奇彥企業有限公司

HITANO ENTERPRISE CORP.

7F-7, No. 3 WU CHUAN 1st RD.,
WU-KU INDUSTRIAL PARK,
TAIPEI HSIEN, TAIWAN
Tel: 886-2-2299-1331 (REP.)
Fax: 886-3-3398-2466

SPECIFICATION FOR

OPEN MODE GREEN TYPE MEDIUM VOLTAGE CAPACITORS

Series : OP Series

Description: Open Mode, 0805 to 1812 Size, X7R, 100V~500V,

ROHS Compliant

DRAWN BY	CHECKED BY	APPROVED BY
趙麗雲	王和明	蔣建文

1. INTRODUCTION

HITANO open-mode series MLCC is designed by a special internal electrode pattern, which can reduce voltage concentrations by distributing voltage gradients throughout the entire capacitor. This special design also affords open-mode pattern to prevent circuit leakage when focused to failure in a board flex situation.

2. FEATURES

a. High voltage in a given case size.
b. Circuit open during product cracking.
c. High stability and reliability.

3. APPLICATIONS

a. High current applications.
b. Power supply and related industries
c. The other mechanical stress concerned products.

4. HOW TO ORDER

OP	32	N	100	J	202	L	T
Series	Size	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging
OP=Open-mode	21=0805 (2012) 31=1206 (3216) 32=1210 (3225) 43=1812 (4532)	B=X7R	Two significant digits followed by no. of zeros. And R is in place of decimal point. eg.: 102=10x10^2 =1000pF	K=±10% M=±20%	Two significant digits followed by no. of zeros. And R is in place of decimal point. 101=100 VDC 201=200 VDC 251=250 VDC 501=500 VDC	L=Ag/Ni/Sn C=Cu/Ni/Sn (Note 1)	T=7" reeled G=13" reeled

Note 1: Please see below product range to find right termination code.

5. EXTERNAL DIMENSIONS

Size Inch (mm)	L (mm)	W (mm)	T (mm)	Remark	M_B (mm)
0805 (2012)	2.00±0.15	1.25±0.10	0.80±0.10	B	0.40±0.20
			1.25±0.10	D	
1206 (3216)	3.20±0.15	1.60±0.15	0.80±0.10	B	0.50±0.20
			0.95±0.10	C	
			1.25±0.10	D	
	3.20±0.20	1.60±0.20	1.60±0.20	G	
1210 (3225)	3.20±0.30	2.50±0.20	0.95±0.10	C	0.50±0.25
			1.25±0.10	D	
	3.20±0.40	2.50±0.30	1.60±0.20	G	
	3.20±0.40	2.50±0.30	2.50 ± 0.30	M	
1812 (4532)	4.50±0.40	3.20±0.30	1.25±0.10	D	0.60±0.25
			2.00±0.20	K	

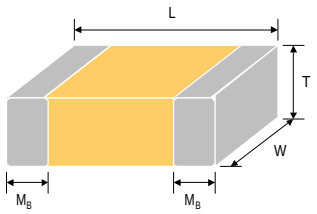

Fig. 1 The outline of MLCC

Reflow soldering only is recommended.

6. GENERAL ELECTRICAL DATA

Dielectric	X7R
Size	0805, 1206, 1210, 1812
Capacitance*	100pF to 1μF
Capacitance tolerance	K (±10%), M (±20%)
Rated voltage (WVDC)	100V, 200V, 250V, 500V
Tan δ*	≤2.5%
Insulation resistance at Ur	≥10GΩ or RxC≥500Ω-F whichever is smaller
Dielectric strength	100V: ≥2.5 x WVDC 200V and 250V: ≥2 x WVDC 500V: ≥1.5 x WVDC
Operating temperature	-55 to +125°C
Capacitance characteristic	±15%
Termination	Ni/Sn (lead-free termination)

* Measured at 25°C ambient temperature and 30~70% related humidity. Apply 1.0±0.2Vrms, 1.0kHz±10%.

7. CAPACITANCE RANGE

DIELECTRIC		X7R															
SIZE		0805				1206				1210				1812			
RATED VOLTAGE (VDC)		100	200	250	500	100	200	250	500	100	200	250	500	100	200	250	500
	100pF (101)	B	B	B	B												
	120pF (121)	B	B	B	B												
	150pF (151)	B	B	B	B	B	D	D	D								
	180pF (181)	B	B	B	B	B	D	D	D								
	220pF (221)	B	B	B	B	B	D	D	D								
	270pF (271)	B	B	B	B	B	D	D	D								
	330pF (331)	B	B	B	B	B	D	D	D								
	390pF (391)	B	B	B	B	B	D	D	D								
	470pF (471)	B	B	B	B	B	D	D	D								
	560pF (561)	B	B	B	B	B	D	D	D								
	680pF (681)	B	B	B	B	B	D	D	D								
	820pF (821)	B	B	B	B	B	D	D	D								
	1,000pF (102)	B	B	B	B	B	D	D	D	C	C	C	C	D	D	D	D
	1,200pF (122)	B	B	B	B	B	D	D	D	C	C	C	C	D	D	D	D
	1,500pF (152)	B	B	B	B	B	D	D	D	C	C	C	C	D	D	D	D
	1,800pF (182)	B	B	B	B	B	D	D	D	C	C	C	C	D	D	D	D
	2,200pF (222)	B	B	B	B	B	D	D	D	C	C	C	C	D	D	D	D
	2,700pF (272)	B	B	B	B	B	D	D	D	C	C	C	C	D	D	D	D
	3,300pF (332)	B	B	B	B	B	D	D	D	C	C	C	C	D	D	D	D
	3,900pF (392)	B	B	B		B	D	D	D	C	C	C	C	D	D	D	D
	4,700pF (472)	B	B	B		B	D	D	D	C	C	C	C	D	D	D	D
	5,600pF (562)	B	D	D		B	D	D	D	C	C	C	C	D	D	D	D
	6,800pF (682)	B	D	D		B	D	D	D	C	C	C	C	D	D	D	D
	8,200pF (822)	B	D	D		B	D	D	D	C	C	C	C	D	D	D	D
	0.010μF (103)	B	D	D		B	D	D	D	C	C	C	C	D	D	D	D
	0.012μF (123)	B	D	D		B	D	D	D	C	C	C	C	D	D	D	D
	0.015μF (153)	B	D	D		B	D	D	D	C	C	C	C	D	D	D	D
	0.018μF (183)	B	D	D		B	D	D	D	C	C	C	C	D	D	D	D
	0.022μF (223)	B	D	D		B	D	D	G	C	C	C	D	D	D	D	D
	0.027μF (273)	D				B	D	D	G	C	C	C	G	D	D	D	D
	0.033μF (333)	D				B	G	G	G	C	C	C	G	D	D	D	D
	0.039μF (393)	D				B	G	G		C	C	C	G	D	D	D	D
	0.047μF (473)	D				B	G	G		C	D	D	G	D	D	D	D
	0.056μF (563)					B	G	G		C	D	D	G	D	D	D	K
	0.068μF (683)					B	G	G		C	G	G		D	D	D	K
	0.082μF (823)					B	G	G		C	G	G		D	D	D	K
	0.10μF (104)					D	G	G		C	G	G		D	D	D	K
	0.12μF (124)					D				C	G	G		D	D	D	
	0.15μF (154)					G				D	M	M		D	K	K	
	0.18μF (184)					G				D	M	M		D	K	K	
	0.22μF (224)					G				D	M	M		D	K	K	
	0.27μF (274)									G				D	K	K	
	0.33μF (334)									G				D	K	K	
	0.39μF (394)									M				D	K	K	
	0.47μF (474)									M				K	K	K	
	0.56μF (564)									M				K			
	0.68μF (684)													K			
	0.82μF (824)													K			
	1.0μF (105)													K			

1. The cell with red color mark is expressed product with Ag/Ni/Sn terminations.

8. PACKAGING DIMENSION AND QUANTITY

Size	Thickness (mm)	Paper tape		Plastic tape	
		7" reel	13" reel	7" reel	13" reel
0805	0.80±0.10	4k	15k	-	-
	1.25±0.10	-	-	3k	10k
1206	0.80±0.10	4k	15k	-	-
	0.95±0.10	-	-	3k	10k
	1.25±0.10	-	-	3k	10k
	1.60±0.20	-	-	2k	-
1210	0.95±0.10	-	-	3k	10k
	1.25±0.10	-	-	3k	10k
	1.60±0.20	-	-	2k	-
	2.50 ± 0.30			1k	
1812	1.25±0.10	-	-	1k	-
	2.00±0.20	-	-	1k	-

Unit: pieces

9. INNER CONSTRUCTION OF OPEN-MODE DESIGN

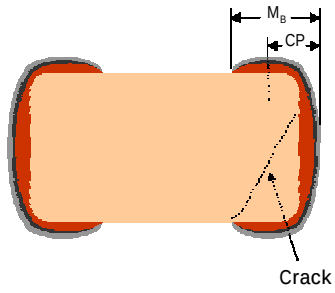

Fig. 2 Normal design (CP<M_B) - circuit leakage during cracking.

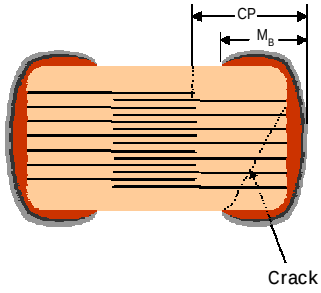

Fig. 3 Open-mode design (CP>M_B) - circuit open during cracking.

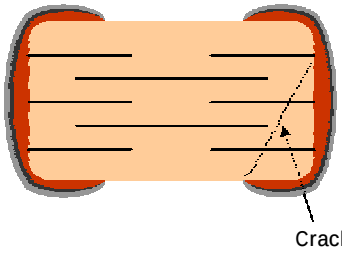

Fig. 4 Floating design (one kind of open-mode design)- circuit open during cracking.

10. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>1.</td><td>Visual and Mechanical</td><td>---</td><td>* No remarkable defect.
* Dimensions to conform to individual specification sheet.</td></tr>
<tr><td>2.</td><td>Capacitance</td><td rowspan="2">1.0±0.2Vrms, 1kHz±10%</td><td>* Shall not exceed the limits given in the detailed spec.</td></tr>
<tr><td>3.</td><td>Q/ D.F. (Dissipation Factor)</td><td>X7R: D.F. ≤2.5%</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Dielectric Strength</td><td>* To apply voltage (≤50V) 250%.
* Duration: 1 to 5 sec.
* Charge and discharge current less than 50mA.</td><td rowspan="2">* No evidence of damage or flash over during test.</td></tr>
<tr><td>* To apply voltage:
100V ≥3 times VDC
200V~300V ≥2 times VDC
500V ≥1.5 times VDC
* Cut-off, set at 10mA
* TEST= 15 sec.
* RAMP=0</td></tr>
<tr><td>5.</td><td>Insulation Resistance</td><td>To apply rated voltage for 60 sec.</td><td>≥10GΩ or RxC≥100Ω-F whichever is smaller.</td></tr>
<tr><td>6.</td><td>Temperature Coefficient</td><td>With no electrical load.
Operating temperature: -55~125˚C at 25˚C</td><td>Within ±15%.</td></tr>
<tr><td>7.</td><td>Adhesive Strength of Termination</td><td>* Pressurizing force：
5N (≤0603) and 10N (>0603)
* Test time: 10±1 sec.</td><td>* No remarkable damage or removal of the terminations.</td></tr>
<tr><td>8.</td><td>Vibration Resistance</td><td>* Vibration frequency: 10~55 Hz/min.
* Total amplitude: 1.5mm
* Test time: 6 hrs. (Two hrs each in three mutually perpendicular directions.)</td><td>* No remarkable damage.
* Cap change and Q/D.F.: To meet initial spec.</td></tr>
<tr><td>9.</td><td>Solderability</td><td>* Solder temperature: 235±5˚C
* Dipping time: 2±0.5 sec.</td><td>95% min. coverage of all metalized area.</td></tr>
<tr><td>10.</td><td>Bending Test</td><td>* The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 1 mm and then the pressure shall be maintained for 5±1 sec.
* Measurement to be made after keeping at room temp. for 24±2 hrs.</td><td>* No remarkable damage.
* Cap change: X7R: within ±12.5%
(This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)</td></tr>
<tr><td>11.</td><td>Resistance to Soldering Heat</td><td>* Solder temperature: 270±5˚C
* Dipping time: 10±1 sec
* Preheating: 120 to 150˚C for 1 minute before immerse the capacitor in a eutectic solder.
* Before initial measurement (Class II only): Perform 150+0/-10˚C for 1 hr and then set for 48±4 hrs at room temp.
* Measurement to be made after keeping at room temp. for 48±4 hrs.</td><td>* No remarkable damage.
* Cap change: X7R: within ±7.5%
* Q/D.F., I.R. and dielectric strength: To meet initial requirements.
* 25% max. leaching on each edge.</td></tr>
<tr><td>12.</td><td>Temperature Cycle</td><td>* Conduct the five cycles according to the temperatures and time.
<table>
<tr><th>Step</th><th>Temp. (˚C)</th><th>Time (min.)</th></tr>
<tr><td>1</td><td>Min. operating temp. +0/-3</td><td>30±3</td></tr>
<tr><td>2</td><td>Room temp.</td><td>2~3</td></tr>
<tr><td>3</td><td>Max. operating temp. +3/-0</td><td>30±3</td></tr>
<tr><td>4</td><td>Room temp.</td><td>2~3</td></tr>
</table>
* Before initial measurement (Class II only): Perform 150+0/-10˚C for 1 hr and then set for 48±4 hrs at room temp.
* Measurement to be made after keeping at room temp. for 48±4 hrs.</td><td>* No remarkable damage.
* Cap change：X7R: within ±7.5%
* Q/D.F., I.R. and dielectric strength: To meet initial requirements.</td></tr>
</table>

No.	Item	Test Condition	Requirements
13.	Humidity (Damp Heat) Steady State	* Test temp.: 40±2°C * Humidity: 90~95% RH * Test time: 500+24/-0hrs. * Measurement to be made after keeping at room temp. for 48±4 hrs. (Class II).	* No remarkable damage. * Cap change: X7R: within ±12.5% * Q/D.F. value: X7R: D.F. ≤3.0% * I.R.: ≥1GΩ or RxC≥50Ω-F whichever is smaller.
14.	Humidity (Damp Heat) Load	* Test temp.: 40±2°C * Humidity: 90~95%RH * Test time: 500+24/-0 hrs. * To apply voltage : rated voltage. * Measurement to be made after keeping at room temp. for 48±4 hrs.	* No remarkable damage. * Cap change: X7R: within ±12.5% * Q/D.F. value: X7R: D.F. ≤3.0% * I.R.: ≥500MΩ or RxC≥25Ω-F whichever is smaller.
15.	High Temperature Load (Endurance)	* Test temp.: X7R: 125±3°C * To apply voltage: (1) V<500V: 200% of rated voltage. (2) 500V: 150% of rated voltage. * Test time: 1000+24/-0 hrs. * Measurement to be made after keeping at room temp. for 48±4 hrs.	* No remarkable damage. * Cap change: X7R: within ±12.5% * Q/D.F. value: X7R: D.F. ≤3.0% * I.R.: ≥1GΩ or RxC≥50Ω-F whichever is smaller.