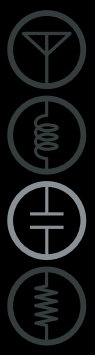
Innovative Service Around the Globe YAGEO

DATA SHEET

SURFACE-MOUNT CERAMIC EMI FILTER CAPACITORS

X2Y® Series

10 V TO 100 V



Phycomp

Product Specification – Sep 09, 2003 V.9

Surface-mount ceramic EMI filter capacitors

X2Y® Series

DESCRIPTION

Phycomp's X2Y® series is a breakthrough in the design of ceramic multilayer products for decoupling and filtering in an IPD (integrated passive device).

X2Y® products comprise two identical Y-capacitors and one X-capacitor, integrated into a 4 terminal device, which is available in standard MLCC sizes. Thanks to the unique multilayer construction the device provides noise cancellation within the device, reducing ESL from nanohenry to picohenry levels.

Using the unique balance between the Y-capacitors and the shielded multilayer structure the X2Y® products offer superior decoupling and filtering.

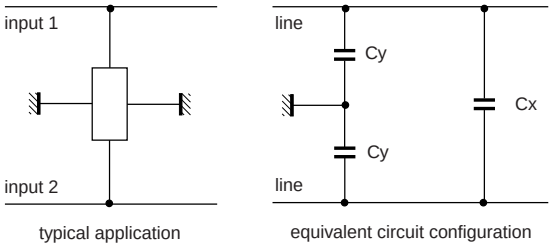
The X2Y® device performs as a broadband filter enabling better EMC compliance for electrical equipment in a wide range of applications.

FEATURES

- **Broadband Filter and Decoupler**: X2Y is effective up to 10 GHz and frequencies beyond.
- **By-pass**: Unlike feedthrough capacitors, X2Y devices are in by-pass and only handle the noise current.
- **Superior Balance**: 2 closely matched Y-caps provide stable balance over time and temperature.
- **Ultra-low Inductance**: typical equivalent series inductance (ESL) to less than 50 picohenries.
- **Ultra-low ESR**: typical values of a few milli-ohms.
- **Lower Component and Placement Costs**: X2Y can eliminate inductors, ferrites, standard capacitors, resistors and surge devices normally combined to form filter networks in the past.
- **Board Space Reduced**: Whether on the PCB board or IC Package, X2Y components allow for design simplification resulting in a substantial reduction of board space needed.

APPLICATIONS

- EMI filtering on DC motors
- Filtered connectors (airbag connectors, RJ-45 connectors)
- High speed data-line filtering
- Decoupling of supply-lines in high speed digital circuits
- Broadband filtering.



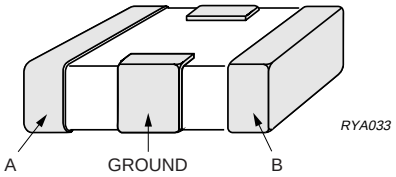


Fig.1 Simplified outline.

Surface-mount ceramic EMI filter capacitors

X2Y® Series

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Materials	NP0, X7R, Y5V
Rated voltage	10 V, 16 V, 25 V, 50/63 V, 100 V (IEC)
Capacitance range (Y-capacitor):	
0603 series	10 pF to 220 nF
0805 series	10 pF to 470 nF
1206 series	22 nF to 2200 nF
1210 series	47 nF to 4700 nF
1812 series	100 nF to 1000 nF
Tolerance on capacitance	±10% (K), ±20% (M), −20% to +80% (Z),
Test voltage (DC) for 1 minute	$2.5 \times U_R$
Sectional specifications	IEC 60384-10, second edition 1989-04
Detailed specification	based on IEC 60384-10-1
Climatic category (IEC 60068)	NP0 and X7R: 55/125/56, Y5V: 25/85/21

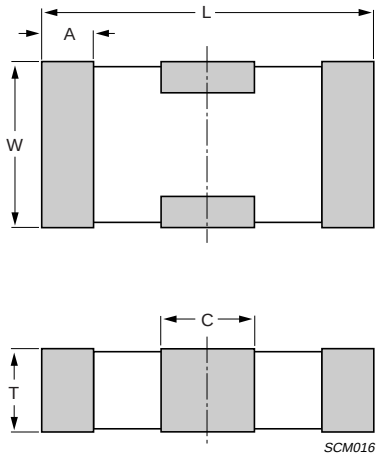
Surface-mount ceramic EMI filter capacitors

X2Y® Series

GENERAL SELECTION CHART

C (pF)	0603			0805			1206		1210		1812
	NP0	X7R	Y5V	NP0	X7R	Y5V	X7R	Y5V	X7R	Y5V	X7R
10	100 V			100 V							
22											
47											
100											
220											
330											
1000		100 V									
2200											
4700					100 V						
5600											
10000		50 V/63 V									
15000		25 V			50 V/63 V		100 V				
18000											
22000					25 V						
39000		16 V					50 V/63 V		100 V		
47000					16 V						
56000											
100000		10 V	16 V						50 V/63 V		100 V
180000					10 V	16 V	25 V				
220000							16 V				
270000											
330000									25 V		
390000											50 V/63 V
470000							10 V				
560000											
820000									16 V		25 V
1000000								16 V			
2200000										16 V	
4700000											

MECHANICAL DATA



For dimensions see Table 1.

Fig.2. Component outline.

Physical dimensions

Table 1 Capacitor dimensions

CASE SIZE	L	W	T		A		C
			MIN.	MAX.	MIN.	MAX.	
Dimensions in millimetres							
0603	1.6 ±0.15	0.8 ±0.10	0.50	0.70	0.25	0.50	0.40 ±0.20
0805	2.0 ±0.15	1.25 ±0.15	0.75	0.95	0.25	0.55	0.60 ±0.20
1206	3.2 ±0.20	1.6 ±0.20	0.8	1.35	0.25	0.65	1.20 ±0.30
1210	3.2 ±0.20	2.5 ±0.20	1.10	1.90	0.25	0.65	1.20 ±0.30
1812	4.5 ±0.20	3.2 ±0.20	1.10	1.90	0.25	0.65	1.30 ±0.30
Dimensions in inches							
0603	0.063 ±0.006	0.032 ±0.005	0.019	0.028	0.010	0.020	0.015 ±0.008
0805	0.079 ±0.006	0.049 ±0.006	0.030	0.037	0.010	0.022	0.023 ±0.008
1206	0.126 ±0.008	0.063 ±0.008	0.031	0.053	0.010	0.026	0.047 ±0.012
1210	0.126 ±0.008	0.098 ±0.008	0.043	0.075	0.010	0.026	0.047 ±0.012
1812	0.177 ±0.008	0.126 ±0.008	0.043	0.075	0.010	0.026	0.051 ±0.012

ELECTRICAL CHARACTERISTICS FOR NP0

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
Rated voltage U_R (DC)	100 V
Capacitance range	10 pF to 330 pF
Tolerance on capacitance after 1000 hours	±10% (K)
Tan δ; note 1	$\leq 10 \times 10^{-4}$
Insulation resistance after 1 minute at U_R (DC)	$R_{ins} > 10$ GΩ
Temperature coefficient	$(0 \pm 30) \times 10^{-6}$/K

Note

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

SELECTION CHART FOR NP0 - PREFERRED TYPES(1)

SIZE	Y-CAPACITOR		X-CAPACITOR		THICKNESS (mm)	CTC ORDERING CODE (2)(3)
	CAP (pF)	VOLTAGE RATING (V)	CAP (pF)	VOLTAGE RATING (V)		
0603	10	100	5	200	0.60	X 0603 KR NP0 0BN 100
	22	100	11	200	0.60	X 0603 KR NP0 0BN 220
	47	100	24	200	0.60	X 0603 KR NP0 0BN 470
	100	100	50	200	0.60	X 0603 KR NP0 0BN 101
	220	100	110	200	0.60	X 0603 KR NP0 0BN 221
0805	10	100	5	200	0.85	X 0805 KR NP0 0BN 100
	22	100	11	200	0.85	X 0805 KR NP0 0BN 220
	47	100	24	200	0.85	X 0805 KR NP0 0BN 470
	100	100	50	200	0.85	X 0805 KR NP0 0BN 101
	220	100	110	200	0.85	X 0805 KR NP0 0BN 221
	330	100	165	200	0.85	X 0805 KR NP0 0BN 331

Notes

1. Other values available on request.
2. Ordering codes for preferred versions (±10% tolerance, 180 mm reel). For other packing and tolerance see section Ordering Code.
3. For 12NC ordering codes see Table 2.

Thickness classification and packing quantities for NP0

THICKNESS CLASSIFICATION (mm)	8 mm TAPE WIDTH QUANTITY PER REEL			
	∅180 mm; 7"		∅330 mm; 13"	
	PAPER	BLISTER	PAPER	BLISTER
0.6 ±0.1	4 000	–	20 000	–
0.8 ±0.1	4 000	–	15 000	–

ELECTRICAL CHARACTERISTICS FOR X7R

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 106 kPa, and a relative humidity of 63 to 67%.

DESCRIPTION	VALUE
Rated voltage U_R (DC)	10 V, 16 V, 25 V, 50 V/63 V and 100 V
Capacitance range	1 nF to 1 μF
Tolerance on capacitance after 1000 hours	±10%; ±20%
Tan δ; note 1 10 V 16 V ≥25 V	 ≤5% ≤3.5% ≤2.5%
Insulation resistance after 1 minute at U_R (DC)	$R_{ins} \times C > 500$ seconds
Maximum capacitance change as a function of temperature	±15%
Aging	Typical 1% per time decade

Note

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

Surface-mount ceramic EMI filter capacitors

X2Y® Series

SELECTION CHART FOR X7R SIZES 0603, 0805, 1206(1)

SIZE	Y-CAPACITOR		X-CAPACITOR		THICKNESS (mm)	CTC ORDERING CODE (2)(3)
	CAP (nF)	VOLTAGE RATING (V)	CAP (nF)	VOLTAGE RATING (V)		
0603	1	100	0.5	200	0.60	X 0603 MR X7R 0BB 102
	2.2	100	1.1	200	0.60	X 0603 MR X7R 0BB 222
	4.7	100	2.4	200	0.60	X 0603 MR X7R 0BB 472
	5.6	100	2.8	200	0.60	X 0603 MR X7R 0BB 562
	10	50 / 63	5	100	0.60	X 0603 MR X7R 9BB 103
	22	25	11	50	0.60	X 0603 MR X7R 8BB 223
	47	16	24	25	0.60	X 0603 MR X7R 7BB 473
	56	16	28	25	0.60	X 0603 MR X7R 7BB 563
	100	10	50	16	0.60	X 0603 MR X7R 6BB 104
0805	4.7	100	24	200	0.85	X 0805 MR X7R 0BB 472
	10	100	5	200	0.85	X 0805 MR X7R 0BB 103
	15	50 / 63	8	100	0.85	X 0805 MR X7R 9BB 153
	18	50 / 63	9	100	0.85	X 0805 MR X7R 9BB 183
	22	25	11	50	0.85	X 0805 MR X7R 8BB 223
	39	25	20	50	0.85	X 0805 MR X7R 8BB 393
	47	16	24	25	0.85	X 0805 MR X7R 7BB 473
	100	16	50	25	0.85	X 0805 MR X7R 7BB 104
	180	10	90	16	0.85	X 0805 MR X7R 6BB 184
1206	22	100	11	200	1.20	X 1206 MK X7R 0BB 223
	47	50 / 63	24	100	1.20	X 1206 MK X7R 9BB 473
	100	50 / 63	50	100	1.20	X 1206 MK X7R 9BB 104
	180	25	90	50	1.20	X 1206 MK X7R 8BB 184
	220	16	110	25	1.20	X 1206 MK X7R 7BB 224
	390	16	195	25	1.20	X 1206 MK X7R 7BB 394
	470	10	235	16	1.20	X 1206 MK X7R 6BB 474
	820	10	410	16	1.20	X 1206 MK X7R 6BB 824

Notes

1. Other values available on request.
2. Ordering codes for preferred versions (±20% tolerance, 180 mm reel). For other packing and tolerance see section Ordering Code Information.
3. For 12NC ordering codes see Table 2.

SELECTION CHART FOR X7R SIZES 1210, 1812(1)

SIZE	Y-CAPACITOR		X-CAPACITOR		THICKNESS (mm)	CTC ORDERING CODE (2)(3)
	CAP (pF)	VOLTAGE RATING (V)	CAP (nF)	VOLTAGE RATING (V)		
1210	47	100	24	200	1.20	X 1210 MK X7R 0BB 473
	100	50 / 63	50	100	1.20	X 1210 MK X7R 9BB 104
	220	50 / 63	110	100	1.60	X 1210 MK X7R 9BB 224
	470	25	235	50	1.60	X 1210 MK X7R 8BB 474
	560	25	280	50	1.90	X 1210 MK X7R 8BB 564
	1 000	16	500	25	1.60	X 1210 MK X7R 7BB 105
1812	100	100	50	200	1.20	X 1812 MK X7R 0BB 104
	220	100	110	200	1.60	X 1812 MK X7R 0BB 224
	330	100	165	200	1.90	X 1812 MK X7R 0BB 334
	470	50 / 63	235	100	1.60	X 1812 MK X7R 9BB 474
	560	50 / 63	280	100	1.90	X 1812 MK X7R 9BB 564
	680	25	340	50	1.20	X 1812 MK X7R 8BB 684
	1 000	25	500	50	1.60	X 1812 MK X7R 8BB 105

Notes

1. Other values available on request.
2. Ordering codes for preferred versions (±20% tolerance, 180 mm reel). For other packing and tolerance see section Ordering Code Information.
3. For 12NC ordering codes see Table 2.

Thickness classification and packing quantities for X7R

THICKNESS CLASSIFICATION (mm)	QUANTITY PER REEL				
	8 mm TAPE WIDTH				12 mm TAPE WIDTH
	∅180 mm; 7"		∅330 mm; 13"		∅180 mm; 7"
	0603 - 1210				1812
	PAPER	BLISTER	PAPER	BLISTER	BLISTER
0.6 ±0.1	5 000	–	20 000	–	–
0.85 ±0.1	4 000	–	15 000	–	–
1.2 ±0.15	–	2 500	–	10 000	–
1.6 ±0.15	–	2 500	–	7 000	1 200
1.9 ±0.2	–	2 500	–	7 000	1 200

ELECTRICAL CHARACTERISTICS FOR Y5V

Class 2 capacitors; Y5V dielectric; NiSn terminations

Unless otherwise stated all electrical values apply at an ambient temperature of 25 ±1 °C, an atmospheric pressure of 86 to 106 kPa, and a relative humidity of 63 to 67%.

DESCRIPTION	VALUE
Rated voltage U_R (DC)	16 V
Capacitance range	100 nF to 4.7 μF
Tolerance on capacitance after 1000 hours	−20% / +80% (Z)
Tan δ; note 1	≤12.5%
Insulation resistance after 1 minute at U_R (DC)	$R_{ins} \times C > 500$ seconds
Maximum capacitance change as a function of temperature	+30% to −80%
Aging	Typical 7% per time decade

Note

1. Measured at 25 °C, 1 V and 1 kHz, using a four-gauge method.

SELECTION CHART FOR Y5V

SIZE	Y-CAPACITOR		X-CAPACITOR		THICKNESS (mm)	CTC ORDERING CODE (1)(2)
	CAP (nF)	VOLTAGE RATING (V)	CAP (nF)	VOLTAGE RATING (V)		
0603	220	16	110	25	0.60	X 0603 ZR Y5V 7BB 224
0805	470	16	235	25	0.85	X 0805 ZR Y5V 7BB 474
1206	2 200	16	1100	25	1.20	X 1206 ZK Y5V 7BB 225
1210	4 700	16	2350	25	1.60	X 1210 ZK Y5V 7BB 475

Notes

1. Ordering codes for preferred versions (180 mm reel). For other packing and tolerance see section Ordering Code.
2. For 12NC ordering codes see Table 2.

Thickness classification and packing quantities for Y5V

THICKNESS CLASSIFICATION (mm)	QUANTITY PER REEL			
	8 mm TAPE WIDTH			
	∅180 mm; 7"		∅330 mm; 13"	
	PAPER	BLISTER	PAPER	BLISTER
0.6 ±0.1	5 000	–	20 000	–
0.85 ±0.1	4 000	–	15 000	–
1.2 ±0.15	–	2 500	–	10 000
1.6 ±0.15	–	2 500	–	7 000

ORDERING INFORMATION

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

Table 2 Conversion table: Clear text code - 12NC code

TC	SIZE	CAPACITANCE VALUE	CAPACITANCE TOLERANCE	RATED VOLTAGE (V)	CTC ORDERING CODE	12NC ORDERING CODE	QUANTITY PER REEL
		Y-CAP	Y-CAP	Y-CAP			
NP0	0603	10 pF	±10%	100	X 0603 KR NP0 0BN 100	2259 096 11623	5 000
NP0	0603	22 pF	±10%	100	X 0603 KR NP0 0BN 220	2259 096 11627	5 000
NP0	0603	47 pF	±10%	100	X 0603 KR NP0 0BN 470	2259 096 11632	5 000
NP0	0603	100 pF	±10%	100	X 0603 KR NP0 0BN 101	2259 096 11636	5 000
NP0	0603	220 pF	±10%	100	X 0603 KR NP0 0BN 221	2259 096 11641	5 000
NP0	0805	10 pF	±10%	100	X 0805 KR NP0 0BN 100	2259 090 11623	4 000
NP0	0805	22 pF	±10%	100	X 0805 KR NP0 0BN 220	2259 090 11627	4 000
NP0	0805	47 pF	±10%	100	X 0805 KR NP0 0BN 470	2259 090 11632	4 000
NP0	0805	100 pF	±10%	100	X 0805 KR NP0 0BN 101	2259 090 11636	4 000
NP0	0805	220 pF	±10%	100	X 0805 KR NP0 0BN 221	2259 090 11641	4 000
NP0	0805	330 pF	±10%	100	X 0805 KR NP0 0BN 331	2259 090 11643	4 000
X7R	0603	1 nF	±20%	100	X 0603 MR X7R 0BB 102	2259 096 15723	4 000
X7R	0603	2.2 nF	±20%	100	X 0603 MR X7R 0BB 222	2259 096 15727	4 000
X7R	0603	4.7 nF	±20%	100	X 0603 MR X7R 0BB 472	2259 096 15732	4 000
X7R	0603	5.6 nF	±20%	100	X 0603 MR X7R 0BB 562	2259 096 15733	4 000
X7R	0603	10 nF	±20%	50 / 63	X 0603 MR X7R 9BB 103	2259 086 15736	4 000
X7R	0603	22 nF	±20%	25	X 0603 MR X7R 8BB 223	2259 076 15741	4 000
X7R	0603	47 nF	±20%	16	X 0603 MR X7R 7BB 473	2259 066 15745	4 000
X7R	0603	56 nF	±20%	16	X 0603 MR X7R 7BB 563	2259 066 15746	4 000
X7R	0603	100 nF	±20%	10	X 0603 MR X7R 6BB 104	2259 056 15749	4 000
X7R	0805	4.7 nF	±20%	100	X 0805 MR X7R 0BB 472	2259 090 15732	4 000
X7R	0805	10 nF	±20%	100	X 0805 MR X7R 0BB 103	2259 090 15736	4 000
X7R	0805	18 nF	±20%	50 / 63	X 0805 MR X7R 9BB 183	2259 080 15739	4 000
X7R	0805	22 nF	±20%	25	X 0805 MR X7R 8BB 223	2259 070 15741	4 000
X7R	0805	39 nF	±20%	25	X 0805 MR X7R 8BB 393	2259 070 15744	4 000
X7R	0805	47 nF	±20%	16	X 0805 MR X7R 7BB 473	2259 060 15745	4 000
X7R	0805	100 nF	±20%	16	X 0805 MR X7R 7BB 104	2259 060 15749	4 000
X7R	0805	180 nF	±20%	10	X 0805 MR X7R 6BB 184	2259 050 15753	4 000

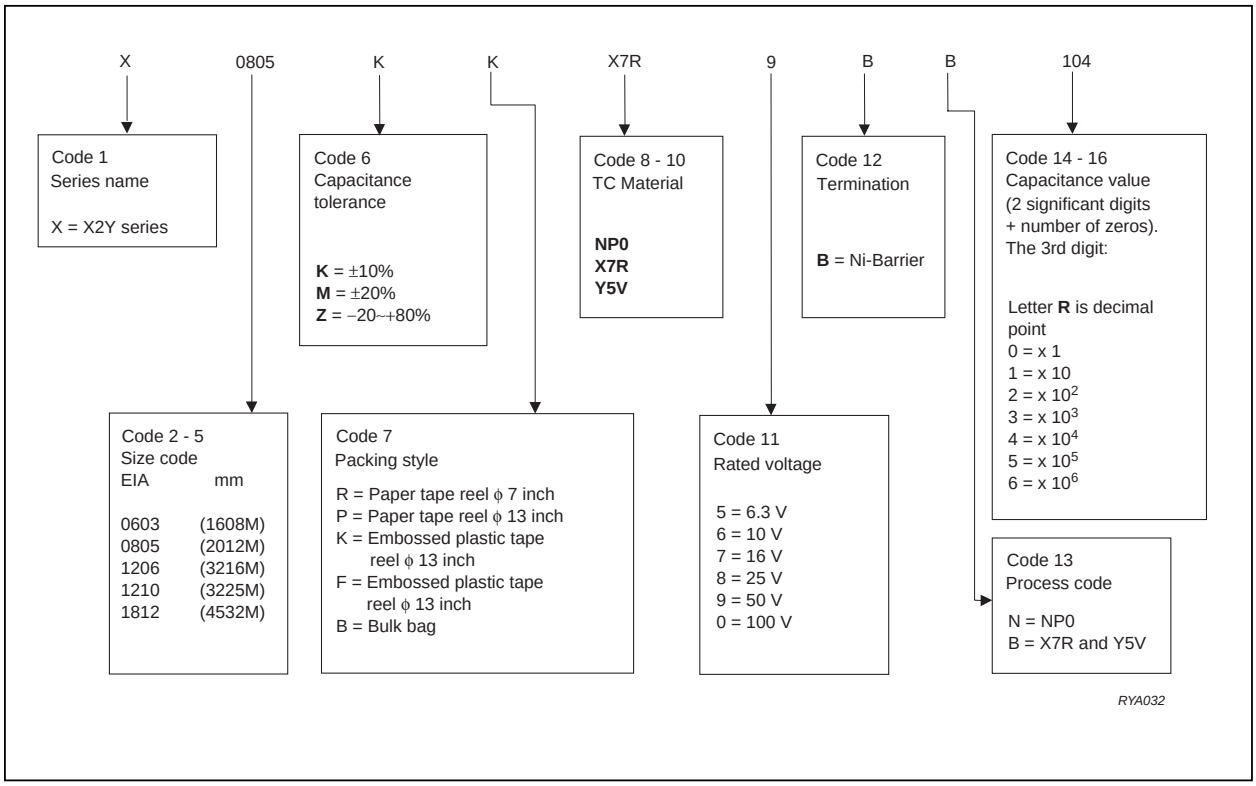
Table 2 Conversion table: Clear text code - 12NC code (continued)

TC	SIZE	CAPACITANCE VALUE	CAPACITANCE TOLERANCE	RATED VOLTAGE (V)	CTC ORDERING CODE	12NC ORDERING CODE	QUANTITY PER REEL
		Y-CAP	Y-CAP	Y-CAP			
X7R	1206	22 nF	±20%	100	X 1206 MK X7R 0BB 223	2259 091 25741	2 500
X7R	1206	47 nF	±20%	50 / 63	X 1206 MK X7R 9BB 473	2259 081 25745	2 500
X7R	1206	100 nF	±20%	50 / 63	X 1206 MK X7R 9BB 104	2259 081 25749	2 500
X7R	1206	180 nF	±20%	25	X 1206 MK X7R 8BB 184	2259 071 25753	2 500
X7R	1206	220 nF	±20%	16	X 1206 MK X7R 7BB 224	2259 061 25754	2 500
X7R	1206	390 nF	±20%	16	X 1206 MK X7R 7BB 394	2259 061 25757	2 500
X7R	1206	470 nF	±20%	10	X 1206 MK X7R 6BB 474	2259 051 25758	2 500
X7R	1206	820 nF	±20%	10	X 1206 MK X7R 6BB 824	2259 051 25762	2 500
X7R	1210	47 nF	±20%	100	X 1210 MK X7R 0BB 473	2259 092 25745	2 500
X7R	1210	100 nF	±20%	50 / 63	X 1210 MK X7R 9BB 104	2259 082 25749	2 500
X7R	1210	220 nF	±20%	50 / 63	X 1210 MK X7R 9BB 224	2259 082 25754	2 500
X7R	1210	470 nF	±20%	25	X 1210 MK X7R 8BB 474	2259 072 25758	2 500
X7R	1210	560 nF	±20%	25	X 1210 MK X7R 8BB 564	2259 072 25759	2 500
X7R	1210	1 000 nF	±20%	16	X 1210 MK X7R 7BB 105	2259 062 25763	2 500
X7R	1812	100 nF	±20%	100	X 1812 MK X7R 0BB 104	2259 094 25749	1 200
X7R	1812	220 nF	±20%	100	X 1812 MK X7R 0BB 224	2259 094 25754	1 200
X7R	1812	330 nF	±20%	100	X 1812 MK X7R 0BB 334	2259 094 25756	1 200
X7R	1812	470 nF	±20%	50 / 63	X 1812 MK X7R 9BB 474	2259 084 25758	1 200
X7R	1812	560 nF	±20%	50 / 63	X 1812 MK X7R 9BB 564	2259 084 25759	1 200
X7R	1812	680 nF	±20%	25	X 1812 MK X7R 8BB 684	2259 074 25761	1 200
X7R	1812	1 000 nF	±20%	25	X 1812 MK X7R 8BB 105	2259 074 25763	1 200
Y5V	0603	220 nF	+20%/–80%	16	X 0603 ZR Y5V 7BB 224	2259 066 19854	4 000
Y5V	0805	470 nF	+20%/–80%	16	X 0805 ZR Y5V 7BB 474	2259 060 19858	4 000
Y5V	1206	2 200 nF	+20%/–80%	16	X 1206 ZK Y5V 7BB 225	2259 061 19867	2 500
Y5V	1210	4 700 nF	+20%/–80%	16	X 1210 ZK Y5V 7BB 475	2259 062 19872	2 500

Surface-mount ceramic EMI filter capacitors

X2Y® Series

Ordering code: Unified Clear Text Code



RECOMMENDED DIMENSIONS OF SOLDER LANDS

Table 3 Reflow soldering

CASE SIZE (EIA)	Footprint dimensions (mm)						Placement Accuracy (mm)
	A	B	C	D	E	F	
0603	2.0	0.7	0.5	0.35	1.2	0.3	±0.20
0805	2.5	1.1	0.6	0.5	1.8	0.35	±0.20
1206	4.0	1.4	1.0	1.15	2.4	0.4	±0.25
1210	4.0	2.2	1.0	1.15	3.7	0.4	±0.25
1812	5.6	2.8	1.2	1.15	4.8	1.0	±0.25

Table 4 Wave soldering

CASE SIZE (EIA)	Footprint dimensions (mm)						Placement Accuracy (mm)
	A	B	C	D	E	F	
0603	2.4	0.7	0.7	0.35	1.2	0.3	±0.20
0805	3.0	1.1	0.85	0.5	1.8	0.35	±0.20
1206	4.8	1.4	1.4	1.15	2.4	0.4	±0.25

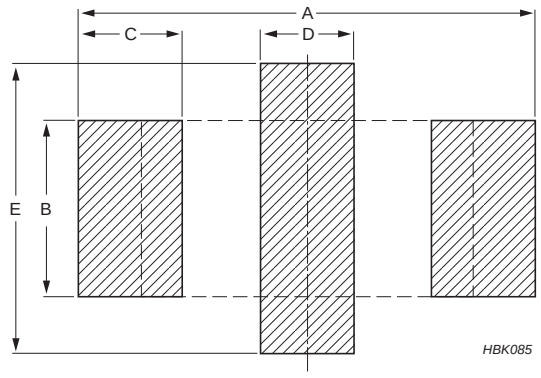
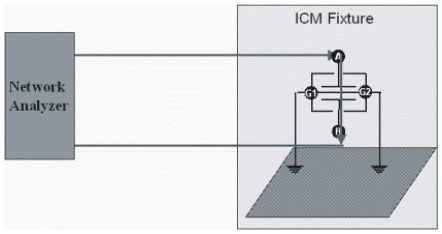


Fig.3 Recommended dimensions of solder lands.

INSERTION LOSS CHARACTERISTICS

Measurement setup



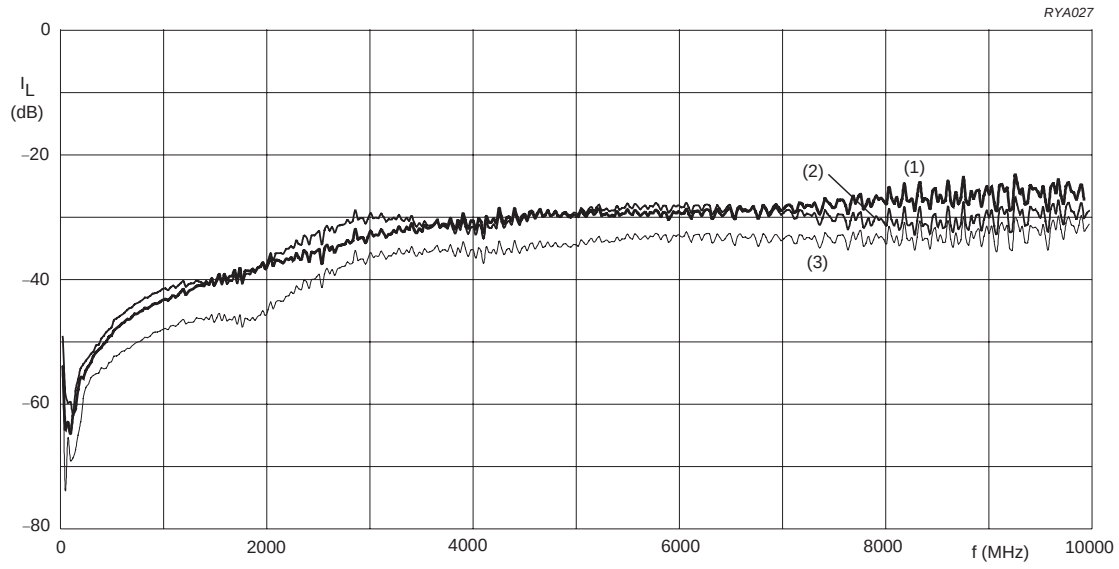
RYA030

X2Y series through measurement

RYA031

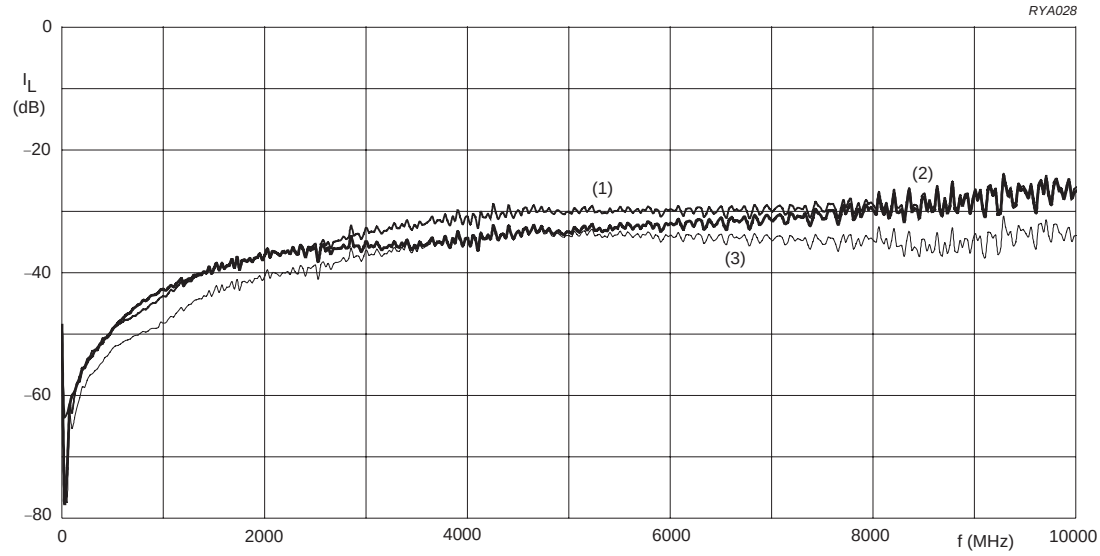
ICM X2Y fixture

- Vector Network Analyzer: R&S ZVM 10 MHz - 20 GHz
- X2Y test fixture: ICM X2Y 10 GHz series through test fixture
- Measurement frequency range: 10 MHz - 10 GHz
- TRL calibration
- S-parameter files in Touchstone format available for simulation.



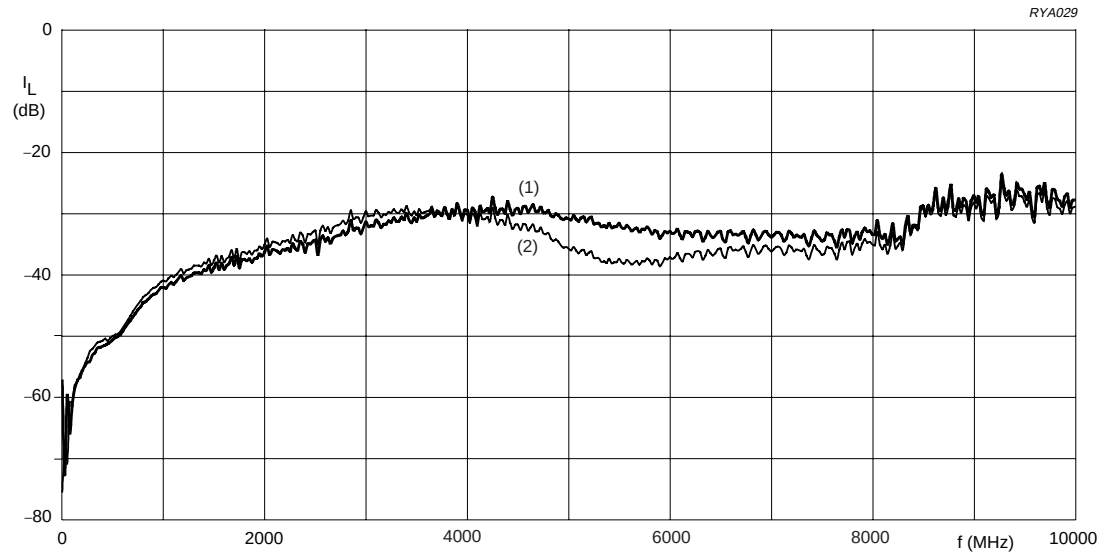
1. 0805 = 100 nF.
2. 0805 = 15 nF.
3. 0603 = 3.3 nF.

Fig.4 Insertion Loss curves (S21) for X2Y 0603 and 0805 series.



1. 1210 = 560 nF.
2. 1210 = 5 μF.
3. 1206 = 200 nF.

Fig.5 Insertion Loss curves (S21) for X2Y 1206 and 1210 series.



1. 470 nF.
2. 270 nF.

Fig.6 Insertion Loss curves (S21) for X2Y 1812 series.

TESTS AND REQUIREMENTS

Table 5 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 ×10 magnification	in accordance with specification
4.6.1		capacitance	Class 1: ≤1000 pF; f = 1 MHz >1000 pF; f = 1 kHz NP0: measuring voltage 1 V at 20 °C Class 2: For all capacitors f = 1 kHz X7R: measuring voltage 1 V at 20 °C Y5V: measuring voltage 1 V at 25 °C	within specified tolerance
4.6.2		tan δ	Class 1: ≤1000 pF; f = 1 MHz >1000 pF; f = 1 kHz NP0: measuring voltage 1 V at 20 °C Class 2: For all capacitors f = 1 kHz X7R: measuring voltage 1 V at 20 °C Y5V: measuring voltage 1 V at 25 °C	in accordance with specifications
4.6.3		insulation resistance	at U_R (DC) for 1 minute	in accordance with specification
4.6.4		voltage proof	2.5 × 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

IEC 60384-10/ CECC 32 100 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
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	ΔC/C: class 1: within ±10% class 2, X7R: within ±10% class 2, Y5V: within ±30%

4.10	Tb	resistance to soldering heat	Precondition:
			120 to 150 °C for 1 minute;
			260 ±5 °C for 10 ±0.5 s
			in a static solder bath
				the terminations shall be well tinned after recovery
				ΔC/C:
				class 1: within ±0.5% or 0.5 pF whichever is greater
				class 2, X7R:
				>−5% and ≤10%
				class 2, Y5V:
				>−10% and ≤20%

		resistance to leaching	260 ±5 °C for 30 ±1 s in a static solder bath	using visual enlargement of ×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 ±0.5 s in a solder bath at 235 ±5 °C	the terminations shall be well tinned
4.12	Na	rapid change of temperature	Preconditioning, class 2 only; NP0 / X7R: −55 to +125 °C; 5 cycles Y5V: −25 to +85 °C; 5 cycles	no visual damage after 48 hours recovery; ΔC/C: class 1: within ±1% or 1 pF class 2, X7R: within ±15% class 2, Y5V: within ±20%

IEC 60384-10/ CECC 32 100 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS

4.14	Ca	damp heat, steady state	Initialisation:
			48 hours after U_R at 40 °C
			for 1 hour (for initial value measurement);
			500 ±12 hours at 40 °C;
			90 to 95% RH; U_R applied.
				no visual damage
				after recovery:
				class 1: 1 to 2 hours
				class 2: 24 hours
				$\Delta C/C$:
				class 1: within ±2% or 1 pF, whichever is greater
				class 2, X7R: within ±15%, ±20%
				class 2, Y5V: within +30/−40%
				tan δ:
				class 1: ≤2 × specified value
				class 2: X7R: ≤7%
				class 2, Y5V: ≤15%
				R_{ins}:
				class 1:
				2500 MΩ or $R_{ins} \times C_R \geq 25$ s, whichever is less
				class 2:
				1000 MΩ or $R_{ins} \times C_R \geq 25$ s, whichever is less

4.15		endurance	preconditioning, class 2 only:
			1000 hours at upper category temperature at:
			$1.5 \times U_R$
				no visual damage
				after 24 hours recovery:
				$\Delta C/C$:
				class 1: within ±2% or 1 pF, whichever is greater
				class 2, X7R: within ±20%
				class 2, Y5V: within +30/−40%
				tan δ:
				class 1: ≤2 × specified value
				class 2: X7R: ≤7%
				class 2: Y5V: ≤15%
				R_{ins}:
				class 1:
				4000 MΩ or $R_{ins} \times C_R \geq 40$ s, whichever is less
				class 2:
				2000 MΩ or $R_{ins} \times C_R \geq 50$ s, whichever is less

REVISION HISTORY

Revision	Date	Change Notification	Description
Rev.5	2001 Sep 25	-	- Published on web
Rev.6	2002 Jul 10	-	- Product range extended in all materials and sizes; - Insertion loss measurements added.
Rev.7	2003 Apr 02	-	- Updated company logo
Rev.8	2003 Jul 23	-	- Cover page revised
Rev.9	2003 Sep 09	-	- Cover page corrected