

## Ceramic Capacitors

Order code	Manufacturer code	Description
71-1600	n/a	RL 4000 1N 0805 50V X7R CAP. (RC)
71-1605	n/a	RL 4000 2N2 0805 50V X7R CAP. (RC)
71-1610	n/a	RL 4000 4N7 0805 50V X7R CAP. (RC)
71-1585	n/a	220PF 0805 50V NPO CAP (4000) (RC)
71-1590	n/a	RL 4000 330PF 0805 50V NPO CAP (RC)
71-1595	n/a	RL 4000 470PF 0805 50V NPO CAP (RC)
71-1800	n/a	47PF NPO 0603 CHIP CERAMIC 50V (100) RC
71-1802	n/a	56PF NPO 0603 CHIP CERAMIC 50V (100) RC
71-1804	n/a	68PF NPO 0603 CHIP CERAMIC (100)
71-1792	n/a	22PF NPO 0603 CHIP CERAMIC 50V (100) RC
71-1794	n/a	27PF NPO 0603 CHIP CERAMIC 50V (100) RC
71-1796	n/a	33PF NPO 0603 CHIP CERAMIC 50V (100) RC
71-1786	n/a	6P8 NPO 0603 CHIP CERAMIC 50V (100) RC
71-1788	n/a	10PF NPO 0603 CHIP CERAMIC 50V (100) RC
71-1790	n/a	15PF NPO 0603 CHIP CERAMIC 50V (100) RC
71-1370	n/a	PK 100 22N 0805 50V X7R CAP. RC
71-1375	n/a	PK 100 47N 0805 50V X7R CAP. RC
71-1380	n/a	PK 100 100N 0805(25V) X7R CAP. (RC)
71-1355	n/a	PK 100 2N2 0805 50V X7R CAP. RC
71-1360	n/a	PK 100 4N7 0805 50V X7R CAP. (RC)
71-1365	n/a	PK 100 10N 0805 50V X7R CAP. (RC)
71-1340	n/a	PK 100 330PF 0805 50V NPO CAP.RC
71-1345	n/a	PK 100 470PF 0805 50V NPO CAP. (RC)
71-1350	n/a	PK 100 1N 0805 50V X7R CAP. (RC)
71-1325	n/a	PK 100 100PF 0805 50V NPO CAP. (RC)
71-1330	n/a	PK 100 150PF 0805 50V NPO CAP. RC
71-1335	n/a	PK 100 220PF 0805 50V NPO CAP. (RC)
71-1312	n/a	PK 100 27PF 0805 50V NPO CAP. RC
71-1315	n/a	PK 100 33PF 0805 50V NPO CAP. (RC)
71-1320	n/a	PK 100 47PF 0805 50V NPO CAP. (RC)
71-1570	n/a	RL 4000 47PF 0805 50V NPO CAP. (RC)
71-1575	n/a	RL 4000 100PF 0805 50V NPO CAP (RC)
71-1580	n/a	RL 4000 150PF 0805 50V NPO CAP RC
71-1560	n/a	RL 4000 22PF 0805 50V NPO CAP. (RC)
71-1562	n/a	RL 4000 27PF 0805 50V NPO CAP. (RC)
71-1565	n/a	RL 4000 33PF 0805 50V NPO CAP. (RC)
71-1978	n/a	RL 22N Y5V 0603 CHIP CERAMIC 50V(4000)RC
71-1550	n/a	10PF 0805 50V NPO CAP (4000) (RC)
71-1555	n/a	RL 4000 15PF 0805 50V NPO CAP (RC)
71-1972	n/a	RL 47N X7R 0603 CHIP CERAMIC 16V(4000)RC
71-1974	n/a	RL 100N X7R 0603 CHIP CERAMI 16V(4000)RC
71-1976	n/a	RL 10N Y5V 0603 CHIP CERAMIC 50V(4000)RC
71-1966	n/a	RL 15N X7R 0603 CHIP CERAMIC 50V(4000)RC
71-1968	n/a	RL 22N X7R 0603 CHIP CERAMIC 25V(4000)RC
71-1970	n/a	RL 33N X7R 0603 CHIP CERAMIC (4000)
71-1960	n/a	RL 3N3 X7R 0603 CHIP CERAMIC 50V(4000)RC

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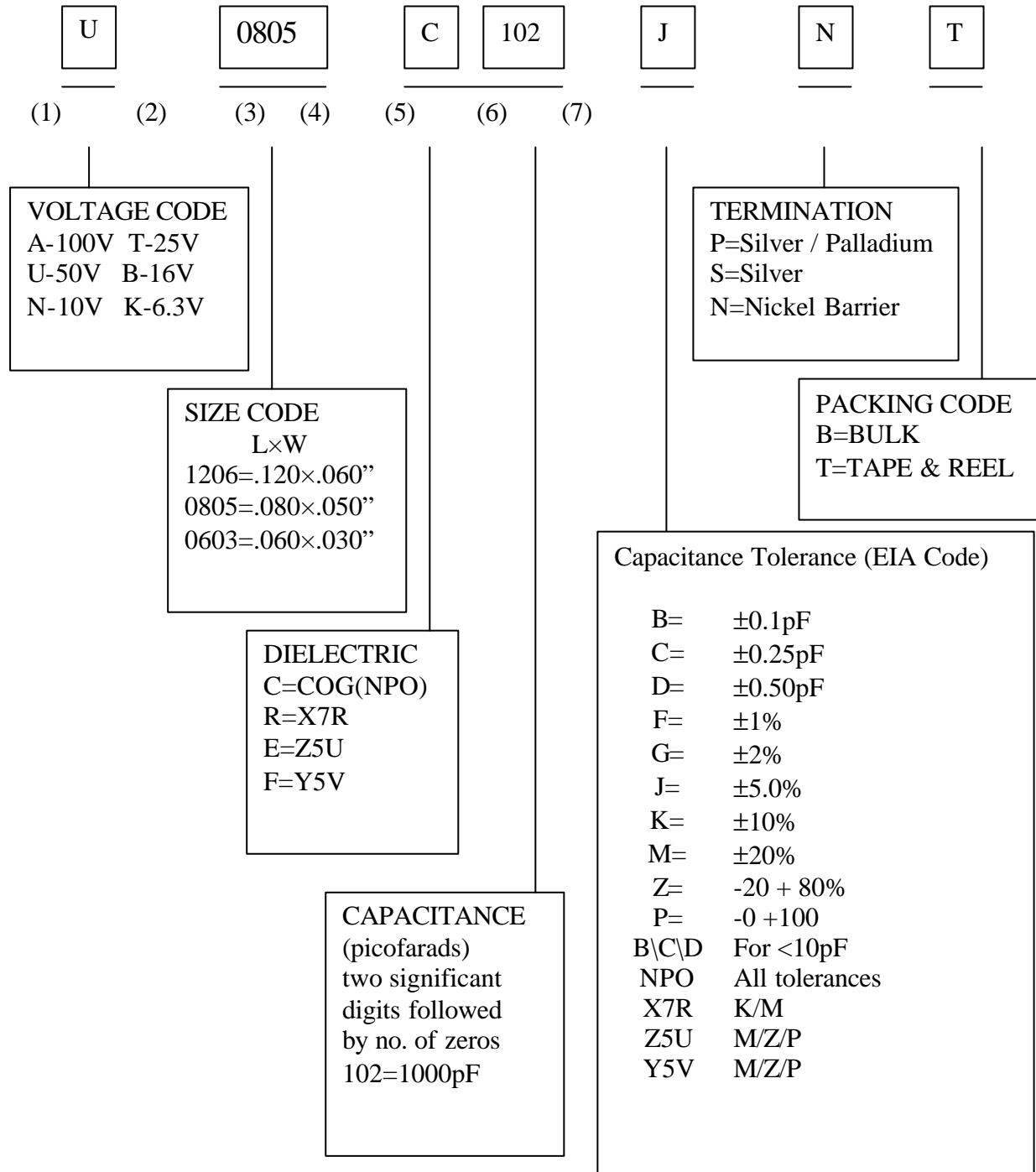
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71-1962	n/a	RL 4N7 X7R 0603 CHIP CERAMIC 50V(4000)RC
71-1964	n/a	RL 10N X7R 0603 CHIP CERAMIC 50V(4000)RC
71-1954	n/a	RL 1N X7R 0603 CHIP CERAMIC 50V(4000)RC
71-1956	n/a	RL 1N5 X7R 0603 CHIP CERAMIC 50V(4000)RC
71-1958	n/a	RL 2N2 X7R 0603 CHIP CERAMIC 50V(4000)RC
71-1922	n/a	56PF NPO 10% 0603 CHIP CERAM 50V(4000)RC
71-1950	n/a	RL 470PF X7R 0603 CHIP CERAM 50V(4000)RC
71-1952	n/a	RL 680PF X7R 0603 CHIP CERAM 50V(4000)RC
71-1914	n/a	27PF NPO 10% 0603 CHIP CERAM 50V(4000)RC
71-1916	n/a	RL33PF NPO 10% 0603CHIP CERA 50V(4000)RC
71-1920	n/a	RL 47PF NPO10% 0603 CHIP CER 50V(4000)RC
71-1908	n/a	10PF NPO 10% 0603 CHIP CERAM 50V(4000)RC
71-1910	n/a	RL 15PF NPO10% 0603 CHIP CER 50V(4000)RC
71-1912	n/a	22PF NPO 10% 0603 CHIP CERAM 50V(4000)RC
71-1902	n/a	RL 2P2 NPO 0603 CHIP CERAMIC 50V(4000)RC
71-1904	n/a	RL 4P7 NPO 0603 CHIP CERAMIC 50V(4000)RC
71-1906	n/a	RL 6P8 NPO 0603 CHIP CERAMIC 50V(4000)RC
71-1866	n/a	470N Y5V 0603 CHIP CERAMIC 16V (100) RC
71-1868	n/a	1U Y5V 0603 CHIP CERAMIC 16V (100) RC
71-1900	n/a	RL 1PF NPO 0603 CHIP CERAMIC 50V(4000)RC
71-1988	n/a	RL 1U Y5V 0603 CHIP CERAMIC 16V(4000) RC
71-1862	n/a	100N Y5V 0603 CHIP CERAMIC 25V (100) RC
71-1864	n/a	220N Y5V 0603 CHIP CERAMIC 25V (100) RC
71-1982	n/a	RL 100N Y5V 0603 CHIP CERAMI 25V(4000)RC
71-1984	n/a	RL 220N Y5V 0603 CHIP CERAMI 25V(4000)RC
71-1986	n/a	RL 470N Y5V 0603 CHIP CERAMI 16V(4000)RC
71-1840	n/a	3N3 X7R 0603 CHIP CERAMIC 50V (100) RC
71-1842	n/a	4N7 X7R 0603 CHIP CERAMIC 50V (100) (RC)
71-1980	n/a	RL 47N Y5V 0603 CHIP CERAMIC (4000)
71-1834	n/a	1N X7R 0603 CHIP CERAMIC 50V (100) (RC)
71-1836	n/a	1N5X7R 0603 CHIP CERAMIC 50V (100) RC
71-1838	n/a	2N2 X7R 0603 CHIP CERAMIC 50V (100) RC

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1.SCOPE

This specification is applicable to Pan Overseas multilayer ceramic capacitors.

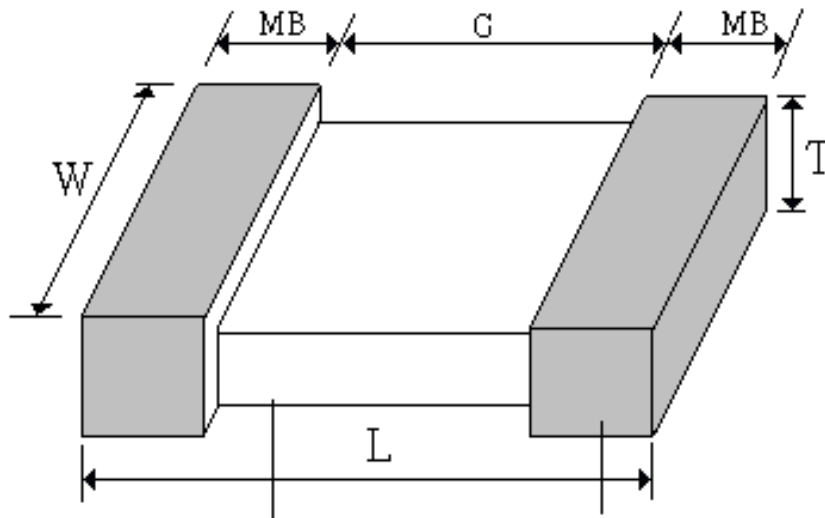
2.CODE CONSTRUCTION:



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3. SHAPE AND DIMENSIONS



Ceramic dielectric Terminal electrode

Unit:mm

TYPE	L	W	thickness	MB(min.)	Gmin
0603	1.6±0.1	0.80±0.1	0.8±0.1	0.20	0.3
0805	2.0±0.2	1.20 +0.2/-0.15	1.40max	0.25	0.7
1206	3.2±0.2	1.60±0.2	1.52max	0.25	1.4

4.STANDARD TEST CONDITIONS:

Tests shall, unless otherwise specified, be carried out at 5 to 35°C and RH 45 to 85%.  
 If any doubt has been encounter in judgement, the test shall be done at 25±2°C,RH 60 to 70% and 860~1060mbar.

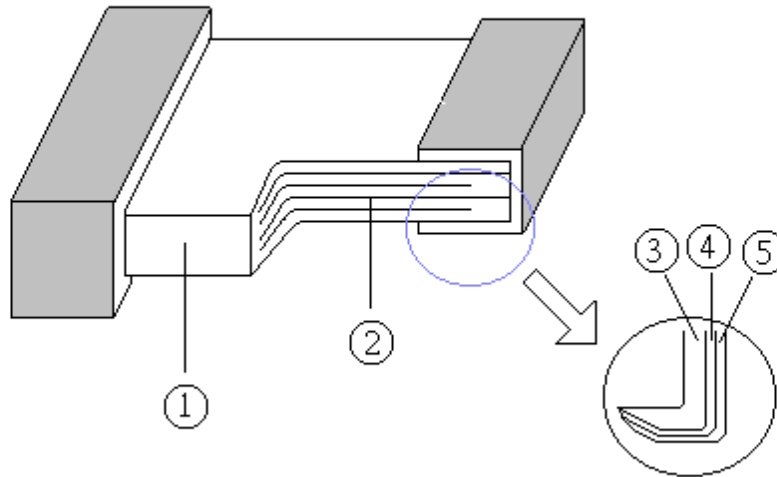
5.STORING CONDITION AND TERM

Recommends the storing of products within 6 months at temperature 15~35°C and humidity 70%RH max.

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## 6. STURCTURE



NO	Specifications	Material
1	Ceramic dielectric	Ceramic
2	Internal Electrode	70Ag-30Pd
3	Terminal electrode	Ag layer(Ta)
4		Ni layer(Tn)
5		Sn layer(Ts)
		90Sn-10Pb

\*Ta: 40 μm min.

Tn: 1 μm min.

Ts: 2 μm min

## 7. OPERATING TEMPERATURE RANGE

Y5V : -30~85°C

Z5U : +10~85°C

NPO, X7R : -55~125°C

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<b>8.PERFORMANCE</b>			
NO.	Item	Performance	Test or inspection method
(1)	External Appearance	No defects which may affect performance.	Visual inspection.
(2)	Voltage Proof	Withstand test voltage without Insulation breakdown or other damage.	2.5 times of rated voltage About DC voltage shall be applied for 1~5sec Charge/discharge current shall not Exceed 50 mA .
(3)	Insulation Resistance	NPO: 100,000M $\Omega$ or 10,000M $\Omega$ $\Omega$ F Min (Whichever is smaller) X7R, Y5V, Z5U: 10,000M $\Omega$ or 1,000M $\Omega$ $\Omega$ F Min (Whichever is smaller)	Apply rated voltage for 1 minute.
(4)	Capacitance	Within the specified tolerance.	Measuring frequency: Z5U-Y5V-X7R:1KHz $\pm$ 50Hz NPO : >1000pF : 1KHz $\pm$ 50Hz $\leq$ 1000pF : 1MHz $\pm$ 100KHz  Measuring voltage: Z5U : 0.5VRMS X7R-Y5V : 1.0 $\pm$ 0.2VRMS NPO : 1.0 $\pm$ 0.2VRMS
(5)	Dissipation Factor	NPO: $\geq$ 30pF: Q $\geq$ 1000 < 30pF : Q $\geq$ 400+20C X7R: $\geq$ 50V : 0.025max. <50V : 0.035max. Y5V: $\geq$ 50V : 0.050max. <50V : 0.070max. $\leq$ 16V & C $\geq$ 1.0 uF : 0.090max. $\leq$ 10V : 0.125max. Z5U: 0.040max.	
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NO.	ITEM	Performance			Test or inspection method
(6)	Temperature Characteristic of Capacitance	Temperatures Coefficient			Temperature Coefficient is calculated basing on values determined at 25°C and maximum operating temperature. Capacitance shall be measured by the step , shown in the following table. Equilibrium is obtained for each step.
		T.C.	Operating Temperature	Capacitance Change(ΔC)	
		NPO	-55~+125°C	0±30(ppm/°C)	
		X7R	-55~+125°C	± 15%	
		Y5V	-30~+85°C	+22%~-82%	
		Z5U	+10~+85°C	+22%~ -56%	
		Step	Temperature(°C)		
		1	25±2		
		2	Min.Temp.±2		
		3	25±2		
		4	Max.Temp.±2		
(7)	Solderability	New solder to over 75% of termination			Completely soak both terminal electrodes in solder at 235±5°C for 3±0.5 sec.
(8)	Solder -ing to Heat	External appearance	No Cracks and terminations are covered at least 75% with new solder.		Completely immerse both terminations in solder at 270±5°Cfor 3±0.5 sec.  Leave the capacitors in ambient condition for the following time before measurement.  Class 1: 4~24 hours. Class 2: 24 ± 2 hours ambient.  Preconditioning: (only for Class 2): Perform a heat treatment at 150 +0- 10°C for one hour and then let sit for 48±4 hours at room temperature. Perform the initial measurement.
		Capacitance ΔC/C	NPO	±2.5% or ± 0.25 pF max. (whichever is larger)	
			X7R	±15%	
			Z5U	±20%	
		Y5V	±20%		
	D.F.	Meet the initial specification			
	Insulation Resistance	Meet The initial specification			
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NO.	ITEM		Performance		Test or inspection method	
(9)	Moisture Resistance	External appearance	No mechanical damage.		Apply the rated voltage at temperature 40±2°C and humidity 90 to 95%RH for 500+24,-0 hours.  Charge / discharge current shall. not exceed 50 mA.  Leave the capacitors in ambient condition for the following time before measurement.  Class 1: 24 ± 2 hours. Class 2: 48 ± 4 hours.  Preconditioning: (only for Class 2): Apply the rated DC voltage for 1hour at 40±2°C. Remove and let sit for 48±4 hours at room temperature. Perform initial measurement.	
		Capacitance ΔC/C	NPO	±5% or ±0.5pF max. (Whichever is larger.)		
			X7R	±15%		
			Y5V	±30%		
			Z5U	±30%		
		Q or DF	NPO: (1) ≥30pF : Q ≥350 (2) 10pF ≤ C < 30pF Q ≥ 275+2.5C (3) <10pF Q ≥200+10 C X7R: 0.05max. Y5V: ≥50V : 0.075max. 16V ≤ C < 50V : 0.10 max. 16V & C ≤ 1.0uF : 0.125max. ≤10V : 0.15max. Z5U : 0.075max.			
		Insulation Resistance	1,000MΩ or 100MΩ ΩF min. (whichever is smaller)			
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NO.	ITEM		Performance	Test or inspection method
(10)	Life	External appearance	No mechanical damage.	
		Capacitance ΔC/C.	NPO	±3% or ±0.3pF max. (Whichever is larger)
		D.F.	X7R	±15%
			Y5V	±30%
			Z5U	±30%
			<p>NPO:</p> <p>(1) <math>C \geq 30\text{pF} : Q \geq 350</math></p> <p>(2) <math>10\text{pF} \leq C &lt; 30\text{pF}</math> <math>Q \geq 275 + 2.5^\circ\text{C}</math></p> <p>(3) <math>C &lt; 10\text{pF}</math> <math>Q \geq 200 + 10^\circ\text{C}</math></p> <p>Characteristics</p> <p>X7R:</p> <p>(1) <math>\geq 50\text{V} : 0.04 \text{ max.}</math></p> <p>(2) <math>&lt; 50\text{V} : 0.05 \text{ max.}</math></p> <p>Y5V:</p> <p><math>\geq 50\text{V} : 0.075 \text{ max.}</math></p> <p><math>16\text{V} \leq C &lt; 50\text{V} : 0.10 \text{ max.}</math></p> <p><math>16\text{V} \ \&amp; \ C \geq 1.0\mu\text{F} : 0.125 \text{ max.}</math></p> <p><math>\leq 10\text{V} : 0.15 \text{ max.}</math></p> <p>Z5U:</p> <p>0.075 max.</p>	
		Insulation Resistance	1,000MΩ or 100MΩ ÷F min. (Whichever is smaller.)	
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Preconditioning: (only for Class 2):  
Apply 200% of the rated DC voltage for 1 hour at the maximum operating temperature  $\pm 3^\circ\text{C}$ . Remove and let sit for  $48 \pm 4$  hours at room temperature. Perform initial measurement.

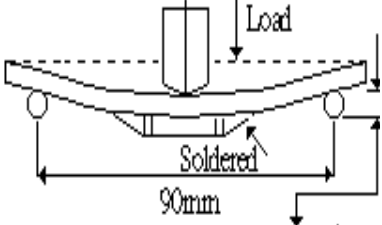
Apply 2×rated voltage at maximum operating temperature  $\pm 3^\circ\text{C}$  for 500 +48/-0 hours.

Charge / discharge current shall not exceed 50 mA.

Leave the capacitors in ambient condition for the following time before measurement.

Class 1:  $24 \pm 2$  hours.

Class 2:  $48 \pm 4$  hours.

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NO.	ITEM		Performance	Test or inspection method
(11)	Deflection	NPO	No cracking or marking defects shall occur $\Delta C \leq \pm 5\%$ ( $C > 10\text{pF}$ ) $\Delta C \leq 0.5\text{ pF}$ ( $C \leq 10\text{pF}$ )	 <p>Flexure: 1mm</p>
		X7R	No cracking or marking defects shall occur $\Delta C \leq \pm 12.5\%$	
		Z5U Y5V	No cracking or marking defects shall occur $\Delta C \leq \pm 20\%$	
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9. Specification table of capacitance with rated voltage:

Size	T.C.	Rated voltage	Capacitance value
0603	COG(NPO)	50 V	0.5 ~ 1000 pF
		50 V	180 ~ 22,000 pF
	X7R	25 V	10,000 ~ 27,000 pF
		16 V	18,000 ~ 100,000 pF
	Z5U	50 V	1,000 ~ 10,000 pF
	Y5V	50 V	1,000 ~ 100,000 pF
		25 V	33,000 ~ 100,000 pF
		16 V	47,000 ~ 330,000 pF
		10 V	47,000 ~ 1,000,000 pF
	0805	COG(NPO)	25/50/100 V
100 V			150 ~ 15,000 pF
X7R		50 V	150 ~ 100,000 pF
		25 V	10,000 ~ 150,000 pF
		16 V	10,000 ~ 1,000,000 pF
		50 V	1,000 ~ 100,000 pF
Z5U		25 V	1,000 ~ 100,000 pF
		50 V	1,000 ~ 220,000 pF
Y5V		25 V	1,000 ~ 330,000 pF
		16 V	220,000 ~ 1,000,000 pF
		10 V	220,000 ~ 2,200,000 pF
		100 V	0.5 ~ 2,200 pF
1206	COG(NPO)	50 V	0.5 ~ 6,800 pF
		25 V	0.5 ~ 10,000 pF
		100 V	330 ~ 39,000 pF
	X7R	50 V	330 ~ 150,000 pF
		25 V	330 ~ 330,000 pF
		16 V	330 ~ 470,000 pF
		50 V	1,000 ~ 220,000 pF
	Z5U	50 V	1,000 ~ 220,000 pF
	Y5V	50 V	1,000 ~ 470,000 pF
		25 V	68,000 ~ 1,000,000 pF
		16 V	220,000 ~ 4,700,000 pF
		10 V	220,000 ~ 10,000,000 pF

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10.Packing:

(1) Reel specification: Standard reel diameter is 7" and 13"

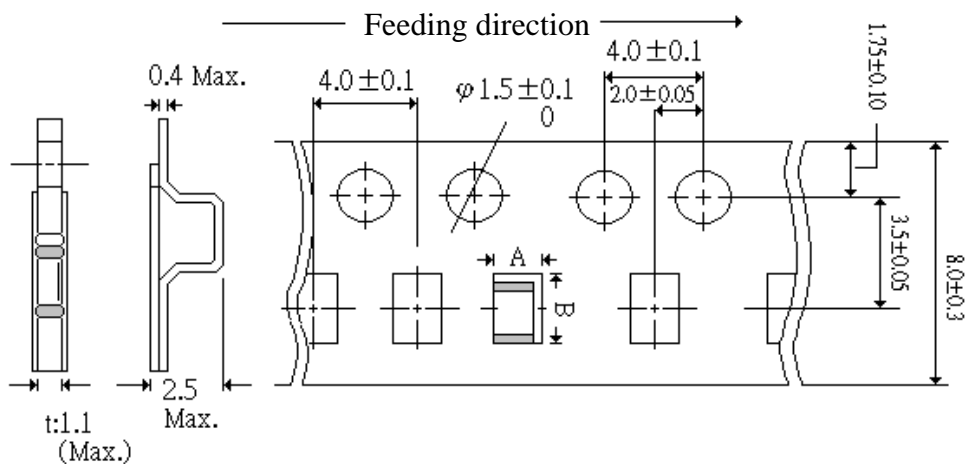
(2) Quantity for each reel:

Chip size	Tape Wide	Quantity per reel
0603	8 mm	4000
0805	8 mm	3000/4000 *
1206	8 mm	3000/4000 *

\* Different size of reel base on different thickness of chips

(3) Tape specification:

8 mm Tape



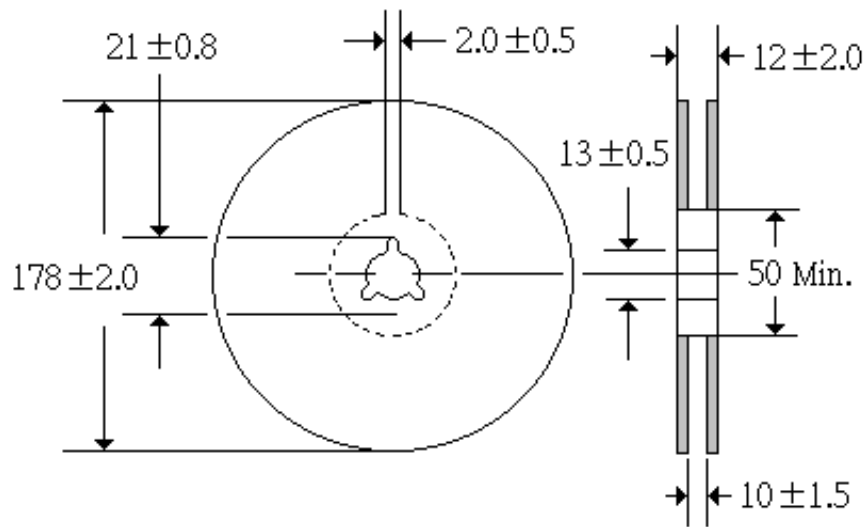
	0603	0805	1206
A	1.05±0.1	1.55±0.15	2.0±0.2
B	1.85±0.1	2.3±0.15	3.6±0.2

Unit: mm

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(4) Dimension of reel :



(5) Peeling off strength of Top tape

The angle between top tape and base tape is  $165 \sim 180^\circ$ , and the peeling speed is control in  $300 \pm 10$  mm/min, and the peeling force as follows:

- 8mm tape or base tape : 10 ~ 100 grams (0.1~1.0N)
- 12mm tape or base tape: 10 ~ 130 grams (0.1~ 1.3N)

