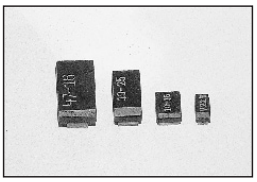
FEATURES

- **EXPANDED VALUE RANGE & REDUCED CASE SIZES**
- MOLDED CONSTRUCTION FOR HIGH SOLDERING HEAT RESISTANCE
- ELEVEN CASE SIZES (J, P, A2, A, B2, B, C2, C, V, D AND E)
- BOTH FLOW AND REFLOW SOLDERING APPLICABLE
- TAPE & REEL PACKAGING COMPATIBLE WITH AUTOMATIC PICK & PLACE EQUIPMENT



RoHS Compliant
includes all homogeneous materials

*See Part Number System for Details

SPECIFICATIONS & PERFORMANCE CHARACTERISTICS

Capacitance Range	0.1µF to 680µF								
Capacitance Tolerance	±20% (M), ±10% (K)								
Rated Voltage Range @ 85°C (Vdc)	2.5	4.0	6.3	10	16	20	25	35	50
Surge Voltage Rating @ 85°C (Vdc)	3.3	5.2	8.0	13	20	28	33	46	85
Derated Voltage @ 125°C (Vdc)	1.8	2.5	4.0	6.3	10	13	16	22	32
Operating Temperature Range	-55°C to +85°C (to +125°C with Derating)								
Dissipation Factor	See Case Size and Specifications Table								
Leakage Current @ +25°C (After 5 Minutes at Rated Voltage)	Not More Than 0.01CV or 0.5µA, whichever is greater								
Capacitance Change With Temperature	-55°C			+85°C			+125°C		
A2, A, B2, B, C, D & E Case Size	ΔC - 12%			ΔC ± 12%			ΔC ± 12%		
J & P Case Size	ΔC - 20%			ΔC ± 20%			ΔC ± 20%		
Resistance to Soldering Heat (+260°C for 5 Seconds)	ΔC ± 5%* Max, LC = Less than initial specification. DF = Less than initial specification								
Moisture Resistance (500 hours; 90~95% RH @ 40°C)	ΔC ± 5%* Max, LC = Less than initial specification. DF = 150% of initial specification								
Temperature Cycling (5 cycles; -55°C ~ +125°C)	ΔC ± 5%* Max, LC = Less than initial specification. DF = Less than initial specification								
Load Life (at Rated Voltage) (2,000 hours @ 85°C)	ΔC ± 10%* Max, LC = 125% of initial specification. DF = Less than initial specification								
Base Failure Rate (1.0Ω/Volt)	1%/1000 hours at 60% confidence level (+85°C)								

***±12% ~ ±15% for extended values, ±20% for J & P case size values**

RIPPLE CURRENT CORRECTION FACTOR:

Ambient Temperature	25°C	+55°C	+85°C	+105°C	+125°C
Correction Factor	1.0	0.90	0.80	0.40	0.15

RIPPLE CURRENT/VOLTAGE RATINGS:

$$I\text{max.} = \sqrt{\frac{Pd}{ESR}} \qquad V\text{ max.} = Z \bullet \sqrt{\frac{Pd}{ESR}}$$

Imax. = Ripple Current rating (Arms)

Pd = Power dissipation (watt)

ESR = Equivalent series resistance (ohm)

V max. = Ripple voltage rating (Vrms)

Z = The capacitors impedance (ohm) = $\sqrt{(ESR)^2+(XL-XC)^2}$

POWER DISSIPATION @ 25°C (FREE AIR) & EQUIVALENT SERIES INDUCTANCE (ESL)

Case Code	Pd Max. (W)	ESL (nH)
P	0.025	1.00
A2	0.050	1.20
A	0.070	1.20
B2	0.070	1.50
B	0.080	1.50
C2	0.090	
C	0.110	2.70
V	0.125	
D	0.150	3.00
E	0.165	3.00

PART NUMBER SYSTEM

NTC-T 106 M 16 TR B F

- F — RoHS Compliant
- B — Case Code
- TR — Packaging: TR=Tape/Reel
- 16 — Voltage
- M — Tolerance Code: K=±10%, M=± 20%
- 106 — Capacitance Code
- NTC-T — Series

PRECAUTIONS

Please review the notes on correct use, safety and precautions found on our website at **www.niccomp.com/tantpc**
If in doubt or uncertainty, please review your specific application - process details with NIC's technical support personnel: **tpmg@niccomp.com**

STANDARD AND EXTENDED PRODUCT SPECIFICATIONS TABLE

*Extended Case Sizes
Chart show Case Size, Max. Tan δ @ 120Hz/+20°C, Max. ESR @ 100KHz/+20°C

Cap (µF)	Code	Working Voltage (Vdc)								
		2.5	4.0	6.3	10	16	20	25	35	50
0.1	104	-	-	-	-	-	-	-	A 4%/18Ω	-
0.15	154	-	-	-	-	-	-	-	-	-
0.22	224	-	-	-	-	-	-	-	A 4%/18Ω	-
0.33	334	-	-	-	-	-	-	-	A 4%/15Ω	-
0.47	474	-	-	-	-	P 10%/35Ω	-	A 4%/14Ω	A*6%/12Ω B 4%/8.0Ω	-
0.68	684	-	-	-	-	-	A 4%/12Ω	A*6%/10Ω	-	-
1.0	105	-	-	P 10%/25Ω	P 10%/25Ω	J 10%/30Ω P 20%/25Ω A2*6%/16Ω A 4%/10Ω	A2*6%/13Ω A*6%/9.0Ω	P 6%/8.0Ω A2 6%/13Ω A*6%/8.0Ω	A2 6%/13Ω A*6%/8.0Ω B 4%/4.8Ω	C 4%/5.5Ω
1.5	155	-	P 10%/25Ω	P 10%/25Ω	J 20%/30Ω P 20%/25Ω A2*8%/20Ω A 4%/8.0Ω	J 10%/25Ω A2*6%/13Ω A 4%/8.0Ω	A2*6%/13Ω A*6%/6.5Ω	A*6%/8.0Ω B 4%/4.6Ω	A*6%/8.0Ω B*6%/4.0Ω C 4%/3.0Ω	-
2.2	225	-	P 10%/25Ω	J 20%/20Ω P 20%/20Ω A2*8%/18Ω A 4%/8.0Ω	J 20%/30Ω P 20%/20Ω A2*8%/12Ω A 4%/7.0Ω	P 10%/19Ω A2*6%/13Ω A*6%/6.0Ω	P 10%/8.0Ω A2 6%/7.0Ω A*6%/6.0Ω B 4%/3.5Ω	A*6%/8.0Ω B*6%/4.0Ω	A 6%/5Ω B*6%/4.2Ω C 4%/3.0Ω	D 4%/1.8Ω
3.3	335	-	P 20%/20Ω A2*8%/18Ω A 4%/8.0Ω	J 20%/20Ω P 20%/13Ω A2*8%/9.0Ω A 4%/7.5Ω	J 20%/25Ω P 20%/20Ω A2*8%/12Ω A*8%/5.5Ω	P 10%/8.0Ω A2 8%/7.0Ω A*6%/5.0Ω B 4%/3.5Ω	A2 8%/5.0Ω A*6%/5.0Ω B2 6%/3.9Ω B*6%/3.0Ω	A 6%/7.0Ω B*6%/3.5Ω C 4%/2.5Ω	B2 6%/3.0Ω B*6%/4.0Ω C 4%/2.5Ω D 4%/2.0Ω	D 4%/1.4Ω
4.7	475	A2*8%/18Ω	P 20%/12Ω A2*8%/10Ω A 4%/7.5Ω	J 20%/15Ω P 20%/12Ω A2*8%/7.5Ω A*8%/6.0Ω	J 20%/10Ω P 20%/10Ω A2*8%/8.0Ω A*8%/5.0Ω B 4%/3.5Ω	A2 8%/4.5Ω A*6%/5.0Ω B*6%/3.0Ω	A2 15%/5.0Ω A*6%/5.0Ω B2 6%/3.0Ω B*6%/3.0Ω C 4%/2.4Ω	B2 6%/3.0Ω B*6%/3.0Ω C 4%/2.4Ω	C*6%/2.2Ω D 4%/1.5Ω	D 4%/1.4Ω
6.8	685	P 20%/20Ω A2*8%/16Ω	P 20%/12Ω A2*8%/8.0Ω A*8%/6.0Ω	J 20%/7.0Ω P 20%/12Ω A2*8%/7.5Ω A*8%/5.0Ω B 6%/3.5Ω	A2 8%/8.0Ω A*8%/4.5Ω B 8%/3.0Ω	A2*6%/5.0Ω A*6%/5.0Ω B2 6%/5.0Ω B*6%/2.5Ω	B2 6%/3.0Ω B*6%/2.8Ω C 6%/1.9Ω	B 6%/2.5Ω C*6%/1.9Ω D 6%/1.4Ω	C*6%/1.9Ω D 6%/1.3Ω	-
10	106	P 20%/12Ω A2*8%/15Ω	J 20%/12Ω P 20%/12Ω A2*12%/8.0Ω A*8%/5.0Ω B 6%/3.5Ω	J 20%/8.0Ω P 20%/12Ω A2*8%/10Ω A*8%/4.0Ω B 6%/3.0Ω	P 20%/6.0Ω A2 8%/5.0Ω A*8%/3.2Ω B2*8%/3.2Ω B*8%/2.5Ω C 6%/1.8Ω	A 8%/5.0Ω B2 8%/4.0Ω B*6%/2.4Ω C 6%/1.8Ω	B*6%/2.5Ω C*6%/1.8Ω D 6%/1.3Ω	C2 6%/2.0Ω C*6%/1.8Ω D 6%/1.2Ω	C 6%/1.5Ω D 6%/1.0Ω E*6%/1.0Ω	-
15	156	J 20%/8.0Ω A2*12%/10Ω A*8%/5.0Ω	P 20%/ A2*12%/8.0Ω A*8%/4.0Ω B*8%/3.0Ω	P 20%/5.0Ω A2 12%/4.0Ω A*8%/3.5Ω B2*8%/3.5Ω B*8%/2.5Ω	A2 20%/3.0Ω B2*8%/2.5Ω C 6%/1.8Ω	A 12%/5.0Ω B2*6%/2.5Ω C*6%/1.8Ω D 6%/1.8Ω	C*6%/1.7Ω D 6%/0.8Ω	C 6%/1.5Ω D*6%/1.0Ω	D*6%0.9Ω	-
22	226	P 20%/4.0Ω A2*12%/10Ω A*8%/4.0Ω	P 20%/5.0Ω A2 12%/4.0Ω A*8%/3.5Ω B2*8%/3.5Ω B*8%/2.8Ω	P 20%/4.0Ω A2 12%/2.8Ω A*10%/4.5Ω B2*12%/4.5Ω B*8%/2.3Ω C 6%/1.8Ω	A 12%/2.5Ω B2 12%/4.0Ω B*8%/2.4Ω C*8%/1.8Ω	B2 10%/2.2Ω B*6%/2.5Ω C*6%/1.6Ω D 6%/0.8Ω	C2 6%/1.4Ω C*6%/1.5Ω D*6%/0.8Ω	D*6%/0.8Ω	-	-
33	336	P 20%/5.0Ω A2 12%/4.0Ω A*8%/3.5Ω B2*8%/3.5Ω B*8%/3.0Ω	P 20%/4.0Ω A2 8%/4.5Ω A*10%/4.5Ω B212%/4.5Ω B*8%/2.4Ω	A2 18%/3.0Ω A 12%/5.0Ω B2 12%/1.7Ω B*8%/2.0Ω C*8%/1.8Ω	B2 12%/1.7Ω B*8%/2.0Ω C*8%/1.6Ω D 6%/0.8Ω	B 8%/1.4Ω C2 6%/1.4Ω C*6%/1.2Ω D*6%/0.8Ω	D*6%/0.8Ω	D 6%/0.7Ω	-	-

STANDARD AND EXTENDED PRODUCT SPECIFICATIONS TABLE

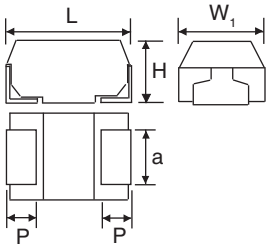
*Extended Case Sizes
Chart Shows Case Sizes, Max. Tan δ @120Hz/20°C, Max. ESR @ 100KHz/20°C

Cap (µF)	Code	Working Voltage (Vdc)						
		2.5	4.0	6.3	10	16	20	25
47	476	P 30%/6.0Ω A2 12%/4.5Ω A*12%/4.5Ω B2*12%/4.5Ω B*8%/2.4Ω	P 30%/3.0Ω A2 15%/4.5Ω A 12%/5.0Ω B2 12%/3.0Ω B*8%/2.0Ω C*8%/1.8Ω	A 12%/2.0Ω B2 12%/3.0Ω B*8%/2.0Ω C*8%/1.6Ω	B 8%/3.0Ω C2 8%/1.0Ω C*8%/1.6Ω D*8%/0.8Ω	C*6%/1.2Ω D*6%/0.8Ω	D*6%0.8Ω	-
68	686	A 18%/3.0Ω B*8%/2.0Ω	A 12%/2.5Ω B2 15%/3.0Ω B*8%/2.0Ω C*8%/1.6Ω	A 30%/2.0Ω B2 20%/2.0Ω B*10%/1.8Ω C2 10%/0.8Ω C*8%1.2Ω D*8%/0.8Ω	B 12%/0.9Ω C2 10%/1.0Ω C*8%/1.2Ω D*8%/0.8Ω	C 6%/0.7Ω D*6%/0.7Ω	-	-
100	107	A 30%/2.0Ω B2 18%/2.0Ω B*8%/2.0Ω	A 30%/2.0Ω B2 20%/1.3Ω B*12%/2.0Ω C2 10%/0.8Ω C*8%/1.2Ω D*8%/0.8Ω	B2 20%/1.3Ω B 12%/1.2Ω C2 10%/0.8Ω C*10%/0.9Ω D*8%/0.8Ω	C2 10%/0.8Ω C 10%/1.2Ω V 8%/0.5Ω D*8%/0.7Ω	D*10%/1.0Ω	-	-
150	157	A 30%/2.0Ω B2 20%/1.0Ω B*16%/5.0Ω C2 12%/0.8Ω	B 18%/2.0Ω C2 10%/0.8Ω C*10%/1.0Ω D*8%/0.7Ω	B 12%/1.0Ω C 10%/1.2Ω D*8%/0.7Ω	V 8%/0.5Ω D*10%/0.7Ω	D*6%/0.9Ω	-	-
220	227	B2 30%/1.0Ω B 18%/2.0Ω C2 12%/0.8Ω C*12%/1.0Ω	B 18%/0.5Ω C 12%/1.2Ω D*8%/0.7Ω	B 18%/0.5Ω C 14%/1.2Ω V 12%/0.5Ω D*12%/0.8Ω	D 12%/1.0Ω E*8%/0.9Ω	-	-	-
330	337	B2 30%/2.0Ω B 25%/0.6Ω C 16%/1.2Ω	C 14%/1.2Ω V 12%/0.5Ω D*14%/0.7Ω	V 14%/0.5Ω D 14%/1.0Ω	-	-	-	-
470	477	B 35%/0.6Ω C 18%/1.2Ω D*14%/0.7Ω	D 16%/1.0Ω	D 20%/0.3Ω	-	-	-	-
680	687	-	D 24*/0.3Ω	-	-	-	-	-

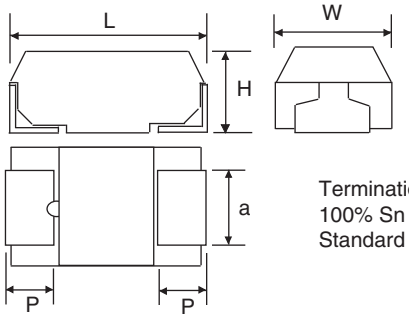
DIMENSIONS (mm)

Case Code	Metric Code	English Code	L	W	H	P	a
J	1608	0603	1.6 ± 0.1	0.8 ± 0.1	0.8 ± 0.1	0.3 ± 0.15	0.6 ± 0.1
P	2012	0805	2.0 ± 0.2	1.25 ± 0.2	1.2 MAX.	0.5 ± 0.2	0.9 ± 0.1
A2	3216	1206	3.2 ± 0.2	1.6 ± 0.2	1.2 MAX.	0.8 ± 0.3	1.2 ± 0.1
A	3216	1206	3.2 ± 0.2	1.6 ± 0.2	1.6 ± 0.2	0.8 ± 0.3	1.2 ± 0.1
B2	3528	1411	3.5 ± 0.2	2.8 ± 0.2	1.2 MAX.	0.8 ± 0.3	2.3 ± 0.1
B	3528	1411	3.5 ± 0.2	2.8 ± 0.2	1.9 ± 0.2	0.8 ± 0.3	2.2 ± 0.1
C2	6032	2412	6.0 ± 0.3	3.2 ± 0.3	1.5 MAX.	1.3 ± 0.3	2.2 ± 0.1
C	6032	2412	6.0 ± 0.3	3.2 ± 0.3	2.6 ± 0.3	1.3 ± 0.3	2.2 ± 0.1
V	7343	2916	7.3 ± 0.2	4.3 ± 0.2	2.0 MAX.	1.3 ± 0.3	2.4 ± 0.1
D	7343	2916	7.3 ± 0.2	4.3 ± 0.2	2.9 ± 0.3	1.3 ± 0.3	2.4 ± 0.1
E	7343H	2917	7.3 ± 0.2	4.3 ± 0.2	4.1 ± 0.2	1.3 ± 0.3	2.4 ± 0.1

J, P, A, A2, C, V, D & E CASE SIZE



B & B2 CASE SIZE



Terminations:
100% Sn (Lead-Free)
Standard

CAPACITANCE CODES

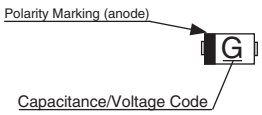
Cap. (µF)	STD EIA Code	EIA Code 198D	Code for P Case Size	Code for J Case Size				
				2.5Vdc	4Vdc	6.3Vdc	10Vdc	16Vdc
0.1	104	A5	-	-	-	-	-	C
0.15	154	E5	-	-	-	-	-	-
0.22	224	J5	-	-	-	-	-	-
0.33	334	N5	N	-	-	-	-	-
0.47	474	S5	S	-	-	-	-	-
0.68	684	W5	W	-	-	-	-	-
1.0	105	A6	A	-	-	-	-	-
1.5	155	E6	E	-	-	-	A	-
2.2	225	J6	J	-	-	ſ	A	-
3.3	335	N6	N	-	-	J	-	-
4.7	475	S6	S	-	-	J	A	-
6.8	685	W6	W	-	G	ſ	-	-
10	106	A7	A	e	G	ſ	-	-
22	226	J7	J	-		-	-	-
33	336	N7	N	-	-	-	-	-
47	476	S7	S	-	-	-	-	-

VOLTAGE CODES

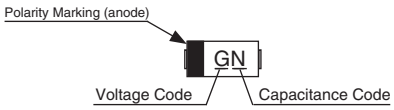
Vottage	Code
2.5	e
4	G
6.3	J
10	A
16	C
20	D
25	E
35	V
50	H

COMPONENT MARKING

J Case Size



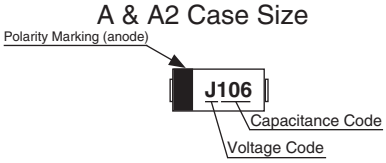
P Case Size



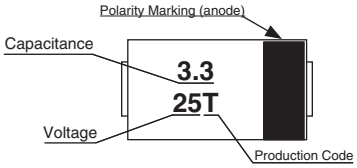
PRODUCTION CODE

Year	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
2006	N	P	Q	R	S	T	U	V	W	X	Y	Z
2007	a	b	c	d	e	f	g	h	j	k	l	m
2008	n	p	q	r	s	t	u	v	w	x	y	z
2009	A	B	C	D	E	F	G	H	J	K	L	M

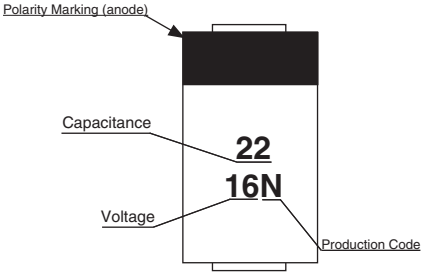
A & A2 Case Size



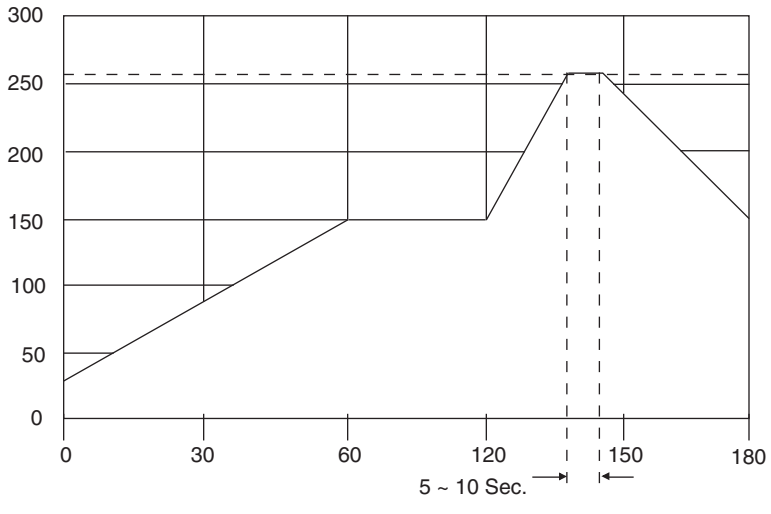
B, B2 & D1 Case Size
2.5V marked 2, 6.3V marked 6



C, V & D Case Size
2.5V marked 2, 6.3V marked 6

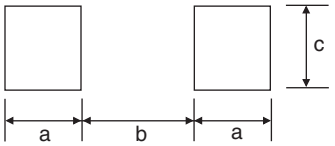


Flow/Reflow Soldering
Maximum Temperature/Time: Flow 260°C/5 Sec.
Reflow 260°C/10 Sec.



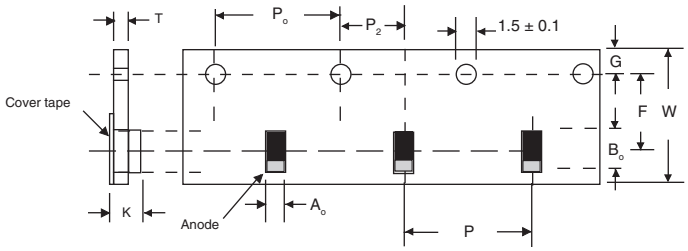
RECOMMENDED LAND PATTERN DIMENSIONS (mm)

Case Size	a	b	c
J	0.90	0.70	1.00
P	1.05	0.50	1.20
A & A2	1.35	1.10	1.50
B & B2	1.35	1.40	2.70
C	2.00	2.90	2.70
D	2.05	4.10	2.90
D	2.05	4.10	2.90



TAPE DIMENSIONS (mm)

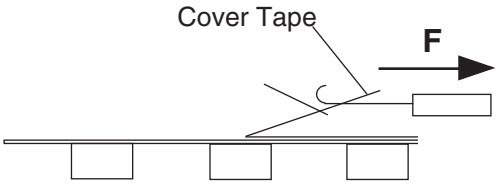
Metric Code	Case Code	A_0±0.2	B_0±0.2	W ±0.3	F ± 0.05	P_0±0.1	P_0±0.1	P_0±0.05	G ±0.1	K ±0.2	T	7" Reel
1608	J	1.0	1.8	8.0	3.5	4.0	2.0	2.0	1.75	1.1	0.2	4000
2012	P	1.4	2.2	8.0	3.5	4.0	4.0	2.0	1.75	1.4	0.2	3000
3216	A2	1.0	3.5	8.0	3.5	4.0	4.0	2.0	1.75	1.4	0.2	3000
3216	A	1.9	3.5	8.0	3.5	4.0	4.0	2.0	1.75	1.9	0.2	2000
3528	B2	3.2	3.8	8.0	3.5	4.0	4.0	2.0	1.75	1.4	0.2	3000
3528	B	3.2	3.8	8.0	3.5	4.0	4.0	2.0	1.75	2.1	0.2	2000
6032	C	3.7	6.4	12.0	5.65	4.0	8.0	2.0	1.5	3.0	0.3	500
7343	D	4.8	7.7	12.0	5.65	4.0	8.0	2.0	1.5	3.3	0.3	500
7343H	E	4.7	7.7	12.0	5.5	4.0	8.0	2.0	1.5	4.5	0.6	500



Cover tape peel-off specification

1. Peel-off speed : 300 mm/min.
2. Peel-off force : F = 30 - 75g
3. Peel-off angle : Θ = 0 - 15°

Peel-off speed
(F) = 50mm/Sec.



REEL DIMENSIONS (mm)

Tape Width	A	C	D	E	N	W_1	W_2
8mm	178 ±2.0	13 ±0.5	21 ±0.5	2.0 ±0.5	50 min.	10 ±2.0	14.5 max.
12mm	178 ±2.0	13 ±0.5	21 ±0.5	2.0 ±0.5	50 min.	14.5 ±2.0	18.5 max.