

Surface Mount Aluminum Electrolytic Capacitors NATT Series

FEATURES

- CYLINDRICAL V-CHIP CONSTRUCTION FOR SURFACE MOUNTING
- AVAILABLE WITH ANTI-VIBRATION WIDE TERMINATIONS
- EXTENDED TEMPERATURE & LOAD LIFE (1,000 ~ 2,000 HOURS @ +125°C)
- SUITABLE FOR DC-DC CONVERTER, DC-AC INVERTER, ETC.
- DESIGNED FOR AUTOMATIC MOUNTING AND REFLOW SOLDERING
- MEETS THE REQUIREMENTS OF AEC-Q200*

*Contact NIC for supporting test data

SAC Alloy Compatible
230°C ~ 260°C

RoHS
Compliant

includes all homogeneous materials



*See Part Number System for Details

CHARACTERISTICS

Rated Voltage Rating	6.3 ~ 100Vdc	LOW ESR COMPONENT LIQUID ELECTROLYTE For Performance Data see www.LowESR.com							
Rated Capacitance Range	2.2 ~ 4,700μF								
Operating Temp. Range	-55 ~ +125°C								
Capacitance Tolerance	±20% (M)								
Max. Leakage Current After 2 Minutes @ 20°C	0.01CV or 3μA whichever is greater								
Tan δ @ 120Hz/20°C	W.V. (Vdc)	6.3	10	16	25	35	50	63	100
	S.V. (Vdc)	8.0	13	20	32	44	63	79	125
	Tan δ	0.30	0.24	0.20	0.16	0.14	0.14	0.12	0.10
Low Temperature Stability Impedance Ratio @ 120Hz	W.V. (Vdc)	6.3	10	16	25	35	50	63	100
	Z-25°C/Z+20°C	4	3	2	2	2	2	2	2
	Z-40°C/Z+20°C	8	6	4	3	3	3	3	3
Load Life Test @ 125°C 1,000 ~ 2,000 hours (see specifications tables for specific part numbers)	Capacitance Change	Within ±30% of initial measured value							
	Tan δ	Less than ±300% of the specified maximum value							
	Leakage Current	Less than the specified maximum value							

LOW ESR COMPONENT
LIQUID ELECTROLYTE
For Performance Data
see www.LowESR.com

STANDARD VALUES AND CASE SIZES (mm)

Cap (μF)	Code	Working Voltage (Vdc)							
		6.3	10	16	25	35	50	63	100
2.2	2R2	-	-	-	-	-	6.3x6.3	-	-
3.3	3R3	-	-	-	-	-	6.3x6.3	-	-
4.7	4R7	-	-	-	-	6.3x6.3	6.3x6.3	-	-
10	100	-	-	-	-	6.3x6.3	6.3x6.3	-	8x10.5
22	220	-	-	-	-	6.3x6.3	6.3x8	8x10.5	8x10.5
33	330	-	-	-	6.3x6.3	6.3x8	6.3x8 8x10.5	8x10.5	10x10.5
47	470	-	6.3x6.3	6.3x6.3	6.3x8	6.3x8 8x10.5	8x10.5 10x10.5	8x10.5 10x10.5	12.5x14
100	101	6.3x6.3	6.3x8	6.3x8 8x10.5	6.3x8 8x10.5	8x10.5 10x10.5	10x10.5 12.5x14	10x10.5 12.5x14	16x17
220	221	6.3x8	6.3x8 8x10.5	8x10.5	8x10.5 10x10.5	10x10.5 12.5x14	12.5x14 16x17	12.5x14 16x17	-
330	331	8x10.5	8x10.5	10x10.5	10x10.5 12.5x14	12.5x14 16x17	12.5x14 16x17	16x17	-
470	471	8x10.5	10x10.5	12.5x14	12.5x14 16x17	16x17	16x17	16x17	-
680	681	10x10.5	12.5x14	12.5x14	12.5x14	16x17	16x17	-	-
1000	102	12.5x14	12.5x14	12.5x14	16x17	16x17	-	-	-
1500	152	12.5x14	12.5x14	16x17	16x17	-	-	-	-
2200	222	12.5x14	16x17	16x17	-	-	-	-	-
3300	332	16x17	16x17	-	-	-	-	-	-
4700	472	16x17	-	-	-	-	-	-	-

PEAK REFLOW TEMPERATURE CODES

Code	Peak Reflow Temperature
N	260°C
L	250°C
K	245°C
J	240°C
H	235°C

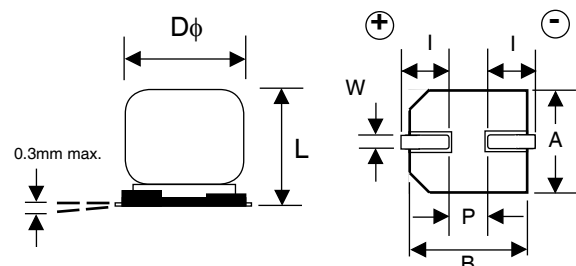
TERMINATION FINISH & PACKAGING OPTIONS CODES

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 1: 16mm diameter parts are only available with Sn finish.
Note 2: 12.5mm & 16mm parts are only available on 15" reels.

CASE SIZE DIMENSIONS (mm)

Case Size	φD±0.5	L max.	A±0.2	B±0.2	I±0.3	W	P±0.3
6.3x6.3	6.3	6.3	6.6	6.6	2.5	0.5~0.8	2.2
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	0.7~1.0	3.2
10x10.5	10.0	10.5	10.3	10.3	3.2	1.1~1.4	4.6
12.5x14	12.5	14.0	12.8	12.8	4.5	1.1~1.4	4.6
16x17	16.0	17.0	16.3	16.3	5.5	1.8~2.1	7.0



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SPECIFICATIONS ARE SUBJECT TO CHANGE

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STANDARD VALUES, CASE SIZES AND SPECIFICATIONS

NIC Part Number	Cap. (μ F)	W.V. (Vdc)	Dissipation Factor (Tan δ)	Max. ESR (Ω) 100KHz, +20°C	Max. Ripple Current (mA) +125°C, 100KHz	Load Life Hours @ +125°C
NATT101M6.3V6.3X6.3NBF	100	6.3	0.30	1.60	70	1,000
NATT221M6.3V6.3X8NBF	220		0.30	0.90	110	1,000
NATT331M6.3V8X10.5NBF	330		0.30	0.40	160	2,000
NATT471M6.3V8X10.5NBF	470		0.30	0.40	160	2,000
NATT681M6.3V10X10.5LBF	680		0.30	0.30	296	2,000
NATT102M6.3V12.5X14KLBF	1000		0.30	0.12	550	2,000
NATT152M6.3V12.5X14KLBF	1500		0.30	0.12	550	2,000
NATT222M6.3V12.5X14KLBF	2200		0.30	0.12	550	2,000
NATT332M6.3V16X17JLSF	3300		0.30	0.08	900	2,000
NATT472M6.3V16X17JLSF	4700		0.30	0.08	900	2,000
NATT470M10V6.3X6.3NBF	47	10	0.24	1.60	70	1,000
NATT101M10V6.3X8NBF	100		0.24	0.90	110	1,000
NATT221M10V6.3X8NBF	220		0.24	0.90	110	1,000
NATT221M10V8X10.5NBF	220		0.24	0.40	160	2,000
NATT331M10V8X10.5NBF	330		0.24	0.40	160	2,000
NATT471M10V10X10.5LBF	470		0.24	0.30	296	2,000
NATT681M10V12.5X14KLBF	680		0.24	0.12	550	2,000
NATT102M10V12.5X14KLBF	1000		0.24	0.12	550	2,000
NATT152M10V12.5X14KLBF	1500		0.24	0.12	550	2,000
NATT222M10V16X17JLSF	2200		0.24	0.08	900	2,000
NATT332M10V16X17JLSF	3300		0.24	0.08	900	2,000
NATT470M16V6.3X6.3NBF	47	16	0.20	1.60	70	1,000
NATT101M16V6.3X8NBF	100		0.20	0.90	110	1,000
NATT101M16V8X10.5NBF	100		0.20	0.40	160	2,000
NATT221M16V8X10.5NBF	220		0.20	0.40	160	2,000
NATT331M16V10X10.5LBF	330		0.20	0.30	296	2,000
NATT471M16V12.5X14KLBF	470		0.20	0.12	550	2,000
NATT681M16V12.5X14KLBF	680		0.20	0.12	550	2,000
NATT102M16V12.5X14KLBF	1000		0.20	0.12	550	2,000
NATT152M16V16X17JLSF	1500		0.20	0.08	900	2,000
NATT222M16V16X17JLSF	2200		0.20	0.08	900	2,000
NATT330M25V6.3X6.3NBF	33	25	0.16	1.60	70	1,000
NATT470M25V6.3X8NBF	47		0.16	0.90	110	1,000
NATT101M25V6.3X8NBF	100		0.16	0.90	110	1,000
NATT101M25V8X10.5NBF	100		0.16	0.40	160	2,000
NATT221M25V8X10.5NBF	220		0.16	0.40	160	2,000
NATT221M25V10X10.5LBF	220		0.16	0.30	296	2,000
NATT331M25V10X10.5LBF	330		0.16	0.30	296	2,000
NATT331M25V12.5X14KLBF	330		0.16	0.12	550	2,000
NATT471M25V12.5X14KLBF	470		0.16	0.12	550	2,000
NATT681M25V12.5X14KLBF	680		0.16	0.12	550	2,000
NATT102M25V16X17JLSF	1000	35	0.16	0.08	900	2,000
NATT152M25V16X17JLSF	1500		0.16	0.08	900	2,000
NATT470M35V6.3X6.3NBF	47		0.14	2.00	60	1,000
NATT100M35V6.3X6.3NBF	10		0.14	1.60	70	1,000
NATT220M35V6.3X6.3NBF	22		0.14	1.60	70	1,000
NATT330M35V6.3X8NBF	33		0.14	0.90	110	1,000
NATT470M35V6.3X8NBF	47		0.14	0.90	110	1,000
NATT470M35V8X10.5NBF	47		0.14	0.40	160	2,000
NATT101M35V8X10.5NBF	100		0.14	0.40	160	2,000
NATT101M35V10X10.5LBF	100		0.14	0.30	296	2,000
NATT221M35V10X10.5LBF	220		0.14	0.30	296	2,000
NATT221M35V12.5X14KLBF	220		0.14	0.12	550	2,000
NATT331M35V12.5X14KLBF	330		0.14	0.12	550	2,000
NATT471M35V12.5X14KLBF	470		0.14	0.12	550	2,000
NATT471M35V16X17JLSF	470		0.14	0.08	900	2,000
NATT681M35V16X17JLSF	680		0.14	0.08	900	2,000
NATT102M35V16X17JLSF	1000		0.14	0.08	900	2,000

For Automotive Equipment, see part number system



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STANDARD VALUES, CASE SIZES AND SPECIFICATIONS

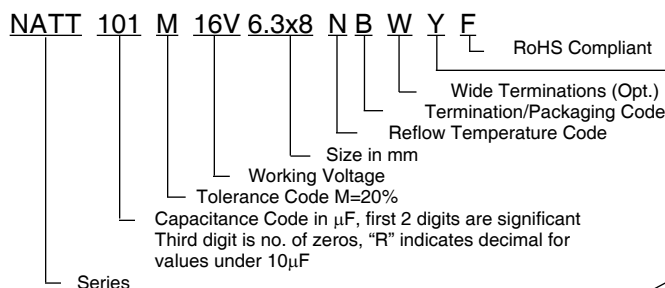
NIC Part Number	Cap. (μF)	W.V. (Vdc)	Dissipation Factor (Tan δ)	Max. ESR (Ω) 100KHz, +20°C	Max. Ripple Current (mA) +125°C, 100KHz	Load Life Hours @ +125°C
NATT2R2M50V6.3X6.3NBF	2.2	50	0.14	3.50	45	1,000
NATT3R3M50V6.3X6.3NBF	3.3		0.14	3.50	45	1,000
NATT4R7M50V6.3X6.3NBF	4.7		0.14	3.50	45	1,000
NATT100M50V6.3X6.3NBF	10		0.14	2.80	50	1,000
NATT220M50V6.3X8NBF	22		0.14	2.00	80	1,000
NATT330M50V6.3X8NBF	33		0.14	2.00	80	1,000
NATT330M50V8X10.5NBF	33		0.14	0.70	140	2,000
NATT470M50V8X10.5NBF	47		0.14	0.70	140	2,000
NATT470M50V10X10.5LBF	47		0.14	0.50	247	2,000
NATT101M50V10X10.5LBF	100		0.14	0.50	247	2,000
NATT101M50V12.5X14KLBF	100		0.14	0.23	490	2,000
NATT221M50V12.5X14KLBF	220		0.14	0.23	490	2,000
NATT331M50V12.5X14KLBF	330		0.14	0.23	490	2,000
NATT331M50V16X17JLSF	330		0.14	0.15	800	2,000
NATT471M50V16X17JLSF	470		0.14	0.15	800	2,000
NATT681M50V16X17JLSF	680		0.14	0.15	800	2,000
NATT220M63V8X10.5KBF	22	63	0.12	1.0	100	1,500
NATT330M63V8X10.5KBF	33		0.12	1.0	100	1,500
NATT470M63V8X10.5KBF	47		0.12	1.0	100	1,500
NATT470M63V10X10.5JBF	47		0.12	0.5	150	1,500
NATT101M63V10X10.5JBF	100		0.12	0.5	150	1,500
NATT101M63V12.5X14JLBF	100		0.12	0.25	350	1,500
NATT221M63V12.5X14JLBF	220		0.12	0.25	350	1,500
NATT221M63V16X17HLSF	220		0.12	0.18	500	1,500
NATT331M63V16X17HLSF	330		0.12	0.18	500	1,500
NATT471M63V16X17HLSF	470		0.12	0.18	500	1,500
NATT100M100V8X10.5JBF	10	100	0.10	1.00	70	1,500
NATT220M100V8X10.5JBF	22		0.10	1.00	70	1,500
NATT330M100V10X10.5JBF	33		0.10	0.80	115	1,500
NATT470M100V12.5X14HLBF	47		0.10	0.33	350	1,500
NATT101M100V16X17HLSF	100		0.10	0.24	500	1,500

For Automotive Equipment, see part number system

RIPPLE CURRENT FREQUENCY MULTIPLIER

Capacitance (μF)	Frequency (Hz)			
	100	1K	10K	100K
≤22	0.50	0.80	0.90	1.0
≤150	0.65	0.85	0.92	1.0
>150	0.70	0.85	0.95	1.0

PART NUMBER SYSTEM



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



PEAK REFLOW TEMPERATURE & DURATION (6.3 ~ 50V)

Diameter	Time above 200°C	Time above 217°C	Time above 230°C	Peak Temperature 5 seconds
6.3mm ~ 8mm ϕ	80 sec. max.	70 sec. max.	40 sec. max.	260°C
10mm ϕ	70 sec. max.	60 sec. max.	40 sec. max.	250°C
12.5mm ϕ	60 sec. max.	50 sec. max.	30 sec. max.	245°C
16mm ϕ	50 sec. max.	40 sec. max.	20 sec. max.	240°C

PEAK REFLOW TEMPERATURE & DURATION (63V)

Diameter	Time above 200°C	Time above 217°C	Time above 230°C	Peak Temperature 5 seconds
8mm ϕ	60 sec. max.	50 sec. max.	30 sec. max.	245°C
10mm ϕ	50 sec. max.	40 sec. max.	20 sec. max.	240°C
12.5mm ϕ	50 sec. max.	40 sec. max.	20 sec. max.	240°C
16mm ϕ	50 sec. max.	40 sec. max.	15 sec. max.	235°C

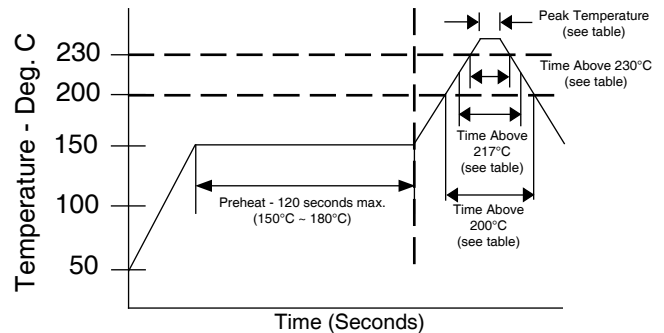
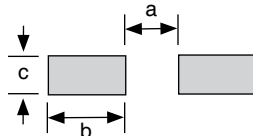
PEAK REFLOW TEMPERATURE & DURATION (100V)

Diameter	Time above 200°C	Time above 217°C	Time above 230°C	Peak Temperature 5 seconds
8mm ϕ	60 sec. max.	50 sec. max.	30 sec. max.	240°C
10mm ϕ	50 sec. max.	40 sec. max.	20 sec. max.	240°C
12.5mm ϕ	50 sec. max.	40 sec. max.	20 sec. max.	235°C
16mm ϕ	45 sec. max.	30 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.

RECOMMENDED LAND PATTERN DIMENSIONS (mm)

Case Size	a	b	c
6x3x6.3 6.3x8	2.1	3.5	1.8
8x10.5	2.8	4.1	2.1
10x10.5	4.3	4.4	2.5
12.5x14	4.3	5.8	2.5
16x17	6.6	6.5	5.0

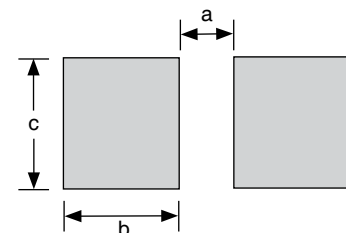
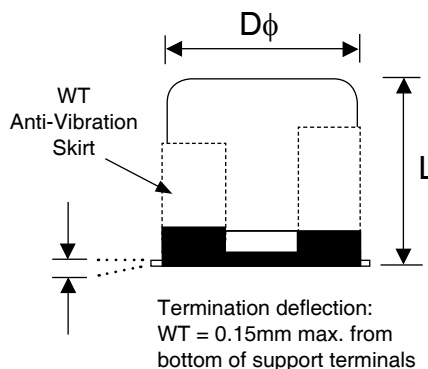
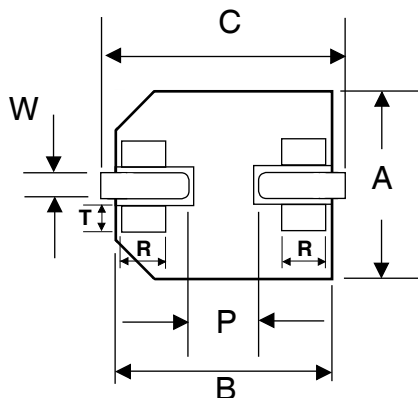


WIDE TERMINATION (WT) DIM. (mm)

Case Size	D ϕ ± 0.5	L ± 0.5	A, B	C ± 0.2	P ± 0.2	W	R	T
8 x 10.5WT	8.0	10.5	8.3 ± 0.2	9.0	3.2	0.7 ~ 1.0	(0.7)	(1.3)
10 x 10.5WT	10.0	10.5	10.3 ± 0.2	11.0	4.6	1.0 ~ 1.4	(0.7)	(1.3)
12.5 x 14WT	12.5	14.0	13.5 ± 0.2	14.2	4.6	1.0 ~ 1.4	(2.2)	(2.4)
16 x 17WT	16.0	17.0	17.0 ± 0.2	18.0	7.0	1.8 ~ 2.1	(3.0)	(2.0)

WT LAND PATTERN DIM. (mm)

Case Size	a	b	c
8x10.5	2.5	4.5	4.7
10x10.5	3.8	4.8	4.7
12.5x14	3.8	6.1	6.9
16x17	5.0	8.0	9.5



Review & Compare Reflow Soldering Heat Limits
V-chip SMT Aluminum Electrolytic Capacitors
www.niccomp.com/RSL

CARRIER TAPE DIMENSIONS (mm)

Case Size	A ± 0.2	B ± 0.2	C ± 0.3	D ± 0.1	P ± 0.1	T ± 0.2	t max.	S ± 0.1
6.3 x 6.3	7.0	7.0	16.0	7.5	12.0	6.5	0.6	-
6.3 x 8	7.0	7.0	16.0	7.5	12.0	8.2	0.6	-
8 x 10.5	8.7	8.7	24.0	11.5	16.0	11.1	0.6	-
10 x 10.5	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

TR13 330mm (13") REEL

TR15 380mm (15") REEL

Case Size	W ± 1.0	Qty per Reel	
		13" (330mm)	15" (380mm)
6.3 x 6.3	18	800	1,000
6.3 x 8	18	500	900
8 x 10.5	26	300	500
10 x 10.5	26	300	500
12.5 x 14	34	-	250
16 x 17	46	-	200

TAPING SPECIFICATIONS (mm)

- Both Leader and Trailer tape: Minimum 40mm (1.57") empty carrier tape pockets.
- Leader tape: Approximately 20cm of cover tape at leader.
- Connection: Maximum 3 connections (slices) per reel.

