

# DATA SHEET

## **SURFACE-MOUNT CERAMIC MULTILAYER CAPACITORS**

General purpose & High capacitance

Class 2, X7R

6.3 V TO 50 V

100 pF to 22  $\mu$ F

RoHS compliant



## SCOPE

This specification describes X7R series chip capacitors with lead-free terminations.

## APPLICATIONS

- PCs, Hard disk, Game PCs
- DVDs, Camcorders
- Mobile phones
- Data processing

## FEATURES

- Supplied in tape on reel
- Nickel-barrier end termination
- RoHS compliant
- Halogen Free compliant

## ORDERING INFORMATION-GLOBAL PART NUMBER, PHYCOMP

### CTC & I2NC

All part numbers are identified by the series, size, tolerance, TC material, packing style, voltage, process code, termination and capacitance value.

### YAGEO BRAND ordering code

### GLOBAL PART NUMBER (PREFERRED)

CC XXXX X X X7R X BB XXX  
 (1) (2) (3) (4) (5)

### (1) SIZE – INCH BASED (METRIC)

0201 (0603)  
 0402 (1005)  
 0603 (1608)  
 0805 (2012)  
 1206 (3216)  
 1210 (3225)  
 1812 (4532)

### (2) TOLERANCE

J = ±5% <sup>(1)</sup>  
 K = ±10%  
 M = ±20%

### (3) PACKING STYLE

R = Paper taping reel; Reel 7 inch  
 K = Blister taping reel; Reel 7 inch  
 P = Paper taping reel; Reel 13 inch  
 F = Blister taping reel; Reel 13 inch  
 C = Bulk case

### (4) RATED VOLTAGE

5 = 6.3 V  
 6 = 10 V  
 7 = 16 V  
 8 = 25 V  
 9 = 50 V

### (5) CAPACITANCE VALUE

2 significant digits+number of zeros  
 The 3rd digit signifies the multiplying factor, and letter R is decimal point  
 Example: 103 =  $10 \times 10^3 = 10,000 \text{ pF} = 10 \text{ nF}$

## NOTE

- I. Tolerance ±5% doesn't available for full product range, please contact local sales force before order

**PHYCOMP BRAND ordering codes**

GLOBAL PART NUMBER (preferred), PHYCOMP CTC (for North America) and I2NC (traditional) codes are acceptable to order Phycomp brand products.

**GLOBAL PART NUMBER (PREFERRED)**

For detailed information of GLOBAL PART NUMBER and ordering example, please refer to page 2.

**I2NC CODE**

**2 2 X X X X X X X X X**

**Carrier type**

- 38 = Paper ( $\geq 10$  V)
- 22 = Blister ( $\geq 10$  V)
- 50 = Blister (6.3 V)
- 55 = Paper (6.3 V)
- 54 = Bulk

**Rated voltage - Termination**

- 20 = 6.3 V
- 24 = 10 V
- 78 = 16 V
- 91 = 25 V
- 58 = 50 V

**Size**

- 8 = 0201
- 7 = 0402
- 6 = 0603
- 0 = 0805
- 1 = 1206
- 2 = 1210
- 4 = 1812

**Capacitance value<sup>(1)</sup>**

**Tolerance**

- 5 =  $\pm 5\%$ <sup>(2)</sup>
- 6 =  $\pm 10\%$
- 7 =  $\pm 20\%$

**Temperature characteristic**

- 5 = X7R

**Packaging<sup>(3)</sup>**

- 1 = reel:  $\varnothing 180$  mm; 7"
- 5 = reel:  $\varnothing 330$  mm; 13"
- 4 = bulk case

YNM0029

(1) Please refer to "Last 2-digit of I2NC" in "CAPACITANCE RANGE & THICKNESS FOR X7R"  
 (2) Tolerance  $\pm 5\%$  doesn't available for full product range, please contact local sales force before order  
 (3) Quantity on reel depends on thickness classification; see table 5

**PHYCOMP CTC CODE (FOR NORTH AMERICA)**

Example: 02012R102K8B20D

0201	2R	102	K	8	B	2	0	D
Size code	Temp. Char.	Capacitance in pF	Tolerance	Voltage	Termination	Packing	Marking	Range identifier
0201	2R = X7R	101 = 100 pF;	J = $\pm 5\%$ <sup>(1)</sup>	5 = 6.3 V	B = NiSn	2 = 180 mm	0 = no marking	D = Class 2 MLCC
0402		the third digit	K = $\pm 10\%$	6 = 10 V		7" paper		
0603		signifies the	M = $\pm 20\%$	7 = 16 V		3 = 330 mm		
0805		multiplying factor:		8 = 25 V		13" paper		
1206		0 = $\times 1$		9 = 50 V		B = 180 mm		
1210		1 = $\times 10$				7" blister		
1812		2 = $\times 100$				F = 330 mm		
		3 = $\times 1,000$				13" blister		
						P = Bulk case		

**NOTE**

I. Tolerance  $\pm 5\%$  doesn't available for full product range, please contact local sales force before order

## CONSTRUCTION

The capacitor consists of a rectangular block of ceramic dielectric in which a number of interleaved metal electrodes are contained. This structure gives rise to a high capacitance per unit volume.

The inner electrodes are connected to the two end terminations and finally covered with a layer of plated tin (NiSn). The terminations are lead-free. A cross section of the structure is shown in Fig. 1.

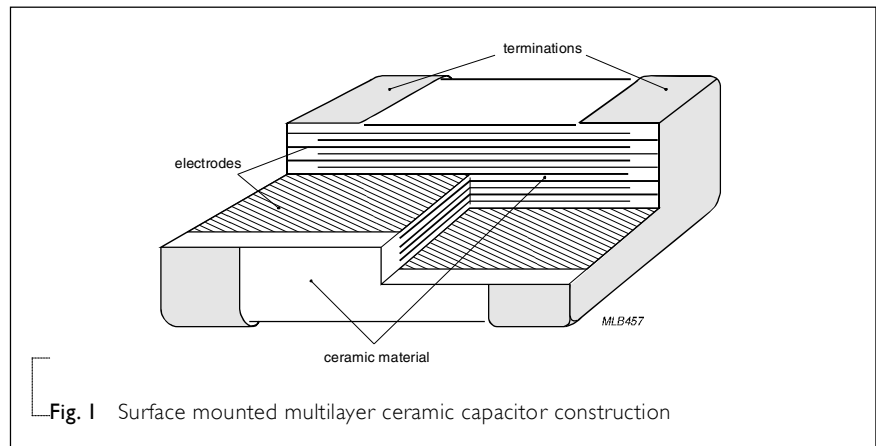


Fig. 1 Surface mounted multilayer ceramic capacitor construction

## DIMENSION

Table I For outlines see fig. 2

TYPE	L <sub>1</sub> (mm)	W (mm)	T (MM)	L <sub>2</sub> / L <sub>3</sub> (mm)		L <sub>4</sub> (mm)
				min.	max.	min.
0201	0.6 ±0.03	0.3 ±0.03	Refer to table 2 to 4	0.10	0.20	0.20
0402	1.0 ±0.05	0.5 ±0.05		0.20	0.30	0.40
0603	1.6 ±0.10	0.8 ±0.10		0.20	0.60	0.40
0805	2.0 ±0.10 <sup>(1)</sup>	1.25 ±0.10 <sup>(1)</sup>		0.25	0.75	0.55
	2.0 ±0.20 <sup>(2)</sup>	1.25 ±0.20 <sup>(2)</sup>				
1206	3.2 ±0.15 <sup>(1)</sup>	1.6 ±0.15 <sup>(1)</sup>		0.25	0.75	1.40
	3.2 ±0.20 <sup>(2)</sup>	1.6 ±0.20 <sup>(2)</sup>				
1210	3.2 ±0.20 <sup>(1)</sup>	2.5 ±0.20 <sup>(1)</sup>		0.25	0.75	1.40
	3.2 ±0.30 <sup>(2)</sup>	2.5 ±0.30 <sup>(2)</sup>				
1812	4.5 ±0.20 <sup>(1)</sup>	3.2 ±0.20		0.25	0.75	2.20
	4.5 ±0.40 <sup>(2)</sup>					

## NOTE

1. Dimension for size 0805 to 1812, C < 1 μF
2. Dimension for size 0805 to 1812, C ≥ 1 μF

## OUTLINES

For dimension see Table I

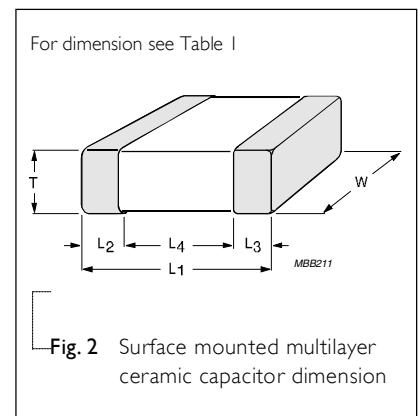


Fig. 2 Surface mounted multilayer ceramic capacitor dimension

**CAPACITANCE RANGE & THICKNESS FOR X7R**

Table 2 Sizes from 0201 to 0402

CAP.	Last 2-digit of	0201					0402				
		12NC	6.3 V	10 V	16 V	25 V	6.3 V	10 V	16 V	25 V	50 V
100 pF	09										
150 pF	12										
220 pF	14										
330 pF	16					0.3±0.03					
470 pF	18										
680 pF	21										
1.0 nF	23										0.5±0.05
1.5 nF	25										
2.2 nF	27										
3.3 nF	29								0.5±0.05	0.5±0.05	
4.7 nF	32	0.3±0.03	0.3±0.03	0.3±0.03							
6.8 nF	34										
10 nF	36										
15 nF	38										
22 nF	41										
33 nF	43										
47 nF	45					0.5±0.05	0.5±0.05				
68 nF	47										
100 nF	49										
150 nF	52										
220 nF	54										
330 nF	56										
470 nF	58										
680 nF	61										
1.0 μF	63										
2.2 μF	67										
4.7 μF	72										
10 μF	76										
22 μF	81										

**NOTE**

1. Values in shaded cells indicate thickness class in mm
2. Capacitance value of non E-6 series is on request
3. For product with 5% tolerance, please contact local sales force before order

**CAPACITANCE RANGE & THICKNESS FOR X7R**

Table 3 Sizes from 0603 to 0805

CAP.	Last 2-digit of		0603					0805				
	12NC	6.3 V	10 V	16 V	25 V	50 V	6.3 V	10 V	16 V	25 V	50 V	
100 pF	09											
150 pF	12											
220 pF	14											
330 pF	16											
470 pF	18											
680 pF	21											
1.0 nF	23											
1.5 nF	25											
2.2 nF	27										0.6±0.1	
3.3 nF	29									0.6±0.1		
4.7 nF	32				0.8±0.1	0.8±0.1						
6.8 nF	34		0.8±0.1	0.8±0.1								
10 nF	36											
15 nF	38											
22 nF	41											
33 nF	43											
47 nF	45											
68 nF	47								0.6±0.1		0.85±0.1	
100 nF	49									0.85±0.1		
150 nF	52						0.85±0.1	0.85±0.1	0.85±0.1			
220 nF	54	0.8±0.1									1.25±0.2	
330 nF	56											
470 nF	58											
680 nF	61											
1.0 µF	63						1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2		
2.2 µF	67	0.8±0.1	0.8±0.1	0.8±0.1								
4.7 µF	72											
10 µF	76											
22 µF	81											

**NOTE**

1. Values in shaded cells indicate thickness class in mm
2. Capacitance value of non E-6 series is on request
3. For product with 5% tolerance, please contact local sales force before order

**CAPACITANCE RANGE & THICKNESS FOR X7R**

Table 4 Sizes from 1206 to 1812

CAP.	Last 2-digit of		1206				1210				1812	
	12NC	6.3 V	10 V	16 V	25 V	50 V	10 V	16 V	25 V	50 V	50 V	
100 pF	09											
150 pF	12											
220 pF	14											
330 pF	16											
470 pF	18											
680 pF	21											
1.0 nF	23											
1.5 nF	25											
2.2 nF	27											
3.3 nF	29											
4.7 nF	32					0.85±0.1						
6.8 nF	34				0.85±0.1							
10 nF	36											
15 nF	38								0.85±0.1		0.85±0.1	
22 nF	41											
33 nF	43											
47 nF	45											
68 nF	47											
100 nF	49											
150 nF	52					1.15±0.1						
220 nF	54									1.15±0.1	1.15±0.1	
330 nF	56			0.85±0.1	0.85±0.1	0.85±0.1			0.85±0.1		1.15±0.1	
470 nF	58			0.85±0.1	0.85±0.1	1.0±0.1			1.15±0.1	1.6±0.2		
680 nF	61									1.25±0.2	1.6±0.2	
1.0 µF	63			1.15±0.1	1.15±0.1	1.6±0.2			1.25±0.2			
2.2 µF	67	1.15±0.1	1.15±0.1									
4.7 µF	72				1.6±0.2				1.9±0.2			
10 µF	76	1.6±0.2	1.6±0.2	1.6±0.2			1.9±0.2	1.9±0.2	1.9±0.2			
22 µF	81							2.5±0.2				

**NOTE**

1. Values in shaded cells indicate thickness class in mm
2. Capacitance value of non E-6 series is on request
3. For product with 5% tolerance, please contact local sales force before order
4. For special ordering code, please contact local sales force before order

**THICKNESS CLASSES AND PACKING QUANTITY**

Table 5

SIZE CODE	THICKNESS CLASSIFICATION	TAPE WIDTH QUANTITY PER REEL	Ø180 MM / 7 INCH		Ø330 MM / 13 INCH		QUANTITY PER BULK CASE
			Paper	Blister	Paper	Blister	
0201	0.3 ±0.03 mm	8 mm	15,000	---	50,000	---	---
0402	0.5 ±0.05 mm	8 mm	10,000	---	50,000	---	50,000
0603	0.8 ±0.1 mm	8 mm	4,000	---	15,000	---	15,000
0805	0.6 ±0.1 mm	8 mm	4,000	---	20,000	---	10,000
	0.85 ±0.1 mm	8 mm	4,000	---	15,000	---	8,000
	1.25 ±0.2 mm	8 mm	---	3,000	---	10,000	5,000
1206	0.6 ±0.1 mm	8 mm	4,000	---	20,000	---	---
	0.85 ±0.1 mm	8 mm	4,000	---	15,000	---	---
	1.00 / 1.15 ±0.1 mm	8 mm	---	3,000	---	10,000	---
	1.25 ±0.2 mm	8 mm	---	3,000	---	10,000	---
	1.6 ±0.15 mm	8 mm	---	2,500	---	10,000	---
1210	1.6 ±0.2 mm	8 mm	---	2,000	---	10,000	---
	0.6 / 0.7 ±0.1 mm	8 mm	---	4,000	---	15,000	---
	0.85 ±0.1 mm	8 mm	---	4,000	---	10,000	---
	1.15 ±0.1 mm	8 mm	---	3,000	---	10,000	---
	1.15 ±0.15 mm	8 mm	---	3,000	---	10,000	---
	1.25 ±0.2 mm	8 mm	---	3,000	---	---	---
	1.5 ±0.1 mm	8 mm	---	2,000	---	---	---
	1.6 / 1.9 ±0.2 mm	8 mm	---	2,000	---	---	---
1808	2.0 ±0.2 mm	8 mm	---	2,000 1,000	---	---	---
	2.5 ±0.2 mm	8 mm	---	1,000 500	---	---	---
	1.15 ±0.15 mm	12 mm	---	3,000	---	---	---
	1.25 ±0.2 mm	12 mm	---	3,000	---	---	---
	1.35 ±0.15 mm	12 mm	---	2,000	---	---	---
	1.5 ±0.1 mm	12 mm	---	2,000	---	---	---
	1.6 ±0.2 mm	12 mm	---	2,000	---	---	---
1812	2.0 ±0.2 mm	12 mm	---	2,000	---	---	---
	0.6 / 0.85 ±0.1 mm	12 mm	---	2,000	---	---	---
	1.15 ±0.1 mm	12 mm	---	1,500	---	---	---
	1.15 ±0.15 mm	12 mm	---	1,500	---	---	---
	1.35 ±0.15 mm	12 mm	---	1,000	---	---	---
	1.5 ±0.1 mm	12 mm	---	1,000	---	---	---
	1.6 ±0.2 mm	12 mm	---	1,000	---	---	---
	2.0 ±0.2 mm	12 mm	---	1,000	---	---	---
2.5 ±0.2 mm	12 mm	---	500	50,000	---	---	



**ELECTRICAL CHARACTERISTICS****X7R DIELECTRIC CAPACITORS; NISN TERMINATIONS**

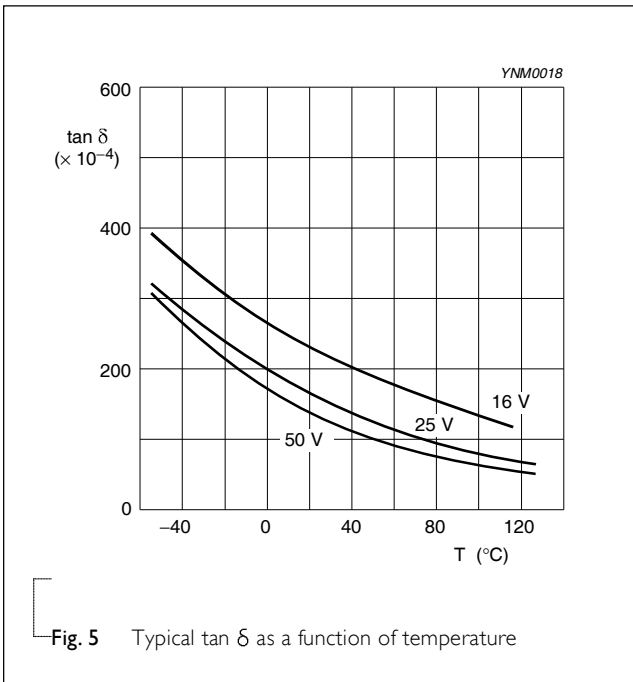
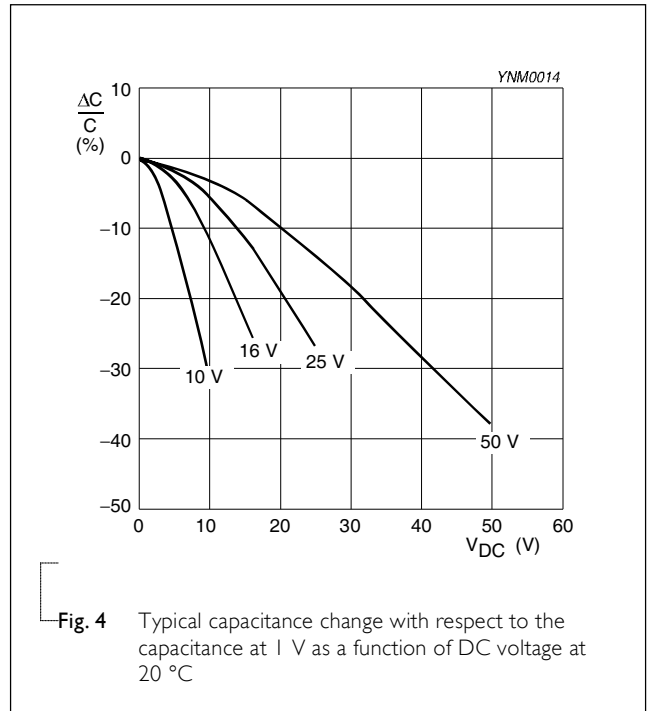
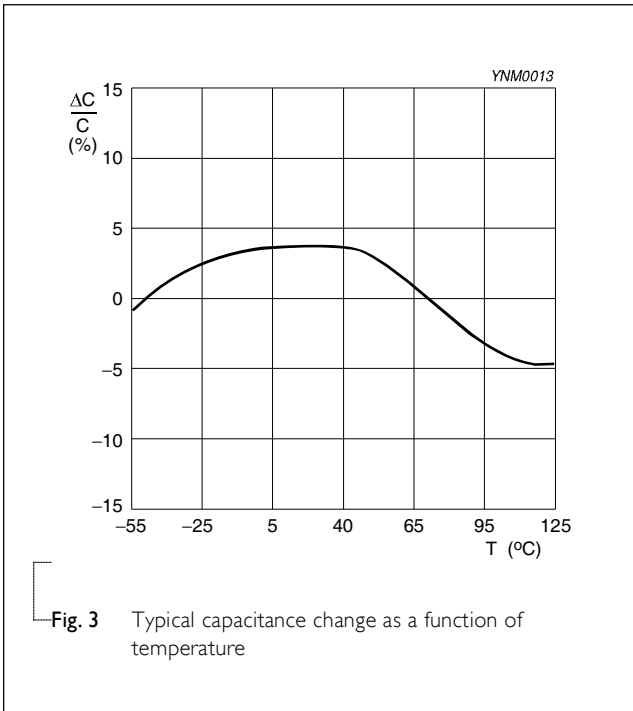
Unless otherwise stated all electrical values apply at an ambient temperature of  $20 \pm 1$  °C, an atmospheric pressure of 86 to 106 kPa, and a relative humidity of 63 to 67%.

Table 6

DESCRIPTION	VALUE
Capacitance range	100 pF to 22 $\mu$ F
Capacitance tolerance	$\pm 5\%$ , $\pm 10\%$ , $\pm 20\%$
Dissipation factor (D.F.)	
$\leq 10$ V	$\leq 5\%$
Exception: 0201 $\geq 12$ nF; 0603 $\geq 2.2$ $\mu$ F; 0805 $\geq 10$ $\mu$ F 1210 $\geq 10$ $\mu$ F	$\leq 10\%$
16 V	$\leq 3.5\%$
Exception: 0201 $\geq 1.5$ nF; 0402 $\geq 27$ nF; 0603 $\geq 220$ nF; 0805 $\geq 680$ nF; 1206 $\geq 2.2$ $\mu$ F; 1210 $\geq 10$ $\mu$ F 1206 $\geq 10$ $\mu$ F; 1210 $\geq 22$ $\mu$ F	$\leq 5\%$ $\leq 10\%$
25 V	$\leq 2.5\%$
Exception: 0402 $\geq 10$ nF; 0603 $\geq 47$ nF; 0805 $\geq 220$ nF; 1206 $\geq 1$ $\mu$ F; 1210 $\geq 4.7$ $\mu$ F 0201 $\geq 560$ pF; 0402 $\geq 56$ nF; 0603 $\geq 1$ $\mu$ F; 0805 $\geq 680$ nF; 1206 $\geq 2.2$ $\mu$ F; 1210 $\geq 10$ $\mu$ F	$\leq 3.5\%$ $\leq 5\%$
$\geq 50$ V	$\leq 2.5\%$
Exception: 0201 $\geq 47$ pF; 1206 $\geq 1$ $\mu$ F 0603 $\geq 47$ nF	$\leq 3.5\%$ $\leq 3.0\%$
Insulation resistance after 1 minute at $U_r$ (DC)	$R_{ins} \geq 10$ G $\Omega$ or $R_{ins} \times C_r \geq 500$ seconds whichever is less
Maximum capacitance change as a function of temperature (temperature characteristic/coefficient):	$\pm 15\%$
Operating temperature range:	$-55$ °C to $+125$ °C

**NOTE**

Capacitance tolerance  $\pm 5\%$  doesn't available for full product range, please contact local sales force before order



**SOLDERING RECOMMENDATION**

Table 7

SOLDERING METHOD	SIZE				
	0402	0603	0805	1206	≥ 1210
Reflow	≥ 0.1 μF	≥ 1.0 μF	≥ 2.2 μF	≥ 4.7 μF	Reflow only
Reflow/Wave	< 0.1 μF	< 1.0 μF	< 2.2 μF	< 4.7 μF	---

**TESTS AND REQUIREMENTS**

Table 8 Test procedures and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Mounting	IEC 60384-21/22	4.3 The capacitors may be mounted on printed-circuit boards or ceramic substrates	No visible damage
Visual inspection and dimension check	4.4	Any applicable method using × 10 magnification	In accordance with specification
Capacitance	4.5.1	Class 2: f = 1 KHz for C ≤ 10 μF, measuring at voltage 1 V <sub>rms</sub> at 20 °C f = 120 Hz for C > 10 μF, measuring at voltage 0.5 V <sub>rms</sub> at 20 °C	Within specified tolerance
Dissipation factor (D.F.)	4.5.2	Class 2: f = 1 KHz for C ≤ 10 μF, measuring at voltage 1 V <sub>rms</sub> at 20 °C f = 120 Hz for C > 10 μF, measuring at voltage 0.5 V <sub>rms</sub> at 20 °C	In accordance with specification
Insulation resistance	4.5.3	At U <sub>r</sub> (DC) for 1 minute	In accordance with specification
Temperature characteristic	4.6	Class 2: Between minimum and maximum temperature X7R: -55 °C to +125 °C Normal Temperature: 20 °C	<General purpose series> ΔC/C Class 2: X7R: ±15%  <High Capacitance series> ΔC/C Class 2: X7R: ±15%

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Adhesion	IEC 60384-21/22 4.7	A force applied for 10 seconds to the line joining the terminations and in a plane parallel to the substrate	Force size ≥ 0603: 5N size = 0402: 2.5N size = 0201: 1N
Bond strength of plating on end face	4.8	Mounting in accordance with IEC 60384-22 paragraph 4.3  Conditions: bending 1 mm at a rate of 1 mm/s, radius jig 340 mm	No visible damage  <General purpose series> ΔC/C Class2: X7R: ±10%  <High Capacitance series> ΔC/C Class2: X7R: ±10%
Resistance to soldering heat	4.9	Precondition: 150 +0/-10 °C for 1 hour, then keep for 24 ± 1 hours at room temperature Preheating: for size ≤ 1206: 120 °C to 150 °C for 1 minute Preheating: for size >1206: 100 °C to 120 °C for 1 minute and 170 °C to 200 °C for 1 minute Solder bath temperature: 260 ± 5 °C Dipping time: 10 ± 0.5 seconds Recovery time: 24 ± 2 hours	Dissolution of the end face plating shall not exceed 25% of the length of the edge concerned  <General purpose series> ΔC/C Class2: X7R: ±10%  <High Capacitance series> ΔC/C Class2: X7R: ±10%  D.F. within initial specified value R <sub>ins</sub> within initial specified value

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Solderability	IEC 60384-21/22	4.10 Preheated the temperature of 80 °C to 140 °C and maintained for 30 seconds to 60 seconds.	The solder should cover over 95% of the critical area of each termination
		<p>Test conditions for lead containing solder alloy</p> <p>Temperature: 235 ±5 °C</p> <p>Dipping time: 2 ±0.2 seconds</p> <p>Depth of immersion: 10 mm</p> <p>Alloy Composition: 60/40 Sn/Pb</p> <p>Number of immersions: 1</p> <p>Test conditions for leadfree containing solder alloy</p> <p>Temperature: 245 ±5 °C</p> <p>Dipping time: 3 ±0.3 seconds</p> <p>Depth of immersion: 10 mm</p> <p>Alloy Composition: SAC305</p> <p>Number of immersions: 1</p>	
Rapid change of temperature	4.11	<p>Preconditioning:</p> <p>150 +0/-10 °C for 1 hour, then keep for 24 ±1 hours at room temperature</p> <p>5 cycles with following detail:</p> <p>30 minutes at lower category temperature</p> <p>30 minutes at upper category temperature</p> <p>Recovery time 24 ±2 hours</p>	<p>No visual damage</p> <hr/> <p>&lt;General purpose series&gt;</p> <p><math>\Delta C/C</math></p> <p>Class2:</p> <p>X7R: ±15%</p> <p>&lt;High Capacitance series&gt;</p> <p><math>\Delta C/C</math></p> <p>Class2:</p> <p>X7R: ±15%</p> <hr/> <p>D.F. meet initial specified value</p> <p><math>R_{175}</math> meet initial specified value</p>

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Damp heat with $U_r$ load	IEC 60384-21/22 4.13	<ol style="list-style-type: none"> <li>Preconditioning, class 2 only: 150 <math>\pm</math>0/-10 °C /1 hour, then keep for 24 <math>\pm</math>1 hour at room temp</li> <li>Initial measure: Spec: refer initial spec C, D, IR</li> <li>Damp heat test: 500 <math>\pm</math>12 hours at 40 <math>\pm</math>2 °C; 90 to 95% R.H. 1.0 <math>U_r</math> applied</li> <li>Recovery: Class 2: 24 <math>\pm</math>2 hours</li> <li>Final measure: C, D, IR</li> </ol> <p>P.S. If the capacitance value is less than the minimum value permitted, then after the other measurements have been made the capacitor shall be precondition according to "IEC 60384 4.1" and then the requirement shall be met.</p>	<p>No visual damage after recovery</p> <hr/> <p><b>&lt;General purpose series&gt;</b>  <math>\Delta C/C</math>  Class2:  X7R: <math>\pm</math>15%  D.F.  Class2:  X7R: <math>\leq</math> 16V: <math>\leq</math> 7%  <math>\geq</math> 25V: <math>\leq</math> 5%</p> <p><math>R_{ins}</math>  Class2:  X7R: <math>\geq</math> 500 M<math>\Omega</math> or <math>R_{ins} \times C_r \geq</math> 25s  whichever is less</p> <p><b>&lt;High Capacitance series&gt;</b>  <math>\Delta C/C</math>  Class2:  X7R: <math>\pm</math>20%  D.F.  Class2:  X7R: 2 x initial value max</p> <p><math>R_{ins}</math>  Class2:  X7R: 500 M<math>\Omega</math> or <math>R_{ins} \times C_r \geq</math> 25s  whichever is less</p>

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Endurance	IEC 60384- 4.14 21/22	<ol style="list-style-type: none"> <li>Preconditioning, class 2 only: 150 +0/-10 °C /1 hour, then keep for 24 ±1 hour at room temp</li> <li>Initial measure: Spec: refer initial spec C, D, IR</li> <li>Endurance test: Temperature: X7R: 125 °C Specified stress voltage applied for 1,000 hours: Applied 2.0 × U<sub>r</sub> for general product. Applied 1.5 × U<sub>r</sub> for high cap. product.</li> <li>Recovery time: 24 ±2 hours</li> <li>Final measure: C, D, IR</li> </ol> <p>P.S. If the capacitance value is less than the minimum value permitted, then after the other measurements have been made the capacitor shall be precondition according to "IEC 60384 4.1" and then the requirement shall be met.</p>	<p>No visual damage</p> <hr/> <p>&lt;General purpose series&gt;  <math>\Delta C/C</math>  Class2:  X7R: ±15%  D.F.  Class2:  X7R: ≤ 16V: ≤ 7%  ≥ 25V: ≤ 5%  R<sub>ins</sub>  Class2:  X7R: ≥ 1,000 MΩ or R<sub>ins</sub> × C<sub>r</sub> ≥ 50s  whichever is less</p> <p>&lt;High Capacitance series&gt;  <math>\Delta C/C</math>  Class 2:  X7R: ±20%  D.F.  Class 2:  X7R: 2 × initial value max  R<sub>ins</sub>  Class 2:  X7R: 1,000 MΩ or R<sub>ins</sub> × C<sub>r</sub> ≥ 50s  whichever is less</p>
Voltage proof	IEC 60384- 4.6 1	<p>Specified stress voltage applied for 1 minute</p> <p>U<sub>r</sub> ≤ 100 V: series applied 2.5 U<sub>r</sub>  100 V &lt; U<sub>r</sub> ≤ 200 V series applied (1.5 U<sub>r</sub> + 100)  200 V &lt; U<sub>r</sub> ≤ 500 V series applied (1.3 U<sub>r</sub> + 100)  U<sub>r</sub> &gt; 500 V: 1.3 U<sub>r</sub>  I: 7.5 mA</p>	No breakdown or flashover

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 3	Oct 26, 2009	-	- Capacitance range of X7R 25V with size 0402 extend to 100 nF
Version 2	May 11, 2009	-	- Product range updated
Version 1	Apr 24, 2009	-	- Ordering code updated
Version 0	Apr 15, 2009	-	<ul style="list-style-type: none"> <li>- New datasheet for general purpose and high capacitance X7R series with RoHS compliant</li> <li>- Replace the "6.3V to 50V" part of pdf files: X7R_10V_9, X7R_16V-to-100V_9, X7R_16-to-500V_9, UP-X5R_X7R_HighCaps_6.3-to-25V_11, UY-X5R_X7R_HighCaps_6.3-to-25V_11</li> <li>- Combine 0201 from pdf files: UP-NP0X5RX7RY5V_0201_6.3-to-50V_2 and UY-NPOX5RX7RY5V_0201_6.3-to-50V_2</li> <li>- Define global part number</li> <li>- Description of "Halogen Free compliant" added</li> <li>- Test method and procedure updated</li> </ul>