

# Miniature Aluminum Electrolytic Capacitors

NRE-H Series

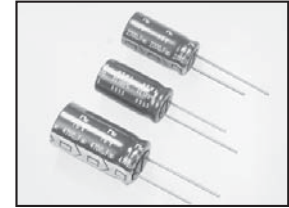
HIGH VOLTAGE, RADIAL LEADS, POLARIZED

## FEATURES

- HIGH VOLTAGE (UP THROUGH 450VDC)
- NEW REDUCED SIZES

**RoHS Compliant**  
includes all homogeneous materials

\*See Part Number System for Details



## CHARACTERISTICS

Rated Voltage Range		160 ~ 450Vdc					
Capacitance Range		0.47 ~ 330μF					
Operating Temperature Range		-40 ~ +85°C: 160 ~ 250V or -25 ~ +85°C: 315 ~ 450V					
Capacitance Tolerance		±20%(M)					
Max. Leakage Current @ 20°C	After 1 min.	CV ≤ 1000μF = 0.03CV + 15μA					
	After 2 min.	CV > 1000μF = 0.02CV + 25μA					
Max. Tan δ @ 120Hz/20°C	W.V. (Vdc)	160	200	250	350	400	450
	Tan δ	0.20	0.20	0.20	0.25	0.25	0.25
Low Temperature Stability Impedance Ratio @ 120Hz	Z-25°C/Z+20°C	3	3	3	10	12	12
	Z-40°C/Z+20°C	6	6	6	-	-	-
Load Life Test at Rated W.V. +85°C 2,000 Hours	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 85°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					

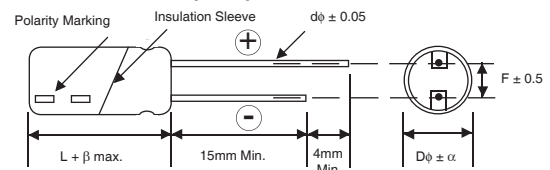
## STANDARD PRODUCT AND CASE SIZE TABLE Dφ x L (mm)

Cap. (μF)	Code	Working Voltage (Vdc)					
		160	200	250	350	400	450
0.47	R47	5x11	5x11	5x11	6.3x11	6.3x11	-
1.0	1R0	5x11	5x11	5x11	6.3x11	8x11.5	8x12.5
2.2	2R2	6.3x11	6.3x11	6.3x11	8x11.5	8x11.5	10x16
3.3	3R3	6.3x11	6.3x11	8x11.5	8x12.5	10x12.5	10x20
4.7	4R7	6.3x11	8x11.5	8x11.5	10x12.5	10x16	12.5x20
10	100	8x11.5	8x12.5	10x12.5	10x16	10x20	12.5x25
22	220	10x12.5	10x16	10x20	12.5x20	12.5x25	16x25
33	330	10x20	10x20	12.5x20	12.5x25	16x25	16x31
47	470	12.5x20	12.5x20	12.5x25	16x25	16x31	18x36
68	680	12.5x20	12.5x25	16x25	16x36	16x36	18x41
82	820	12.5x25	-	16x31	18x31.5	18x35.5	-
100	101	12.5x25	16x25	16x31	18x36	18x41	-
150	151	16x31	16x36	18x36	-	-	-
220	221	16x36	18x36	18x41	-	-	-
330	331	18x41	-	-	-	-	-

## LEAD SPACING & DIAMETER (mm)

Case Dia. (Dφ)	5	6.3	8	10	12.5	16	18
Lead Dia. (dφ)	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
dim. β	1.5	1.5	1.5	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.

## 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)



## STANDARD PRODUCT, SPECIFICATIONS AND CASE SIZES D $\phi$ x L (mm)

Part Number	Cap. ( $\mu$ F)	W.V. (Vdc)	Dissipation Factor +20°C/120Hz	Ripple Current Rating (mA) +85°C/120Hz	Max. ESR ( $\Omega$ ) +20°C/120Hz	Load Life Hours @ +85°C	
NRE-HR47M160V5X11F	0.47	160	0.20	10	706	2,000	
NRE-H1R0M160V5X11F	1.0		0.20	21	332	2,000	
NRE-H2R2M160V6.3X11F	2.2		0.20	31	151	2,000	
NRE-H3R3M160V6.3X11F	3.3		0.20	40	101	2,000	
NRE-H4R7M160V6.3X11F	4.7		0.20	55	70.6	2,000	
NRE-H100M160V8X11.5F	10		0.20	90	33.2	2,000	
NRE-H20M160V10X12.5F	22		0.20	153	15.1	2,000	
NRE-H330M160V10X20F	33		0.20	195	10.1	2,000	
NRE-H470M160V12.5X20F	47		0.20	245	7.06	2,000	
NRE-H680M160V12.5X20F	68		0.20	310	4.88	2,000	
NRE-H820M160V12.5X25F	82		0.20	380	4.05	2,000	
NRE-H101M160V12.5X25F	100		0.20	410	3.32	2,000	
NRE-H151M160V16X31F	150		0.20	550	2.21	2,000	
NRE-H221M160V16X36F	220		0.20	745	1.51	2,000	
NRE-H331M160V18X41F	330	0.20	800	1.01	2,000		
NRE-HR47M200V5X11F	0.47	200	0.20	11	706	2,000	
NRE-H1R0M200V5X11F	1.0		0.20	23	332	2,000	
NRE-H2R2M200V6.3X11F	2.2		0.20	34	151	2,000	
NRE-H3R3M200V6.3X11F	3.3		0.20	45	101	2,000	
NRE-H4R7M200V8X11.5F	4.7		0.20	57	70.6	2,000	
NRE-H100M200V8X12.5F	10		0.20	92	33.2	2,000	
NRE-H220M200V10X16F	22		0.20	160	15.1	2,000	
NRE-H330M200V10X20F	33		0.20	210	10.1	2,000	
NRE-H470M200V12.5X20F	47		0.20	250	7.06	2,000	
NRE-H680M200V12.5X25F	68		0.20	325	4.88	2,000	
NRE-H101M200V16X25F	100		0.20	430	3.32	2,000	
NRE-H151M200V16X36F	150		0.20	575	2.21	2,000	
NRE-H221M200V18X36F	220		0.20	760	1.51	2,000	
NRE-HR47M250V5X11F	0.47		250	0.20	12	706	2,000
NRE-H1R0M250V5X11F	1.0	0.20		25	332	2,000	
NRE-H2R2M250V6.3X11F	2.2	0.20		35	151	2,000	
NRE-H3R3M250V8X11.5F	3.3	0.20		48	101	2,000	
NRE-H4R7M250V8X11.5F	4.7	0.20		58	70.6	2,000	
NRE-H100M250V10X12.5F	10	0.20		94	33.2	2,000	
NRE-H220M250V10X20F	22	0.20		170	15.1	2,000	
NRE-H330M250V12.5X20F	33	0.20		220	10.1	2,000	
NRE-H470M250V12.5X25F	47	0.20		260	7.06	2,000	
NRE-H680M250V16X25F	68	0.20		335	4.88	2,000	
NRE-H820M250V16X31.5F	82	0.20		400	4.05	2,000	
NRE-H101M250V16X31F	100	0.20		432	3.32	2,000	
NRE-H151M250V18X36F	150	0.20		588	2.21	2,000	
NRE-H221M250V18X41F	220	0.20		760	1.51	2,000	
NRE-HR47M350V6.3X11F	0.47	350	0.25	14	882	2,000	
NRE-H1R0M350V6.3X11F	1.0		0.25	29	415	2,000	
NRE-H2R2M350V8X11.5F	2.2		0.25	40	188	2,000	
NRE-H3R3M350V8X12.5F	3.3		0.25	52	126	2,000	
NRE-H4R7M350V10X12.5F	4.7		0.25	67	86.2	2,000	
NRE-H100M350V10X16F	10		0.25	100	41.5	2,000	
NRE-H220M350V12.5X20F	22		0.25	175	18.8	2,000	
NRE-H330M350V12.5X25F	33		0.25	225	12.6	2,000	
NRE-H470M350V16X25F	47		0.25	260	8.82	2,000	
NRE-H680M350V16X36F	68		0.25	340	6.10	2,000	
NRE-H820M350V18X31.5F	82		0.25	405	5.06	2,000	
NRE-H101M350V18X36F	100		0.25	440	4.15	2,000	
NRE-HR47M400V6.3X11F	0.47		400	0.25	14	882	2,000
NRE-H1R0M400V8X11.5F	1.0			0.25	29	415	2,000
NRE-H2R2M400V8X11.5F	2.2	0.25		40	188	2,000	
NRE-H3R3M400V10X12.5F	3.3	0.25		52	126	2,000	
NRE-H4R7M400V10X16F	4.7	0.25		67	86.2	2,000	
NRE-H100M400V10X20F	10	0.25		100	41.5	2,000	



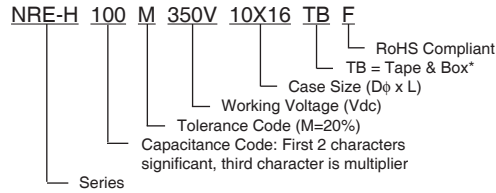
### STANDARD PRODUCT, SPECIFICATIONS AND CASE SIZES D $\phi$ x L (mm)

Part Number	Cap. ( $\mu$ F)	W.V. (Vdc)	Dissipation Factor +20°C/120Hz	Ripple Current Rating (mA) +85°C/120Hz	Max. ESR ( $\Omega$ ) +20°C/120Hz	Load Life Hours @ +85°C
NRE-H220M400V12.5X25F	22	400	0.25	180	18.8	2,000
NRE-H330M400V16X25F	33		0.25	230	12.6	2,000
NRE-H470M400V16X31F	47		0.25	270	8.82	2,000
NRE-H680M400V16X36F	68		0.25	345	6.10	2,000
NRE-H820M400V18X35.5F	82		0.25	420	5.06	2,000
NRE-H101M400V18X41F	100		0.25	450	4.15	2,000
NRE-H1R0M450V8X12.5F	1.0	450	0.25	26	415	2,000
NRE-H2R2M450V10X16F	2.2		0.25	40	188	2,000
NRE-H3R3M450V10X20F	3.3		0.25	52	126	2,000
NRE-H4R7M450V12.5X20F	4.7		0.25	67	86.2	2,000
NRE-H100M450V12.5X25F	10		0.25	100	41.5	2,000
NRE-H220M450V16X25F	22		0.25	190	18.8	2,000
NRE-H330M450V16X31F	33		0.25	220	12.6	2,000
NRE-H470M450V18X36F	47		0.25	245	8.82	2,000
NRE-H680M450V18X41F	68		0.25	270	6.10	2,000

### RIPPLE CURRENT FREQUENCY CORRECTION FACTOR

Frequency (Hz)	120	1K	10k	100K
Correction Factor $\leq 33\mu$ F	1.0	1.3	1.45	1.45
Correction Factor $> 33\mu$ F	1.0	1.2	1.30	1.30

### PART NUMBER SYSTEM



\*see taping specifications for details

# 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".

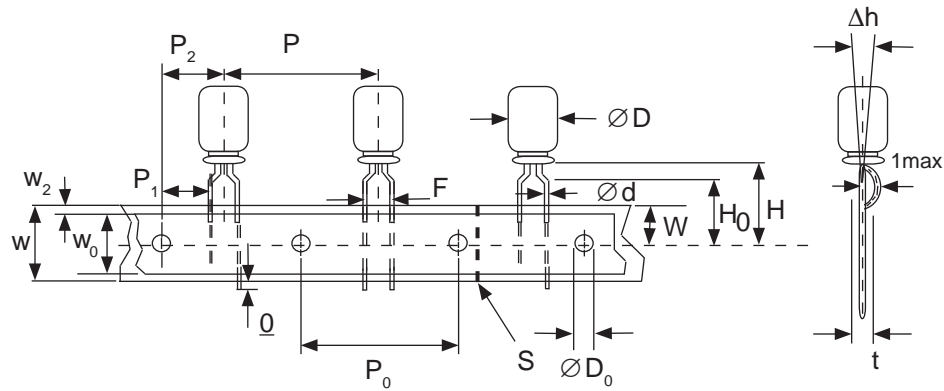


# Miniature Aluminum Electrolytic Capacitors Taping Specifications

## 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		

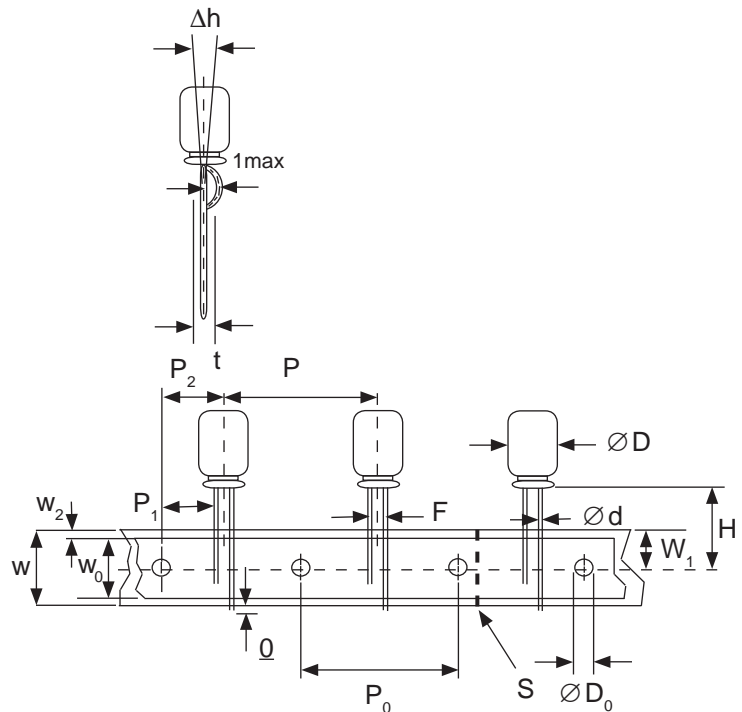


## SPECIAL STRAIGHT LEAD TAPING TBST

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

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