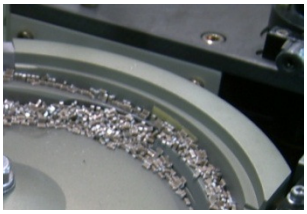
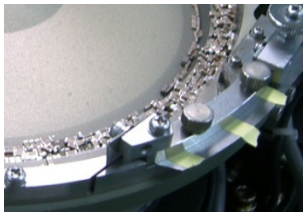
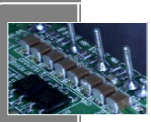
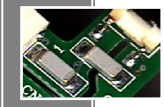
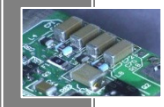
Holy Stone
Enterprise Co., Ltd.

CERAMIC CAPACITOR CATALOG 2016



www.holystone.com.tw
www.holystonecaps.com

Holy Stone

▪ Introduction

▪The Company

Holy Stone Enterprise Company Ltd. (Holy Stone) was established in June of 1981 as an agent and distributor of electronic components. In 1994, with technology and cooperation from a Japanese partner, Holy Stone began manufacturing Multi-layer Ceramic Capacitors. Today, Holy Stone is recognized as an industry leader in application specific ceramic capacitors.

Holy Stone integrates active and passive component distribution with significant manufacturing capabilities. Holy Stone's unique business model combines the service and inventory management strengths of a broad line distributor with the technical knowledge and world class pricing of a manufacturer.

Holy Stone was founded by five engineers in 1981. Since this point Holy Stone has maintained a focus and commitment to providing customers with innovative products and exceptional service. The result of that unwavering commitment is evident in Holy Stone's phenomenal growth. Holy Stone also maintains a high profile on the Taiwan Stock Exchange, ranked in the top 100 companies and the leader among its peers.

▪Manufacturing Facilities

Holy Stone capacitors are produced in two modern factories located in Lungtan and Yilan, Taiwan.

In addition to these factories, the advanced materials research laboratory is located in Japan. The factory operating systems are certified to ISO-9001 and ISO-14001.

▪Sales and Support Locations

Holy Stone administrative Headquarters are located in Taipei, Taiwan.
Holy Stone maintains sales and support offices in Kaohsiung, Taiwan, Shenzhen, Suzhou and Shanghai, China.

Holy Stone Enterprise Company Ltd has subsidiary companies in North America and in Europe. " Holy Stone International", located in Murrieta, California, U.S.A. is responsible for sales and technical support in the Americas. "HolyStone (Europe) Ltd.", located in Norwich, England is responsible for sales and technical service for Europe. Holy Stone opened its Singapore office to service Southeast Asia. Holy Stone also has a network of independent representatives, Distributors and Agents throughout the world.

▪The Environment

Holy Stone is committed to the cause of achieving and maintaining a healthy environment. Holy Stone is also among the first suppliers of halogen free epoxy coated capacitors. The factory is Certified to ISO-14000 and all standard products are designed and produced conforming to full RoHS compliance.

▪Our Employees

Holy Stone's success is measured by the satisfaction of our customers and share holders. Achieving that satisfaction is the result of the sum contribution of our employees. Those contributions come from all of our employees, whether they are engaged in administrative functions, manufacturing our goods or servicing our customers. Holy Stone strives to maintain a work environment that stimulates creativity, encourages enthusiasm and rewards results.

You should know Holy Stone.

Holy Stone

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Product Series		Application	Page
	HVC Series -- High Voltage Capacitors	For Power Circuits (Backlight Inverter, DC to DC,…)	5-9
	SCC Series -- Safety Capacitors	For Isolation and Protection Circuits (UL, EN132400 Class X2/Y3, X1/Y2, and X2)	10-11
	NCC Series -- Normal Chip Capacitors	For Decoupling Circuits	12-13
	HCC Series -- High Capacitance MLCC-More than 1uF	For Smoothing (DC to DC) and Decoupling Circuits	14-15
	HBC Series – Low-Loss High Frequency Capacitors	For Hi-Frequency Pulse & Lighting Ballast Snubber Circuits	16-17
	ACC Series -- Automotive Grade Capacitors	For Automotive markets or any AECQ-200 qualified application	18-19
	HCN Series -- Hi-Cap NP0	For ADSL/xDSL Application (Replacement for Film Capacitor)	20-21
	LCC Series -- Large Size MLCC (1515 to 7565)	For Voltage Multipliers, Power Circuit (DC-DC, Ballast, Snubbe), Surge protection, Industrial Control, …	22-23
	RDC Series -- Radial Dipped Ceramic Capacitors	For Car Electronic, Inverter and Converter, Power Supplier	24-25
	HDC Series -- High Voltage Ceramic Disc Capacitors	For xDSL, Power Circuits (Backlight Inverter, Power Supplier, …)	26-27
	HDC Series -- Ultra High Voltage Ceramic Capacitors	For 10KV to 20KV Application (Pump, Hybrid Engine, Power Supplier, …)	28-31
	SDC Series -- Safety Ceramic Disc Capacitors	For xDSL, Set Top Box, VOIP, Power Supplier (UL, CSA, EN132400 Class X1/Y2, X1/Y1)	32-35

Capacitance Availability Guide

Vdc	Dielectric	0201	0402	0603	0805	1206	1210	1808	1812	1825	2220	2225
6.3v	NPO											
	X7R		1uF	2.2uF	10uF	22uF						
	X5R	2.2uF	10uF	47uF	47uF	220uF	100uF					
10V	NPO											
	X7R		100nF	2.2uF	10uF	22uF	47uF					
	X5R	1uF	10uF	22uF	47uF	47uF	100uF					
16V	NPO	100pF		3.3nF	12nF	100nF	100nF		120nF			
	X7R		100nF	1uF	10uF	10uF	22uF					
	X5R		4.7uF	10uF	22uF	22uF	100uF					
25V	NPO	100pF		3.3nF	12nF	100nF	100nF		120nF			
	X7R		47nF	1uF	4.7uF	10uF	22uF		10uF			
	X5R		2.2uF	10uF	22uF	22uF	22uF					
35V	NPO											
	X7R				2.2uF	10uF	10uF		10uF		10uF	
	X5R		2.2uF	10uF								
50V	NPO		820pF	3.3nF	12nF	100nF	100nF		120nF	100nF	100nF	100nF
	X7R		22nF	1uF	2.2uF	4.7uF	10uF		10uF	10uF	10uF	
	X5R			2.2uF	10uF	10uF	10uF					
100V	NPO			680pF	12nF	12nF	39nF		100nF	100nF	100nF	100nF
	X7R			100nF	100nF	2.2uF	4.7uF		2.2uF	10uF	10uF	10uF
	X5R					2.2uF						
200V	NPO			680pF	3.9nF	10nF	10nF		27nF	100nF	47nF	100nF
	X7R				47nF	220nF	680nF		1.0uF	2.2uF	2.2uF	4.7uF
	X5R											
250V	NPO			680pF	3.9nF	10nF	10nF		27nF	100nF	47nF	100nF
	X7R				47nF	220nF	680nF		1.0uF	2.2uF	2.2uF	2.2uF
	X5R											
500V	NPO				680pF	5.6nF	6.8nF	2.2nF	8.2nF	100nF	39nF	100nF
	X7R				22nF	68nF	120nF	47nF	470nF	470nF	470nF	470nF
	X5R											
630V	NPO					4.7nF	6.8nF	2.2nF	8.2nF	47nF	27nF	47nF
	X7R					47nF						
	X5R											
1KV	NPO					1.0nF	3.3nF	2.2nF	6.8nF	18nF	18nF	18nF
	X7R				2.2nF	22nF	47nF	33nF	100nF	220nF	220nF	270nF
	X5R											
2KV	NPO					390pF		1nF	1.5nF			
	X7R				1.0nF	5.6nF	10nF	10nF	33nF	56nF	56nF	100nF
	X5R											

SMD Capacitors								
	Vac		1808	1812	2208	2211	2220	2825
X2/Y3	250Vrms	NP0	2.0pF–1nF	N/A	N/A	N/A	N/A	N/A
	250Vrms	SL	220pF-1nF	N/A	N/A	N/A	N/A	N/A
	250Vrms	X7R	150pF–2.2nF	330pF–4.7nF	N/A	N/A	N/A	N/A
X1/Y2	250Vrms	NP0	2.0pF–330pF	2.0pF-680pF	2.0pF-330pF	2.0pF-1nF	2.0pF-1.2nF	N/A
	250Vrms	X7R	150pF-1nF	130pF-1nF	36pF-1nF	68pF-2.7nF	101pF-4.7nF	N/A
X2	250Vrms	NP0	N/A	N/A	N/A	N/A	N/A	N/A
	250Vrms	X7R	N/A	N/A	N/A	N/A	150pF – 33nF	47nF-56nF
	305Vrms	X7R	N/A	N/A	N/A	N/A	150pF – 56nF	N/A

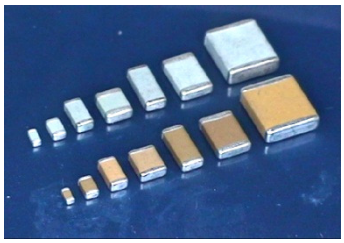
◆ All ranges are Lead (Pb) free

Following the obsolescence of the Y3 classification of Safety capacitors in the 4th Edition of IEC60384-14 from the 10th July 2016, Holy Stone has released our new **XY Range**. This range is equivalent in terms of capacitance values, rated voltages and case sizes to our previous range of X2/Y3 parts, however they will be supplied without any certification. Please contact Holy Stone for further assistance.

Holy Stone

Multilayer Ceramic Chip Capacitors

[High Voltage NP0 and X7R Capacitors]



HVC Series

Holy Stone high voltage products are designed and manufactured to meet the general requirements of international standards. The product offering is well suited for commercial and industrial applications and includes NP0 (C0G) and X7R characteristics in sizes 0603 to 2225 and with working voltages up to 5KV.

◆ Features

- ❑ Special internal electrode design offers the highest voltage rating
- ❑ Surface mount suitable for wave and reflow soldering
- ❑ High reliability
- ❑ RoHS compliant

◆ Applications

- ❑ Suitable for LAN/WLAN interface, Back-Lighting Inverter, DC-DC Converters, Ballast, Modems and Power Supplies.

◆ Summary of Specifications

Operation Temperature	-55 ℃ ~ +125 ℃
Rated Voltage	100Vdc to 5000Vdc
Temperature Coefficient	NP0 : ≤ ± 30ppm/ ℃ , -55 ℃ ~ +125 ℃ (EIA Class Ⅰ)
	X7R : ≤ ± 15% , -55 ℃ ~ +125 ℃ (EIA Class Ⅱ)
	SL : ≤ +350/-1000 ppm/ ℃ , -25 ℃ ~ +85 ℃ (EIA Class Ⅰ)
Dissipation Factor	NP0/SL : Q≧1000 , X7R : D.F.≦2.5%
Insulation Resistance	10GΩ or 500/CΩ whichever is smaller
Aging	NP0/SL : 0% , X7R : Typically 1.0% per decade of time
Dielectric Strength	100V ≦ V ＜ 500V : 200% Rated Voltage
	500V ≦ V ＜ 1000V : 150% Rated Voltage
	1000V≦ V : 120% Rated Voltage

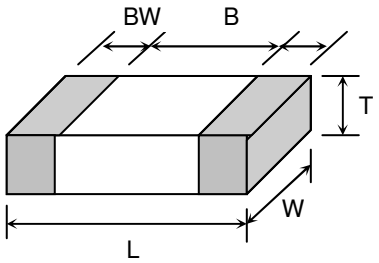
◆ How To Order

C	1206	X	102	K	202	T	E	X

Product Code	Chip Size	Dielectric	Capacitance Unit : pF	Tolerance	Rated Voltage	Packaging	Thickness (mm)	Special Requirement
C: MLCC (Multilayer Ceramic Chip of Capacitor)	Ex.: 0603 0805 1206 1210 1808 1812 1825 2220 2225	Ex.: N: NP0 X: X7R	Ex.: 2R0:2.0pF 100:10×10^0 471:47×10^1 102:10×10^2	Ex.: C:+/-0.25pF D:+/-0.50pF J :+/- 5% K :+/-10% M:+/-20%	Ex.: 101: 100Vdc 251: 250Vdc 501: 500Vdc 631: 630Vdc 102: 1000Vdc 202: 2000Vdc 302: 3000Vdc 402: 4000Vdc 502: 5000Vdc	T: T/R 7” R: T/R 13” B: Bulk	Ex: B:0.85±0.10 E:1.60±0.20	Ex.: O: Arc Prevention Coating X: Polymer Termination (Super Term)

Holy Stone

◆ Dimensions



Unit : mm [inches]

TYPE	L	W	T (max)	B (min)	BW (min)
0603	1.60±0.10 [.063±.004]	0.80±0.10 [.031 ±.004]	0.95 [.037]	0.40 [.016]	0.15 [.006]
0805	2.00±0.20 [.079±.012]	1.25±0.20 [.049±.012]	1.45 [.057]	0.70 [.028]	0.20 [.008]
1206	3.20±0.30 [.126±.012]	1.60±0.20 [.063±.012]	1.80 [.071]	1.50 [.059]	0.30 [.012]
1210	3.20±0.30 [.126±.012]	2.50±0.20 [.098±.012]	2.60 [.102]	1.60 [.059]	0.30 [.012]
1808	4.60±0.30 [.181±.012]	2.00±0.20 [.079±.008]	2.20 [.087]	2.50 [.098]	0.30 [.012]
1812	4.60±0.30 [.181±.012]	3.20±0.30 [.126±.012]	3.00 [.118]	2.50 [.098]	0.30 [.012]
1825	4.60±0.30 [.181±.012]	6.35±0.40 [.250±.016]	3.00 [.118]	2.50 [.098]	0.30 [.012]
2220	5.70±0.40 [.220±.016]	5.00±0.40 [.197±.016]	3.00 [.118]	3.50 [.137]	0.30 [.012]
2225	5.70±0.40 [.220±.016]	6.35±0.40 [.250±.016]	3.00 [.118]	3.50 [.137]	0.30 [.012]

◆ Capacitance Range – NP0 - 100Vdc to 1KVdc

| Temperature Characteristic | Size | Rated Voltage | Capacitance Range | | |

| Temperature Characteristic | Size | Rated Voltage | Capacitance Range | | |

◆ Capacitance Range – X7R 100Vdc to 1KVdc

| Temperature Characteristic | Size | Rated Voltage | Capacitance Range | | |

◆ Capacitance Range – X7R - 1.5KV to 2.5KV

Temperature Characteristic	Size	Rated Voltage	Capacitance Range																																				
			151	181	221	271	331	391	471	561	681	821	102	122	152	182	222	272	332	392	472	562	682	822	103	123	153	183	223	273	333	393	473	563	683	823	104
X7R	0805	2KV			C	C	C	C	C	C	C	C	C																								
	1206	1.5KV			B	B	B	B	B	B	B	B	B	C	C	C	C	D	D	D	D	D	D	E	E												
		2KV			B	B	B	B	B	B	B	B	B	C	C	C	C	D	D	E	E	E															
		2.5KV											B	C	C	C	C	D	D																		
	1210	2KV			C	C	C	C	C	C	C	C	C	C	C	C	D	D	E	E	E	E	F	F	G												
	1808	2KV	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	E	E	F												
	1812	2KV			D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	E	E	E	F	F	G	H						
	1825	2KV																D	D	D	D	D	D	D	D	E	E	E	E	F	F	G	G	H			
	2220	2KV											D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	E	E	E	F	F	G	G			
	2225	2KV											D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	E	E	E	F	F	G	H	I

◆ Capacitance Range – X7R 3KVdc to 5KVdc

Temperature Characteristic	Size	Rated Voltage	Capacitance Range																																		
			151	181	221	271	331	391	471	561	681	821	102	122	152	182	222	272	332	392	472	562	682	822	103	123	153	183	223	273	333	393	473	563	683	823	104
X7R	1206	3KV	B	B	B	B	B	C	C	C	D	D	D	E																							
	1808	3KV	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	E	E	E	F	F															
		4KV	D	D	D	D	D	E	E	E	F	F	F																								
	1812	3KV									D	D	D	D	D	D	D	D	D	D	E	E	E	F	F												
	1825	3KV									D	D	D	D	D	D	D	D	D	D	D	D	D	E	E	E	F	G									
	1825	4KV																																			
	2220	3KV									D	D	D	D	D	D	D	D	D	D	D	D	D	E	E	E	F	G									
	2220	4KV																																			
	2225	3KV															D	D	D	D	D	D	D	D	D	D	E	E	E	F	G						
	2225	4KV																																			

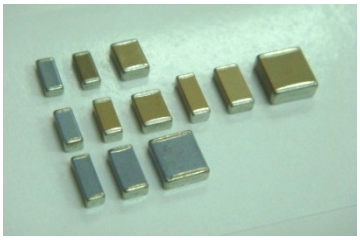
◆ Thickness Specifications

Symbol Code	S	O	A	B	C	D	E	F	G	H
Thickness(mm)	0.3±0.03	0.5±0.05	0.6±0.1	0.85±0.15	1.0+0.1/-0.05	1.25±0.20	1.6±0.2	2.0±0.2	2.4±0.2	2.8±0.2

- ***Other dimensions, capacitance values and voltages ratings are available on request. Please contact Holy Stone.***

Holy Stone

Multilayer Ceramic Chip Capacitors
[Safety Capacitors – X2, X2Y3 & X1Y2]
SCC Series Rated up to 305Vac



The SCC series X2, X2/Y3 & X1/Y2 rated at 250Vrms and X2 rated at 305Vrms safety capacitors are designed specifically for use in modem, facsimile, telephone and other electronic equipment. These parts are compliant to , IEC60384-14 and UL60950-1 and UL60384-14 standards. These capacitors are available in NP0 (C0G) and X7R dielectrics.

◆ Features

- ❑ Small size & high capacitance
- ❑ Suitable for reflow soldering
- ❑ Surface mount
- ❑ Safety standard approval by IEC60384-14 and UL 60950-1 and UL60384-14
- ❑ Certified to:
  TUV R50005234, R50103496 & UL E229738
  TUV R50162550 & UL E300818
  & UL E229738 for Lead(Pb) free

RoHS compliant and Lead(Pb) free option

◆ Applications

❑ The X2, X2/Y3 & X1/Y2 (250Vrms) and X2- (305Vrms) are specially designed for use in Modem, Facsimile, Telephone and other telecommunication equipment, electronic equipment for lighting and surge protection, EMI filtering and Isolation.

◆ Safety Detail of Specifications

EN 60384-14 : 2005	Meets the electrical requirements and certification for equipment requiring Class X1/Y2 and X2/Y3 devices.
IEC 60950-1 : 2005	Component certified for equipment requiring IEC 60950 compliance
IEC 60384-14 : 2005	Component certified for equipment requiring IEC-60384 compliance
UL 60950-1 : 2007 2nd Edition	TNV/SELV isolation capacitors certified To UL 60950

◆ How To Order

SCC	1808	X	102	K	502	T	S

Product Code	Chip Size	Dielectric	Capacitance Unit : pF	Tolerance	Class	Packaging	Special Requirement
SCC: Safety Approved of MLCC Product	Ex.: 1808 1812 2208 2211 2220 2825	Ex.: N: NP0 X: X7R S: SL	Ex.: 2R0:2.0pF 100:10x10^0 471:47x10^1 182:18x10^2	Ex.: J :+/-5% K :+/-10% M :+/-20%	Ex.: 202: X2 252 :X2 (305Vrms) 302: X2/Y3 502: X1/Y2 602: X1/Y2 for SCC2208N, SCC2211N, SCC2220N	T: T/R 7” R: T/R 13” B: Bulk	Ex.: S: Arc Prevention Coating X: Polymer Termination (Super Term) Z: Arc Prevention Coating & Polymer Termination (Super Term) G: Lead(Pb) Free

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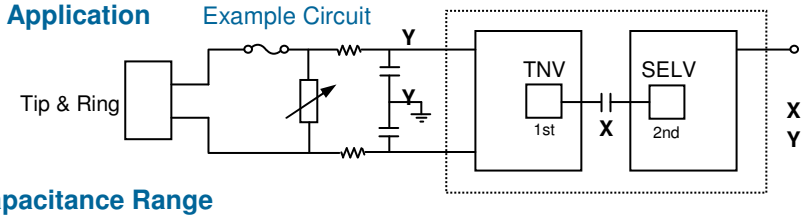
◆ Summary of Specifications

Rated Voltage	AC 250Vrms and AC 305Vrms
Temperature Coefficient	NP0 : < 30ppm/ ℃ , -55 ℃ ~ +125 ℃ (EIA Class Ⅰ)
	X7R : < ± 15% , -55 ℃ ~ +125 ℃ (EIA Class Ⅱ)
Capacitance Range	X2/Y3 : 2.0pF ~ 2700pF , X1/Y2 : 2.0pF ~ 4700pF
	X2 – 250Vrms : 150pF ~ 56nF X2 – 305Vrms : 150pF ~ 56nF
Quality and Dissipation Factor	NP0 : Q≧1000 , X7R : D.F.≦2.5%
Climatic Category	55/125/21
Insulation Resistance	10GΩ
Voltage Proof	X Capacitor : Applied Voltage 1075Vdc(4.3Ur),1312Vdc(4.3Ur) Y Capacitor : Applied Voltage 1500Vac
Impulse	Y3 : 2.5KV (Compliant to IEC 60950) , X2 : 2.5KV / Y2 : 5KV for three times
Aging	NP0: 0 % , X7R: 1.0 % per decade hr., typical

◆ Application

Example Circuit



X : Across The Line (Ex.: SCC1808N151K302T)
Y : Line By Pass (Ex.: SCC2211X102K502T)

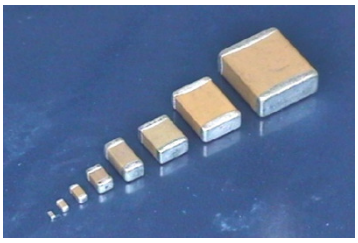
◆ Capacitance Range

250Vrms

Class	Size	Temperature Characteristic	Rated Voltage	Certificated	Capacitance Range: 2R0 5R0 6R8 8R2 100 120 150 180 220 270 330 360 390 470 560 680 820 101 121 131 151 181 221 271 331 391 471 561 681 821 102 122 152 182 222 272 332 472 473 563
X2/Y3	1808	NP0	250Vrms	TUV/UL	■ ■ ■

Holy Stone

Multilayer Ceramic Chip Capacitors
[Normal Chip Capacitors – NP0,X7R,X5R,Y5V]
NCC Series



Standard Multilayer Ceramic Chip Capacitors are available in a full range of sizes and temperature coefficients, with voltage ratings from 6.3V to 50V.

◆ Features

- ❑ Surface mount suitable for wave and reflow soldering
- ❑ Small size and high reliability
- ❑ Excellent in high frequency characteristics
- ❑ RoHS compliant

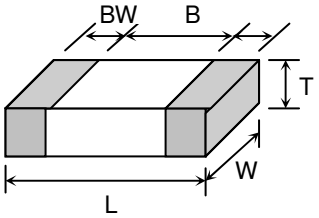
◆ Applications

- ❑ Suitable for general electronics circuit, telecommunication, personal computers and peripheral, power circuit, mobile application & etc ….

◆ Summary of Specifications

Operation Temperature	NP0 & X7R : -55 ℃ ~ +125 ℃ , X5R : -55 ℃ ~ +85 ℃ , Y5V : -30 ℃ ~ +85 ℃
Rated Voltage	6.3Vdc to 50Vdc
Temperature Coefficient	NP0 : ≤ ± 30ppm/ ℃ , -55 ℃ ~ +125 ℃ (EIA Class Ⅰ)
	X7R : ≤ ± 15% , -55 ℃ ~ +125 ℃ (EIA Class Ⅱ)
	X5R : ≤ ± 15% , -55 ℃ ~ +85 ℃ (EIA Class Ⅱ)
	Y5V: +22%/-82% , -30 ℃ ~ +85 ℃ (EIA Class Ⅱ)
Dissipation Factor	NP0 : More than 30pF: Q≥ 1000 (0.001) , 30pF and below : Q≥400+20C (C=pF)
	X7R, X5R : Max. 0.10; Y5V : Max. 0.2
Insulation Resistance	10GΩ or 500/CΩ whichever is smaller (C in Farads)
Aging	NP0 : 0% , X7R/X5R : typically 1.0% , Y5V ≤ 7% per decade of time
Dielectric Strength	250% Rated Voltage

◆ Dimensions



TYPE	L	W	T (max)	B (min)	BW (min)
0201	0.60±0.03 [.024±.001]	0.30±0.03 [.011 ±.001]	0.33 [.013]	0.20 [.008]	0.10 [.004]
0402	1.00±0.05 [.039±.002]	0.50±0.05 [.020 ±.002]	0.55 [.022]	0.30 [.012]	0.15 [.006]
0603	1.60±0.10 [.063±.004]	0.80±0.10 [.031 ±.004]	0.95 [.037]	0.40 [.016]	0.15 [.006]
0805	2.00±0.20 [.079±.012]	1.25±0.20 [.049 ±.008]	1.45 [.057]	0.70 [.028]	0.20 [.008]
1206	3.20±0.30 [.126±.012]	1.60±0.20 [.063±.008]	1.80 [.071]	1.50 [.059]	0.30 [.012]

◆ How To Order

C	0402	B	104	K	010	T

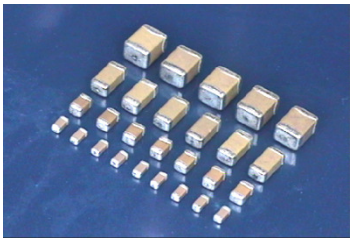
Product Code	Chip Size	Dielectric	Capacitance Unit : pF	Tolerance	Rated Voltage	Packaging
C: MLCC (Multilayer Ceramic Chip of Capacitor)	Ex.: 0201 0402 0603 0805 1206	Ex.: N: NP0 X: X7R B:X5R Y:Y5V	Ex.: 102 : 10×10^2 473 : 47×10^3 104 : 10×10^4	Ex.: F : +/- 1% G : +/- 2% J : +/- 5% K : +/- 10% M : +/- 20% Z : +80/-20%	Ex.: 007 : 6.3Vdc 010 : 10Vdc 016 : 16Vdc 025 : 25Vdc 050 : 50Vdc	T: T&R 7” R: T&R 13” B: Bulk

◆ Capacitance Range

| Dielectric Characteristic | Size | Rated Voltage | Capacitance Range | | |

Holy Stone

Multilayer Ceramic Chip Capacitors
[High Capacitance MLCC – 1.0uF and above]
HCC Series



◆ Features

- ❑ Surface mount suitable for wave and reflow soldering
- ❑ High reliability
- ❑ Small size and high capacitance value
- ❑ Excellent high frequency characteristics
- ❑ RoHS compliant

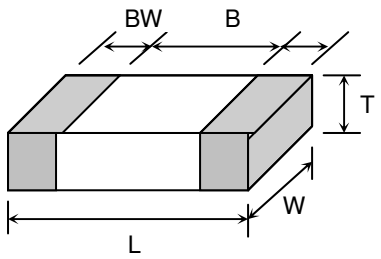
◆ Applications

- ❑ Ideal for smoothing and decoupling circuits
- ❑ Suitable for DC-DC converter, personal computer and peripherals, telecommunication and general electronic equipment

◆ Summary of Specifications

Operation Temperature	NP0 & X7R : -55°℃ ~ +125℃ , X6S : -55℃ ~ +105℃; X5R : -55℃ ~ +85°℃ , Y5V : -30°℃ ~ +85°℃
Rated Voltage	4.0Vdc to 50Vdc
Temperature Coefficient	X7R : ≤ ± 15% , -55°℃ ~ +125℃ (EIA Class Ⅱ)
	X6S : ≤ ± 22% , -55℃ ~ +105℃ (EIA Class Ⅱ)
	X5R : ≤ ± 15% , -55℃ ~ +85℃ (EIA Class Ⅱ)
	Y5V : +22%/-82% , -30℃ ~ +85℃ (EIA Class Ⅱ)
Dissipation Factor	X7R, X5R, X6S : Max. 0.15; Y5V: Max 0.2
Insulation Resistance	10GΩ or 500/CΩ whichever is smaller (C in Farads)
Aging	X7R/X6S/X5R : typically 1.0% and Y5V ≤ 7% per decade of time
Dielectric Strength	250% Rated Voltage

◆ Dimensions



TYPE	L	W	T (max)	B (min)	BW (min)
0402	1.00±0.05 [.039±.002]	0.50±0.05 [.020 ±.002]	0.55 [.022]	0.30 [.012]	0.15 [.006]
0603	1.60±0.10 [.063±.004]	0.80±0.10 [.031 ±.004]	0.95 [.037]	0.40 [.016]	0.15 [.006]
0805	2.00±0.20 [.079±.012]	1.25±0.20 [.049 ±.008]	1.45 [.057]	0.70 [.028]	0.20 [.008]
1206	3.20±0.30 [.126±.012]	1.60±0.20 [.126±.012]	1.80 [.071]	1.50 [.059]	0.30 [.012]
1210	3.20±0.30 [.126±.012]	2.50±0.20 [.098±.008]	2.70 [.105]	1.60 [.063]	0.30 [.012]
1812	4.60±0.3 [.181±.012]	3.20±0.3 [.126±.012]	3.00 [.118]	2.50 [.098]	0.30 [.012]
2220	5.7±0.40 [.220±.016]	5.00±0.40 [.197±.016]	3.00 [.118]	3.50 [.137]	0.30 [.012]

◆ How To Order

C	0805	B	106	K	010	T

Product Code	Chip Size	Dielectric	Capacitance Unit : pF	Tolerance	Rated Voltage	Packaging
C: MLCC (Multilayer Ceramic Chip of Capacitor)	Ex. 0402 0603 0805 1206 1210 1812 2220	Ex.: X:X7R S:X6S B:X5R Y:Y5V	Ex.: 105:10×10^5 106:10×10^6 226:22×10^6	Ex.: J : +/- 5% K: +/- 10% M:+/- 20% Z :+80/-20%	Ex.: 004: 4Vdc 007: 6.3Vdc 010: 10Vdc 016: 16Vdc 025: 25Vdc 035: 35Vdc 050: 50Vdc	T: T&R 7” R: T&R 13” B: Bulk

◆ Capacitance Range

X7R (X) Series

Size	0402		0603					0805						1206						1210					1812		2220
Code	4V	6.3V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	35V	50V	6.3V	10V	16V	25V	35V	50V	10V	16V	25V	35V	50V	25V	50V	50V
105	O	O	B	B	B	B	B	D	D	D	D	D	D	D	D	D/E	D/E	D/E	D/E	D	D	D	D	E	F	F	F
155																										F	
225			B	B				D	D	D	D	D	D	E	E	E	E	E	E	F	F	F	F	F	F	F	F
335														E	E	E	E									F	
475								D	D	D	D			E	E	E	E	E	E	F	F	F	F	F	F	F	F
106								D	D	D				E	E	E	E	E		F	F	F	F	F/G	F/G	F/G	G
226														E	E					G	G	G					
476																											

X6S (S) Series

Size	0201	0402				0603						0805							1206							1210					
Code	4V	6.3V	10V	16V	25V	4V	6.3V	10V	16V	25V	50V	4V	6.3V	10V	16V	25V	35V	50V	4V	6.3V	10V	16V	25V	35V	50V	6.3V	10V	16V	25V	35V	50V
105		O	O	O	O		B	B	B	B	B				D	D	D	D						E	E						E
225		O	O	O			B	B	B	B				D	D	D	D	D				E	E	E	E				F	F	F
475		O					B	B	B	B			D	D	D	D	D	D			E	E	E	E	E			F	F	F	F
106		O				B	B	B	B				D	D	D	D	D			E	E	E	E	E			F	F	F	F	F/G
226						B	B					D	D	D	D					E	E	E					G	G	G		
476												D							E	E						G	G	G			
107																										G					

X5R (B) Series

Size	0201			0402					0603						0805							1206					1210				
Code	4V	6.3V	10V	6.3V	10V	16V	25V	35V	6.3V	10V	16V	25V	35V	50V	4V	6.3V	10V	16V	25V	35V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
105		S	S	O	O	O	O	O	B	B	B	B	B	B				D	D	D	D			E	E	E	F	F	F	F	F
225	S	S		O	O	O	O	O	B	B	B	B	B	B		D	D	D	D	D	D		E	E	E	E	F	F	F	F	F
335																	D	D													
475				O	O	O			B	B	B	B	B			D	D	D	D	D	D		E	E	E	E	F	F	F	F	F
106				O	O				B	B	B	B				D	D	D	D	D	D	E	E	E	E	E	F	F	F	F	F/G
226									B	B						D	D	D	D			E	E	E	E		G	G	G	G	
476															D		D					E	E				G	G	G		
107															D							E									
227																						E					G	G			

Y5V (Y) Series

Size	0402		0603				0805					1206			1210			
Code	6.3V	10V	6.3	10V	16V	25V	6.3V	10V	16V	25V	50V	10V	16V	25V	10V	16V	25V	35V
105	O	O		B	B	B			B	B	D							
225			B	B	B			D	D	D								
475			B	B			D	D	D									
106							D	D	D			D	D/E	E		F	F	F
226							D	D				D/E	D/E		F	F		

■ ***Other dimensions, capacitance values and voltages rating are available. Please contact HEC.***

Symbol Code	S	O	A	B	C	D	E	F	G	H
Thickness(mm)	0.3±0.03	0.5±0.05	0.6±0.1	0.85±0.15	1.0+0.1/-0.05	1.25±0.20	1.6±0.2	2.0±0.2	2.4±0.2	2.8±0.2

Multilayer Ceramic Chip Capacitors
[Low-Loss, High Frequency Capacitors]
HBC Series

◆ Features

- ❑ Low stable ESR at high frequency
- ❑ Ultra stable NP0 performance
- ❑ Suitable for solder wave and reflow soldering
- ❑ RoHS compliant
- ❑ High peak to peak voltage capability

◆ Applications

- ❑ High frequency pulse circuits
- ❑ Lighting ballast snubber circuits
- ❑ DC-DC converters
- ❑ High dv/dt rating

◆ Summary of Specifications

Operation Temperature	-55 ℃ ~ +125 ℃
Rated Voltage	500Vdc and 1000Vdc
Temperature Coefficient	≤ ± 30ppm at -55 ℃ ~ +125 ℃
Capacitance Range	10pF ~ 2700pF
Dissipation Factor	0.1% max. at 1MHz 25℃
Insulation Resistance	10GΩ
Dielectric Withstanding	1.5 x WVDC for 5 sec
Capacitance Tolerance	F, G, J, K
Ageing	None
Piezo Effects	None
dv/dt Rating	>8KV/μ second

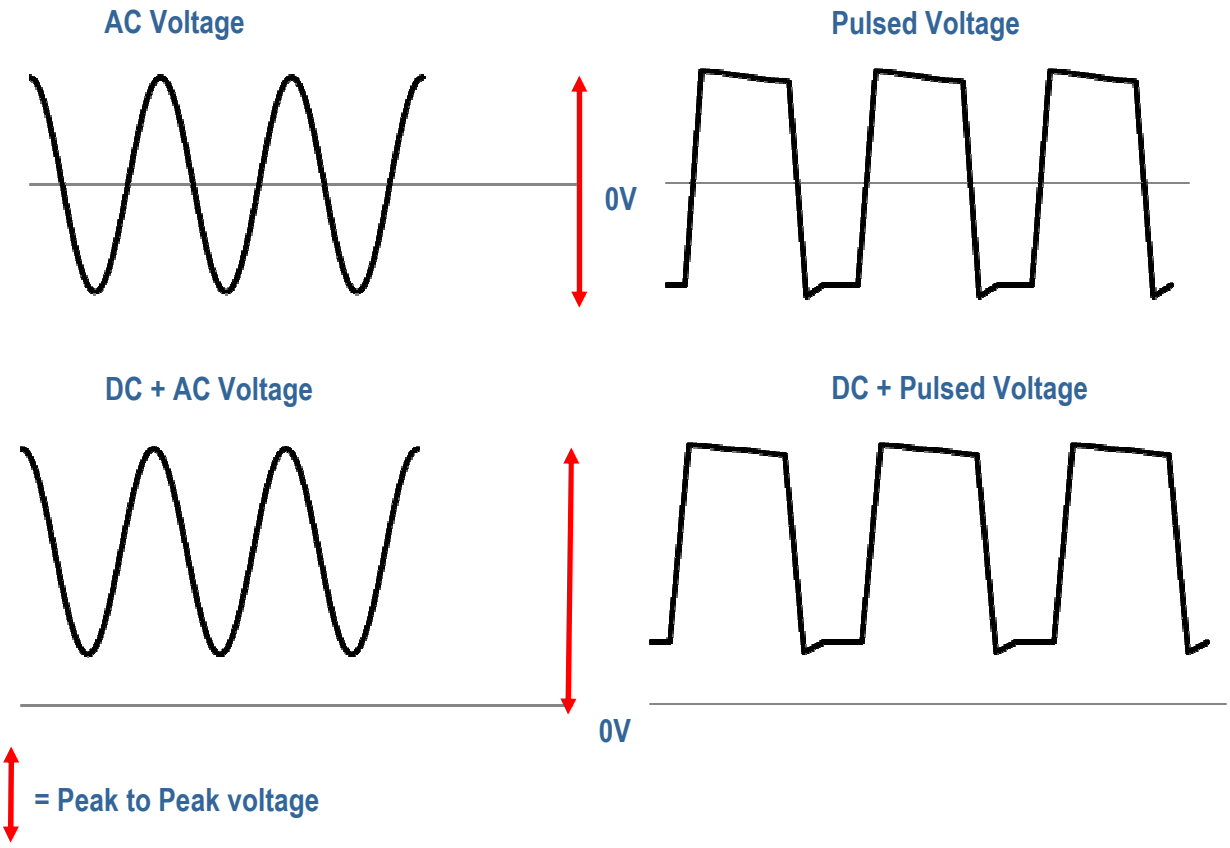
◆ How To Order

HBC	1206	N	100	J	501	T

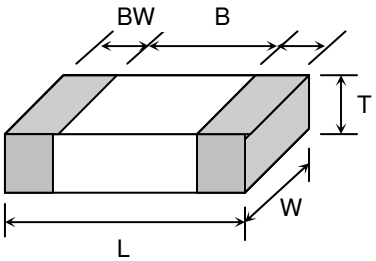
Product Code	Chip Size	Dielectric	Capacitance Unit : pF	Tolerance	Rated Voltage	Packaging
HBC: Low-Loss High Frequency Capacitor	Ex.: 1206 1210	N : NP0	Ex.: 100 : 10×10^0 101 : 10×10^1 102 : 10×10^2	Ex.: F : ± 1% G : ± 2% J : ± 5% K : ± 10%	Ex.: 501 : 500Vdc 631 : 630Vdc	T: T&R 7” R: T&R 13” B: Bulk

◆ Characteristics Peak to Peak Voltage

The maximum Peak to Peak voltage, as defined below, should not exceed the DC voltage rating of the capacitor



◆ Dimensions



Unit : mm [inch]

TYPE	L	W	T (max)	B (min)	BW (min)
1206	3.20±0.30 [.126±.012]	1.60 ± 0.2 [.063±.008]	1.80 [.071]	1.50 [.059]	0.30 [.012]
1210	3.20±0.30 [.126±.012]	2.50 ± 0.2 [.098±.008]	2.60 [.102]	1.60 [.063]	0.30 [.012]

◆ Capacitance Range

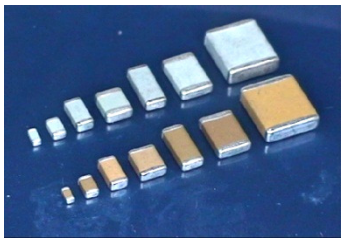
Size	Voltage	Capacitance Range																												
		100	120	150	180	220	270	330	390	470	560	680	820	101	121	151	181	221	271	331	391	471	561	681	821	102	122	152	182	222	272
1206	500V	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
1206	630V	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
1206	1000V	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■													
1210	500V	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1210	630V	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1210	1000V	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

■ ***Other dimensions, capacitance values and voltages rating are available. Please contact Holy Stone.***

Holy Stone

ACC Series

Automotive Grade NP0 & X7R MLCC Capacitors. Rated Voltage 16V – 1KV



◆ Features

- ❑ AEC-Q200 qualified.
- ❑ Suitable for harsh Automotive environments without additional qualification testing
- ❑ Available with Polymer Termination (Super Term) to prevent mechanical cracking
- ❑ High Reliability
- ❑ Sizes 0805 and 2220 with capacitance range from 10pF – 10uF
- ❑ Rated voltage up to 1KVdc
- ❑ RoHS compliant
- ❑ 250Vac, X1/Y2 Safety capacitors available

◆ Applications

- ❑ Power supplies
- ❑ Lighting
- ❑ Isolation
- ❑ Powertrain
- ❑ Safety equipment
- ❑ Custom applications

◆ Summary of Specifications

Operating Temperature	-55~+125 ℃	
Rated Voltage	16Vdc to 1KVdc	
Temperature Coefficient	NP0 : ≤ ± 30ppm/ ℃	, -55~+125 ℃ (EIA Class Ⅰ)
	X7R : ≤ ± 15%	, -55~+125 ℃ (EIA Class Ⅱ)
Capacitance Range	NP0 :10pF to 100nF ; X7R :330pF to 10uF	
Dissipation Factor	NP0 : more than 30pF Q≧1000 ; 30pF & below Q≧400+20C X7R : more than or equal to 50V: Max. 2.5% , less than 50V: Max. 10%	
Insulation Resistance	10GΩ or 500/C Ω whichever is smaller (C in Farad)	
Aging	NP0: 0% ; X7R: 2.5% per decade of time	
Dielectric Strength	V < 100V	: 250% rated voltage
	100V ≤ V <500V	: 200% rated voltage
	500V ≤ V <1000V	: 150% rated voltage
	1000V ≤ V	: 120% rated voltage

◆ How To Order

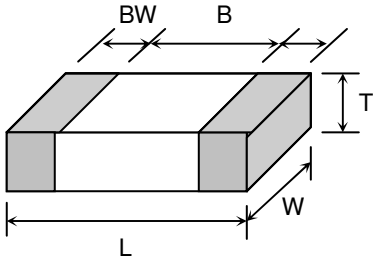
ACC	0805	X	104	K	050	T	X
Product Code ACC: Automotive Grade Capacitors	**Chip Size** EX.: 0805 1206 1210 1812 1825 2220	**Dielectric** Ex.: N: NP0 X: X7R	**Capacitance Unit : pF** Ex.: 100:10×10⁰ 471:47×10¹ 102:10×10² 473:47×10³ 104:10×10⁴	**Tolerance** Ex.: J :+/- 5% K :+/-10% M:+/-20%	**Rated Voltage** Ex.: 025:25Vdc 050:50Vdc 101:100Vdc 251:250Vdc 501:500Vdc 102:1000Vdc	**Packaging** Ex.: T: T/R 7” R: T/R 13” B: Bulk	**Special Requirement** Ex.: X: Polymer Termination (Super Term)

▪ ***Regarding to the specification and How to Order of the X1/Y2 Class, please refer to SCC series or contact your local Holy Stone office.***

ACC Series – Automotive Grade Capacitors

Holy Stone

◆ Dimensions



Unit : mm

TYPE	L	W	T (max)	B (min)	BW (min)
0805	2.00±0.20	1.25±0.20	1.45	0.70	0.20
1206	3.20.±0.30	1.60±0.20	1.80	1.50	0.30
1210	3.20±0.30	2.50±0.20	2.60	1.60	0.30
1812	4.60±0.30	3.20±0.30	3.00	2.50	0.30
1825	4.60±0.30	6.35±0.40	3.00	2.50	0.30
2220	5.70±0.40	5.00±0.40	3.00	3.50	0.30
2208 (Safety caps)	5.80±0.50	2.00±0.20	2.20	4.00	0.30
2220 (Safety caps)	5.80±0.50	5.00±0.40	3.00	4.00	0.30

◆ Capacitance Range

Capacitance Range (pF): 100 120 150 180 200 220 270 300 330 390 470 560 680 820 101 121 151 181 221 271 331 391 471 561 681 821 102 122 152 182 222 272 332 392 472 562 682 822 103 123 153 183 223 393 473 563 683 823 104

Dielectric Characteristic	Size	Rated Voltage	100	120	150	180	200	220	270	300	330	390	470	560	680	820	101	121	151	181	221	271	331	391	471	561	681	821	102	122	152	182	222	272	332	392	472	562	682	822	103	123	153	183	223	393	473	563	683	823	104
NP0	0805	25V	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C/D	B/C/D	B/C/D	C/D	C/D	D	D	D	D													
		50V	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C/D	B/C/D	B/C/D	C/D	C/D	D	D	D	D													
		100V	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C/D	B/C/D	B/C/D	C/D	C/D	D	D	D	D													
		250V	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C/D	B/C/D	B/C/D	C/D	C/D	D	D															
	1206	25V				B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C/D	B/C/D	B/C/D	B/C/D	B/C/D	B/C/D	B/C/D	B/C/D	B/C/D	C/D	D	D	D/E	D/E	D/E	D/E	D/E	E					
		50V				B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C/D	B/C/D	B/C/D	B/C/D	B/C/D	B/C/D	B/C/D	B/C/D	B/C/D	C/D	D	D	D/E	D/E	D/E	D/E	D/E	E					
		100V				B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C/D	B/C/D	B/C/D	B/C/D	B/C/D	C/D	D	E	E	E	E	E	E											
		250V				B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C/D	B/C/D	B/C/D	B/C/D	B/C/D	C/D	D	E	E	E	E	E	E											
	1210	50V																											C	C	C	C	C	C	C	C	C	C	C	C	C	C/D	C/D/E	C/D/E	C/D/E	E/F	E/F	E/F					
		100V																											C	C	C	C	C	C	C	C	C	C	C	C	C	C/D	C/D/E	C/D/E	C/D/E	E/F	F	F					
		1KV																					D/E	D/E	D/E																											
	1812	50V																											D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D/E/F	D/E/F	D/E/F	D/E/F	E/F	E/F	
		100V																											D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D/E/F	D/E/F	D/E/F	D/E/F	E/F	E/F	
		1KV																											E	E	F	F	F	F	F	F	F	G	G													
	1825	500V																																							D	E	E	E	F	F	G					

Capacitance Range (pF): 331 391 471 561 681 821 102 122 152 182 222 272 332 392 472 562 682 822 103 123 153 183 223 273 333 393 473 563 683 823 104 124 154 184 224 274 334 394 474 564 684 824 105 155 225 335 475 685 106

Dielectric Characteristic	Size	Rated Voltage	331	391	471	561	681	821	102	122	152	182	222	272	332	392	472	562	682	822	103	123	153	183	223	273	333	393	473	563	683	823	104	124	154	184	224	274	334	394	474	564	684	824	105	155	225	335	475	685	106
X7R	0805	16V	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	C	C	C	C	C	C	C	C																		
		25V	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	C	C	C	C	C	C	C	C																			
		50V	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	C	C	C	C	C	C	C	C																			
		100V	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	C	C	C	C	C	C	C	C																			
		250V	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C																							
	1206	25V	B	B	B	B	B	B	B	B	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	C/D	D/E	D/E	D/E	D/E	D/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
		50V	B	B	B	B	B	B	B	B	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	C/D	D/E	D/E	D/E	D/E	D/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
		100V	B	B	B	B	B	B	B	B	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	C/D	D/E	D/E	D/E	D/E	D/E	E	E	E	E	E	E	E	E	E	E	E	E	E													
		250V	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	C/D	D/E	D/E	D/E	D/E	D/E	E	E	E	E	E	E																			
	1210	50V																							C/D	C/D	C/D	C/D	C/D	D/E	D/E	D/E	D/E	D/E	D/E	D/E	D/E	D/E	D/E	E/F	E/F	F	F	F	F	F	F	F	F	F	F	F
		100V																							C/D	C/D	C/D	C/D	C/D	D/E	D/E	D/E	D/E	D/E	D/E	D/E	D/E	D/E	D/E	E/F	E/F	F	F	F	F	F	F	G					
	1812	50V																							D	D	D	D	D/E	D/E	D/E	D/E	E	E	E	E	E	E	E	E/F	E/F	E/F	E/F	E/F	E/F	F	F	F			
		100V																							D	D	D	D	D/E	D/E	D/E	D/E	E	E	E	E	E	E	E	E/F	E/F	E/F	E/F	E/F	F	G						
	2220	50V																													D	D	D	D	D	E	E	E	E	E/F	E/F	E/F	E/F	E/F	E/F	E/F	F	F	G	H		
		100V																													D	D	D	D	D	E	E	E	E	E/F	E/F	E/F	E/F	E/F	E/F	F	F	F				

Class	Size	Dielectric Characteristic	Rated Voltage	Certificated	100	120	150	180	220	270	330	360	390	470	560	680	820	101	121	131	151	181	221	271	331	391	471	561	681	821	102	122	152	182	222	272	332	472	473	563
X1/Y2	2208	X7R	250Vrms	TUV/UL								E/F	E/F	E/F	E/F	E/F	E/F	F	F	F	F	F	F	F	F	F	F	F	F	F	F										
X1/Y2	2220	X7R	250Vrms	TUV/UL														F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	G	H		

Note : ☐ Available with Standard or Polymer Termination (Super Term)
■ Only Polymer Termination (Super Term) Available

Symbol Code	S	O	A	B	C	D	E	F	G	H
Thickness(mm)	0.3±0.03	0.5±0.05	0.6±0.1	0.85±0.15	1.0+0.1/-0.05	1.25±0.20	1.6±0.2	2.0±0.2	2.4±0.2	2.8±0.2

▪ ***Other dimensions, capacitance values and voltage ratings are available on request. Please contact your local Holy Stone office.***

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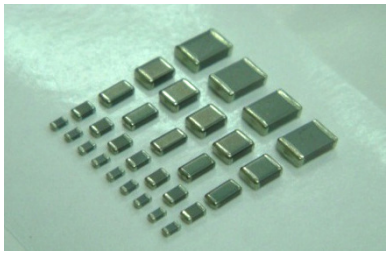

Multilayer Ceramic Chip Capacitors [High Cap. NP0]

HCN Series

Replacement for Film Capacitor

◆ Features

- ❑ Small size & high Capacitance
- ❑ Suitable for wave and reflow soldering
- ❑ Excellent characteristics and tight tolerances
- ❑ Excellent Bias, high temperature stability & low Tan δ
- ❑ Replace Film Capacitors
- ❑ RoHS compliant

◆ Applications

- ❑ Suitable for ADSL filter circuits, cable Modem and coupling circuits, general Telecommunication use, power (Inverter for oscillation circuit), wireless charger and audio circuit

◆ Summary of Specifications

Operation Temperature	-55 ℃ ~ +125 ℃
Rated Voltage	16Vdc to 50Vdc
Temperature Coefficient	NP0 : ≤ 30ppm/ ℃ , -55 ℃ ~ +125 ℃ (EIA Class Ⅰ)
Capacitance Range	1nF ~ 120nF
Dissipation Factor	Q ≥1000 at 1KHz 20 ℃
Insulation Resistance	10GΩ or 500/C Ω whichever is smaller (C in Farad)
Dielectric Strength	250% Rated Voltage for 1~ 5 seconds @ 50mA max. current
Aging	0% per decade hr.

◆ How To Order

C	1206	N	103	J	025	T

Product Code	Chip Size	Dielectric	Capacitance Unit : pF	Tolerance	Rated Voltage	Packaging
C: MLCC (Multilayer Ceramic Chip of Capacitor)	Ex.: 0603 0805 1206 1210 1812	N: NP0	Ex.: 102 : 10×10^2 103 : 10×10^3 124 : 12×10^4	Ex.: F : +/- 1% G : +/- 2% J : +/- 5%	Ex.: 016:16Vdc 025:25Vdc 050:50Vdc	T: T&R 7” R: T&R 13” B: Bulk

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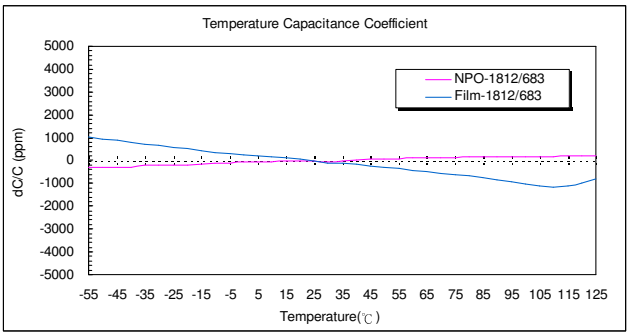
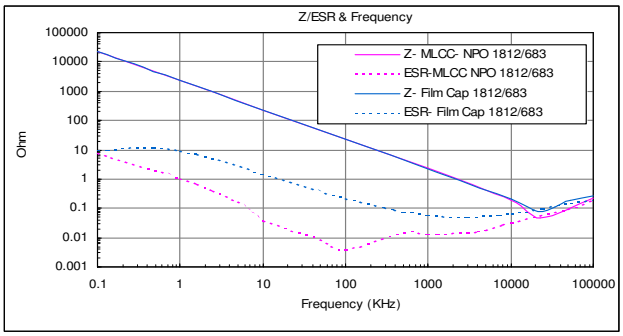
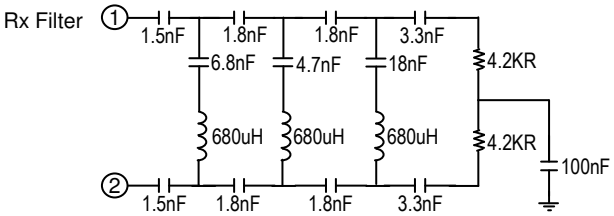
◆ Characteristics

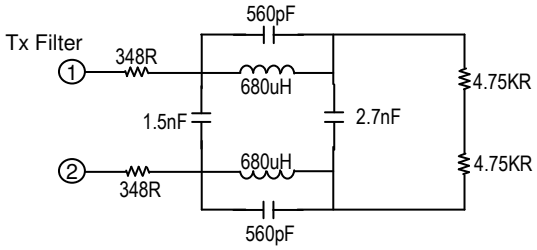




◆ Application

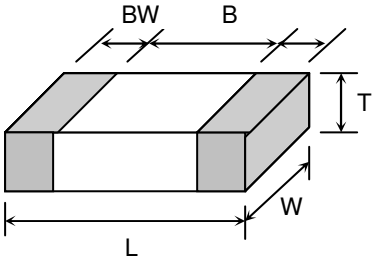
Example Circuits





◆ Dimensions

Unit : mm [inches]



TYPE	L	W	T (max)	B (min)	BW (min)
0603	1.60±0.10 [.063±.004]	0.80±0.10 [.031±.004]	0.95 [.037]	0.40 [.016]	0.15 [.006]
0805	2.00±0.20 [.079±.008]	1.25±0.20 [.049 ±.008]	1.45 [.057]	0.70 [.028]	0.20 [.008]
1206	3.20±0.30 [.126±.012]	1.60±0.20 [.126±.008]	1.80 [.071]	1.50 [.059]	0.30 [.012]
1210	3.20±0.30 [.126±.012]	2.50±0.20 [.098±.008]	2.20 [.087]	1.60 [.063]	0.30 [.012]
1812	4.60±0.30 [.181±.012]	3.20±0.30 [.126±.012]	2.20 [.087]	4.00 [.157]	0.30 [.012]

◆ Capacitance Range

| Dielectric Characteristic | Size | Voltage | Capacitance Range | | |

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Multilayer Ceramic Chip Capacitors
[Large Size Ceramic Chip Capacitors]
LCC Series

◆ Features

- ❑ Optimized internal designs offers the highest voltage rating (up to 8KVdc)
- ❑ Capacitance range from 100pF to 47uF and sizes from 1515 to 3640
- ❑ Available with proprietary surface coating for arc prevention
- ❑ Available with flexible termination (Super Term) to minimize the effects of mechanical stress
- ❑ RoHS compliant

◆ Applications

- ❑ Voltage Multipliers
- ❑ Power Supplies
- ❑ DC-DC Converters
- ❑ Surge protection
- ❑ Industrial control circuits
- ❑ Isolation
- ❑ Ballast
- ❑ Snubber
- ❑ Custom applications

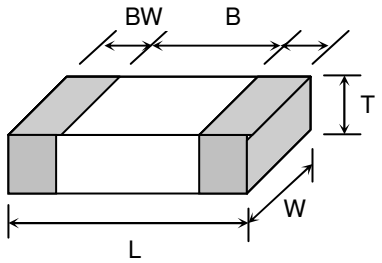
◆ Summary of Specifications

Operation Temperature	-55 ℃ ~ +125 ℃
Rated Voltage	50Vdc to 8KVdc
Temperature Coefficient	NP0 : ≤ ± 30ppm/ ℃ , -55~+125 ℃ (EIA Class Ⅰ)
	X7R : ≤ ± 15% , -55~+125 ℃ (EIA Class Ⅱ)
Capacitance Range	NP0 : 100pF to 220nF , X7R : 1000pF to 47uF
Dissipation Factor	NP0 : Q≧1000 , X7R : D.F.≦2.5%
Insulation Resistance	10GΩ or 500/CΩ whichever is smaller (C in Farad)
Aging	NP0 : 0% , X7R : 2.5 % per decade of time
Dielectric Strength	V ≤ 500V : 200% Rated Voltage
	500V ≤ V < 1000V : 150% Rated Voltage
	V ≥1000V : 120% Rated Voltage

◆ How To Order

C	2520	X	103	K	102	T	N	S	X
Product Code C: MLCC (Multilayer Ceramic Chip of Capacitor)	**Chip Size** EX.: 1515 2520 3530 3640	**Dielectric** Ex.: N : NP0 X : X7R	**Capacitance Unit : pF** Ex.: 100 : 10×10^0 471 : 47×10^1 102 : 10×10^2	**Tolerance** Ex.: J : +/- 5% K : +/-10% M : +/-20%	**Rated Voltage** Ex.: 050:50Vdc 251:250Vdc 631:630Vdc 102:1000Vdc	**Packaging** Ex.: T : T&R W : Waffle B : Bulk	**Termination** EX: N: Ni Barrier/Sn Plate P: Pd/Ag	**Testing Requirement** Ex.: S: Standard Electrical H: Hi-Reliability	**Special Requirement** Ex.: O: Arc Prevention Coating X: Cushion Termination (Super Term)

◆ Dimensions



Unit : mm [inches]

TYPE	L	W	T (max)	B (min)	BW (min)
1515	3.80±0.50 [.15±.020]	3.80±0.50 [.15 ±.020]	3.20 [.126]	1.60 [.059]	0.30 [.012]
2520	6.35±0.50 [.25±.020]	5.00±0.50 [.20±.020]	3.20 [.126]	4.00 [.157]	0.30 [.012]
3530	8.90±0.50 [.35±.020]	7.60±0.50 [.30±.020]	5.00 [.200]	5.50 [.217]	0.30 [.012]
3640	9.20±0.50 [.36±.020]	10.2±0.50 [.40±.020]	5.00 [.200]	6.00 [.236]	0.30 [.012]

◆ Capacitance Range

size	Dieletric	Capacitance (pF) maximum									
		50V	100V	250V	500V	1KV	2KV	3KV	4KV	5KV	8KV
1515	NP0	473	393	333	103	222	821	471	221	680	—
	X7R	395	275	225	474	104	333	103	472	222	102
	X7R	475	335	475			473	223			
2520	NP0	823	683	563	473	103	392	222	102	471	101
	X7R	226	106	475	125	274	823	183	123	562	182
	X7R	396	276	685			224	393			
3530	NP0	224	184	104	823	473	103	472	332	102	251
	X7R	336	226	685	225	474	154	333	223	103	392
	X7R	476	396	106			334	104			
3640	NP0	224	184	104	823	473	123	562	392	122	561
	X7R	336	396	725	275	524	184	393	273	183	472
	X7R	476	526	156			394	154			

▪ ***Under development, please contact Holy Stone***

▪ ***All values are capacitance EIA codes.***

▪ ***Other dimensions, capacitance values and voltages rating are available. Please contact Holy Stone.***

Soldering And Handling Precautions:

Large ceramic capacitors are more prone to thermal and mechanical cracks. To minimize mechanical cracks, capacitors have to be handled carefully in the original waffle pack container, carrier tape or other suitable container. Care must be taken that these capacitors do not come into contact with each other which can cause chip outs, cracks or other mechanical damage.

The recommended method for soldering large chips is reflow soldering. Wave soldering and manual soldering with Iron is not recommended. Ceramic capacitors must be preheated with less than 2ºC/second rate to about 50ºC below the reflow temperature. Any sudden increase or decrease in temperature more than the recommended rate, during soldering, may cause internal thermal cracks.

Options:

• HEC offers polymer termination (Super Term) for very large chips to minimize mechanical cracks due to board flexing.
• To minimize the potential for surface arcing in higher voltage applications, HEC offers the option of a proprietary surface coating.
• Pd/Ag termination is also offered as a standard option for Hybrid circuits and other applications.

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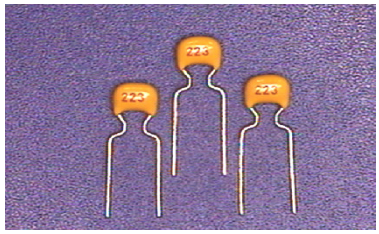
Radial Dipped Ceramic Capacitors [General Used Capacitors – 6.3V-1KV]

RDC Series



◆ Features

- ❑ Advanced process technology produces thinner layers of ceramic dielectric and offers higher voltage rating and capacitance values
- ❑ Provides good frequency response
- ❑ High reliability
- ❑ RoHS compliant
- ❑ Halogen free

◆ Applications

- ❑ Suitable for Automotive Electronics, Power supplies
- ❑ Inverter and Converter
- ❑ Fuel pump, Water pump, Hybrid engine, Door lock, and Wiper

◆ Summary of Specifications

Operation Temperature	NP0, X7R : -55 ℃ ~ +125 ℃ , X5R : -55 ℃ ~ +85 ℃ , Y5V : -30 ℃ ~ +85 ℃
Rated Voltage	16Vdc to 1KVdc
Temperature Coefficient	NP0 : ≤ ± 30ppm/ ℃ , -55 ℃ ~ +125 ℃ (EIA Class Ⅰ)
	X7R : ≤ ± 15% , -55 ℃ ~ +125 ℃ (EIA Class Ⅱ)
	X5R : ≤ ± 15% , -55 ℃ ~ +85 ℃ (EIA Class Ⅱ)
	Y5V : ≤ +22~ -82% , -30 ℃ ~ +85 ℃ (EIA Class Ⅱ)
Capacitance Range	NP0 : 10pF to 100nF
	X7R : 180pF to 22uF
	X5R : 0.1uF to 22uF
	Y5V : 0.01uF to 2.2uF
Dissipation Factor	Please refer to HEC specification data sheet by request or contact Holy Stone
Insulation Resistance	10GΩ or 500/CΩ whichever is smaller (C in Farads)
Aging	NP0 : 0% , X7R, X5R : 2.5 % , Y5V: 6% per decade of time
Dielectric Strength	V ≤ 50 : 250% Rated Voltage
	V＜500V : 200% Rated Voltage
	500V ≤ V＜1000V : 150% Rated Voltage
	1000 ≤ V : 120% Rated Voltage

◆ How To Order

RDC	X	471	K	631	EK	A	N
Product Code RDC: Radial Ceramic Chip Capacitor	**Dielectric** Ex.: N : NP0 X : X7R B : X5R Y : Y5V	**Capacitance Unit : pF** Ex.: 2R0 : 2.0pF 100 : 10×10^0 471 : 47×10^1 102 : 10×10^2	**Tolerance** Ex.: C : +/-0.25pF D : +/-0.50pF J : +/- 5% K : +/-10% M : +/-20% Z : +80/-20%	**Rated Voltage** Ex.: 007:6.3Vdc 010:10Vdc 025:25Vdc 050:50Vdc 101:100Vdc 251:250Vdc 631:630Vdc 102:1000Vdc	**Leader Style & Dimension** Ex: D Type CD:4.5x5.5mm DD:4.5x5.5mm ED:5.5x7.0mm FD:7.5x8.0mm K Type CK:4.5x5.5mm DK:4.5x5.5mm EK:5.5x7.0mm FK:7.5x8.0mm	**Lead Length & Packaging** Ex.: S: 5.0mm M: 10.0mm L: 25mm min. O: 30mm A: Ammo Box	**Optional Suffix & Special requirement** Ex.: Blank: No special requirement N: Halogen Free C: F= 5.0±1.0 mm (special lead space) D: Special thickness 4.0mm

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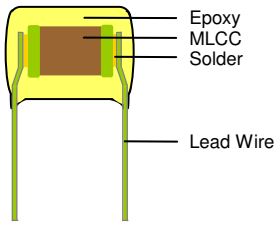
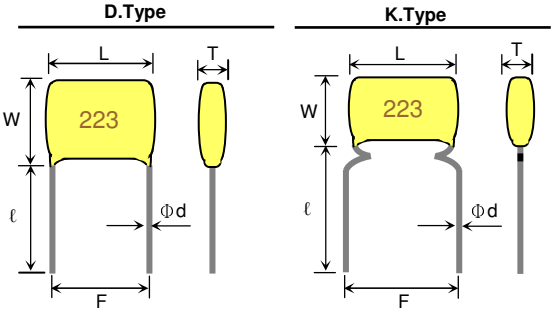
◆ Structure & Standard Dimensions





Unit : mm [inches]

TYPE	L (max)	W (max)	T (max)	F	ℓ (min)	Φd
CD	4.5 [0.177]	5.5 [0.217]	2.5 [0.098]	2.5±0.5 [.098 ±.020]	25.0 [0.984]	0.5±0.1 [0.020 ±.004]
CK	4.5 [0.177]	5.5 [0.217]	2.5 [0.098]	5.0±1.0 [.197 ±.039	25.0 [0.984]	0.5±0.1 [0.020 ±.004]
DD	4.5 [0.177]	5.5 [0.217]	2.5 [0.098]	2.5±0.5 [.098 ±.020]	25.0 [0.984]	0.5±0.1 [0.020 ±.004]
DK	4.5 [0.177]	5.5 [0.217]	2.5 [0.098]	5.0±1.0 [.197 ±.039]	25.0 [0.984]	0.5±0.1 [0.020 ±.004]
ED	5.5 [0.217]	7.0 [0.276]	4.0 [0.157]	2.5±0.5 [.098 ±.020]	25.0 [0.984]	0.5±0.1 [0.020 ±.004]
EK	5.5 [0.217]	7.0 [0.276]	4.0 [0.157]	5.0±1.0 [.197 ±.039]	25.0 [0.984]	0.5±0.1 [0.020 ±.004]
FD	7.5 [0.295]	8.0 [0.315]	4.0 [0.157]	5.0±1.0 [.197 ±.039]	25.0 [0.984]	0.6±0.1 [0.024 ±.004]
FK	7.5 [0.295]	8.0 [0.315]	4.0 [0.157]	6.0±1.0 [.236 ±.039]	25.0 [0.984]	0.6±0.1 [0.024 ±.004]
GD	7.6 [0.299]	9.4 [0.370]	6.9 [0.272]	6.0±1.0 [.236 ±.039]	25.0 [0.984]	0.6±0.1 [0.024 ±.004]
GK	7.6 [0.299]	9.4 [0.370]	6.9 [0.272]	9.5±1.0 [.374 ±.039]	25.0 [0.984]	0.6±0.1 [0.024 ±.004]
WD	7.5 [0.295]	7.0 [0.276]	4.0 [0.157]	5.0±1.0 [.197 ±.039]	25.0 [0.984]	0.6±0.1 [0.024 ±.004]
WK	7.5 [0.295]	7.0 [0.276]	4.0 [0.157]	5.0±1.0 [.197 ±.039]	25.0 [0.984]	0.6±0.1 [0.024 ±.004]
UD	7.0 [0.276]	10.7 [0.421]	6.90 [0.272]	5.0±1.0 [.197 ±.039]	25.0 [0.984]	0.6±0.1 [0.024 ±.004]

◆ Capacitance Range

NP0(N) Series

Type	C□			D□							E□								W□	
WVDC	50V	100V	250V	16V	25V	50V	100V	250V	500V	1KV	16V	25V	50V	100V	250V	500V	630V	1KV	500V	1KV
Cap Min.	121	560	560	471	100	100	100	100	100	470	102	180	180	180	150	150	150	100	102	2R0
Cap Max.	821	681	681	123	123	123	822	392	331	470	473	473	473	473	103	472	392	102	242	331

Type	F□						G□					U□			
WVDC	16V	25V	50V	100V	500V	1KV	50V	100V	250V	500V	1KV	50V	250V	500V	630V
Cap Min.	102	102	102	102	821	680	822	822	223	102	391	333	392	103	333
Cap Max.	104	104	104	104	822	682	273	273	273	223	103	104	104	473	333

X7R(X) Series

Type	C□		D□						E□								W□			
WVDC	50V	100V	25V	50V	100V	250V	500V	1KV	25V	50V	100V	200V	250V	500V	630V	1KV	250V	500V	630V	1KV
Cap Min.	103	221	154	103	103	271	271	221	223	223	332	102	181	181	392	221	272	272	272	272
Cap Max.	104	104	684	474	104	473	473	222	225	475	225	224	474	104	683	333	124	473	473	153

Type	F□						G□							U□					
WVDC	50V	100V	250V	500V	630V	1KV	25V	50V	100V	250V	500V	630V	1KV	50V	100V	250V	300V	500V	1KV
Cap Min.	563	563	103	103	221	221	106	474	474	154	104	104	103	684	104	103	103	683	103
Cap Max.	106	225	105	474	104	104	226	106	106	225	474	474	224	225	105	105	105	274	104

X5R(B) Series

Type	D□			E□		G□		
WVDC	25V	50V	100V	25V	50V	25V	50V	100V
Cap Min.	154	154	104	104	104	106	105	105
Cap Max.	105	105	334	225	225	226	106	106

Y5V(Y) Series

Type	D□
WVDC	25V
Cap Min.	103
Cap Max.	225

▪ ***Other dimensions, capacitance values and voltages rating are available. Please contact Holy Stone.***

Holy Stone

Ceramic Disc Capacitors
[High Voltage Disc Capacitors]
HDC Series – 1KVdc to 6KVdc

HDC Series (ceramic disc capacitors) are ideal for use in general electronic products with voltage ratings from 1KV to 6KV.

◆ Features

- Wide operating temperature range
- Low Loss at wide range of frequency
- High reliability
- RoHS compliant
- Halogen Free available

◆ Applications

- Suitable for LAN/WLAN interface
- Ballast circuit of back-lighting inverter
- DC-DC converters
- Snubber circuit of switching power supplies
- Modems and communication

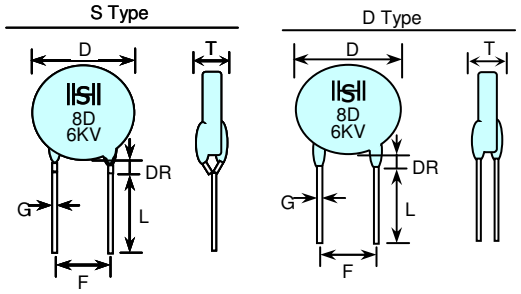
◆ Summary of Specifications

Operation Temperature	NP0/X7R : -55 ℃ ~ +125 ℃
	Y5P/Y5S/SL : -25 ℃ ~ +85 ℃
	Y5U/Y5V : -25 ℃ ~ +85 ℃
Capacitance Range	2pF to 100nF
Rated Voltage	1KVdc to 6KVdc
Temperature Coefficient	NP0 : ≤ ± 30ppm/ ℃ , -55 ℃ ~ +125 ℃ (EIA Class I)
	SL : +350 ~ -1000ppm/ ℃ , -25 ℃ ~ +85 ℃ (EIA Class I)
	Y5S : ≤ ± 22% , -25 ℃ ~ +85 ℃
	X7R : ≤ ± 15% , -55 ℃ ~ +125 ℃ (EIA Class II)
	Y5P : ≤ ± 10% , Y5U : +22%/-56% , Y5V : +22%/-82% , -25 ℃ ~ +85℃ (EIA Class II)
Dissipation Factor	Class I , NP0/SL : Q ≥ 300 at 1MHz/1Vrms
	Class II , Y5P : DF ≤ 2.5% , Y5U/Y5V : DF ≤ 5.0% at 1KHz/1Vrms
Insulation Resistance	10GΩ or 500/CΩ whichever is smaller (C in Farads)
Aging	NP0 : 0% , SL : 1.5% per decade of time
	X7R, Y5P, Y5S : 3.5 % per decade of time
	Y5U : 5.0 % , Y5V: 7.5% per decade of time
Dielectric Strength	V≤ 2KV : 200% Rated Voltage
	3KV : 175% Rated Voltage
	6KV : 150% Rated Voltage

◆ How To Order

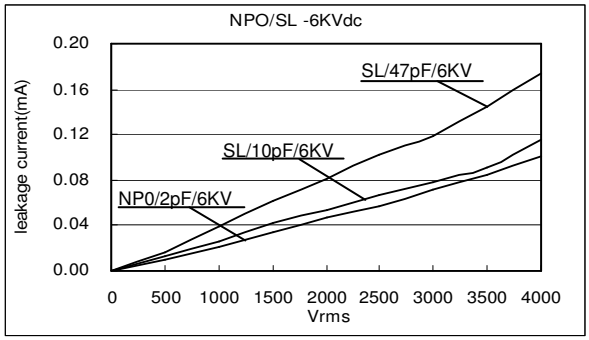
HDC	S	3R0	C	602	7	A	A	N
Product Code HDC: Ceramic Disc Capacitor	**Dielectric** Ex.: N : NP0 S : SL L : Y5S X : X7R P : Y5P Y : Y5V E : Y5U	**Capacitance Unit : pF** Ex.: 2R0 : 2pF 100 : $10x10^0$ 151 : $15x10^1$	**Tolerance** Ex.: C : ±0.25pF D : ±0.5pF H : ±3% J : ± 5% K : ±10% M : ±20%	**Rated Voltage** Ex.: 102:1000Vdc 202:2000Vdc 302:3000Vdc 602:6000Vdc	**Lead Space** Ex.: 5 : 5.00mm 6 : 6.35mm 7 : 7.50mm A : 10.0mm B : 12.5mm	**Lead Length & Packaging** Ex.: H: 3.1mm C: 3.5mm S: 5.0mm M: 10.0mm L: 25mm min. T: T & R A: Ammo Box	**Lead Shape Style** Ex.: S Type 1: φ =0.50mm 2: φ =0.60mm 3: φ =0.65mm 4: φ =0.80mm D Type 9: φ =0.50mm A: φ =0.60mm B: φ =0.65mm C: φ =0.80mm	**Optional Suffix** Ex.: N :Halogen Free

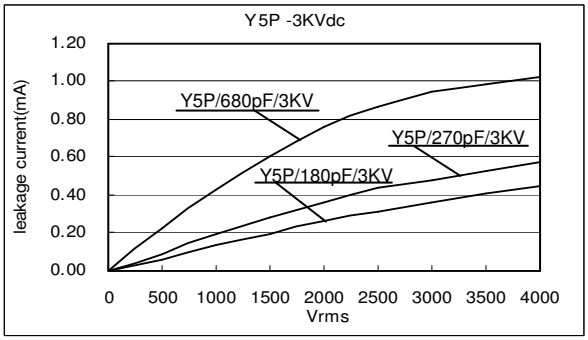
◆ Dimensions



Code	Dimension			
D	Φ20.5mm max.			
F	5.0±1.0 mm	7.50±1.5 mm	10.0±2.0 mm	12.5±2.0 mm
G	0.5±0.1mm / 0.6±0.1mm / 0.8±0.1mm			
T	8.0mm max.			
DR	4.0mm max.			

◆ Leakage Current Characteristics (Typical Reference)





◆ Capacitance Range

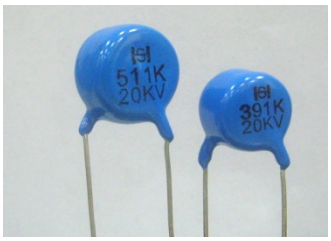
Dielectric Characteristic	Voltage	Capacitance Range																															
		2R0	3R0	5R0	6R0	7R0	8R0	9R0	100	120	150	180	220	270	330	390	470	560	680	820	101	121	151	181	221	271	331	391	471	561	681	821	102
NPO	3KV	■	■	■	■	■	■	■	■	■																							
	6KV	■	■	■	■	■	■																										
SL	1KV								■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	2KV								■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
	3KV		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
	6KV		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■										
Y5S	3KV																				■	■	■	■	■	■	■	■	■	■	■	■	■

Dielectric Characteristic	Voltage	Capacitance Range																															
		101	121	151	181	221	271	331	391	471	561	681	821	102	122	152	182	222	272	332	392	472	562	682	822	103	153	223	273	333	393	473	104
X7R	2KV	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■											
	3KV	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■														
Y5P	1KV	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■							
	2KV	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■											
	3KV	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■													
Y5U	1KV									■		■		■		■		■		■		■		■		■		■					
	2KV									■		■		■		■		■		■		■		■		■							
	3KV									■		■		■		■		■		■		■											
Y5V	1KV																									■		■		■		■	■
	2KV													■		■		■		■		■				■							

▪ ***Other capacitance and voltage rating are available. Please contact Holy Stone.***

Holy Stone

Ceramic Disc Capacitors
[Ultra High Voltage Disc Capacitors]
HDC Series – over 10KVdc



HDC Series (ceramic disc capacitors) are ideal for use in general electronic products with voltage ratings over 10KVdc.

◆ Features

- ❑ Wide operating temperature range
- ❑ Low Loss at wide range of frequency
- ❑ High reliability
- ❑ RoHS compliant
- ❑ Halogen Free available

◆ Applications

- ❑ Suitable for LAN/WLAN interface
- ❑ Ballast circuit of back-lighting inverter
- ❑ DC-DC converters
- ❑ Snubber circuit of switching power supplies
- ❑ Modems and communication
- ❑ High voltage power supply

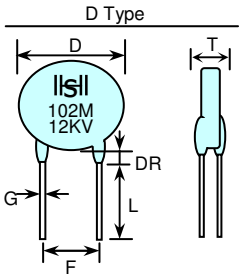
◆ Summary of Specifications

Operation Temperature	NP0/X7R : -55 ℃ ~ +125 ℃
	Y5P/Y5S/SL : -25 ℃ ~ +85 ℃
	Y5U/Y5V : -25 ℃ ~ +85 ℃
Capacitance Range	10pF to 10nF
Capacitance	1MHz/1KHz ± 20% /osc : 1 to 5Vrms, and 20 ℃
Rated Voltage	Over 10KVdc
Temperature Coefficient	NP0 : ≤ ± 30ppm/ ℃ , -55 ℃ ~ +125 ℃ (EIA Class I)
	SL : +350 ~ -1000ppm/ ℃ , -25 ℃ ~ +85 ℃ (EIA Class I)
	Y5S (N3300) ± 22% , -25 ℃ ~ +85 ℃
	X7R : ≤ ± 15% , -55 ℃ ~ +125 ℃ (EIA Class II)
	Y5P : ≤ ± 10% , Y5U : +22%/-56% , Y5V : +22%/-82% , -25 ℃ ~ +85 ℃ (EIA Class II)
Dissipation Factor	Class I , NP0/SL : Q ≥ 300 at 1MHz/1Vrms
	Class II , Y5P : DF ≤ 2.5% , Y5U/Y5V : DF ≤ 5.0% at 1KHz/1Vrms
Insulation Resistance	10GΩ at 500Vdc 1 minute
Aging	NP0 : 0% , SL : 1.5% per decade of time
	X7R, Y5P, Y5S : 3.5 % per decade of time
	Y5U : 5.0 % , Y5V : 7.5% per decade of time
Dielectric Strength	150% Rated Voltage

◆ How To Order

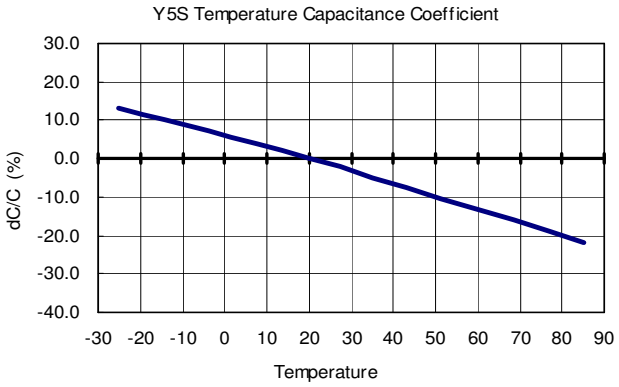
HDC	E	102	M	153	A	L	C	N
Product Code HDC: Ceramic Disc Capacitor	**Dielectric** Ex.: N : NP0 S : SL L : Y5S X : X7R P : Y5P E : Y5U Y : Y5V	**Capacitance Unit : pF** Ex.: 102 : $10x10^2$ 103 : $10x10^3$	**Tolerance** Ex.: J : ±5% K : ±10% M : ±20%	**Rated Voltage** Ex.: 103:10KVdc 123:12KVdc 153:15KVdc 203:20KVdc	**Lead Space** Ex.: A : 10.0mm B : 12.5mm	**Lead Length & Packaging** Ex.: L : 25mm min.	**Lead Shape Style** Ex.: D Type C: φ =0.80mm	**Optional Suffix** Ex.: N :Halogen Free

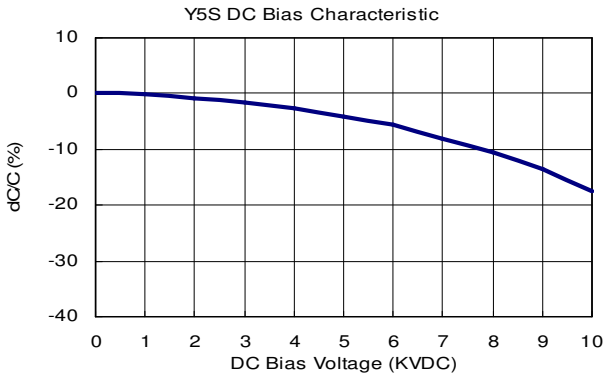
◆ Dimensions



Code	Dimension	
	D Type	
D	Please contact Holy Stone	
F	10.0±2 mm	12.5±2 mm
G	0.8±0.1mm max.	
T	Please contact Holy Stone	
DR	5.0mm max.	

◆ Temperature Capacitance Coefficient & DC Bias (Typical Reference)





◆ Capacitance Range

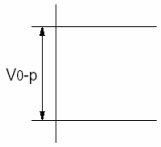
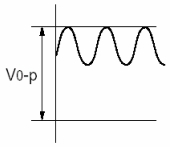
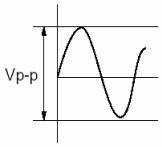
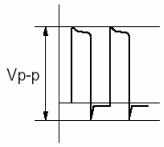
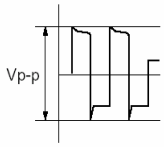
Dielectric Characteristic	Voltage	Capacitance Range																																	
		100	120	150	180	220	270	330	390	470	560	680	820	101	121	151	181	221	271	331	391	471	561	681	821	102	152	222	332	472	682	103	123
NPO	10KV	■	■	■	■	■	■	■	■	■	■	■	■																				
	15KV	■	■	■	■	■	■	■	■	■	■	■																					
	20KV	■	■	■	■	■	■	■	■	■																							
SL	10KV					■	■	■	■	■	■	■	■	■	■	■	■	■															
	15KV			■	■	■	■	■	■	■	■	■	■	■	■	■																	
	20KV			■	■	■	■	■	■	■	■	■	■	■	■	■																	
X7R	10KV													■	■	■	■	■	■	■	■	■	■	■	■	■							
	12KV													■	■	■	■	■	■	■	■	■	■	■	■	■							
	15KV													■	■	■	■	■	■	■	■	■	■	■	■	■							
Y5S	10KV													■	■	■	■	■	■	■	■	■	■	■	■	■							
	12KV													■	■	■	■	■	■	■	■	■	■	■	■	■							
	15KV													■	■	■	■	■	■	■	■	■	■	■	■	■							
Y5P	10KV													■	■	■	■	■	■	■	■	■	■	■	■	■							
	12KV													■	■	■	■	■	■	■	■	■	■	■	■	■							
	15KV													■	■	■	■	■	■	■	■	■	■	■	■	■							
Y5U	10KV																			■		■		■		■	■	■	■	■	■	■	
	12KV																			■		■		■		■	■	■	■	■			
	15KV																			■		■		■		■	■	■	■				
Y5V	10KV																									■	■	■	■	■	■	■	
	12KV																							■		■	■	■	■	■			
	15KV																					■		■		■	■	■	■				

▪ ***Other capacitance and voltage rating are available. Please contact Holy Stone.***

◆ Caution

(1) Operating Voltage:

When DC-rated capacitors are to be used in AC or ripple current circuits, be sure to maintain the Vp-p value of the applied voltage or the Vo-p which contains a DC bias within the rated voltage range.
When the voltage is applied to the circuit, starting or stopping may generate an irregular voltage for a transit period because of resonance or switching. Be sure to use a capacitor with a rated voltage range that includes these irregular voltages.

Voltage	DC Voltage	DC+AC Voltage	AC Voltage	Pulse Voltage (1)	Pulse Voltage (2)
Positional measurement					

(2) Operating Temperature and Self-generated Heat

Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a high frequency current, pulse current or similar current, it may self-generate heat due to dielectric loss. The frequency of the applied sine wave voltage should be less than 100kHz. The applied voltage load should be such that the capacitor's self-generated heat is within 20°C at an atmosphere temperature of 25°C. When measuring, use a thermocouple of small thermal capacity-K of ø0.1mm in conditions where the capacitor is not affected by radiant heat from other components or surrounding ambient fluctuations.
Excessive heat may lead to deterioration of the capacitor's characteristics and reliability. (Never attempt to perform measurement with the cooling fan running. Otherwise, accurate measurement cannot be ensured.)

(3) Fail-Safe

It should be assumed that if the capacitor fails, it will fail in short circuit mode. Be sure to provide an appropriate fail-safe function, like a fuse in your circuit, if failure would cause an electric shock, fire or fumes.

(4) Operating and storage environment

The insulating coating of capacitors does not form a perfect seal; therefore, do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present, and avoid exposure to moisture. Before cleaning, bonding or molding this product, verify that these processes do not affect product quality by testing the performance of a cleaned, bonded or molded product in the intended equipment. Store the capacitors where the temperature and relative humidity do not exceed 35°C and 75%RH. Use capacitors within 12 months.

(5) Vibration and impact

Do not expose a capacitor or its leads to excessive shock or vibration during use.

(6) Soldering

When soldering this product to a PCB/PWB, do not exceed the solder heat resistance specification of the capacitor.

Subjecting this product to excessive heating could melt the internal solder joint and may result in thermal shock that can crack the ceramic element. When soldering capacitors with a soldering iron, it should be performed in following conditions.

Temperature of iron-tip: 400 degrees C. max.
Soldering iron wattage : 50W max.
Soldering time : 3.5 sec. max.

Failure to follow the above cautions may result, in worst case, in short circuit and cause fuming or partial dispersion when the product is used.

(7) Cleaning (ultrasonic cleaning)

To perform ultrasonic cleaning, observe the following conditions.
Rinse bath capacity : Output of 20 watts per liter or less.
Rinsing time : 5 min. maximum.
Do not vibrate the PCB/PWB directly.
Excessive ultrasonic cleaning may lead to fatigue failure of the lead wires.

(8) Rating

Capacitance change of capacitor

(a). Class 1 series (Temp. Char. SL、NP0)

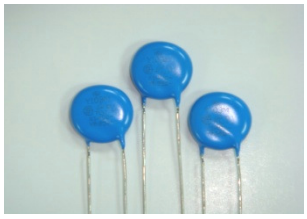
Capacitance might change a little depending on the surrounding temperature or an applied voltage.
Please contact us if you intend to use this product in a strict time constant circuit.

(b). CLASS 2 Series (Temp. Char. X7R,Y5S,Y5P,Y5U and Y5V)

Capacitors have an aging characteristic, whereby the capacitor continually decreases its capacitance slightly if the capacitor is left on for a long time. Moreover, capacitance might change greatly depending on the surrounding temperature or an applied voltage. Therefore, it is not likely to be suitable for use in a time constant circuit.
Please contact us if you need detailed information.

Holy Stone

Ceramic Disc Capacitors
[Safety Disc Capacitors – X1Y1& X1Y2]
SDC Series



This specification applies to the following Safety Standards that are recognized for Ceramic Capacitors used in Electronic Appliances.

◆ Features

- ❑ Operating temperature range guaranteed up to 125℃(UL/CSA:85℃)
- ❑ Safety capacitors specially designed for use in Modem, Facsimile, Telephone and other electronic equipment for lighting and surge protection, EMI filter and isolation.
- ❑ The series is recognized by UL,CSA,TUV,CQC
- ❑ Coated with Flame-retardant epoxy resin (conforming to UL 94-0 standards)
- ❑ Suitable for automatic insertion
- ❑ RoHS compliant
- ❑ Halogen Free available

◆ Applications

- ❑ Safety capacitors specially designed for use in Modem, Facsimile, Telephone and other electronic equipment for lighting and surge protection, EMI filter and isolation.
- ❑ Interference suppressor for AC line of electronic equipment

◆ Related Standards and Certificate Numbers

Certificated Body	Relation Standard	Number	Rated Voltage
TUV	IEC 60384-14 EN 60384-14	R 50152938	X1:400 VAC Y2:250 VAC X1:440 VAC Y1:250 VAC X1:440 VAC Y1:400 VAC
UL	UL 60384-14	E300818	
CUL/CSA	CSA :E60384-14	E300818	
CB Report	IEC 60384-14	HU841-M1	
ENEC	EN 60384-14	HN69245677 HN69245678 HN69245679	
CQC	GB/T14472-1998 IEC 60384-14	CQC13001096459 /CQC13001096458 CQC13001096461/CQC13001096470 CQC13001086961/CQC13001086960 CQC13001095807	

◆ How To Order

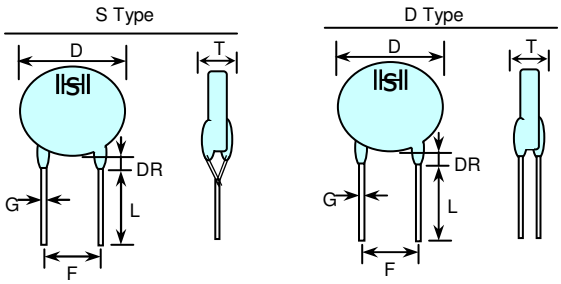
SDC	P	101	K	50	2	7	A	2

Product Code	Dielectric	Capacitance Unit : pF	Tolerance	Class	Rated Voltage	Lead Space	Lead Length	Lead Shape
SDC: Safety Disc Ceramic Capacitor	Ex.: N : NP0 S : SL X : X7R P : Y5P Y : Y5V E : Y5U	Ex.: 100 : $10x10^0$ 151 : $15x10^1$	Ex.: J : ±5.0% K : ±10% M : ±20%	Ex.: 10 : X1/Y1 50 : X1/Y2	Ex.: **2:** Y2 Cap:250V X1 Cap:400V **3:** Y1 Cap:250V X1 Cap:440V **4:** Y1 Cap:400V X1 Cap:440V	Ex.: 5 : 5.00mm 6 : 6.35mm 7 : 7.50mm A : 10.0mm B : 12.5mm	Ex.: H: 3.1mm C: 3.5mm S: 5.0mm M: 10mm L : 25mm min T : T&R A: Ammo Box	**S Type** 1: φ =0.50mm 2: φ =0.60mm 3: φ =0.65mm 4: φ =0.80mm **D Type** 9: φ =0.50mm A: φ =0.60mm B: φ =0.65mm C: φ =0.80mm

◆ Summary of Specifications

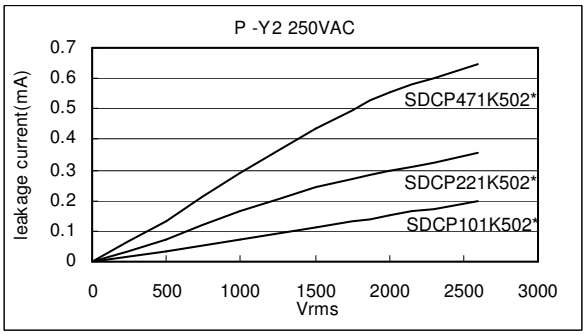
Operation Temperature	-25 ℃ ~ +125 ℃
Dielectric Strength	X1:440 VAC / Y1:250 VAC : 4000VAC for 1 minute
	X1:440 VAC / Y1:400 VAC : 4000VAC for 1 minute
	X1:400 VAC / Y2:250 VAC : 2600VAC for 1 minute
Capacitance Range	X1:440 VAC / Y1:250 VAC : 2pF to 4700pF
	X1:440 VAC / Y1:400 VAC : 2pF to 4700pF
	X1:400 VAC / Y2:250 VAC : 2pF to 10,000pF
Dissipation Factor	Class I , NP0/SL : Q ≥ 300 at 1MHz/1Vrms
	Class II , Y5P : DF ≤ 2.5% , Y5U/Y5V : DF ≤ 5.0% at 1KHz/1Vrms
Insulation Resistance	10,000MΩ min. at 500Vdc

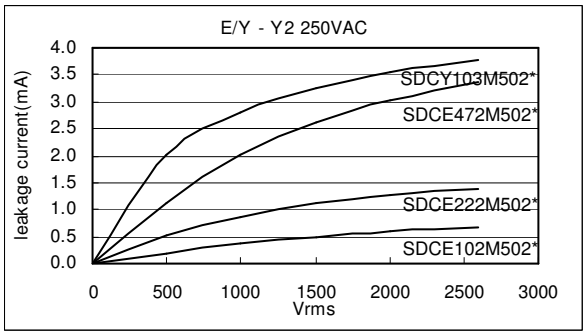
◆ Dimensions



Code	Dimension			
D	Φ 16.0mm max.			
F	5.0±1.0 mm	7.50±1.5 mm	10.0±2.0 mm	12.5±2.0 mm
G	0.5±0.1mm / 0.6±0.1mm / 0.8±0.1mm			
T	8.0mm max.			
DR	4.0mm max.			

◆ Leakage Current Characteristics (Typical Reference)





◆ Capacitance Range

Body Diameter (max.) / Body Thickness (max.)

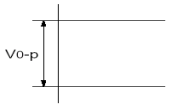
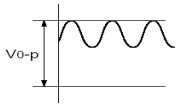
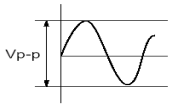
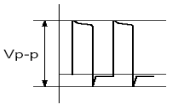
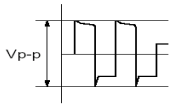
Class	TC	Capacitance Range																																			
		2R0	3R0	5R0	8R0	100	150	220	330	390	470	680	101	121	151	181	221	271	331	391	471	561	681	102	152	182	202	222	332	392	472	682	822	103
X1: 400VAC Y2: 250VAC	NPO	8/5	8/5	8/5	9/5	10/5																															
	SL				8/5	8/5	8/5	8/5	8/5	8/5	8/5	8/5																									
	Y5P				8/5	8/5	8/5	8/5	8/5	8/5	8/5	8/5	8/7	8/7	8/7	8/7	8/7	8/7	8/7	8/7	8/7	9/7	9/7	10/7													
	Y5U																							8/7	9/7	10/7	10/7	10/7	12/7	13/7	14/7						
	Y5V																							8/7	8/7			9/7	10/7		12/7	14/7	15/7	16/7			
X1: 440VAC Y1: 250VAC	NPO	8/8	8/8	8/8																																	
	SL				8/8	8/8	8/8	9/8	9/8	9/8	9/8	10/8																									
	Y5P								8/8		8/8		8/8		8/8		8/8		9/8	9/8	9/8		10/8	12/8													
	Y5U																							8/8	9/8	10/8	10/8	11/8	3.5/6	4.5/6	5.5/6						
X1: 440VAC Y1: 400VAC	NPO	8/8	8/8	8/8																																	
	SL				8/8	8/8	8/8	9/8	9/8	9/8	9/8	10/8																									
	Y5P												8/8		8/8		8/8		9/8	9/8	9/8		10/8	12/8													
	Y5U																							8/8	9/8	10/8	10/8	11/8	3.5/6	4.5/6	5.5/6						

◆ Caution (Rating)

(1) Operating Voltage

Be sure to maintain the Vp-p value of the applied voltage or the Vo-p which contains a DC bias within the rated voltage range.

When the voltage is started to apply to the circuit or it is stopped applying, the irregular voltage may be generated for a transit period because of resonance or switching. Be sure to use a capacitor within rated voltage containing this irregular voltage.

Voltage	DC Voltage	DC+AC Voltage	AC Voltage	Pulse Voltage (1)	Pulse Voltage (2)
Positional Measurement					

(2) Operating Temperature and Self-generated Heat

Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a high-frequency current, pulse current or the like, it may have the self-generated heat due to dielectric-loss.

Applied voltage should be the load such as self-generated heat is within 20℃ on the condition of atmosphere temperature 25℃. When measuring, use a thermocouple of small thermal capacity-K of φ0.1mm and be in the condition where capacitor is not affected by radiant heat of other components and wind of surroundings. Excessive heat my lead to deterioration of the capacitor's characteristics and reliability.

(3) Test condition for withstanding Voltage

I. Test Equipment

Test equipment for AC withstanding voltage shall be used with the performance of the wave similar to 50/60 Hz sine waves.

If a distorted sine wave or over load exceeding the specified voltage value is applied, a failure may be caused.

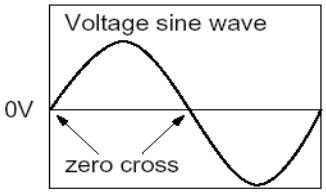
II. Voltage Applied Method

When the withstand voltage is applied, the capacitor's leads or terminals shall be firmly connected to the output of the withstand voltage test equipment, and then the voltage shall be raised from near zero to the test voltage.

If the test voltage is applied directly to capacitor, the test voltage should be applied at the *zero cross point. At the end of the test time, the test voltage shall be reduced to near zero, and then capacitor's lead or terminal shall be taken off the output of the withstand voltage test equipment.

If the test voltage is not applied from the near zero voltage point and applied directly to capacitor, a surge voltage may arise, and cause the capacitor to fail.

* ZERO CROSS is the point where voltage sine wave pass 0V.- See the right figure.



(4) Fail-Safe

It should be assumed that if the capacitor fails, it will fail in short circuit mode. Be sure to provide an appropriate fail-safe function, like a fuse in your circuit, if failure would cause an electric shock, fire or fumes.

◆ Caution (Storage and operating condition)

The insulating coating of capacitors does not form a perfect seal; therefore, do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt are likely to be present. And avoid exposure to moisture. Before cleaning, bonding, or molding this product, verify that these processes do not affect product quality by testing the performance of a cleaned, bonded or molded product in the intended equipment. Store the capacitors where the temperature and relative humidity do not exceed 35°C and 75%RH. Use capacitors within 12 months.

◆ Caution (Soldering and Mounting)

1. Vibration and impact:
   Do not expose a capacitor or its leads to excessive shock or vibration during use.
2. Soldering:
   When soldering this product to a PCB/PWB, do not exceed the solder heat resistance specification of the capacitor. Subjecting this product to excessive heating could melt the internal junction solder and may result in thermal shocks that can crack the ceramic element.
   When soldering these capacitor with a soldering iron, it should be performed in following conditions.

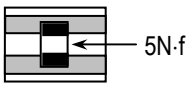
   Temperature of iron-tip: 400 degrees C. max.
   Soldering iron wattage: 50W max.
   Soldering time: 3.5 sec. max.
3. Cleaning (ultrasonic cleaning):
   To perform ultrasonic cleaning, observe the following conditions.
   Rinse bath capacity: Output of 20 watts per liter or less.
   Rinsing time: 5 min maximum.
   Do not vibrate the PCB/PWB directly.
   Excessive ultrasonic cleaning may lead to fatigue destruction of the lead wires.

◆ Caution (Handling)

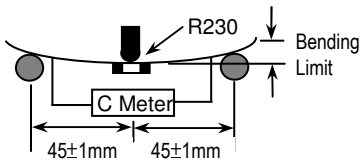
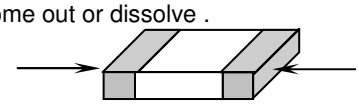
Vibration and impact
Do not expose a capacitor or its leads to excessive shock or vibration during use.

Failure to follow the above cautions may result, in worst case, in a short circuit and cause fuming or partial dispersion where the product is used.

Specifications & Test Conditions

Item	Specification	Test Conditions
Operating Temperature	Char. / Operating Temp. NP0(N) -55˚~ +125˚C SL (L) -55˚C~+125˚C X5R (B) -55˚C~ +85˚C X7R (X) -55˚C~ +125˚C X8R (H) -55˚C~+150˚C X7E (C) -55˚C~+125˚C X6S (S) -55˚C~+105˚C Y5V (Y) -30˚C~ +85˚C	
Visual	No abnormal exterior appearance	Visual Inspection
Capacitance	Within the specified tolerance	Char. NP0/SL / Frequency / Voltage C≤100pF 1MHz±10% 1.0±0.2Vrms C>100pF 1KHz±10% 1.0±0.2Vrms
Quality Factor	Class Ⅰ (NP0/SL): More Than 30pF : Q ≧1000 30pF & Below: Q≧400＋20C (C:Cap., pF)	
Dissipation Factor	Class Ⅱ (X7R/X5R/X6S/Y5V): Please check the summery of specification of each product series Class Ⅱ (X7E: Maximum 1%	Perform a heat temperature at 150±5℃ for 30min. then place at room temp. for 24±2hr.
Insulation Resistance	10,000MΩ or 500/C Ω whichever is smaller for rated voltage>10V and greater 100/C Ω for rated voltage≤10V. X1/Y2 and X2/Y3: 10GΩ min	Applied voltage : rated voltage Charge time : 60±5 sec. Charge-discharge current shall be less than 50mA current. Applied voltage: 500V charge time 60 sec
Dielectric Withstand Voltage (DWV) (Unless otherwise stated on product descriptions)	No dielectric breakdown or mechanical breakdown X1/Y2 and X2/Y3	V ≤ 50V : 250% rated voltage 100V ≤ V < 500V : 200% rated voltage 500V ≤ V < 1000V : 120% rated voltage Voltage applied for 1~5 sec. Current is limited to less than 50mA X Capacitor : Applied voltage 1075Vdc(4.3Ur) Y Capacitor: Applied Voltage 1500Vac For 1 Min. Current limited to less than 50mA
Temperature Capacitance Coefficient	Char. / Temp. Range / Cap. Change NP0(N) -55˚C~+125˚C ± 30ppm/℃ SL (L) -55˚C~+85˚C +350/ -1000ppm/ ˚C X7R (X) -55˚C~ +85˚C ± 15% X5R (B) -55˚C~ +125˚C ± 15% X8R (H) -55˚C~+150˚C ± 15% X5E (C) -55˚C~ +85˚C ± 4.7% X6S (S) -55˚C~+105˚C ± 22% Y5V (Y) -30˚C~ +85˚C +22/-82%	Class Ⅰ : [C2-C1/C1(T2-T1)] x 100% Class Ⅱ : (C2-C1)/C1 x 100% T1:Standard temperature(25℃) T2:Test temperature C1:Capacitance at standard temperature C2:Capacitance at test temperature
Adhesive Strength of Termination	No indication of peeling shall occur on the terminal electrode.	 5N·f A 5N·f (≈ 0.5Kg·f) pull force shall be applied for 10±1 sec.

Specifications & Test Conditions

Item	Specification	Test Conditions
Resistance to Flexure of Substrate	No mechanical damage or capacitance change more than the following table. Char. — Capacitance Change NP0(N)/SL(L) — ≦ ± 5.0% of initial value X7R (X) — ≦ ± 12.5% of initial value X5R (B) — ≦ ± 12.5% of initial value X6S (S) — ≦ ± 12.5% of initial value Y5V (Y) — ≦ ± 30.0% of initial value	The board should bend 1.0mm with a rate of 1.0 mm/sec. 
Solderability	More than 90% of the termination surface should be soldered so the metal part does not come out or dissolve . 	Solder Temperature : 245±5℃ Dip Time : 5 ± 0.5 sec. Immersing Speed : 25±10% mm/s Solder : H63A Flux :Rosin Preheat : At 80~120 ℃ For 10~30sec.
Resistance to Soldering Heat	Appearance — No mechanical damage shall occur Capacitance — Class Ⅰ (NP0): Within 2.5% or ±0.25pF whichever is larger of initial value Class Ⅱ : Char. — Cap. change X5R(B) — ≤ ±7.5% of initial value X7R(X) — ≤ ±7.5% of initial value X6S (S) — ≤ ±7.5% of initial value Y5V(Y) — ≤ ±20% of initial value Q / Tan δ — To satisfy the specified initial value Insulation Resistance — To satisfy the specified initial value	Class Ⅱ capacitor shall be set for 48± 4 hours at room temperature after one hour heat treatment at 150 +0/-10℃ before initial measuring. Preheat : at 150±10°C for 60~120sec. Dip : solder temperature of 260±5℃ Dip Time : 10 ± 1sec. Immersing Speed : 25±10% mm/s Solder : H63A Flux : Rosin Measure at room temperature after cooling for Class Ⅰ : 24 ± 2 Hours Class Ⅱ : 48 ± 4 Hours
Temperature Cycle	Appearance — No mechanical damage shall occur Capacitance — Class Ⅰ (NP0): Within 2.5% or ±0.25pF whichever is larger of initial value Char. — Cap. change X5R(B) — ≤ ±7.5% of initial value X7R(X) — ≤ ±7.5% of initial value X8R(H) — ≤ ±7.5% of initial value X7E(C) — ≤ ±7.5% of initial value X6S(S) — ≤ ±7.5% of initial value Y5V(Y) — ≤ ±20% of initial value Q / Tan δ — To satisfy the specified initial value Insulation Resistance — To satisfy the specified initial value	Class Ⅱ capacitor shall be set for 48±4 hours at room temperature after one hour heat treatment at 150 +0/-10 ℃ before initial measuring. Capacitor shall be subjected to five cycles of the temperature cycle as following: Step — Temp.(℃) — Time(min) 1 — Min Rated Temp.+0/-3 — 30 2 — 25 — 3 3 — Max Rated Temp.+3/-0 — 30 4 — 25 — 3 Measure at room temperature after cooling for Class Ⅰ : 24 ± 2 Hours Class Ⅱ : 48 ± 4 Hours

Specifications & Test Conditions

Item		Specification	Test Conditions
Humidity	Appearance	No mechanical damage shall occur	Class Ⅱ capacitor shall be set for 48±4 hours at room temperature after one hour heat treatment at 150 +0/-10 ℃ before initial measure. Temperature : 40± 2 ℃ Relative humidity : 90 ~95%RH Test Time : 500 +12/-0 hr Measure at room temperature after cooling for Class Ⅰ : 24 ± 2 Hours Class Ⅱ : 48 ± 4 Hours
	Capacitance	Class Ⅰ NP0(N)/SL(L): Within 5.0% or ±0.5pF whichever is larger of initial value Class Ⅱ : Char. — Cap. change X5R(B) — ≤±12.5% of initial value X7R(X) — ≤±12.5% of initial value X8R(H) — ≤±12.5% of initial value X7E(C) — ≤±12.5% of initial value X6S(S) — ≤±12.5% of initial value Y5V(Y) — ≤±30% of initial value	
	Q Class Ⅰ	30pF & over : Q ≧350 10 to 30pF : Q≧275+2.5C 30pF & below: Q≧200+10C	
	Tan δ Class Ⅱ	Please see table 1 for details	
	Insulation Resistance	1,000MΩ or 50/C Ω whichever is smaller for rated voltage>10V and greater 10/C Ω for rated voltage≦10V. (C in Farad)	
Damp Heat/ Steady State	Appearance	No mechanical damage shall occur	Class Ⅱ capacitors applied DC voltage of the rated voltage is applied for one hour at maximum Operating temperature ±3℃ then shall be set for 48±4 hours at room temperature and the initial measurement shall be conducted. Applied Voltage :Rated Voltage Temperature : 40±2℃ Relative humidity : 90 ~95%RH Test time : 500 +12/-0Hr Current applied : 50 mA Max. Measure at room temperature after cooling for Class Ⅰ : 24 ± 2 Hours Class Ⅱ : 48 ± 4 Hours
	Capacitance	Class Ⅰ (NP0)/SL(L): Within 7.5% or ±0.75pF whichever is larger of initial value Class Ⅱ : Char. — Cap. change X5R(B) — ≤±12.5% of initial value X7R(X) — ≤±12.5% of initial value X8R(H) — ≤±12.5% of initial value X7E(C) — ≤±12.5% of initial value X6S(S) — ≤±12.5% of initial value Y5V(Y) — ≤±30% of initial value	
	Q Class Ⅰ	30pF & Over : Q ≧350 10 to 30pF : Q≧275+2.5C 30pF & Below: Q≧200+10C	
	Tan δ Class Ⅱ	Please see table 1 for details	
	Insulation Resistance	500MΩ or 25/C Ω whichever is smaller for rated voltage>10V and greater 5/C Ω for rated voltage≦10V. (C in Farad)	

Specifications & Test Conditions

Item		Specification	Test Conditions
High Temperature Load (Life Test)	Appearance	No mechanical damage shall occur	Class Ⅱ Capacitors : The applied DC test voltage is applied for one hour at maximum operating temperature ±3℃, then left to stabilize for 48±4 hours at room temperature before the initial measurement is taken. Applied voltage : please see HEC specification data sheet. Temperature : max. operating temperature Test Time : 1000 +48/-0Hr Current applied : 50 mA max. Measure at room temperature after cooling for Class Ⅰ : 24 ± 2 hours Class Ⅱ : 48 ± 4 hours
	Capacitance	Class Ⅰ (NP0)/SL(L): Within 5.0% or ±0.5pF whichever is larger of initial value Class Ⅱ : Char. Cap. change X5R(B) ≤±12.5% of initial value X7R(X) ≤±12.5% of initial value X7E(C) ≤±12.5% of initial value X7R(S) ≤±12.5% of initial value Y5V(Y) ≤±30% of initial value	
	Q Class Ⅰ	30pF & Over : Q ≧350 10 to 30pF : Q≧275+2.5C 30pF & Below: Q≧200+10C	
	Tan δ Class Ⅱ	Please see table 1 for details	
	Insulation Resistance	1,000MΩ or 50/C Ω whichever is smaller . For rated voltage>10V and greater 10/C Ω for rated voltage≦10V. (C in Farad)	
Vibration	Appearance	No mechanical damage shall occur	Solder the capacitor on P.C. board. Vibrate the capacitor with an amplitude of 1.5mm P-P changing the frequencies from 10Hz to 55Hz and back to 10Hz in about 1 min. Repeat this for 2 hours each in 3 perpendicular directions.
	Capacitance	Within the specified tolerance	
	Q / Tan δ	To satisfy the specified initial value	

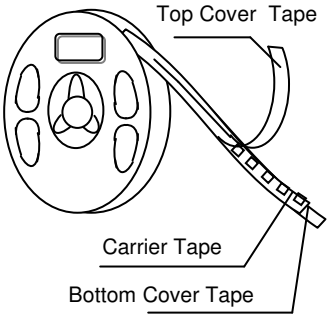
◆ Multilayer Ceramic Chip Capacitor

● Bulk Packing

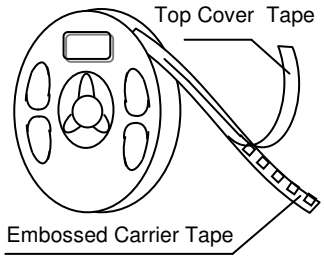
Standard packing 10Kpcs/pack, others according to customers' request.

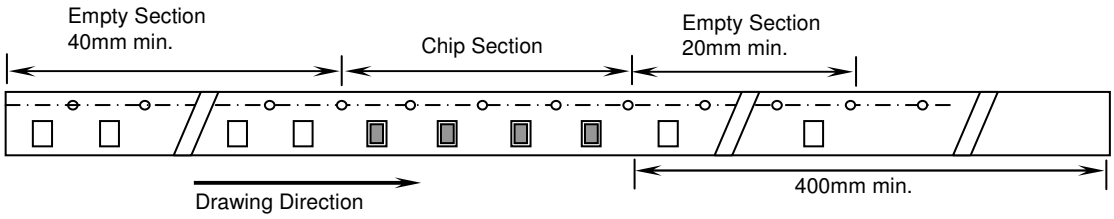
● Tape Packing

Paper Tape



Embossed Tape





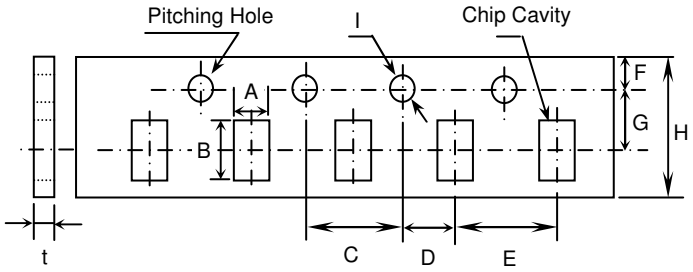
Material And Quantity (¢180mm)

Chip Size (EIA Code)	Dimension (mm) L	W	T	¢180mm reel Paper Tape	Plastic Tape
0201	0.6	0.3	T≤0.33	15,000 pcs/reel	N/A
0402	1.0	0.5	T≤0.55	10,000 pcs/reel	N/A
0603	1.6	0.8	T≤0.90	4,000 pcs/reel	N/A
0805	2.0	1.25	T≤0.90	4,000 pcs/reel	N/A
			0.9< T≤1.25	N/A	3,000 pcs/reel
1206	3.2	1.6	T≤0.90	4,000 pcs/reel	N/A
			0.9< T≤1.25	N/A	3,000 pcs/reel
			T>1.25	N/A	2,000 pcs/reel
1210	3.2	2.5	T≤1.25	N/A	3,000 pcs/reel
			T>1.25	N/A	2,000 pcs/reel
1808	4.6	2.0	T≤1.25	N/A	3,000 pcs/reel
			T>1.25	N/A	2,000 pcs/reel
1812	4.6	3.2	T≤2.20	N/A	1,000 pcs/reel
			T>2.20	N/A	700 pcs/reel
1825	4.6	6.35	T≤2.20	N/A	700 pcs/reel
			T>2.20	N/A	400 pcs/reel
2208	5.7	2.0	T≤2.20	N/A	1,000 pcs/reel
2211	5.7	2.8	T≤2.20	N/A	1,000 pcs/reel
			T>2.20	N/A	700 pcs/reel
2220	5.7	5.0	T≤2.20	N/A	1,000 pcs/reel
			T>2.20	N/A	700 pcs/reel
2225	5.7	6.35	T≤2.20	N/A	700 pcs/reel
			T>2.20	N/A	400 pcs/reel

NA：Not Available

Tape Dimensions and Specifications

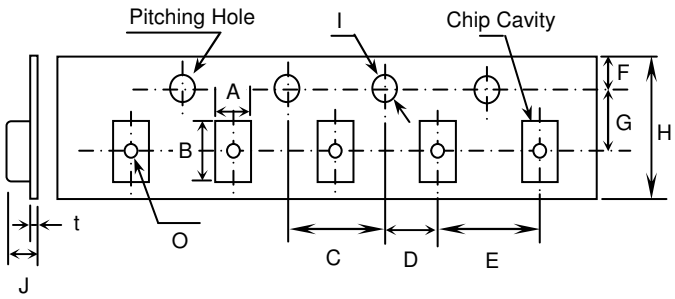
Paper Tape



Unit：mm

	0201	0402	0603	0805	1206	1210
A	0.37±0.1	0.61±0.1	1.10±0.2	1.50±0.2	1.90±0.2	2.90±0.2
B	0.67±0.1	1.20±0.1	1.90±0.2	2.30±0.2	3.50±0.2	3.60±0.2
C	4.00±0.1	-- -->				
D	2.0±0.05	-- -->				
E	2.00±0.1	-- -->	4.00±0.1	-- -->		
F	1.75±0.1	-- -->				
G	3.5±0.05	-- -->				
H	8.00±0.3	-- -->				
I	¢1.5+0.1/-0	-- -->				
t	1.1 max.	-- -->				

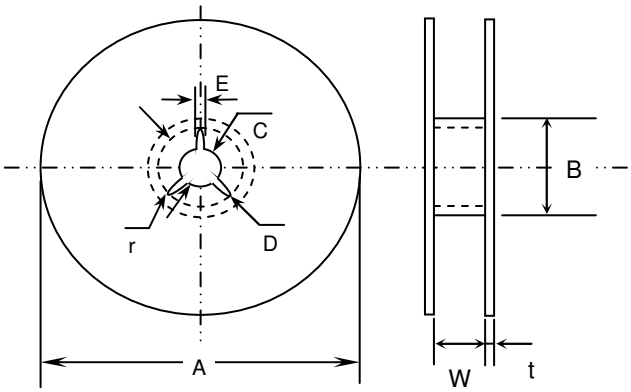
Embossed Tape



Unit：mm

	0805	1206	1210	1808	2208	1812	1825	2211	2220	2225
A	1.5±0.2	1.9±0.2	2.9±0.2	2.5±0.2	2.5±0.2	3.6±0.2	6.9±0.2	3.2±0.2	5.4±0.2	6.9±0.2
B	2.3±0.2	3.5±0.2	3.6±0.2	4.9±0.2	6.1±0.2	4.9±0.2	4.9±0.2	6.1±0.2	6.1±0.2	6.1±0.2
C	4.0±0.1	➔								
D	2.0±0.05	➔								
E	4.0±0.1	➔				8.0±0.1	➔			
F	1.75±0.1	➔								
G	3.5±0.05	➔		5.5±0.05	➔					
H	8.0±0.3	➔		12.0 +3/-0	➔					
I	¢1.5+0.1/-0	➔								
J	3.0 max.	➔		4.0 max.	➔					
t	0.3 max.	➔								
O	0.15 min.	➔								

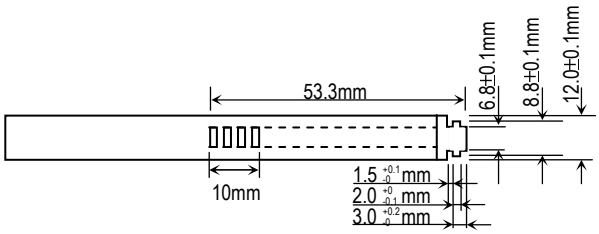
Reel Dimensions



Unit：mm

	0402 to 1210	1808 to 2220
A	¢ 382 max.	¢ 178±0.2
B	¢ 50 min.	¢ 60±0.2
C	¢ 13±0.5	¢ 13±0.5
D	¢ 21±0.8	¢ 21±0.8
E	¢ 2.0±0.5	¢ 2.0±0.5
W	10±0.15	13±0.3
t	2.0±0.5	17±1.4
r	1.0	1.0

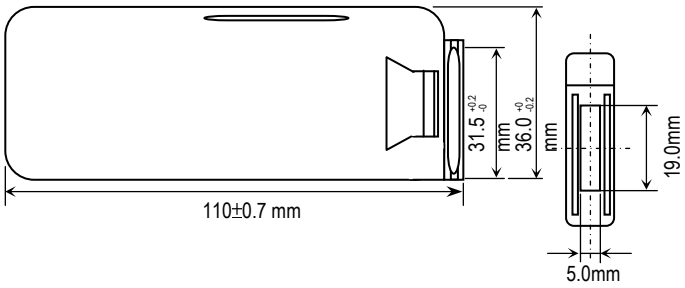
Bulk Cassette Packing



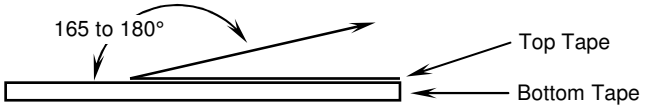
Cassette Packing

Unit：mm

Chip Size	0402	0603	2012
Length	1.00±0.05	1.60±0.10	2.00±0.20
Width	0.50±0.05	0.80±0.10	1.25±0.20
Thickness	0.50±0.05	0.80±0.10	0.60±0.10
Quantity	50,000pcs	15,000pcs	10,000pcs



● Cover Tape Peel Force



The peel force of cover tape is 5 to 70 grams in the direction of arrow.

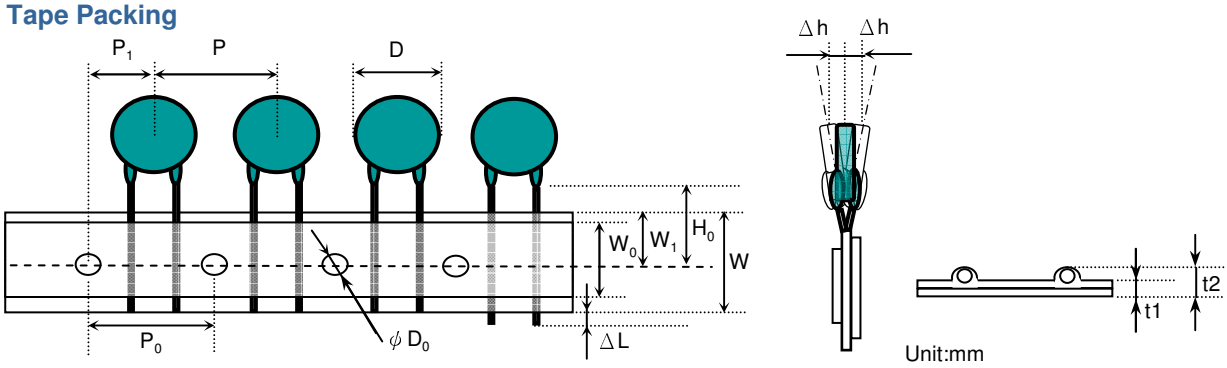
◆ Ceramic Disc Capacitors Packing Information (SDC,HDC Series)

● Bulk Packing

Standard packing 300pcs,500pcs&1,000pcs/pack, others according to customers' request.

Bulk Package	Lead Code	Qt'y/One Pack
HDC Series	H,C,S,M / L	1,000 / 500 pcs
SDC Series	H,C,S,M / L	500 / 250 pcs

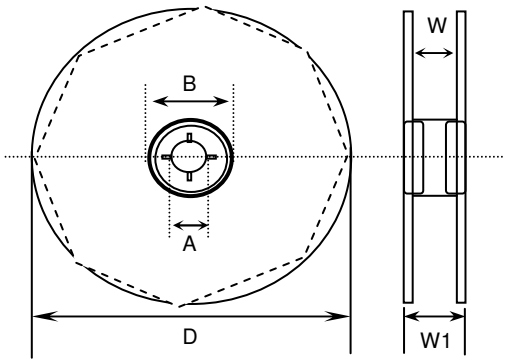
● Tape Packing



	Symbol	Lead Space 5.00mm	6.35mm	7.50mm
Pitch of component	P	12.7±1.0		
Feed Hole Pitch	P_0	12.7±0.3		
Hole center to component center	P_1	6.35±1.3		
Body diameter	D	11.0 max		
Hold position	W1	8+1.0-0.5		
Hold tape width	W_0	10 min		
Hold position	W_1	9±0.5		
Lead wire clinch	H_0	16+1.5-0.5		
Total tape thickness	t1	0.6±0.3		
Total thickness, tape& lead wire	t2	1.5 max		
Feed hold diameter	ϕD_0	4.0±0.2		
Deviation across tape	△h	2.0 max		
Protrusion Length	△L	1.0 max		

● Packing Dimensions

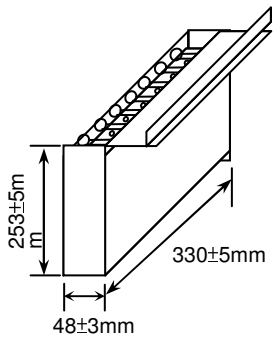
Reel Dimensions :



Unit : mm

Code	Dimension
W1	56
W	44
D	340
A	30
B	84

Ammo Dimensions :



● Packing Quantity

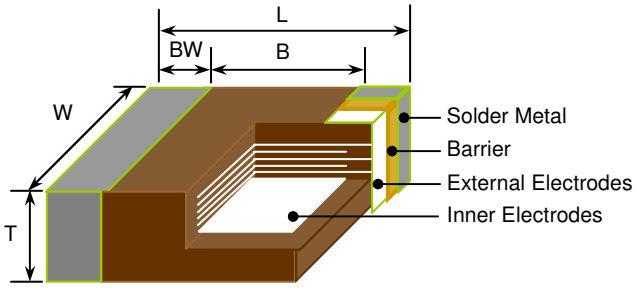
Unit:mm

Package	One Box / One Reel	Carton Box
Taping Reel Pack	1,500 / 2,000 pcs	15,000 / 20,000 pcs
Ammo Box Pack	1,000 / 1,500 pcs	10,000 / 15,000 pcs

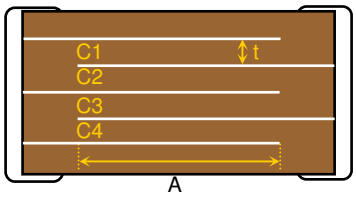
The Multilayer Ceramic Chip of Capacitors supplied in bulk, cassette or taped & reel package are ideally suitable for thick-film Hybrid circuits and automatic surface mounting on printed circuit boards.

Mainly use in electric circuit for by-pass, filtering and smoothing circuit.

◆ Shapes and Dimensions



Cross Section



Dimension (mm) [inches]

EIA style	L	W	Tmax.	BWmin	Bmin.
0201	0.60±0.03 [.024±.002]	0.30±0.03 [.011±.002]	0.33 [.013]	0.10 [.004]	0.20 [.008]
0402	1.00±0.05 [.039±.002]	0.50±0.05 [.020±.002]	0.55 [.022]	0.15 [.006]	0.30 [.012]
0603	1.60±0.10 [.063±.004]	0.80±0.10 [.031±.004]	0.95 [.037]	0.15 [.006]	0.40 [.016]
0805	2.00±0.20 [.079±.008]	1.25±0.20 [.049±.008]	1.45 [.057]	0.20 [.008]	0.70 [.028]
1206	3.20±0.30 [.126±.012]	1.60±0.20 [.063±.008]	1.80 [.071]	0.30 [.012]	1.50 [.059]
1210	3.20±0.30 [.126±.012]	2.50±0.20 [.098±.008]	2.60 [.102]	0.30 [.012]	1.60 [.063]
1808	4.60±0.30 [.181±.012]	2.00±0.20 [.079±.008]	2.20 [.087]	0.30 [.012]	2.50 [.098]
1812	4.60±0.30 [.181±.012]	3.20±0.30 [.126±.012]	3.00 [.118]	0.30 [.012]	2.50 [.098]
1825	4.60±0.30 [.181±.012]	6.35±0.40 [.250±.016]	2.60 [.102]	0.30 [.012]	2.50 [.098]
2208	5.70±0.40 [.220±.016]	2.00±0.20 [.197±.008]	2.20 [.087]	0.30 [.012]	3.50 [.137]
2211	5.70±0.40 [.220±.016]	2.80±0.40 [.110±.016]	3.00 [.118]	0.30 [.012]	3.50 [.137]
2220	5.70±0.40 [.220±.016]	5.00±0.40 [.197±.016]	3.00 [.118]	0.30 [.012]	3.50 [.137]
2225	5.70±0.40 [.220±.016]	6.35±0.40 [.250±.016]	3.00 [.118]	0.30 [.012]	3.50 [.137]

$$C = \varepsilon_0 \cdot \varepsilon \frac{A \cdot N}{t}$$

C : Capacitance
ε_0 : Dielectric constant in the air
ε : Proportional dielectric constant
A : Overlap Area
t : Dielectric Thickness
N : Layers

◆ Nominal Capacitance and Tolerance

1. Standard Combination of Nominal Capacitance and Tolerance

Class	EIA Symbol	Tolerance	Nominal Capacitor
I	NP0	J (±5%),K (±10%)	E-12 ,E-24 Series
II	X7R	K(±10%), M(±20%)	E-3,E-6 Series
	X7E	K(±10%), M(±20%)	E-3,E-6 Series
	X5R	K(±10%), M(±20%)	E-3,E-6 Series
	Y5U	M(±20%),Z(+80/-20 %)	E-3 Series
	Y5V	M(±20%),Z(+80/-20 %)	E-3 Series
	Z5U	M(±20%),Z(+80/-20 %)	E-3 Series

2. E Series (Standard Number)

E-Series	Application Capacitance											
E-3	1.0			2.2			4.7					
E-6	1.0	1.5	2.2	3.3	4.7	6.8						
E12	1.0	1.2	1.5	1.8	2.2	2.7	3.3	3.9	4.7	5.6	6.8	8.2
E24	1.0	1.2	1.5	1.8	2.2	2.7	3.3	3.9	4.7	5.6	6.8	8.2
	1.1	1.3	1.6	2.0	2.4	3.0	3.6	4.3	5.1	6.2	7.5	9.1

◆EIA Designations

For Class Ⅰ Dielectrics

Coefficient of capacitance (ppm/℃)		Multiplier applicable to column		Tolerance of temp. coeff.(ppm/℃)	
0.0	C	-1.0	0	30	G
1.0	M	-10	1	60	H
1.5	P	-100	2	120	J
2.2	R	-1000	3	250	K
3.3	S	-10000	4	500	L
4.7	T	+1	5	1000	M
7.5	U	+10	6	2500	N
		+100	7		
		+1000	8		
		+10000	9		

Ex.: C0G Negative 0±30ppm/℃
U2J Negative 750±120ppm/℃

For Class Ⅱ Dielectrics

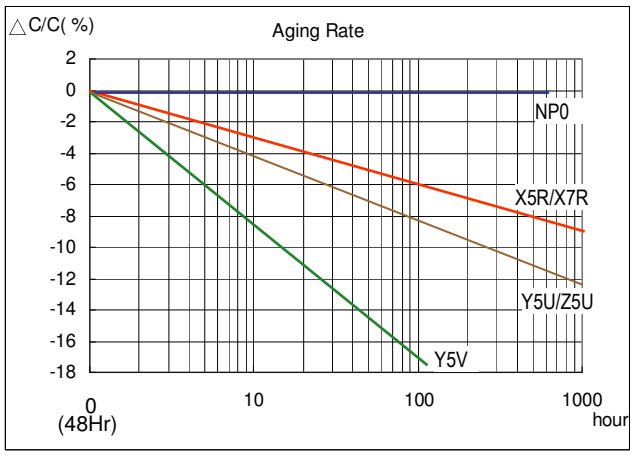
Low Temp. Symbol		High Temp. Symbol		Max. %△C Symbol	
-55℃	X	+45℃	3	±1.0%	A
-30℃	Y	+65℃	4	±1.2%	B
+10℃	Z	+85℃	5	±2.2%	C
		+105℃	6	±3.3%	D
		+125℃	7	±4.7%	E
		+150 ℃	8	±7.5%	F
		+200 ℃	9	±10.0%	P
				±15.0%	R
				±22.0%	S
				+22% /-33%	T
				+22% /-56%	U
				+22% /-82%	V

Ex.: X7R -55 ~ +125 ℃ ±15%
Y5V -30 ~ +85 ℃ +22%/-82%

◆Operating Temperature Range

Class	EIA Symbol	Dielectric Code	Temperature Range(℃)	Capacitance Change	Reference Temperature
Ⅰ	NP0	N	-55℃ ~ +125 ℃	0±30 ppm/℃	25℃
	SL	L	-25℃ ~ +85 ℃	+350/-1000 ppm/℃	25℃
Ⅱ	X7R	X	-55℃ ~ +125℃	±15%	25℃
	X7E	C	-55℃ ~ +125℃	±4.7%	25℃
	X5R	B	-55℃ ~ +85℃	±15%	25℃
	Y5V	Y	-30℃ ~ +85℃	+22/-82 %	25℃
	Y5U	E	-30℃ ~ +85℃	+22/-56 %	25℃
	Z5U	Z	+10℃ ~ +85℃	+22/-56 %	25℃

◆ Dielectric Material – Aging Rate

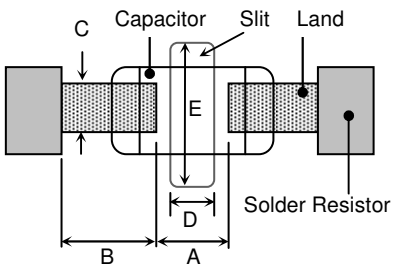


Aging Rate
NP0: 0
X7R/X5R : 1 ~ 4 % /decade
Y5U/Z5U : 4~6% / decate
Y5V : 6~10 % /decade
After performing De-Aging at 150±5 ℃ for 30 minutes and placement at room temperature for 48 hours.

◆ Construction of Board Pattern

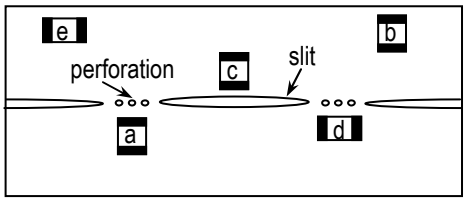
Improper circuit layout and pad/land size may cause poor solder joints between the component and the PC board. Insufficient solder may create a weak joint, and excessive solder may increase the potential for mechanical or thermal cracks in the ceramic capacitor. Therefore we recommend the solder pad/land size to be as shown in the following table:

1. Size and recommend land dimensions for reflow soldering



EIA Code	Chip (mm)		Land (mm)				
	L	W	A	B	C	D	E
0201	0.60	0.30	0.2~0.3	0.2~0.4	0.2~0.4	--	--
0402	1.00	0.50	0.3~0.5	0.3~0.5	0.4~0.6	--	--
0603	1.60	0.80	0.4~0.6	0.6~0.7	0.6~0.8	--	--
0805	2.00	1.25	0.7~0.9	0.6~0.8	0.8~1.1	--	--
1206	3.20	1.60	2.2~2.4	0.8~0.9	1.0~1.4	1.0~2.0	3.2~3.7
1210	3.20	2.50	2.2~2.4	1.0~1.2	1.8~2.3	1.0~2.0	4.1~4.6
1808	4.60	2.00	2.8~3.4	1.8~2.0	1.5~1.8	1.0~2.8	3.6~4.1
1812	4.60	3.20	2.8~3.4	1.8~2.0	2.3~3.0	1.0~2.8	4.8~5.3
1825	4.60	6.35	2.8~3.4	1.8~2.0	5.1~5.8	1.0~4.0	7.1~8.3
2208	5.70	2.00	4.0~4.6	2.0~2.2	1.5~1.8	1.0~4.0	3.6~4.1
2211	5.70	2.80	4.0~4.6	2.0~2.2	2.0~2.6	1.0~4.0	4.4~4.9
2220	5.70	5.00	4.0~4.6	2.0~2.2	3.5~4.8	1.0~4.0	6.6~7.1
2225	5.70	6.35	4.0~4.6	2.0~2.2	5.1~5.8	1.0~4.0	7.1~8.3

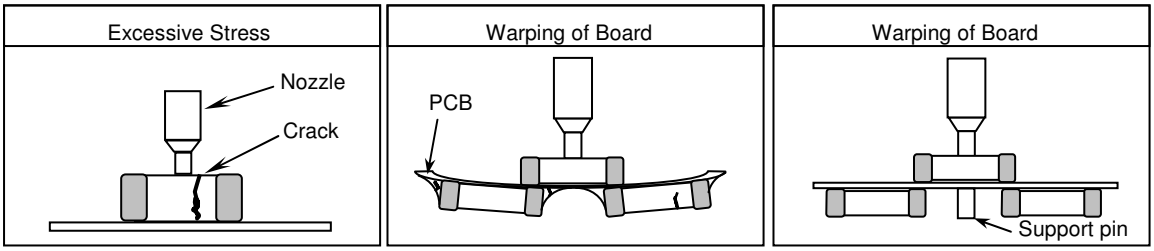
2. Mechanical strength varies according to location of chip capacitors on the P.C. board.
   Design the layout of components on the PC board in such a way to minimize the stress imposed on the components, upon flexure of the boards in depanelization or other processes.



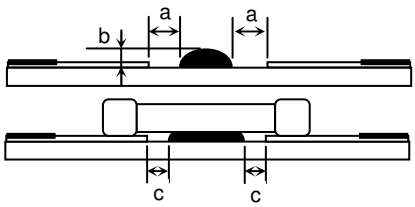
Component layout close to the edge of the board or the "depanelization line" is not recommended.
Susceptibility to stress is in the order of: a>b>c and d>e

◆ Mounting

1. Sometimes cracking can be caused by the impact load of the pick and place nozzle.
   In the pick and place operation, if the low dead point is too low, excessive stress is applied to component. This may cause cracks in the ceramic capacitor, therefore it is required to move the low dead point of the nozzle to the higher level to minimize the board warpage and stress on the components. Nozzle pressure should be adjusted to N to 3N (static load) during the pick and place operation.



2. Amount of Adhesive

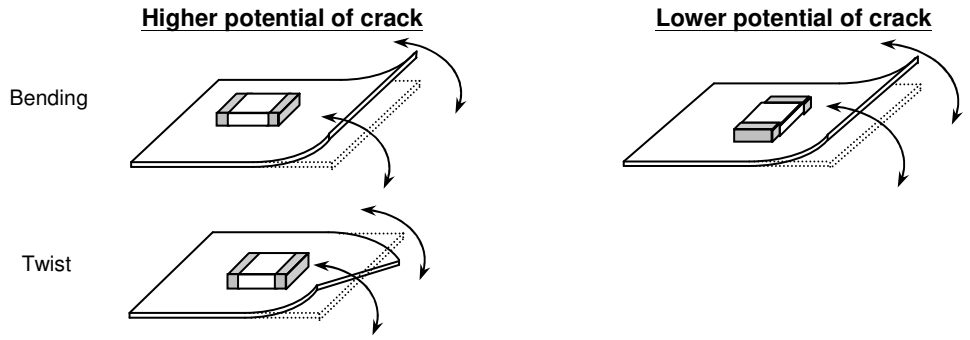


Example : 0805 & 1206

a	0.2mm min.
b	70 ~ 100 μm
c	Do not touch the solder land

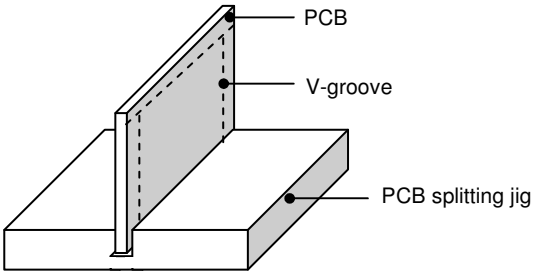
◆ Handling after chip mounted

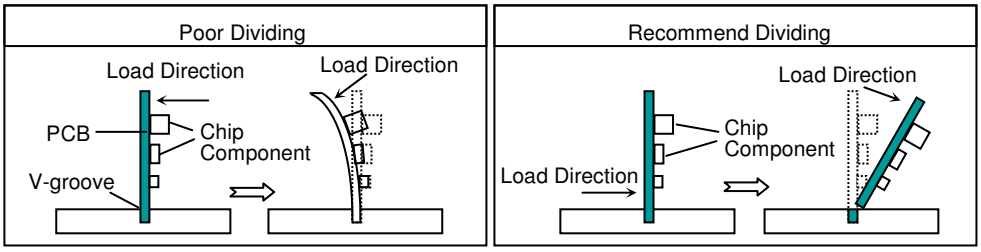
1. Proper handling of the PCB is recommended since excessive bending and twisting of the PC board may induce mechanical stress and cause internal cracking of the capacitor.



2. There is a potential of cracking if board is warped due to excessive load from the check pin

3. Examples of PCB de-panelization jigs:
The outline of PCB breaking jig is shown below. It is recommended when dividing or breaking PCB that they are held near the jig where no bending will occur, this way there will be no compressive stress is applied to the capacitors on the PCB. Do not hold the PCB at a position which is far away from the jig, tensile stress to the capacitors may cause them to crack.



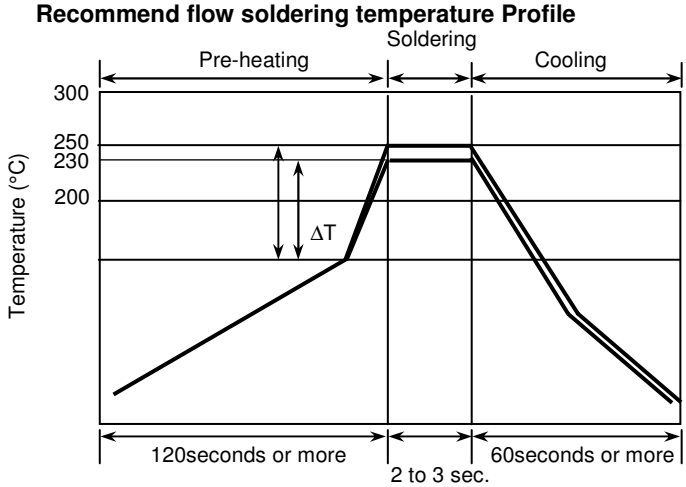


◆Soldering

1. Wave Soldering

Most components are wave soldered with solder at 230 to 250˚C. Adequate care must be taken to prevent the potential of thermal cracks in the ceramic capacitors. Refer to the soldering methods below for optimum soldering benefits.

Recommend flow soldering temperature Profile



Soldering Method	Change in Temp.(℃)
1206 and Under	ΔT ≤100~130℃ max.

To optimize the result of soldering, proper preheating is essential:

1) Preheat temperature is too low
   a. Flux flows to easily
   b. Possibility of thermal cracks
2) Preheat temperature is too high
   a. Flux deteriorates even when oxide film is removed
   b. Causes warping of circuit board
   c. Loss of reliability in chip and other components

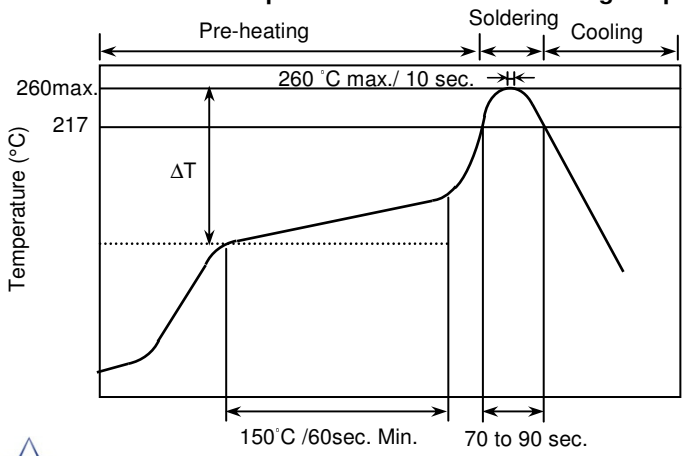
Cooling Condition:

Natural cooling in air is recommended. Forced cooling should be avoided, however if the chips are dipped into a solvent for cleaning, the temperature difference (ΔT) between the solvent and the chips must be less than 100˚C.

2. Reflow Soldering

Preheat to the reflow temperature is recommended to decrease the potential of thermal cracking in the components. The recommended heating rate depends on the size of component, however it should not exceed 3˚C/Sec.

Recommend reflow profile for Lead-Free soldering temperature Profile (MIL-STD-202G #210F)

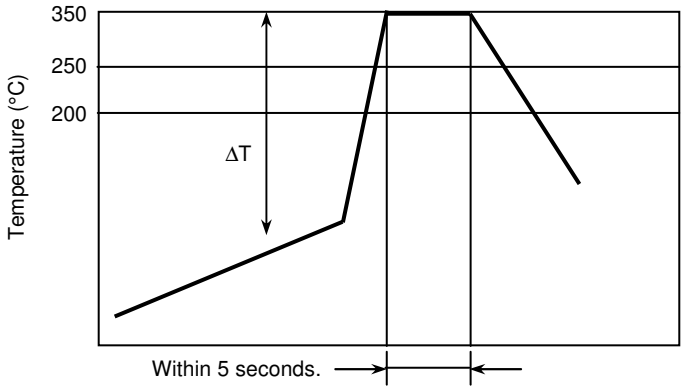


Soldering Method	Change in Temp.(℃)
1206 and Under	ΔT ≤190℃
1210 and Over	ΔT ≤130℃

※ The cycles of soldering : Twice (Max.)

3. Hand Soldering

Sudden temperature changes in ceramic capacitors will result in a temperature gradient within the component and therefore may cause internal thermal cracking. In general a hand soldering method is not recommended unless proper preheating and handling practices have been taken. Care must also be taken not to touch the ceramic body of the capacitor with the tip of solder Iron. The soldering iron tip should always be placed on to the solder pad.



Soldering Method	Change in Temp.(℃)
1206 and Under	ΔT ≤150℃
1210 and Over	ΔT ≤130℃

How to Solder Repair by Solder Iron

1) Selection of the soldering iron tip
   The required temperature of soldering iron for any type of repair depends on the type of the tip, the substrate material, and the solder land size.

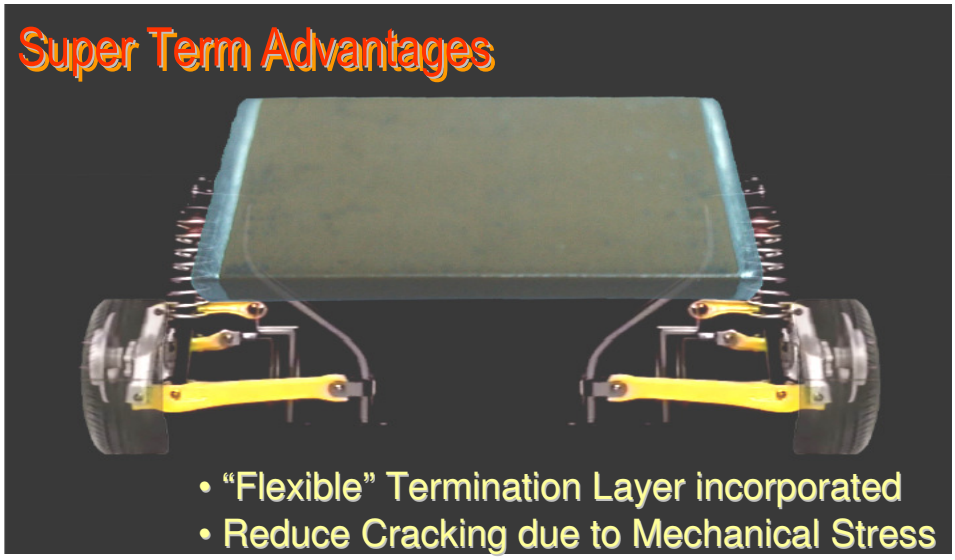
2) recommended solder iron condition
   a.) Preheat the substrate to (60˚C to 120˚C) on a hot plate. Note that due to the heat loss, the actual setting of the hot plate may have to be higher. (For example 100˚C to 150˚C)
   b.) Soldering iron power shall not exceed 30 W.
   c.) Soldering iron tip diameter shall not exceed 3mm.
   d.) Temperature of the iron tip shall not exceed 350˚C, and the process should be finished within 5 seconds. **(refer to MIL-STD-202G)**
   e.) Do not touch the ceramic body with the tip of solder iron. Direct contact of the soldering iron tip to ceramic body may cause thermal cracks.
   f.) After soldering operation, let the products should be allowed to cool down naturally in air.

◆Storage

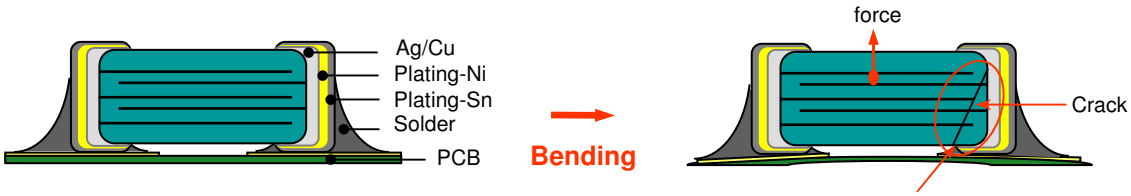
Store the capacitors where the temperature and relative humidity do not exceed 40˚C and 70%RH. We recommend that the capacitors be used within 12 months from the date of manufacturing. Store the products in the original package and do not open the outer polyethylene bag until just before usage. If it is open, seal it as soon as possible or keep it in a desiccant with a desiccation agent.

Reducing Short Circuit Risks – Super Term

Internal MLCC cracking can result in serious failure modes. If ceramic capacitors are subjected to severe mechanical stress, a bending crack may occur. This crack can run through two or more electrodes of opposing polarity and result in a short circuit. Typical bending cracks are shown below. In the worst case scenario, these short circuits may lead to the MLCC overheating and catastrophic failure.



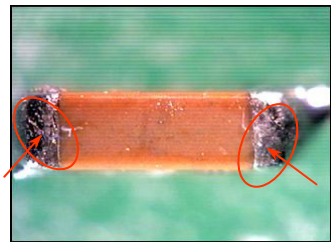
Typical Applications are power circuit input and output filtering, smoothing…



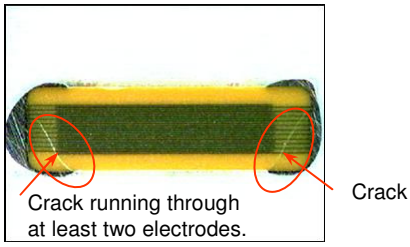
Standard termination construction may result in cracking during PCB bending, vibration, Depanelizing, etc.

Actual Examples:

Failure Mode Type 1



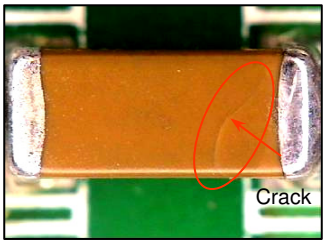
Surface View



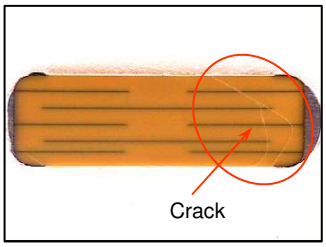
Cross Section View

The failure mode results from PCB bending forces. These cracks may not be visible on the MLCC surface. Cross sectional analysis is required to determine these internal cracks.

Failure Mode Type 2 (wetting greater than 2/3 of thickness)



Top View

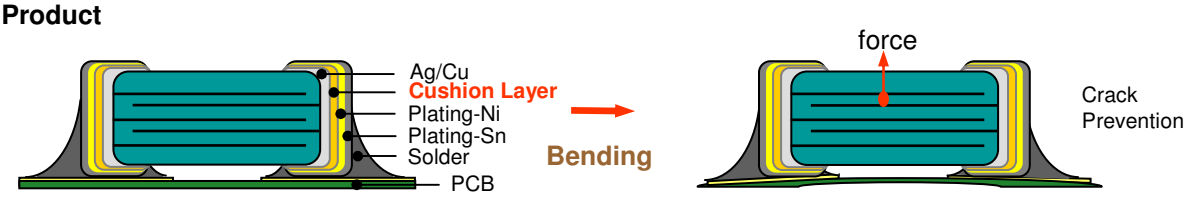


Cross Section View

MLCC cracking frequently occurs during the circuit board depanelizing process. The root cause is knife (blade) vibration during the process.

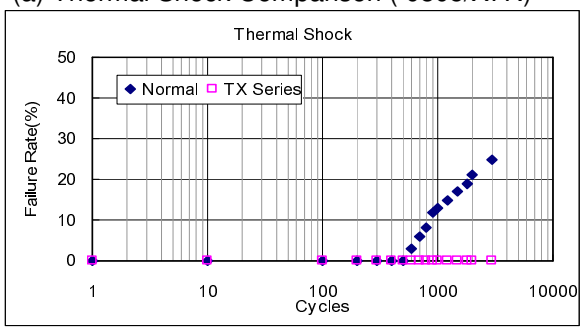
Holy Stone has developed the **"Super Term" Series (TX suffix in the part number),** which incorporates a "cushion layer" in the termination structure. This construction effectively absorbs external forces, reduces the incidence of cracking and improves overall product reliability. Super Term product applications include: high temperature automotive, power circuits and other critical end products with extreme processing conditions.

TX Product



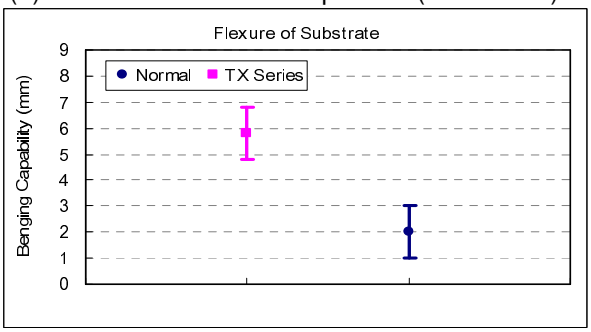
Reliability/Durability Comparison

(a) Thermal Shock Comparison (0805/X7R)

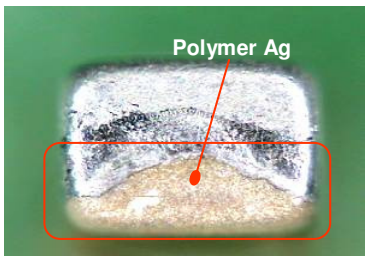


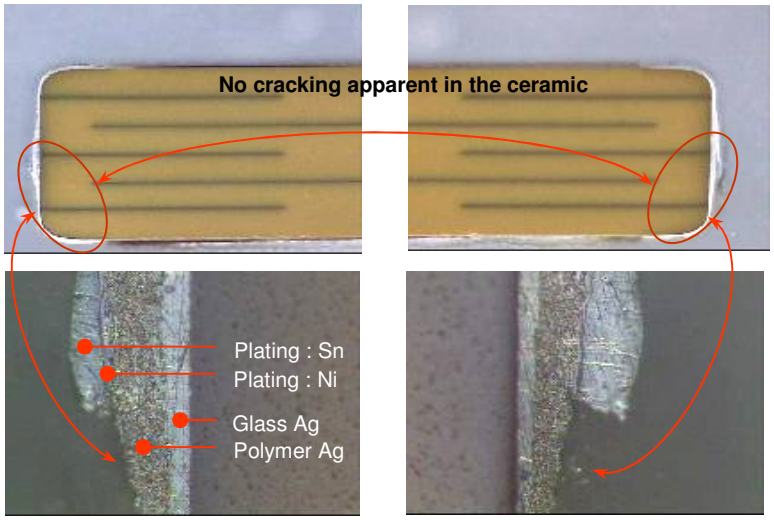
Thermal shock test on standard termination results in inception of failure at 500 cycles. Super Term TX Series reliability improves to over 3000 cycles.

(b) Substrate Flexure Comparison (0805/X7R)



Bending test on Super Term shows an improvement of about 5.0 mm bend vs. an average of about 2.0 mm. for standard termination.



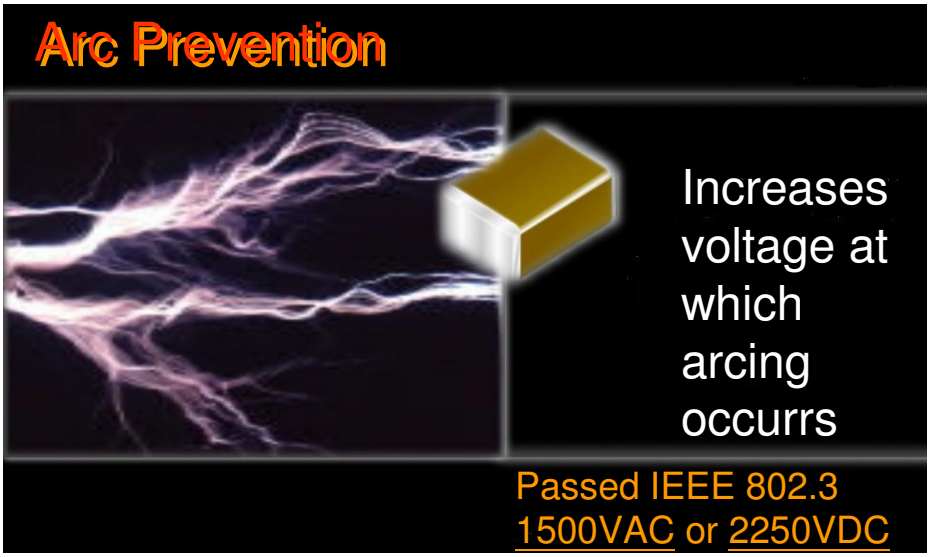


During destructive bending test, the PCB is subjected to bending until capacitor failure. With Super Term there is no cracking damage in the ceramic. Super Term effectively prevents ceramic body cracking during extreme mechanical stress as simulated by this test.

Super Term failures resulting from destructive bending test tend to occur in the OPEN mode and not short circuit mode typical of standard termination failures. The Super Term cushion layer material is a "polymer silver" material and can be seen in the above photo.

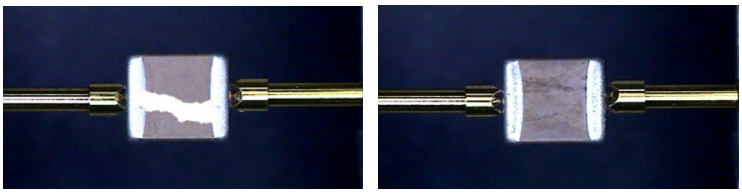
MLCC Arc Prevention – for Hi-Pot Testing

Due to the open and porous nature of the surface of the X7R dielectric, moisture and/or dirt which will have a lower resistance than the dielectric grains, can become entrapped in the surface. Dirt can also include any flux residues as a result of the soldering process. This dirt/flux as well as becoming entrapped into the surface will, in itself, attract additional moisture onto the surface thus reducing the surface resistance and the voltage at which arcing occurs. Surface arcing or flashover at worst can cause equipment failure during isolation testing and, in addition, will leave a carbon track on the surface which can lead to eventual failure of the capacitor.



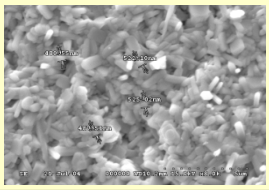
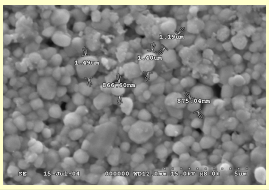
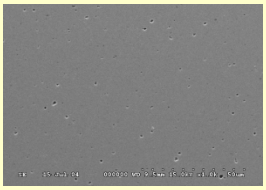
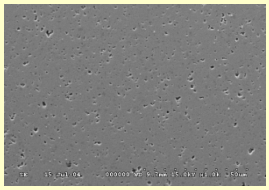
Typical Applications for telecommunication devices(IEEE802.3) in LAN interface, Ballast…

Holy Stone has developed an Arc Prevention coating process that coats the surface of the dielectric without encroaching onto the termination material. This coating makes the surface of the dielectric non porous and prevents moisture and dirt becoming trapped thus reducing the surface resistance and the arcing voltage of the capacitor. It has been shown that the arcing voltage can be increased by up to 65% on soldered parts by using the **Holy Stone** Arc Prevention Coating.



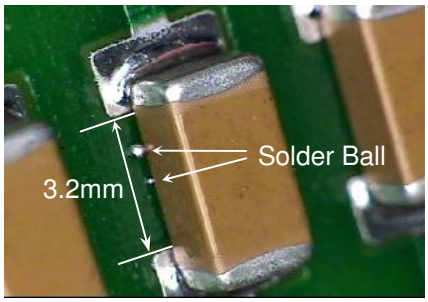
Typical surface arcing on X7R MLCC is from termination-to-termination (shown in polarized light)

NP0 & X7R Material Characteristic Comparison

Item	NP0	X7R
Dielectric Constant	30 ~ 100	2000 ~ 4000
I. Resistance	$>10^{13}\ \Omega$	$>10^{11}\ \Omega$
B.D. Voltage	70~80 Vdc/um	40~50 Vdc/um
Grain Size	< 500nm	900nm ~ 1500nm
Grain Size (x8000)		
Porosity (x1000)		

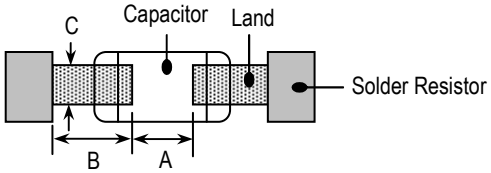
- The different grain shape and size will lead to different grain density after sintering.
- The grain size of NP0 dielectric is smaller than that of X7R resulting a denser and less porous structure.
- Surface porosity will trap dirt, flux and moisture causing the surface resistance to dramatically decrease.
- Low surface resistance will cause the arcing voltage to reduce, possibly leading to failure of the capacitor or equipment during isolation testing.
- Using the **Holy Stone** Arc Prevention coating effectively makes the surface of X7R dielectric similar to that of NP0.

Creepage distance v.s. Arcing Voltage



Solder balls reduce the creepage distance between terminations and thus reduce the arcing voltage

Recommended Solder Pad Design



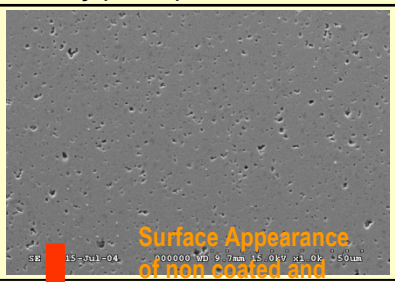
EIA Code	Chip (mm)		Land (mm)		
	L	W	A	B	C
1808	4.6±0.3	2.0 ±0.2	3.2~3.6	1.2~2.4	1.5~1.8
1812	4.6±0.3	3.2 ±0.2	3.2~3.6	1.2~2.4	2.3~3.0
2208	5.7±0.4	2.0 ±0.2	4.0~4.6	1.2~2.4	1.5~1.8
2211	5.7±0.4	2.0 ±0.3	4.0~4.6	1.2~2.4	2.0~2.6
2220	5.7±0.4	5.0 ±0.4	4.0~4.6	1.2~2.4	3.5~4.8

The distance between terminations also has a direct effect on the arcing voltage. The greater the distance (chip size) the higher this voltage will be. Solder pad design will have a significant effect on the arcing of high voltage capacitors. Above is our recommended solder pad land design or each chip size.

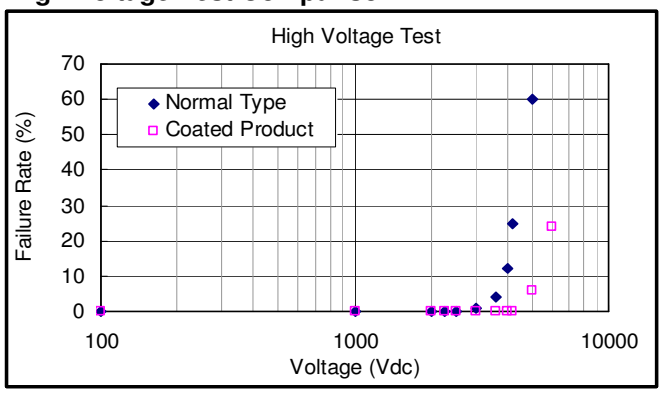
Arc Prevention Coating.

The application of the Arc Prevention coating, which is a high insulation resistance material, coats the surface of the dielectric with a smooth and non porous layer that prevents moisture entering the surface pours and also aids cleaning post soldering. The following diagrams show the difference between coated and non coated X7R components.

Surface Comparison

Item	Porosity (x1000)
Before	
After	

High Voltage Test Comparison



- **The coating reduces the porosity of the X7R surface and provides a smooth surface which help prevent surface arcing.**
- **The maximum Hi-pot test level will be increased by >1000Vdc after coating with both unsoldered and soldered cpmponents.**

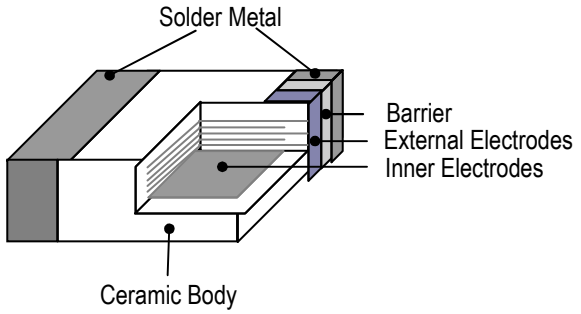
Using the Holy Stone Arc Prevention coating increases the surface arcing voltage of X7R capacitors to almost that of an equivalent NP0 part. However the higher dielectric constant of X7R allows for higher capacitance values to be achieved in any given case size.
The Holy Stone Arc Prevention coating provides a total solution to the harmful effects of surface arcing.

Description:

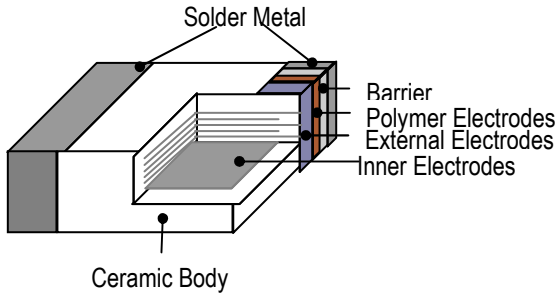
MLCC , Ceramic Disc Capacitors: NP0, SL, X7R, X5R, X6S, X7E, Y5V and Y5U dielectrics.

Basic Construction/Homogenous Material :

(a) Standard Type



(b) "X" Type: Super Termination (Option)



- Multi-layer Ceramic Chip capacitors are Homogenous devices manufactured from materials that cannot be mechanically disjointed into different materials.
- Multi-layer Ceramic Chip products : Standard sizes are fully RoHS Compliant.

Group	Series		RoHS Status	Cadmium	Hexavalent Chromium	Lead *	Mercury	PBBs	PBDE
			Limit	<0.01%	<0.01%	<0.1%	<0.01%	<0.01%	0.01%
MLC Family Surface mount Products	NCC,HCC,VAC,RFC, HCX, SMC, LCC		Available	√	√	√	√	√	√
	TCX,LDC, HTC		Available	√	√	√	√	√	√
	HCN,SAC SCC,		Available	√	√	√ / √ *	√	√	√
	HVC	NP0	Available	√	√	√ / √*	√	√	√
		X7R	Available	√	√	√ / √ *	√	√	√
*** Pb in internal ceramic insert – exempt from RoHS annex 7 to Article 4.1**									

RoHS Status	Lead-Free Status / MSL level
※ External plating : 100% Matte Sn as Standard.	※ Pb-free Reflow & Wave Solder compliant, MSL=1 • Reflow : 260℃ max recommended. • Wave : 260℃ max recommended, Wave & Reflow profile refer to HEC recommended solder profile.

Part Number Designation:
(Generally no change to P/N, but available as P/N prefix at customer request)

RoHS Compliant : No Change to P/N
Pb-Free : No Change to P/N

Product Marking :
(available at customer request, highlighted or marked on reel and container)

Pb free : Pb free

refer to JEDEC&IPC Std.

ISO Certification

Plant	Certificated	Date	Organization	Registration No.
Taipei HQ/Lung Tan Factory	ISO 9001:2008	20,Mar.,2002	BVQI	TW14041Q
Taipei HQ/Lung Tan Factory	ISO 14001:2004	29,May,2003	BVQI	TW14014E

ISO 9001:2008

ISO 14001:2004

禾伸堂企業股份有限公司
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• Lungtan Plant / 龍潭生產事業處

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• Suzhou Sales Office / 蘇州

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• Shenzhen Sales Office / 深圳

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