

# 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\***

**SAC Alloy Compatible**  
230°C ~ 260°C

**RoHS Compliant**  
includes all homogeneous materials



\*Contact NIC for supporting test data

\*See Part Number System for Details

## CHARACTERISTICS

Rated Voltage Rating	6.3 ~ 100Vdc								
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](http://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 12.5x14	12.5x14 16x17	-
330	331	8x10.5	8x10.5	10x10.5	10x10.5 12.5x14	12.5x14	12.5x14 16x17	16x17	-
470	471	8x10.5	10x10.5	12.5x14	12.5x14	12.5x14 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

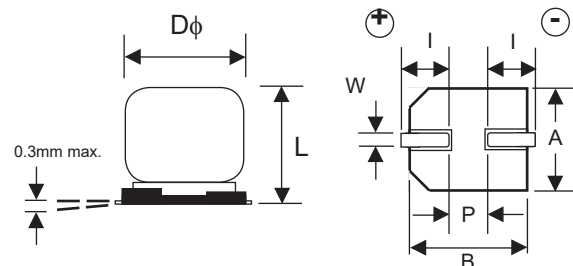
## TERMINATION FINISH & PACKAGING OPTIONS CODES

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	0.7~1.1	3.2
10x10.5	10.0	10.5	10.3	10.3	3.2	0.7~1.4	4.6
12.5x14	12.5	14.0	12.8	12.8	4.5	1.0~1.4	4.6
16x17	16.0	17.0	16.3	16.3	5.5	1.7~2.1	7.0



# Surface Mount Aluminum Electrolytic Capacitors NATT Series

## 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
NATT101M6.3V6.3X6.3N_F	100	6.3	0.30	1.60	70	1,000
NATT221M6.3V6.3X8N_F	220		0.30	0.90	110	1,000
NATT331M6.3V8X10.5N_F	330		0.30	0.40	160	2,000
NATT471M6.3V8X10.5N_F	470		0.30	0.40	160	2,000
NATT681M6.3V10X10.5L_F	680		0.30	0.30	296	2,000
NATT102M6.3V12.5X14K_F	1000		0.30	0.12	550	2,000
NATT152M6.3V12.5X14K_F	1500		0.30	0.12	550	2,000
NATT222M6.3V12.5X14K_F	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
NATT470M10V6.3X6.3N_F	47	10	0.24	1.60	70	1,000
NATT101M10V6.3X8N_F	100		0.24	0.90	110	1,000
NATT221M10V6.3X8N_F	220		0.24	0.90	110	1,000
NATT221M10V8X10.5N_F	220		0.24	0.40	160	2,000
NATT331M10V8X10.5N_F	330		0.24	0.40	160	2,000
NATT471M10V10X10.5L_F	470		0.24	0.30	296	2,000
NATT681M10V12.5X14K_F	680		0.24	0.12	550	2,000
NATT102M10V12.5X14K_F	1000		0.24	0.12	550	2,000
NATT152M10V12.5X14K_F	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	
NATT470M16V6.3X6.3N_F	47	16	0.20	1.60	70	1,000
NATT101M16V6.3X8N_F	100		0.20	0.90	110	1,000
NATT101M16V8X10.5N_F	100		0.20	0.40	160	2,000
NATT221M16V8X10.5N_F	220		0.20	0.40	160	2,000
NATT331M16V10X10.5L_F	330		0.20	0.30	296	2,000
NATT471M16V12.5X14KL_F	470		0.20	0.12	550	2,000
NATT681M16V12.5X14KL_F	680		0.20	0.12	550	2,000
NATT102M16V12.5X14KL_F	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
NATT330M25V6.3X6.3N_F	33	25	0.16	1.60	70	1,000
NATT470M25V6.3X8N_F	47		0.16	0.90	110	1,000
NATT101M25V6.3X8N_F	100		0.16	0.90	110	1,000
NATT101M25V8X10.5N_F	100		0.16	0.40	160	2,000
NATT221M25V8X10.5N_F	220		0.16	0.40	160	2,000
NATT221M25V10X10.5L_F	220		0.16	0.30	296	2,000
NATT331M25V10X10.5L_F	330		0.16	0.30	296	2,000
NATT331M25V12.5X14K_F	330		0.16	0.12	550	2,000
NATT471M25V12.5X14K_F	470		0.16	0.12	550	2,000
NATT681M25V12.5X14K_F	680		0.16	0.12	550	2,000
NATT102M25V16X17JLSF	1000	0.16	0.08	900	2,000	
NATT152M25V16X17JLSF	1500	0.16	0.08	900	2,000	
NATT4R7M35V6.3X6.3N_F	4.7	35	0.14	2.00	60	1,000
NATT100M35V6.3X6.3N_F	10		0.14	1.60	70	1,000
NATT220M35V6.3X6.3N_F	22		0.14	1.60	70	1,000
NATT330M35V6.3X8N_F	33		0.14	0.90	110	1,000
NATT470M35V6.3X8N_F	47		0.14	0.90	110	1,000
NATT470M35V8X10.5N_F	47		0.14	0.40	160	2,000
NATT101M35V8X10.5N_F	100		0.14	0.40	160	2,000
NATT101M35V10X10.5L_F	100		0.14	0.30	296	2,000
NATT221M35V10X10.5L_F	220		0.14	0.30	296	2,000
NATT221M35V12.5X14K_F	220		0.14	0.12	550	2,000
NATT331M35V12.5X14K_F	330		0.14	0.12	550	2,000
NATT471M35V12.5X14K_F	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

Part Number Suffix Where    : Preferred (15" reel) = LB or LS, Legacy (13" reel) = B or S (check with NIC for availability)

For Automotive Equipment, see part number system



NIC COMPONENTS CORP.

www.niccomp.com

SPECIFICATIONS ARE SUBJECT TO CHANGE

# Surface Mount Aluminum Electrolytic Capacitors NATT Series

## 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
NATT2R2M50V6.3X6.3N_F	2.2	50	0.14	3.50	45	1,000
NATT3R3M50V6.3X6.3N_F	3.3		0.14	3.50	45	1,000
NATT4R7M50V6.3X6.3N_F	4.7		0.14	3.50	45	1,000
NATT100M50V6.3X6.3N_F	10		0.14	2.80	50	1,000
NATT220M50V6.3X8N_F	22		0.14	2.00	80	1,000
NATT330M50V6.3X8N_F	33		0.14	2.00	80	1,000
NATT330M50V8X10.5N_F	33		0.14	0.70	140	2,000
NATT470M50V8X10.5N_F	47		0.14	0.70	140	2,000
NATT470M50V10X10.5L_F	47		0.14	0.50	247	2,000
NATT101M50V10X10.5L_F	100		0.14	0.50	247	2,000
NATT101M50V12.5X14K_F	100		0.14	0.23	490	2,000
NATT221M50V12.5X14K_F	220		0.14	0.23	490	2,000
NATT331M50V12.5X14K_F	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	
NATT220M63V8X10.5K_F	22	63	0.12	1.0	100	1,500
NATT330M63V8X10.5K_F	33		0.12	1.0	100	1,500
NATT470M63V8X10.5K_F	47		0.12	1.0	100	1,500
NATT470M63V10X10.5J_F	47		0.12	0.5	150	1,500
NATT101M63V10X10.5J_F	100		0.12	0.5	150	1,500
NATT101M63V12.5X14J_F	100		0.12	0.25	350	1,500
NATT221M63V12.5X14J_F	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
NATT100M100V8X10.5J_F	10	100	0.10	1.00	70	1,500
NATT220M100V8X10.5J_F	22		0.10	1.00	70	1,500
NATT330M100V10X10.5J_F	33		0.10	0.80	115	1,500
NATT470M100V12.5X14H_F	47		0.10	0.33	350	1,500
NATT101M100V16X17HLSF	100		0.10	0.24	500	1,500

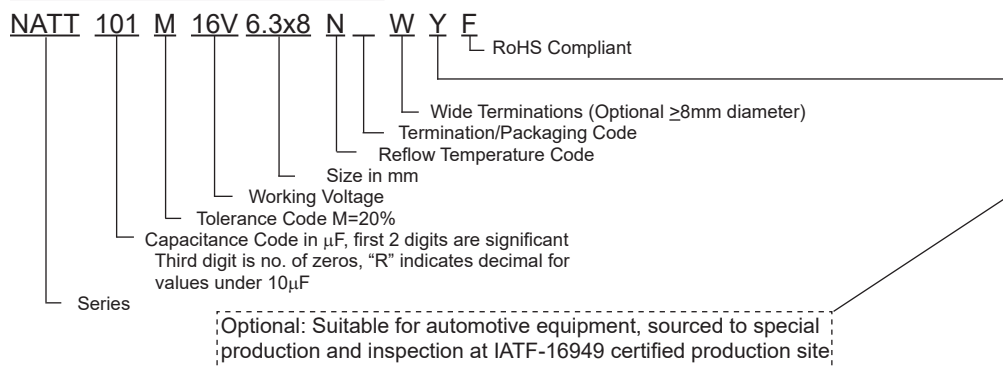
Part Number Suffix Where \_\_: Preferred (15" reel) = LB or LS, Legacy (13" reel) = B or S (check with NIC for availability)

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 at <https://www.nicomp.com/resource/files/aluminum/AlumApplInfoCautions.pdf>  
 If in doubt or uncertainty, please review your specific application - process details with NIC's technical support personnel: [tpmg@nicomp.com](mailto:tpmg@nicomp.com)

# Surface Mount Aluminum Electrolytic Capacitors NATT Series

## PEAK REFLOW TEMPERATURE & DURATION (6.3 ~ 50V)

Diameter	Time above 200°C	Time above 217°C	Time above 230°C	Peak Temperature 5 seconds	Reflow Code
6.3mm ~ 8mm $\phi$	80 sec. max.	70 sec. max.	40 sec. max.	260°C	N
10mm $\phi$	70 sec. max.	60 sec. max.	40 sec. max.	250°C	L
12.5mm $\phi$	60 sec. max.	50 sec. max.	30 sec. max.	245°C	K
16mm $\phi$	50 sec. max.	40 sec. max.	20 sec. max.	240°C	J

## PEAK REFLOW TEMPERATURE & DURATION (63V)

Diameter	Time above 200°C	Time above 217°C	Time above 230°C	Peak Temperature 5 seconds	Reflow Code
8mm $\phi$	60 sec. max.	50 sec. max.	30 sec. max.	245°C	K
10mm $\phi$	50 sec. max.	40 sec. max.	20 sec. max.	240°C	J
12.5mm $\phi$	50 sec. max.	40 sec. max.	20 sec. max.	240°C	J
16mm $\phi$	50 sec. max.	40 sec. max.	15 sec. max.	235°C	H

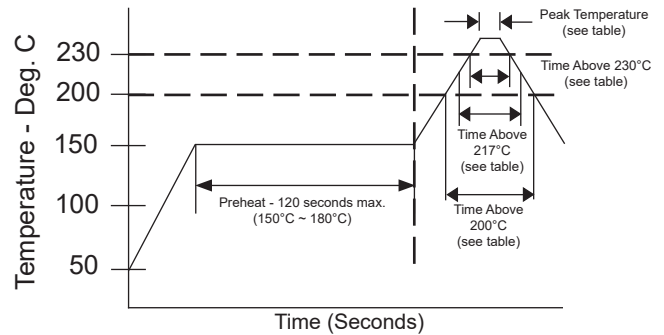
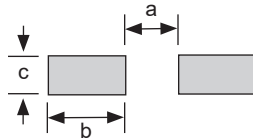
## PEAK REFLOW TEMPERATURE & DURATION (100V)

Diameter	Time above 200°C	Time above 217°C	Time above 230°C	Peak Temperature 5 seconds	Reflow Code
8mm $\phi$	60 sec. max.	50 sec. max.	30 sec. max.	240°C	J
10mm $\phi$	50 sec. max.	40 sec. max.	20 sec. max.	240°C	J
12.5mm $\phi$	50 sec. max.	40 sec. max.	20 sec. max.	235°C	H
16mm $\phi$	45 sec. max.	30 sec. max.	10 sec. max.	235°C	H

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

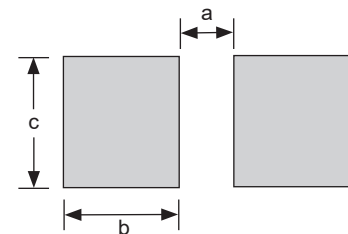
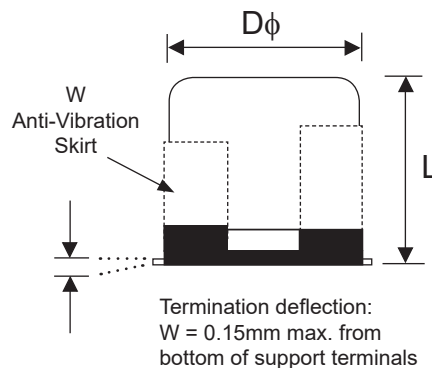
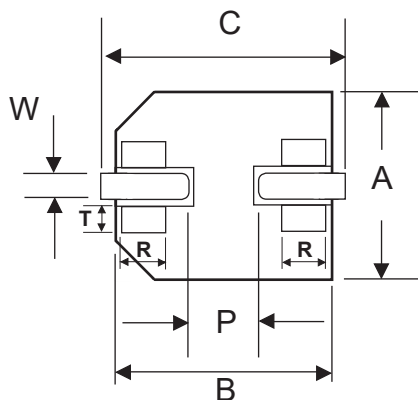


## WIDE TERMINATION (W) DIM. (mm)

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

## W 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](http://www.niccomp.com/RSL)

W (Wide Terminations) Anti-Vibration Test	
Test Method	Direction: X, Y, Z axis Frequency & Duration: 5 to 2000Hz reciprocation for 20 minutes, 2 hours each direction Peak to Peak Amplitude: 5mm Peak Acceleration: 30G Sweep Type: Log
Δ Capacitance	Within ± 10% of initial value
Tangent of Loss	≤ Specified value
Leakage Current	≤ Specified value

## REEL SIZE

**LB or LS 380mm (15") PREFERRED**

**L or S 330mm (13") Contact NIC for Availability**

(See page 6 for plastic reel dimensions)

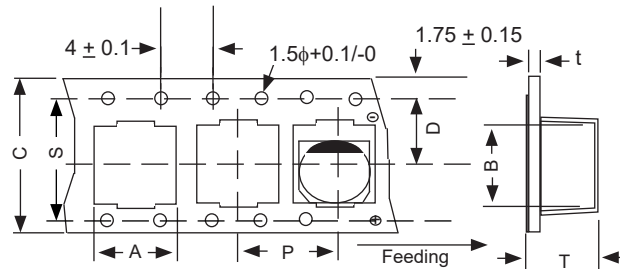
## CARRIER TAPE DIMENSIONS (mm)

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

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

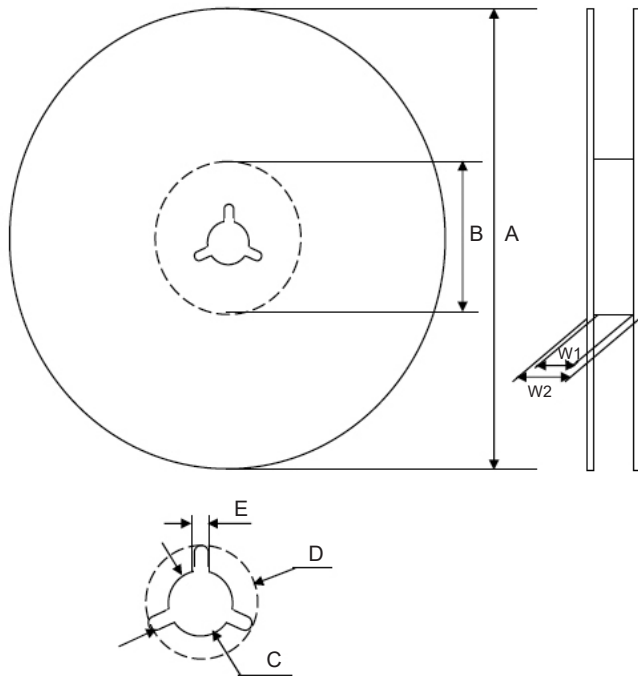
## TAPING SPECIFICATIONS (mm)

- 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.



# Surface Mount Aluminum Electrolytic Capacitors NATT Series

Preferred is V-Chip 15" (380mm) Reel (LBF or LSF suffix)



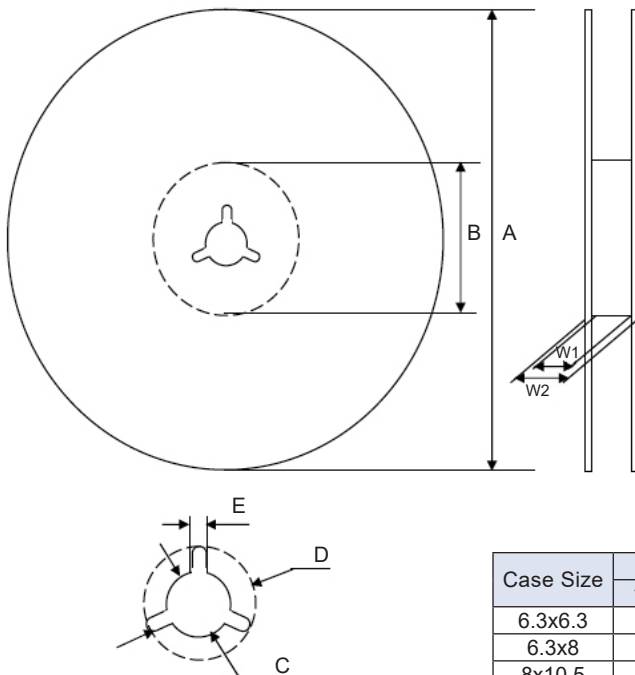
### Dimensions (mm)

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

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

Color
Black or Blue

Optional V-Chip 13" (330mm) Reels (BF or SF suffix). Contact NIC for availability



### Dimensions (mm)

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

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

Color
Black or Blue

Case Size	Qty per Reel	
	13" (330mm)	15" (380mm)
6.3x6.3	800	1,000
6.3x8	500	900
8x10.5	300	500
10x10.5	300	500
12.5x14	-	250
16x17	-	200