5	0.5
H \pm 0.75	17.5	17.5	18.5	18.5
F +0.8 ~ -0.2	5.0 -0.2 ~ +0.8			
P	12.7 \pm 1.0			
P ₀	12.7 \pm 0.2			
P ₁	3.85 \pm 0.5 (at end of tape)			
P ₂	6.35 \pm 1.0			
W	18.0 \pm 0.5			
W ₀	11.5 min.			
W ₁	9.0 \pm 0.5			
W ₂	0 ~ 2.5			
H ₀	16.0 \pm 0.5			
l	1.0 max.			
D ₀ ϕ	4.0 \pm 0.2			
Δ 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) TR, TB

Taping Dimensions (mm)

Case Dia. (D ϕ)	10	12.5
Case Size	All	All
Dim.	All	All
d ϕ \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 ₀	12.7 \pm 0.2	
P ₁	3.85	
P ₂	6.35 \pm 1.0	
W	18.0 \pm 0.5	
W ₀	11.5 min	
W ₁	9.0 \pm 0.5	
W ₂	0 ~ 2.5	
H ₀	16.0 \pm 0.5	
l	1.0 max.	
D ₀ ϕ	4.0 \pm 0.2	
Δ 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, 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 "TRN" OR "TBN".

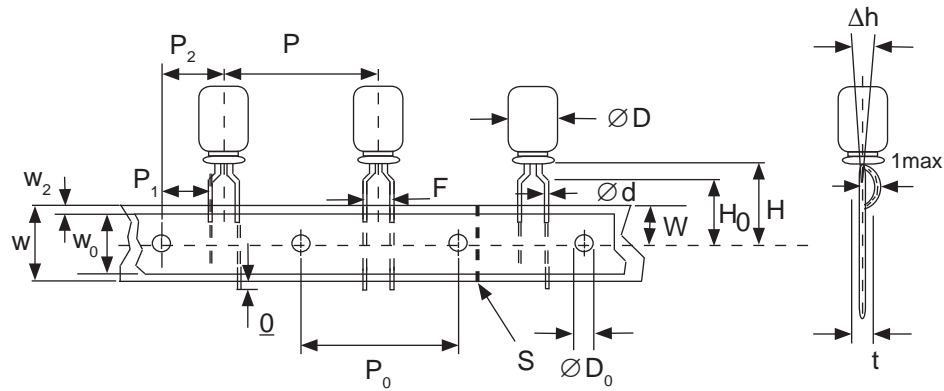


Miniature Aluminum Electrolytic Capacitors Taping Specifications

SPECIAL RADIAL TAPING (2.5mm LEAD SPACING, FORMED LEADS) TRF1, TBF1

Taping Dimensions (mm)

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

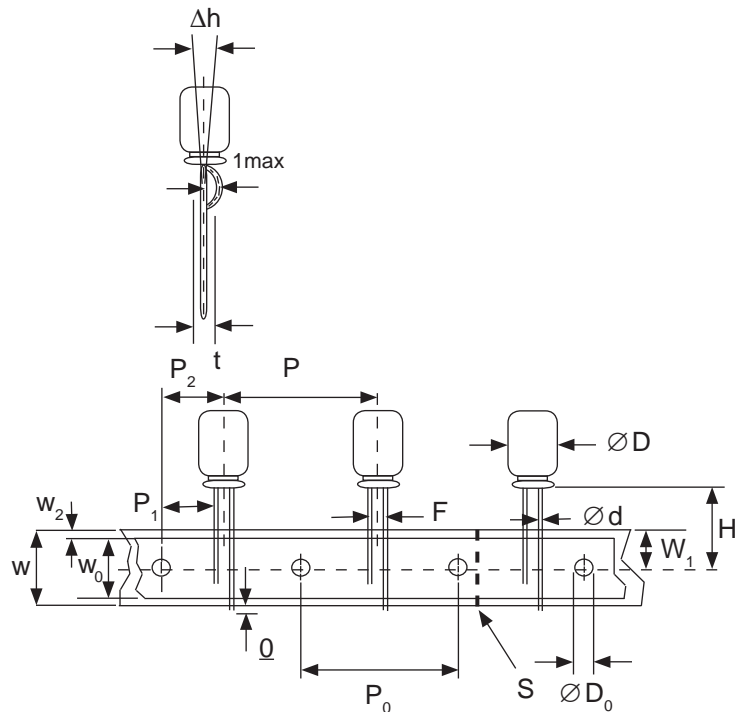


SPECIAL STRAIGHT LEAD TAPING TRST, TBST

Taping Dimensions (mm)

Case Dia. (D ϕ)	4			5			6.3		8	
Case Size Dim.	4x5 4x7	5x5 5x7	5x11		6.3x5 6.3x7	6.3x11	8x11.5			
d ϕ \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 ₀	12.7 \pm 0.2									
P ₁	5.1	5.1	5.1	5.1	5.1	5.1	4.6			
P ₂	6.35 \pm 1.0									
W	18.0 \pm 0.5									
W ₀	11.5 min.									
W ₁	9.0 \pm 0.5									
W ₂	0 ~ 2.5									
H ₀	16.0 \pm 0.5									
l	1.0 max.									
D ₀ ϕ	4.0 \pm 0.2									
Δ 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.

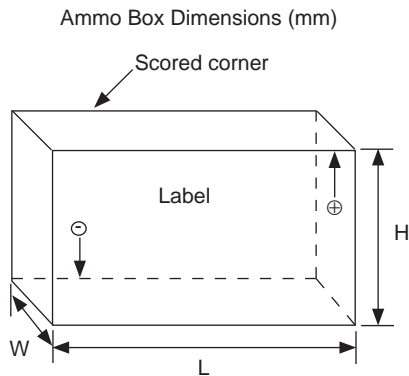


Miniature Aluminum Electrolytic Capacitors Taping Specifications

RADIAL TAPED PACKAGING

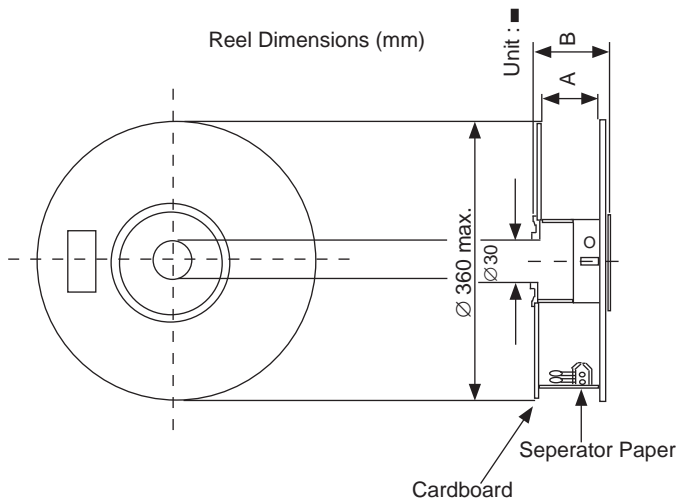
Ammo Box (Tape & Box) TB, TBF, TBST

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



Reel Packages (Tape & Reel) TR, TRF1, TRST

Size of reel and component quantity

Case Dia (D ϕ) or Case Size	Q'ty per Box (pcs)	Dim. A	Dim. B
4 ϕ	1,800	42	52
5 ϕ	1,500	42	52
6.3 ϕ	1,000	42	52
8 ϕ	800	42	52
10x12.5*	600	42	52
10x16*	600	48	56
10x20*	600	52	60
12.x20*	250	52	60
12.5x25*	250	56	64

*Special Taping Consult Factory For Availability

