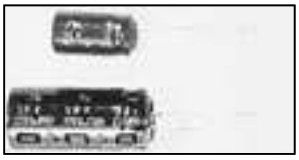
Miniature Aluminum Electrolytic Capacitors

NRSX Series

VERY LOW IMPEDANCE AT HIGH FREQUENCY, RADIAL LEADS, POLARIZED ALUMINUM ELECTROLYTIC CAPACITORS

RoHS Compliant
includes all homogeneous materials
*See Part Number System for Details



FEATURES

- VERY LOW IMPEDANCE
- LONG LIFE AT 105°C (1000 ~ 7000 hrs.)
- HIGH STABILITY AT LOW TEMPERATURE
- IDEALLY SUITED FOR USE IN SWITCHING POWER SUPPLIES & CONVERTERS

CHARACTERISTICS

Rated Voltage Range		6.3 ~ 50 VDC						
Capacitance Range		1.0 ~ 15,000µF						
Operating Temperature Range		-55 ~ +105°C						
Capacitance Tolerance		± 20% (M)						
Max. Leakage Current @ (20°C)	After 1 min.	0.03CV or 4µA, whichever if greater						
	After 2 min.	0.01CV or 3µA, whichever if greater						
Max. Tan δ @ 120Hz/20°C		W.V. (Vdc)	6.3	10	16	25	35	50
		S.V. (Vdc)	8	13	20	32	44	63
		C < 1,200µF	0.22	0.19	0.16	0.14	0.12	0.10
		C = 1,500µF	0.23	0.20	0.17	0.15	0.13	0.11
		C = 1,800µF	0.23	0.20	0.17	0.15	0.13	0.11
		C = 2,200µF	0.24	0.21	0.18	0.16	0.14	0.12
		C = 2,700µF	0.25	0.22	0.19	0.17	0.15	
		C = 3,300µF	0.26	0.23	0.20	0.18	0.16	
		C = 3,900µF	0.27	0.24	0.21	0.19		
		C = 4,700µF	0.28	0.25	0.22	0.20		
		C = 5,600µF	0.30	0.27	0.24			
		C = 6,800µF	0.32	0.29	0.26			
		C = 8,200µF	0.35	0.32	0.29			
		C = 10,000µF	0.38	0.35				
		C = 12,000µF	0.42					
		C = 15,000µF	0.48					
Low Temperature Stability Impedance Ratio @ 120Hz		Z-25°C/Z+20°C	3	2	2	2	2	2
		Z-40°C/Z+20°C	4	4	3	3	3	2
Load Life Test at Rated W.V. & 105°C 7,000 Hours: 16 ~ 18∅ 5,000 Hours: 12.5∅ 4,000 Hours: 10∅ 3,000 Hours: 6.3 ~ 8∅ 2,500 Hours: 5 ∅ 1,000 Hours: 4∅		Capacitance Change	Within ±20% of initial measured value					
		Tan δ	Less than 200% of specified maximum value					
		Leakage Current	Less than specified maximum value					
Shelf Life Test 105°C 1,000 Hours No Load		Capacitance Change	Within ±20% of initial measured value					
		Tan δ	Less than 200% of specified maximum value					
		Leakage Current	Less than specified maximum value					
Max. Impedance at 100Khz & -20°C		Less than 2 times the impedance at 100Khz & +20°C						
Applicable Standards		JIS C5141, C5102 and IEC 384-4						

PART NUMBER SYSTEM

NRSX 101 M 25V 6.3X11 TB F

- F — RoHS Compliant
- TB = Tape & Box (optional)
- 6.3X11 — Case Size (mm)
- 25V — Working Voltage
- M — Tolerance Code M=20%, K=10%
- 101 — Capacitance Code in µF
- NRSX — Series

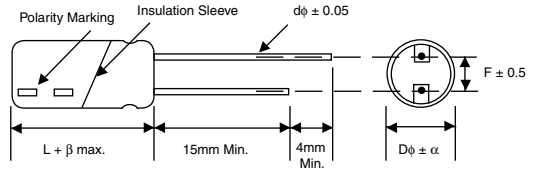
RIPPLE CURRENT CORRECTION FACTOR

Cap. (µF)	Frequency (Hz)			
	120	1K	10K	100K
1.0 ~ 330	0.40	0.68	0.78	1.00
390 ~ 1000	0.50	0.76	0.87	1.00
1200 ~ 2200	0.70	0.85	0.90	1.00
2700 ~ 15000	0.90	0.95	1.00	1.00

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

LEADSPACING AND DIAMETER (mm)

Case Dia.	4x7	5x7	6.3x7	5x11	6.3x11	8ϕ	10 ~ 12.5ϕ	16 ~ 18ϕ
Lead Space(F)	1.5	2.0	2.5	2.0	2.5	3.5	5.0	7.5
Lead Dia. (dϕ)	0.45			0.5		0.6		0.8



$\beta = 1.5\ L < 20$ or $2.0\ L \geq 20$

SLEEVE COLOR: DARK BROWN

STANDARD PRODUCTS, CASE SIZES AND SPECIFICATIONS

W.V. (Vdc)	Cap. (µF)	Cap. Code	Case Size Dϕ x L(mm)	Lead Space (mm)	Max. Tan δ at 120Hz	Max. LC (µA) 2 minutes	Max. Z(Ω) 100Khz/20°C	Max. Ripple Current 100Khz/105°C (mA rms)
6.3	27	270	4 x 7	1.5	0.22	3.0	2.0	65
	56	560	5 x 7	2.0	0.22	3.5	0.95	120
	100	101	5 x 11	2.0	0.22	6.3	0.42	190
	120	121	6.3 x 7	2.5	0.22	7.5	0.45	200
	220	221	6.3 x 11	2.5	0.22	13.9	0.22	300
	270	271	6.3 x 11	2.5	0.22	17.0	0.22	300
	330	331	6.3 x 11	2.5	0.22	20.8	0.30	280
	390	391	8 x 11.5	3.5	0.22	24.6	0.11	560
	470	471	8 x 11.5	3.5	0.22	29.6	0.11	560
	560	561	8 x 12.5	3.5	0.22	35.3	0.11	570
	820	821	8 x 15	3.5	0.22	51.7	.085	730
			10 x 12.5	5.0				800
	1200	122	8 x 20	3.5	0.22	75.6	.069	800
			10 x 16	5.0			.062	1050
	1500	152	10 x 20	5.0	0.23	94.5	.044	1250
			12.5 x 16				.062	1150
	1800	182	10 x 22	5.0	0.23	113	.039	1450
	2200	222	10 x 22	5.0	0.24	139	.039	1450
	2700	272	12.5 x 20	5.0	0.25	170	.038	1600
	3300	332	12.5 x 20	5.0	0.26	208	.038	1600
	3900	392	12.5 x 25	5.0	0.27	246	.029	1800
	5600	562	12.5 x 25	5.0	0.30	353	.031	1780
	6800	682	16 x 25	7.5	0.32	428	.022	2100
	8200	822	16 x 31.5	7.5	0.35	517	.018	2350
	10000	103	16 x 35	7.5	0.38	630	.018	2550
	12000	123	18 x 35.5	7.5	0.42	756	.015	3200
	15000	153	18 x 35.5	7.5	0.48	945	.015	3200
10	22	220	4 x 7	1.5	0.19	3.0	1.15	90
	39	390	5 x 7	2.0	0.19	3.9	.49	160
	82	820	5 x 11	2.0	0.19	8.2	.42	190
			6.3 x 7	2.5			.24	280
	100	101	5 x 11	2.0	0.19	10	.42	190
	150	151	6.3 x 11	2.5	0.19	15	.22	300
	180	181	6.3 x 11	2.5	0.19	18	.22	300
	220	221	6.3 x 11	2.5	0.19	22	.22	300
	330	331	8 x 11.5	3.5	0.19	33	.11	560

STANDARD PRODUCTS, CASE SIZES AND SPECIFICATIONS

W.V. (Vdc)	Cap. (µF)	Cap. Code	Case Size Dϕ x L(mm)	Lead Space (mm)	Max. Tanδ at 120Hz	Max. LC (µA) 2 minutes	Max. Z (Ω) 100Khz/20°C	Max. Ripple Current 100Khz/105°C (mA rms)
10	390	391	8 x 12.5	3.5	0.19	39	.11	570
	470	471	8 x 12.5	3.5	0.19	47	.16	410
	560	561	10 x 12.5	5.0	0.19	56	.085	800
	680	681	8 x 15	3.5	0.19	68	.085	730
			10 x 12.5	5.0			.09	800
	820	821	10 x 16	5.0	0.19	82	.062	1050
	1000	102	8 x 20	3.5	0.19	100	.069	800
			10 x 16	5.0			.062	1050
	1200	122	10 x 20	5.0	0.19	120	.044	1250
			12.5 x 16				.063	1150
	1500	152	10 x 22	5.0	0.20	150	.039	1450
	1800	182	12.5 x 20	5.0	0.20	180	.038	1600
	2200	222	12.5 x 20	5.0	0.21	220	.038	1600
	2700	272	12.5 x 25	5.0	0.22	270	.029	1800
	3300	332	12.5 x 25	5.0	0.23	330	.029	1880
	3900	392	16 x 25	7.5	0.24	390	.022	2100
	4700	472	16 x 25	7.5	0.25	470	.022	2100
	5600	562	16 x 25	7.5	0.27	560	.022	2100
	6800	682	16 x 31.5	7.5	0.29	680	.018	2350
	8200	822	16 x 35	7.5	0.35	820	.018	2550
	10000	103	18 x 35.5	7.5	0.35	1000	.018	2800
16	15	150	4 x 7	1.5	0.16	3	1.15	90
	27	270	5 x 7	2.0	0.16	4.3	.49	160
	47	470	5 x 11	2.0	0.16	7.5	.42	190
	56	560	5 x 11	2.0	0.16	9.0	.42	190
			6.3 x 7			2.5	.49	280
	68	680	5 x 11	2.0	0.16	10.9	.42	190
	100	101	6.3 x 11	2.5	0.16	16	.22	300
	120	121	6.3 x 11	2.5	0.16	19	.22	300
	220	221	8 x 11.5	3.5	0.16	35	.11	560
	270	271	8 x 12.5	3.5	0.16	43	.11	570
	330	331	8 x 12.5	3.5	0.16	53	.16	410
	390	391	10 x 12.5	5.0	0.16	62	.085	800
	470	471	8 x 15	3.5	0.16	75	.085	730
			10 x 12.5	5.0				800
	560	561	10 x 16	5.0	0.16	90	.062	1050

STANDARD PRODUCTS, CASE SIZES AND SPECIFICATIONS

W.V. (Vdc)	Cap. (µF)	Cap. Code	Case Size Dϕ x L(mm)	Lead Space (mm)	Max. Tanδ at 120Hz	Max. LC (µA) 2 minutes	Max. Z (Ω) 100Khz/20°C	Max. Ripple Current 100Khz/105°C (mA rms)
16	680	681	8 x 20	3.5	0.16	109	.069	800
			10 x 16	5.0			.062	1050
	820	821	10 x 20	5.0	0.16	131	.044	1250
			12.5 x 16				.063	1150
	1000	102	10 x 22	5.0	0.16	160	.039	1450
	1200	122	10 x 22	5.0	0.16	192	.039	1450
	1500	152	12.5 x 20	5.0	0.17	240	.038	1600
	1800	182	12.5 x 25	5.0	0.17	288	.029	1800
	2200	222	12.5 x 25	5.0	0.18	352	.022	1800
			16 x 25	7.5				2100
	2700	272	~~12.5 x 30~~	~~5.0~~	~~0.17~~	~~432~~	~~.025~~	~~2310~~ Discontinued
			16 x 25	7.5	0.19	432	.022	2100
	3900	392	16 x 25	7.5	0.21	624	.022	2100
	4700	472	16 x 31.5	7.5	0.22	752	.018	2350
	5600	562	16 x 35	7.5	0.24	896	.018	2550
	6800	682	16 x 35	7.5	0.26	1088	.018	2550
	8200	822	18 x 35.5	7.5	0.29	1310	.018	2800
25	10	100	4 x 7	1.5	0.14	3.0	1.15	90
	22	220	5 x 7	2.0	0.14	5.5	.49	160
	39	390	5 x 11	2.0	0.14	9.8	.42	190
			6.3 x 7	2.5			.24	280
	47	470	5 x 11	2.0	0.14	12	.42	190
	82	820	6.3 x 11	2.5	0.14	21	.22	300
	100	101	6.3 x 11	2.5	0.14	25	.22	300
	180	181	8 x 12.5	3.5	0.14	45	.11	570
	220	221	8 x 12.5	3.5	0.14	55	.11	570
	270	271	10 x 12.5	5.0	0.14	68	.085	850
	330	331	8 x 15	3.5	0.14	83	.085	730
			10 x 12.5	5.0				800
	390	391	10 x 16	5.0	0.14	98	.062	1050
	470	471	8 x 20	3.5	0.14	118	.069	800
			10 x 16	5.0			.062	1050
	560	561	10 x 20	5.0	0.14	140	.044	1250
			12.5 x 16				.063	1150
	680	681	10 x 22	5.0	0.14	170	.039	1450

STANDARD PRODUCTS, CASE SIZES AND SPECIFICATIONS

W.V. (Vdc)	Cap. (µF)	Cap. Code	Case Size Dϕ x L(mm)	Lead Space (mm)	Max. Tanδ at 120Hz	Max. LC (µA) 2 minutes	Max. Z (Ω) 100Khz/20°C	Max. Ripple Current 100Khz/105°C (mA rms)
25	820	821	10 x 22	5.0	0.14	205	.039	1450
			12.5 x 20	5.0			.038	1600
	1000	102	12.5 x 20	5.0	0.14	250	.038	1600
	1200	122	12.5 x 25	5.0	0.14	300	.029	1800
	1500	152	12.5 x 25	5.0	0.15	375	.029	1800
	1800	182	16 x 25	7.5	0.15	450	.022	2100
	2200	222	16 x 25	7.5	0.16	550	.022	2100
	2700	272	16 x 25	7.5	0.17	675	.022	2100
	3300	332	16 x 31.5	7.5	0.18	825	.018	2350
	3900	392	16 x 35	7.5	0.19	975	.018	2550
	4700	472	18 x 35.5	7.5	0.20	1175	.018	2800
35	6.8	6R8	4 x 7	1.5	0.12	3.0	1.15	90
	12	120	5 x 7	2.0	0.12	4.2	.49	160
	22	220	5 x 11	2.0	0.12	7.7	.42	190
	27	270	5 x 11	2.0	0.12	9.5	.42	190
			6.3 x 7	2.5			.29	280
	33	330	5 x 11	2.0	0.12	12	.42	190
	47	470	6.3 x 11	2.5	0.12	17	.22	300
	56	560	6.3 x 11	2.5	0.12	20	.22	300
	68	680	6.3 x 11	2.5	0.12	24	.22	300
	100	101	8 x 11.5	3.5	0.12	35	.11	560
	120	121	8 x 12.5	3.5	0.12	42	.11	570
	150	151	8 x 12.5	3.5	0.12	53	.11	570
	180	181	10 x 12.5	5.0	0.12	63	.085	800
	220	221	8 x 15	3.5	0.12	77	.085	730
			10 x 12.5	5.0				800
	270	271	10 x16	5.0	0.12	95	.062	1050
	330	331	8 x 20	3.5	0.12	116	.069	800
	390	391	10 x 20	5.0	0.12	137	.044	1250
	470	471	10 x 22	5.0	0.12	165	.039	1450
	560	561	10 x 22	5.0	0.12	196	.039	1450
			12.5 x 20				.038	1600
	680	681	12.5 x 20	5.0	0.12	238	.038	1600
	820	821	12.5 x 25	5.0	0.12	287	.029	1800
	1000	102	12.5 x 25	5.0	0.12	350	.029	1800
	1200	122	12.5 x 25	5.0	0.12	420	.029	1800
	1500	152	16 x 25	7.5	0.13	525	.022	2100
	1800	182	16 x 25	7.5	0.13	630	.022	2100
	2200	222	16 x 31.5	7.5	0.14	770	.018	2350
	2700	272	16 x 35	7.5	0.15	945	.018	2550
	3300	332	18 x 35.5	7.5	0.16	1155	.018	2800

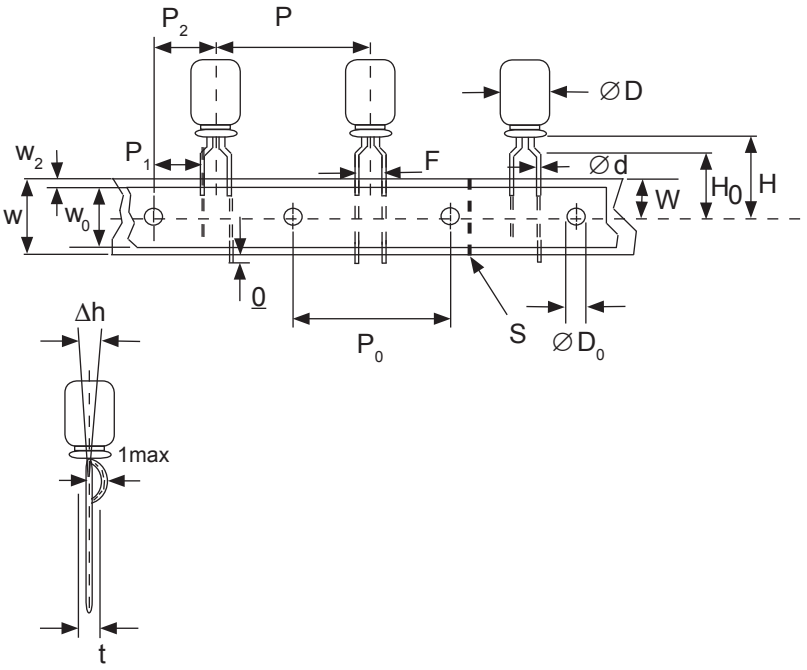
STANDARD PRODUCTS, CASE SIZES AND SPECIFICATIONS

W.V. (Vdc)	Cap. (µF)	Cap. Code	Case Size Dϕ x L(mm)	Lead Space (mm)	Max. Tanδ at 120Hz	Max. LC (µA) 2 minutes	Max. Z (Ω) 100Khz/20°C	Max. Ripple Current 100Khz/105°C (mA rms)
50	1.0	1R0	5 x 11	2.0	0.1	3.0	3.3	30
	2.2	2R2	5 x 11	2.0	0.1	3.0	3.0	45
	3.3	3R3	5 x 11	2.0	0.1	3.0	2.7	55
	4.7	4R7	5 x 11	2.0	0.1	3.0	2.0	90
	10	100	5 x 11	2.0	0.1	5.0	2.0	90
	15	150	5 x 11	2.0	0.1	7.5	1.2	130
	22	220	5 x 11	2.0	0.1	11	.70	160
	33	330	6.3 x 11	2.5	0.1	17	.43	220
	47	470	6.3 x 11	2.5	0.1	24	.43	220
	68	680	8 x 11.5	3.5	0.1	34	.26	360
	100	101	10 x 12.5	5.0	0.1	50	.16	550
	150	151	10 x 16	5.0	0.1	75	.12	760
	220	221	10 x 20	5.0	0.1	110	.088	950
			12.5 x 16				.11	810
	330	331	10 x 22	5.0	0.1	165	.072	1000
			12.5 x 20				.059	1200
	470	471	12.5 x 20	5.0	0.1	235	.059	1200
	680	681	12.5 x 25	5.0	0.1	340	.045	1400
	1000	102	16 x 25	7.5	0.1	500	.039	1750
	1500	152	16 x 35	7.5	0.11	750	.025	2300
	2200	222	18 x 35.5	7.5	0.12	1100	.024	2400

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

Taping Dimensions (mm)

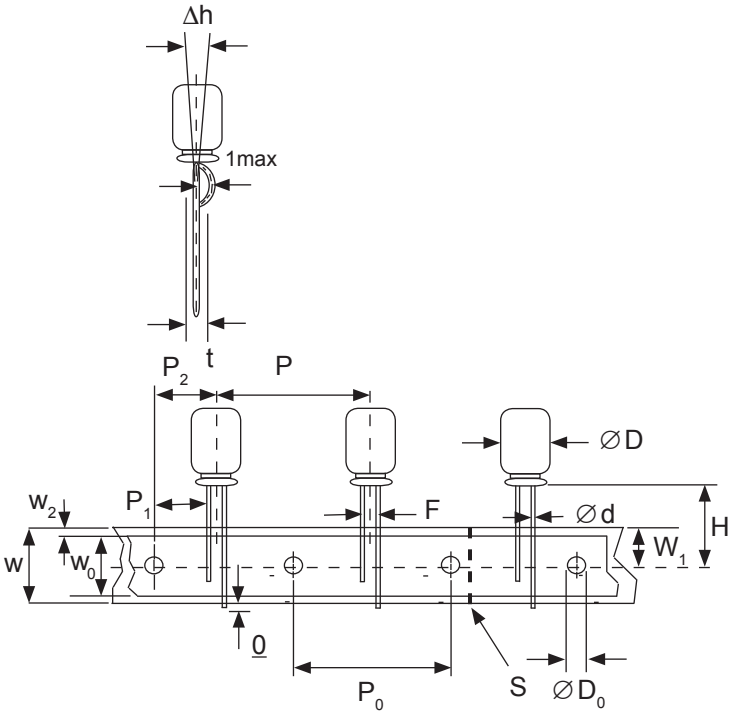
Case Dia. (Dϕ)	4	5		6.3		8
Case Size Dim.	4x5 4x7	5x5 5x7	5x11	6.3x5 6.3x7	6.3x11	8x11.5
dϕ ±0.05	0.45	0.45	0.5	0.45	0.5	0.6
H ±0.75	17.5	17.5	18.5	17.5	18.5	20.0
F +0.8 ~ -0.2	5.0 -02 ~ +0.8					
P	12.7 ±1.0					
P_0	12.7 ±0.2					
P_1	3.85 ±0.5 (at end of tape)					
P_2	6.35 ±1.0					
W	18.0 ±0.5					
W_0	11.5 min.					
W_1	9.0 ±0.5					
W_2	0 ~ 2.5					
H_0	16.0 ±0.5					
I	1.0 max.					
$D_0\phi$	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. (Dϕ)	10	12.5
Case Size Dim.	All	All
dϕ ±0.05	0.6	0.6
H ±0.75	19.0	19.0
F +0.8 ~ -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	
I	1.0 max.	
$D_0\phi$	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 Suf x: TB12.7MMP)		
12.5mm diameter available with P dim. = 15mm, P_1= 5.0mm, P_0 = 15.0mm & P_2 = 7.5mm (P/N Suf x: TB15MMP)		

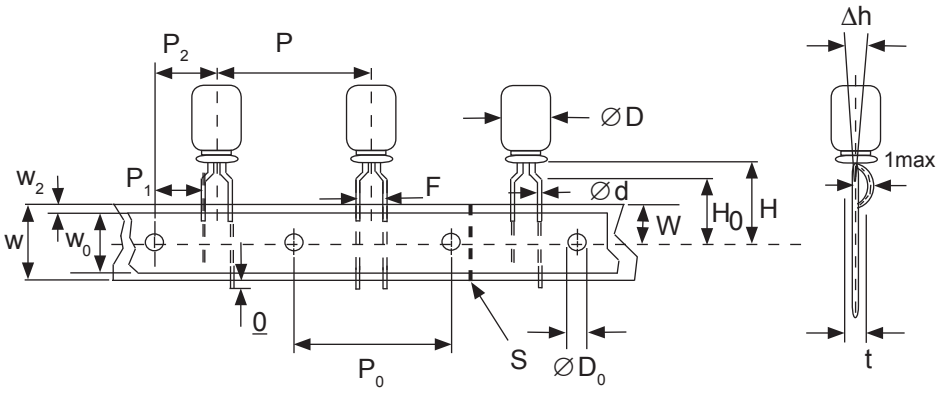


NOTE: ANODE (+) LEAD FEEDS OFF FIRST. FOR OPTION OF NEGATIVE (–) LEAD FIRST, SPECIFY "TBN".

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

Taping Dimensions (mm)

Case Dia. (Dϕ)	4	5	
Case Size Dim.	4x5 4x7	5x5 5x7	5x11
dϕ ±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 -02 ~ +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		
I	1.0 max.		
D_0ϕ	4.0 ±0.2		
Δh	0 ±1.0		
t	0.7 ±0.2		

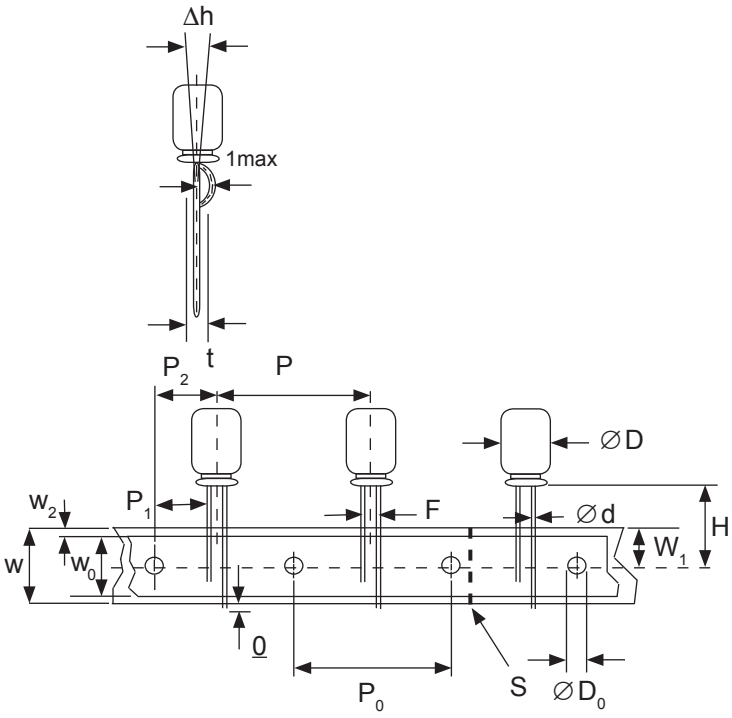


SPECIAL STRAIGHT LEAD TAPING TBST

Taping Dimensions (mm)

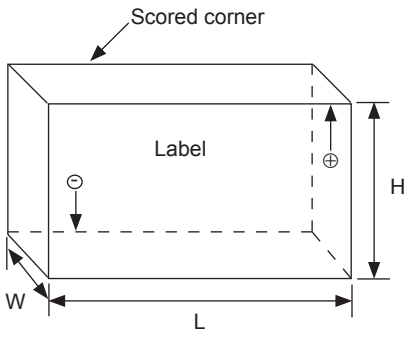
Case Dia. (Dϕ)	4	5		6.3		8
Case Size Dim.	4x5 4x7	5x5 5x7	5x11	6.3x5 6.3x7	6.3x11	8x11.5
dϕ ±0.05	0.45	0.45	0.5	0.45	0.5	0.6
H ±0.75	17.5	17.5	18.5	17.5	18.5	20.0
F +0.8 ~ -0.2	2.0*	2.0	2.0	2.5	2.5	3.5
P ±1.0	12.7 ±0.2					
P_0	12.7 ±0.2					
P_1	5.1	5.1	5.1	5.1	5.1	4.6
P_2	6.35 ±1.0					
W	18.0 ±0.5					
W_0	11.5 min.					
W_1	9.0 ±0.5					
W_2	0 ~ 2.5					
H_0	16.0 ±0.5					
I	1.0 max.					
D_0ϕ	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 are in the lead and a 2.0mm lead-space.



RADIAL TAPED PACKAGING

Ammo Box Dimensions (mm)



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

Size of box and component quantity

Case Dia (Dϕ) 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