DATA SHEET

Class 1, NP0 1/2/3/4 kV high voltage series, NME

Surface mount ceramic multilayer capacitors

Product specification
Supersedes data of 2nd March 2000
File under Discrete Ceramics, ACM2

2000 Jun 05

Philips Components

PHILIPS

Surface mount ceramic multilayer capacitors

Class 1, NP0 1/2/3/4 kV high voltage series, NME

FEATURES

- Sizes 1206; 1808; 1812; 2220
- High capacitance per unit volume
- Supplied in tape on reel or in bulk
- NiSn terminations.

APPLICATIONS

These surface mounted high voltage capacitors were developed specifically for circuits requiring voltage up to 4 kV. Typical applications are:

- Inverter circuits for the backlights of liquid crystal displays
- Snubber circuits of power supplies
- Voltage multiplier circuits
- Surge protection.

Due to high voltage across the terminations, circuit applications of 1 to 4 kV or higher may need a coating on the surface to prevent external arcing. This is especially true under humid conditions.

DESCRIPTION

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

The inner electrodes are connected to the two terminations, silver dipped with a barrier layer of plated nickel 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)	1 kV; 2 kV; 3 kV; 4 kV (IEC)
Capacitance range (E12 series); note 1	3.3 pF to 3300 pF
Tolerance on capacitance at T_{amb} = 20 °C	±5%; note 2
Test voltage (DC) for 1 minute: U_R = 1000 V U_R > 1000 V	 1.5 × U_R 1.2 × 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
Climatic category (IEC 60068)	55/125/56

Notes

1. Other values are available on request.
2. Special tolerance on capacitance is available on request.

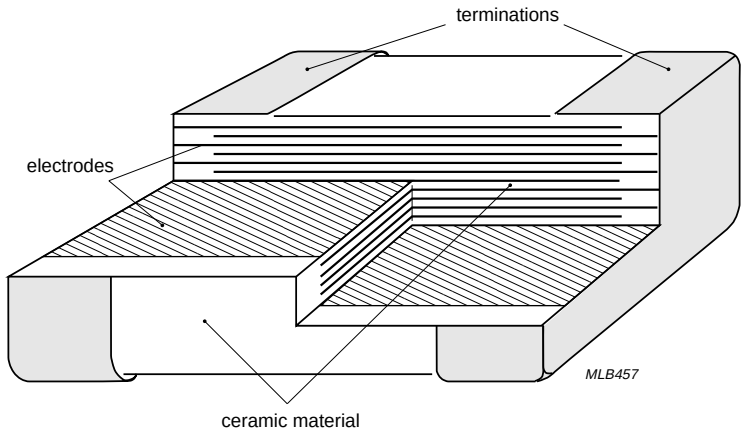
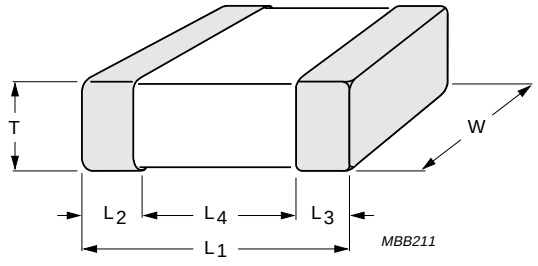


Fig.1 Construction of a ceramic multilayer capacitor.

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 MAX.	L_2 and L_3 MAX.	L_4 MIN.
Dimensions in millimetres					
1206	3.2 ±0.15	1.6 ±0.15	1.30	0.75	1.4
1808	4.5 ±0.20	2.0 ±0.20	1.75	0.75	2.20
1812	4.5 ±0.20	3.2 ±0.20	1.75	0.75	2.20
2220	5.7 ±0.20	5.0 ±0.20	1.30	0.75	2.90
Dimensions in inches					
1206	0.126 ±0.006	0.063 ±0.006	0.051	0.030	0.055
1808	0.177 ±0.008	0.079 ±0.008	0.069	0.030	0.088
1812	0.177 ±0.008	0.126 ±0.008	0.069	0.030	0.088
2220	0.224 ±0.008	0.197 ±0.008	0.051	0.030	0.114

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SELECTION CHART

C (pF)	LAST TWO DIGITS OF 12NC	1 kV			2 kV	3 kV		4 kV	
		1206	1812	2220	1206	1808	1812	1808	1812
3.3	17								
3.9	18								
4.7	19								
5.6	20								
6.8	21								
8.2	22								
10	23								
12	24								
15	25							1.2 to 1.75	
18	26					0.9 to 1.3			
22	27								1.2 to 1.75
27	28								
33	29								
39	31						0.9 to 1.3		
47	32				0.9 to 1.3				
56	33								
68	34								
82	35								
100	36								
120	37								
160	38								
180	39								
220	41	0.9 to 1.3							
270	42								
330	43		0.5 to 1.0						
390	44								
470	45								
560	46			0.5 to 1.0					
680	47								
820	48								
1000	49								
1200	51		0.9 to 1.3			Values in shaded cells indicate thickness classification.			
1500	52								
1800	53								
2200	54								
2700	55			0.9 to 1.3					
3300	56								

Thickness classification and packaging quantities

THICKNESS CLASSIFICATION (mm)	8 mm TAPE WIDTH AMOUNT PER REEL		12 mm TAPE WIDTH AMOUNT PER REEL		
	∅180 mm 7" BLISTER	∅330 mm 13" BLISTER	∅180 mm 7" BLISTER		
	1206	1206	1808	1812	2220
0.5 to 1.0	–	–	–	2000	1500
0.9 to 1.3	3000	10000	1500	1500	1500
1.2 to 1.75	–	–	1000	1000	–

ORDERING INFORMATION

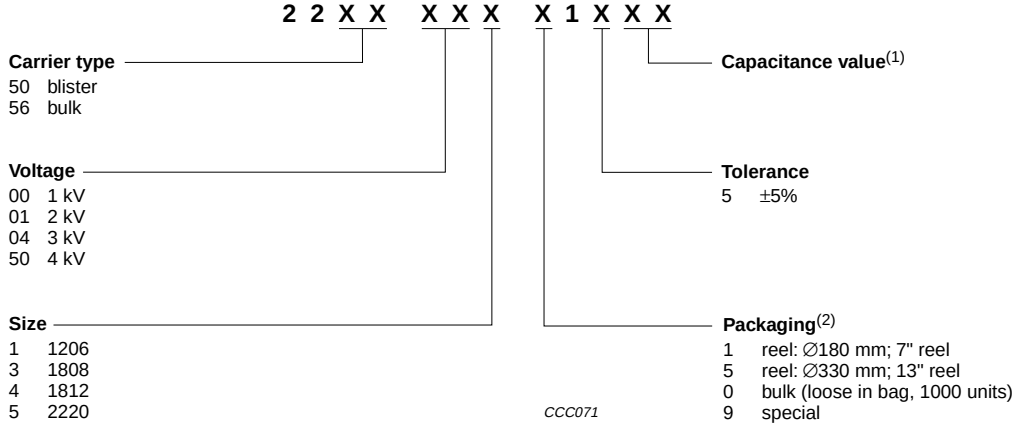
Components may be ordered by using either a simple 15-digit clear text code or Philips unique 12NC.

Clear text code

Example: 1206CG220JFBB00

SIZE CODE	TEMP. CHAR.	CAPACITANCE	TOL.	VOLTAGE	TERMINATION	PACKAGING	MARKING	SERIES
1206 1808 1812 2220	CG = NP0	220 = 22 pF; the third digit signifies the multiplying factor: 0 = × 1 1 = × 10 2 = × 100	J = ±5%	E = 1 kV F = 2 kV G = 3 kV H = 4 kV	B = NiSn	B = 180 mm; 7" blister F = 330 mm; 13" blister A = bulk	0 = no marking	0 = conv. ceramic

Ordering code 12NC



(1) Refer to chapter “Selection chart”.

(2) Amount on reel depends on thickness classification, see section “Thickness classification and packaging quantities”.

ELECTRICAL CHARACTERISTICS

Class 1 capacitors; NP0 dielectric; NiSn terminations

Unless otherwise stated all electrical values apply at an ambient temperature of 23 ±3 °C, an atmospheric pressure of 86 to 106 kPa, and a relative humidity of 63 to 67%.

DESCRIPTION	VALUE
Rated voltage U_R (DC)	1 kV; 2 kV; 3 kV; 4 kV (IEC)
Capacitance range (E12 series)	3.3 pF to 3300 pF
Tolerance on capacitance at T_{amb} = 20 °C	±5%
Test voltage (DC) for 1 minute:	
U_R = 1000 V	$1.5 \times U_R$
U_R > 1000 V	$1.2 \times U_R$
Tan δ	$\leq 10 \times 10^{-4}$
Insulation resistance after 1 minute at U_R (DC)	R_{ins} > 100 GΩ
Temperature coefficient	$(0 \pm 30) \times 10^{-6}$/K
Ageing	not applicable

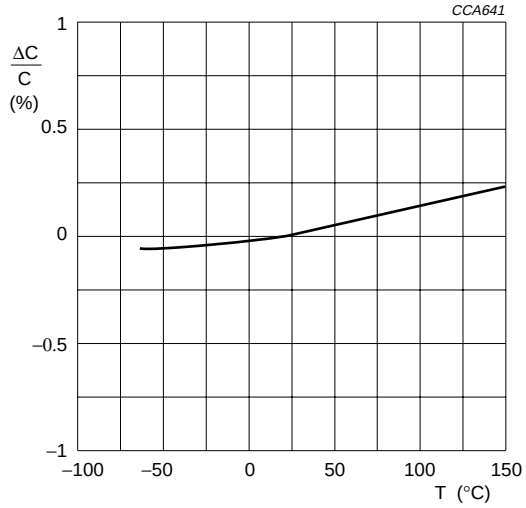


Fig.3 Typical capacitance change as a function of temperature.