

DATA SHEET

Class 2, X7R 10 V Surface-mount ceramic multilayer capacitors

Product specification
Supersedes data of 24th May 2000

2001 May 30 Rev.5

Surface-mount ceramic
multilayer capacitors

Class 2, X7R 10 V

FEATURES

- Three standard sizes
- For high frequency applications
- Supplied in tape on reel or in bulk case
- NiSn terminations.

APPLICATIONS

Consumer electronics, for example:

- Tuners
- Television receivers
- Video recorders
- All types of cameras.

DESCRIPTION

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.

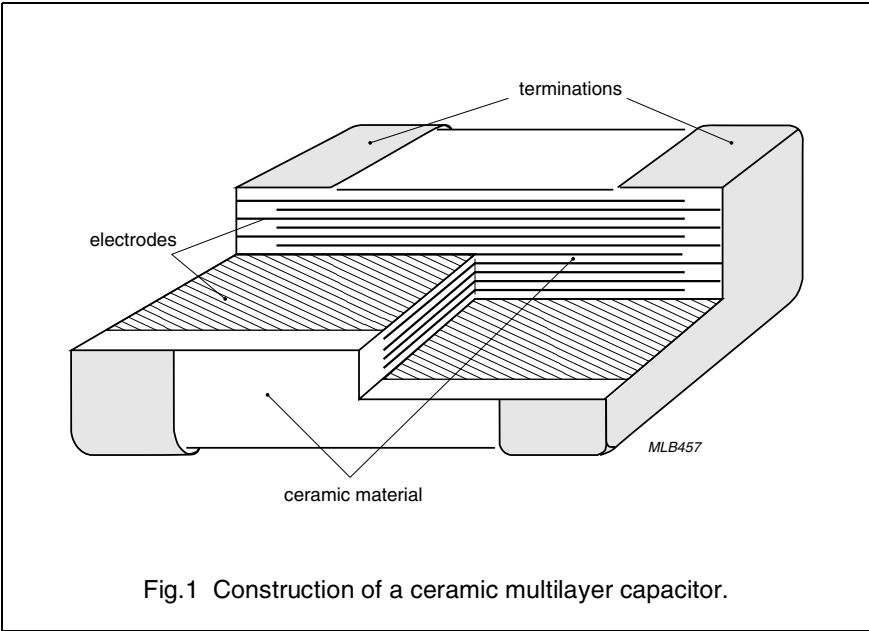
The inner electrodes are connected to the two terminations and finally covered with a layer of plated tin (NiSn). A cross section of the structure is shown in Fig.1.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Rated voltage U_R (DC)	10 V
Capacitance range (E6 series)	150 nF to 2.2 μ F; note 1
Tolerance on capacitance after 1 000 hours	$\pm 10\%$
Test voltage (DC) for 1 minute	$2.5 \times U_R$
Sectional specifications	IEC 60384-10, second edition 1989-04; also based on CECC 32 100
Detailed specification	based on CECC 32 101-801
End terminations	NiSn
Climatic category (IEC 60068)	55/125/21

Note

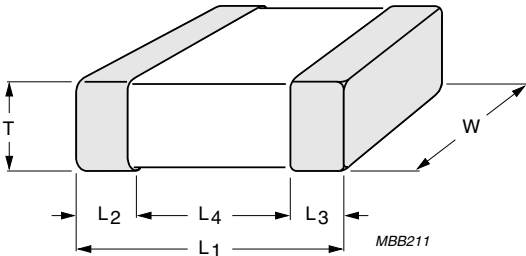
1. Measured at 20 °C, 1 V and 1 kHz, using a four-gauge method.



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Class 2, X7R 10 V

MECHANICAL DATA



For dimensions see Table 1.

Fig.2 Component outline.

Physical dimensions

Table 1 Capacitor dimensions; see Fig.2

CASE SIZE	L ₁	W	T		L ₂ and L ₃		L ₄ MIN.
			MIN.	MAX.	MIN.	MAX.	
Dimensions in millimetres							
0603	1.6 ±0.10	0.8 ±0.07	0.73	0.87	0.25	0.65	0.40
0805	2.0 ±0.10	1.25 ±0.10	0.50	1.35	0.25	0.75	0.55
1206	3.2 ±0.15	1.6 ±0.15	0.50	1.75	0.25	0.75	1.40
Dimensions in inches							
0603	0.063 ±0.004	0.032 ±0.003	0.029	0.035	0.010	0.026	0.016
1206	0.126 ±0.006	0.063 ±0.006	0.020	0.069	0.010	0.030	0.056
0805	0.079 ±0.004	0.049 ±0.004	0.020	0.053	0.010	0.030	0.022

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Class 2, X7R 10 V

SELECTION CHART

C (nF)	LAST TWO DIGITS OF 12NC	10 V		
		0603	0805	1206
150	52			
180	53	0.80 ±0.07		
220	54		0.6 ±0.10	
270	55			
330	56			
390	57		0.85 ±0.10	
470	58			
560	59			
680	61		1.25 ±0.10	
820	62	Values in shaded cells indicate thickness classification.		
1000	63			0.85 ±0.10
1200	64			
1500	65			
1800	66			1.15 ±0.10
2200	67			

Thickness classification and packing quantities

THICKNESS CLASSIFICATION (mm)	8 mm TAPE WIDTH QUANTITY PER REEL				QUANTITY PER BULK CASE	
	Ø180 mm; 7"		Ø330 mm; 13"		0603	0805
	PAPER	BLISTER	PAPER	BLISTER		
0.6 ±0.10	4000	–	20000	–	–	–
0.80 ±0.07	4000	–	15000	–	15000	–
0.85 ±0.10	4000	–	15000	–	–	–
1.15 ±0.10	–	3000	–	10000	–	–
1.25 ±0.10	–	3000	–	10000	–	5000

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ORDERING INFORMATION

Components may be ordered by using either a simple 15-digit clear text code or Phycomp’s unique 12NC.

Clear text code

Example: 06032R154K6BB0D

SIZE CODE	TEMP. CHAR.	CAPACITANCE	TOL.	VOLTAGE	TERMINATION	PACKING	MARKING	SERIES
0603 0805 1206	2R = X7R	154 = 150 000 pF; the third digit signifies the multiplying factor: 4 = × 10 000 5 = × 100 000	K = ±10%	6 = 10 V	B = NiSn	2 = 180 mm; 7" paper 3 = 330 mm; 13" paper B = 180 mm; 7" blister F = 330 mm; 13" blister P = bulk case	0 = no marking	D = BME

Ordering code 12NC

2 2 X X X X X X X 5 X X X

Carrier type

22 blister
38 paper tape
54 bulk

Rated voltage - Termination

24 10 V; NiSn

Size

6 0603
0 0805
1 1206

Capacitance value⁽¹⁾

Tolerance

6 ±10%

Packaging⁽²⁾

1 reel: Ø180 mm; 7"
5 reel: Ø330 mm; 13"
4 bulk case

CCB409

(1) Refer to chapter "Selection chart".

(2) Quantity on reel depends on thickness classification, see section "Thickness classification and packing quantities".

Surface-mount ceramic multilayer capacitors

Class 2, X7R 10 V

ELECTRICAL CHARACTERISTICS

Class 2 capacitors; X7R dielectric; NiSn terminations

Unless otherwise stated all electrical values apply at an ambient temperature of 20 ± 1 °C, an atmospheric pressure of 86 to 105 kPa, and a relative humidity of 63 to 67%.

DESCRIPTION	VALUE
Capacitance range (E6 series); note 1	150 nF to 2.2 μ F
Tolerance on capacitance after 1 000 hours	$\pm 10\%$
Tan δ ; note 1	$\leq 5\%$
Insulation resistance after 1 minute at U_R (DC)	$R_{ins} \times C \geq 500$ seconds
Maximum capacitance change as a function of temperature	$\pm 15\%$
Ageing	typical 3% per time decade
Resistance to soldering heat	260 °C; 10 seconds

Note

1. Measured at 20 °C, 1 V and 1 kHz, using a four-gauge method.

Surface-mount ceramic multilayer capacitors

Class 2, X7R 10 V

TESTS AND REQUIREMENTS

Table 2 Test procedures and requirements

IEC 60384-10/ CECC 32 100 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
4.4		mounting	the capacitors may be mounted on printed-circuit boards or ceramic substrates by applying wave soldering, reflow soldering (including vapour phase soldering) or conductive adhesive	no visible damage
4.5		visual inspection and dimension check	any applicable method using $\times 10$ magnification	in accordance with specification
4.6.1		capacitance	$f = 1 \text{ kHz}$; measuring voltage $1 V_{\text{rms}}$ at 20°C	within specified tolerance
4.6.2		$\tan \delta$	$f = 1 \text{ kHz}$; measuring voltage $1 V_{\text{rms}}$ at 20°C	in accordance with specification
4.6.3		insulation resistance	at U_R (DC) for 1 minute	in accordance with specification
4.6.4		voltage proof	$2.5 \times U_R$ for 1 minute	no breakdown or flashover
4.7.1		temperature characteristic	between minimum and maximum temperature	in accordance with specification
4.8		adhesion	a force of 5 N applied for 10 s to the line joining the terminations and in a plane parallel to the substrate	no visible damage
4.9		bond strength of plating on end face	mounted in accordance with CECC 32 100, paragraph 4.4	no visible damage
			conditions: bending 1 mm at a rate of 1 mm/s, radius jig 340 mm	$\Delta C/C: \leq 10\%$
4.10	Tb	resistance to soldering heat	precondition: 120 to 150°C for 1 minute; $260 \pm 5^\circ\text{C}$ for $10 \pm 0.5 \text{ s}$	the terminations shall be well tinned after recovery $\Delta C/C: \leq 10\%$
		resistance to leaching	$260 \pm 5^\circ\text{C}$ for $30 \pm 1 \text{ s}$ in a static solder bath	using visual enlargement of $\times 10$, dissolution of the terminations shall not exceed 10%
4.11	Ta	solderability	zero hour test, and test after storage (20 to 24 months) in original packing in normal atmosphere; unmounted chips completely immersed for $2 \pm 0.5 \text{ s}$ in a solder bath at $235 \pm 5^\circ\text{C}$	the terminations shall be well tinned

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Class 2, X7R 10 V

IEC 60384-10/ CECC 32 100 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
4.12	Na	rapid change of temperature	preconditioning; 5 cycles in the following sequence: 30 minutes at $-55\text{ }^{\circ}\text{C}$, change within 30 minutes to $+125\text{ }^{\circ}\text{C}$	no visible damage after 48 hours recovery: $\Delta C/C: \leq 15\%$
4.14	Ca	damp heat, steady state	initialization: 48 hours after U_R at $40\text{ }^{\circ}\text{C}$ for 1 hour (for initial value measurement); 500 ± 12 hours at $40\text{ }^{\circ}\text{C}$; 90 to 95% RH; U_R applied	preconditioning: U_R at $40\text{ }^{\circ}\text{C}$ for 1 hour after 48 hours recovery: $\Delta C/C: \pm 15\%$ $\tan \delta: 7\%$ $R_{ins}: 500\text{ M}\Omega$ or $R_1 C_R \geq 25\text{ s}$, whichever is less
4.15		endurance	initialization: $2 \times U_R$ at $125\text{ }^{\circ}\text{C}$ for 1 hour (initial value is measured after 48 hours, recovery at room temperature); 1000 hours at $125\text{ }^{\circ}\text{C}$ and $2 \times U_R$ applied	after 48 hours recovery: $\Delta C/C: \pm 20\%$ $\tan \delta: 7\%$ $R_{ins}: 1000\text{ M}\Omega$ or $R_1 C_R \geq 50\text{ s}$, whichever is less

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Class 2, X7R 10 V

REVISION HISTORY

Revision	Date	Change Notification	Description
Rev.5	2001 May 30	–	- Converted to Phycomp brand