

Surface-Mount Ceramic Multilayer Capacitors

NP0, X7R & Y5V

Size 0201

FEATURES

- High capacitance per unit volume
- Miniature size for compact products
- Lead free applications

APPLICATIONS

- Mobile phones
- Digital cameras
- Camcorders
- Hi-F tuners.

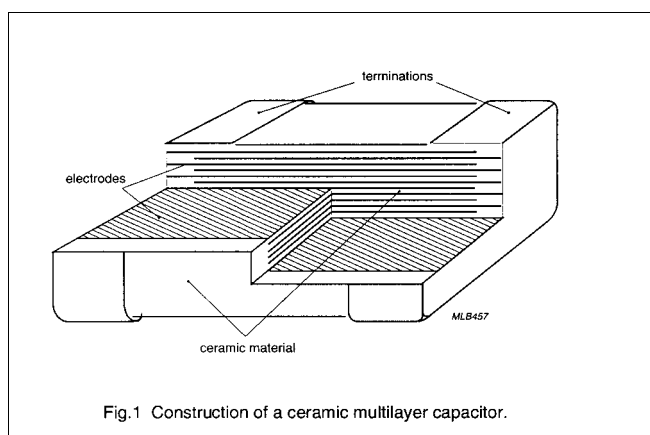
DESCRIPTION

The capacitor consists of many 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 Lead-free plated tin (NiSn). A cross section of the structure is shown in Fig.1.

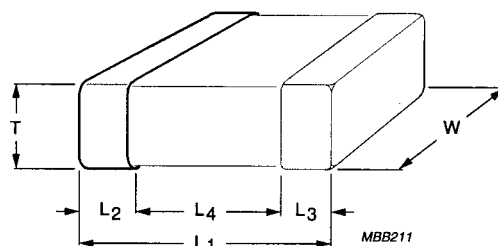
QUICK REFERENCE DATA

DESCRIPTION	VALUE
Rated Voltage UR (DC):	
NP0 Dielectric	25V, 50V
X7R Dielectric	16V, 25V & 50V
Y5V Dielectric	6.3V, 10V, 16V
Capacitance Range (E12 series):	
NP0 (CG)	1pF ~ 33pF
X7R (2R)	47pF ~ 22nF
Y5V (2E)	4.7nF ~ 100nF
Tolerance on Capacitance at T_{amb}=20°C:	
NP0 (CG):	
C < 5pF	±0.25pF
5pF ≤ C < 10pF	±0.50pF, ±0.25pF
C ≥ 10pF	±5%, ±2%
X7R (2R)	±20%, ±10%, ±5%
Y5V (2E)	±20%, +80-20%
Test Voltage (DC) for 1 Minute:	2.5 × UR
Sectional Specifications:	IEC 60384-10, Second edition 1989-04; also based on CECC 32 100
Detailed Specification:	Based on CECC 32 101-801



SIZE & DIMENSIONS

MECHANICAL DATA



For dimensions see Table 1.

Fig.2 Component outline.

Physical dimensions

Table 1 Capacitor dimensions

CASE SIZE	L ₁	W	T	L ₂ and L ₃	L ₄ MIN.
Dimensions in millimetres					
0201	0.6 ±0.03	0.3 ±0.03	0.3 ±0.03	0.15 ±0.05	0.20
Dimensions in inches					
0201	0.024 ±0.001	0.012 ±0.001	0.012 ±0.001	0.006 ±0.002	0.008

Surface-Mount Ceramic Multilayer Capacitors

NP0 50V and 25V

Size 0201

SELECTION CHART FOR NP0 50 V and 25V

Capacitance		NPO 50V & 25V
Code	Value	0201
1R0	1.0pF	
1R2	1.2pF	
1R5	1.5pF	
1R8	1.8pF	
2R2	2.2pF	
2R7	2.7pF	
3R3	3.3pF	
3R9	3.9pF	
4R7	4.7pF	0.30 ± 0.03
5R6	5.6pF	
6R8	6.8pF	
8R2	8.2pF	
100	10pF	
120	12pF	
150	15pF	
180	18pF	
220	22pF	
330	33pF	
470	47pF	In Development (25V)
560	56pF	In Development (25V)
820	82pF	In Development (25V)
101	100pF	In Development (25V)

Notes:

Values in shaded cells indicate thickness class.

Thickness Classification and Packing Quantities

THICKNESS CLASSIFICATION (mm)	8 mm TAPE WIDTH		QUANTITY PER BULK CASE
	QUANTITY PER REEL		
	Ø180mm ; 7"	Ø330 mm; 13"	
	PAPER	PAPER	0201
0.3 ± 0.03	15000	TBD	TBD

Surface-Mount Ceramic Multilayer Capacitors

NP0 50V and 25V
Size 0201

ORDERING INFORMATION FOR NP0 50V & 25V

Components may be ordered by using Skywell part number illustrated as below:

For example: **0201CG120J500BA**

0201	CG	120	J	500	B	A	□
Size Code	Dielectric	Capacitance	Tolerance	Voltage	Termination	Package	Reserved
0201	CG=NP0	3-Digit Code	B=±0.01pF	3-Digit	B=Ni/Sn	A: paper tape	C: low profile
0402	2R=X7R	First two digits	C=±0.25pF	100=10v	A=Silver	L: plastic tape	T: 13" reel
0603	3R=X5R	are significant,	D=±0.50pF	160=16v	(lead free has	B: bulk	B:
0805	2E=Y5V	third digit is the	F=±1%	250=25v	been in effect	M: cassette	
1206	2F=Z5U	Multiple of 10s.	G=±2%	500=50v	since 1999)		
1210		(here is 100pF)	J=±5%	101=100			
1812			K=±10%				
2512							

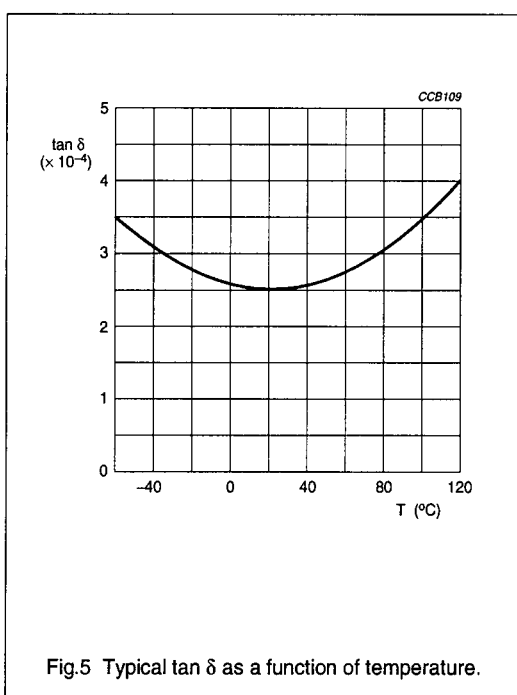
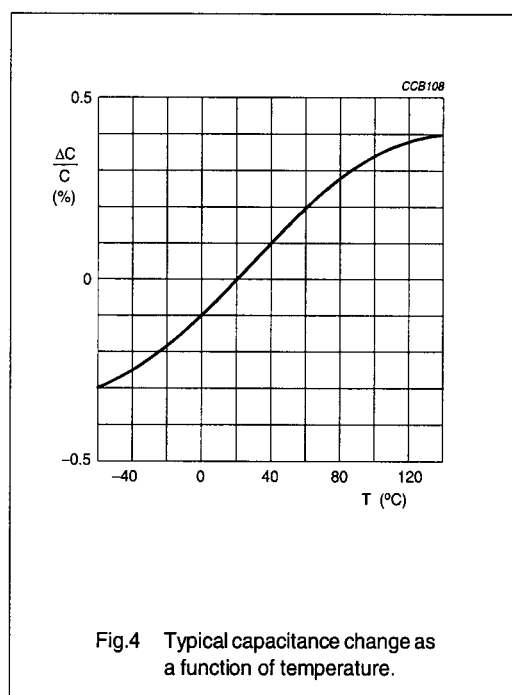
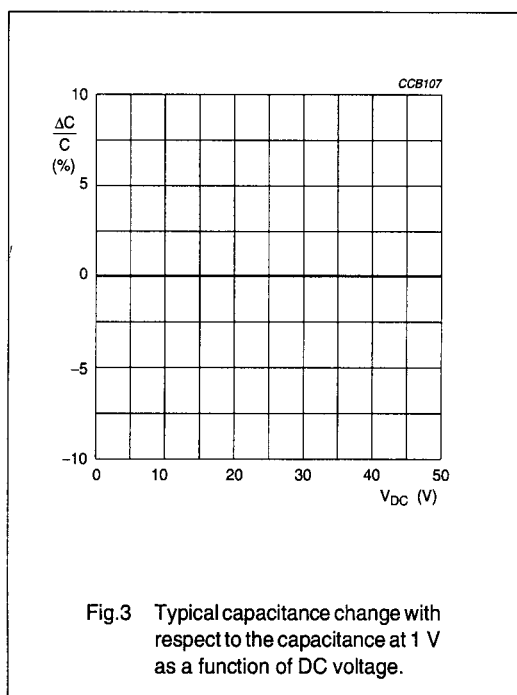
ELECTRICAL CHARACTERISTICS

Class 1 capacitors; NP0 dielectric; NiSn terminations

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

DESCRIPTION	VALUE
Capacitance range (E12 series)	1.0pF to 100pF
Tolerance on capacitance at Tamb =20°C:	
C < 5.0pF	±0.25pF
5.0pF C < 10pF	±0.50pF, ±0.25pF
C ≥10pF	±5%, ±2%, ±1%
Tan δ :	
C <10pF	≤10(3/C+0.7) ×10 ⁻⁴ or 30×10 ⁻⁴ , whichever is smallest
C ≥10pF	≤10×10 ⁻⁴
Insulation resistance after 1 minute at UR (DC)	R _{ins} >100 GΩ
Temperature coefficient	(0 ±30) ×10 ⁻⁶ /K

PERFORMANCE CHARACTERISTICS



Surface-Mount Ceramic Multilayer Capacitors

X7R 16V, 25V and 50V

Size 0201

SELECTION CHART FOR X7R 16V, 25V AND 50V

Capacitance		X7R 16V	X7R 25V	X7R 50V
Code	Value	0201		
470	47 pF			
560	56pF			
680	68pF			
820	82pF			
101	100 pF			
121	120 pF			
151	150pF			0.30±0.03
181	180 pF			
221	220 pF			
271	270pF			
331	330 pF			
391	390 pF			
471	470 pF			
561	560 pF			
681	680 pF			
821	820 pF		0.30±0.03	
102	1000 pF			
122	1200 pF			
152	1500 pF			
182	1800 pF			
222	2200 pF			
272	2700 pF	0.30±0.03		
332	3300 pF			
472	4700 pF			
822	8200 pF			
103	10nF			

Note: Values in shaded cells indicate thickness class.

Thickness Classification and Packing Quantities

THICKNESS CLASSIFICATION (mm)	8 mm TAPE WIDTH		QUANTITY PER BULK CASE
	QUANTITY PER REEL		
	Ø	Ø330 mm; 13"	
	PAPER	PAPER	
0.3 ± 0.03	15000	TBD	TBD

USA

CHINA

TAIWAN

Surface-Mount Ceramic Multilayer Capacitors

NPO, X7R & Y5V
Size 0201

ORDERING INFORMATION FOR X7R 16V, 25V AND 50V

Components may be ordered by using Skywell Part Number.

For example: **02012R103K160BA**

0201	2R	103	K	160	B	A	☐
Size Code	Dielectric	Capacitance	Tolerance	Voltage	Termination	Package	Reserved
0201	CG=NPO	3-Digit Code	K=±10%	3-Digit Code	B=Ni/Sn	A: paper tape	C: low profile
0402	2R=X7R	First two digits	J=±5%	6R3=6.3v	A=Silver	L: plastic tape	T: 13" reel
0603	3R=X5R	are significant,	M=±20%	100=10v	(lead free has	B: bulk	B:
0805	2E=Y5V	third digit is the		160=16v	been in effect	M: cassette	
1206	2F=Z5U	Multiple of 10s.		250=25v	since 1999)		
1210		(here is 10nF)		500=50v			
1812				101=100v			
2512							

Y5V (2E) SELECTION CHART

Capacitance		Y5V 6.3V, 10V & 16V
Code	Value	0201
472	4.7nF (16V)	
682	6.8nF (16V)	
822	8.2nF(16V)	
103	10nF (10V)	0.30+-0.03
223	22nF (10V)	
333	33nF (10V)	
473	47nF (10V)	
104	100nF (6.3V)	

ELECTRICAL CHARACTERISTICS

Class 2 capacitors; X7R & Y5V dielectric; NiSn terminations

Unless otherwise stated all electrical values apply at an ambient temperature of 20 °C ±1 °C.

DESCRIPTION	VALUE
Capacitance Range (E12 series)	47pF to 10nF for X7R, 4.7nF ~ 100nF for Y5V
Tolerance on Capacitance After 1000hours	±20%, ±10% for X7R, +80-20% for Y5V
Tan δ :	
50V and higher	250 × 10 ⁻⁴
25V and 16V	350 × 10 ⁻⁴
10V and less	500 × 10 ⁻⁴
Insulation Resistance After 1 Minute at UR (DC)	Rins >10GΩ or 1000MΩ /C(uF) whichever is smaller
Test Voltage (DC) for 1 Minute	2.5 × UR
Aging Rate	Typical 1.5% for X7R, 7% for Y5V

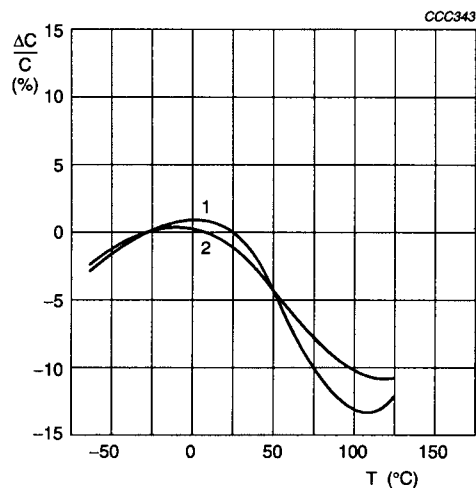
USA

CHINA

TAIWAN

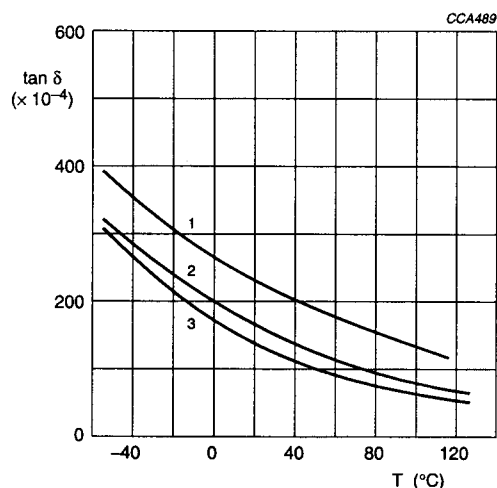
Surface-Mount Ceramic Multilayer Capacitors

X7R 16V ,25V and 50V
Size 0201



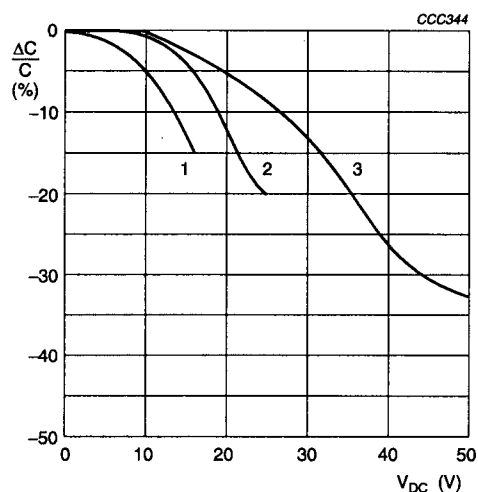
Curve 1 = 16 V product.
Curve 2 = 25 V and 50 V products.

Fig.6 Typical capacitance change as a function of temperature.



Curve 1 = 16 V product.
Curve 2 = 25 V product.
Curve 3 = 50 V product.

Fig.7 Typical tan δ as a function of temperature.



Curve 1 = 16 V product.
Curve 2 = 25 V product.
Curve 3 = 50 V product.

Fig.8 Typical capacitance change with respect to the capacitance at 1 V as a function of DC voltage at 20 °C.

PACKING

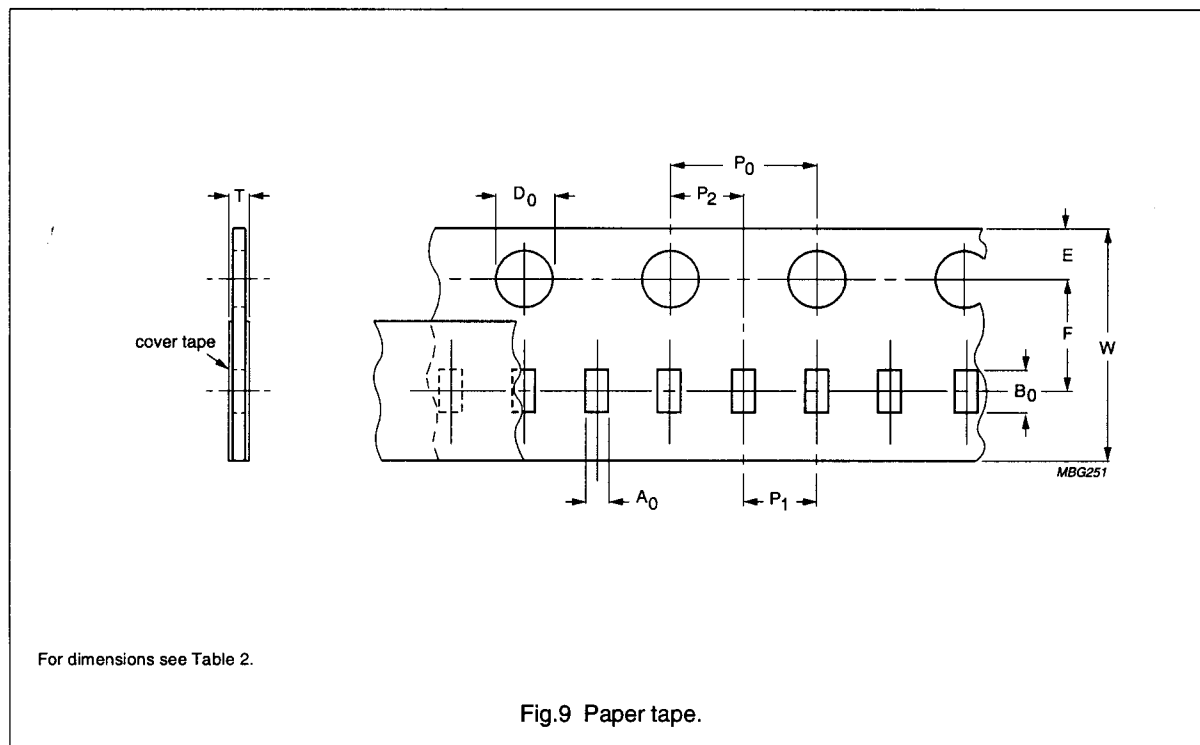


Table 2 Dimensions of paper tape for relevant product size; see Fig.9

SYMBOL	PRODUCT SIZE CODE 0201		UNIT
	SIZE	TOL.	
A ₀	0.37	±0.03	mm
B ₀	0.67	±0.03	mm
W	8.0	±0.2	mm
E	1.75	±0.1	mm
F	3.5	±0.05	mm
D ₀	1.5	+0.1/-0	mm
P ₀ ; note 1	4.0	±0.1	mm
P ₁	2.0	±0.05	mm
P ₂	2.0	±0.05	mm
T _{max}	0.37	±0.02	mm

Note

1. P₀ pitch tolerance over any 10 pitches is ±0.2 mm.

DIMENSIONS OF SOLDER LANDS

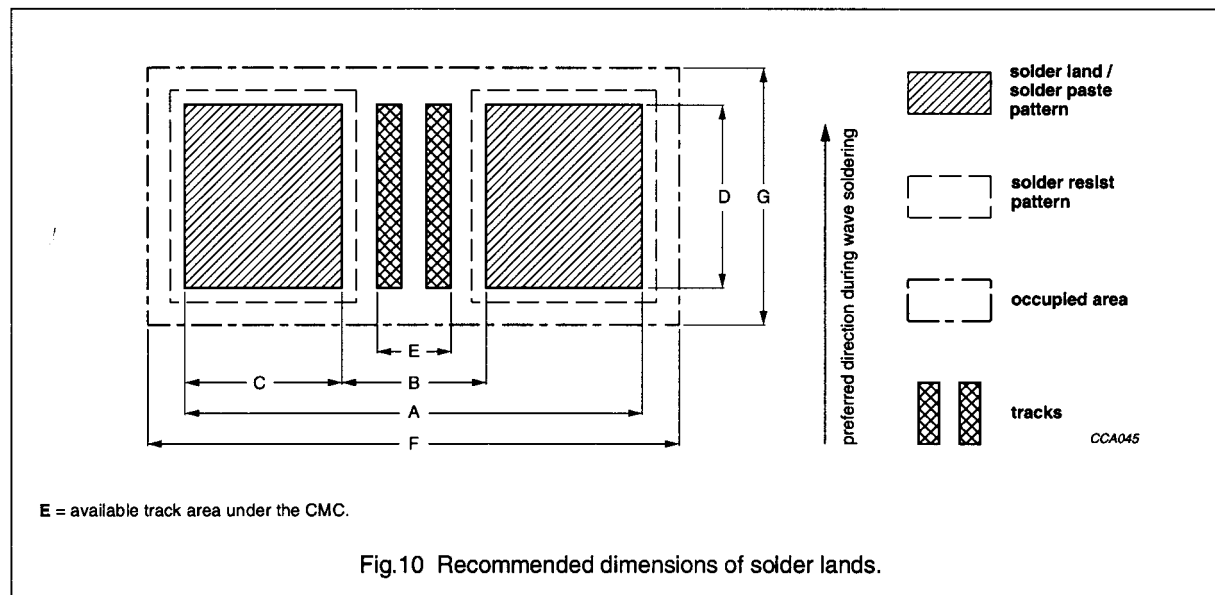


Table 3 Reflow soldering; for dimensions also see Fig.10

SIZE CODE	FOOTPRINT DIMENSIONS (mm)							PROCESSING REMARKS	PLACEMENT ACCURACY (mm)
	A	B	C	D	E	F	G		
0201	0.65	0.23	0.21	0.30	N/A	0.90	0.60	IR or hot plate soldering	t.b.d.