

LOW PROFILE, RADIAL LEAD, POLARIZED

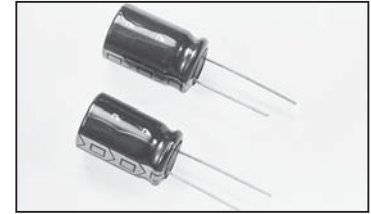
### FEATURES

- LOW PROFILE APPLICATIONS
- HIGH STABILITY AND PERFORMANCE

**RoHS  
Compliant**

includes all homogeneous materials

\*See Part Number System for Details



### CHARACTERISTICS

Rated Voltage Range		6.3 ~ 100Vdc								
Capacitance Range		22 ~ 4,700 $\mu$ F								
Operating Temperature Range		-40 ~ +85°C								
Capacitance Tolerance		$\pm 20\%$ (M)								
Max. Leakage Current @ +20°C	After 1 min.	0.03CV or 4 $\mu$ A, whichever is greater								
	After 2 min.	0.01CV or 3 $\mu$ A, whichever is greater								
Max. Tan $\delta$ @ 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	0.24	0.20	0.16	0.14	0.12	0.10	0.09	0.08	
	C = 2,200 $\mu$ F	0.26	0.22	0.18	0.16	-	-	-	-	
	C = 3,300 $\mu$ F	0.28	0.24	-	-	-	-	-	-	
Low Temperature Stability Impedance Ratio @ 120Hz	Z-25°C/Z+20°C	4	3	3	2	2	2	2	2	
	Z-40°C/Z+20°C	10	8	6	4	3	3	3	3	
Load Life Test at Rated W.V. and +85°C 3,000 Hours	Capacitance Change	Within $\pm 20\%$ of initial measured value								
	Tan $\delta$	Less than 200% of specified maximum value								
	Leakage Current	Less than specified maximum value								

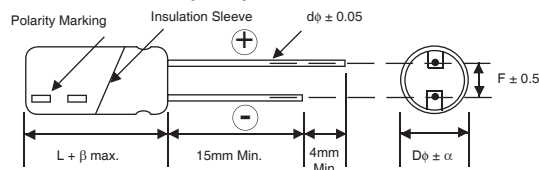
### STANDARD PRODUCT AND CASE SIZE TABLE D $\phi$ x L (mm)

Cap ( $\mu$ F)	Code	Working Voltage (Vdc)							
		6.3	10	16	25	35	50	63	100
22	220	-	-	-	-	-	-	-	10x9.5
100	101	-	-	-	-	10x9.5	10x9.5	-	16x16
220	221	-	-	10x9.5	10x9.5	-	-	-	18x21
330	331	-	10x9.5	10x9.5	10x12.5	12.5x16	16x16	16x16	-
470	471	-	10x9.5	-	12.5x16	16x16	16x16	16x21	-
1,000	102	-	12.5x16	12.5x16	16x16	18x21	-	-	-
2,200	222	16x16	16x16	16x16	16x21	-	-	-	-
3,300	332	18x21	18x21	-	-	-	-	-	-
4,700	472	18x21	18x21	-	-	-	-	-	-

### LEAD SPACING AND DIAMETER (mm)

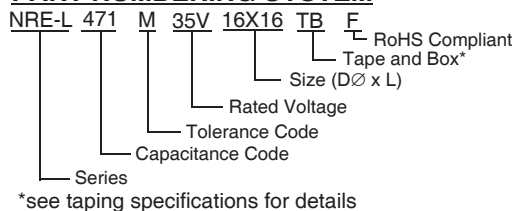
Case Dia. (D $\phi$ )	10	12.5	16	18
Lead Dia. (d $\phi$ )	0.6	0.6	0.8	0.8
Lead Spacing (F)	5.0	5.0	7.5	7.5
Dim. $\alpha$	0.5	0.5	0.5	0.5
dim. $\beta$	1.5	1.5	2.0	2.0

### DIMENSIONS (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 NUMBERING SYSTEM



\*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](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)



Part Number	Cap. (μF)	W.V. (Vdc)	Dissipation Factor +20°C/120Hz	Ripple Current Rating (mA) +85°C/120Hz	Max. ESR (Ω) +20°C/120Hz	Load Life Hours @ +85°C
NREL222M6.3V16x16F	2,200	6.3	0.26	1030	0.20	3,000
NREL332M6.3V18x21F	3,300		0.28	1330	0.14	3,000
NREL472M6.3V18x21F	4,700		0.30	1630	0.11	3,000
NREL331M10V10x9.5F	330	10	0.20	290	1.01	3,000
NREL471M10V10x9.5F	470		0.20	340	0.71	3,000
NREL102M10V12.5x16F	1,000		0.20	680	0.33	3,000
NREL222M10V16x16F	2,200		0.22	1120	0.17	3,000
NREL332M10V18x21F	3,300		0.24	1510	0.12	3,000
NREL472M10V18x21F	4,700		0.26	1650	0.09	3,000
NREL221M16V10x9.5F	220	16	0.16	260	1.01	3,000
NREL331M16V10x9.5F	330		0.16	320	0.80	3,000
NREL102M16V12.5x16F	1,000		0.16	695	0.27	3,000
NREL222M16V16x16F	2,200		0.18	1140	0.14	3,000
NREL221M25V10x9.5F	220	25	0.14	280	0.80	3,000
NREL331M25V10x12.5F	330		0.14	390	0.70	3,000
NREL471M25V12.5x16F	470		0.14	560	0.49	3,000
NREL102M25V16x16F	1,000		0.14	730	0.23	3,000
NREL222M25V16x21F	2,200		0.16	1250	0.12	3,000
NREL101M25V10x9.5F	100	35	0.12	200	1.99	3,000
NREL331M35V12.5x16F	330		0.12	510	0.60	3,000
NREL471M35V16x16F	470		0.12	710	0.42	3,000
NREL102M35V18x21F	1,000		0.12	1190	0.20	3,000
NREL101M50V10x9.5F	100	50	0.10	220	1.66	3,000
NREL331M50V16x16F	330		0.10	650	0.50	3,000
NREL471M50V16x16F	470		0.10	725	0.35	3,000
NREL331M63V16x16F	330	63	0.09	560	0.68	3,000
NREL471M63V16x21F	470		0.09	770	0.45	3,000
NREL220M100V10x9.5F	22	100	0.08	110	6.04	3,000
NREL101M100V16x16F	100		0.08	410	1.33	3,000
NREL221M100V18x21F	220		0.08	720	0.60	3,000

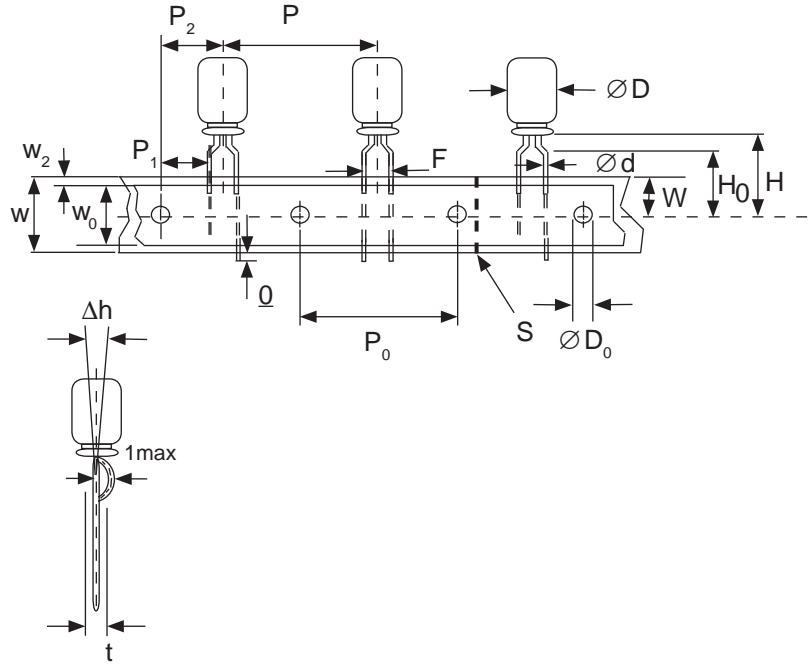


# Miniature Aluminum Electrolytic Capacitors Taping Specifications

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

Taping Dimensions (mm)

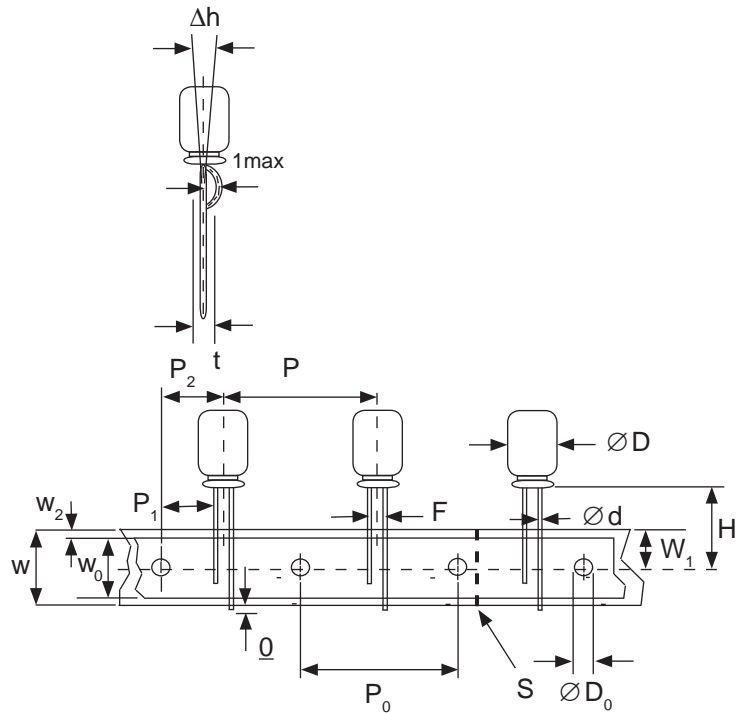
Case Dia. (D $\phi$ )	4	5	6.3	8
Case Size	4x5 4x7	5x5 5x7	5x11	6.3x5 6.3x7 6.3x11 8x11.5
d $\phi$ $\pm$ 0.05	0.45	0.45	0.5	0.45
H $\pm$ 0.75	17.5	17.5	18.5	17.5
F +0.8 ~ -0.2	5.0 -0.2 ~ +0.8			
P	12.7 $\pm$ 1.0			
P <sub>0</sub>	12.7 $\pm$ 0.2			
P <sub>1</sub>	3.85 $\pm$ 0.5 (at end of tape)			
P <sub>2</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".

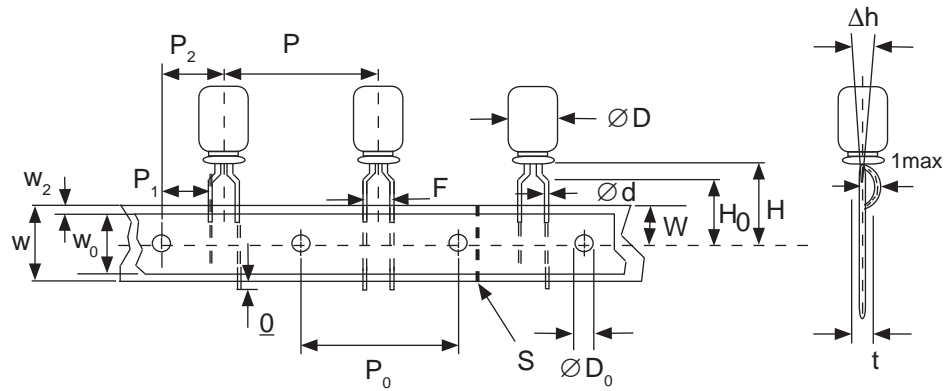


# Miniature Aluminum Electrolytic Capacitors Taping Specifications

## 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			

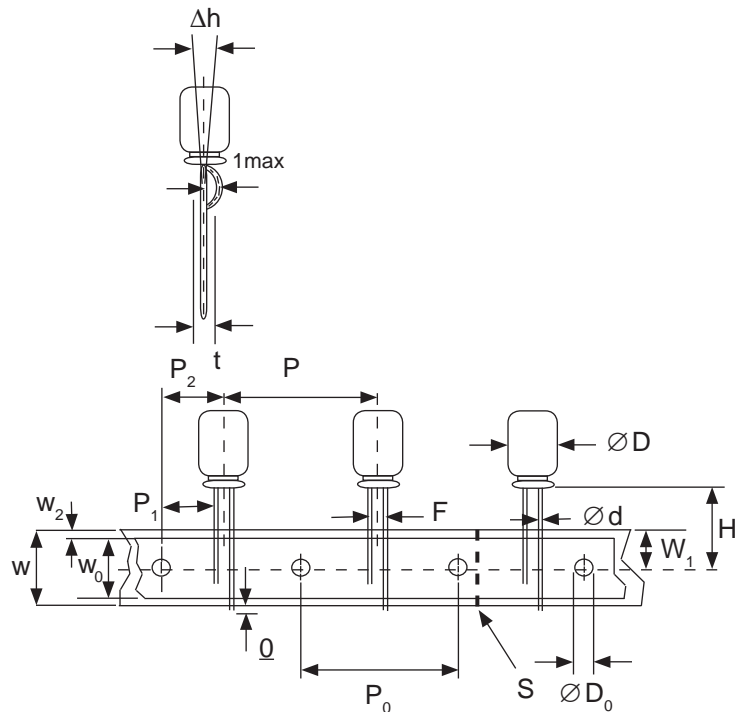


## SPECIAL STRAIGHT LEAD TAPING TBST

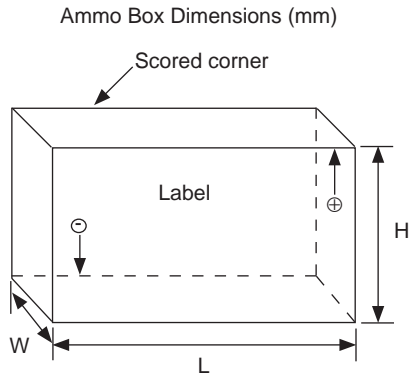
Taping Dimensions (mm)

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	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