

# Surface Mount Aluminum Electrolytic Capacitors NAWU Series

## FEATURES

- CYLINDRICAL V-CHIP CONSTRUCTION FOR SURFACE MOUNTING
- HIGH TEMPERATURE, EXTEND LIFE (5000 HOURS @ 105°C)
- 4X6.3mm ~ 18X22mm CASE SIZES
- DESIGNED FOR REFLOW SOLDERING
- **MEETS THE REQUIREMENTS OF AEC-Q200\***

\*Contact NIC for supporting test data

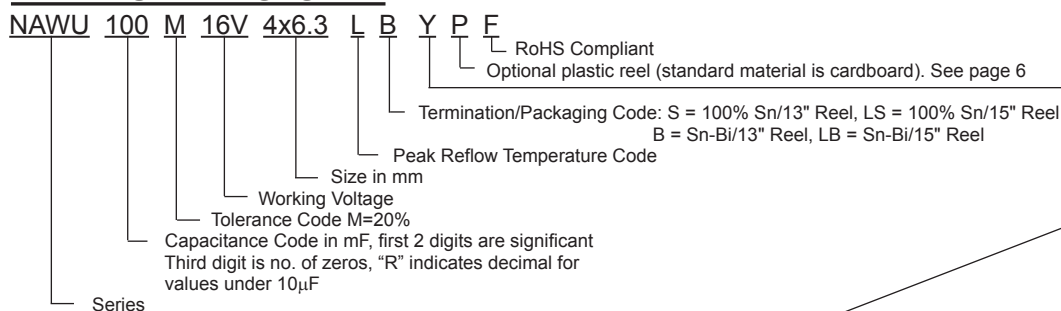
*Expanded  
Capacitance/Voltage  
Range*



## CHARACTERISTICS

Rated Voltage Range	6.3 ~ 400Vdc										
Rate Capacitance Range	1.0 ~ 220μF										
Operating Temp. Range	-40°C ~ +105°C										
Capacitance Tolerance	±20% (M)										
Max. Leakage Current After 2 Minutes @ 20°C	0.01CV or 3μA whichever is greater									≤ 1000μF = 0.03CV + 15μA > 1000μF = 0.02CV + 25μA	
Tan δ @120Hz/20°C	W.V. (Vdc)	6.3	10	16	25	35	50	100	160	200	400
	S.V.(Vdc)	8	13	20	32	44	63	125	200	250	450
	Tan δ	0.30	0.24	0.20	0.16	0.14	0.14	0.18	0.2	0.2	0.25
Low Temperature Stability Impedance Ratio @ 120Hz	W.V. (Vdc)	6.3	10	16	25	35	50	100	160	200	400
	Z-25°C/Z+20°C	4	3	2	2	2	2	2	3	3	6
	Z-40°C/Z+20°C	10	7	5	3	3	3	3	6	6	10
Load Life Test @ 105°C 5,000hrs	Capacitance Change	Within ± 30% of initial measured value									
	Tan δ	Less than 300% of specified max. value									
	Leakage Current	Less than specified max. value									

## PART NUMBER SYSTEM



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

## PEAK REFLOW TEMPERATURE CODES

Code	Peak Reflow Temperature
L	250°C
K	245°C
J	240°C
H	235°C
G	230°C

## TERMINATION FINISH & PACKAGING OPTIONS CODES

Code	Finish & Reel Size
B	Sn-Bi Finish & 13" Reel
LB	Sn-Bi Finish & 15" Reel
S	100% Sn Finish & 13" Reel
LS	100% Sn Finish & 15" Reel

Note: 16mm & 18mm diameter parts are only available with Sn finish

## PRECAUTIONS

Please review the notes on correct use, safety and precautions 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)



# Surface Mount Aluminum Electrolytic Capacitors NAWU Series

## STANDARD VALUES, PART NUMBERS AND MAXIMUM RIPPLE CURRENT

Part Number	W.V. (Vdc)	Cap. ( $\mu$ F)	Dissipation Factor (Tan $\delta$ )	Ripple Current Rating (mA @ 105°C/120Hz)	Load Life Hours @ +105°C
NAWU330M6.3V5X6.3LBF	6.3	33	0.30	35	5,000
NAWU470M6.3V5X6.3LBF		47	0.30	38	5,000
NAWU101M6.3V6.3X6.3LBF		100	0.30	69	5,000
NAWU221M6.3V6.3X8LBF		220	0.30	101	5,000
NAWU220M10V5X6.3LBF	10	22	0.24	30	5,000
NAWU330M10V5X6.3LBF		33	0.24	35	5,000
NAWU470M10V6.3X6.3LBF		47	0.24	50	5,000
NAWU101M10V6.3X8LBF		100	0.24	81	5,000
NAWU100M16V4X6.3LBF	16	10	0.20	18	5,000
NAWU220M16V5X6.3LBF		22	0.20	30	5,000
NAWU330M16V6.3X6.3LBF		33	0.20	48	5,000
NAWU470M16V6.3X6.3LBF		47	0.20	50	5,000
NAWU101M16V6.3X8LBF		100	0.20	81	5,000
NAWU100M25V5X6.3LBF	25	10	0.16	25	5,000
NAWU220M25V6.3X6.3LBF		22	0.16	42	5,000
NAWU330M25V6.3X6.3LBF		33	0.16	50	5,000
NAWU470M25V6.3X8LBF		47	0.16	63	5,000
NAWU4R7M35V4X6.3LBF	35	4.7	0.14	16	5,000
NAWU100M35V5X6.3LBF		10	0.14	27	5,000
NAWU220M35V6.3X6.3LBF		22	0.14	44	5,000
NAWU330M35V6.3X8LBF		33	0.14	57	5,000
NAWU1R0M50V4X6.3LBF	50	1.0	0.14	8.0	5,000
NAWU2R2M50V4X6.3LBF		2.2	0.14	11	5,000
NAWU3R3M50V4X6.3LBF		3.3	0.14	14	5,000
NAWU4R7M50V5X6.3LBF		4.7	0.14	19	5,000
NAWU100M50V6.3X6.3LBF		10	0.14	32	5,000
NAWU220M50V6.3X8LBF		22	0.14	49	5,000
NAWU100M100V8X10.5JBF	100	10	0.18	55	5,000
NAWU100M160V10X10.8JBF	160	10	0.20	43	5,000
NAWU220M160V12.5X14HLBF		22	0.20	112	5,000
NAWU330M160V12.5X14HLBF		33	0.20	137	5,000
NAWU470M160V16X17GLSF		47	0.20	180	5,000
NAWU680M160V16X17GLSF		68	0.20	215	5,000
NAWU820M160V16X17GLSF		82	0.20	235	5,000
NAWU101M160V18X17.5GLSF		100	0.20	320	5,000
NAWU121M160V18X22GLSF		120	0.20	340	5,000
NAWU3R3M200V8X10.8JBF	200	3.3	0.20	31	5,000
NAWU4R7M200V8X10.8JBF		4.7	0.20	37	5,000
NAWU100M200V10X10.8JBF		10	0.20	43	5,000
NAWU220M200V12.5X14HLBF		22	0.20	112	5,000
NAWU330M200V12.5X14HLBF		33	0.20	137	5,000
NAWU470M200V16X17GLSF		47	0.20	180	5,000
NAWU680M200V16X17GLSF		68	0.20	215	5,000
NAWU680M200V18X17.5GLSF		68	0.20	270	5,000
NAWU101M200V18X22GLSF		100	0.20	330	5,000
NAWU2R2M400V8X10.8JBF	400	2.2	0.25	25	5,000
NAWU3R3M400V10X10.8JBF		3.3	0.25	36	5,000
NAWU4R7M400V10X10.8JBF		4.7	0.25	38	5,000
NAWU100M400V12.5X14HLBF		10	0.25	57	5,000
NAWU220M400V16X17GLSF		22	0.25	115	5,000
NAWU270M400V18X17.5GLSF		27	0.25	125	5,000
NAWU330M400V18X22GLSF		33	0.25	160	5,000

For Automotive Equipment see part number system



# Surface Mount Aluminum Electrolytic Capacitors NAWU Series

## RIPPLE CURRENT

### FREQUENCY CORRECTION FACTOR

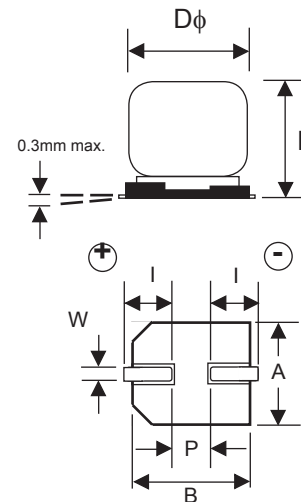
Frequency Hz	$100 \leq F < 1K$	$1K \leq F < 10K$	$10K \leq F < 100K$	$100K \leq F$
0.1 ~ 1.0 $\mu$ F	0.50	1.00	1.20	1.30
2.2 ~ 4.7 $\mu$ F	0.65	1.00	1.20	1.30
10 ~ 47 $\mu$ F	0.80	1.00	1.20	1.30
100 ~ 220 $\mu$ F	0.80	1.00	1.10	1.15
All 160V ~ 400V	50	120	300	1K
	0.75	1.00	1.20	1.30
				10K $\leq$ F
				1.50

### STANDARD PRODUCTS AND CASE SIZE TABLE D x L (mm)

Cap ( $\mu$ F)	Code	Working Voltage (Vdc)									
		6.3	10	16	25	35	50	100	160	200	400
1.0	1R0	-	-	-	-	-	4X6.3	-	-	-	-
2.2	2R2	-	-	-	-	-	4X6.3	-	-	-	8X10.8
3.3	3R3	-	-	-	-	-	4X6.3	-	-	8X10.8	10X10.8
4.7	4R7	-	-	-	-	4X6.3	5X6.3	-	-	8X10.8	10X10.8
10	100	-	-	4X6.3	5X6.3	5X6.3	6.3X6.3	8X10.5	10X10.8	10X10.8	12.5X14
22	220	-	5X6.3	5X6.3	5X6.3	6.3X6.3	6.3X8	-	12.5X14	12.5X14	16X17
27	270	-	-	-	-	-	-	-	-	-	18X17.5
33	330	5X6.3	5X6.3	6.3X6.3	6.3X6.3	6.3X8	-	-	12.5X14	12.5X14	18X22
47	470	5X6.3	6.3X6.3	6.3X6.3	6.3X8	-	-	-	16X17	16X17	-
68	680	-	-	-	-	-	-	-	16X17	16X17 18X17.5	-
82	820	-	-	-	-	-	-	-	16X17	-	-
100	101	6.3X6.3	6.3X8	6.3X8	-	-	-	-	18X17.5	18X22	-
120	121	-	-	-	-	-	-	-	18X22	-	-
220	221	6.3X8	-	-	-	-	-	-	-	-	-

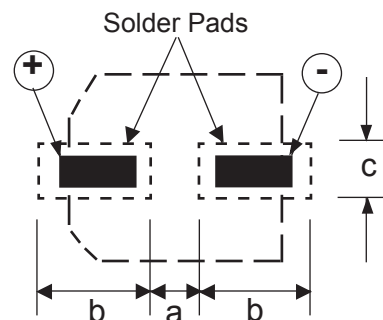
### DIMENSIONS D x L (mm)

Case Size	$\phi D$	L max.*	A $\pm 0.2$	B $\pm 0.2$	I $\pm 0.2$	W	P $\pm 0.2$
4x6.3(6.1)	4.0	6.3	4.3	4.3	1.8	0.5 ~ 0.8	1.0
5x6.3	5.0	6.3	5.3	5.3	2.2	0.5 ~ 0.8	1.3
6.3x6.3	6.3	6.3	6.6	6.6	2.5	0.5 ~ 0.8	1.8
6.3X8	6.3	8.0	6.6	6.6	2.5	0.5 ~ 0.8	2.2
8x10.5	8.0	10.5	8.3	8.3	2.9	0.7 ~ 1.1	3.2
8x10.8	8.0	10.8	8.3	8.3	2.9	0.7 ~ 1.1	3.2
10x10.8	10.0	10.8	10.3	10.3	3.2	0.7 ~ 1.4	4.6
12.5x14	12.5	14	12.8	12.8	4.5	1.0 ~ 1.4	4.6
16x17	16	17	16.3	16.3	5.5	1.8 ~ 2.1	7.0
18X17.5	18	17.5	19.0	19.0	6.5	1.7 ~ 2.1	7.0
18X22	18	*21.5 <sup>+0.5</sup> / <sub>-1.0</sub>	19.0	19.0	6.5	1.7 ~ 2.1	7.0



### RECOMMENDED LAND PATTERN (mm)

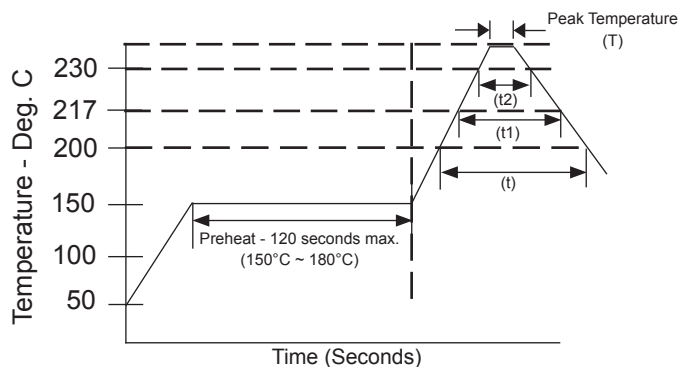
Case Dia.	a	b	c
4	1.0	2.6	1.6
5	1.4	3.0	1.6
6.3	2.1	3.5	1.6
8	2.8	4.1	2.1
10	4.3	4.4	2.5
12.5	4.3	5.8	2.5
16	6.6	6.5	5.0
18	6.6	7.7	5.0



## PEAK REFLOW TEMPERATURE AND DURATION

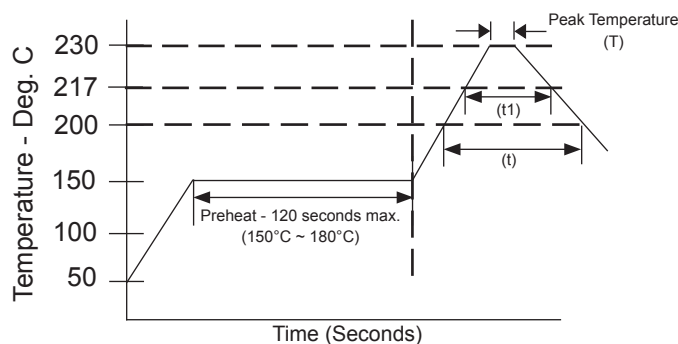
Voltage	Diameter	Time above 200°C (t)	Time above 217°C (t1)	Time above 230°C (t2)	Peak Temperature 5 seconds (T)
6.3 ~ 50V	4 ~ 6.3mm $\phi$	70 sec. max.	60 sec. max.	40 sec. max.	250°C
100V	8mm $\phi$	60 sec. max.	40 sec. max.	30 sec. max.	240°C
160 ~ 400V	8 ~ 10mm $\phi$	50 sec. max.	30 sec. max.	20 sec. max.	240°C
	12.5mm $\phi$	45 sec. max.	20 sec. max.	10 sec. max.	235°C

Capacitors can withstand two times reflow at the above conditions.  
Second reflow shall be at least one hour after natural cool to room temperature.



## PEAK REFLOW TEMPERATURE AND DURATION

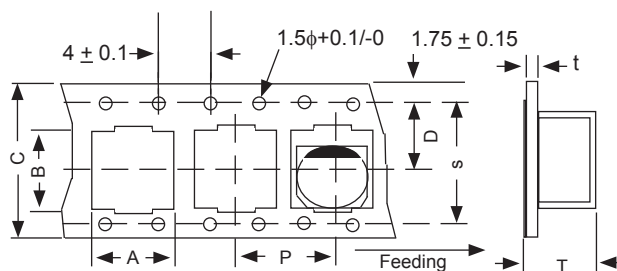
Voltage	Diameter	Time above 200°C (t)	Time above 217°C (t1)	Peak Temperature 5 seconds (T)
160 ~ 400V	16 ~ 18mm $\phi$	30 sec. max.	15 sec. max.	230°C



Review & Compare Reflow Soldering Heat Limits  
V-chip SMT Aluminum Electrolytic Capacitors  
[www.niccomp.com/RSI](http://www.niccomp.com/RSI)

## CARRIER TAPE DIMENSIONS (mm)

Case Size	A ±0.5	B ±0.2	C ±0.3	D ±0.1	P ±0.1	T ±0.2	t max.	S ± 0.1
4 x 6.3(6.1)	4.7	4.7	12.0	5.5	8.0	6.2	0.6	-
5 x 6.3	5.7	5.7	12.0	5.5	12.0	6.2	0.6	-
6.3 x 6.3	7.0	7.0	16.0	7.5	12.0	6.2	0.6	-
6.3 x 8	7.0	7.0	16.0	7.5	12.0	8.2	0.6	-
8 x 10.8	8.7	8.7	24.0	11.5	16.0	11.1	0.6	-
10 x 10.8	10.7	10.7	24.0	11.5	16.0	11.2	0.6	-
12.5 x 14	13.2	13.2	32.0	14.2	24.0	14.3	0.6	28.4
16 x 17	17.5	17.5	44.0	20.2	28.0	17.3	0.6	40.4
18x17.5	19.5	17.5	44.0	20.2	32.0	17.8	0.6	40.4
18x22	19.5	17.5	44.0	20.2	32.0	22.5	0.6	40.4



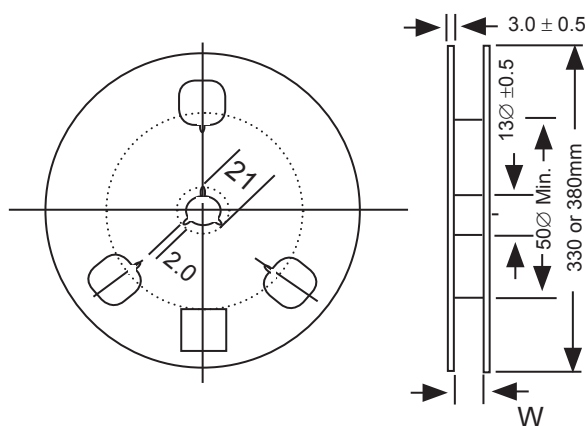
## TR13 330mm (13") CARDBOARD REEL

## TR15 380mm (15") CARDBOARD REEL

(See page 6 for plastic reel dimensions)

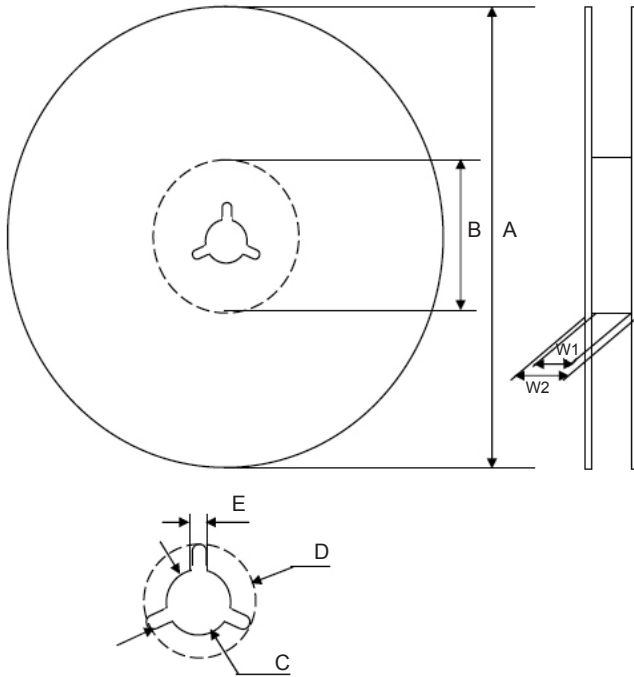
Case Size	W ± 1	Quantity per reel	
		TR13 (330mm)	TR15 (380mm)
4x6.3(6.1)	14	1200	2000
5x6.3	14	800	1000
6.3x6.3	18	800	1000
6.3x8	18	500	900
8x10.8	26	300	500
10x10.8	26	300	500
12.5x14	34	-	250
16x17	46	-	200
18x17.5	46	-	175
18x22	46	-	125

## CARDBOARD REEL



# Surface Mount Aluminum Electrolytic Capacitors NAWU Series

## Optional V-Chip 13" (330mm) Plastic Reels (TR13PF suffix)



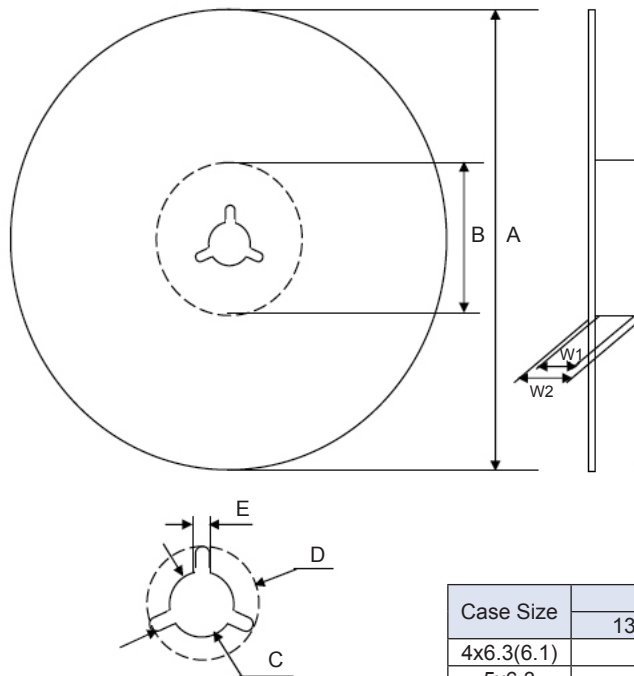
### Dimensions (mm)

Case Size	Tape Width	W1	W2
4x6.3, 5x6.3	12.0	12.4 ~ 14.4	15.5 ~ 20.0
6.3x6.3, 6.3x8	16.0	16.4 ~ 18.4	19.5 ~ 24.0
8x10.8, 10x10.8	24.0	24.4 ~ 26.4	27.5 ~ 32.0

Case Size	Tape Width	A	B	C	D	E
4x6.3, 5x6.3	12.0	$\phi 330$ $\pm 2.0$	$\phi 50 \sim 105$	$\phi 13$ $\pm 0.5$	$\phi 21$ $\pm 1.0$	2.0 $\pm 0.5$
6.3x6.3, 6.3x8	16.0					
8x10.8, 10x10.8	24.0					

Color
Black or Blue

## Optional V-Chip 15" (380mm) Plastic Reels (TR15PF suffix)



### Dimensions (mm)

Case Size	Tape Width	W1	W2
4x6.3, 5x6.3	12.0	12.5 ~ 14.0	15.5 ~ 20.0
6.3x6.3, 6.3x8	16.0	16.5 ~ 18.0	19.5 ~ 24.0
8x10.8, 10x10.8	24.0	24.5 ~ 26.0	27.5 ~ 32.0
12.5x14	32.0	33.0 ~ 34.0	36.5 ~ 38.5
16x17, 18x17.5, 18x22	44.0	45.0 ~ 46.0	48.5 ~ 50.5

Case Size	Tape Width	A	B	C	D	E
4x6.3, 5x6.3	12.0	$\phi 380$ $\pm 2$	$\phi 80 \sim 105$	$\phi 13$ $\pm 0.5$	$\phi 21$ $\pm 1.0$	2.0 $\pm 0.5$
6.3x6.3, 6.3x8	16.0					
8x10.8, 10x10.8	24.0					
12.5x14	32.0					
16x17, 18x17.5, 18x22	44.0					

Color
Black or Blue

Case Size	Quantity per reel	
	13" (330mm)	15" (380mm)
4x6.3(6.1)	1200	2000
5x6.3	800	1000
6.3x6.3	800	1000
6.3x8	500	900
8x10.8	300	500
10x10.8	300	500
12.5x14	-	250
16x17	-	200
18x17.5	-	175
18x22	-	125



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[NACE221M16V6.3X8TR13F](#) [NRSS332M50V18X35.5F](#) [NDTM106K25F1TRF](#) [NACZ221M50V10X10.5TR13F](#) [NTC-T107K16TRDF](#)  
[NCM15X7R103K50F](#) [NRSS682M25V18X35.5F](#) [NEXC224Z5.5V10.5X8.5TRF](#) [NRLRW221M450V30X35SF](#) [NRLMW223M25V35X35F](#)  
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[NEXS105Z5.5V28.5X14F](#) [NRLR181M400V25X30SF](#) [NRSZ102M25V12.5X20F](#) [NUVA33T385TRF](#) [NUVA33V405TRF](#)  
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[NACZ101M25V6.3X8TR13F](#) [NTC-T475K50TRDF](#) [NCD222M1KVZ5UKF](#) [NRLR472M63V25X40SF](#) [NTP157M10TRD\(40\)F](#)  
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[NACK102M10V 10X10.5TR13F](#) [NACZ221M35V8X10.5TR13F](#) [NCD4R7C1KVNPOF](#) [NRWA101M10V5X11F](#) [NRWA222M25V16X25F](#)  
[NRWS222M35V 16X25F](#) [NTC-T336K16TRCF](#) [NCD681K10KVY5PF](#) [NRWP102M16V10X12.5F](#) [NRLM822M50V30X35F](#)