



# DATA SHEET

## SURFACE-MOUNT CERAMIC MULTILAYER CAPACITORS Mid-voltage

NPO/X7R 100 V TO 630 V 0.47 pF to 2.2 µF

RoHS compliant & Halogen Free



yageo Phicomp

Surface-Mount Ceramic Multilayer Capacitors Mid-voltage NP0/X7R 100 V to 630 V

#### <u>SCOPE</u>

This specification describes Midvoltage NP0/X7R series chip capacitors with lead-free terminations.

#### **APPLICATIONS**

PCs, Hard disk, Game PCs Power supplies, Charger LCD panel ADSL, Modem

#### <u>FEATURES</u>

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

#### ORDERING INFORMATION - GLOBAL PART NUMBER, PHYCOMP

#### CTC & 12NC

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 <u>xxxx</u> <u>x</u> <u>x</u> <u>xxx</u> <u>x</u> B <u>x</u> <u>xxx</u> (1) (2) (3) (4) (5) (6) (7)

#### (I) SIZE - INCH BASED (METRIC)

0201 (0603) / 0402 (1005) / 0603 (1608) / 0805 (2012) / 1206 (3216) / 1210 (3225) 1808 (4520) / 1812 (4532)

#### (2) TOLERANCE

 $C = \pm 0.25 \text{ pF}$   $D = \pm 0.5 \text{ pF}$   $F = \pm 1\%$   $G = \pm 2\%$   $J = \pm 5\%$   $K = \pm 10\%$  $M = \pm 20\%$ 

#### (3) PACKING STYLE

- R = Paper/PE taping reel; Reel 7 inch
- K = Blister taping reel; Reel 7 inch
- P = Paper/PE taping reel; Reel 13 inch
- F = Blister taping reel; Reel 13 inch

#### (4) TC MATERIAL

NPO X7R

#### (5) RATED VOLTAGE

- 0 = 100 V
- A = 200 V
- Y = 250 V
- B = 500 V
- Z = 630 V

#### (6) PROCESS

N = NP0

B = Class 2 MLCC

#### (7) CAPACITANCE VALUE

2 significant digits+number of zeros

The 3rd digit signifies the multiplying factor, and letter R is decimal point

Example:  $|2| = |2 \times |0| = |20 \text{ pF}$ 

#### Surface-Mount Ceramic Multilayer Capacitors Mid-voltage NP0/X7R 100 V to 630 V

#### **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.

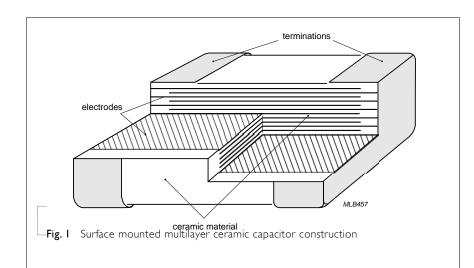
The inner electrodes are connected to the two end terminations and finally covered with a layer of plated tin (NiSn). The terminations are lead-free. A cross section of the structure is shown in Fig. I.

#### **DIMENSION**

2

Table I	For	outlines	see	fig.

4.5 ±0.40



#### L<sub>2</sub> / L<sub>3</sub> (mm) L<sub>4</sub> (mm) TYPE L<sub>I</sub> (mm) W (mm) T (MM) min. max. min. 0201 0.6 ±0.03 0.3±0.03 0.20 0.3±0.03 0.10 0.20 0402 1.0 ±0.05 $0.5 \pm 0.05$ $0.5 \pm 0.05$ 0.15 0.30 0.40 0603 1.6 ±0.10 0.8 ±0.10 0.20 0.8 ±0.10 0.60 0.40 2.0 ±0.10 1.25 ±0.10 0.6 ±0.10 0805 2.0 ±0.10 1.25 ±0.10 0.85 ±0.10 0.25 0.75 0.70 2.0 ±0.20 1.25 ±0.20 1.25 ±0.20 0.6 ±0.10 3.2 ±0.15 1.6 ±0.15 0.85 ±0.10 1206 1.25 ±0.20 0.25 0.75 1.40 3.2 ±0.30 1.6 ±0.20 1.6 ±0.20 3.2 ±0.30 1.6 ±0.30 1.6 ±0.30 0.85 ±0.10 3.2 ±0.20 2.5 ±0.20 $1.25 \pm 0.20$ 1210 0.25 0.75 1.40 1.6 ±0.20 2.5 ±0.20 3.2 ±0.30 2.0 ±0.20 1808 0.75 $4.5 \pm 0.40$ $2.0 \pm 0.30$ 1.25 ±0.20 0.25 2.20 1812

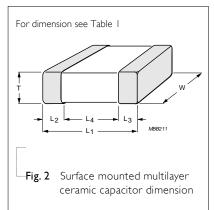
0.85 ±0.10

0.25

0.75

2.20

#### OUTLINES



З

18

Product specification

3.2 ±0.30

YAGEO									Product specific	$\frac{4}{18}$
	Surface	-Mount Ce	ramic Mu	Itilayer Ca	apacitors	Mid-volta	ge NP0/X	7R 100 V to	630 V	18
<u>CAPACITA</u>	ANCE RAN	NGE & THIO	CKNESS FO	<u>Dr Npo</u>						
Table 2	izes from 02	201 to 0805								
CAP.	0201	0402	0603			0805				
	100V	100V	100 V	200 V	250 V	100 V	200 V	250 V	500 V	630V
0.22 pF				_						
0.47 pF										
0.56 pF										
0.68 pF										
0.82 pF										
I.0 pF										
I.2 pF										
I.5 pF										
1.8 pF										
2.2 pF 2.7 pF										
3.3 pF										
3.9 pF										
4.7 pF										
5.6 pF										
6.8 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1
8.2 pF										
10 pF										
I2 pF										
15 pF										
18 pF										
22 pF										
27 pF										
33 pF										
39 pF										
47 pF										
56 pF										
68 pF										
82 pF										
100 pF										

I. Values in shaded cells indicate thickness class in mm

Surface-Mount Ceramic Multilayer Capacitors Mid-voltage NP0/X7R 100 V to 630 V

#### CAPACITANCE RANGE & THICKNESS FOR NPO

Table 3 Sizes from 0603 to 0805 (continued)

CAP.	0402 100 V	0603 100 V	200 V	250 V	0805 100 ∨	200 V	250 V	500 V	630 V
I 20 pF I 50 pF						0.6± 0.1	0.6± 0.1	0.6± 0.1	0.6± 0.1
180 pF 220 pF									
270 pF 330 pF	0.5± 0.05		0.8± 0.1	0.8± 0.1	0.6± 0.1			0.85±0.1	0.85±0.1
390 pF 470 pF						0.85±0.1	0.85±0.1		
560 pF 680 pF								1.25±0.2	1.25±0.2
820 pF 1.0 nF 1.2 nF		0.8± 0.1							
I.5 nF					0.85±0.1				
2.2 nF 2.7 nF						1.25±0.2	1.25±0.2		
3.3 nF 3.9 nF									
4.7 nF 5.6 nF					1.25±0.2				
6.8 nF 8.2 nF									
10 nF 12 nF									
15 nF 18 nF									
22 nF									

### ΝΟΤΕ

I. Values in shaded cells indicate thickness class in mm

2. Capacitance value of non E-12 series is on request

Product specification  $\frac{5}{18}$ 

YAGEO	Phice	omp							Product sp	pecification 6
			Ceramic N	lultilayer	Capacito	Mid-v	oltage NF	P0/X7R 100	V to 630 V	18
CAPACITA	NCE DA	NGE & T		EOR NDO						
		206 to  2		<u>10K 1110</u>						
CAP.	1206					1210				
	100 V	200 V	250 V	500 V	630 V	100 V	200 V	250 V	500 V	630 V
0.47 pF										
0.56 pF										
0.68 pF										
0.82 pF										
I.0 pF										
I.2 pF										
1.5 pF										
1.8 pF										
2.2 pF										
2.7 pF										
3.3 pF										
3.9 pF										
4.7 pF										
5.6 pF	0.6±0.1	0.6±0.1	0.6±0.1							
6.8 pF	0.0±0.1	0.0±0.1	0.0±0.1							
8.2 pF										
10 pF										
I2 pF										
I5 pF										
18 pF										
22 pF										
27 pF				0.6±0.1	1.25±0.2					
33 pF				0.0±0.1	1.23±0.2					
39 pF										
47 pF										1.25±0.2
56 pF						1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2	1.20±0.2
68 pF						1,2010,2	1,2310,2	1,23±0,2	1,23±0,2	
82 pF										

I. Values in shaded cells indicate thickness class in  ${\sf mm}$ 



YAGE	O <sub>1</sub> Phí	comp								Product s	pecification 7
	Surfa	ce-Mount	t Ceramic	Multilaye	r Capacit	OIS Mid-	voltage	NP0/X7R	100	V to 630 V	18
CADACI	TANCER	ANCENS		6 600 NID	0						
		<u>ange a l</u> n 1206 to 12		<u>s FOR NP(</u> ed)	<u>u</u>						
CAP.	1206	111200 to 12		cu)		1210					
_	100 V	200 V	250 V	500 V	630 V	100 V	200 \	/ 2	50 V	500 V	630 V
100 pF											
120 pF											
150 pF											
180 pF											
220 pF											
270 pF		0.6±0.1	0.6±0.1	0.6±0.1							
330 pF											1.25±0.2
390 pF											
470 pF	0 ( ) 0				1.25±0.2						
560 pF	0.6±0.1										
680 pF							1.25±0.	2 1.25	±0.2	1.25±0.2	
820 pF											
I.0 nF											
I.2 nF		0.85±0.1	0.85±0.1	0.85±0.1		1.25±0.2					
I.5 nF											
I.8 nF											
2.2 nF				1.25±0.2							
2.7 nF		1.25±0.2	1.25±0.2								
3.3 nF											
3.9 nF											
4.7 nF	0.85±0.1										
5.6 nF											
6.8 nF											
8.2 nF											
10 nF	1.25±0.2										
l2 nF											
15 nF											
18 nF						14102					
22 nF						1.6±0.2					

I. Values in shaded cells indicate thickness class in mm

	) Phíco Surface		ic Multilayer Ca	nacitore	Mid-vol	tage NP0/X7R		pecification
	Junaco	-mvunt veran	ne multilayer va	iharirni 9		Idge   NF0/A/K	100 10 050 1	
		NGE & THICKN	<u>ess for Npo</u>					
	Sizes 1812	1012						
CAP.		1812 100 V	200 V		250 V		500 V	630\
		100 V	200 1		250 1		300 1	
	10 pF 12 pF							
	12 pF 15 pF							
	18 pF							
	22 pF							
	27 pF							
	33 pF							
	39 pF							
	47 pF							
	56 pF							
	68 pF							
	82 pF							
	100 pF							
	120 pF							
	150 pF							
I	180 pF							
2	220 pF							
2	270 pF							1.25±0.2
3	330 pF							1,2010,2
3	390 pF							
	470 pF					1.2	5±0.2	
	560 pF							
	680 pF							
8	320 pF							
	l nF							
	I.2 nF		1.25±0.2		1.25±0.2			
	1.5 nF							
	1.8 nF							
	2.2 nF	1.25±0.2						
	2.7 nF 3.3 nF	1.23±0.2						
	3.9 nF							
	4.7 nF							
	5.6 nF							
	6.8 nF							
	8.2 nF							
	10 nF							
	I2 nF							
	15 nF							
	18 nF							
	22 nF							

I. Values in shaded cells indicate thickness class in mm



	Surface	-Mount Cer	amic Multil	ayer Capaci	itors Mid-v	Mid-voltage NP0/X7R 100 V to 630 V			
<u>CAPACIT</u>	<u>ANCE RAN</u>	NGE & THIC	KNESS FOR	<u>X7R</u>					
Table 7	Sizes from (	0402 to 0805							
CAP.	0402	0603		0805					
	100 V	100 V	250 V	100 V	200 V	250 V	500 V	630 V	
100 pF									
150 pF									
220 pF									
330 pF									
470 pF									
680 pF	0.5.0.05				0.05 . 0 .	0.05 . 0 .		0.05 . 0.1	
I.0 nF	0.5±0.05			0 ( + 0 +	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	
1.5 nF				0.6±0.1					
2.2 nF 3.3 nF		0.8±0.1	0.8±0.1						
4.7 nF		0.0±0.1							
6.8 nF									
10 nF								1.25±0.2	
I5 nF							1.25±0.2	1.20 ±0.2	
22 nF				0.85±0.1					
33 nF					1.25±0.2	I.25±0.2 -			
47 nF									
68 nF									
100 nF									
150 nF				1.25±0.2					
220 nF									
330 nF									
470 nF									
ΙμF									

I. Values in shaded cells indicate thickness class in mm

2. Capacitance value of non E-6 series is on request

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- 3. For special ordering code, please contact local sales force before order
- 4. For product with 5% tolerance, please contact local sales force before order



9

18

Product specification

YAGE	<b>)</b> Phíc	omp							Product speci	ication 10
				lultilayer (	Capacitor	S Mid-volt	age NP0/>	K7R 100 V	to 630 V	18
CAPACIT		<u>NGE &amp; TI</u> 1 1206 to 12	<u>hickness</u>	<u>FOR X7R</u>						
CAP.	512es from	1 1 206 10 12	10			1210				
	100 V	200 V	250 V	500 V	630 V	100 V	200 V	250 V	500 V	630V
100 pF										
150 pF										
220 pF										
330 pF										
470 pF										
680 pF										
I.0 nF										
I.5 nF										
2.2 nF		0.85±0.1	0.85±0.1	1.25±0.2	1.25±0.2 -					
3.3 nF	0.85±0.1									
4.7 nF							0.85±0.1	0.85±0.1		
6.8 nF							0.03±0.1	0.05±0.1		1.25±0.2
10 nF									1.25±0.2	
15 nF	_			_		0.85±0.1				
22 nF					1.6±0.2					1.6±0.2
33 nF		1.25±0.2	1.25±0.2	1.6±0.2	1.0±0.2					2.0±0.2
47 nF		1,20 20,2	1.20 ±0.2							2.0 ± 0.2
68 nF							1.25±0.2	1.25±0.2	1.6±0.2	
100 nF	I.25±0.2 -	1.6±0.2	1.6±0.2						2.0±0.2	
150 nF										
220 nF						1.25±0.2 <sup>-</sup>				
330 nF										
470 nF	1.6±0.2									
680 nF										
ΙμF						2.0±0.2				
2.2 µF	1.6±0.3									

I. 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



YAGEC	) Phíco	тр				
	Surface	-Mount Ce	ramic Mul	tilayer Cap	acitors	Mid-volt
CAPACIT	'ANCE RAP	NGE & THIO	CKNESS FO	R X7R		
		1808 to 1812				
CAP.	1812	000 V (	250.14	500.14	(20.)(	
	100 V	200 V	250 V	500 V	630 V	
100 pF						
150 pF						
220 pF						
330 pF						
470 pF						
680 pF						
I.0 nF						
I.5 nF						
2.2 nF						
3.3 nF						
4.7 nF		0.85±0.1	0.85±0.1		1.35±0.2	
6.8 nF	0.85±0.1			1.25±0.2		
10 nF						
15 nF						
22 nF						
33 nF					1.6±0.2	
47 nF						
68 nF		1.25±0.2	1.25±0.2			
100 nF				1.6±0.2		
150 nF	1.25±0.2					
220 nF						
330 nF		1.6±0.2	1.6±0.2			
470 nF						
680 nF	1.6±0.2					r
ΙμF						<u>.</u>

- I. 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

Product specification 11

NP0/X7R 100 V to 630 V

18

#### THICKNESS CLASSES AND PACKING QUANTITY

SIZE CLOSSIFICATION CLOSSIFICATION CLASSIFICATION CODI         TAPE WIDTH QUANTITY PR REL         0180 MH / 7 INCH Paper         0330 MM / 13 INCH Paper         QUANTITY Bisser         QUANTITY PR BLICK CSE           0401         0.3 ±003 mm         8 mm         15.000	Table I	0						
CODE         CLASSIFICATION         QUANTITY PER RELL         Paper         Bister         Paper         Bister         PER BULK CASE           0402         0.3 ±0.03 mm         8 mm         15.000          50.000          50.000           0603         0.8 10.1 mm         8 mm         40.00          20.000          50.000           0663         0.8 10.1 mm         8 mm         40.00          20.000          10.000           0.8 0.1 mm         8 mm         40.00          15.000          80.000           0.8 0.8 10.1 mm         8 mm         40.00          10.000             0.6 40.1 mm         8 mm          30.00          10.000            1.00/1.15 10.1 mm         8 mm          30.00          10.000            1.6 4.0.15 mm         8 mm          25.00          10.000            1.6 4.0.15 mm         8 mm          30.00             1.15 4.0.15 mm         8 mm	SIZE	THICKNESS	TAPE WIDTH	Ø180 MM	/ 7 INCH	Ø330 MM /	13 INCH	OUANTITY
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           0605         0.6.6 ±0.1 mm         8 mm         4.000          15.000          15.000           0806         0.85 ±0.1 mm         8 mm         4.000          10.000         5.000           1206         0.6.6 ±0.1 mm         8 mm         4.000          10.000         5.000           1206         0.6.6 ±0.1 mm         8 mm          3.000          10.000            1.00 / 1.15 ±0.1 mm         8 mm          3.000          10.000            1.6 ±0.15 mm         8 mm          3.000          10.000            1.6 ±0.15 mm         8 mm          3.000          10.000            1.15 ±0.15 mm         8 mm          3.000              1.15 ±0.15 mm         8 mm          3.000 </th <th></th> <th></th> <th></th> <th>Paper</th> <th>Blister</th> <th>Paper</th> <th>Blister</th> <th></th>				Paper	Blister	Paper	Blister	
0603         0.8 ±0.1 mm         8 mm         4.000          15.000          15.000           0805         0.6 ±0.1 mm         8 mm         4.000          15.000          15.000           0805         0.6 ±0.1 mm         8 mm         4.000          15,000          80.000           125 ±0.2 mm         8 mm         4.000          15,000          80.000           0.8 / 0.85 ±0.1 mm         8 mm         4.000          15,000             1206         1.00 / 1.15 ±0.1 mm         8 mm         4.000          15,000             12106         1.6 ±0.2 mm         8 mm          3.000          10,000            1210         0.6 / 0.7 ±0.1 mm         8 mm          3.000          10,000            115 ±0.1 mm         8 mm          3.000          10,000            1.15 ±0.1 mm         8 mm          3.000              1.15 ±0.1 mm         8 mm <td>0201</td> <td>0.3 ±0.03 mm</td> <td>8 mm</td> <td>15,000</td> <td></td> <td>50,000</td> <td></td> <td></td>	0201	0.3 ±0.03 mm	8 mm	15,000		50,000		
0.6 ± 0.1 mm         0 mm         4,000          1,0000          1,0000           0805         0.8 / 0.85 ± 0.1 mm         8 mm         4,000          15,000          8,000           125 ± 0.2 mm         8 mm         4,000          10,000         5,000           0.6 ± 0.1 mm         8 mm         4,000          20,000             0.8 / 0.85 ± 0.1 mm         8 mm         4,000          20,000             1.00 / 1.15 ± 0.1 mm         8 mm          3,000          10,000            1.6 / 0.15 ± 0.1 mm         8 mm          2,000          10,000            1.15 ± 0.1 mm         8 mm          2,000             1.15 ± 0.1 mm         8 mm          3,000             1.15 ± 0.1 mm         8 mm          3,000	0402	0.5 ±0.05 mm	8 mm	10,000		50,000		50,000
0805         0.8 / 0.85 ± 0.1 mm         8 mm         4,000          15,000          8,000           1.25 ± 0.2 mm         8 mm         4,000          20,000             0.8 / 0.85 ± 0.1 mm         8 mm         4,000          20,000             0.8 / 0.85 ± 0.1 mm         8 mm         4,000          10,000            1.00 / 1.15 ± 0.1 mm         8 mm          3,000          10,000            1.6 ± 0.2 mm         8 mm          2,000          10,000            1.6 ± 0.2 mm         8 mm          2,000          10,000            1.6 ± 0.2 mm         8 mm          3,000          10,000            1.15 ± 0.1 mm         8 mm          3,000              1.15 ± 0.1 mm         8 mm          3,000              1.15 ± 0.1 mm         8 mm          3,000	0603	0.8 ±0.1 mm	8 mm	4,000		15,000		15,000
125 ±0.2 mm         8 mm          1000         5000           0.6 ±0.1 mm         8 mm         4000          10000            1206         1.00 / 1.15 ±0.1 mm         8 mm         4000          10000            1.00 / 1.15 ±0.1 mm         8 mm          3000             1.6 ±0.1 stol         8 mm          3000          10000            1.6 ±0.1 stol         8 mm          2.500          10000            1.6 ±0.2 mm         8 mm          2.000          8.000            1.6 ±0.1 mm         8 mm          3.000          10.000            1.15 ±0.1 mm         8 mm          3.000          10.000            1.15 ±0.1 mm         8 mm          3.000              1.6 / 1.9 ±0.2 mm         8 mm          3.000              1.5 ±0.1 mm         12 mm          3.000		0.6 ±0.1 mm	8 mm	4,000		20,000		10,000
1206         0.6 ± 0.1 mm         8 mm         4,000          20,000             0.8 / 0.85 ± 0.1 mm         8 mm         4,000          15,000             1.20 / 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          2,000          8,000            1.6 ± 0.2 mm         8 mm          4,000          10,000            1.6 ± 0.15 mm         8 mm          4,000          10,000            1.15 ± 0.11 mm         8 mm          3,000          10,000            1.15 ± 0.11 mm         8 mm          3,000              1.5 ± 0.11 mm         8 mm          3,000              1.5 ± 0.11 mm         12 mm          3,000	0805	0.8 / 0.85 ±0.1 mm	8 mm	4,000		15,000		8,000
1206         0.8 / 0.85 ±0.1 mm         8 mm         4.000          15.000             1.00 / 1.15 ±0.1 mm         8 mm          3.000          10.000            1.6 ±0.1 smm         8 mm          2.500          10.000            1.6 ±0.2 mm         8 mm          2.500          10.000            1.6 ±0.2 mm         8 mm          2.000          8.000            0.6 / 0.7 ±0.1 mm         8 mm          4.000          10.000            1.15 ±0.1 smm         8 mm          3.000          10.000            1.15 ±0.1 smm         8 mm          3.000              1.15 ±0.1 smm         8 mm          3.000              1.6 / 1.9 ±0.2 mm         8 mm          3.000              1.6 / 1.9 ±0.2 mm         8 mm          3.000		1.25 ±0.2 mm	8 mm		3,000		10,000	5,000
1206         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            1.6 ±0.2 mm         8 mm          2.000          8,000            0.6 / 0.7 ±0.1 mm         8 mm          4.000          15,000            0.8 ±0.1 mm         8 mm          3.000          10,000            1.15 ±0.1 mm         8 mm          3.000              1.15 ±0.1 mm         8 mm          3.000              1.15 ±0.1 mm         8 mm          3.000              1.6 / 1.9 ±0.2 mm         8 mm          3.000              1.6 / 1.9 ±0.2 mm         12 mm          3.000              1.808		0.6 ±0.1 mm	8 mm	4,000		20,000		
1206         1.25 ±0.2 mm         8 mm          3,000          10,000            1.6 ±0.15 mm         8 mm          2,500          10,000            1.6 ±0.2 mm         8 mm          2,000          8,000            0.6 / 0.7 ±0.1 mm         8 mm          4,000          15,000            0.85 ±0.1 mm         8 mm          3,000          10,000            1.15 ±0.1 mm         8 mm          3,000          10,000            1.25 ±0.2 mm         8 mm          3,000          10,000            1.5 ±0.1 mm         8 mm          3,000              1.6 / 1.9 ±0.2 mm         8 mm          3,000              2.0 ±0.2 mm         8 mm          3,000              1.6 / 1.9 ±0.2 mm         12 mm          3,000		0.8 / 0.85 ±0.1 mm	8 mm	4,000		15,000		
1.25 ±0.2 mm         8 mm          3,000          10,000            1.6 ±0.15 mm         8 mm          2,500          10,000            1.6 ±0.2 mm         8 mm          2,000          8,000            0.6 / 0.7 ±0.1 mm         8 mm          4,000          10,000            1.15 ±0.1 mm         8 mm          3,000          10,000            1.15 ±0.1 mm         8 mm          3,000          10,000            1.25 ±0.2 mm         8 mm          3,000              1.6 / 1.9 ±0.2 mm         8 mm          2,000              2.0 ±0.2 mm         8 mm          3,000              1.6 / 1.9 ±0.2 mm         12 mm          3,000              2.0 ±0.2 mm         12 mm          3,000              1.55 ±0.1 mm         12 m	1204	1.00 / 1.15 ±0.1 mm	8 mm		3,000		10,000	
11         1.6 ±0.2 mm         8 mm          2,000          8,000            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 ±0.1 mm         8 mm          3,000          10,000            1.25 ±0.2 mm         8 mm          3,000              1.6 / 1.9 ±0.2 mm         8 mm          2,000              2.0 ±0.2 mm         8 mm          2,000              2.5 ±0.2 mm         12 mm          3,000              1.15 ±0.15 mm         12 mm          3,000              1.45 ±0.1 mm         12 mm          3,000              1.5 ±0.1 mm	1200	1.25 ±0.2 mm	8 mm		3,000		10,000	
1210         0.6 / 0.7 ±0.1 mm         8 mm          4,000          15,000            1.15 ±0.1 mm         8 mm          4,000          10,000            1.15 ±0.1 mm         8 mm          3,000          10,000            1.15 ±0.1 mm         8 mm          3,000          10,000            1.25 ±0.2 mm         8 mm          3,000              1.6 / 1.9 ±0.2 mm         8 mm          2,000              2.0 ±0.2 mm         8 mm          1,000              2.0 ±0.2 mm         8 mm          3,000              1.5 ±0.1 mm         12 mm          3,000              1.5 ±0.1 mm         12 mm          3,000              1.5 ±0.1 mm         12 mm          2,000              1.6 ±0.2 mm		1.6 ±0.15 mm	8 mm		2,500		10,000	
1210         0.85 ±0.1 mm         8 mm          4,000          10,000            1.15 ±0.15 mm         8 mm          3,000          10,000            1.15 ±0.15 mm         8 mm          3,000          10,000            1.15 ±0.15 mm         8 mm          3,000              1.25 ±0.2 mm         8 mm          2,000              1.6/1.9 ±0.2 mm         8 mm          2,000              2.0 ±0.2 mm         8 mm          1,000              2.5 ±0.2 mm         8 mm          1,000              1.15 ±0.15 mm         12 mm          3,000              1.25 ±0.2 mm         12 mm          3,000              1.25 ±0.15 mm         12 mm          2,000              1.15 ±0.15 mm		1.6 ±0.2 mm	8 mm		2,000		8,000	
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              2.0 ±0.2 mm         8 mm          1,000              2.5 ±0.2 mm         8 mm          1,000              1.15 ±0.15 mm         12 mm          3,000              1.25 ±0.2 mm         12 mm          3,000              1.25 ±0.15 mm         12 mm          2,000              1.5 ±0.15 mm         12 mm          2,000              1.15 ±0.15 mm         12 mm		0.6 / 0.7 ±0.1 mm	8 mm		4,000		15,000	
1210         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              2.0 ±0.2 mm         8 mm          2,000              2.5 ±0.2 mm         8 mm          3,000              1.15 ±0.15 mm         12 mm          3,000              1.25 ±0.2 mm         12 mm          3,000              1.15 ±0.15 mm         12 mm          2,000              1.6 ±0.2 mm         12 mm          2,000              1.15 ±0.1 mm         12 mm          1,000		0.85 ±0.1 mm	8 mm		4,000		10,000	
1210         1.25 ±0.2 mm         8 mm          3,000              1.5 ±0.1 mm         8 mm          2,000               2.0 ±0.2 mm         8 mm          2,000              2.0 ±0.2 mm         8 mm          1,000              2.5 ±0.2 mm         8 mm          3,000              1.15 ±0.15 mm         12 mm          3,000              1.15 ±0.15 mm         12 mm          3,000              1.35 ±0.15 mm         12 mm          2,000              1.35 ±0.15 mm         12 mm          2,000              1.6 ±0.2 mm         12 mm          2,000              1.6 ±0.2 mm         12 mm          1,000              1.15 ±0.1 mm		1.15 ±0.1 mm	8 mm		3,000		10,000	
		1.15 ±0.15 mm	8 mm		3,000		10,000	
Is ±0.1 mm         8 mm          2,000               1.6 / 1.9 ±0.2 mm         8 mm          2,000		1.25 ±0.2 mm	8 mm		3,000			
2.0 ±02 mm         8 mm          2,000 1,000              2.5 ±02 mm         8 mm          500              1.15 ±0.15 mm         12 mm          3,000              1.25 ±0.2 mm         12 mm          3,000              1.25 ±0.2 mm         12 mm          3,000              1.25 ±0.2 mm         12 mm          2,000              1.35 ±0.15 mm         12 mm          2,000              1.6 ±0.2 mm         12 mm          2,000          8,000            2.0 ±0.2 mm         12 mm          2,000              1.15 ±0.1 mm         12 mm          1,000              1.15 ±0.15 mm         12 mm          1,000              1.15 ±0.1 mm         12 mm	1210	1.5 ±0.1 mm	8 mm		2,000			
$1808 = \frac{1.15 \pm 0.2 \text{ mm}}{1.15 \pm 0.15 \text{ mm}} = \frac{1.2 \text{ mm}}{1.25 \pm 0.2 \text{ mm}} = \frac{1.2 \text{ mm}}{1.2 \text{ mm}} = \frac{3.000}{1.2 \text{ mm}} = \frac{1.35 \pm 0.15 \text{ mm}}{1.2 \text{ mm}} = \frac{1.2 \text{ mm}}{1.2 \text{ mm}} = \frac{2.000}{1.2 \text{ mm}} = \frac{1.35 \pm 0.15 \text{ mm}}{1.2 \text{ mm}} = \frac{2.000}{1.2 \text{ mm}} = \frac{2.000}{1.2 \text{ mm}} = \frac{1.2 \text{ mm}}{1.2 \text{ mm}} = \frac{2.000}{1.2 \text{ mm}} = \frac{1.2 \text{ mm}}{1.2 \text{ mm}} = \frac{2.000}{1.2 \text{ mm}} = \frac{1.2 \text{ mm}}{1.2 \text{ mm}} = \frac{2.000}{1.2 \text{ mm}} = \frac{1.25 \pm 0.1 \text{ mm}}{1.2 \text{ mm}} = \frac{2.000}{1.2 \text{ mm}} = \frac{1.000}{1.2 \text{ mm}} = \frac{1.15 \pm 0.1 \text{ mm}}{1.2 \text{ mm}} = \frac{1.000}{1.2 \text{ mm}} = \frac{1.000}{1.2 \text{ mm}} = \frac{1.15 \pm 0.1 \text{ mm}}{1.2 \text{ mm}} = \frac{1.000}{1.2 \text{ mm}} = \frac{1.000}{1.2 \text{ mm}} = \frac{1.1000}{1.2 \text{ mm}} = \frac{1.000}{1.2 \text{ mm}} = \frac{1.25 \pm 0.1 \text{ mm}}{1.2 \text{ mm}} = \frac{1.000}{1.2 \text{ mm}} = \frac{1.000}{1.2 \text{ mm}} = \frac{1.25 \pm 0.1 \text{ mm}}{1.2 \text{ mm}} = \frac{1.000}{1.0 \text{ mm}} = \frac{1.20 \text{ mm}}{1.2 \text{ mm}} = \frac{1.000}{1.2 \text{ mm}} = \frac{1.000}{$		1.6 / 1.9 ±0.2 mm	8 mm		2,000			
Image: 1.15 ±0.15 mm         12 mm          500		2.0 ±0.2 mm	8 mm					
I808         I.25 ±0.2 mm         I2 mm          3,000              I.35 ±0.15 mm         I2 mm          2,000              I.5 ±0.1 mm         I2 mm          2,000              I.5 ±0.1 mm         I2 mm          2,000              I.6 ±0.2 mm         I2 mm          2,000          8,000            2.0 ±0.2 mm         I2 mm          2,000          8,000            0.6 / 0.85 ±0.1 mm         I2 mm          2,000              I.15 ±0.1 mm         I2 mm          1,000              I.15 ±0.15 mm         I2 mm          1,000              I.15 ±0.15 mm         I2 mm          1,000              I.15 ±0.1 mm         I2 mm          1,000              I.6 ±0.2 mm		2.5 ±0.2 mm	8 mm					
1808         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          8,000            2.0 ±0.2 mm         12 mm          2,000          8,000            2.0 ±0.2 mm         12 mm          2,000          8,000            1.15 ±0.1 mm         12 mm          2,000              1.15 ±0.1 mm         12 mm          1,000              1.15 ±0.15 mm         12 mm          1,000              1.15 ±0.15 mm         12 mm          1,000              1.25 ±0.2 mm         12 mm          1,000              1.5 ±0.1 mm         12 mm          1,000              1.6 ±0.2 mm <td< td=""><td></td><td>1.15 ±0.15 mm</td><td>l2 mm</td><td></td><td>3,000</td><td></td><td></td><td></td></td<>		1.15 ±0.15 mm	l2 mm		3,000			
1808         1.5 ±0.1 mm         12 mm          2,000              1.6 ±0.2 mm         12 mm          2,000          8,000            2.0 ±0.2 mm         12 mm          2,000          8,000            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          1,000              1.15 ±0.1 mm         12 mm          1,000              1.15 ±0.15 mm         12 mm          1,000              1.25 ±0.2 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 <t< td=""><td></td><td>1.25 ±0.2 mm</td><td>l2 mm</td><td></td><td>3,000</td><td></td><td></td><td></td></t<>		1.25 ±0.2 mm	l2 mm		3,000			
I.5 ±0.1 mm         I2 mm          2,000	1808	1.35 ±0.15 mm	l2 mm		2,000			
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        1,000             1.15 ±0.1 mm       12 mm        1,000             1.15 ±0.15 mm       12 mm        1,000             1.25 ±0.2 mm       12 mm        1,000             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	1000	1.5 ±0.1 mm	l2 mm		2,000			
0.6 / 0.85 ±0.1 mm         12 mm          2,000              1.15 ±0.1 mm         12 mm          1,000               1.15 ±0.1 mm         12 mm          1,000               1.15 ±0.15 mm         12 mm          1,000              1.25 ±0.2 mm         12 mm          1,000              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		1.6 ±0.2 mm	l2 mm		2,000		8,000	
I.15 ±0.1 mm         I2 mm         I.000         III         III           I.15 ±0.15 mm         I2 mm         III         IIII         IIII         IIIII         IIIIII         IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII		2.0 ±0.2 mm	l2 mm		2,000			
I 1.15 ±0.15 mm         I 2 mm          I,000		0.6 / 0.85 ±0.1 mm	l2 mm		2,000			
I 25 ±0.2 mm         I2 mm          I,000		1.15 ±0.1 mm	l2 mm		1,000			
1812         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		1.15 ±0.15 mm	l2 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		1.25 ±0.2 mm	l2 mm		1,000			
I.6 ±0.2 mm     I2 mm      I,000         2.0 ±0.2 mm     I2 mm      I,000	1812	1.35 ±0.15 mm	l2 mm		1,000			
2.0 ±0.2 mm 12 mm 1,000		1.5 ±0.1 mm	l2 mm		1,000			
		1.6 ±0.2 mm	12 mm		٥٥٥, ا			
		2.0 ±0.2 mm	12 mm		1,000			
					500			

18

Surface-Mount Ceramic Multilayer Capacitors Mid-voltage NP0/X7R 100 V to 630 V

#### ELECTRICAL CHARACTERISTICS

#### NP0/X7R DIELECTRIC CAPACITORS; NISN TERMINATIONS

Unless otherwise specified, all test and measurements shall be made under standard atmospheric conditions for testing as given in 5.3 of IEC 60068-1:

- Temperature: 15 °C to 35 °C
- Relative humidity: 25% to 75%
- Air pressure: 86 kPa to 106 kPa

Before the measurements are made, the capacitor shall be stored at the measuring temperature for a time sufficient to allow the entire capacitor to reach this temperature.

The period as prescribed for recovery at the end of a test is normally sufficient for this purpose.

Table	2		
DESCRIP	TION		VALUE
Capacitar	nce range	0.47 p	oF to 2.2 µF
Capacitar	nce tolerance		
NP0	C < 10 <sub>P</sub> F	±0.25	pF, ±0.5 pF
	C ≥ 10 <sub>P</sub> F	±2%, =	±5%, ±10%
X7R		±5% <sup>(1)</sup> , ±	10%, ±20%
Dissipatio	on factor (D.F.)		
NP0	C < 30 <sub>P</sub> F	≤   / ( 40	00 + 20C )
	C ≥ 30 <sub>P</sub> F		≤ 0.1 %
X7R			≤ 2.5 %
Exception	n	X7R/0603/100V, 12nF ≤ C ≤ 100nF, X7R/1206/2.2µF/100V	≤ 5%
		X7R/1206/100V/1μF; X7R/1210/100V/1μF and 2.2μF;	≤ 3.5%
Insulation	n resistance after 1 minute at U <sub>r</sub> (DC)	$R_{ins} \ge 10 \text{ G}\Omega \text{ or } R_{ins} \times C \ge 500 \text{ seconds which}$	never is less
	n capacitance change as a function of tempe ature characteristic/coefficient):	rature	
NP0		±	:30 ppm/°C
X7R			±15%
Operatin	g temperature range:		
NP0/X7	7R	-55 ℃ t	to +125 °C

#### ΝΟΤΕ

I. Capacitance tolerance ±5% doesn't available for X7R full product range, please contact local sales force before order

Surface-Mount Ceramic Multilayer Capacitors Mid-voltage NP0/X7R 100 V to 630 V

### SOLDERING RECOMMENDATION

Table 12

SOLDERING METHOD	SIZE 0201	0402	0603	0805	1206	≥ 1210
Reflow	Reflow only	> 100 nF	> 1.0 µF	> 2.2 µF	> 2.2 µF	Reflow only
Reflow/Wave		≤ 100 nF	≤ 1.0 µF	≤ 2.2 µF	≤ 2.2 µF	

#### TESTS AND REQUIREMENTS

TEST	TEST METH	HOD	PROCEDURE	REQUIREMENTS	
Mounting	IEC 60384- 4.3 21/22		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 I: $f =   MHz \text{ for } C \le   nF$ , measuring at voltage $  V_{rms} \text{ at } 20^{\circ}C$ $f =   KHz \text{ for } C >   nF$ , measuring at voltage $  V_{rms} \text{ at } 20^{\circ}C$ Class 2: $f =   KHz \text{ for } C \le   0 \ \mu\text{F}$ , measuring at voltage $  V_{rms} \text{ at } 20^{\circ}C$	Within specified tolerance	
Dissipation Factor (D.F.)		4.5.2	Class I: $f = I \text{ MHz}$ for $C \le I \text{ nF}$ , measuring at voltage $I \text{ V}_{rms}$ at 20°C $f = I \text{ KHz}$ for $C > I \text{ nF}$ , measuring at voltage $I \text{ V}_{rms}$ at 20°C Class 2: $f = I \text{ KHz}$ for $C \le I0 \mu$ F, measuring at voltage $I \text{ V}_{rms}$ at 20°C	In accordance with specification (in Table 11)	
		4.5.3	$U_r \le 500$ V: At Ur for 1 minute $U_r > 500$ V: At 500 V for 1 minute	In accordance with specification (in Table 11)	

### YAGEO Phicomp Surface-Mount Ceramic Multilayer Capacitors Mid-voltage NP0/X7R 100 V to 630 V

Product specification	15
(20.)/	18

TEST	TEST METH	HOD	PROCEDURE	REQUIREMENTS	
Temperature coefficient		4.6	Capacitance shall be measured by the steps shown in the following table. The capacitance change should be measured after 5 min at each specified temperature stage. Step Temperature(°C)	<pre><general purpose="" series=""> Class1: <math>\Delta</math> C/C: ±30ppm Class2: X7R: <math>\Delta</math> C/C: ±15%</general></pre>	
			a25±2bLower temperature±3°Cc25±2dUpper Temperature±2°Ce25±2	<high capacitance="" series=""> Class2: X7R/X5R: Δ C/C: ±15%</high>	
			(1) Class I Temperature Coefficient shall be calculated from the formula as below Temp, Coefficient = $\frac{C2 - C1}{C1 \times \Delta T} \times 10^6$ [ppm/°C] C1: Capacitance at step c C2: Capacitance at 125°C		
			$\Delta T: 100^{\circ}C (=125^{\circ}C - 25^{\circ}C)$ (2) Class II Capacitance Change shall be calculated from the formula as below $\Delta C = \frac{C2 - C1}{C1} \times 100\%$ C1: Capacitance at step c C2: Capacitance at step b or d		
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	
Bending Strength		4.8	Mounting in accordance with IEC 60384-22 paragraph 4.3	No visible damage	
			Conditions: bending I mm at a rate of I mm/s, radius jig 5 mm	$\Delta$ C/C Class 1: NP0: within ±1% or 0.5 pF, whichever is greater Class2: X7R: ±10%	



Surface-Mount Ceramic Multilayer Capacitors Mid-voltage NP0/X7R 100 V to 630 V

Product specification	16
630 V	18

TEST	TEST METH	HOD	PROCEDURE	REQUIREMENTS
Resistance to Soldering		4.9	Precondition: 150 +0/–10 °C for 1 hour, then keep for 24 ±1 hours at room	Dissolution of the end face plating shall not exceed 25% of the length of the edge concerned
Heat			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	$\Delta$ C/C Class 1: NP0: within ±0.5% or 0.5 pF, whichever is greater Class2: X7R: ±10%
			Solder bath temperature: 260 ±5 °C Dipping time: 10 ±0.5 seconds Recovery time: 24 ±2 hours	D.F. within initial specified value R <sub>ins</sub> within initial specified value
Solderability		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
			<ol> <li>Temperature: 235±5°C</li> <li>/ Dipping time: 2 ±0.5 s</li> <li>Temperature: 245±5°C</li> <li>/ Dipping time: 3 ±0.5 s (lead free)</li> <li>Depth of immersion: 10mm</li> </ol>	
Rapid Change of	IEC 60384- 21/22	4.11	Preconditioning 150 +0/–10 °C for 1 hour, then keep for _	No visual damage
Temperature			<ul> <li>24 ±1 hours at room temperature</li> <li>5 cycles with following detail:</li> <li>30 minutes at lower category temperature</li> <li>30 minutes at upper category temperature</li> </ul>	$\Delta$ C/C Class 1: NP0: within ±1% or 1 pF, whichever is greater Class2: X7R: ±15%
			Recovery time 24 ±2 hours -	D.F. meet initial specified value R <sub>ins</sub> meet initial specified value

# YAGEO Phícomp Surface-Mor

Surface-Mount Ceramic Mi	ultilayer Capacitors	Mid-voltage	NP0/X7R
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100 V to 630 V	
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TEST	EST TEST METHOD PROCEDURE			RE		REQUIREMENTS	
Damp Heat	4.13		<ul> <li>3. Preconditioning, class 2 only: 150 +0/-10 °C /1 hour, then keep for 24 ±1 hour at room temp</li> <li>4. Initial measure: Spec: refer initial spec C, D, IR</li> <li>5. Damp heat test: 500 ±12 hours at 40 ±2 °C; 90 to 95% R.H.</li> <li>6. Recovery: Class 1: 6 to 24 hours Class 2: 24 ±2 hours</li> <li>7. Final measure: C, D, IR</li> <li>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 <i>"IEC 60384 4.1"</i> and then the requirement shall be met.</li> </ul>			No visual damage after recovery	
						$eq:linear_line$	
						X7R: ≥ 500 M $\Omega$ or $R_{ins} \times C_r \ge 25s$ whichever is less	
Endurance	IEC 60384- 21/22	4.14	<ol> <li>Preconditioning, class 2 only: 150 +0/-10 °C /1 hour, then keep for</li> </ol>			No visual damage	
			24 ±1 hour at room temp 2. Initial measure: Spec: refer initial spec C, D, IR 3. Endurance test: Temperature: NP0/X7R: 125 °C Specified stress voltage applied for 1,000 hours: 4. High voltage series follows with below stress condition: Voltage NPO X7R $\leq 100V$ 2.0 × Ur 2.0 × Ur 200/250V 1.5 × Ur 1.5 × Ur 500/630V 1.3 × Ur 1.2 × Ur $\geq 1KV$ 1.2 × Ur 1.1 × Ur * NPO, 0603, 100V, 5.1nF to 10nF, apply voltage : 1.5 × Ur 5. Recovery time: 24 ±2 hours 6. Final measure: C, D, IR P.S. If the capacitance value is less than the minimum value permitted, then after the other measurements have been made the capacitor		C, D, IR R: 125 °C applied for 1,000 hours: bws with below stress X7R 2.0 × Ur 1.5 × Ur 1.2 × Ur 1.1 × Ur F to 10nF, apply voltage : hours value is less than the ted, then after the other	$\begin{array}{l} \Delta C/C \\ Class I: \\ NP0: within \pm 2\% \ or \ I \ pF, whichever is greater \\ Class 2: \\ \times 7R: \pm 15\% \\ D.F. \\ Class I: \\ NP0: \leq 2 \times \text{specified value} \\ Class 2: \\ \times 7R: \geq 25 \ \forall: \leq 5\% \\ R_{\text{ins}} \\ Class I: \\ NP0: \geq 4,000 \ M\Omega \ or \\ R_{\text{ins}} \times C_r \geq 40s \ \text{whichever is less} \\ Class 2: \\ \times 7R: \geq 1,000 \ M\Omega \ or \\ R_{\text{ins}} \times C_r \geq 50s \ \text{whichever is less} \\ \end{array}$	
Voltage Proof		4.6	Specified structure Ur $\leq 100 \text{ V}$ : 100  V < Ur (1.5  Ur + 100  V) (1.3  Ur + 100  Ur) Ur > 500  V: $Ur \geq 1000 \text{ V}$	ess voltage ap series applied ≤ 200 V serie 00) ≤ 500 V serie 10) 1.3 Ur ': 1.2 Ur	es applied	No breakdown or flashover	

Surface-Mount Ceramic Multilayer Capacitors Mid-voltage NP0/X7R 100 V to 630 V

<u>REVISION</u>	<u>HISTORY</u>

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 22	Sep. 10, 2020	-	- Add
			NPO : 0603/100V/1.8nF to 10nF, 1206/250V/3.3nF to 3.9nF 1206/630V/2.2nF
			X7R : 0805/100V330nF to 1µF, 0805/250V/68nF to 100nF
			1206/100V/680nF, 1210/500V/68nF to 100nF, 1210/630V/47nF
			- Modify
			NPO :1210/100V/12nF to 15nF thickness to 1.25mm X7R :1210/630V/22nF thickness to 1.6mm
			1210/630V/27nF to 33nF thickness to 2.0mm
Version 21	Jul. 13, 2018	-	- Add
			NPO : 0402/120pF to 1nF/100V, 0603/1.2nF to 1.5nF/100V, 1206/1.8nF/630V, 1210/12nF to 22nF/100V
			X7R : 0805/33nF to 47nF/200 to 250V
Version 20	Sep. 14, 2017	-	- Dimension outlines updated
Version 19	Mar 7, 2017	-	- 0805 L4 spec updated
Version 18	Dec 9, 2016	-	- Soldering recommendation update
Version 17	Aug 16, 2016	-	- Capacitance range & thickness update
Version 16	Apr. 16, 2015	-	- Capacitance range & thickness
Version 15	Apr. 16, 2015	-	- Electrical characteristics update
Version 14	Sep. 25, 2014	-	- Electrical characteristics update
Version 13	Apr. 21, 2014	-	- Electrical characteristics update
Version 12	Dec. 12, 2013	-	- Electrical characteristics update
Version I I	Jun. 17, 2013	-	- Test method and procedure updated
Version 10	Nov 22, 2012	-	- Test method and procedure updated
Version 9	Feb 02, 2012	-	- Test method and procedure updated
Version 8	Apr 22, 2011	-	- NP0 0402 100V added
Version 7	Mar 01, 2011	-	- Dimension updated
Version 6	Sep 30, 2010	-	- Update the thickness of 0805 100V
Version 5	Sep 28, 2010	-	- Product range updated
			- Thickness classes and packing quantity table updated
Version 4	Jun 17, 2010	-	- Update the dimension of 0805, 1206 and 1812
Version 3	Mar 25, 2010	-	- Product range update
Version 2	Mar 15, 2010	-	- Product range update
Version I	Oct 30, 2009	-	- Change to dual brand datasheet that describe Mid-voltage NP0/X7R series with RoHS compliant
			- Replace the "100V to 630V" part of pdf files: UP-NP0X7R_MV_100-to- 500V_0, UY-NP0X7R_MV_100-to-500V_0, NP0_16V-to-100V_6, NP0_50-to-500V_10, X7R_16-to-500V_9 and X7R_16V-to-100V_9
			- Define global part number - Description of "Halogen Free compliant" added - Test method and procedure updated
Version 0	Sep 08, 2005	-	- New



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