

Miniature Aluminum Electrolytic Capacitors

NRE-HW Series

HIGH VOLTAGE, RADIAL, POLARIZED, EXTENDED TEMPERATURE

FEATURES

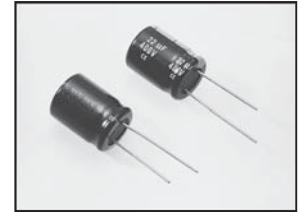
- HIGH VOLTAGE/TEMPERATURE (UP TO 450VDC/+105°C)
- NEW REDUCED SIZES

CHARACTERISTICS

Rated Voltage Range	160 ~ 450VDC						
Capacitance Range	1.0 ~ 330 μ F						
Operating Temperature Range	-40°C ~ +105°C (160 ~ 400V) or -25°C ~ +105°C (450V)						
Capacitance Tolerance	\pm 20% (M)						
Maximum Leakage Current @ 20°C	CV \leq 1000 μ F 0.03CV +15 μ A, CV > 1000 μ F 0.02 +25 μ A (after 2 minutes)						
Max. Tan δ @ 120Hz/20°C	W.V.	160	200	250	350	400	450
	S.V.	200	250	300	400	450	500
	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	4	6	6
	Z-40°C/Z+20°C	6	6	6	8	10	-
Load Life Test at Rated W.V. +105°C 2,000 Hours: 10 ϕ & Up +105°C 1,000 Hours: 8 ϕ	Capacitance Change	Within \pm 25% 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 with no load	Shall meet same requirements as in load life test						

RoHS Compliant
includes all homogeneous materials

*See Part Number System for Details



STANDARD PRODUCT AND CASE SIZE TABLE D ϕ xL (mm)

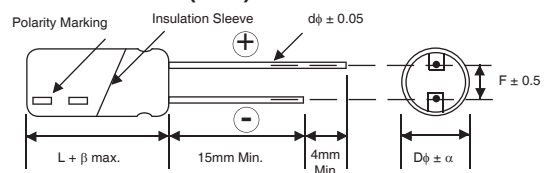
Cap (μ F)	Code	Working Voltage (Vdc)					
		160	200	250	350	400	450
1.0	1R0	5x11	5x11	5x11	6.3x11	8x11.5	8x12.5
2.2	2R2	6.3x11	6.3x11	6.3x11	8x11.5	8x11.5	10x16
3.3	3R3	6.3x11	6.3x11	8x11.5	8x12.5	10x12.5	10x20
4.7	4R7	6.3x11	8x11.5	8x11.5	10x12.5	10x16	12.5x20
10	100	8x11.5	8x12.5	10x12.5	10x20	10x20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

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

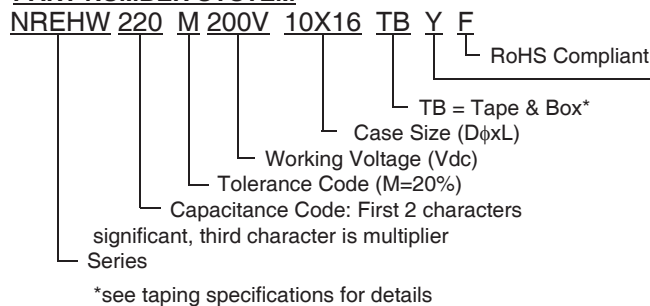
$\beta = L < 20\text{mm} = 1.5\text{mm}$, $L > 20\text{mm} = 2.0\text{mm}$

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 NUMBER SYSTEM



Optional: For automotive equipment, sourced to special production and inspection at TS-16949 certified production site.

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



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	
NRE-HW1R0M160V5x11F	1.0	160	0.20	15	332	1,000	
NRE-HW2R2M160V6.3x11F	2.2		0.20	22	151	1,000	
NRE-HW3R3M160V6.3x11F	3.3		0.20	28	101	1,000	
NRE-HW4R7M160V6.3x11F	4.7		0.20	39	70.6	1,000	
NRE-HW100M160V8x11.5F	10		0.20	63	33.2	1,000	
NRE-HW220M160V10x12.5F	22		0.20	107	15.1	2,000	
NRE-HW330M160V10x20F	33		0.20	137	10.1	2,000	
NRE-HW470M160V12.5x20F	47		0.20	172	7.06	2,000	
NRE-HW680M160V12.5x20F	68		0.20	217	4.88	2,000	
NRE-HW820M160V12.5x25F	82		0.20	270	4.05	2,000	
NRE-HW101M160V12.5x25F	100		0.20	287	3.32	2,000	
NRE-HW151M160V16x31F	150		0.20	385	2.21	2,000	
NRE-HW221M160V16x36F	220		0.20	522	1.51	2,000	
NRE-HW331M160V18x41F	330		0.20	560	1.01	2,000	
NRE-HW1R0M200V5x11F	1.0	200	0.20	16	332	1,000	
NRE-HW2R2M200V6.3x11F	2.2		0.20	24	151	1,000	
NRE-HW3R3M200V6.3x11F	3.3		0.20	32	101	1,000	
NRE-HW4R7M200V8x11.5F	4.7		0.20	40	70.6	1,000	
NRE-HW100M200V8x12.5F	10		0.20	64	33.2	1,000	
NRE-HW220M200V10x16F	22		0.20	112	15.1	2,000	
NRE-HW330M200V10x20F	33		0.20	147	10.1	2,000	
NRE-HW470M200V12.5x20F	47		0.20	175	7.06	2,000	
NRE-HW680M200V12.5x25F	68		0.20	228	4.88	2,000	
NRE-HW101M200V16x25F	100		0.20	301	3.32	2,000	
NRE-HW151M200V16x36F	150		0.20	403	2.21	2,000	
NRE-HW221M200V18x36F	220		0.20	532	1.51	2,000	
NRE-HW1R0M250V5x11F	1.0		250	0.20	18	332	1,000
NRE-HW2R2M250V6.3x11F	2.2			0.20	25	151	1,000
NRE-HW3R3M250V8x11.5F	3.3	0.20		34	101	1,000	
NRE-HW4R7M250V8x11.5F	4.7	0.20		41	70.6	1,000	
NRE-HW100M250V10x12.5F	10	0.20		66	33.2	2,000	
NRE-HW220M250V10x20F	22	0.20		119	15.1	2,000	
NRE-HW330M250V12.5x20F	33	0.20		154	10.1	2,000	
NRE-HW470M250V12.5x25F	47	0.20		182	7.06	2,000	
NRE-HW680M250V16x25F	68	0.20		235	4.88	2,000	
NRE-HW820M250V16x31.5F	82	0.20		284	4.05	2,000	
NRE-HW820M250V18x25F	82	0.20		284	4.05	2,000	
NRE-HW101M250V16x36F	100	0.20		302	3.32	2,000	
NRE-HW151M250V18x36F	150	0.20		412	2.21	2,000	
NRE-HW1R0M350V6.3x11F	1.0	350		0.25	20	415	1,000
NRE-HW2R2M350V8x11.5F	2.2		0.25	28	188	1,000	
NRE-HW3R3M350V8x12.5F	3.3		0.25	36	126	1,000	
NRE-HW4R7M350V10x12.5F	4.7		0.25	47	86.2	2,000	
NRE-HW100M350V10x20F	10		0.25	70	41.5	2,000	
NRE-HW220M350V12.5x25F	22		0.25	123	18.8	2,000	
NRE-HW330M350V16x25F	33		0.25	158	12.6	2,000	
NRE-HW470M350V16x31F	47		0.25	182	8.82	2,000	
NRE-HW680M350V16x36F	68		0.25	242	6.10	2,000	
NRE-HW820M350V18x35.5F	82		0.25	294	5.06	2,000	
NRE-HW101M350V18x41F	100		0.25	308	4.15	2,000	
NRE-HW1R0M400V8x11.5F	1.0		400	0.25	20	415	1,000
NRE-HW2R2M400V8x11.5F	2.2			0.25	28	188	1,000
NRE-HW3R3M400V10x12.5F	3.3			0.25	36	126	2,000
NRE-HW4R7M400V10x16F	4.7	0.25		47	86.2	2,000	
NRE-HW100M400V10x20F	10	0.25		70	41.5	2,000	

For Automotive Applications see part number system



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
NRE-HW220M400V12.5x25F	22	400	0.25	126	18.8	2,000
NRE-HW330M400V16x25F	33		0.25	161	12.6	2,000
NRE-HW470M400V16x31F	47		0.25	189	8.82	2,000
NRE-HW680M400V18x36F	68		0.25	249	6.10	2,000
NRE-HW820M400V18x41F	82		0.25	315	5.06	2,000
NRE-HW1R0M450V8x12.5F	1.0		450	0.25	18	415
NRE-HW2R2M450V10x16F	2.2	0.25		28	188	2,000
NRE-HW3R3M450V10x20F	3.3	0.25		36	126	2,000
NRE-HW4R7M450V12.5x20F	4.7	0.25		47	86.2	2,000
NRE-HW100M450V12.5x25F	10	0.25		70	41.5	2,000
NRE-HW220M450V16x25F	22	0.25		125	18.8	2,000
NRE-HW330M450V16x31F	33	0.25		154	12.6	2,000
NRE-HW470M450V18x36F	47	0.25		172	8.82	2,000
NRE-HW680M450V18x41F	68	0.25		189	6.10	2,000

For Automotive Applications see part number system

RIPPLE CURRENT FREQUENCY CORRECTION FACTOR

Cap. Value	Frequency (Hz)		
	100 ~ 500	1K ~ 5K	10K ~ 100K
<100μF	1.00	1.30	1.50
100 ~ 1000μF	1.00	1.20	1.30

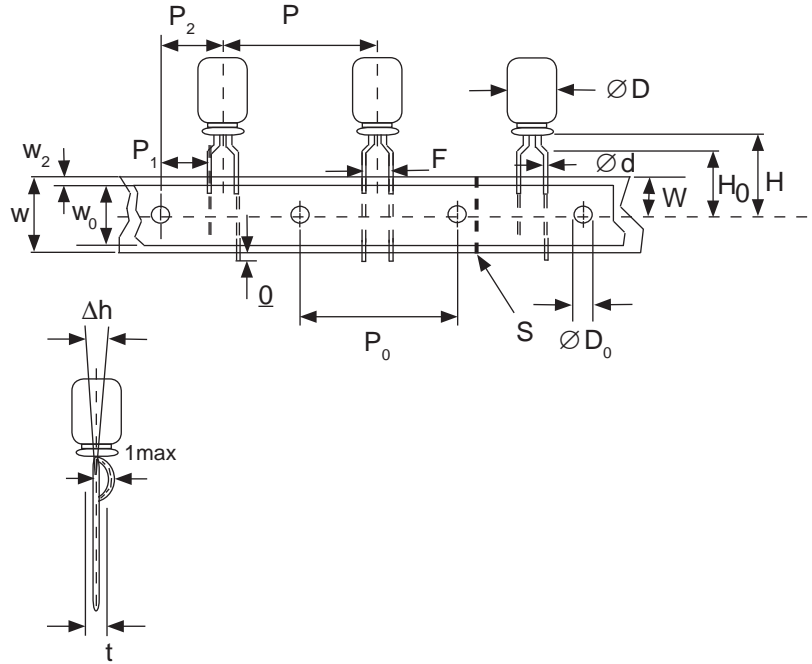


Miniature Aluminum Electrolytic Capacitors Taping Specifications

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

Taping Dimensions (mm)

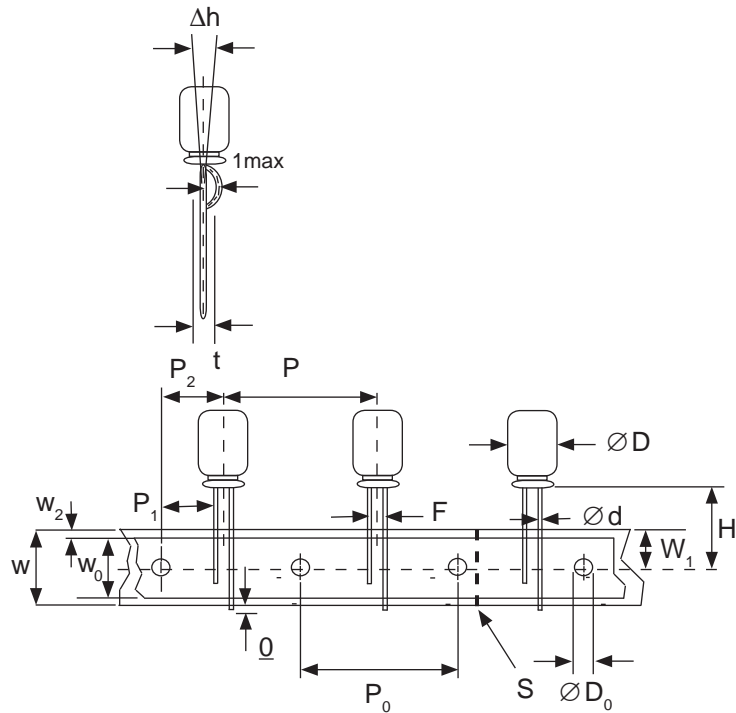
Case Dia. (D ϕ)	4	5	6.3	8
Case Size	4x5 4x7	5x5 5x7	5x11	6.3x5 6.3x7 6.3x11 8x11.5
d ϕ \pm 0.05	0.45	0.45	0.5	0.45
H \pm 0.75	17.5	17.5	18.5	17.5
F +0.8 ~ -0.2	5.0 -0.2 ~ +0.8			
P	12.7 \pm 1.0			
P ₀	12.7 \pm 0.2			
P ₁	3.85 \pm 0.5 (at end of tape)			
P ₂	6.35 \pm 1.0			
W	18.0 \pm 0.5			
W ₀	11.5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

Taping Dimensions (mm)

Case Dia. (D ϕ)	10	12.5
Case Size	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 "TBN".

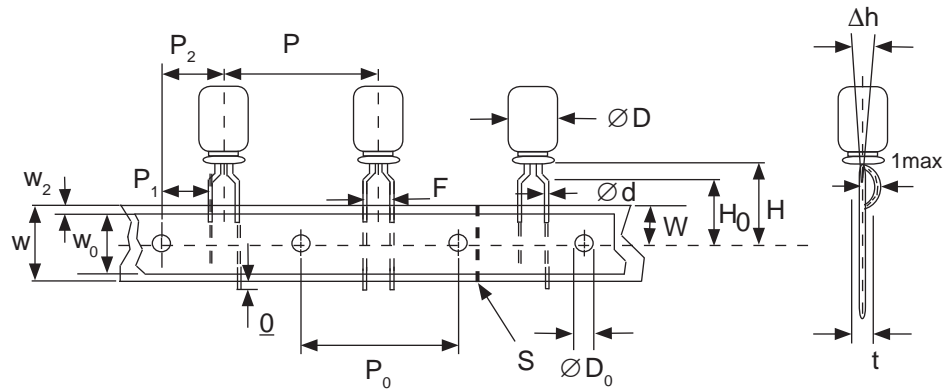


Miniature Aluminum Electrolytic Capacitors Taping Specifications

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

Taping Dimensions (mm)

Case Dia. (D ϕ)	4	5	
Case Size Dim.	4x5 4x7	5x5 5x7	5x11
d ϕ ± 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		

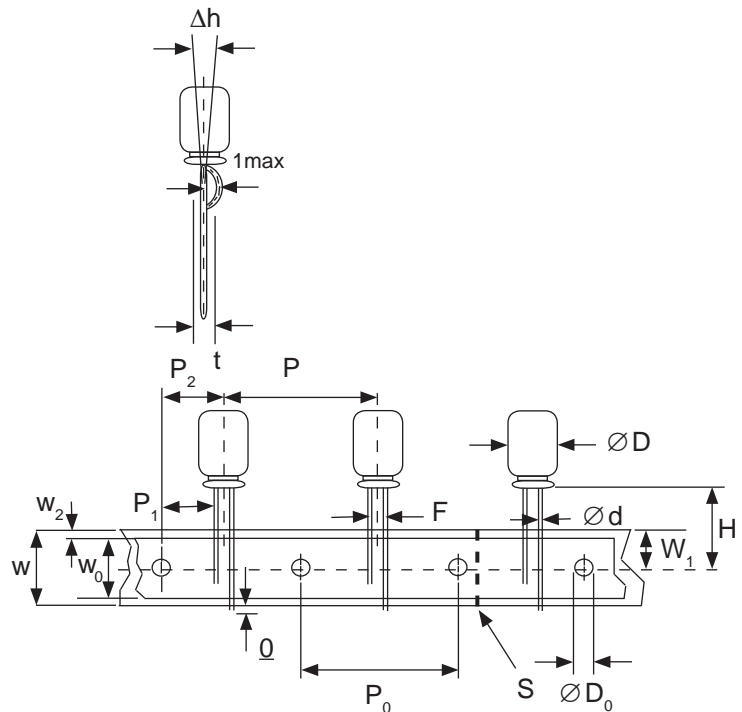


SPECIAL STRAIGHT LEAD TAPING TBST

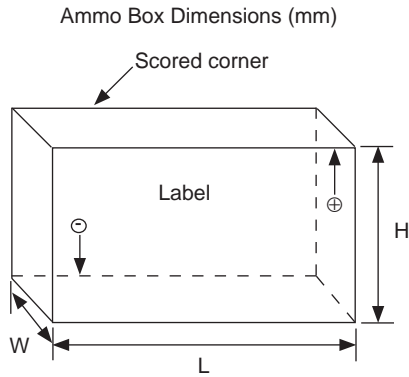
Taping Dimensions (mm)

Case Dia. (D ϕ)	4	5			6.3		8
Case Size Dim.	4x5 4x7	5x5 5x7	5x11	6.3x5 6.3x7	6.3x11	8x11.5	
d ϕ ± 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