

Data Sheet

Customer:

Product: Industrial MLCC – IM Series

Sizes.: 0201/0402/0603/0805/1206/1210/1808/1812

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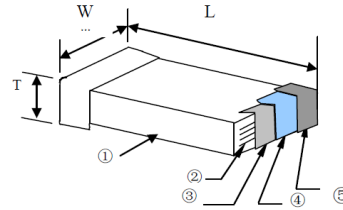
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Industrial MLCC
Industrial MLCC



Construction



Feature

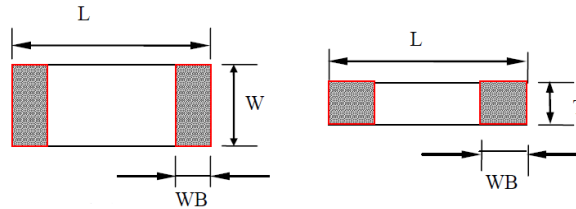
- The product has high reliability and is suitable for various electronic products with harsh application conditions, high quality requirements and low failure rate.
- Executive Standard: GH/T 21041-2007, GH/T 21042-2007

①	Ceramic Dielectric	④	Nickel Layer:
②	Inner Electrodes	⑤	Tin Layer
③	Substrate Electrodes		

Applications

- The products are specially designed and applied to industrial electronic automation equipment, network core equipment and related electronic products.

Dimensions



Capacitance ≤ 50V

Type	Size (Inch)	L (mm)	W (mm)	T (mm)	WB (mm)	Special Instructions
01	0201	0.60±0.03	0.30±0.03	0.30±0.03	0.15±0.05	C<220nF
		0.60±0.05	0.30±0.05	0.30±0.05	0.15±0.05	C≥220nF
02	0402	1.00±0.05	0.50±0.05	0.50±0.05	0.25±0.05	C<1uF
		1.00±0.15	0.50±0.15	0.50±0.15	0.25±0.05	1uF ≤ C<10uF
		1.00±0.20	0.50±0.20	0.50±0.20	0.25±0.05	C ≥ 10uF
03	0603	1.60±0.10	0.80±0.10	0.80±0.10	0.35±0.20	C<10uF
		1.60±0.20	0.80±0.20	0.80±0.20	0.35±0.20	C ≥ 10uF
05	0805	2.00±0.20	1.25±0.20	0.80±0.20	0.50±0.20	C<1uF
				1.25±0.20	0.50±0.20	C ≥ 1uF
06	1206	3.20±0.30	1.60±0.30	0.80±0.20	0.60±0.30	C ≤ 330nF
				1.00±0.20	0.60±0.30	330nF<C<470nF
				1.25±0.20	0.60±0.30	470nF ≤ C<2.2uF
				1.60±0.30	0.60±0.30	C ≥ 2.2uF
10	1210	3.20±0.30	2.50±0.30	≤ 2.80	0.60±0.30	All
08	1808	4.50±0.40	2.00±0.20	≤ 2.20	0.60±0.30	All
12	1812	4.50±0.40	3.20±0.30	≤ 3.50	0.60±0.30	All

Note: The specific thickness of the product can read capacity range and voltage in this approval sheet.

Industrial MLCC

Capacitance > 50V

Type	Size (Inch)	L (mm)	W (mm)	T (mm)	WB (mm)
02	0402	1.00±0.05	0.50±0.05	0.50±0.05	0.25±0.10
03	0603	1.60±0.10	0.80±0.10	0.80±0.10	0.30±0.10
05	0805	2.00±0.20	1.25±0.20	≤0.55	0.50±0.20
				0.80±0.20	
				1.00±0.20	
				1.25±0.20	
06	1206	3.20±0.30	1.60±0.30	0.80±0.20	0.60±0.30
				1.00±0.20	
				1.25±0.20	
				1.60±0.30	
10	1210	3.20±0.30	2.50±0.30	≤2.80	0.60±0.30
08	1808	4.50±0.40	2.00±0.20	≤2.20	0.60±0.30
12	1812	4.50±0.40	3.20±0.30	≤3.50	0.60±0.30

Note: The specific thickness of the product can read capacity range and voltage in this approval sheet.

Part Numbering

IM	03	J	T	N	250	3R9
Product Type	Dimensions (L×W)	Capacitance Tolerance	Packaging	Dielectric	Voltage (VDCW)	Capacitance
	01: 0201 02: 0402 03: 0603 05: 0805 06: 1206 10: 1210 08: 1808 12: 1812	A: ±0.05pF (Cap≤10pF) B: ±0.1pF (Cap≤10pF) C: ±0.25pF (Cap≤10pF) D: ±0.5pF (Cap≤10pF) F: ±1% G: ±2% J: ±5% K: ±10% M: ±20%	T: Taping Reel	N: NPO (COG) B: X7R BS: X7S S: X6S X: X5R	4V0: 4V 6V3: 6.3V 250: 25V 500: 50V 101: 100V 102: 1000V 202: 2000V 302: 3000V	3R9: 3.9pF 150: 15pF 181: 180pF 225: 2.2μF 106: 10μF

Temperature Coefficient /Characteristics

Dielectric	Reference Temperature Point	Temperature Coefficient	Operation Temperature Range
NOP(COG)	20℃	0±30ppm/℃	-55~125℃
X5R	20℃	±15%	-55~85℃
X7R	20℃	±15%	-55~125℃
X7S	20℃	±22%	-55~125℃
X6S	20℃	±22%	-55~105℃

Note : Nominal temperature coefficient and allowed tolerance of class I are decided by the changing of the capacitance between 20℃ and 85℃.
Nominal temperature coefficient of class II are decided by the temperature of 20℃.

■ General Capacitance & Voltage

Capacitance & Voltage (NPO)

Type	Rated Voltage	Capacitance	
		NPO(COG) (pF)	
0201	50V	0R1~221 【0.3】	
0402	50V	0R1~102 【0.5】	
	100V	0R1~101 【0.5】	
0603	50V	0R1~682 【0.8】	
	100V	0R1~102 【0.8】	
	200V	0R1~471 【0.8】	
	250V	0R1~471 【0.8】	
0805	50V	0R1~822 【0.8】 103~223 【1.25】	
	100V	0R1~332 【0.8】	
	200V ~ 250V	0R1~102 【0.8】 122~152 【1.25】	
		500V ~ 630V	0R1~331 【0.8】 471~561 【1.25】
	1000V	0R1~101 【1.25】	
	1206	50V	0R3~822 【0.8】 103~104 【1.6】
100V		0R1~332 【0.8】	
200V ~ 250V		0R1~182 【0.8】 202~272 【1.25】	
		500V ~ 630V	0R1~100 【0.8】 110~471 【1】 561~152 【1.25】
1000V			0R1~121 【1】 151~102 【1.25】
			2000V
1210		50V	
		100V	1R0~682 【1.25】
		200V ~ 250V	1R0~332 【1.25】 1R0~122 【1.25】
			500V ~ 630V
	1000V	821~122 【1.6】	
	2000V	1R0~271 【1.25】 301~471 【1.6】	
		1808	50V
100V	2R0~472 【1.6】		
200V ~ 250V	2R0~392 【1.6】		
500V ~ 630V	2R0~272 【1.6】 2R0~102 【1.6】		
	2000V		2R0~471 【1.6】
3000V	2R0~331 【1.6】		
4000V	2R0~330 【1.6】		
5000V	2R0~330 【1.6】		
1812	50V	100~104 【1.25】	
	100V	3R0~103 【1.25】	
	200V ~ 250V	3R0~682 【1.25】 3R0~102 【1.25】	
		500V ~ 630V	122~472 【1.6】 3R0~122 【1.6】
	1000V		3R0~102 【1.6】
	2000V	3R0~102 【1.6】	
	3000V	3R0~561 【1.6】	
	4000V	3R0~221 【1.6】	
	5000V	3R0~680 【1.6】	

■ 【】 General thickness corresponds to the capacity, unit: mm

■ General Capacitance & Voltage

Capacitance & Voltage (X7R)

Type	Rated Voltage	Capacitance
		X7R (pF)
0201	≤ 16V	101~223 【0.3】
	25V	101~103 【0.3】
	50V	101~102 【0.3】
0402	≤ 10V	101~473 【0.5】
	16V	101~224 【0.5】
	25V	101~104 【0.5】
	50V	101~473 【0.5】
0603	100V	151~103 【0.5】
	≤ 10V	151~225 【0.8】
	16V	151~225 【0.8】
	25V	151~105 【0.8】
	50V	151~474 【0.8】
	100V	151~104 【0.8】
0805	200V	151~103 【0.8】
	250V	151~103 【0.8】
	≤ 10V	151~474 【0.8】
		564~475 【1.25】
	16V	151~474 【0.8】
		564~225 【1.25】
	25V	151~474 【0.8】
		564~105 【1.25】
	50V	151~334 【0.8】
		364~474 【1.25】
1206	100V	151~563 【0.8】
		683~224 【1.25】
	200V ~ 250V	151~183 【0.8】
		203~223 【1.25】
	500V ~ 630V	151~562 【0.8】
		682~103 【1.25】
	6V3	201~334 【0.8】
		474~155 【1.25】
		225~106 【1.6】
	10V	201~334 【0.8】
		474~155 【1.25】
		225~106 【1.6】
	16V	201~334 【0.8】
		474~155 【1.25】
		225~106 【1.6】
	25V	201~334 【0.8】
	474~155 【1.25】	
	225~106 【1.6】	
50V	201~334 【0.8】	
	474~155 【1.25】	
	225~475 【1.6】	
100V	151~563 【0.8】	
	683~334 【1.25】	
	474~105 【1.6】	
220V ~ 250V	151~273 【0.8】	
	333~154 【1.25】	
	184~224 【1.6】	
500V ~ 630V	151~272 【0.8】	
	332~333 【1.25】	
1000V	151~102 【0.8】	
	112~123 【1.25】	
2000V	151~272 【1.25】	

■ 【】 General thickness corresponds to the capacity, unit: mm

■ General Capacitance & Voltage

Capacitance & Voltage (X7R)

Type	Rated Voltage	Capacitance
		X7R (pF)
1210	6V3	221~474 【1.25】
		564~106 【1.6】
	10V	221~474 【1.25】
		564~106 【1.6】
	16V	221~474 【1.25】
		564~106 【1.6】
	25V	221~474 【1.25】
		564~475 【1.6】
	50V	221~474 【1.25】
		564~475 【1.6】
	100V	151~224 【1.25】
		334~225 【1.6】
	200V ~ 250V	151~154 【1.25】
		184~224 【1.25】
500V ~ 630V	151~563 【1.25】	
	683~104 【1.6】	
1000V	151~392 【1.25】	
	472~223 【1.6】	
2000V	151~272 【1.25】	
	332~103 【1.6】	
1808	6V3	221~475 【1.6】
	10V	221~475 【1.6】
	16V	221~475 【1.6】
	25V	221~475 【1.6】
	50V	221~475 【1.6】
	100V	221~225 【1.6】
	200V ~ 250V	221~224 【1.6】
	500V ~ 630V	221~683 【1.6】
	1000V	151~223 【1.6】
	2000V	151~103 【1.6】
	3000V	151~472 【1.6】
4000V	151~222 【1.6】	
1812	16V	471~105 【1.6】
		125~685 【2.5】
	25V	471~105 【1.6】
		125~475 【2.5】
	50V	471~105 【1.6】
		125~475 【2.5】
	100V	271~564 【1.6】
		684~105 【2】
	200V ~ 250V	271~224 【1.6】
		334~564 【2】
	500V ~ 630V	281~104 【1.6】
		124~224 【2】
	1000V	271~473 【1.6】
		563 【2】
2000V	271~123 【1.6】	
3000V	271~472 【1.6】	
4000V	271~332 【1.6】	

■ 【】 General thickness corresponds to the capacity, unit: mm

■ General Capacitance & Voltage

Capacitance & Voltage (X7S)

Type	Rated Voltage	Capacitance
		(pF)
0402	≤ 10V	104~474 【0.5】
	16V	473~224 【0.5】
	25V	223~224 【0.5】
	50V	472~103 【0.5】
0603	≤ 10V	474~225 【0.8】
	16V	474~105 【0.8】
	25V	474~105 【0.8】
	50V	474~105 【0.8】
0805	≤ 10V	105~106 【1.25】
	16V	154~474 【0.8】
		564~225 【1.25】
	25V	154~474 【0.8】
		564~105 【1.25】
	50V	154~334 【0.8】
364~474 【1.25】		
1206	4V	225~226 【1.6】
	6V3	225~1.6 【1.6】
	10V	225~106 【1.6】
	16V	105~155 【0.8】
		225~106 【1.6】
	25V	105~155 【0.8】
		225~106 【1.6】
	50V	105~155 【0.8】
225~474 【1.6】		
1210	6V3	475~106 【1.6】
	16V	225~106 【1.6】
	25V	225~106 【1.6】
	50V	105~106 【1.6】

■ 【】 General thickness corresponds to the capacity, unit: mm

■ General Capacitance & Voltage

Capacitance & Voltage (X6S)

Type	Rated Voltage	Capacitance
		(pF)
0201	≤ 16V	153~104 【0.3】
	25V	153~104 【0.3】
0402	≤ 10V	104~105 【0.5】
	16V	104~105 【0.5】
	25V	103~104 【0.5】
0603	≤ 10V	104~225 【0.8】
	16V	104~105 【0.8】
0805	≤ 10V	104~474 【0.8】
		564~475 【1.25】
1206	4V	225~226 【1.6】
	6V3	104~155 【0.8】
		225~226 【1.6】
	10V	104~155 【0.8】
		225~226 【1.6】
	16V	104~155 【0.8】
		225~106 【1.6】
	25V	104~155 【0.8】
225~475 【1.6】		
1210	4V	104~474 【1.25】
		564~106 【1.6】
	6V3	104~474 【1.25】
		564~106 【1.6】
	10V	104~474 【1.25】
		564~106 【1.6】
	16V	104~474 【1.25】
		564~106 【1.6】
	25V	104~474 【1.25】
		564~106 【1.6】

■ **【】** General thickness corresponds to the capacity, unit: mm

■ General Capacitance & Voltage

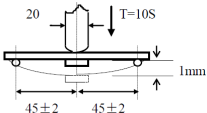
Capacitance & Voltage (X5R)

Type	Rated Voltage	Capacitance
		(pF)
0201	≤ 16V	153~224 【0.3】
	25V	153~104 【0.3】
	50V	472~103 【0.3】
0402	≤ 10V	223~105 【0.5】
	16V	223~105 【0.5】
	25V	223~224 【0.5】
0603	50V	472~104 【0.5】
	≤ 10V	474~225 【0.8】
	16V	474~225 【0.8】
0805	25V	474~225 【0.8】
	50V	474~105 【0.8】
	≤ 10V	564~106 【1.25】
1206	16V	564~475 【1.25】
	25V	564~225 【1.25】
	50V	564~105 【1.25】
	4V	105~155 【0.8】
	6V3	225~106 【1.6】
	10V	225~106 【1.6】
1210	16V	225~106 【1.6】
	25V	225~475 【1.6】
	50V	225~475 【1.6】
	4V	475~106 【1.6】
	6V3	475~106 【1.6】
	10V	475~106 【1.6】
1808	16V	475~106 【1.6】
	25V	475~106 【1.6】
	6V3	475~106 【1.6】
	10V	475~106 【1.6】
1812	25V	475~106 【2.5】

■ **【】** General thickness corresponds to the capacity, unit: mm

Environmental Characteristics

Item	Requirement								Test Method			
Capacitance	Should be within the specified tolerance								NPO: (Class I) Cap≤ 1000pF 1.0±0.2Vrms, 1MHz±10% Cap>1000pF 1.0±0.2Vrms, 1KHz±10% X7R,X7S,X6S,X5R: (Class II) Test Temperature:25℃±3℃ Cap≤ 10uF 1.0±0.2Vrms, 1KHz±10% Cap>10uF 0.5±0.1Vrms, 120Hz±24 Hz			
(DF, tanδ) Dissipation Factor	NPO (Class I)	DF							Capacitance	Measuring Frequency	Measuring Voltage	
		≤0.1%							Cr ≥ 30 pF	1MHz±10%	1.0±0.2Vrms	
		≤1/(400+20Cr)							Cr < 30 pF			
	X7R,X7S, X6S,X5R: (Class II)	Voltage	DF	0201	0402	0603	0805	≥ 1206	Cap≤ 10uF 1.0±0.2Vrms, 1KHz±10% Cap>10uF 0.5±0.1Vrms, 120Hz±24Hz			
		>100V	≤ 250	all								
		100V	≤ 250	-	≤ 10nF	≤ 100 nF	≤ 220 nF	≤ 680 nF				
			≤ 350	-	-	-	-	≤ 1μF				
		50V	≤ 250	≤ 3.3nF	≤ 10nF	≤ 100nF	≤ 330nF	≤ 680 nF				
			≤ 350	≤ 10nF	-	-	-	≤ 1μF				
			≤ 500	-	-	-	≤ 680nF	-				
			≤ 1000	-	≤ 100μF	≤ 1μF	≤ 1μF	≤ 4.7μF				
		25V	≤ 250	≤ 3.3nF	≤ 10nF	≤ 150nF	≤ 330nF	≤ 680 nF				
			≤ 350	≤ 10nF	-	≤ 330nF	-	≤ 2.2μF				
			≤ 500	-	-	-	≤ 1μF	-				
≤ 750	-		-	-	≤ 2.2μF	≤ 4.7μF						
≤ 1000	≤ 100nF		≤ 100nF	≤ 2.2μF	-	≤ 10μF						
16V	≤ 250	≤ 3.3 nF	≤ 10nF	≤ 150nF	≤ 330nF	≤ 680 nF						
	≤ 350	≤ 15nF	≤ 100nF	≤ 330nF	-	≤ 2.2μF						
	≤ 500	≤ 47nF	≤ 220nF	≤ 680nF	≤ 2.2μF	-						
	≤ 750	-	-	-	≤ 4.7μF	≤ 4.7μF						
	≤ 1000	≤ 100nF	≤ 1μF	≤ 2.2μF	-	≤ 10μF						
≤ 10V	≤ 250	≤ 3.3nF	≤ 10nF	≤ 150nF	≤ 330nF	≤ 680nF						
	≤ 350	≤ 15nF	≤ 100nF	≤ 330nF	-	≤ 2.2μF						
	≤ 500	≤ 47nF	≤ 220nF	≤ 680nF	≤ 2.2μF	-						
	≤ 750	-	-	-	≤ 4.7μF	≤ 10μF						
	≤ 1000	≤ 100nF	≤ 1μF	≤ 2.2μF	≤ 10μF	≤ 22μF						
Appearance	No visible damage								Visual inspection			
Physical Dimension	Within the specified dimensions								Use caliper			

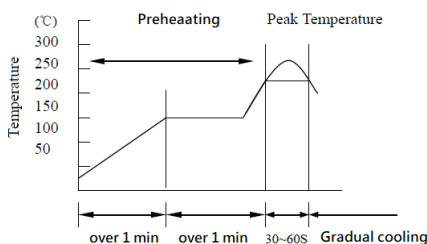
Item	Requirement	Test Method												
Dielectric Withstanding Voltage(DWV)	No breakdown or damage.	Ur<100V Measuring Voltage: Class I :300% Ur Class II :250% Ur Duration: 1~5s Charge/Discharge Current: 50mA max. 100V ≤ Vr<500V Force 200% Rated voltage for 5 seconds. Max current should not exceed 50mA. 500V ≤ Vr ≤ 1000V Force 150% Rated voltage for 5 seconds. Max current should not exceed 50mA. 1000V ≤ Vr ≤ 2000V Force 120% Rated voltage for 5 seconds. Max current should not exceed 50mA. 2000V ≤ Vr ≤ 5000V Force 120% Rated voltage for 5 seconds. Max current should not exceed 10mA.												
Solderability	At least 95% of the terminal electrode is covered by new solder. Visual Appearance: No visible damage.	Preheating conditions:80 to 120℃ ; 10~30s. <table border="1" data-bbox="1066 846 1538 958"> <tr> <td data-bbox="1066 846 1310 958">Solder Temperature: 235±5℃ (Sn/Pb:63/37) Duration: 2±0.5s</td> <td data-bbox="1310 846 1538 958">Solder Temperature: 245±5℃ (Lead-free) Duration: 3±0.3s</td> </tr> </table>	Solder Temperature: 235±5℃ (Sn/Pb:63/37) Duration: 2±0.5s	Solder Temperature: 245±5℃ (Lead-free) Duration: 3±0.3s										
Solder Temperature: 235±5℃ (Sn/Pb:63/37) Duration: 2±0.5s	Solder Temperature: 245±5℃ (Lead-free) Duration: 3±0.3s													
Resistance to Flexure of Substrate (Bending Strength)	NPO: ΔC/C:≤±1% or ±1pF, whichever is larger. X7R/X7S/X6S/X5R: ΔC/C: -10%~10% DF&IR: Same to initial value Appearance: no visible damage.	Test Board: Al2O3 or PCB Warp: 1mm Speed: 1 mm/sec. Unit: mm The measurement should be made with the board in the bending position. 												
Resistance to Soldering Heat	<table border="1" data-bbox="228 1267 1066 1435"> <tr> <td data-bbox="228 1267 395 1305">Item</td> <td data-bbox="395 1267 759 1305">NPO</td> <td data-bbox="759 1267 1066 1305">X7R/X7S/X6S/X5R</td> </tr> <tr> <td data-bbox="228 1305 395 1361">ΔC/C</td> <td data-bbox="395 1305 759 1361">≤±1% or ±1pF whichever is larger</td> <td data-bbox="759 1305 1066 1361">-15%~+15%</td> </tr> <tr> <td data-bbox="228 1361 395 1400">DF</td> <td data-bbox="395 1361 759 1400">Same to initial value</td> <td data-bbox="759 1361 1066 1400"></td> </tr> <tr> <td data-bbox="228 1400 395 1435">IR</td> <td data-bbox="395 1400 759 1435">Same to initial value</td> <td data-bbox="759 1400 1066 1435"></td> </tr> </table> Appearance : No visible damage. At least 95% of the terminal electrode is covered by new solder.	Item	NPO	X7R/X7S/X6S/X5R	ΔC/C	≤±1% or ±1pF whichever is larger	-15%~+15%	DF	Same to initial value		IR	Same to initial value		Preheating conditions: 100 to 200℃ ; 60~120s. Solder Temperature: 265±5℃ Duration: 10±1s Clean the capacitor with solvent and examine it with a 10X(min.) microscope. Recovery Time: 24±2h Recovery condition: Room temperature
Item	NPO	X7R/X7S/X6S/X5R												
ΔC/C	≤±1% or ±1pF whichever is larger	-15%~+15%												
DF	Same to initial value													
IR	Same to initial value													
Termination Adhesion	No visible damage	Applied Force: 5N Duration: 10±1S												
Vibration	NPO: ΔC/C:≤±1% or ±1pF, whichever is larger. X7R/X7S/X6S/X5R: ΔC/C: -10%~10% DF&IR: Same to initial value Appearance: no visible damage.	5 g's for 20 minutes, 12 cycles each of 3 orientations. Note: Use 8"x5" PCB. 0.31" thick 7 secure points on one long side and 2 secure points at corners of opposite side. Parts mounted within 2" form any secure point. Test from 10~2000Hz.												
Humidity Load	NPO: ΔC/C :±2.5% or ±2.5pF, whichever is larger. X7R/X7S/X6S/X5R: ΔC/C: ≤±10% DF: Same to initial value. IR:Class I: C ≤10nF, Ri ≥10000MΩ C>10nF,Ri-CR ≥100S Class II: C ≤25nF, Ri ≥2000MΩ C>25nF,Ri-CR ≥20S Appearance: No visible damage	Preconditioning, class 2 only: At 140~150℃ 1 hour, then keep for 24±1 hour at room temp. Test condition: 40℃ , 95%RH Add 100KΩ resistor, applied Ur and 1.3 to 1.5 volts for 500 hours.												

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Item	Requirement	Test Method																		
Temperature Cycle	NPO: $\Delta C/C: \leq \pm 1\%$ or $\pm 1\text{pF}$, whichever is larger. X7R/X7S/X6S/X5R: $\Delta C/C: -10\% \sim 10\%$ DF&IR: Same to initial value Appearance: no visible damage.	Preconditioning (class II only): up-category temperature, 1h Recovery time: $24 \pm 1\text{h}$ Initial Measurement Cycling Times: 1000 times, 1 cycle, 4 steps: <table border="1"> <thead> <tr> <th>Step</th> <th>Temp.(°C)</th> <th>Time (min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Low- category temp NPO/X7R/X7S/X6S/X5R : -55</td> <td>30</td> </tr> <tr> <td>2</td> <td>Normal temp. (+20)</td> <td>1</td> </tr> <tr> <td>3</td> <td>Up- category temp NPO/X7R/X7S : +125 X5R: +85 X6S:+105</td> <td>30</td> </tr> <tr> <td>4</td> <td>Normal temp. (+20)</td> <td>1</td> </tr> </tbody> </table> Recovery time after test: $24 \pm 2\text{h}$	Step	Temp.(°C)	Time (min)	1	Low- category temp NPO/X7R/X7S/X6S/X5R : -55	30	2	Normal temp. (+20)	1	3	Up- category temp NPO/X7R/X7S : +125 X5R: +85 X6S:+105	30	4	Normal temp. (+20)	1			
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4	Normal temp. (+20)	1																		
Life Test	NPO: $\Delta C/C: \leq \pm 2\%$ or $\pm 1\text{pF}$, whichever is larger. X7R/X7S/X6S/X5R: $\Delta C/C \leq \pm 20\%$ DF: Same to initial value. IR: Class I: $R_i \geq 5000\text{M}\Omega$ or $R_i \cdot CR \geq 50\text{S}$ whichever is smaller Class II: $R_i \geq 1000\text{M}\Omega$ or $R_i \cdot CR \geq 10\text{S}$ whichever is smaller Visual Appearance: No visible damage	Low-Voltage: $U_r < 100\text{V}$: 2x Rated Voltage $100\text{V} \leq U_r < 500\text{V}$: 2x Rated Voltage $500\text{V} \leq U_r \leq 1000\text{V}$: 1.5x Rated Voltage $U_r > 1000\text{V}$: 1.2x Rated Voltage Duration: 1000h Temperature : 125°C (NPO/X7R/X7S) 85°C (X5R) 105°C (X6S) Charge/ Discharge Current: 50mA max. Recovery Conditions: Room Temperature Recovery Time: 24h (Class 1), or 48h (Class2) <table border="1"> <thead> <tr> <th colspan="4">Table 1</th> </tr> <tr> <th>Capacitance</th> <th>Test Voltage</th> <th>Capacitance</th> <th>Test Voltage</th> </tr> </thead> <tbody> <tr> <td>$0201 \geq 47\text{nF}$</td> <td rowspan="4">1.5Ur</td> <td>$0805 \geq 1\mu\text{F}$</td> <td rowspan="4">1.5 Ur</td> </tr> <tr> <td>$0402 \geq 330\text{nF}$</td> <td>$1206 \geq 10\mu\text{F}$</td> </tr> <tr> <td>$0603 \geq 470\text{nF}$</td> <td>$1210 \geq 10\mu\text{F}$</td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>	Table 1				Capacitance	Test Voltage	Capacitance	Test Voltage	$0201 \geq 47\text{nF}$	1.5Ur	$0805 \geq 1\mu\text{F}$	1.5 Ur	$0402 \geq 330\text{nF}$	$1206 \geq 10\mu\text{F}$	$0603 \geq 470\text{nF}$	$1210 \geq 10\mu\text{F}$		
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$0603 \geq 470\text{nF}$		$1210 \geq 10\mu\text{F}$																		
High Temperature Exposure	NPO: $\Delta C/C: \leq \pm 1\%$ or $\pm 1\text{pF}$, whichever is larger. X7R/X7S/X6S/X5R: $\Delta C/C: -10\% \sim 10\%$ DF&IR: Same to initial value	Temperature: 125°C (NPO/X7R/X7S) 85°C (X5R) 105°C (X6S) Voltage: without Duration: 1000h Recovery conditions: room temperature Recovery Time: 24h(Class I) or 48h(Class II)																		
Destructive Physical Analysis	No defects or abnormalities	Accounting to EIA-469																		
Insulation Resistnace(I R)	I : $C \leq 10\text{nF}, R_i \geq 50000\text{M}\Omega$ $C > 10\text{nF}, R_i \cdot CR \geq 500\text{S}$ II: $C \leq 25\text{nF}, R_i \geq 10000\text{M}\Omega$ $C > 25\text{nF}, R_i \cdot CR \geq 100\text{S}$	Measuring Voltage: Rated Voltage Duration: $60 \pm 5\text{s}$ Test Humidity: $\leq 75\%$ Test Temperature: $25 \pm 3^\circ\text{C}$ Test Current: $\leq 50\text{mA}$																		

■ Storage Temperature: 5 ~ 40°C ; Relative Humidity 20 ~70 %RH

■ The temperature profile for soldering



	Pb-Sn Soldering	Lead-free Soldering
Peak Temperature	230~250°C	240~260°C

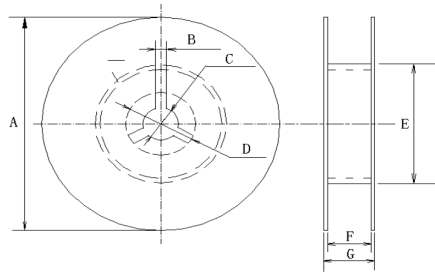
■ While in preheating, please keep the temperature difference between soldering temperature and surface temperature of chips as: $T \leq 150^\circ\text{C}$.

■Packaging

Packaging Quantity

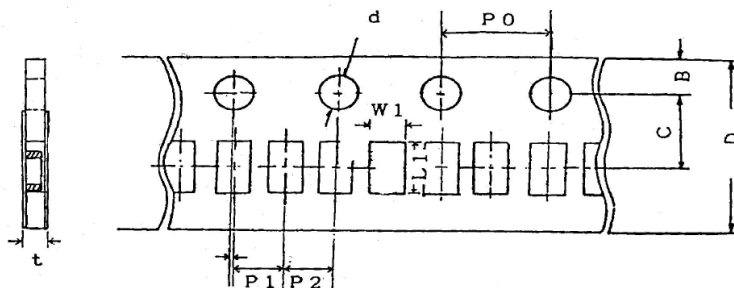
Type	Packaging (7" Reel)	
	Paper tape	Plastic tape
0201	15K	-
0402	10K	-
0603	4K	-
0805	4K	3K
1206	4K	T ≤ 1.35mm 3K T > 1.35mm 2K
1210	-	T ≤ 1.80mm 2K T > 1.80mm 1K
1808	-	2K
1812	-	T ≤ 1.85mm 1K T > 1.85mm 0.5K

Tape and Reel



Type	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)
0201	178±2.0(7")	3.0	13.0±0.5	21.0±0.8	50 or more	10.0±1.5	12 max
0402	178±2.0(7")	3.0	13.0±0.5	21.0±0.8	50 or more	10.0±1.5	12 max
0603	178±2.0(7")	3.0	13.0±0.5	21.0±0.8	50 or more	10.0±1.5	12 max
0805	178±2.0(7")	3.0	13.0±0.5	21.0±0.8	50 or more	10.0±1.5	12 max
1206	178±2.0(7")	3.0	13.0±0.5	21.0±0.8	50 or more	10.0±1.5	12 max
1210	178±2.0(7")	3.0	13.0±0.5	21.0±0.8	50 or more	10.0±1.5	12 max
1808	330±2.0(13")	3.0	13.0±0.5	21.0±0.8	50 or more	12.6 max	13.6 max
1812	330±2.0(13")	3.0	13.0±0.5	21.0±0.8	50 or more	12.6 max	13.6 max

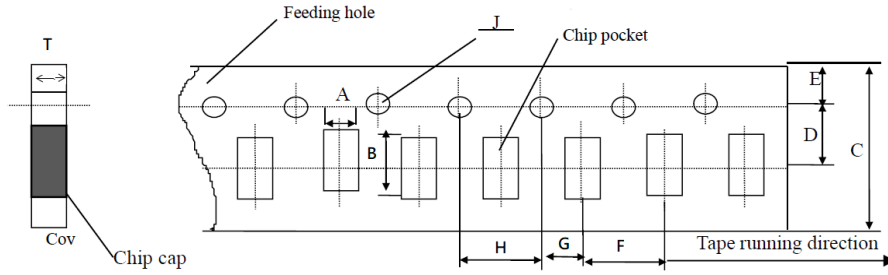
Paper Tape Size Specification



Type	W1 (mm)	L1 (mm)	D (mm)	C (mm)	B (mm)	P1 (mm)	P2 (mm)	P0 (mm)	d (mm)	t (mm)
0201	0.37±0.10	0.67±0.10	8.00±0.10	3.50±0.05	1.75±0.10	2.00±0.05	2.00±0.05	4.00±0.10	1.50-0/+0.10	0.80 Below
0402	0.65±0.10	1.15±0.10	8.00±0.10	3.50±0.05	1.75±0.10	2.00±0.05	2.00±0.05	4.00±0.10	1.50-0/+0.10	0.80 Below

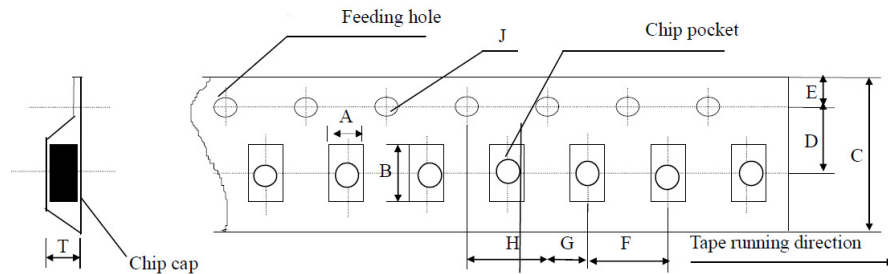
Industrial MLCC

Paper Tape Size Specification



Type	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	J (mm)	T (mm)
0603	1.10±0.10	1.90±0.10	8.00±0.10	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.10	4.00±0.10	1.50-0/+0.10	1.10 max
0805	1.45±0.15	2.30±0.15	8.00±0.15	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.10	4.00±0.10	1.50-0/+0.10	1.10 max
1206	1.80±0.20	3.40±0.20	8.00±0.20	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.10	4.00±0.10	1.50-0/+0.10	1.10 max

Plastic Tape Size Specification



Type	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	J (mm)	T (mm)
0805	1.55±0.20	2.35±0.20	8.00±0.20	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.10	4.00±0.10	1.50-0/+0.10	1.50 Max
1206	1.95±0.20	3.60±0.20	8.00±0.20	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.10	4.00±0.10	1.50-0/+0.10	1.85 Max
1210	2.70±0.10	3.42±0.10	8.00±0.10	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.55-0/+0.10	3.20 Max
1808	2.20±0.10	4.95±0.10	12.00±0.10	5.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50-0/+0.10	3.00 Max
1812	3.66±0.10	4.95±0.10	12.00±0.10	5.50±0.05	1.75±0.10	8.00±0.10	2.00±0.05	4.00±0.10	1.55-0/+0.10	4.00 Max

Recommended Soldering Method

Type	Dielectric	Capacitance	Soldering Method
0201	NPO	-	R
	X7R/X7S/X6S/X5R	-	R
0402	NPO	-	R
	X7R/X7S/X6S/X5R	-	R
0603	NPO	-	R
	X7R/X7S/X6S/X5R	$C \geq 1\mu F$	R
		$C < 1\mu F$	R
0805	NPO	-	R
	X7R/X7S/X6S/X5R	$C \geq 4.7\mu F$	R
		$C < 4.7\mu F$	R
1206	NPO	-	R
	X7R/X7S/X6S/X5R	$C \geq 10\mu F$	R
		$C < 10\mu F$	R
≥ 1210	NPO	-	R
	X7R/X7S/X6S/X5R	-	R

Soldering method : R - Reflow Soldering