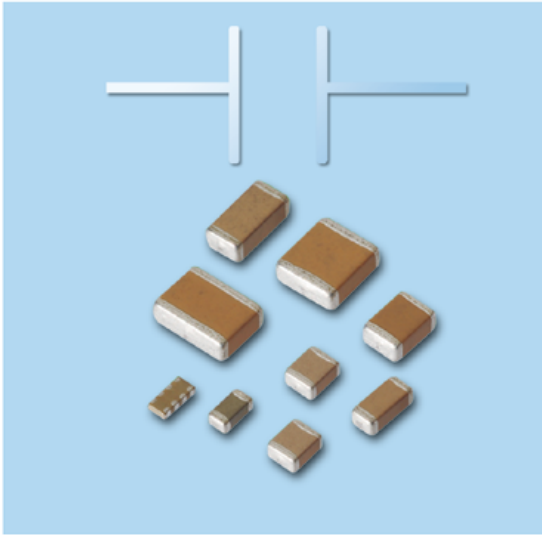
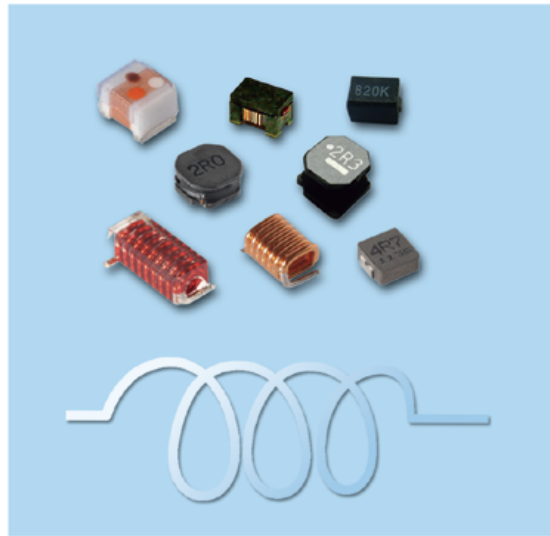
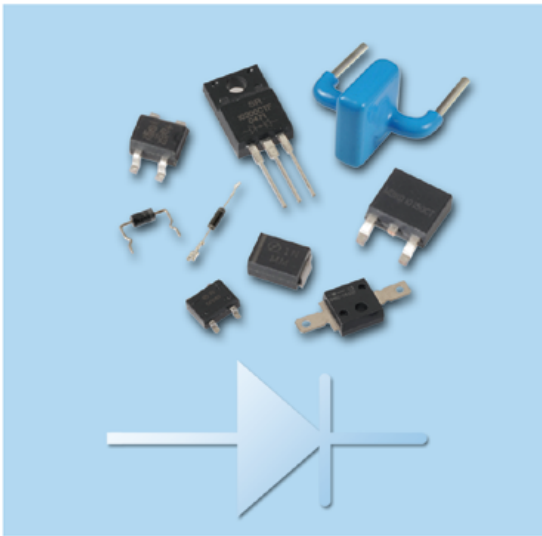
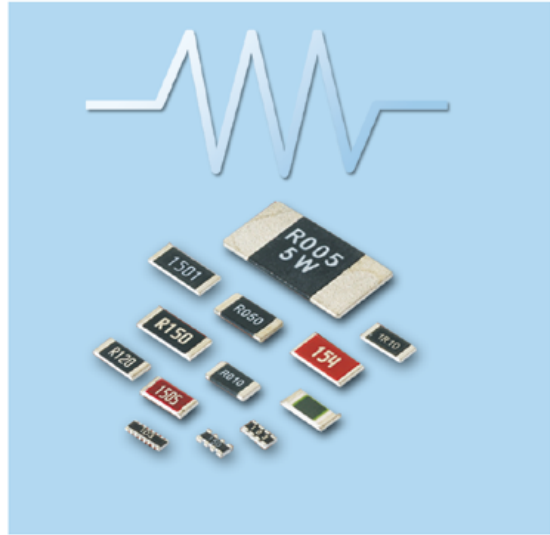


## MLCC



## CHIP-R



## DIODE

## COIL



信昌電子陶瓷  
Prosperity Dielectrics Co., Ltd.

# ABOUT PDC

## Introduction

Prosperity Dielectrics Co., Ltd. (PDC) was founded in 1990 as the 1st local manufacturer and exporter in Taiwan for ceramic dielectric powders and multiple-layer ceramic chip capacitors (MLCCs). PDC joined to Walsin Technology Corporation (WTC) as an allied company in September 2005, and incorporated Frontier to create solid synergy in 2008. Our product lines expand to SMD magnetic chips, power chokes, coils, diode and transformers.

信昌電子陶瓷成立於 1990 年，為國內少數能自行供給瓷粉原料並同時銷售積層陶瓷電容的被動元件廠商，更是唯一有能力由上游初發原料，向下垂直整合至被動晶片元件的廠商。2005 年信昌電陶與華新集團進行策略聯盟、2008 年正式合併弘電電子，將銷售範圍從介電瓷粉、半導體陶瓷電容器瓷片、積層陶瓷電容、晶片電阻延伸到二極體與線圈，成為國內唯一可全數提供特殊電容、電感、電阻之被動元件供應商。

## Support You Forward

With niche technology of key materials, PDC can meet the market requirements. The integration of researching and developing from materials to the customer-required components can shorten the time of mass production. To progressively make plans for each product to be with high added value functions, such as Mid and high voltage, high precision, large size capacitors, and high power, high precision, low resistance resistors or other high added value products. In the future, combine with core material technology and advance high frequency and high capacitance further.

由於掌握關鍵性材料的技術利基，信昌電陶可配合市場需求，由材料研發著手，向下整合開發客戶所需要的電子元件，縮短量產時效，並積極規劃各項產品朝高附加價值的零件功能領域邁進，如：中高壓、高精度、大尺寸之晶片電容器及高功率、高精度與低阻值之晶片電阻器等高附加價值產品。未來更將結合材料核心技術，進軍高頻及高容領域。

At present, PDC has developed ceramic dielectric powder used by NME and BME manufacturing process. Self-applied mass production and external sale are simultaneously carried out to improve the proportion to the supply of internal high-level MLCC materials. By the strategy of vertical production capability from ceramic dielectric powder material to MLCC finished goods, bring the high performance of vertical integration.

目前信昌電陶貴金屬製程及卑金屬製程（BME）使用的晶片電容器介電瓷粉已陸續開發完成，量產自用與對外銷售並行展開，提升國內高階積層電容瓷粉原料自主供應比率。藉由原料往下游整合至晶片電容器成品的延伸策略，發揮上下垂直整合的高度營運績效。

For the past few years, to extend the production capability of magnetic components and semiconductor series, PDC gradually set up the manufacturing equipments for semiconductor in Kun Shan Plant and the manufacturing equipments for coil and transformer in Dong Guan and Hunan Plant. The improvement of the production capability is able to increase the sales performance.

近年來，為了擴展磁性元件及半導體系列產品的產能，信昌電陶陸續在中國昆山廠增置半導體相關製造設備，在東莞廠、湖南廠、重慶廠增置電感、變壓器相關製造設備，藉由產能提升，大幅拉升業績。

### Vertical integration & Complete key technology:

- Material (Ceramic Dielectric Powder)
- Semi-finished good (Semiconducting Ceramic Chip Capacitor)
- Finished goods (Chip Capacitor, Chip resistor, Coil, Diode)

### 上下游垂直整合，掌握完整關鍵性技術：

- 原料（介電瓷粉）
- 半成品（半導體陶瓷電容瓷片）
- 成品（晶片電容、晶片電阻、線圈、二極體）

<b>Milestone 歷史沿革</b> 	<p><b>1990</b> PDC former parent company, Taiwan Cement, merged with Mei Da Mei and founded PDC in Nantou. 台泥集團購買美大美電子公司，信昌電子陶瓷正式成立。</p> <p><b>1995</b> PDC merged with Taiwan Precision Material Corporation. 信昌電子陶瓷併購台灣精密材料公司。</p> <p><b>2002</b> Public Listed in OTC. 信昌電子陶瓷正式上櫃。</p> <p><b>2005</b> PDC was strategically allied with Wasin Tech. 與華新科技（股）公司策略聯盟。</p> <p><b>2007</b> To be strategically allied with Frontier, and setting up new production lines, Diode and Magnetic components. 與弘電電子工業（股）公司策略聯盟，生產二極體與磁性材料元件。</p> <p><b>2008</b> Positioned as Specialty and Material BG in PSA Group. 集團推動 PSA 被動系統聯盟企業識別，信昌電子陶瓷定位為特殊品及材料事業群。</p>
<b>Core Technology 關鍵技術</b> 	<p><b>1988</b> Manufacturing and developing ceramic dielectric materials. 生產製造圓板電容粉末、開發。</p> <p><b>1990</b> Manufacturing Multilayer Ceramic Capacitors. 生產製造積層陶瓷晶片電容。</p> <p><b>1995</b> Manufacturing Ceramic Chip Resistors and Ceramic Chip Coil 生產陶瓷晶片電阻、陶瓷晶片電感。</p> <p><b>2001</b> As the 1st manufacturer and provider in Taiwan for ceramic dielectric powders and multilayer ceramic chip capacitors (MLCC). 臺灣第一家自行供給晶片電容器介電瓷粉之被動元件廠商。</p> <p><b>2001</b> With self-made conducting dielectric powder, controlling the complete key technology from material to manufacture. 自製半導體介電瓷粉，掌握由材料至製程的完整關鍵性技術。</p> <p><b>2007</b> Manufacturing Diode and magnetic components. 生產二極體與磁性材料元件。</p>
<b>Brand Value 品牌價值</b> 	<p><b>2001</b> The first supplier in Asia to get SEMKO product safety certificate. 亞洲第一家獲得 SEMKO 安全規格認證之供應商。</p> <p><b>2003</b> ISO 9001 certified. 獲 ISO 9001 驗證通過。</p> <p><b>2004</b> Industrial Sustainable Excellence Award. 榮獲經濟部工業局工業精銳獎。</p> <p><b>2004</b> TS16949、ISO 14000 and OHSAS 18000 certified. 獲 TS16949、ISO 14000 及 OHSAS 18000 驗證。</p> <p><b>2008</b> IECQ QC080000 HSF certified. 獲 IECQ QC080000 HSF 驗證。</p> <p><b>2007</b> Common Wealth Magazine Top 1000 Manufacturers in Taiwan Ranked in No. 705. 天下雜誌 1000 大製造業排名第 705 名。</p> <p><b>2008</b> Common Wealth Magazine Top 1000 Manufacturers in Taiwan Ranked in No. 682. 天下雜誌 1000 大製造業排名第 682 名。</p> <p><b>2009</b> Common Wealth Magazine Top 1000 Manufacturers in Taiwan Ranked in No. 677. 天下雜誌 1000 大製造業排名第 677 名。</p> <p><b>2012</b> Recognition of Winning the Silver Invention Award for Copper or Its Alloy Cofirable Dielectric Ceramics. 榮獲國家發明創作獎 - 發明獎銀牌「可與銅及其合金進行共燒製作的介電陶瓷組成物」</p> <p><b>2015</b> MLCC product have obtained the IECQ certificate &amp; the certificate of AS9100 management system for the aerospace industry. 通過 IECQ 第三方認證及 AS9100 航太工業管理系統驗證。</p>
<b>Market Performance 市場表現</b> 	<p>PDC ceramic dielectric powder ranks in No.2 in global capacity and No.3 in global market share. 介電陶瓷粉產品產能全球第二、市占率全球第三。</p> <p>The only local manufacturer in Taiwan with the capability in specialty products includes multiple-layer ceramic capacitors, chip resistors, and coils. 國內唯一可全數提供特殊電容、電感、電阻之被動元件供應商。</p> <p>The only local manufacturer in Taiwan entered the supply chain of Japan market. 國內唯一打入日本供應鏈之廠商。</p>

## Business Operation 經營模式分析

- Vertical integration to improve competitiveness.
- Building strategic alliances to strengthen competitiveness.
- Expanding Western and Japanese markets, cultivation high-end products.
- Moving into Chinese market to expand market share.
- 垂直整合發展，擺脫同業競爭
- 運用策略聯盟，產品水平延伸
- 拓展歐美日市場，深耕高階產品
- 跨足中國市場，擴大市佔率

## Branding Strategy 品牌經營策略

- Developing specialized products market.
- Enhancing brand value with continuing innovation and R&D ability.
- Improving competitiveness through vertical integration.
- Satisfying customer's need through extending product lines.
- 深耕被動元件特殊品市場及其上游材料產業高階產品
- 持續創新研發能力，提升品牌含金量
- 產品垂直整合，強化競爭優勢
- 產品水平延伸，滿足客戶一次購足

## Keystothe Success 關鍵成功因素

- The only local manufacturer with vertical production capability from ceramic dielectric powder material to multiple-layer ceramic chip capacitors.
- Differentiating marketing strategy with niche product.
- Diversifying product lines to expand customer base.
- Continuing innovation and R&D ability.
- Focusing core competence with PSA group support.
- 國內唯一有能力由上游初發原料，向下垂直整合至被動晶片元件的廠商，掌握材料與製程的完整關鍵性技術
- 利基產品差異化與行銷差異化策略
- 產品線多元發展，擴大客戶群
- 持續創新與研發，開發新產品與導入新製程
- 共享集團資源，聚焦核心競爭力

## Characteristics 企業特色

- PDC is the domestic manufacturer devoting to ceramic dielectric materials.
- 為國內廠商對介電瓷粉材料研發投注最深者

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- The contents of this catalog are applicable to the products which are purchased from our sales offices or distributors (so called "PDC's official sales channel").
- It is only applicable to the products purchased from any of PDC's official sales channel.
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- 內部記載之產品規格僅提供參考，實際規格請依照我司標準承認書為準。

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## ■ Mega cap Stacked Capacitors

### FEATURES

- High reliability and stability.
- Higher mechanical endurance.
- Anti thermal stress and mechanical stress.
- Improved vibration performance
- More capacitance without changing footprint.
- 100% Burn in.
- RoHS Compliant.

### APPLICATION

- DC to DC converter.
- High voltage coupling/DC blocking.
- Back-lighting inverters.
- Snubbers in high frequency power converters.
- Power supplies.
- Surge protection.
- Filtering, smoothing, and decoupling application.

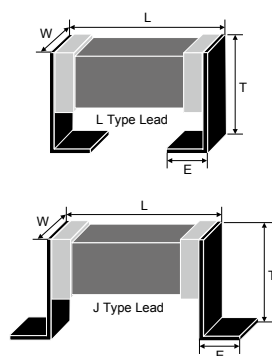
### PART NUMBER

FE	2H	X	105	K	631	E	D	L
PDC Family	Chip Q'ty and size	Dielectric	Capacitance	Tolerance	Rated voltage	Packaging	Thickness	Control Code
Stacked Capacitors Series	The first digit : # of chips in stack Second digit code : chip size (below)  A 1210 (3225) C 1812 (4532) G 1825 (4563) H 2220 (5750) I 2225 (5763)	N COG (NPO) X X7R	105=10x10 <sup>Λ</sup> 5 =1μF 106=10x10 <sup>Λ</sup> 6 =10μF	J= ±5% K= ±10% M= ±20%	500=50V 101=100V 201=200V 251=250V 501=500V 631=630V 102=1000V	B=Bulk T=Tray package E=Tape and 7" Reel, Embossed Tape L=Tape and 13" Reel, Embossed Tape	Reference Thickness Description (Table 1)	L=L type lead J=J type lead S=Straight type lead

### GENERAL ELECTRICAL DATA

Dielectric	COG	X7R	
<b>Size</b>	1210, 1812, 1825, 2220, 2225	1210, 1812, 1825, 2220, 2225	
<b>Rated voltage (WVDC)</b>	50V, 100V, 200V, 250V, 500V, 630V, 1000V	50V, 100V, 200V, 250V, 500V, 630V, 1000V	
<b>Capacitance range*</b>	660nF Max.	44 μ F Max.	
<b>Capacitance tolerance</b>	J (±5%), K (±10%), M (±20%)		
<b>Tan δ *e)</b>	Cap. Rang	Q Spec.	
	Cap<30pF:	Q≥400+20C	
	Cap≥30pF:	Q≥1000	
Measured at the condition of 30~70% related humidity			
<b>Capacitance &amp; Tan δ Test Condition</b>	for 25°C at ambient temperature		Preconditioning for Class II MLCC: Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition (25°C ) for 24±2 hours before measurement
	Cap. Rang	Test Condition	Cap. Rang
	Cap≤1000pF	1.0±0.2Vrms, 1.0MHz±10%	Cap≤10μF
Cap>1000pF	1.0±0.2Vrms, 1.0KHz±10%	Cap>10μF	0.5±0.2Vrms, 120KHz±20%
<b>Insulation resistance at 500Vdc for 60 seconds</b>	≥100GΩ or RxC≥ 500Ω-F whichever is smaller	≥10GΩ or RxC≥100Ω-F whichever is smaller	
<b>Operating temperature</b>	-55 to +125°C		
<b>Capacitance characteristic</b>	±30ppm / °C	±15%	
<b>Termination</b>	L / J / Straight type lead		

### DIMENSIONS



Size inch (mm)	L (mm)	W (mm)	T (mm) code	M <sub>B</sub> (mm)
1210 (3225)	3.50±0.40	2.50±0.40		1.70±0.15
1812 (4532)	4.80±0.40	3.20±0.40	Reference	1.70±0.15
1825 (4563)	4.80±0.40	6.30±0.50	Thickness	1.70±0.15
2220 (5750)	6.00±0.40	5.00±0.50	Description	1.70±0.15
2225 (5763)	6.00±0.40	6.30±0.50		1.70±0.15

MLCC

Chip R

Diode

Coil

## ■ Mega cap Stacked Capacitors

### CAPACITANCE RANGE (MAX.)

#### COG

Size	Code	Rated Voltage						
		50V	100V	200V	250V	500V	630V	1000V
1210	1A	683	473	333	333	183	153	392
	2A	134	104	663	663	363	333 (M)	782
1812	1C	154	104	563	563	393	333	562
	2C	334 (M)	224 (M)	124	124	783	663	123
1825	1G	154	124	104	104	683	683	123
	2G	334	244	204	224 (M)	134	134	243
2220	1H	274	184	104	104	683	563	123
	2H	544	364	224 (M)	224 (M)	134	124	243
2225	1I	334	224	154	154	104	823	123
	2I	664	444	334 (M)	334 (M)	224 (M)	164	243

#### X7R

Size	Code	Rated Voltage						
		50V	100V	200V	250V	500V	630V	1000V
1210	1A	475	335	684	684	154	154	683
	2A	106	665	135	135	334 (M)	334 (M)	134
1812	1C	106	565	105	105	474	184	104
	2C	226 (M)	126	225 (M)	225 (M)	105	364	224 (M)
1825	1G	106	106	275	275	824	824	334
	2G	226 (M)	226 (M)	545	545	165	165	664
2220	1H	226	106	275	275	105	105	394
	2H	446	226 (M)	545	545	225 (M)	225 (M)	784
2225	1I	226	106	395	395	155	155	394
	2I	446	226 (M)	785	785	335 (M)	335 (M)	784

### RATING

TABLE 1

Code	Description	Code	Description	Code	Description
A	3.00±0.30 mm	J	7.80±0.30 mm	S	12.60±0.30 mm
B	3.60±0.30 mm	K	8.40±0.30 mm	T	13.20±0.30 mm
C	4.20±0.30 mm	L	9.00±0.30 mm		
D	4.80±0.30 mm	M	9.60±0.30 mm		
E	5.40±0.30 mm	N	10.20±0.30 mm		
F	6.00±0.30 mm	P	10.80±0.30 mm		
G	6.60±0.30 mm	Q	11.40±0.30 mm		
H	7.20±0.30 mm	R	12.00±0.30 mm		

For more information about products with special capacitance or data, please contact PDC local representative.

MLCC

Chip R

Diode

Coil



## ■ Anti-Arcing High-Voltage Multilayer Ceramic Chip Capacitors

### FEATURES

- Special interior design offers high voltage rating in a given case size.
- High reliability and stability.
- Anti-Arcing
- RoHS compliant

### APPLICATION

- DC to DC converter.
- High voltage coupling/DC blocking.
- Back-lighting inverters.
- LAN/WLAN interface.
- Modem.
- Power supplies.

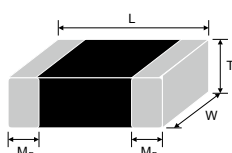
### PART NUMBER

FJ	31	X	103	K	102	E	C	G
PDC Family	Size	Dielectric	Capacitance	Tolerance	Rated voltage	Packaging	Thickness	Control Code
Anti-Arcing	<b>21</b> 0805 (2012)	<b>N</b> COG(NPO)	<b>102</b> =10x10 <sup>^2</sup>	<b>J</b> = ± 5%	<b>102</b> =1000V	<b>E</b> =	Reference	<b>G</b> =RoHS
High voltage application with ≥ 1KVdc	<b>31</b> 1206 (3216)	<b>X</b> X7R	=1000pF	<b>K</b> = ± 10%	<b>152</b> =1500V	Tape and 7" Reel,	Thickness	Compliant
	<b>32</b> 1210 (3225)		<b>100</b> =10x10 <sup>^0</sup>	<b>M</b> = ± 20%	<b>202</b> =2000V	Embossed Tape	Description	
	<b>42</b> 1808 (4520)		=10pF		<b>302</b> =3000V	<b>P</b> =		
	<b>43</b> 1812 (4532)				<b>402</b> =4000V	Tape and 7" Reel,		
	<b>46</b> 1825 (4563)					Paper Tape		
	<b>55</b> 2220 (5750)					<b>L</b> =		
	<b>56</b> 2225 (5763)					Tape and 13" Reel,		
						Embossed		
						<b>G</b> =		
						Tape and 13" Reel,		
						Paper Tape		

### GENERAL ELECTRICAL DATA

Dielectric	NPO	X7R
<b>Size</b>	0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225
<b>Rated voltage (WVDC)</b>	1KV, 1.5KV, 2KV, 3KV, 4KV	1KV, 1.5KV, 2KV, 3KV, 4KV
<b>Capacitance range*</b>	0.5pF ~ 12nF	100pF ~ 390nF
<b>Capacitance tolerance</b>	Cap ≤ 5pF: B (± 0.1pF), C (± 0.25pF) 5pF < Cap < 10pF: C (± 0.25pF), D (± 0.5pF) Cap ≥ 10pF: F (± 1%), G (± 2%), J (± 5%), K (± 10%)	J (± 5%) K (± 10%) M (± 20%)
<b>Tan δ *</b>	Cap. Rang Q Spec. Cap < 30pF: Q ≥ 400+20C Cap ≥ 30pF: Q ≥ 1000	≤ 2.5%
Measured at the condition of 30~70% related humidity.		
<b>Capacitance &amp; Tan δ Test Condition</b>	for 25°C at ambient temperature	Preconditioning for Class II MLCC: Perform a heat treatment at 150 ± 10°C for 1 hour, then leave in ambient condition for 24 ± 2 hours before measurement.
	Cap. Rang Test Condition	Apply 1.0 ± 0.2Vrms, 1.0kHz ± 10%, at 25°C ambient temperature.
	Cap ≤ 1000pF 1.0 ± 0.2Vrms, 1.0MHz ± 10%	
	Cap > 1000pF, 1.0 ± 0.2Vrms, 1.0kHz ± 10%	
<b>Insulation resistance</b>	≥ 100GΩ or R • C ≥ 500 Ω • F whichever is smaller	≥ 10GΩ or R • C ≥ 100 Ω • F whichever is smaller
<b>Operating temperature</b>		- 55 to + 125°C
<b>Temperature coefficient</b>	± 30ppm / °C	± 15%
<b>Termination</b>	Ag (or Cu)/Ni/Sn (lead-free termination)	

### DIMENSIONS



Size inch (mm)	L (mm)	W (mm)	T (mm) code	M <sub>b</sub> (mm)
0805 (2012)	2.10 ± 0.20	1.25 ± 0.20		0.50 ± 0.20
1206 (3216)	3.3 ± 0.30	1.60 ± 0.20		0.60 ± 0.20
1210 (3225)	3.30 ± 0.40	2.50 ± 0.30		0.75 ± 0.35
1808 (4520)	4.50+0.40/-0.30	2.00 ± 0.25	Reference	0.75 ± 0.35
1812 (4532)	4.50+0.40/-0.30	3.20 ± 0.30	Thickness	0.75 ± 0.35
1825 (4563)	4.50+0.40/-0.30	6.30 ± 0.40	Description	0.75 ± 0.35
2220 (5750)	5.70 ± 0.40	5.00 ± 0.40		0.85 ± 0.35
2225 (5763)	5.70 ± 0.40	6.30 ± 0.40		0.85 ± 0.35

MLCC

Chip R

Diode

Coil

## ■ Anti-Arcing High-Voltage Multilayer Ceramic Chip Capacitors

### RATING

#### NPO

Size	0805	1206				1210				1808				1812				1825				2220					2225								
Cap	Code	1KV	1KV	1.5KV	2KV	3KV	1KV	1.5KV	2KV	3KV	1KV	1.5KV	2KV	3KV	1KV	1.5KV	2KV	3KV	1KV	1.5KV	2KV	3KV	1KV	1.5KV	2KV	3KV	4KV	1KV	1.5KV	2KV	3KV	4KV			
1.5pF	1R5	C	X	X	X																														
1.8pF	1R8	C	X	X	X																														
2.2pF	2R2	C	X	X	X						C	C	C	C																					
2.7pF	2R7	C	X	X	X						C	C	C	C																					
3.3pF	3R3	C	X	X	X						C	C	C	C																					
3.9pF	3R9	C	X	X	X						C	C	C	C																					
4.7pF	4R7	C	X	X	X						C	C	C	C																					
5pF	5R0	C	X	X	X						C	C	C	C																					
5.6pF	5R6	C	X	X	X						C	C	C	C																					
6.8pF	6R8	C	X	X	X						C	C	C	C																					
8.2pF	8R2	C	X	X	X						C	C	C	C																					
10pF	100	C	X	X	X	E	M	M	M	F	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
12pF	120	C	X	X	X	E	M	M	M	F	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
15pF	150	C	X	X	X	E	M	M	M	F	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
18pF	180	C	X	X	X	E	M	M	M	F	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
22pF	220	C	X	X	X	E	M	M	M	F	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
27pF	270	C	X	X	X	E	M	M	M	F	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
33pF	330	C	X	M	M	E	M	M	M	F	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
39pF	390	C	X	M	M	E	M	M	M	F	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
47pF	470	C	M	M	M	E	M	M	M	F	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
56pF	560	C	M	C	C	E	M	C	C	F	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
68pF	680	C	M	C	C	E	M	C	C	F	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
82pF	820	C	C	C	C	E	M	C	C	F	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
100pF	101	C	C	C	C		C	C	C	F	C	C	C	F	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
120pF	121	C	C	E	E		C	C	C	F	C	C	C	F	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
150pF	151	C	C	E	E		C	E	E	F	C	F	F	F	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
180pF	181	C	E	E	E		C	E	E	F	C	F	F	F	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
220pF	221	C	E	E	E		E	E	E	F	C	F	F	F	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
270pF	271	C	E	E	E		E	E	E	G	F	F	F	F	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	G	
330pF	331	C	E	E	E		E	E	E		F	F	F	F	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
390pF	391		E	E	E		E	E	E		F	F	F	F	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
470pF	471		E	E	E		E	E	E		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
560pF	561		E				E	E	E		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
680pF	681		E				E	E	E		F	F	F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
820pF	821		E				E	E	E		F	F	F		F	F	F	G	F	F	F	G	F	F	F	G		F	G	G	G	G	G	G	
1000pF	102		E				E	F	F		F	F	F		F	F	F	G	F	F	F	G	F	F	F	G		F	G	G	G	G	G	G	
1200pF	122		E				E	F	F		F	F	F		F	F	F		F	F	F	G	G	G	G	G		F	G	G	G	G	G	G	
1500pF	152						F	G	G		F	F	F		F	F	F		F	G	G	G	G	G	G	G		F	G	G	G	G	G	G	
1800pF	182						G	G	G		F	F	F		F	F	F		F	G	G	G	G	G	G	G		F	G	G	G	G	G	G	
2200pF	222						G				F				F	F	F		F	G	G	G	G	G	G	G		F	G	G	G	G	G	G	
2700pF	272						G				F				F	G	G		F	G	G	G	G	G	G	G		F	G	G	G	G	G	G	
3300pF	332						G				F				F	G	G		F	G	G		G	G	G		F	G	G	G	G	G	G	G	
3900pF	392						G								G				G	G	G		G	G	G		F	G	G						
4700pF	472														G				G	G	G		G	G	G		F	G	G						
5600pF	562														G				G	G	G		G	G	G		G	G	G						
6800pF	682																		G	G	G		G	G	G		G	G	G						
8200pF	822																		G	G	G		G	G	G		G	G	G						
0.010μF	103																		G				G					G	G	G					
0.012μF	123																		G				G					G							

MLCC

Chip R

Diode

Coil



## ■ Anti-Arcing High-Voltage Multilayer Ceramic Chip Capacitors

### RATING

		X7R																																			
Size		0805			1206				1210				1808					1812					1825					2220					2225				
Cap	Code	1KV	1KV	1.5KV	2KV	1KV	1.5KV	2KV	1KV	1.5KV	2KV	3KV	4KV	1KV	1.5KV	2KV	3KV	4KV	1KV	1.5KV	2KV	3KV	4KV	1KV	1.5KV	2KV	3KV	4KV	1KV	1.5KV	2KV	3KV	4KV				
100pF	101	X	C	C	C																																
120pF	121	X	C	C	C																																
150pF	151	X	C	C	C							C	C	C	C	F																					
180pF	181	X	C	C	C							C	C	C	C	F																					
220pF	221	X	C	C	C	C	E	E	C	C	C	C	F																								
270pF	271	X	C	C	C	C	E	E	C	C	C	C	F	C	C	C	E	F								F				F			F				
330pF	331	X	C	C	C	C	E	E	C	C	C	F	F	C	C	C	E	F							F				F			F					
390pF	391	X	C	C	C	C	E	E	C	C	C	F	F	C	C	C	E	F							F				F			F					
470pF	471	X	C	C	C	C	E	E	C	C	C	F	F	C	C	C	E	F							F				F			F					
560pF	561	X	C	C	C	C	E	E	C	C	C	F	F	C	C	C	E	F							F				F			F					
680pF	681	X	C	C	C	C	E	E	C	C	C	F	F	C	C	C	F	F							F				F			F					
820pF	821	X	C	C	C	C	E	E	C	C	C	F	F	C	C	C	F	F							F				F			F					
1000pF	102	X	C	C	C	C	E	E	C	C	C	F	F	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F					
1200pF	122	X	C	E	E	C	F	F	C	F	F	F		C	C	C	F	G	F	F	F	F	G	F	F	F	F	G	F	F	F	G					
1500pF	152	C	C	E	E	C	F	F	C	F	F	F		C	C	C	F	G	F	F	F	F	G	F	F	F	F	G	F	F	F	G					
1800pF	182	C	C	E	E	C	F	F	C	F	F	F		C	E	E	G	G	F	F	F	F	G	F	F	F	F	G	F	F	F	G					
2200pF	222	C	C	E	E	C	F	F	C	F	F	F		C	E	E	G		F	F	F	F		F	F	F	F		F	F	F	F					
2700pF	272	C	C	E	E	C	G	G	C	F	F			C	E	E	G		F	F	F	F		F	F	F	F		F	F	F	F					
3300pF	332	C	C	E	E	C	G	G	C	F	F			C	F	F	G		F	F	F	F		F	F	F	F		F	F	F	F					
3900pF	392	C	C	E		E	G	G	C	F	F			C	F	F	G		F	F	F	F		F	F	F	F		F	F	F	F					
4700pF	472	C	C	E		E	G	G	C	F	F			C	F	F	G		F	F	F	F		F	F	F	F		F	F	F	F					
5600pF	562	C	C			E	G	G	F	F	F			C	G	G			F	F	F	G		F	F	F	F		F	F	F	G					
6800pF	682	C	C			E	G	G	F	F	F			C	G	G			F	F	F	G		F	F	F	G		F	F	F	G					
8200pF	822	C	C			E	G	G	F					C	G	G			F	F	F	G		F	G	G	G		F	F	F	G					
0.010uF	103		C			E			F					E	G	G			F	F	F	G		F	G	G	G		F	F	F	G					
0.012uF	123		E			E			F					F					F	G	G	H		F	G	G	H		F	G	G	G					
0.015uF	153		E			E			F					F					F	G	G	H		F	G	G	H		F	G	G	G					
0.018uF	183		E			E			F					G					F	G	G	H		F	H	H	H		F	G	G	H					
0.022uF	223		E			E			F					G					F	G	G			F	H	H			F	G	G						
0.027uF	273					E			F					G					F	H	H			F	H	H			F	G	G						
0.033uF	333					E			F					G					F	H	H			F	H	H			F	G	G						
0.039uF	393					F			F					G					F	H	H			F	H	H			F	G	H						
0.047uF	473					G			F					G					F	H	H			F	H	H			F	G	H						
0.056uF	563					G			F					G					F	H	H			F	H	H			F	G	H						
0.068uF	683					G								G					F					G					F	G							
0.082uF	823													G						G					G					F	G						
0.10uF	104													G						G					G					G	G						
0.12uF	124																			H					G					H							
0.15uF	154																			H					G					H							
0.18uF	184																			H					G					H							
0.22uF	224																			H					G					H							
0.27uF	274																			H					G					H							
0.33uF	334																			H					G					H							
0.39uF	394																			H					G					H							

MLCC

Chip R

Diode

Coil

## High Reliability for Industrial Grade

### FEATURES

- Realize high capacitance in small sizes.
- Capacitor with lead-free termination (pure Tin).
- RoHS compliant.
- HALOGEM compliant.
- Surface mount suited for wave and reflow soldering.
- High reliability and no polarity.
- Excellent in high frequency characteristic.

### APPLICATION

- Digital circuit coupling or decoupling applications.
- For high frequency and high-density type power suppliers.
- For bypassing.
- Ideal for smoothing circuits.
- DC to DC converter.

### PART NUMBER

FR	32	X	225	K	101	E	G	G
PDC Family	Size	Dielectric	Capacitance	Tolerance	Rated voltage	Packaging	Thickness	Control Code
High Quality Equipment Capacitor	18 0603 (1608) 21 0805 (2012) 31 1206 (3216) 32 1210 (3225) 42 1808 (4520) 43 1812 (4532) 46 1825 (4563) 55 2220 (5750) 56 2225 (5763)	N COG(NPO) X X7R	106=10x10 <sup>6</sup> =10μF 100=10x10 <sup>4</sup> =10pF	J= ± 5% K= ± 10 % M= ± 20 %	250=25V 500=50V 101=100V 201=200V 251=250V 501=500V 631=630V 102=1000V 152=1500V 202=2000V 302=3000V 402=4000V	E= Tape and 7" Reel, Embossed Tape P= Tape and 7" Reel, Paper Tape L= Tape and 13" Reel, Embossed G= Tape and 13" Reel, Paper Tape	Reference Thickness Description	G=RoHS Compliant Q=Surface Coating (Size 1206~2225)

### GENERAL ELECTRICAL DATA

Dielectric	NPO	X7R
<b>Size</b>	0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225
<b>Rated voltage (WVDC)</b>	25V, 50V, 100V, 200V, 250V, 500V, 630V, 1000V, 1500V, 2000V, 3000V, 4000V	25V, 50V, 100V, 200V, 250V, 500V, 630V, 1000V, 1500V, 2000V, 3000V, 4000V
<b>Capacitance range</b>	0.5pF ~ 330nF	100pF ~ 22μF
<b>Capacitance tolerance</b>	Cap≤5pF: B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF: C (±0.25pF), D (±0.5pF) 10pF≤Cap: F (±1%), G (±2%), J (±5%), K (±10%)	J (±5%) K (±10%) M (±20%)
<b>Tan δ</b>	Cap. Rang Q Spec. Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000	≤2.5%

Measured at the condition of 30~70% related humidity.

### Capacitance & Tan δ Test Condition

for 25°C at ambient temperature

Preconditioning for Class II MLCC: Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement.

Cap. Rang	Test Condition
Cap≤1000pF	1.0±0.2Vrms, 1.0MHz±10%
Cap>1000pF	1.0±0.2Vrms, 1.0kHz±10%

1.0±0.2Vrms, 1.0kHz±10% for C≤10 μF; 0.5±0.2Vrms, 120Hz±20% for C>10 μF, at 25°C ambient temperature

**Insulation resistance** ≥100GΩ or R·C≥500Ω·F whichever is smaller ≥10GΩ or R·C≥100Ω·F whichever is smaller

**Operating temperature** -55 to +125°C

**Temperature coefficient** ±30ppm/°C ±15%

**Termination** Cu (or Ag)/Ni/Sn (lead-free termination)

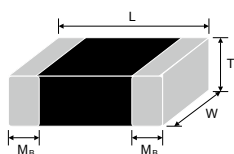
### Humidity (Damp Heat) Load

Test Condition

- Test temp: 85±2°C
- Humidity: 85% RH
- Test time: 500+24/-0 hrs.
- To apply voltage: rated voltage (Max.:100V)
- Measurement to be made after keeping at room temp. for 24±2 hrs. (Class I) or 48±4 hrs. (Class II).
- No remarkable damage.

- Cap change: X7R, within ±12.5%  
NPO, Within ±5% or ±0.5pF whichever is larger.
- Q/D.F. value: X7R, ≤200% x Initial requirement
- I.R.: ≥1GΩ or RxC≥50Ω·F whichever is smaller.

### DIMENSIONS



Size inch (mm)	L (mm)	W (mm)	T (mm) code	M <sub>b</sub> (mm)
0603 (1608)	1.60±0.15	0.80±0.15		0.40±0.15
0805 (2012)	2.00±0.20	1.25±0.20		0.50±0.20
1206 (3216)	3.20±0.20	1.60±0.20		0.60±0.20
1210 (3225)	3.30±0.30	2.50±0.30	Reference	0.75±0.35
1808 (4520)	4.50±0.40	2.00±0.25	Thickness	0.75±0.35
1812 (4532)	4.50±0.40	3.20±0.30	Description	0.75±0.35
1825 (4563)	4.50±0.40	6.30±0.40		0.75±0.35
2220 (5750)	5.70±0.40	5.00±0.40		0.85±0.35
2225 (5763)	5.70±0.40	6.30±0.40		0.85±0.35

## High Reliability for Industrial Grade

### RATING

		NPO																							
Size		0603					0805							1206											
Cap	Code	25V	50V	100V	200V	250V	25V	50V	100V	200V	250V	500V	630V	1KV	25V	50V	100V	200V	250V	500V	630V	1KV	1.5KV	2KV	3KV
0.5pF	0R5	S	S	S	S	S	A	A	A	A	A	A	A												
0.6pF	0R6	S	S	S	S	S	A	A	A	A	A	A	A												
0.7pF	0R7	S	S	S	S	S	A	A	A	A	A	A	A												
0.8pF	0R8	S	S	S	S	S	A	A	A	A	A	A	A												
0.9pF	0R9	S	S	S	S	S	A	A	A	A	A	A	A												
1.0pF	1R0	S	S	S	S	S	A	A	A	A	A	A	A												
1.2pF	1R2	S	S	S	S	S	A	A	A	A	A	A	A		X	X	X								
1.5pF	1R5	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X	X
1.8pF	1R8	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X	X
2.2pF	2R2	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X	X
2.7pF	2R7	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X	X
3.3pF	3R3	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X	X
3.9pF	3R9	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X	X
4.7pF	4R7	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X	X
5.0pF	5R0	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X	X
5.6pF	5R6	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X	X
6.8pF	6R8	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X	X
8.2pF	8R2	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X	X
10pF	100	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X	E
12pF	120	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X	E
15pF	150	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X	E
18pF	180	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X	E
22pF	220	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X	E
27pF	270	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X	E
33pF	330	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	M	M	E
39pF	390	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	M	M	E
47pF	470	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	M	M	M	E
56pF	560	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	M	C	C	E
68pF	680	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	M	C	C	E
82pF	820	S	S	S	S	S	A	A	A	A	A	X	X	C	X	X	X	X	X	X	X	C	C	C	E
100pF	101	S	S	S	S	S	A	A	A	A	X	X	X	C	X	X	X	X	X	X	X	C	C	C	
120pF	121	S	S	S	S	S	A	A	A	A	X	C	C	C	X	X	X	X	X	X	X	C	E	E	
150pF	151	S	S	S	S	S	A	A	A	A	X	C	C	C	X	X	X	X	X	X	X	C	E	E	
180pF	181	S	S	S	S	S	A	A	A	X	C	C	C	C	X	X	X	X	X	X	X	E	E	E	
220pF	221	S	S	S	S	S	A	A	A	C	C	C	C	C	X	X	X	X	X	X	X	E	E	E	
270pF	271	S	S	S	B	B	A	A	A	C	C	C	C	C	X	X	X	X	M	M	M	E	E	E	
330pF	331	S	S	S	B	B	A	A	A	C	C	C	C	C	X	X	X	X	M	M	M	E	E	E	
390pF	391	S	S	S	B	B	X	X	X	C	C	C	C		X	X	X	M	M	M	M	E	E	E	
470pF	471	S	S	S	B	B	X	X	X	C	C	C	C		X	X	X	M	M	M	M	E	E	E	
560pF	561	S	S	S	B	B	X	X	X	C	C	C	C		X	X	X	M	C	C	C	E			
680pF	681	S	S	S	B	B	X	X	X	C	C	C	C		X	X	X	M	C	C	C	E			
820pF	821	S	S	S	B	B	X	X	X	C	C	C	C		X	X	X	M	E	E	E	E			
1000pF	102	S	S	S			X	X	X	C	C	C	C		X	X	X	M	E	E	E	E			
1200pF	122	B	B				X	X	X	C	C	C	C		X	X	X	M	E	E	E	E			
1500pF	152						X	X	X	C	C	C	C		X	X	X	C	E	E	E				
1800pF	182						X	X	X	C	C	C	C		X	X	X	C	E	E	E				
2200pF	222						X	X	X	C	C	C	C		X	X	X	C	E	E	E				
2700pF	272						C	C	C	C	C				X	X	X	C	E	E	E				
3300pF	332						C	C	C	C	C				X	X	X	C	E	E	E				
3900pF	392						C	C	C	C					X	X	X	E	E	E	E				
4700pF	472						C	C	C						X	X	X	E	E	E	E				
5600pF	562						C	C	C						X	X	X	E	E	E	E				
6800pF	682						C	C	C						M	M	M	E	E	E					
8200pF	822						C	C							C	C	C	E	E						
0.010μF	103						C	C							C	C	C	E	E						
0.012μF	123														P	P	P								
0.015μF	153														P	P	P								
0.018μF	183														P	P									
0.022μF	223														P	P									
0.027μF	273																								

MLCC

Chip R

Diode

Coil

## High Reliability for Industrial Grade

### RATING

### NPO

Size		1210										1808					1812										
Cap	Code	25V	50V	100V	200V 250V	500V	630V	1KV	1.5KV 2KV	3KV	25V 50V	100V	200V 250V	500V	630V	1KV	1.5KV 2KV	3KV	25V 50V	100V	200V 250V	500V	630V	1KV	1.5KV 2KV	3KV	
1.2pF	1R2																										
1.5pF	1R5																										
1.8pF	1R8																										
2.2pF	2R2									C	C	C	C	C	C	C	C	C									
2.7pF	2R7									C	C	C	C	C	C	C	C	C									
3.3pF	3R3									C	C	C	C	C	C	C	C	C									
3.9pF	3R9									C	C	C	C	C	C	C	C	C									
4.7pF	4R7									C	C	C	C	C	C	C	C	C									
5.0pF	5R0									C	C	C	C	C	C	C	C	C									
5.6pF	5R6									C	C	C	C	C	C	C	C	C									
6.8pF	6R8									C	C	C	C	C	C	C	C	C									
8.2pF	8R2									C	C	C	C	C	C	C	C	C									
10pF	100	M	M	M	M	M	M	M	M	F	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12pF	120	M	M	M	M	M	M	M	M	F	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
15pF	150	M	M	M	M	M	M	M	M	F	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
18pF	180	M	M	M	M	M	M	M	M	F	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22pF	220	M	M	M	M	M	M	M	M	F	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27pF	270	M	M	M	M	M	M	M	M	F	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
33pF	330	M	M	M	M	M	M	M	M	F	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
39pF	390	M	M	M	M	M	M	M	M	F	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
47pF	470	M	M	M	M	M	M	M	M	F	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
56pF	560	M	M	M	M	M	M	M	C	F	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
68pF	680	M	M	M	M	M	M	M	C	F	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
82pF	820	M	M	M	M	M	M	M	C	F	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
100pF	101	M	M	M	M	M	M	C	C	F	C	C	C	C	C	C	C	F	C	C	C	C	C	C	C	C	C
120pF	121	M	M	M	M	M	M	C	C	F	C	C	C	C	C	C	C	F	C	C	C	C	C	C	C	C	C
150pF	151	M	M	M	M	M	M	C	E	F	C	C	C	C	C	C	F	F	C	C	C	C	C	C	C	C	C
180pF	181	M	M	M	M	M	M	C	E	F	C	C	C	C	C	C	F	F	C	C	C	C	C	C	C	C	F
220pF	221	M	M	M	M	M	M	E	E	F	C	C	C	C	C	C	F	F	C	C	C	C	C	C	C	C	F
270pF	271	M	M	M	M	M	M	E	E	G	C	C	C	F	F	F	F	F	C	C	C	C	C	C	C	F	F
330pF	331	M	M	M	M	M	M	E	E		C	C	C	F	F	F	F	F	C	C	C	C	C	C	C	F	F
390pF	391	M	M	M	M	M	M	E	E		C	C	C	F	F	F	F	F	C	C	C	C	C	C	C	F	F
470pF	471	M	M	M	M	M	M	E	E		C	C	C	F	F	F	F	F	C	C	C	C	C	C	C	F	F
560pF	561	M	M	M	M	M	M	E	E		C	C	C	F	F	F	F	F	C	C	C	C	C	C	C	F	F
680pF	681	M	M	M	M	M	M	E	E		C	C	C	F	F	F	F		C	C	C	C	C	C	C	F	F
820pF	821	M	M	M	M	M	M	E	E		C	C	C	F	F	F	F		C	C	C	C	C	C	C	F	F
1000pF	102	M	M	M	C	C	C	E	F		C	C	C	F	F	F	F		C	C	C	C	C	C	C	F	F
1200pF	122	M	M	M	C	C	C	E	F		C	C	C	F	F	F	F		C	C	C	C	C	C	C	F	F
1500pF	152	M	M	M	C	C	C	F	G		C	C	C	F	F	F	F		C	C	C	C	C	C	C	F	F
1800pF	182	M	M	M	C	C	C	G	G		C	C	C	F	F	F	F		C	C	C	C	C	C	C	F	F
2200pF	222	M	M	M	C	C	C	G			C	C	C	F	F	F			C	C	C	C	C	C	C	F	F
2700pF	272	M	M	M	C	C	C	G			C	C	C	F	F	F			C	C	C	C	C	C	C	F	G
3300pF	332	M	M	M	C	C	C	G			C	C	C	F	F	F			C	C	C	C	C	C	C	F	G
3900pF	392	M	M	M	C	C	C	G			C	C	C	F	F				C	C	C	C	C	C	C	G	
4700pF	472	M	C	C	C	C	C				C	C	C	F	F				C	C	C	C	C	C	C	G	
5600pF	562	M	C	C	C	C	C				C	C	E	F	F				C	C	C	C	C	C	C	G	
6800pF	682	M	E	E	E	E	E				C	C	E	F	F				C	C	C	C	C	C			
8200pF	822	M	E	E	E	E	E				C	E	F	F	F				C	C	C	C	C				
0.010μF	103	M	E	E	F	F	F				C	E	F	F	F				C	C	C	C	C				
0.012μF	123	C	E	E	F	F	F				E	F	F	F					C	C	E	E	E				
0.015μF	153	C	E	F	G	G	G				E	F	F						C	C	E	E	E				
0.018μF	183	F	F	G	G	G					F	F	F						C	E	F	F	F				
0.022μF	223	F	F	G	G						F	F							C	E	F	F	F				
0.027μF	273	F	G	G	G						F	F							C	F	G	G	G				
0.033μF	333	F	G	G	G						F								C	F	G	G	G				
0.039μF	393	G	G	G							F								F	G	G	G	G				
0.047μF	473	G	G	G															F	G	G						
0.056μF	563	G	G																G	G	G						
0.068μF	683	G	G																G	G							
0.082μF	823																		G	G							
0.10μF	104																		G	G							
0.12μF	124																		G								
0.15μF	154																		G								

MLCC

Chip R

Diode

Coil

## High Reliability for Industrial Grade

### RATING

Size		NPO																								
Cap	Code	1825							2220							2225										
		25V 50V	100V	200V 250V	500V 630V	1KV	1.5KV 2KV	3KV	25V 50V	100V	200V 250V	500V	630V	1KV	1.5KV 2KV	3KV	4KV	25V 50V	100V	200V 250V	500V	630V	1KV	1.5KV 2KV	3KV	4KV
10pF	100	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F		E	E	E	E	E	F	F	F	
12pF	120	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F		E	E	E	E	E	F	F	F	
15pF	150	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F		E	E	E	E	E	F	F	F	
18pF	180	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F		E	E	E	E	E	F	F	F	
22pF	220	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F		E	E	E	E	E	F	F	F	
27pF	270	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F	F	E	E	E	E	E	F	F	F	F
33pF	330	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F	F	E	E	E	E	E	F	F	F	F
39pF	390	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F	F	E	E	E	E	E	F	F	F	F
47pF	470	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F	F	E	E	E	E	E	F	F	F	F
56pF	560	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F	F	E	E	E	E	E	F	F	F	F
68pF	680	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F	F	E	E	E	E	E	F	F	F	F
82pF	820	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F	F	E	E	E	E	E	F	F	F	F
100pF	101	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F	F	E	E	E	E	E	F	F	F	F
120pF	121	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F	F	E	E	E	E	E	F	F	F	F
150pF	151	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F	F	E	E	E	E	E	F	F	F	F
180pF	181	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F	F	E	E	E	E	E	F	F	F	F
220pF	221	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F	F	E	E	E	E	E	F	F	F	F
270pF	271	E	E	E	E	F	F	F	E	E	E	E	E	F	F	F	G	E	E	E	E	E	F	F	F	G
330pF	331	E	E	E	E	F	F	F	E	E	E	E	E	F	F	G	G	E	E	E	E	E	F	F	F	
390pF	391	E	E	E	E	F	F	F	E	E	E	E	E	F	F	G		E	E	E	E	E	F	F	F	
470pF	471	E	E	E	E	F	F	F	E	E	E	E	E	F	F	G		E	E	E	E	E	F	F	F	
560pF	561	E	E	E	E	F	F	F	E	E	E	E	E	F	F	G		E	E	E	E	E	F	F	F	
680pF	681	E	E	E	E	F	F	G	E	E	E	E	E	F	F	G		E	E	E	E	E	F	F	F	
820pF	821	E	E	E	E	F	F	G	E	E	E	E	E	F	F	G		E	E	E	E	E	F	G	G	
1000pF	102	E	E	E	E	F	F	G	E	E	E	E	E	F	F	G		E	E	E	E	E	F	G	G	
1200pF	122	E	E	E	E	F	F	G	E	E	E	E	E	G	G	G		E	E	E	E	E	F	G	G	
1500pF	152	E	E	E	E	F	G	G	E	E	E	E	E	G	G	G		E	E	E	E	E	F	G	G	
1800pF	182	E	E	E	E	F	G	G	E	E	E	E	E	G	G	G		E	E	E	E	E	F	G	G	
2200pF	222	E	E	E	E	F	G	G	E	E	E	E	E	G	G	G		E	E	E	E	E	F	G	G	
2700pF	272	E	E	E	E	F	G	G	E	E	E	E	E	G	G	G		E	E	E	E	E	F	G	G	
3300pF	332	E	E	E	E	F	G		E	E	E	E	E	G	G			E	E	E	E	E	F	G	G	
3900pF	392	E	E	E	E	G	G		E	E	E	E	E	G	G			E	E	E	E	E	F	G		
4700pF	472	E	E	E	E	G	G		E	E	E	E	E	G	G			E	E	E	E	E	F	G		
5600pF	562	E	E	E	E	G	G		E	E	E	E	E	G	G			E	E	E	E	E	G	G		
6800pF	682	E	E	E	E	G	G		E	E	E	E	E	G	G			E	E	E	E	E	G	G		
8200pF	822	E	E	E	E	G	G		E	E	E	E	E	G	G			E	E	E	E	E	G	G		
0.010μF	103	E	E	E	E	G			E	E	E	E	E	G				E	E	E	E	E	G	G		
0.012μF	123	E	E	E	E	G			E	E	E	E	E	G				E	E	E	E	E	G			
0.015μF	153	E	E	E	E				E	E	E	E	E					E	E	E	E	E				
0.018μF	183	E	E	E	E				E	E	E	E	E					E	E	E	E	E				
0.022μF	223	E	E	E	E				E	E	E	E	E					E	E	E	E	E				
0.027μF	273	E	E	E	F				E	E	E	F	F					E	E	E	E	E				
0.033μF	333	E	E	E	F				E	E	F	F	F					E	E	E	E	E				
0.039μF	393	E	E	F	G				E	E	F	G	G					E	E	F	F	F				
0.047μF	473	E	E	F	G				E	E	G	G	G					E	E	F	F	F				
0.056μF	563	E	F	G	G				E	F	G	G	G					E	E	G	G	G				
0.068μF	683	E	F	G	G				F	F	G	G						E	F	G	G	G				
0.082μF	823	F	G	G					G	G	G							F	F	G	G	G				
0.10μF	104	G	G	G					G	G	G							F	G	G	G					
0.12μF	124	G	G						G	G								G	G	G						
0.15μF	154	G							G	G								G	G	G						
0.18μF	184								G	G								G	G							
0.22μF	224								G									G	G							
0.27μF	274								G									G								
0.33μF	334																	G								

MLCC  
Chip R  
Diode  
Coil

## High Reliability for Industrial Grade

### RATING

### X7R

Size		0603				0805							1206							
Cap	Code	25V	50V	100V	200V 250V	25V	50V	100V	200V	250V	500V 630V	1KV	25V	50V	100V	200V 250V	500V 630V	1KV	1.5KV	2KV
100pF	101	S	S	S	B	X	X	X	X	X	X	X	X	X	X	C	C	C	C	C
120pF	121	S	S	S	B	X	X	X	X	X	X	X	X	X	X	C	C	C	C	C
150pF	151	S	S	S	B	X	X	X	X	X	X	X	X	X	X	C	C	C	C	C
180pF	181	S	S	S	B	X	X	X	X	X	X	X	X	X	X	C	C	C	C	C
220pF	221	S	S	S	B	X	X	X	X	X	X	X	X	X	X	C	C	C	C	C
270pF	271	S	S	S	B	X	X	X	X	X	X	X	X	X	X	C	C	C	C	C
330pF	331	S	S	S	B	X	X	X	X	X	X	X	X	X	X	C	C	C	C	C
390pF	391	S	S	S	B	X	X	X	X	X	X	X	X	X	X	C	C	C	C	C
470pF	471	S	S	S	B	X	X	X	X	X	X	X	X	X	X	C	C	C	C	C
560pF	561	S	S	S	B	X	X	X	X	X	X	X	X	X	X	C	C	C	C	C
680pF	681	S	S	S	B	X	X	X	X	X	X	X	X	X	X	C	C	C	C	C
820pF	821	S	S	S	B	X	X	X	X	X	X	X	X	X	X	C	C	C	C	C
1000pF	102	S	S	S	B	X	X	X	X	X	X	X	X	X	X	C	C	C	C	C
1200pF	122	S	S	S	B	X	X	X	X	X	X	X	X	X	X	C	C	C	E	E
1500pF	152	S	S	S	B	X	X	X	X	X	X	C	X	X	X	C	C	C	E	E
1800pF	182	S	S	S	B	X	X	X	X	X	X	C	X	X	X	C	C	C	E	E
2200pF	222	S	S	S	B	X	X	X	X	X	X	C	X	X	X	C	C	C	E	E
2700pF	272	S	S	S	B	X	X	X	X	X	X	C	X	X	X	C	C	C	E	E
3300pF	332	S	S	S	B	X	X	X	X	X	X	C	X	X	X	C	C	C	E	E
3900pF	392	S	S	S	B	X	X	X	X	X	X	C	X	X	X	C	C	C	E	
4700pF	472	S	S	S	B	X	X	X	X	X	C	C	X	X	X	C	C	C	E	
5600pF	562	S	S	S	B	X	X	X	X	X	C	C	X	X	X	C	C	C		
6800pF	682	S	S	S	B	X	X	X	X	X	C	C	X	X	X	C	C	C		
8200pF	822	S	S	S	B	X	X	X	C	C	C	C	X	X	X	C	C	C		
0.010μF	103	S	S	S	B	X	X	X	C	C	C		X	X	X	C	C	C		
0.012μF	123	S	S	B	B	X	X	X	C	C	C		X	X	X	C	C	E		
0.015μF	153	S	S	B	B	X	X	X	C	C	C		X	X	X	C	C	E		
0.018μF	183	S	S	B		X	X	X	C	C	C		X	X	X	C	C	E		
0.022μF	223	S	S	B		X	X	X	C	C	C		X	X	X	C	E	E		
0.027μF	273	S	S	B		X	X	C	C	C			X	X	X	C	E			
0.033μF	333	S	B	B		X	X	C	C	C			X	X	X	E	E			
0.039μF	393	S	B	B		X	X	C	C				X	X	X	E	E			
0.047μF	473	S	B	B		X	X	C	C				X	X	X	E	E			
0.056μF	563	S	B	B		X	X	C	C				X	X	X	E				
0.068μF	683	S	B	B		X	X	C	C				X	X	X	E				
0.082μF	823	S	B			X	X	C					X	X	C	E				
0.10μF	104	S	B			X	X	C					X	X	C	E				
0.12μF	124					X	C	C					X	X	C					
0.15μF	154					C	C	C					M	M	E					
0.18μF	184					C	C	C					M	M	E					
0.22μF	224					C	C	C					M	M	E					
0.27μF	274					C	I	C					M	C	E					
0.33μF	334					C	I	C					M	C	E					
0.39μF	394					C	I	C					J	P	E					
0.47μF	474					C	I	I					J	P	E					
0.56μF	564					C	I						J	P	P					
0.68μF	684					C	I						J	P	P					
0.82μF	824					C	I						J	P	P					
1.0μF	105					C	I						J	P	P					
1.2μF	125												P	P	P					
1.5μF	155												P	P						
1.8μF	185												P	P						
2.2μF	225												P	P						
2.7μF	275																			
3.3μF	335																			
3.9μF	395																			
4.7μF	475																			

MLCC

Chip R

Diode

Coil

## High Reliability for Industrial Grade

### RATING

		X7R																										
Size		1210								1808								1812										
Cap	Code	25V	50V	100V	200V 250V	500V 630V	1KV	1.5KV 2KV	25V 50V	100V	200V 250V	500V 630V	1KV	1.5KV 2KV	3KV	4KV	25V	50V	100V	200V 250V	500V	630V	1KV	1.5KV 2KV	3KV	4KV		
100pF	101																											
120pF	121																											
150pF	151									C	C	C	C	C	C	F												
180pF	181									C	C	C	C	C	C	F												
220pF	221	M	M	M	M	C	C	E	C	C	C	C	C	C	F													
270pF	271	M	M	M	M	C	C	E	C	C	C	C	C	C	F	C	C	C	C	C	C	C	C	C	E	F		
330pF	331	M	M	M	M	C	C	E	C	C	C	C	C	C	F	F	C	C	C	C	C	C	C	C	E	F		
390pF	391	M	M	M	M	C	C	E	C	C	C	C	C	C	F	F	C	C	C	C	C	C	C	C	E	F		
470pF	471	M	M	M	M	C	C	E	C	C	C	C	C	C	F	F	C	C	C	C	C	C	C	C	E	F		
560pF	561	M	M	M	M	C	C	E	C	C	C	C	C	C	F	F	C	C	C	C	C	C	C	C	E	F		
680pF	681	M	M	M	M	C	C	E	C	C	C	C	C	C	F	F	C	C	C	C	C	C	C	C	F	F		
820pF	821	M	M	M	M	C	C	E	C	C	C	C	C	C	F	F	C	C	C	C	C	C	C	C	F	F		
1000pF	102	M	M	M	M	C	C	E	C	C	C	C	C	C	F	F	C	C	C	C	C	C	C	C	F	F		
1200pF	122	M	M	M	M	C	C	F	C	C	C	C	C	F	F		C	C	C	C	C	C	C	C	F	G		
1500pF	152	M	M	M	M	C	C	F	C	C	C	C	C	F	F		C	C	C	C	C	C	C	C	F	G		
1800pF	182	M	M	M	M	C	C	F	C	C	C	C	C	F	F		C	C	C	C	C	C	C	E	G	G		
2200pF	222	M	M	M	M	C	C	F	C	C	C	C	C	F	F		C	C	C	C	C	C	C	E	G			
2700pF	272	M	M	M	M	C	C	G	C	C	C	C	C	F			C	C	C	C	C	C	C	E	G			
3300pF	332	M	M	M	M	C	C	G	C	C	C	C	C	F			C	C	C	C	C	C	C	F	G			
3900pF	392	M	M	M	M	C	E	G	C	C	C	C	C	F			C	C	C	C	C	C	C	F	G			
4700pF	472	M	M	M	M	C	E	G	C	C	C	C	C	F			C	C	C	C	C	C	C	F	G			
5600pF	562	M	M	M	M	C	E	G	C	C	C	C	F	F			C	C	C	C	C	C	C	G				
6800pF	682	M	M	M	M	C	E	G	C	C	C	F	F	F			C	C	C	C	C	C	C	G				
8200pF	822	M	M	M	M	C	E	G	C	C	C	F	F				C	C	C	C	C	C	C	G				
0.010μF	103	M	M	M	M	C	E		C	C	C	F	F				C	C	C	C	C	C	E	G				
0.012μF	123	M	M	M	M	C	E		E	E	E	F	F				C	C	C	C	C	C	F					
0.015μF	153	M	M	M	M	C	E		E	E	E	F	F				C	C	C	C	C	C	F					
0.018μF	183	M	M	M	M	C	E		E	E	E	F	F				C	C	C	C	C	C	G					
0.022μF	223	M	M	M	M	C	E		E	E	E	F	F				C	C	C	C	C	C	G					
0.027μF	273	M	M	M	M	E	E		E	E	E	F	F				C	C	C	C	C	C	G					
0.033μF	333	M	M	M	M	E	E		E	E	E	F	F				C	C	C	C	C	C	G					
0.039μF	393	M	M	M	M	E	F		E	E	E	F	F				C	C	C	C	C	C	G					
0.047μF	473	M	M	M	M	C	E	G		E	E	E	F	F			C	C	C	C	C	C	G					
0.056μF	563	M	M	M	M	C	E	G		E	E	E	F	F			C	C	C	C	F	F	G					
0.068μF	683	M	M	M	M	E	F	G		E	E	E	F				C	C	C	C	F	F	G					
0.082μF	823	M	M	M	M	E	G			E	E	E	F				C	C	C	C	F	F	G					
0.10μF	104	M	M	M	M	E	G			E	E	E					C	C	E	C	F	F	G					
0.12μF	124	M	M	M	M	E	G			E	E	E					C	C	E	C	G	G						
0.15μF	154	M	M	M	M	C	G			E	E	E					C	C	E	F	G	G						
0.18μF	184	M	M	M	M	C	G			E	E	F					C	C	E	F	G	G						
0.22μF	224	M	M	M	M	C	G			E	E						C	C	E	F	G	G						
0.27μF	274	M	M	M	M	E	G			F	F						C	C	E	F	G							
0.33μF	334	M	M	M	M	C	G			F	F						C	C	E	F	G							
0.39μF	394	M	M	M	M	C	G			F	F						C	C	E	F	G							
0.47μF	474	M	M	M	M	C	G			F							C	C	E	F	G							
0.56μF	564	C	C	C	C	E	G			F							C	C	F	G								
0.68μF	684	C	C	C	C	F	G			F							C	F	F	G								
0.82μF	824	C	C	C	C	F											C	F	F	G								
1.0μF	105	C	C	C	C	F											C	F	F	G								
1.2μF	125	C	C	C	C	G											C	F	F									
1.5μF	155	E	E	E	E	G											C	F	F									
1.8μF	185	E	E	E	E	G											E	F	F									
2.2μF	225	E	E	E	E	G											E	F	G									
2.7μF	275	E	E	E	E	G											F	F	G									
3.3μF	335	E	E	E	E	G											F	F	G									
3.9μF	395	F	F	F	F	G											F	F	G									
4.7μF	475	F	F	F	F	G											G	G	G									
5.6μF	565																G	G	G									
6.8μF	685																G	G										
8.2μF	825																G	G										
10.0μF	106																G	G										

MLCC

Chip R

Diode

Coil



## High Reliability for Industrial Grade

### RATING

#### X7R

Size		1825								2220								2225								
Cap	Code	25V 50V	100V	200V 250V	500V 630V	1KV	1.5KV 2KV	3KV	4KV	25V 50V	100V	200V 250V	500V 630V	1KV	1.5KV 2KV	3KV	4KV	25V 50V	100V	200V 250V	500V 630V	1KV	1.5KV	2KV	3KV	4KV
100pF	101																									
120pF	121																									
150pF	151																									
180pF	181																									
220pF	221																									
270pF	271								F								F									F
330pF	331								F								F									F
390pF	391								F								F									F
470pF	471								F								F									F
560pF	561								F								F									F
680pF	681								F								F									F
820pF	821								F								F									F
1000pF	102	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
1200pF	122	F	F	F	F	F	F	F	G	F	F	F	F	F	F	F	G	F	F	F	F	F	F	F	F	G
1500pF	152	F	F	F	F	F	F	F	G	F	F	F	F	F	F	F	G	F	F	F	F	F	F	F	F	G
1800pF	182	F	F	F	F	F	F	F	G	F	F	F	F	F	F	F	G	F	F	F	F	F	F	F	F	G
2200pF	222	F	F	F	F	F	F	F		F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	
2700pF	272	F	F	F	F	F	F	F		F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	
3300pF	332	F	F	F	F	F	F	F		F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	
3900pF	392	F	F	F	F	F	F	F		F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	
4700pF	472	F	F	F	F	F	F	F		F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	
5600pF	562	F	F	F	F	F	F	G		F	F	F	F	F	F	F		F	F	F	F	F	F	F	G	
6800pF	682	F	F	F	F	F	F	G		F	F	F	F	F	F	G		F	F	F	F	F	F	F	G	
8200pF	822	F	F	F	F	F	F	G		F	F	F	F	F	G	G		F	F	F	F	F	F	F	G	
0.010μF	103	F	F	F	F	F	F	G		F	F	F	F	F	G	G		F	F	F	F	F	F	F	G	
0.012μF	123	F	F	F	F	F	G	H		F	F	F	F	F	G	H		F	F	F	F	F	G	G	G	
0.015μF	153	F	F	F	F	F	G	H		F	F	F	F	F	G	H		F	F	F	F	F	G	G	G	
0.018μF	183	F	F	F	F	F	G	H		F	F	F	F	F	H	H		F	F	F	F	F	G	G	H	
0.022μF	223	F	F	F	F	F	G			F	F	F	F	F	H			F	F	F	F	F	G	G		
0.027μF	273	F	F	F	F	F	H			F	F	F	F	F	H			F	F	F	F	F	G	G		
0.033μF	333	F	F	F	F	F	H			F	F	F	F	F	H			F	F	F	F	F	G	G		
0.039μF	393	F	F	F	F	F	H			F	F	F	F	F	H			F	F	F	F	F	G	H		
0.047μF	473	F	F	F	F	F	H			F	F	F	F	F	H			F	F	F	F	F	G	H		
0.056μF	563	F	F	F	F	F	H			F	F	F	F	F	H			F	F	F	F	F	G	H		
0.068μF	683	F	F	F	F	F				F	F	F	F	G				F	F	F	F	F	G			
0.082μF	823	F	F	F	F	G				F	F	F	F	G				F	F	F	F	F	G			
0.10μF	104	F	F	F	F	G				F	F	F	F	G				F	F	F	F	G	G			
0.12μF	124	F	F	F	F	H				F	F	F	F	G				F	F	F	F	H				
0.15μF	154	F	F	F	F	H				F	F	F	F	H				F	F	F	F	H				
0.18μF	184	F	F	F	F	H				F	F	F	F	H				F	F	F	F	H				
0.22μF	224	F	F	F	F	H				F	F	F	F	H				F	F	F	F	H				
0.27μF	274	F	F	F	F	H				F	F	F	F	H				F	F	F	F	H				
0.33μF	334	F	F	F	F	H				F	F	F	F	H				F	F	F	F	H				
0.39μF	394	F	F	F	F					F	F	F	F	H				F	F	F	F	H				
0.47μF	474	F	F	F	F					F	F	F	F					F	F	F	F					
0.56μF	564	F	F	F	G					F	F	F	G					F	F	F	F					
0.68μF	684	F	F	F	G					F	F	F	G					F	F	F	F					
0.82μF	824	F	F	F	H					F	F	F	H					F	F	F	G					
1.0μF	105	F	F	F						F	F	F	H					F	F	F	G					
1.2μF	125	F	F	G						F	F	G						F	F	G	H					
1.5μF	155	F	F	G						F	F	G						F	F	G	H					
1.8μF	185	F	F	G						F	F	G						F	F	G						
2.2μF	225	F	F	G						F	F	G						F	F	G						
2.7μF	275	F	F	H						F	F	H						F	F	G						
3.3μF	335	F	F							F	F							F	F	H						
3.9μF	395	F	F							F	F							F	F	H						
4.7μF	475	F	G							F	F							F	G							
5.6μF	565	G	G							F	F							F	F							
6.8μF	685	G	G							F	F							F	F							
8.2μF	825	G	G							G	G							G	G							
10.0μF	106	G	G							G	G							G	G							
12.0μF	126									H								H								
15.0μF	156									H								H								
18.0μF	186									H								H								
22.0μF	226									H								H								

MLCC

Chip R

Diode

Coil

## ■ Automotive Capacitor Qualified to AEC-Q200

### FEATURES

- A wide selection of sizes is available (0603 to 1812).
- High capacitance in given case size.
- Capacitor with lead-free termination (pure Tin).
- The MT series meet AEC-Q200 requirement

### APPLICATION

- For Navigation & Information equipments.
- For entertainment equipments.
- For comfortable equipments.
- For Automotive electronic equipment.

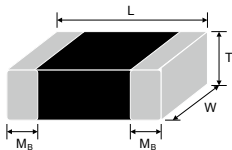
### PART NUMBER

MT	31	X	471	K	251	P	X	G
PDC Family	Size	Dielectric	Capacitance	Tolerance	Rated voltage	Packaging	Thickness	Control Code
Automotive Capacitor Qualified to AEC-Q200	<b>03</b> 0201 (0603) <b>15</b> 0402 (1005) <b>18</b> 0603 (1608) <b>21</b> 0805 (2012) <b>31</b> 1206 (3216) <b>32</b> 1210 (3225) <b>42</b> 1808 (4520) <b>43</b> 1812 (4532)	<b>N</b> NPO <b>X</b> X7R	<b>102</b> =10x10 <sup>^2</sup> =1000pF <b>100</b> =10x10 <sup>^0</sup> =10pF	<b>J</b> = ± 5% <b>K</b> = ± 10% <b>M</b> = ± 20%	<b>100</b> =10V <b>160</b> =16V <b>250</b> =25V <b>500</b> =50V <b>101</b> =100V <b>201</b> =200V <b>251</b> =250V <b>501</b> =500V <b>631</b> =630V	<b>E</b> = Tape and 7" Reel, Embossed Tape <b>P</b> = Tape and 7" Reel, Paper Tape <b>L</b> = Tape and 13" Reel, Embossed <b>G</b> = Tape and 13"Reel, Paper Tape	Reference Thickness Description	<b>G</b> =RoHS Compliant

### GENERAL ELECTRICAL DATA

Dielectric	NPO(C0G)	X7R						
<b>Size</b>	0201, 0402, 0603, 0805, 1206, 1210	0402, 0603, 0805, 1206, 1210, 1808, 1812						
<b>Rated voltage (WVDC)</b>	10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V							
<b>Capacitance range*</b>	0.1pF ~ 33nF	100pF ~ 1.8μF						
<b>Capacitance tolerance**</b>	Cap≤5pF: B (± 0.1pF), C (± 0.25pF) 5pF<Cap<10pF: C (± 0.25pF), D (± 0.5pF) Cap≥10pF: F (± 1%), G (± 2%), J (± 5%)	J (± 5%) K (± 10%) M (± 20%)						
Measured at the condition of 30~70% related humidity.								
<b>Capacitance &amp; Tan δ Test Condition</b>	for 25°C at ambient temperature	Preconditioning for Class II MLCC: Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement.						
	<table border="1"> <thead> <tr> <th>Cap. Rang</th> <th>Test Condition</th> </tr> </thead> <tbody> <tr> <td>Cap≤1000pF</td> <td>1.0±0.2Vrms, 1.0MHz±10%</td> </tr> <tr> <td>Cap&gt;1000pF</td> <td>1.0±0.2Vrms, 1.0kHz±10%</td> </tr> </tbody> </table>	Cap. Rang	Test Condition	Cap≤1000pF	1.0±0.2Vrms, 1.0MHz±10%	Cap>1000pF	1.0±0.2Vrms, 1.0kHz±10%	1.0±0.2Vrms, 1.0kHz±10%, at 25°C ambient temperature.
Cap. Rang	Test Condition							
Cap≤1000pF	1.0±0.2Vrms, 1.0MHz±10%							
Cap>1000pF	1.0±0.2Vrms, 1.0kHz±10%							
<b>Tan δ *</b>	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000	≤ 2.5%						
<b>Insulation resistance at Ur</b>	≥100GΩ or R•C≥500Ω•F whichever is smaller							
<b>Operating temperature</b>	-55 to +125°C							
<b>Capacitance characteristic</b>	± 30ppm / °C	± 15%						
<b>Termination</b>	Cu/Ni/Sn (lead-free termination)							

### DIMENSIONS



Size	inch (mm)	L (mm)	W (mm)	T (mm)	code	M <sub>B</sub> min (mm)
0201 (0603)		0.60±0.03	0.30±0.03			0.15±0.05
0402 (1005)		1.00±0.10	0.50±0.10			0.25+0.05/-0.10
0603 (1608)		1.60±0.15	0.80±0.15			0.40±0.15
0805 (2012)		2.00±0.20	1.25±0.20		Reference	0.50±0.20
1206 (3216)		3.20±0.20	1.60±0.20		Thickness	0.60±0.20
1210 (3225)		3.20±0.30	2.50±0.30		Description	0.75±0.35
1808 (4520)		4.50±0.40	2.00±0.25			0.75±0.35
1812 (4532)		4.50±0.40	3.20±0.30			0.75±0.35

MLCC

Chip R

Diode

Coil

## Automotive Capacitor Qualified to AEC-Q200

### RATING

### COG

Size		0201				0402				0603							0805								
Cap(pF)	Code	10V	16V	25V	50V	10V	16V	25V	50V	10V	16V	25V	50V	100V	200V	250V	10V	16V	25V	50V	100V	200V	250V	500V	630V
0.1	0R1	L	L	L	L	N	N	N	N																
0.2	0R2	L	L	L	L	N	N	N	N																
0.3	0R3	L	L	L	L	N	N	N	N																
0.4	0R4	L	L	L	L	N	N	N	N																
0.5	0R5	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
0.6	0R6	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
0.7	0R7	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
0.8	0R8	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
0.9	0R9	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
1	1R0	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
1.2	1R2	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
1.5	1R5	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
1.8	1R8	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
2.2	2R2	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
2.7	2R7	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
3.3	3R3	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
3.9	3R9	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
4.7	4R7	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
5.6	5R6	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
6.8	6R8	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
8.2	8R2	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
10	100	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
12	120	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
15	150	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
18	180	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
22	220	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
27	270	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
33	330	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
39	390	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
47	470	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
56	560	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
68	680	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A
82	820	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	A	A	X	X
100	101	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	X	X	X	X
120	121	L	L	L	L	N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	X	X	C	C
150	151					N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	C	C	C	C
180	181					N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	C	C	C	C
220	221					N	N	N	N	S	S	S	S	S	S	S	A	A	A	A	A	C	C	C	C
270	271					N	N	N	N	S	S	S	S	S	B	B	A	A	A	A	A	C	C	C	C
330	331					N	N	N	N	S	S	S	S	S	B	B	A	A	A	A	A	C	C	C	C
390	391					N	N	N	N	S	S	S	S	S	B	B	X	X	X	X	X	C	C	C	C
470	471					N	N	N	N	S	S	S	S	S	B	B	X	X	X	X	X	C	C		
560	561					N	N	N	N	S	S	S	S	S			X	X	X	X	X	C	C		
680	681					N	N	N	N	S	S	S	S	S			X	X	X	X	X	C	C		
820	821					N	N	N	N	S	S	S	S	S			X	X	X	X	X	C	C		
1000	102					N	N	N	N	S	S	S	S	S			X	X	X	X	X	C	C		
1200	122									B	B	B	B				X	X	X	X	X	C	C		
1500	152									B	B	B	B				X	X	X	X	X	C	C		
1800	182									B	B	B	B				X	X	X	X	X	C	C		
2200	222									B	B	B	B				X	X	X	X	X	C	C		
2700	272									B	B	B	B				C	C	C	C	C				
3300	332									B	B	B	B				C	C	C	C	C				
3900	392																C	C	C	C	C				
4700	472																C	C	C	C	C				
5600	562																C	C	C	C	C				
6800	682																C	C	C	C	C				
8200	822																C	C	C	C					
10000	103																C	C	C	C					
12000	123																								
15000	153																								
18000	183																								
22000	223																								
27000	273																								
33000	333																								

MLCC

Chip R

Diode

Coil

## ■ Automotive Capacitor Qualified to AEC-Q200

### RATING

Size		NPO																			
Cap(pF)	Code	10V	16V	25V	50V	100V	200V	250V	500V	630V	1000V	10V	16V	25V	50V	100V	200V	250V	500V	630V	
0.1	0R1																				
0.2	0R2																				
0.3	0R3																				
0.4	0R4																				
0.5	0R5																				
0.6	0R6																				
0.7	0R7																				
0.8	0R8																				
0.9	0R9																				
1	1R0																				
1.2	1R2	X	X	X	X	X	X	X	X	X											
1.5	1R5	X	X	X	X	X	X	X	X	X	X										
1.8	1R8	X	X	X	X	X	X	X	X	X	X										
2.2	2R2	X	X	X	X	X	X	X	X	X	X										
2.7	2R7	X	X	X	X	X	X	X	X	X	X										
3.3	3R3	X	X	X	X	X	X	X	X	X	X										
3.9	3R9	X	X	X	X	X	X	X	X	X	X										
4.7	4R7	X	X	X	X	X	X	X	X	X	X										
5.6	5R6	X	X	X	X	X	X	X	X	X	X										
6.8	6R8	X	X	X	X	X	X	X	X	X	X										
8.2	8R2	X	X	X	X	X	X	X	X	X	X										
10	100	X	X	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	
12	120	X	X	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	
15	150	X	X	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	
18	180	X	X	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	
22	220	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	M	M	M	M	
27	270	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	M	M	M	M	
33	330	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	M	M	M	M	
39	390	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	M	M	M	M	
47	470	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	M	M	M	M	
56	560	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	M	M	M	M	
68	680	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	M	M	M	M	
82	820	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	M	M	M	M	
100	101	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	M	M	M	M	
120	121	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	M	M	M	M	
150	151	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	M	M	M	M	
180	181	X	X	X	X	X	X	X	X	X	E	M	M	M	M	M	M	M	M	M	
220	221	X	X	X	X	X	X	X	X	X	E	M	M	M	M	M	M	M	M	M	
270	271	X	X	X	X	X	X	M	M	M	E	M	M	M	M	M	M	M	M	M	
330	331	X	X	X	X	X	X	M	M	M	E	M	M	M	M	M	M	M	M	M	
390	391	X	X	X	X	X	X	M	M	M	E	M	M	M	M	M	M	M	M	M	
470	471	X	X	X	X	X	M	M	M	M	E	M	M	M	M	M	M	M	M	M	
560	561	X	X	X	X	X	M	C	C	C	E	M	M	M	M	M	M	M	M	M	
680	681	X	X	X	X	X	M	C	C	C	E	M	M	M	M	M	M	M	M	M	
820	821	X	X	X	X	X	M	E	E	E	E	M	M	M	M	M	M	M	M	M	
1000	102	X	X	X	X	X	M	E	E	E	E	M	M	M	M	M	C	C	C	C	
1200	122	X	X	X	X	X	M	E	E	E		M	M	M	M	M	C	C	C	C	
1500	152	X	X	X	X	X	C	E	E	E		M	M	M	M	M	C	C	C	C	
1800	182	X	X	X	X	X	C	E	E	E		M	M	M	M	M	C	C	C	C	
2200	222	X	X	X	X	X	C	E	E	E		M	M	M	M	M	C	C	C	C	
2700	272	X	X	X	X	X	C	E				M	M	M	M	M	C	C	C	C	
3300	332	X	X	X	X	X	C	E				M	M	M	M	M	C	C	C	C	
3900	392	X	X	X	X	X	C	E				M	M	M	M	M	C	C	C	C	
4700	472	X	X	X	X	X	C	E				M	M	M	M	M	E	E			
5600	562	X	X	X	X	X						M	M	M	M	M	E	E			
6800	682	M	M	M	M	M						M	M	M	M	M	E	E			
8200	822	C	C	C	C	C						M	M	M	M	M	E	E			
10000	103	C	C	C	C	C						M	M	M	M	M	E	E			
12000	123											C	C	C	C	C					
15000	153											C	C	C	C	C					
18000	183											F	F	F	F	F					
22000	223											F	F	F	F	F					
27000	273											F	F	F	F	F					
33000	333											F	F	F	F	F					

MLCC

Chip R

Diode

Coil

## Automotive Capacitor Qualified to AEC-Q200

### RATING

#### X7R

Size		0402				0603					0805								1206												
Cap(pF)	Code	10V	16V	25V	50V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	200V	250V	500V	630V	10V	16V	25V	50V	100V	200V	250V	500V	630V			
100	101	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X									C	C	C	C
120	121	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X									C	C	C	C
150	151	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
180	181	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
220	221	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
270	271	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
330	331	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
390	391	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
470	471	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
560	561	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
680	681	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
820	821	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
1000	102	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
1200	122	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
1500	152	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
1800	182	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
2200	222	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
2700	272	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
3300	332	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
3900	392	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	
4700	472	N	N	N	N	S	S	S	S	S	X	X	X	X	X	X	X	C	C	C	X	X	X	X	X	X	C	C	C	C	
5600	562	N	N	N	N	S	S	S	S	S	X	X	X	X	X	C	C	C	C	C	X	X	X	X	X	X	C	C	C	C	
6800	682	N	N	N	N	S	S	S	S	S	X	X	X	X	X	C	C	C	C	C	X	X	X	X	X	X	C	C	C	C	
8200	822	N	N	N	N	S	S	S	S	S	X	X	X	X	X	C	C	C	C	C	X	X	X	X	X	X	C	C	C	C	
10000	103	N	N	N	N	S	S	S	S	S	X	X	X	X	X	C	C	C	C	C	X	X	X	X	X	X	C	C	C	C	
12000	123					S	S	S	S		X	X	X	X	X	C	C				X	X	X	X	X	X	C	C			
15000	153					S	S	S	S		X	X	X	X	X	C	C				X	X	X	X	X	X	C	C			
18000	183					S	S	S	S		X	X	X	X	X	C	C				X	X	X	X	X	X	C	C			
22000	223					S	S	S	S		X	X	X	X	X	C	C				X	X	X	X	X	X	C	C			
27000	273					S	S	S	S		X	X	X	X	C						X	X	X	X	X						
33000	333					S	S	S	B		X	X	X	X	C						X	X	X	X	X						
39000	393					S	S	S	B		X	X	X	X	C						X	X	X	X	X						
47000	473					S	S	S	B		X	X	X	X	C						X	X	X	X	X						
56000	563					S	S	S	B		X	X	X	X	C						X	X	X	X	X						
68000	683					S	S	S	B		X	X	X	X	C						X	X	X	X	X						
82000	823					S	S	S	B		X	X	X	C	C						X	X	X	X	C						
100000	104					S	S	S	B		X	X	X	C	C						X	X	X	X	C						
120000	124										X	X	X	C							X	X	X	X	C						
150000	154										C	C	C	C							M	M	M	M	E						
180000	184										C	C	C	C							M	M	M	M	E						
220000	224										C	C	C	I							M	M	M	M	E						
270000	274										C	C	C								M	M	M	C							
330000	334										C	C	C								M	M	M	C							
390000	394										C	C	C								M	M	J	P							
470000	474										C	C	C								J	J	J	P							
560000	564										C	C	C								J	J	J	P							
680000	684										C	C	C								J	J	J	P							
820000	824										C	C	C								J	J	J	P							
1000000	105										C	C									J	J	J	P							

MLCC

Chip R

Diode

Coil

## ■ Automotive Capacitor Qualified to AEC-Q200

### RATING

Size		X7R															
Cap(pF)	Code	1210							1808				1812				
		10V	16V	25V	50V	100V	250V	500V	50V	100V	200V	250V	50V	100V	200V	250V	
100	101						C	C									
120	121						C	C									
150	151						C	C	C	C	C	C					
180	181						C	C	C	C	C	C					
220	221						C	C	C	C	C	C					
270	271						C	C	C	C	C	C	C	C	C	C	
330	331						C	C	C	C	C	C	C	C	C	C	
390	391						C	C	C	C	C	C	C	C	C	C	
470	471						C	C	C	C	C	C	C	C	C	C	
560	561						C	C	C	C	C	C	C	C	C	C	
680	681						C	C	C	C	C	C	C	C	C	C	
820	821						C	C	C	C	C	C	C	C	C	C	
1000	102	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	
1200	122	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	
1500	152	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	
1800	182	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	
2200	222	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	
2700	272	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	
3300	332	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	
3900	392	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	
4700	472	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	
5600	562	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	
6800	682	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	
8200	822	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	
10000	103	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	
12000	123	M	M	M	M	M	M	C	E	E	E	E	C	C	C	C	
15000	153	M	M	M	M	M	M	C	E	E	E	E	C	C	C	C	
18000	183	M	M	M	M	M	M	C	E	E	E	E	C	C	C	C	
22000	223	M	M	M	M	M	M	C	E	E	E	E	C	C	C	C	
27000	273	M	M	M	M	M	M		E	E	E	E	C	C	C	C	
33000	333	M	M	M	M	M	M		E	E	E	E	C	C	C	C	
39000	393	M	M	M	M	M	M		E	E	E	E	C	C	C	C	
47000	473	M	M	M	M	M	C		E	E	E	E	C	C	C	C	
56000	563	M	M	M	M	M	M		E	E	E	E	C	C	C	C	
68000	683	M	M	M	M	M	M		E	E	E	E	C	C	C	C	
82000	823	M	M	M	M	M	M		E	E	E	E	C	C	C	C	
100000	104	M	M	M	M	M	M		E	E	E	E	C	C	C	C	
120000	124	M	M	M	M	M	M		E	E			C	C	C	C	
150000	154	M	M	M	M	M	M		E	E			C	C	C	C	
180000	184	M	M	M	M	M	M		E	E			C	C	C	C	
220000	224	M	M	M	M	M	M		E	E			C	C	C	C	
270000	274												C	C	E	E	
330000	334												C	C	E	E	
390000	394												C	C	F	F	
470000	474												C	C			
560000	564												C	C			
680000	684												C	C			
820000	824												C	C			
1000000	105												C	C			
1500000	155												C	C			
1800000	185												E	E			

MLCC

Chip R

Diode

Coil

# MT (Soft Termination)

## Automotive Capacitor Qualified to AEC-Q200

### FEATURES

- A wide selection of sizes is available (0603 to 1812).
- High capacitance in given case size.
- Capacitor with lead-free termination (pure I Tin).
- The MT Soft termination series meet AEC- Q200 requirement.

### APPLICATION

- For Navigation & Information equipment.
- For entertainment equipment
- For comfortable equipment.
- For Automotive electronic equipment.

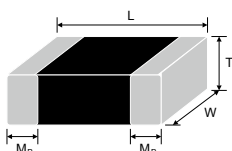
### PART NUMBER

MT	31	X	471	K	251	P	X	E
PDC Family	Size	Dielectric	Capacitance	Tolerance	Rated voltage	Packaging	Thickness	Control Code
Automotive Capacitor	<b>18</b> 0603 (1608) <b>21</b> 0805 (2012)	<b>X</b> X7R	<b>105</b> =10x10 <sup>^5</sup> =1μF	<b>J</b> = ± 5% <b>K</b> =± 10%	<b>500</b> =50V <b>101</b> =100V	<b>E</b> = Tape and 7" Reel, Embossed Tape	Reference Thickness Description	<b>G</b> =RoHS Compliant
Qualified to AEC-Q200	<b>31</b> 1206 (3216) <b>32</b> 1210 (3225) <b>42</b> 1808 (4520) <b>43</b> 1812 (4532)		<b>101</b> =10x10 <sup>^1</sup> =100pF	<b>M</b> =± 20%	<b>201</b> =200V <b>251</b> =250V	<b>P</b> = Tape and 7" Reel, Paper Tape <b>L</b> = Tape and 13" Reel, Embossed <b>G</b> = Tape and 13"Reel, Paper Tape		<b>E</b> =Soft Termination

### GENERAL ELECTRICAL DATA

Dielectric	X7R
<b>Size</b>	0603, 0805, 1206, 1210, 1808, 1812
<b>Rated voltage (WVDC)</b>	50V, 100V, 200V, 250V,
<b>Capacitance range*</b>	100pF ~ 3.3μF
<b>Capacitance tolerance**</b>	J (± 5%), K (± 10%), M (± 20%)
<b>Capacitance &amp; Tan δ Test Condition</b>	Measured at the condition of 30~70% related humidity Preconditioning for Class II MLCC: Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement. Apply 1.0±0.2Vrms, 1.0kHz±10%, at 25°C ambient temperature.
<b>Tan δ*</b>	≤ 2.5%
<b>Insulation resistance at Ur</b>	≥100GΩ or R•C≥ 500Ω-F whichever is smaller
<b>Operating temperature</b>	-55 to +125°C
<b>Capacitance characteristic</b>	± 15%
<b>Termination</b>	Cu / ( Ag polymer ) / Ni / Sn (lead-free termination)

### DIMENSIONS



Size inch (mm)	L (mm)	W (mm)	T (mm) code	M <sub>B</sub> min (mm)
0603 (1608)	1.60±0.20	0.80±0.15		0.40±0.15
0805 (2012)	2.10±0.20	1.25±0.20		0.50±0.20
1206 (3216)	3.30±0.30	1.60±0.20	Reference Thickness Description	0.60±0.20
1210 (3225)	3.30±0.40	2.50±0.30		0.75±0.35
1808 (4520)	4.60±0.50	2.00±0.25		0.75±0.35
1812 (4532)	4.60±0.50	3.20±0.30		0.75±0.35



# (Soft Termination) MT

## Automotive Capacitor Qualified to AEC-Q200

### RATING

Size		X7R																							
Cap	Code	0603				0805				1206				1210				1808				1812			
		50V	100V	200V	250V	50V	100V	200V	250V	50V	100V	200V	250V	50V	100V	200V	250V	50V	100V	200V	250V	50V	100V	200V	250V
100pF	101	S	S	B	B	X	X	X	X	X	X	X	X												
120pF	121	S	S	B	B	X	X	X	X	X	X	X	X												
150pF	151	S	S	B	B	X	X	X	X	X	X	X	X					C	C	C	C				
180pF	181	S	S	B	B	X	X	X	X	X	X	X	X					C	C	C	C				
220pF	221	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C				
270pF	271	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
330pF	331	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
390pF	391	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
470pF	471	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
560pF	561	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
680pF	681	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
820pF	821	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
1,000pF	102	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
1,200pF	122	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
1,500pF	152	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
1,800pF	182	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
2,200pF	222	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
2,700pF	272	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
3,300pF	332	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
3,900pF	392	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
4,700pF	472	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
5,600pF	562	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
6,800pF	682	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
8,200pF	822	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
0.010µF	103	S	S	B	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C	C	C	C	C
0.012µF	123	S	B	B	B	X	X	X	X	X	X	X	X	M	M	M	M	E	E	E	E	C	C	C	C
0.015µF	153	S	B	B	B	X	X	X	X	X	X	X	X	M	M	M	M	E	E	E	E	C	C	C	C
0.018µF	183	S	B			X	X	X	X	X	X	X	X	M	M	M	M	E	E	E	E	C	C	C	C
0.022µF	223	S	B			X	X	X	X	X	X	X	X	M	M	M	M	E	E	E	E	C	C	C	C
0.027µF	273	S	B			X	M	M	M	X	X	X	X	M	M	M	M	E	E	E	E	C	C	C	C
0.033µF	333	B	B			X	M	C	C	X	X	X	X	M	M	M	M	E	E	E	E	C	C	C	C
0.039µF	393	B	B			X	M	C		X	X	X	X	M	M	M	M	E	E	E	E	C	C	C	C
0.047µF	473	B	B			X	M	C		X	X	X	X	M	M	M	M	E	E	E	E	C	C	C	C
0.056µF	563	B				X	M	C		X	X	M	M	M	M	M	M	E	E	E	E	C	C	C	C
0.068µF	683	B				X	M	C		X	X	C	C	M	M	M	M	E	E	E	E	C	C	C	C
0.082µF	823	B				X	M			X	X	C	C	M	M	M	M	E	E	E	E	C	C	C	C
0.10µF	104	B				X	C			X	X	E	E	M	M	M	M	E	E	E	E	C	C	C	C
0.12µF	124					X	C			X	X			M	M	E	E	E	E	E	E	C	C	C	C
0.15µF	154					X	C			X	X			M	M	E	E	E	E	E	E	C	C	C	C
0.18µF	184					X	C			X	M			M	M	E	E	E	E	F	F	C	C	C	C
0.22µF	224					X	C			X	M			M	M	E	E	E	E			C	C	C	C
0.27µF	274					D				X	C			M	M	F	F	F	F			C	C	E	E
0.33µF	334					D				X	E			M	M	F	F	F				C	C	E	E
0.39µF	394									C	E			M	C	G	G					C	C	F	F
0.47µF	474									C	E			M	C	G	G					C	C	G	G
0.56µF	564									C	P			M	E	G	G					C	C	G	G
0.68µF	684									C	P			M	E	G	G					C	C	G	G
0.82µF	824									E	P			C	P							C	C	G	G
1.0µF	105									P	P			C	P							C	C	G	G
1.2µF	125													P	F							C	C		
1.5µF	155													F	F							C	C		
1.8µF	185													G	G							E	E		
2.2µF	225													G	G							E	E		
2.7µF	275													G								F	F		
3.3µF	335																					F	F		

MLCC

Chip R

Diode

Coil

## ■ Automotive Caps without AEC-Q200 Certification

### FEATURES

- A wide selection of sizes is available (0402 to 1812).
- High capacitance in given case size.
- Capacitor with lead-free termination (pure Tin).
- RoHS Compliant
- HALOGEN compliant

### APPLICATION

- For Navigation & Information equipments.
- For entertainment equipments
- For comfortable equipments.
- For Automotive electronic equipment.

### PART NUMBER

MG	31	X	471	K	251	P	X	G
PDC Family	Size	Dielectric	Capacitance	Tolerance	Rated voltage	Packaging	Thickness	Control Code
Automotive Caps without AEC-Q200 certification	<b>15</b> 0402 (1005) <b>18</b> 0603 (1608) <b>21</b> 0805 (2012) <b>31</b> 1206 (3216) <b>32</b> 1210 (3225) <b>43</b> 1812 (4532)	<b>N</b> NPO <b>B</b> X5R <b>X</b> X7R	<b>106</b> =10x10 <sup>6</sup> =10μF <b>100</b> =10x10 <sup>0</sup> =10pF	<b>J</b> = ±5% <b>K</b> =±10% <b>M</b> =±20%	<b>6R3</b> =6.3V <b>100</b> =10V <b>160</b> =16V <b>250</b> =25V <b>500</b> =50V <b>101</b> =100V <b>201</b> =200V <b>251</b> =250V	<b>E</b> = Tape and 7" Reel, Embossed Tape <b>P</b> = Tape and 7" Reel, Paper Tape <b>L</b> = Tape and 13" Reel, Embossed <b>G</b> = Tape and 13" Reel, Paper Tape	Reference Thickness Description	<b>G</b> =RoHS Compliant

### GENERAL ELECTRICAL DATA

Dielectric	NPO	X7R	X5R
<b>Size</b>	0402, 0603, 0805, 1206, 1210, 1812		0402, 0603, 0805, 1206, 1210
<b>Capacitance range*</b>	0.5pF to 0.033μF		0.056μF to 10μF
<b>Capacitance tolerance**</b>	Cap≤5pF: B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF: C (±0.25pF), D (±0.5pF) 10pF≤Cap: F (±1%), G (±2%), J (±5%)	J (±5%), K (±10%), M (±20%)	
<b>Rated voltage (WVDC)</b>	16V, 25V, 50V, 100V	10V, 16V, 25V, 50V, 100V, 200V, 250V	6.3V, 10V, 16V, 25V, 50V
<b>Tan δ*</b>	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000	1.0±0.2Vrms, 1.0kHz±10%, at 25°C ambient temperature.	
<b>Insulation resistance at Ur</b>	≥10GΩ or RxC≥500ΩxF whichever is less		
<b>Operating temperature</b>	-55 to +125°C		-55 to +85°C
<b>Capacitance characteristic</b>	±30ppm / °C		±15%
<b>Termination</b>	Ni/Sn (lead-free termination)		

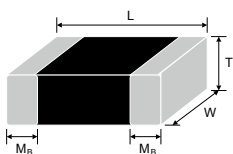
\* Measured at the condition of 30~70% related humidity.

NPO: Apply 1.0±0.2Vrms, 1.0MHz±10% for Cap≤1000pF and 1.0±0.2Vrms, 1.0kHz±10% for Cap>1000pF, 25°C at ambient temperature

Measured at 1.0±0.2Vrms, 1.0kHz±10% for C≤10μF; 0.5±0.2Vrms, 120Hz±20% for C>10μF, 30~70% related humidity, 25°C ambient temperature for X7R, X5R.

\*\* Preconditioning for Class II MLCC: Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement.

### DIMENSIONS



Size inch (mm)	L (mm)	W (mm)	T (mm) code	M <sub>B</sub> min (mm)
0402 (1005)	1.00±0.10	0.50±0.10		0.25+0.05/-0.10
0603 (1608)	1.60±0.15	0.80±0.15		0.40±0.15
0805 (2012)	2.00±0.20	1.25±0.20	Reference Thickness Description	0.50±0.20
1206 (3216)	3.20±0.20	1.60±0.20		0.60±0.20
1210 (3225)	3.20±0.30	2.50±0.30		0.75±0.35
1812 (4532)	4.50±0.40	3.20±0.30		0.75±0.35

## ■ Automotive Caps without AEC-Q200 Certification

### RATING

Size		NPO												1206				1210				1812					
Cap(pF)	Code	10V 16V	25V	50V	100V	10V 16V	25V	50V	100V	10V 16V	25V	50V	100V	200V	250V	10V 16V	25V	50V	100V	10V 16V	25V	50V	100V	10V 16V	25V	50V	100V
0.5	0R5	N	N	N	N	S	S	S	S	A	A	A	A	A	A												
0.6	0R6	N	N	N	N	S	S	S	S	A	A	A	A	A	A												
0.7	0R7	N	N	N	N	S	S	S	S	A	A	A	A	A	A												
0.8	0R8	N	N	N	N	S	S	S	S	A	A	A	A	A	A												
0.9	0R9	N	N	N	N	S	S	S	S	A	A	A	A	A	A												
1	1R0	N	N	N	N	S	S	S	S	A	A	A	A	A	A												
1.2	1R2	N	N	N	N	S	S	S	S	A	A	A	A	A	A												
1.5	1R5	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X								
1.8	1R8	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X								
2.2	2R2	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X								
2.7	2R7	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X								
3.3	3R3	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X								
3.9	3R9	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X								
4.7	4R7	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X								
5.6	5R6	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X								
6.8	6R8	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X								
8.2	8R2	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X								
10	100	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X					M			C
12	120	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X					M			C
15	150	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X					M			C
18	180	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X					M			C
22	220	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X	M	M	M	M				C
27	270	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X	M	M	M	M				C
33	330	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X	M	M	M	M				C
39	390	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X	M	M	M	M				C
47	470	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X	M	M	M	M				C
56	560	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X	M	M	M	M				C
68	680	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X	M	M	M	M				C
82	820	N	N	N	N	S	S	S	S	A	A	A	A	A	A	X	X	X	X	M	M	M	M				C
100	101	N	N	N	N	S	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M				C
120	121	N	N	N	N	S	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M				C
150	151	N	N	N	N	S	S	S	S	A	A	A	A	X	C	X	X	X	X	M	M	M	M				C
180	181	N	N	N	N	S	S	S	S	A	A	A	A	X	C	X	X	X	X	M	M	M	M				C
220	221	N	N	N	N	S	S	S	S	A	A	A	A	C	C	X	X	X	X	M	M	M	M				C
270	271	N	N	N	N	S	S	S	S	A	A	A	A	C	C	X	X	X	X	M	M	M	M				C
330	331	N	N	N	N	S	S	S	S	A	A	A	A	C	C	X	X	X	X	M	M	M	M				C
390	391	N	N	N	N	S	S	S	S	X	X	X	X	C	C	X	X	X	X	M	M	M	M				C
470	471	N	N	N	N	S	S	S	S	X	X	X	X	C	C	X	X	X	X	M	M	M	M				C
560	561	N	N	N	N	S	S	S	S	X	X	X	X	C	C	X	X	X	X	M	M	M	M				C
680	681	N	N	N	N	S	S	S	S	X	X	X	X	C	C	X	X	X	X	M	M	M	M				C
820	821	N	N	N	N	S	S	S	S	X	X	X	X	C	C	X	X	X	X	M	M	M	M				C
1000	102	N	N	N	N	S	S	S	S	X	X	X	X	C	C	X	X	X	X	M	M	M	M	C	C	C	C
1200	122					B	B	B		X	X	X	X	C	C	X	X	X	X	M	M	M	M	C	C	C	C
1500	152					B	B	B		X	X	X	X	C	C	X	X	X	X	M	M	M	M	C	C	C	C
1800	182					B	B	B		X	X	X	X	C	C	X	X	X	X	M	M	M	M	C	C	C	C
2200	222					B	B	B		X	X	X	X	C	C	X	X	X	X	M	M	M	M	C	C	C	C
2700	272					B	B	B		C	C	C	C			X	X	X	X	M	M	M	M	C	C	C	C
3300	332					B	B	B		C	C	C	C			X	X	X	X	M	M	M	M	C	C	C	C
3900	392									C	C	C	C			X	X	X	X	M	M	M	M	C	C	C	C
4700	472									C	C	C	C			X	X	X	X	M	M	M	M	C	C	C	C
5600	562									C	C	C	C			X	X	X	X	M	M	M	M	C	C	C	C
6800	682									C	C	C	C			M	M	M		M	M	M	M	C	C	C	C
8200	822									C	C	C	C			C	C	C		M	M	M	M	C	C	C	C
10000	103									C	C	C	C			C	C	C		M	M	M	M	C	C	C	C
12000	123																			M	C	C	C	C	C	C	C
15000	153																			M	C	C	C	C	C	C	C
18000	183																			F	F	F	F	C	C	C	C
22000	223																			F	F	F	F	C	C	C	C
27000	273																			F	F	F	F	C	C	C	C
33000	333																			F	F	F	F	C	C	C	C

MLCC

Chip R

Diode

Coil

1. For more information about products with special capacitance or other data, please contact PDC local representative.

## Automotive Caps without AEC-Q200 Certification

### RATING

#### X7R

Size		0402			0603			0805				1206				1210					1812							
Cap(pF)	Code	10V 16V	25V	50V	10V 16V	25V	50V	100V	10V 16V	25V	50V	100V	200V 250V	10V 16V	25V	50V	100V	200V 250V	10V 16V	25V	50V	100V	200V 250V	10V 16V	25V	50V	100V	200V 250V
100	101	N	N	N	S	S	S	S	X	X	X	X	X															
120	121	N	N	N	S	S	S	S	X	X	X	X	X															
150	151	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C										
180	181	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C										
220	221	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C										
270	271	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C										
330	331	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C										
390	391	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C										
470	471	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C										
560	561	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C										
680	681	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C										
820	821	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C										
1000	102	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
1200	122	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
1500	152	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
1800	182	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
2200	222	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
2700	272	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
3300	332	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
3900	392	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
4700	472	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
5600	562	N	N	N	S	S	S	S	X	X	X	X	C	X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
6800	682	N	N	N	S	S	S	S	X	X	X	X	C	X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
8200	822	N	N	N	S	S	S	S	X	X	X	X	C	X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
10000	103	N	N	N	S	S	S	S	X	X	X	X	C	X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
12000	123	N	N		S	S	S		X	X	X	X	C	X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
15000	153	N	N		S	S	S		X	X	X	X	C	X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
18000	183	N	N		S	S	S		X	X	X	X	C	X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
22000	223	N	N		S	S	S		X	X	X	X	C	X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
27000	273	N	N		S	S	S		X	X	X	C		X	X	X	X	C	M	M	M	M	M	C	C	C	C	C
33000	333	N	N		S	S	B		X	X	X	C		X	X	X	X	E	M	M	M	M	M	C	C	C	C	C
39000	393	N	N		S	S	B		X	X	X	C		X	X	X	X	E	M	M	M	M	M	C	C	C	C	C
47000	473	N	N		S	S	B		X	X	X	C		X	X	X	X	E	M	M	M	M	C	C	C	C	C	C
56000	563	N			S	S	B		X	X	X	C		X	X	X	X	E	M	M	M	M	C	C	C	C	C	C
68000	683	N			S	S	B		X	X	X	C		X	X	X	X	E	M	M	M	M	E	C	C	C	C	C
82000	823	N			S	S	B		X	X	X	C		X	X	X	C		M	M	M	M	E	C	C	C	C	C
100000	104	N	N		S	S	B		X	X	X	C		X	X	X	C		M	M	M	M	E	C	C	C	C	C
120000	124				S	B			C	C	C			X	X	X	C		M	M	M	M	E	C	C	C	C	C
150000	154				S	B			C	C	C			M	M	M	E		M	M	M	C	G	C	C	C	C	F
180000	184				S	B			C	C	C			M	M	M	E		M	M	M	C	G	C	C	C	C	F
220000	224				S	B			C	C	C			M	M	M			M	M	M	C	G	C	C	C	C	F
270000	274				B				C	C				M	M	C			M	M	M	E	G	C	C	C	C	F
330000	334				B				C	C				M	M	C			M	M	C	E	G	C	C	C	C	F
390000	394				B				C	C				M	J	P			M	M	C	G	G	C	C	C	C	F
470000	474				B				C	C				J	J	P			M	M	C	G	G	C	C	C	F	F
560000	564								C	C				J	J	P			C	C	C	G		C	C	C	F	
680000	684								C	C				J	J	P			C	C	C	F		C	C	F	F	
820000	824								C	C				J	J	P			C	C	C	F		C	C	F	F	
1000000	105								C	C				J	J	P			C	C	C	F		C	C	F	F	
1500000	155													J	P				F	E							F	
2200000	225													J	P				F	E							G	

MLCC

Chip R

Diode

Coil

## ■ Automotive Caps without AEC-Q200 Certification

### RATING

#### X5R

Size		0402			0603				0805				1206				1210	
Cap(pF)	Code	6.3V	10V	16V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	10V	16V
27000	273																	
33000	333																	
39000	393																	
47000	473																	
56000	563		N															
68000	683		N															
82000	823		N															
100000	104		N	N														
150000	154		N	N														
220000	224	N	N	N														
270000	274	N	N			B	B	B										
330000	334	N	N			B	B	B										
390000	394	N				B	B	B										
470000	474	N				B	B	B										
680000	684	N				B	B	B										
820000	824				B	B	B	B										
1000000	105				B	B	B	B										
1500000	155								I	I				J	J	P	F	F
2200000	225								I	I	I	I		J	J	P	F	F
3300000	335										I	I	P	P	P	P	F	F
4700000	475										I	I	P	P	P	P	F	F
6800000	685												P	P				
10000000	106												P	P				

MLCC

Chip R

Diode

Coil

## ■ Anti-Bend (Soft termination) Capacitor Series

### FEATURES

- High performance to withstanding 5mm of substrate bending test guarantee.
- A wide selection of sizes is available (0603 to 2225).
- High capacitance in given case size.
- Capacitor with lead-free termination (pure Tin).
- Reduction in PCB bend failure.
- High reliability and stability.
- RoHS & HALOGEN compliant

### APPLICATION

- For general digital circuit.
- For power supply bypass capacitors.
- For consumer electronics.
- For telecommunication.
- DC to DC converter

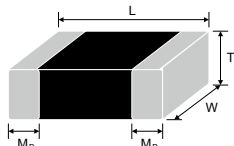
### PART NUMBER

FP	21	X	225	K	101	E	G	G
PDC Family	Size	Dielectric	Capacitance	Tolerance	Rated voltage	Packaging	Thickness	Control Code
Anti-bend	<b>15</b> 0402(1005)	<b>N</b> COG(NPO)	<b>106</b> =10x10 <sup>∧</sup> 6	<b>J</b> = ± 5%	<b>6R3</b> =6.3V	<b>E</b> =	Reference	<b>G</b> =RoHS
General	<b>18</b> 0603 (1608)	<b>X</b> X7R	=10μF	<b>K</b> =± 10 %	<b>100</b> =10V	Tape and 7" Reel,	Thickness	Compliant
Purpose	<b>21</b> 0805 (2012)		<b>100</b> =10x10 <sup>∧</sup> 0	<b>M</b> =± 20 %	<b>160</b> =16V	Embossed Tape	Description	
	<b>31</b> 1206 (3216)		=10pF		<b>250</b> =25V	<b>P</b> =		
	<b>32</b> 1210 (3225)		<b>R47</b> =0.47pF		<b>500</b> =50V	Tape and 7" Reel,		
	<b>42</b> 1808 (4520)		<b>OR5</b> =0.5pF		<b>101</b> =100V	Paper Tape		
	<b>43</b> 1812 (4532)				<b>201</b> =200V	<b>L</b> =		
	<b>46</b> 1825 (4563)				<b>251</b> =250V	Tape and 13" Reel,		
	<b>55</b> 2220 (5750)				<b>501</b> =500V	Embossed		
	<b>56</b> 2225 (5763)				<b>631</b> =630V	<b>G</b> =		
					<b>102</b> =1000V	Tape and 13"Reel,		
					<b>152</b> =1500V	Paper Tape		
					<b>202</b> =2000V			
					<b>302</b> =3000V			
					<b>402</b> =4000V			

### GENERAL ELECTRICAL DATA

Dielectric	NPO	X7R
<b>Size</b>	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225
<b>Rated voltage (WVDC)</b>	10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1KV, 1.5KV, 2KV, 3KV, 4KV	6.3V, 10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1KV, 1.5KV, 2KV, 3KV, 4KV
<b>Capacitance range</b>	0.1pF ~ 330nF	100pF ~ 22μF
<b>Capacitance tolerance</b>	Cap≤5pF: B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF: C (±0.25pF), D (±0.5pF) Cap≥10pF: F (±1%), G (±2%), J (±5%), K (±10%)	J (±5%) K (±10%) M (±20%)
<b>Tan δ</b>	Cap. Rang Q Spec. Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000	Cap. Volt. D.F. Spec. 25V ≤ 3.5% ≥ 50V ≤ 2.5%
<b>Capacitance &amp; Tan δ Test Condition</b>	Cap. Rang Test Condition Cap≤1000pF 1.0±0.2Vrms, 1.0MHz±10% Cap>1000pF, 1.0±0.2Vrms, 1.0kHz±10%	Preconditioning for Class II MLCC: Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement. Apply 1.0±0.2Vrms, 1.0kHz±10%, at 25°C ambient temperature.
<b>Insulation resistance</b>	≥100GΩ or R•C≥500Ω•F whichever is smaller	≥10GΩ or R•C≥100Ω•F whichever is smaller
<b>Operating temperature</b>	- 55 to + 125°C	
<b>Temperature coefficient</b>	±30ppm / °C	±15%
<b>Termination</b>	Cu / Ag polymer / Ni / Sn (lead-free termination)	

### DIMENSIONS



Size inch (mm)	L (mm)	W (mm)	T (mm) code	M <sub>B</sub> (mm)
0402 (1005)	1.00±0.10	0.50±0.10		0.25+0.05/-0.10
0603 (1608)	1.60±0.20	0.80±0.15		0.40±0.15
0805 (2012)	2.10±0.20	1.25±0.20		0.50±0.20
1206 (3216)	3.30±0.30	1.60±0.20		0.60±0.20
1210 (3225)	3.30±0.40	2.50±0.30		0.75±0.25
1808 (4520)	4.60±0.50	2.00±0.20	Reference Thickness Description	0.75±0.35
1812 (4532)	4.60±0.50	3.20±0.30		0.75±0.35
1825 (4563)	4.60±0.50	6.30±0.40		0.75±0.35
2220 (5750)	5.70±0.50	5.00±0.40		0.85±0.35
2225 (5763)	5.70±0.50	6.30±0.40		0.85±0.35

## ■ Anti-Bend (Soft termination) Capacitor Series

### RATING

#### NPO

Size	Code	0402				0603					0805						1206											
		10V	16V	25V 50V	100V	10V	16V	25V 50V	100V	200V 250V	10V	16V	25V 50V	100V	200V	250V	500V 630V	1KV	10V 16V	25V	50V	100V	200V	250V	500V	630V	1KV	1.5KV 2KV
0.1pF	0R1	K	K	K																								
0.2pF	0R2	K	K	K																								
0.3pF	0R3	K	K	K		S	S	S																				
0.4pF	0R4	K	K	K		S	S	S																				
0.5pF	0R5	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C										
1.0pF	1R0	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C			X							
1.2pF	1R2	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X				X		
1.5pF	1R5	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
1.8pF	1R8	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
2pF	2R0	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
2.2pF	2R2	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
2.7pF	2R7	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
3.3pF	3R3	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
3.9pF	3R9	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
4.7pF	4R7	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
5.0pF	5R0	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
5.6pF	5R6	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
6.8pF	6R8	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
8.2pF	8R2	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
10pF	100	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
12pF	120	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
15pF	150	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
18pF	180	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
22pF	220	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
27pF	270	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	X
33pF	330	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	M
39pF	390	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	M
47pF	470	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	M
56pF	560	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	C
68pF	680	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	A	C	X	X	X	X	X	X	X	X	X	C
82pF	820	K	K	K	K	S	S	S	S	S	A	A	A	A	A	A	X	C	X	X	X	X	X	X	X	X	X	C
100pF	101	K	K	K	K	S	S	S	S	S	A	A	A	A	A	X	X	C	X	X	X	X	X	X	X	X	X	C
120pF	121	K	K	K	K	S	S	S	S	S	A	A	A	A	A	X	C	C	X	X	X	X	X	X	X	X	X	C
150pF	151	K	K	K	K	S	S	S	S	S	A	A	A	A	X	X	C	C	X	X	X	X	X	X	X	X	X	C
180pF	181	K	K	K	K	S	S	S	S	S	A	A	A	A	X	C	C	C	X	X	X	X	X	X	X	X	X	E
220pF	221	K	K	K	K	S	S	S	S	S	A	A	A	A	C	C	C	C	X	X	X	X	X	X	X	X	X	E
270pF	271	K	K	K		S	S	S	S	B	A	A	A	A	C	C	C	C	X	X	X	X	X	M	M	M	E	P
330pF	331	K	K	K		S	S	S	S	B	A	A	A	A	C	C	C	C	X	X	X	X	X	M	M	M	E	P
390pF	391	K	K	K		S	S	S	S	B	X	X	X	X	C	C	C	C	X	X	X	X	X	M	M	M	E	P
470pF	471	K	K	K		S	S	S	S	B	X	X	X	X	C	C	I		X	X	X	X	M	M	M	M	E	P
560pF	561	K	K	K		S	S	S	S	B	X	X	X	X	C	C	I		X	X	X	X	M	C	C	C	E	
680pF	681	K	K	K		S	S	S	S	B	X	X	X	X	C	C	I		X	X	X	X	M	C	C	C	E	
820pF	821	K	K	K		S	B	S	S	B	X	X	X	X	C	C	I		X	X	X	X	M	E	E	E	E	
1000pF	102	K	K	K		S	B	S	S		X	X	X	X	C	C	I		X	X	X	X	M	E	E	E	E	
1200pF	122					B	B	B			X	X	X	X	C	C	I		X	X	X	X	M	E	E	E	E	
1500pF	152					B	B	B			X	X	X	X	C	C	I		X	X	X	X	C	E	E	E		
1800pF	182					B	B	B			X	X	X	X	C	C	I		X	X	X	X	C	E	E	E		
2200pF	222					B	B	B			X	X	X	X	C	C	I		X	X	X	X	C	E	E	E		
2700pF	272					B		B			C	C	C	C	C	C			X	X	X	X	C	E	E	E		
3300pF	332					B		B			C	C	C	C	C	C			X	X	X	X	C	E	E	E		
3900pF	392										C	C	C	C					X	X	X	X	C	E	E	E		
4700pF	472										C	C	C	C					X	X	X	X	C	E	E	E		
5600pF	562										C	C	C	C					X	X	X	X	E	E	E	E		
6800pF	682										C	C	C	C					M	M	M	M	E	E	E			
8200pF	822										C	C	C						C	C	C	C	E	E				
0.010μF	103										C	C	C						C	C	C	C	E	E				
0.012μF	123																		P	P	P	P						
0.015μF	153																		P	P	P	P						
0.018μF	183																		P	P	P	P						
0.022μF	223																		P	P	P	P						
0.027μF	273																		P	P	P							
0.033μF	333																		P	P	P							
0.039μF	393																		P	P	P							

MLCC

Chip R

Diode

Coil



## ■ Anti-Bend (Soft termination) Capacitor Series

### RATING

Size		NPO																										
Cap	Code	1210								1808							1812											
		10V 16V	25V 50V	100V	200V 250V	500V	630V	1KV	1.5KV 2KV	25V 50V	100V	200V 250V	500V	630V	1KV	1.5KV 2KV	3KV	10V 16V	25V	50V	100V	200V 250V	500V	630V	1KV	1.5KV 2KV	3KV	
2.2pF	2R2									C	C	C	C	C	C	C												
2.7pF	2R7									C	C	C	C	C	C	C												
3.3pF	3R3									C	C	C	C	C	C	C												
3.9pF	3R9									C	C	C	C	C	C	C												
4.7pF	4R7									C	C	C	C	C	C	C												
5.0pF	5R0									C	C	C	C	C	C	C												
5.6pF	5R6									C	C	C	C	C	C	C												
6.8pF	6R8									C	C	C	C	C	C	C												
8.2pF	8R2									C	C	C	C	C	C	C												
10pF	100	M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12pF	120	M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
15pF	150	M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
18pF	180	M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22pF	220	M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27pF	270	M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
33pF	330	M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
39pF	390	M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
47pF	470	M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
56pF	560	M	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
68pF	680	M	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
82pF	820	M	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
100pF	101	M	M	M	M	M	M	C	C	C	C	C	C	C	C	F	C	C	C	C	C	C	C	C	C	C	C	C
120pF	121	M	M	M	M	M	M	C	C	C	C	C	C	C	C	F	C	C	C	C	C	C	C	C	C	C	C	C
150pF	151	M	M	M	M	M	M	C	E	C	C	C	C	C	F	F	C	C	C	C	C	C	C	C	C	C	C	C
180pF	181	M	M	M	M	M	M	C	E	C	C	C	C	C	F	F	C	C	C	C	C	C	C	C	C	C	C	E
220pF	221	M	M	M	M	M	M	E	E	C	C	C	C	C	F	F	C	C	C	C	C	C	C	C	C	C	C	E
270pF	271	M	M	M	M	M	M	E	E	C	C	C	F	F	F	F	C	C	C	C	C	C	C	C	C	C	E	E
330pF	331	M	M	M	M	M	M	E	E	C	C	C	F	F	F	F	C	C	C	C	C	C	C	C	C	C	E	E
390pF	391	M	M	M	M	M	M	E	E	C	C	C	F	F	F	F	C	C	C	C	C	C	C	C	C	C	E	E
470pF	471	M	M	M	M	M	M	E	E	C	C	C	F	F	F	F	C	C	C	C	C	C	C	C	C	E	E	E
560pF	561	M	M	M	M	M	M	E	E	C	C	C	F	F	F	F	C	C	C	C	C	C	C	C	C	E	E	E
680pF	681	M	M	M	M	M	M	E		C	C	C	F	F	F	F	C	C	C	C	C	C	C	C	C	E	E	F
820pF	821	M	M	M	M	M	M	E		C	C	C	F	F	F	F	C	C	C	C	C	C	C	C	C	E	E	G
1000pF	102	M	M	M	C	C	C	E		C	C	C	F	F	F	F	C	C	C	C	C	C	C	C	E	E	G	
1200pF	122	M	M	M	C	C	C			C	C	C	F	F	F	F	C	C	C	C	C	C	C	C	E	E		
1500pF	152	M	M	M	C	C	C			C	C	C	F	F	F	F	C	C	C	C	C	C	C	C	E	E		
1800pF	182	M	M	M	C	C	C			C	C	C	F	F	F	F	C	C	C	C	C	C	C	C	E	F		
2200pF	222	M	M	M	C	C	C			C	C	C	F	F	F		C	C	C	C	C	C	C	C	E	F		
2700pF	272	M	M	M	C	C	C			C	C	C	F	F	F		C	C	C	C	C	C	C	C	F	G		
3300pF	332	M	M	M	C	C	C			C	C	C	F	F	F		C	C	C	C	C	C	C	C	F	G		
3900pF	392	M	M	M	C	C	C			C	C	C	F	F			C	C	C	C	C	C	C	C	G			
4700pF	472	M	M	M	E	C				C	C	C	F	F			C	C	C	C	C	C	C	C	G			
5600pF	562	M	M	M	E	C				C	C	E	F	F			C	C	C	C	C	C	C	C	G			
6800pF	682	M	M	M	E	E				C	C	E	F	F			C	C	C	C	C	C	C	C				
8200pF	822	M	M	M	E	E				C	E	F	F	F			C	C	C	C	C	C	C	C				
0.010μF	103	M	M	M	E	F				C	E	F	F	F			C	C	C	C	C	C	C					
0.012μF	123	C	C	C	F	F				E	F	F	F				C	C	C	C	E	E	E					
0.015μF	153	C	C	C	G	G				E	F	F					C	C	C	C	E	E	E					
0.018μF	183		F	G	G	G				F	F	F					C	C	C	E	F	F	F					
0.022μF	223		F	G	G					F	F						C	C	C	E	F	F	F					
0.027μF	273		G	G	G					F	F						C	E	E	F	G	G	G					
0.033μF	333		G	G	G					F							C	E	E	F	G	G	G					
0.039μF	393		G	G						F								F	F	G	G	G						
0.047μF	473		G	G														F	F	G	G							
0.056μF	563		G															F	G	G	G							
0.068μF	683		G															F	G	G								
0.082μF	823																	F	G	G								
0.100μF	104																	F	G	G								
0.120μF	124																	F	G									
0.150μF	154																	F	G									

MLCC

Chip R

Diode

Coil

## ■ Anti-Bend (Soft termination) Capacitor Series

### RATING

Size		NPO																								
Cap	Code	1825							2220							2225										
		25V 50V	100V	200V 250V	500V 630V	1KV	1.5KV 2KV	3KV	25V 50V	100V	200V 250V	500V	630V	1KV	1.5KV 2KV	3KV	4KV	25V 50V	100V	200V 250V	500V	630V	1KV	1.5KV 2KV	3KV	4KV
10pF	100	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
12pF	120	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
15pF	150	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
18pF	180	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
22pF	220	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
27pF	270	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
33pF	330	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
39pF	390	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
47pF	470	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
56pF	560	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
68pF	680	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
82pF	820	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
100pF	101	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
120pF	121	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
150pF	151	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
180pF	181	E	E	E	E	E	E	E	E	E	E	E	E	E		F		E	E	E	E	E	E	E	E	F
220pF	221	E	E	E	E	E	E	E	E	E	E	E	E	E		F		E	E	E	E	E	E	E	E	F
270pF	271	E	E	E	E	E	E	E	E	E	E	E	E	E		E	G		E	E	E	E	E	E	E	G
330pF	331	E	E	E	E	E	E	E	E	E	E	E	E	E		E	G		E	E	E	E	E	E	E	
390pF	391	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
470pF	471	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
560pF	561	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
680pF	681	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
820pF	821	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
1000pF	102	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
1200pF	122	E	E	E	E	E	E	E	E	E	E	E	E	E		E		E	E	E	E	E	E	E	E	
1500pF	152	E	E	E	E	E	E	F	E	E	E	E	E	E		F		E	E	E	E	E	E	E	E	
1800pF	182	E	E	E	E	E	E	F	E	E	E	E	E	E		G		E	E	E	E	E	E	E	E	F
2200pF	222	E	E	E	E	E	E	G	E	E	E	E	E	E		G		E	E	E	E	E	E	E	E	F
2700pF	272	E	E	E	E	E	E	G	E	E	E	E	E	E		G		E	E	E	E	E	E	E	E	G
3300pF	332	E	E	E	E	E	E		E	E	E	E	E	E				E	E	E	E	E	E	E	E	G
3900pF	392	E	E	E	E	E	E		E	E	E	E	E	E				E	E	E	E	E	E	E	E	
4700pF	472	E	E	E	E	E	F		E	E	E	E	E	F				E	E	E	E	E	E	E	E	
5600pF	562	E	E	E	E	F	F		E	E	E	E	E	F	F			E	E	E	E	E	E	F		
6800pF	682	E	E	E	E	F	G		E	E	E	E	E	F	G			E	E	E	E	E	E	F		
8200pF	822	E	E	E	E	G	G		E	E	E	E	E	G	G			E	E	E	E	E	F	G		
0.010μF	103	E	E	E	E	G			E	E	E	E	E	G				E	E	E	E	E	G	G		
0.012μF	123	E	E	E	E	G			E	E	E	E	E	G				E	E	E	E	E	G			
0.015μF	153	E	E	E	E				E	E	E	E	E					E	E	E	E	E				
0.018μF	183	E	E	E	E				E	E	E	E	E					E	E	E	E	E				
0.022μF	223	E	E	E	E				E	E	E	E	E					E	E	E	E	E				
0.027μF	273	E	E	E	F				E	E	E	E	E					E	E	E	E	E				
0.033μF	333	E	E	E	F				E	E	F	F	F					E	E	E	E	E				
0.039μF	393	E	E	F	G				E	E	F	F	F					E	E	F	F	F				
0.047μF	473	E	E	F	G				E	E	G	G	G					E	E	F	F	F				
0.056μF	563	E	F	G	G				E	F	G	G	G					E	E	G	G	G				
0.068μF	683	E	F	G	G				E	F	G	G						E	F	G	G	G				
0.082μF	823	F	G	G					F	G	G							F	F	G	G	G				
0.100μF	104	G	G	G					G	G	G							F	G	G	G					
0.120μF	124	G	G						G	G								G	G	G						
0.150μF	154	G							G	G								G	G	G						
0.180μF	184								G	G								G	G							
0.220μF	224								G									G	G							
0.270μF	274								G									G								
0.330μF	334																	G								

MLCC  
Chip R  
Diode  
Coil

## ■ Anti-Bend (Soft termination) Capacitor Series

### RATING

#### X7R

Size	0402					0603					0805										1206														
	Cap	Code	6.3V	10V 16V	25V	50V	100V	6.3V	10V 16V	25V	50V	100V	200V 250V	6.3V	10V	16V	25V	50V	100V	200V	250V	500V 630V	1KV	6.3V	10V	16V	25V	50V	100V	200V 250V	500V 630V	1KV	1.5KV	2KV	
100pF	101		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	X							C	C	C	C	C	
120pF	121		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	X							C	C	C	C	C	
150pF	151		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	X		C	C	C	C	C	C	C	C	C		
180pF	181		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	X		C	C	C	C	C	C	C	C	C		
220pF	221		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	X		C	C	C	C	C	C	C	C	C		
270pF	271		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	X		C	C	C	C	C	C	C	C	C		
330pF	331		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	X		C	C	C	C	C	C	C	C	C		
390pF	391		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	X		C	C	C	C	C	C	C	C	C		
470pF	471		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	X		C	C	C	C	C	C	C	C	C		
560pF	561		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	X		C	C	C	C	C	C	C	C	C		
680pF	681		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	X		C	C	C	C	C	C	C	C	C		
820pF	821		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	X		C	C	C	C	C	C	C	C	C		
1000pF	102		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	X		C	C	C	C	C	C	C	C	C		
1200pF	122		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	X		C	C	C	C	C	C	C	C	E	E	
1500pF	152		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	C		C	C	C	C	C	C	C	C	E	E	
1800pF	182		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	C		C	C	C	C	C	C	C	C	E	E	
2200pF	222		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	C		C	C	C	C	C	C	C	C	E	E	
2700pF	272		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	C		C	C	C	C	C	C	C	C	E	E	
3300pF	332		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	C		C	C	C	C	C	C	C	C	E	E	
3900pF	392		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	X	C		C	C	C	C	C	C	C	C	E		
4700pF	472		K	K	K	K		S	S	S	S	B		C	C	C	C	C	C	C	C	C	C		C	C	C	C	C	C	C	C	E		
5600pF	562		K	K	K			S	S	S	S	B		C	C	C	C	C	C	C	C	C	C		C	C	C	C	C	C	C	C	E		
6800pF	682		K	K	K			S	S	S	S	B		C	C	C	C	C	C	C	C	C	C		C	C	C	C	C	C	C	C	E		
8200pF	822		K	K	K			S	S	S	S	B		C	C	C	C	C	C	C	C	C	C		C	C	C	C	C	C	C	C			
0.010μF	103		K	K	K			S	S	S	S	B		C	C	C	C	C	C	C	C	C			C	C	C	C	C	C	C	C			
0.012μF	123		K	K				S	S	S	B	B		C	C	C	C	C	C	C	C	C			C	C	C	C	C	C	C	E			
0.015μF	153		K	K				S	S	S	B	B		C	C	C	C	C	C	C	C	C			C	C	C	C	C	C	C	E			
0.018μF	183		K	K				S	S	S	B			C	C	C	C	C	C	C	C	C			C	C	C	C	C	C	C				
0.022μF	223		K	K				S	S	S	B			C	C	C	C	C	C	C	C	C			C	C	C	C	C	C	E				
0.027μF	273		K	K				S	S	S	B			C	C	C	C	C	C	C	C	C			C	C	C	C	C	C	E				
0.033μF	333		K	K				S	S	B	B			C	C	C	C	C	C	C	C	C			C	C	C	C	C	E	E				
0.039μF	393		K	K				S	S	B	B			C	C	C	C	C	C	C	C	C			C	C	C	C	C	E	E				
0.047μF	473		K	K				S	S	B	B			C	C	C	C	C	C	C	C	C			C	C	C	C	C	E	E				
0.056μF	563		K					S	S	B	B			C	C	C	C	C	C	C	C	C			C	C	C	C	C	E	E				
0.068μF	683		K					S	S	B	B			C	C	C	C	C	C	C	C	C			C	C	C	C	C	E					
0.082μF	823		K					S	S	B	B			C	C	C	C	C	C	C	C	C			C	C	C	C	C	E					
0.100μF	104	K	K					S	S	B	B			C	C	C	C	C	C	C	C	C			C	C	C	C	C	E					
0.120μF	124							S	B					C	C	C	C	I							C	C	C	C	C						
0.150μF	154							S	B					C	C	C	C	I								M	M	M	M	E					
0.180μF	184							S	B					C	C	C	C	I								M	M	M	M	E					
0.220μF	224							S	B					C	C	C	C	I								M	M	M	M	E					
0.270μF	274								B	B				I	I	I	I									M	M	M	C	E					
0.330μF	334								B	B				I	I	I	I									M	M	M	C	E					
0.390μF	394								B	B				I	I	I	I									M	M	J	P	E					
0.470μF	474								B	B	B			I	I	I	I	I								J	J	J	P	E					
0.560μF	564								B	B				I	I	I	I									J	J	J	P	P					
0.680μF	684								B	B				I	I	I	I									J	J	J	P	P					
0.820μF	824								B					I	I	I										J	J	J	P	P					
1μF	105								B	B				I	I	I	I									J	J	J	P	P					
1.5μF	155													I	I	I										J	J	J	P						
2.20μF	225													I	I	I	I									J	J	J	P	P					
3.3μF	335																									P	P	P							
4.7μF	475														I											P	P	P	P						
10μF	106																									P	P								

MLCC

Chip R

Diode

Coil

## ■ Anti-Bend (Soft termination) Capacitor Series

### RATING

#### X7R

Size		1210										1808							1812													
Cap	Code	10V	16V	25V	50V	100V	200V 250V	400V	500V 630V	1KV	1.5KV	2KV	25V 50V	100V	200V 250V	500V 630V	1KV	1.5KV 2KV	3KV	4KV	10V 16V	25V 50V	100V	200V 250V	400V	500V	630V	1KV	1.5KV 2KV	3KV	4KV	
150pF	151											C	C	C	C	C	C	C	F													
180pF	181											C	C	C	C	C	C	C	F													
220pF	221			M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	F													
270pF	271			M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	F		C	C	C	C	C	C	C	C	C	C	F	
330pF	331			M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	F		C	C	C	C	C	C	C	C	C	C	F	
390pF	391			M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	F		C	C	C	C	C	C	C	C	C	C	F	
470pF	471			M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	F		C	C	C	C	C	C	C	C	C	C	F	
560pF	561			M	M	M	M	M	M	M	M	C	C	C	C	C	C	E	F		C	C	C	C	C	C	C	C	C	C	F	
680pF	681			M	M	M	M	M	M	M	M	C	C	C	C	C	C	E	F		C	C	C	C	C	C	C	C	C	C	F	
820pF	821			M	M	M	M	M	M	M	M	C	C	C	C	C	C	E	F		C	C	C	C	C	C	C	C	C	C	F	
1000pF	102	M	M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	F	F		C	C	C	C	C	C	C	C	C	E	F	
1200pF	122	M	M	M	M	M	M	M	M	M	E	E	C	C	C	C	C	F			C	C	C	C	C	C	C	C	C	F	G	
1500pF	152	M	M	M	M	M	M	M	M	M	E	E	C	C	C	C	C	F			C	C	C	C	C	C	C	C	C	F	G	
1800pF	182	M	M	M	M	M	M	M	M	M	E	E	C	C	C	C	C	F			C	C	C	C	C	C	C	C	C	G	G	
2200pF	222	M	M	M	M	M	M	M	M	M	F	F	C	C	C	C	C	F			C	C	C	C	C	C	C	C	C	G		
2700pF	272	M	M	M	M	M	M	M	M	M	F	G	C	C	C	C	C	F			C	C	C	C	C	C	C	C	C	G		
3300pF	332	M	M	M	M	M	M	M	M	M	F	G	C	C	C	C	C	F			C	C	C	C	C	C	C	C	E	G		
3900pF	392	M	M	M	M	M	M	M	M	M	G	G	C	C	C	C	C	F			C	C	C	C	C	C	C	C	F			
4700pF	472	M	M	M	M	M	M	M	M	M	G	G	C	C	C	C	C	F			C	C	C	C	C	C	C	C	F			
5600pF	562	M	M	M	M	M	M	M	M	M	G	G	C	C	C	C	C	F			C	C	C	C	C	C	C	C	G			
6800pF	682	M	M	M	M	M	M	M	M	M	G	G	C	C	C	C	C	F			C	C	C	C	C	C	C	C	G			
8200pF	822	M	M	M	M	M	M	M	M	M	G	G	C	C	C	C	C				C	C	C	C	C	C	C	C	G			
0.010μF	103	M	M	M	M	M	M	M	M	C			C	C	C	C	C				C	C	C	C	C	C	C	C	G			
0.012μF	123	M	M	M	M	M	M	M	M	C			E	E	E	E	E				C	C	C	C	C	C	C	C				
0.015μF	153	M	M	M	M	M	M	M	M	E			E	E	E	E	E				C	C	C	C	C	C	C	C				
0.018μF	183	M	M	M	M	M	M	M	C	E			E	E	E	F	F				C	C	C	C	C	C	C	E				
0.022μF	223	M	M	M	M	M	M	M	C	E			E	E	E	F	F				C	C	C	C	C	C	C	E				
0.027μF	273	M	M	M	M	M	M	M	C	E			E	E	E	F	F				C	C	C	C	C	C	C	F				
0.033μF	333	M	M	M	M	M	M	M	E	E			E	E	E	F	F				C	C	C	C	C	C	C	F				
0.039μF	393	M	M	M	M	M	M	M	E	F			E	E	E	F	F				C	C	C	C	C	C	C	G				
0.047μF	473	M	M	M	M	M	C	M	E	G			E	E	E	F	F				C	C	C	C	C	C	C	G				
0.056μF	563	M	M	M	M	M	C	M	E	G			E	E	E	F	F				C	C	C	C	C	E	E	G				
0.068μF	683	M	M	M	M	M	E	M	F	G			E	E	E	F					C	C	C	C	C	E	E	G				
0.082μF	823	M	M	M	M	M	E	M	F				E	E	E	F					C	C	C	C	C	E	E	G				
0.100μF	104	M	M	M	M	M	E	M	F				E	E	E						C	C	C	C	C	E	E	G				
0.120μF	124	M	M	M	M	M	E	E	G				E	E	E						C	C	C	C	C	F	F					
0.150μF	154	M	M	M	M	C	E	E	G				E	E	E						C	C	C	C	C	F	F					
0.180μF	184	M	M	M	M	C	E	E					E	E	F						C	C	C	C	C	G	G					
0.220μF	224	M	M	M	M	C	E	E					E	E							C	C	C	C	C	G	G					
0.270μF	274	M	M	M	M	E	F	F					F	F							C	C	C	E	E	G						
0.330μF	334	M	M	M	C	E	F	F					F	F							C	C	C	E	E	G						
0.390μF	394	M	M	M	C	E	G	G					F	F							C	C	C	F	F	G						
0.470μF	474	M	M	M	C	E	G	G					F								C	C	C	F	F	G						
0.560μF	564	C	C	C	C	E	G						F								C	C	C	G	G							
0.680μF	684	C	C	C	C	F	G						F								C	C	C	G	G							
0.820μF	824	C	C	C	C	F															C	C	C	G								
1μF	105	C	C	C	C	F															C	C	C	G								
1.2μF	125																					C	C									
1.5μF	155		F	E	G	G																C	C									
1.8μF	185																						E	E								
2.20μF	225		F	E	G	G																	E	E								
2.70μF	275																						F	F								
3.3μF	335		F	E	G	G																	F	F								
3.9μF	395																						F	F								
4.7μF	475	F	F	F	G																		G	G								
5.6μF	565																						G	G								
6.8μF	685																						G									
8.2μF	825																						G									
10μF	106	F	F																				G									

MLCC

Chip R

Diode

Coil

## ■ Anti-Bend (Soft termination) Capacitor Series

### RATING

#### X7R

Size		1825																2220								2225							
Cap	Code	25V 50V	100V	200V 250V	500V 630V	1KV	1.5KV 2KV	3KV	4KV	25V 50V	100V	200V 250V	400V	500V 630V	1KV	1.5KV 2KV	3KV	4KV	25V 50V	100V	200V 250V	500V 630V	1KV	1.5KV	2KV	3KV	4KV						
270pF	271								F									F										F					
330pF	331								F									F										F					
390pF	391								F									F										F					
470pF	471								F									F										F					
560pF	561								F									F										F					
680pF	681								F									F										F					
820pF	821								F									F										F					
1000pF	102	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F					
1200pF	122	F	F	F	F	F	F	F	G	F	F	F	F	F	F	F	F	G	F	F	F	F	F	F	F	F	F	G					
1500pF	152	F	F	F	F	F	F	F	G	F	F	F	F	F	F	F	F	G	F	F	F	F	F	F	F	F	F	G					
1800pF	182	F	F	F	F	F	F	F	G	F	F	F	F	F	F	F	F	G	F	F	F	F	F	F	F	F	F	G					
2200pF	222	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F						
2700pF	272	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F						
3300pF	332	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F						
3900pF	392	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F						
4700pF	472	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F						
5600pF	562	F	F	F	F	F	F	G		F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	G						
6800pF	682	F	F	F	F	F	F	G		F	F	F	F	F	F	F	G		F	F	F	F	F	F	F	F	G						
8200pF	822	F	F	F	F	F	F	G		F	F	F	F	F	F	G	G		F	F	F	F	F	F	F	F	G						
0.010μF	103	F	F	F	F	F	F	G		F	F	F	F	F	F	G	G		F	F	F	F	F	F	F	F	G						
0.012μF	123	F	F	F	F	F	G	H		F	F	F	F	F	F	G	H		F	F	F	F	F	F	G	G	G						
0.015μF	153	F	F	F	F	F	G	H		F	F	F	F	F	F	G	H		F	F	F	F	F	F	G	G	G						
0.018μF	183	F	F	F	F	F	G	H		F	F	F	F	F	F	H	H		F	F	F	F	F	F	G	G	H						
0.022μF	223	F	F	F	F	F	G			F	F	F	F	F	F	H			F	F	F	F	F	F	G	G							
0.027μF	273	F	F	F	F	F	H			F	F	F	F	F	F	H			F	F	F	F	F	F	G	G							
0.033μF	333	F	F	F	F	F	H			F	F	F	F	F	F	H			F	F	F	F	F	F	G	G							
0.039μF	393	F	F	F	F	F	H			F	F	F	F	F	F	H			F	F	F	F	F	F	G	H							
0.047μF	473	F	F	F	F	F	H			F	F	F	F	F	F	H			F	F	F	F	F	F	G	H							
0.056μF	563	F	F	F	F	F	H			F	F	F	F	F	F	H			F	F	F	F	F	F	G	H							
0.068μF	683	F	F	F	F	F				F	F	F	F	F	F				F	F	F	F	F	F	G								
0.082μF	823	F	F	F	F	F				F	F	F	F	F	F				F	F	F	F	F	F	G								
0.100μF	104	F	F	F	F	G				F	F	F	F	F	G				F	F	F	F	F	G	G								
0.120μF	124	F	F	F	F	H				F	F	F	F	F	G				F	F	F	F	F	H									
0.150μF	154	F	F	F	F	H				F	F	F	F	F	H				F	F	F	F	F	H									
0.180μF	184	F	F	F	F	H				F	F	F	F	F	H				F	F	F	F	F	H									
0.220μF	224	F	F	F	F	H				F	F	F	F	F	H				F	F	F	F	F	H									
0.270μF	274	F	F	F	F	H				F	F	F	F	F	H				F	F	F	F	F	H									
0.330μF	334	F	F	F	F	H				F	F	F	F	F	H				F	F	F	F	F	H									
0.390μF	394	F	F	F	F					F	F	F	F	F	H				F	F	F	F	F	H									
0.470μF	474	F	F	F	F					F	F	F	F	F					F	F	F	F	F										
0.560μF	564	F	F	F	G					F	F	F	G	G					F	F	F	F	F										
0.680μF	684	F	F	F	G					F	F	F	G	G					F	F	F	F	F										
0.820μF	824	F	F	F	H					F	F	F	H	H					F	F	F	G											
1μF	105	F	F	F						F	F	F	H	H					F	F	F	G											
1.2μF	125	F	F	G						F	F	G							F	F	G	H											
1.5μF	155	F	F	G						F	F	G							F	F	G	H											
1.8μF	185	F	F	G						F	F	G							F	F	G												
2.20μF	225	F	F	G						F	F	G							F	F	G												
2.70μF	275	F	F	H						F	F	H							F	F	G												
3.3μF	335	F	F							F	F								F	F	H												
3.9μF	395	F	F							F	F								F	F	H												
4.7μF	475	F	F							F	F								F	F													
5.6μF	565	F	F							F	F								F	F													
6.8μF	685	F	F							F	F								F	F													
8.2μF	825	G	G							G	G								G	G													
10μF	106	G	G							G	G								G	G													
12μF	126									H									H														
15μF	156									H									H														
18μF	186									H									H														
22μF	226									H									H														

MLCC

Chip R

Diode

Coil

## ■ Safety Certified capacitor series (X1/Y2 & X2)

### FEATURES

- Safety standard approval by  
EN 132400: 1994+A2+A3+A4 / EN 60384-14: 2013  
IEC 60384-14: 2013  
UL 60384-14 (Ed 2.0) / UL 62368-1 (2nd Edition)
- Certificate number:  
R 500416666 and R 50359148 by TUV  
E346791 (FOWX2/8) by UL, E231248 By UL
- HALOGEN compliant

### APPLICATION

- DC to DC converter.
- High voltage coupling/DC blocking.
- Back-lighting inverters.
- LAN/WLAN interface.
- Modem.
- Power supplies.



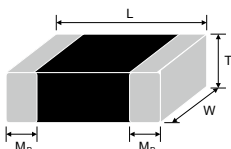
### PART NUMBER

FK	21	X	102	K	502	E	G	G
PDC Family	Size	Dielectric	Capacitance	Tolerance	Rated voltage	Packaging	Thickness	Control Code
<b>FK</b>	<b>06</b> 1206 (3216)	<b>N</b> COG(NPO)	<b>102</b> =10x10 <sup>2</sup>	<b>J</b> = ± 5%	<b>252</b> =2500V	<b>E</b> =	Reference	<b>G</b> =RoHS
Safety X1 & Y2 series	<b>08</b> 1808 (4520)	<b>X</b> X7R	=1000pF	<b>K</b> = ± 10%	<b>502</b> =5000V	Tape and 7" Reel, Embossed Tape	Thickness Description	Compliant
<b>FH</b>	<b>12</b> 1812 (4532)		<b>100</b> =10x10 <sup>0</sup>	<b>M</b> = ± 20%	<b>602</b> =6000V	<b>P</b> =		
Safety X2 series	<b>21</b> 2211 (5728)		=10pF			Tape and 7" Reel, Paper Tape		
	<b>20</b> 2220 (5750)					<b>L</b> =		
						Tape and 13" Reel, Embossed		
						<b>G</b> =		
						Tape and 13" Reel, Paper Tape		

### GENERAL ELECTRICAL DATA

Dielectric	COG (NPO)	X7R	X7R
<b>Size</b>	1808, 1812, 2211	1808, 1812, 2211, 2220	1206
<b>Rated voltage</b>	250VAC		2.5KVDC
<b>Capacitance range*</b>	X1/Y2 Class(Impulse 6KV)	4pF ~ 100pF	X1/Y2 Class 100pF ~ 4.7nF
	X1/Y2 Class(Impulse 5KV)	3pF ~ 720pF	X2 Class 150pF ~ 22nF
	X2 Class	3pF ~ 1000pF	
<b>Capacitance tolerance</b>	Cap<10pF:	D (±0.5pF)	J (± 5%)
	Cap≥10pF:	F (± 1%), G (± 2%), J (± 5%), K (± 10%), M (± 20%)	K (± 10%) M (± 20%)
<b>Tan δ * (Tangent of loss angle)</b>	Cap. Rang	Q Spec.	
	Cap<30pF:	Q≥400+20C	≤2.5%
	Cap≥30pF:	Q≥1000	
Measured at the condition of 30~70% related humidity.			
<b>Capacitance &amp; Tan δ Test Condition</b>	for 25°C at ambient temperature		Class II MLCC: Perform a heat treatment at 150 ± 10°C for 1 hour, then leave in ambient condition for 24 ± 2 hours before measurement.
	Cap. Rang	Test Condition	
	Cap≤1000pF	1.0±0.2Vrms, 1.0MHz±10%	1.0±0.2Vrms, 1.0kHz±10%, at 25°C ambient temperature.
Cap>1000pF	1.0±0.2Vrms, 1.0kHz±10%		
<b>Insulation resistance at 500Vdc for 60 seconds</b>	≥100GΩ or R • C≥1000 whichever is smaller		≥10GΩ or R • C≥500Ω-F whichever is smaller
<b>Operating temperature</b>	- 55°C to + 125°C		
<b>Capacitance characteristic</b>	± 30ppm / °C		± 15%
<b>Termination</b>	(Cu or Ag) / Ni / Sn (lead-free termination)		

### DIMENSIONS



Size inch (mm)	L (mm)	W (mm)	T (mm) code	M <sub>B</sub> min (mm)
1206 (3216)	3.30±0.30	1.60±0.20		0.5±0.25
1808 (4520)	4.50+0.5/-0.3	2.00±0.25	Reference	0.75±0.35
1812 (4532)	4.50+0.5/-0.3	3.20±0.40	Thickness	0.75±0.35
2211 (5728)	5.70±0.40	2.80±0.30	Description	0.85±0.35
2220 (5750)	5.70±0.40	5.00±0.40		

MLCC

Chip R

Diode

Coil

# FK-FH

## ■ Safety Certified capacitor series (X1/Y2 & X2)

### RATING

Class		X1/Y2 (FK Series)								X2 (FH Series)					
Rated Voltage		250Vac												2.5KVdc	
Dielectric		COG				X7R				COG		X7R			X7R
Cap. (pF)	Size	1808	1812	2211	2211	1808	1812	2211	2220	1808	1812	1808	1812	2220	1206
	Impulse	5KV		6KV		5KV				2.5KV					---
3	3R0	D								D					
3.3	3R3	D								D					
4	4R0	D		F	F					D					
4.7	4R7	D		F	F					D					
5	5R0	D		F	F					D					
5.6	5R6	D		F	F					D					
6.8	6R8	D		F	F					D					
8.2	8R2	D		F	F					D					
9	9R0	D		F	F					D					
10	100	D	C	F	F					D	C				
12	120	D	C	F	F					D	C				
15	150	D	C	F	F					D	C				
18	180	D	C	F	F					D	C				
22	220	D	C	F	F					D	C				
27	270	D	C	F	F					D	C				
33	330	D	C	F	F					D	C				
39	390	E	C	F	F					E	C				
47	470	E	C	F	F					E	C				
56	560	E	C	F	F					E	C				
68	680	E	C	F	G					E	C				
82	820	E	C	F	G					E	C				
100	101	F	C	F	H	E				F	C				C
120	121	F	C	G		E				F	C				C
130	131	F	C	G		E		E		F	C				C
150	151	F	C	G		E	E	E		F	C	E			C
160	161	F	C	G		E	E	E	F	F	C	E			C
180	181	F	C	G		E	E	E	F	F	C	E			C
220	221	F	F	G		E	E	E	F	F	C	E			C
270	271	F	F	G		F	E	E	F	F	C	E	E		C
300	301		F	G		F	E	E	F	F	C	E	E		C
330	331		F	G		F	E	E	F	F	C	E	E		C
390	391		F	G		F	E	E	F	F	C	E	E		C
470	471		F	G		F	E	F	F	F	C	E	E		C
560	561			G		F	E	F	F	F	C	E	E		C
680	681			G		F	F	F	F	F	F	E	E		C
720	721			G		F	F	F	F	F	F	E	E		C
820	821					F	F	F	F	F	F	E	E		C
1000	102					F	G	G	F	F	F	F	E		C
1200	122							G	G			F	E		
1500	152							G	G			F	F		
1800	182							G	G			F	F		
2200	222							G	G			F	G		
2700	272								G				G		
3300	332								G				G		
3900	392								G				G		
4700	472								G				G		
5600	562												G		
6800	682														
8200	822														
10000	103														G
12000	123														G
15000	153														G
18000	183														G
22000	223														H

MLCC

Chip R

Diode

Coil

## ■ Extra High Voltage Capacitor Series (≥1KV)

### FEATURES

- Special interior design offers high voltage rating in a given case size.
- High reliability and stability.
- RoHS compliant.

### APPLICATION

- DC to DC converter.
- High voltage coupling/DC blocking.
- Back-lighting inverters.
- LAN/WLAN interface.
- Modem.
- Power supplies.

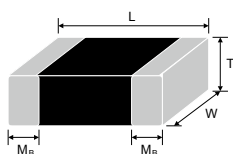
### PART NUMBER

FV	31	X	103	K	102	E	C	G
PDC Family	Size	Dielectric	Capacitance	Tolerance	Rated voltage	Packaging	Thickness	Control Code
<b>High Voltage Series</b>	21 0805 (2012)	N COG(NPO)	102=10x10 <sup>^</sup> 2	J= ± 5%	102=1000V	E= Tape and 7" Reel, Embossed Tape P= Tape and 7" Reel, Paper Tape L= Tape and 13" Reel, Embossed G= Tape and 13"Reel, Paper Tape	Reference Thickness Description	G=RoHS Compliant
	31 1206 (3216)	X X7R	=1000pF	K= ± 10%	152=1500V			
	32 1210 (3225)		100=10x10 <sup>^</sup> 0	M= ± 20%	202=2000V			
	42 1808 (4520)		=10pF		302=3000V			
	43 1812 (4532)				402=4000V			
	46 1825 (4563)							
High voltage application with ≥ 1KVdc	52 2211 (5728)							
	55 2220 (5750)							
	56 2225 (5763)							

### GENERAL ELECTRICAL DATA

Dielectric	COG(NPO)	X7R	
<b>Size</b>	0805,1206, 1210, 1808, 1812, 1825, 2220, 2225	0805,1206, 1210, 1808, 1812, 1825, 2211, 2220, 2225	
<b>Rated voltage (WVDC)</b>	1KV, 1.5KV, 2KV, 3KV,4KV	1KV, 1.5KV, 2KV, 3KV,4KV	
<b>Capacitance range*</b>	1.5pf ~ 12nF	100pF ~ 390nF	
<b>Capacitance tolerance</b>	Cap≤5pF: B (±0.1pF), C (±0.25pF)	J (±5%)	
	5pF<Cap<10pF: C (±0.25pF), D (±0.5pF)	K (±10%)	
	Cap≥10pF: F (±1%), G (±2%), J (±5%), K (±10%)	M (±20%)	
<b>Tan δ *</b>	Cap. Rang	Q Spec.	
	Cap<30pF:	Q≥400+20C	≤2.5%
	Cap≥30pF:	Q≥1000	
Measured at the condition of 30~70% related humidity.			
<b>Capacitance &amp; Tan δ Test Condition</b>	for 25°C at ambient temperature		Preconditioning for Class II MLCC: Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement.
	Cap. Rang	Test Condition	Apply 1.0±0.2Vrms, 1.0kHz±10%, at 25°C ambient temperature.
	Cap≤1000pF	1.0±0.2Vrms, 1.0MHz±10%	
Cap > 1000pF	1.0±0.2Vrms, 1.0kHz±10%		
<b>Insulation resistance</b>	≥100GΩ or R • C≥ 500Ω·F whichever is smaller	≥10GΩ or R • C≥100Ω·F whichever is smaller	
<b>Operating temperature</b>	-55 to +125°C		
<b>Temperature coefficient</b>	±30ppm / °C	±15%	
<b>Termination</b>	Ag (or Cu)/Ni/Sn (lead-free termination)		

### DIMENSIONS



Size inch (mm)	L (mm)	W (mm)	T (mm) code	M <sub>B</sub> min (mm)
0805 (2012)	2.10±0.20	1.25±0.20		0.50±0.20
1206 (3216)	3.30±0.30	1.60±0.20		0.60±0.20
1210 (3225)	3.30±0.40	2.50±0.30		0.75±0.35
1808 (4520)	4.50+0.50/-0.30	2.00±0.25	Reference Thickness Description	0.75±0.35
1812 (4532)	4.50+0.50/-0.30	3.20±0.30		0.75±0.35
1825 (4563)	4.50+0.50/-0.30	6.30±0.40		0.75±0.35
2211 (5728)	5.70±0.40	2.80±0.30		0.85±0.35
2220 (5750)	5.70±0.40	5.00±0.40		0.85±0.35
2225 (5763)	5.70±0.50	6.30±0.40		0.85±0.35

MLCC

Chip R

Diode

Coil



## ■ Extra High Voltage Capacitor Series (≥1KV)

### RATING

### COG(NPO)

Size	0805	1206					1210					1808					1812					1825					2220					2225					
		Cap	Code	1KV	1KV	1.5KV	2KV	3KV	1KV	1.5KV	2KV	3KV	1KV	1.5KV	2KV	3KV	1KV	1.5KV	2KV	3KV	1KV	1.5KV	2KV	3KV	1KV	1.5KV	2KV	3KV	4KV	1KV	1.5KV	2KV	3KV	4KV			
1.5pF	1R5	C	X	X	X																																
1.8pF	1R8	C	X	X	X																																
2.2pF	2R2	C	X	X	X							C	C	C	C																						
2.7pF	2R7	C	X	X	X							C	C	C	C																						
3.3pF	3R3	C	X	X	X							C	C	C	C																						
3.9pF	3R9	C	X	X	X							C	C	C	C																						
4.7pF	4R7	C	X	X	X							C	C	C	C																						
5pF	5R0	C	X	X	X							C	C	C	C																						
5.6pF	5R6	C	X	X	X							C	C	C	C																						
6.8pF	6R8	C	X	X	X							C	C	C	C																						
8.2pF	8R2	C	X	X	X							C	C	C	C																						
10pF	100	C	X	X	X	E	M	M	M	F	C	C	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
12pF	120	C	X	X	X	E	M	M	M	F	C	C	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
15pF	150	C	X	X	X	E	M	M	M	F	C	C	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
18pF	180	C	X	X	X	E	M	M	M	F	C	C	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
22pF	220	C	X	X	X	E	M	M	M	F	C	C	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
27pF	270	C	X	X	X	E	M	M	M	F	C	C	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
33pF	330	C	X	M	M	E	M	M	M	F	C	C	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
39pF	390	C	X	M	M	E	M	M	M	F	C	C	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
47pF	470	C	M	M	M	E	M	M	M	F	C	C	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
56pF	560	C	M	C	C	E	M	C	C	F	C	C	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
68pF	680	C	M	C	C	E	M	C	C	F	C	C	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
82pF	820	C	C	C	C	E	M	C	C	F	C	C	C	C	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
100pF	101	C	C	C	C		C	C	C	F	C	C	C	F	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
120pF	121	C	C	E	E		C	C	C	F	C	C	C	F	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
150pF	151	C	C	E	E		C	E	E	F	C	F	F	F	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
180pF	181	C	E	E	E		C	E	E	F	C	F	F	F	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
220pF	221	C	E	E	E		E	E	E	F	C	F	F	F	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
270pF	271	C	E	E	E		E	E	E	G	F	F	F	F	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	G	
330pF	331	C	E	E	E		E	E	E		F	F	F	F	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
390pF	391		E	E	E		E	E	E		F	F	F	F	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
470pF	471		E	E	E		E	E	E		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
560pF	561		E				E	E	E		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
680pF	681		E				E	E	E		F	F	F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
820pF	821		E				E	E	E		F	F	F		F	F	F	G	F	F	F	G	F	F	F	G	F	F	F	G		F	G	G	G		
1000pF	102		E				E	F	F		F	F	F		F	F	F	G	F	F	F	G	F	F	F	G	F	F	F	G		F	G	G	G		
1200pF	122		E				E	F	F		F	F	F		F	F	F		F	F	F	G	G	G	G	G					F	G	G	G	G		
1500pF	152						F	G	G		F	F	F		F	F	F		F	G	G	G	G	G	G	G					F	G	G	G	G		
1800pF	182						G	G	G		F	F	F		F	F	F		F	G	G	G	G	G	G	G					F	G	G	G	G		
2200pF	222						G				F				F	F	F		F	G	G	G	G	G	G	G					F	G	G	G	G		
2700pF	272						G				F				F	G	G		F	G	G	G	G	G	G	G					F	G	G	G	G		
3300pF	332						G				F				F	G	G		F	G	G		G	G	G					F	G	G	G	G			
3900pF	392						G								G				G	G	G		G	G	G					F	G	G					
4700pF	472														G				G	G	G		G	G	G					F	G	G					
5600pF	562														G				G	G	G		G	G	G					G	G	G					
6800pF	682																		G	G	G		G	G	G					G	G	G					
8200pF	822																		G	G	G		G	G	G					G	G	G					
0.01μF	103																		G				G							G	G	G					
0.012μF	123																		G				G							G							

MLCC

Chip R

Diode

Coil

## Extra High Voltage Capacitor Series (≥1KV)

### RATING

#### X7R

Size	0805	1206			1210			1808					1812					1825					2211		2220					2225											
		Cap	Code	1KV	1.5KV	2KV	1KV	1.5KV	2KV	1KV	1.5KV	2KV	3KV	4KV	1KV	1.5KV	2KV	3KV	4KV	1KV	1.5KV	2KV	3KV	4KV	3KV	4KV	1KV	1.5KV	2KV	3KV	4KV	1KV	1.5KV	2KV	3KV	4KV					
100pF	101	X	C	C	C																																				
120pF	121	X	C	C	C																																				
150pF	151	X	C	C	C				C	C	C	C	F																												
180pF	181	X	C	C	C				C	C	C	C	F																												
220pF	221	X	C	C	C	C	E	E	C	C	C	C	F																												
270pF	271	X	C	C	C	C	E	E	C	C	C	C	F	C	C	C	E	F						F	F	F									F		F				
330pF	331	X	C	C	C	C	E	E	C	C	C	F	F	C	C	C	E	F						F	F	F									F		F				
390pF	391	X	C	C	C	C	E	E	C	C	C	F	F	C	C	C	E	F						F	F	F									F		F				
470pF	471	X	C	C	C	C	E	E	C	C	C	F	F	C	C	C	E	F						F	F	F									F		F				
560pF	561	X	C	C	C	C	E	E	C	C	C	F	F	C	C	C	E	F						F	F	F									F		F				
680pF	681	X	C	C	C	C	E	E	C	C	C	F	F	C	C	C	F	F						F	F	F									F		F				
820pF	821	X	C	C	C	C	E	E	C	C	C	F	F	C	C	C	F	F						F	F	F									F		F				
1000pF	102	X	C	C	C	C	E	E	C	C	C	F	F	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F				
1200pF	122	X	C	E	E	C	F	F	C	F	F	F		C	C	C	F	G	F	F	F	F	G	G	G	F	F	F	F	G	F	F	F	F	G	F	G				
1500pF	152	C	C	E	E	C	F	F	C	F	F	F		C	C	C	F	G	F	F	F	F	G	G	G	F	F	F	F	G	F	F	F	F	G	F	G				
1800pF	182	C	C	E	E	C	F	F	C	F	F	F		C	E	E	G	G	F	F	F	F	G	G	G	F	F	F	F	G	F	F	F	F	G	F	G				
2200pF	222	C	C	E	E	C	F	F	C	F	F	F		C	E	E	G		F	F	F	F		G		F	F	F	F		F	F	F	F		F	F	F			
2700pF	272	C	C	E	E	C	G	G	C	F	F			C	E	E	G		F	F	F	F		G		F	F	F	F		F	F	F	F		F	F	F			
3300pF	332	C	C	E	E	C	G	G	C	F	F			C	F	F	G		F	F	F	F		G		F	F	F	F		F	F	F	F		F	F	F			
3900pF	392	C	C	E		E	G	G	C	F	F			C	F	F	G		F	F	F	F				F	F	F	F		F	F	F	F		F	F	F			
4700pF	472	C	C	E		E	G	G	C	F	F			C	F	F	G		F	F	F	F				F	F	F	F		F	F	F	F		F	F	F			
5600pF	562	C	C			E	G	G	F	F	F			C	G	G			F	F	F	G				F	F	F	F		F	F	F	G		F	F	F			
6800pF	682	C	C			E	G	G	F	F	F			C	G	G			F	F	F	G				F	F	F	G		F	F	F	G		F	F	F			
8200pF	822	C	C			E	G	G	F					C	G	G			F	F	F	G				F	G	G	G		F	G	G	G		F	F	F			
0.010μF	103		C			E			F					E	G	G			F	F	F	G				F	G	G	G		F	F	F	G		F	F	F			
0.012μF	123		E			E			F					F					F	G	G	H				F	G	G	H		F	G	G	G		F	G	G			
0.015μF	153		E			E			F					F					F	G	G	H				F	G	G	H		F	G	G	G		F	G	G			
0.018μF	183		E			E			F					G					F	G	G	H				F	H	H	H		F	G	G	H		F	G	G			
0.022μF	223		E			E			F					G					F	G	G					F	H	H		F	H	H		F	G	G		F	G	G	
0.027μF	273					E			F					G					F	H	H					F	H	H		F	H	H		F	G	G		F	G	G	
0.033μF	333					E			F					G					F	H	H					F	H	H		F	H	H		F	G	G		F	G	G	
0.039μF	393					F			F					G					F	H	H					F	H	H		F	H	H		F	G	H		F	G	H	
0.047μF	473					G			F					G					F	H	H					F	H	H		F	H	H		F	G	H		F	G	H	
0.056μF	563					G			F					G					F	H	H					F	H	H		F	H	H		F	G	H		F	G	H	
0.068μF	683					G								G					F							G				F				F	G		F	G		F	G
0.082μF	823													G					G							G				F				F	G		F	G		F	G
0.10μF	104													G					G							G				F				F	G		F	G		F	G
0.12μF	124																		H							G				F				F	G		F	G		F	G
0.15μF	154																		H							G				F				F	G		F	G		F	G
0.18μF	184																		H							G				F				F	G		F	G		F	G
0.22μF	224																		H							G				F				F	G		F	G		F	G
0.27μF	274																		H							G				F				F	G		F	G		F	G
0.33μF	334																		H							G				F				F	G		F	G		F	G
0.39μF	394																		H							G				F				F	G		F	G		F	G

MLCC

Chip R

Diode

Coil

## Mid-Voltage Capacitor Series (100V~630V)

### FEATURES

- High Voltage in a given case size.
- High reliability and stability.
- RoHS compliant.

### APPLICATION

- DC to DC converter.
- High voltage coupling/DC blocking.
- Back-lighting inverters.
- Sunbbers in high frequency power convertors.

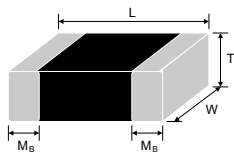
### PART NUMBER

FM	31	X	471	K	251	P	X	G	X
PDC Family	Size	Dielectric	Capacitance	Tolerance	Rated voltage	Packaging	Thickness	Control Code	Control Code
<b>Medium Voltage Series</b>	<b>15</b> 0402 (1005) <b>18</b> 0603 (1608) <b>21</b> 0805 (2012) <b>31</b> 1206 (3216) <b>32</b> 1210 (3225) <b>42</b> 1808 (4520) <b>43</b> 1812 (4532) <b>46</b> 1825 (4563) <b>55</b> 2220 (5750) <b>56</b> 2225 (5763)	<b>N</b> COG(NPO) <b>X</b> X7R <b>F</b> Y5V	<b>102</b> =10x10 <sup>∧</sup> 2 =1000pF <b>100</b> =10x10 <sup>∧</sup> 0 =10pF	<b>J</b> =±5 % <b>K</b> =±10 % <b>M</b> =±20 % <b>Z</b> = -20/+80%	<b>101</b> =100V <b>201</b> =200V <b>251</b> =250V <b>501</b> =500V <b>631</b> =630V	<b>E</b> = Tape and 7" Reel, Embossed Tape <b>P</b> = Tape and 7" Reel, Paper Tape <b>L</b> = Tape and 13" Reel, Embossed <b>G</b> = Tape and 13"Reel, Paper Tape	Reference Thickness Description	<b>G</b> =RoHS Compliant Compliant Q= Surface Coating (Size 1206~2225)	<b>Blank</b> = Standard <b>X</b> = Special Tolerance

### GENERAL ELECTRICAL DATA

Dielectric	COG(NPO)	X7R	Y5V
<b>Size</b>	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	0805, 1206, 1210, 1812
<b>Rated voltage (WVDC)</b>	100V, 200V, 250V, 500V, 630V	100V, 200V, 250V, 500V, 630V	100V, 200V, 250V
<b>Capacitance range*</b>	0.5pF ~ 220nF	100pF ~ 820nF	10nF ~ 680nF
<b>Capacitance tolerance</b>	Cap ≤ 5pF: B (±0.1pF), C (±0.25pF) 5pF < Cap < 10pF: C (±0.25pF), D (±0.5pF) Cap ≥ 10pF: F (±1%), G (±2%), J (±5%), K (±10%)	J (±5%) K (±10%) M (±20%)	M (±20%) Z (-20/+80%)
<b>Tan δ</b>	Cap. Rang Q Spec. Cap < 30pF: Q ≥ 400+20C Cap ≥ 30pF: Q ≥ 1000	≤ 2.5%	≤ 5%
Measured at the condition of 30~70% related humidity.			
<b>Capacitance &amp; Tan δ Test Condition</b>	for 25°C at ambient temperature	Preconditioning for Class II MLCC: Perform a heat treatment at 150 ± 10°C for 1 hour, then leave in ambient condition for 24 ± 2 hours before measurement.	
Cap. Rang	Test Condition	1.0 ± 0.2Vrms, 1.0kHz ± 10%, at 25°C ambient temperature.	1.0 ± 0.2Vrms, 1.0kHz ± 10%, at 20°C ambient temperature.
Cap ≤ 1000pF	1.0 ± 0.2Vrms, 1.0MHz ± 10%		
Cap > 1000pF	1.0 ± 0.2Vrms, 1.0kHz ± 10%		
<b>Insulation resistance at Ur</b>	≥ 100GΩ or R • C ≥ 500Ω-F whichever is smaller	≥ 10GΩ or R • C ≥ 100Ω-F whichever is smaller	
<b>Operating temperature</b>	-55 to +125°C	-25 to +85°C	
<b>Capacitance characteristic</b>	± 30ppm / °C	± 15%	+30/-80%
<b>Termination</b>	Cu (or Ag)/Ni/Sn (lead-free termination)		

### DIMENSIONS



Size inch (mm)	L (mm)	W (mm)	T (mm) code	M <sub>B</sub> min (mm)
0402 (1005)	1.00 ± 0.1	0.50 ± 0.1		0.25 +0.05/-0.10
0603 (1608)	1.60 ± 0.15	0.80 ± 0.15		0.40 ± 0.15
0805 (2012)	2.00 ± 0.20	1.25 ± 0.20		0.50 ± 0.20
1206 (3216)	3.20 ± 0.2	1.60 ± 0.20		0.60 ± 0.20
1210 (3225)	3.20 ± 0.30	2.50 ± 0.30		0.75 ± 0.35
1808 (4520)	4.50 ± 0.40	2.00 ± 0.25	Reference Thickness Description	0.75 ± 0.35
1812 (4532)	4.50 ± 0.40	3.20 ± 0.30		0.75 ± 0.35
1825 (4563)	4.50 ± 0.40	6.30 ± 0.40		0.75 ± 0.35
2220 (5750)	5.70 ± 0.40	5.00 ± 0.40		0.85 ± 0.35
2225 (5763)	5.70 ± 0.40	6.30 ± 0.40		0.85 ± 0.35

## ■ Mid-Voltage Capacitor Series (100V~630V)

### RATING

#### COG(NPO)

Size	Code	0402					0603			0805					1206					1210					1808				
		100V	200V	250V	100V	200V	250V	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V		
0.5pF	0R5	N	N	N	S	S	S	A	A	A	A																		
1pF	1R0	N	N	N	S	S	S	A	A	A	A																		
1.2pF	1R2	N	N	N	S	S	S	A	A	A	A	X			X														
1.5pF	1R5	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X												
1.8pF	1R8	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X												
2.2pF	2R2	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X						C	C	C	C	C		
2.7pF	2R7	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X						C	C	C	C	C		
3.3pF	3R3	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X						C	C	C	C	C		
3.9pF	3R9	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X						C	C	C	C	C		
4.7pF	4R7	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X						C	C	C	C	C		
5.6pF	5R6	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X						C	C	C	C	C		
6.8pF	6R8	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X						C	C	C	C	C		
8.2pF	8R2	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X						C	C	C	C	C		
10pF	100	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M	C	C	C	C	C		
12pF	120	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M	C	C	C	C	C		
15pF	150	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M	C	C	C	C	C		
18pF	180	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M	C	C	C	C	C		
22pF	220	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M	C	C	C	C	C		
27pF	270	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M	C	C	C	C	C		
33pF	330	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M	C	C	C	C	C		
39pF	390	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M	C	C	C	C	C		
47pF	470	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M	C	C	C	C	C		
56pF	560	N	N	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M	C	C	C	C	C		
68pF	680	N	N		S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M	C	C	C	C	C		
82pF	820	N	N		S	S	S	A	A	A	X	X	X	X	X	X	X	M	M	M	M	M	C	C	C	C	C		
100pF	101	N	N		S	S	S	A	A	X	X	X	X	X	X	X	X	M	M	M	M	M	C	C	C	C	C		
120pF	121	N			S	S	S	A	A	X	C	C	X	X	X	X	X	M	M	M	M	M	C	C	C	C	C		
150pF	151	N			S	S	S	A	X	X	C	C	X	X	X	X	X	M	M	M	M	M	C	C	C	C	C		
180pF	181	N			S	S	S	A	X	C	C	C	X	X	X	X	X	M	M	M	M	M	C	C	C	C	C		
220pF	221	N			S	S	S	A	C	C	C	C	X	X	X	X	X	M	M	M	M	M	C	C	C	C	C		
270pF	271				S	B	B	A	C	C	C	C	X	X	M	M	M	M	M	M	M	M	C	C	C	F	F		
330pF	331				S	B	B	A	C	C	C	C	X	X	M	M	M	M	M	M	M	M	C	C	C	F	F		
390pF	391				S	B	B	X	C	C	C	C	X	X	M	M	M	M	M	M	M	M	C	C	C	F	F		
470pF	471				S	B	B	X	C	C	C	C	X	M	M	M	M	M	M	M	M	M	C	C	C	F	F		
560pF	561				S	B	B	X	C	C	C	C	X	M	C	C	C	M	M	M	M	M	C	C	C	F	F		
680pF	681				S	B	B	X	C	C	C	C	X	M	C	C	C	M	M	M	M	M	C	C	C	F	F		
820pF	821				S	B	B	X	C	C	C	C	X	M	E	E	E	M	M	M	M	M	C	C	C	F	F		
1000pF	102				S			X	C	C	C	C	X	M	E	E	E	M	C	C	C	C	C	C	C	F	F		
1200pF	122				B			X	C	C	C	C	X	M	E	E	E	M	C	C	C	C	C	C	C	F	F		
1500pF	152				B			X	C	C	C	C	X	C	E	E	E	M	C	C	C	C	C	C	C	F	F		
1800pF	182							X	C	C	C	C	X	C	E	E	E	M	C	C	C	C	C	C	C	F	F		
2200pF	222							X	C	C	C	C	X	C	E	E	E	M	C	C	C	C	C	C	C	F	F		
2700pF	272							C	C	C			X	C	E	E	E	M	C	C	C	C	C	C	C	F	F		
3300pF	332							C	C	C			X	C	E	E	E	M	C	C	C	C	C	C	C	F	F		
3900pF	392							C					X	E	E	E	E	M	C	C	C	C	C	C	C	F	F		
4700pF	472							C					X	E	E	E	E	C	C	C	C	C	C	C	C	F	F		
5600pF	562							C					X	E	E	E	E	C	C	C	C	C	C	E	E	F	F		
6800pF	682							C					M	E	E	E		E	E	E	E	E	C	E	E	F	F		
8200pF	822												C	E	E			E	E	E	E	E	E	F	F	F	F		
0.010μF	103												C	E	E			E	F	F	F	F	E	F	F	F	F		
0.012μF	123												P					E	F	F	F	F	F	F	F	F			
0.015μF	153												P					F	G	G	G	G	F	F	F				
0.018μF	183												P					G	G	G	G		F	F	F				
0.022μF	223												P					G	G	G			F						
0.027μF	273																	G	G	G			F						
0.033μF	333												T					G	G	G									
0.039μF	393																	G											
0.047μF	473																	G											
0.056μF	563																												
0.068μF	683																												
0.082μF	823																												
0.10μF	104																												

MLCC

Chip R

Diode

Coil

## Mid-Voltage Capacitor Series (100V~630V)

### RATING

#### COG(NPO)

Size		1812					1825					2220					2225				
Cap	Code	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V
10pF	100	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
12pF	120	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
15pF	150	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
18pF	180	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
22pF	220	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
27pF	270	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
33pF	330	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
39pF	390	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
47pF	470	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
56pF	560	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
68pF	680	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
82pF	820	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
100pF	101	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
120pF	121	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
150pF	151	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
180pF	181	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
220pF	221	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
270pF	271	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
330pF	331	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
390pF	391	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
470pF	471	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
560pF	561	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
680pF	681	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
820pF	821	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
1000pF	102	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
1200pF	122	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
1500pF	152	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
1800pF	182	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
2200pF	222	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
2700pF	272	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
3300pF	332	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
3900pF	392	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
4700pF	472	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
5600pF	562	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
6800pF	682	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
8200pF	822	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
0.010μF	103	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
0.012μF	123	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
0.015μF	153	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
0.018μF	183	E	F	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
0.022μF	223	E	F	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
0.027μF	273	F	G	G	G	G	E	E	E	F	F	E	E	E	F	F	E	E	E	E	E
0.033μF	333	F	G	G	G	G	E	E	E	F	F	E	F	F	F	F	E	E	E	E	E
0.039μF	393	G	G	G	G		E	F	F	G	G	E	F	F	G	G	E	F	F	F	F
0.047μF	473	G	G	G			E	F	F	G	G	E	G	G	G	G	E	F	F	F	F
0.056μF	563	G	G	G			F	G	G	G	G	F	G	G	G	G	E	G	G	G	G
0.068μF	683	G					F	G	G	G	G	F	G	G	G		F	G	G	G	G
0.082μF	823	G					G	G	G	G		G	G	G			F	G	G	G	G
0.10μF	104	G					G	G	G			G	G	G			G	G	G	G	
0.12μF	124						G	G	G			G					G	G	G		
0.15μF	154						G					G					G	G	G		
0.18μF	184						G					G					G				
0.22μF	224																G				

MLCC

Chip R

Diode

Coil

## Mid-Voltage Capacitor Series (100V~630V)

### RATING

X7R

Size		0402				0603				0805					1206					1210					1808	
Cap	Code	100V	100V	200V	250V	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V	500V	630V				
100pF	101	N	S	B	B	X	X	X	X	X	X	C	C	C	C											
120pF	121	N	S	B	B	X	X	X	X	X	X	C	C	C	C											
150pF	151	N	S	B	B	X	X	X	X	X	X	C	C	C	C						C	C				
180pF	181	N	S	B	B	X	X	X	X	X	X	C	C	C	C						C	C				
220pF	221	N	S	B	B	X	X	X	X	X	X	C	C	C	C	M	M	M	C	C	C	C				
270pF	271	N	S	B	B	X	X	X	X	X	X	C	C	C	C	M	M	M	C	C	C	C				
330pF	331	N	S	B	B	X	X	X	X	X	X	C	C	C	C	M	M	M	C	C	C	C				
390pF	391	N	S	B	B	X	X	X	X	X	X	C	C	C	C	M	M	M	C	C	C	C				
470pF	471	N	S	B	B	X	X	X	X	X	X	C	C	C	C	M	M	M	C	C	C	C				
560pF	561	N	S	B	B	X	X	X	X	X	X	C	C	C	C	M	M	M	C	C	C	C				
680pF	681	N	S	B	B	X	X	X	X	X	X	C	C	C	C	M	M	M	C	C	C	C				
820pF	821	N	S	B	B	X	X	X	X	X	X	C	C	C	C	M	M	M	C	C	C	C				
1000pF	102	N	S	B	B	X	X	X	X	X	X	C	C	C	C	M	M	M	C	C	C	C				
1200pF	122	N	S	B	B	X	X	X	X	X	X	C	C	C	C	M	M	M	C	C	C	C				
1500pF	152	N	S	B	B	X	X	X	X	X	X	C	C	C	C	M	M	M	C	C	C	C				
1800pF	182	N	S	B	B	X	X	X	X	X	X	C	C	C	C	M	M	M	C	C	C	C				
2200pF	222	N	S	B	B	X	X	X	X	X	X	C	C	C	C	M	M	M	C	C	C	C				
2700pF	272	N	S	B	B	X	X	X	X	X	X	C	C	C	C	M	M	M	C	C	C	C				
3300pF	332	N	S	B	B	X	X	X	X	X	X	C	C	C	C	M	M	M	C	C	C	C				
3900pF	392	N	S	B	B	X	X	X	X	X	X	C	C	C	C	M	M	M	C	C	C	C				
4700pF	472	N	S	B	B	X	X	X	C	C	X	C	C	C	C	M	M	M	C	C	C	C				
5600pF	562		S	B	B	X	X	X	C	C	X	C	C	C	C	M	M	M	C	C	F	F				
6800pF	682		S	B	B	X	X	X	C	C	X	C	C	C	C	M	M	M	C	C	F	F				
8200pF	822		S	B	B	X	C	C	C	C	X	C	C	C	C	M	M	M	C	C	F	F				
0.010μF	103		S	B	B	X	C	C	C	C	X	C	C	C	C	M	M	M	C	C	F	F				
0.012μF	123		B	B	B	X	C	C	C	C	X	C	C	C	C	M	M	M	C	C	F	F				
0.015μF	153		B	B	B	X	C	C	C	C	X	C	C	C	C	M	M	M	C	C	F	F				
0.018μF	183		B			X	C	C	C	C	X	C	C	C	C	M	M	M	C	C	F	F				
0.022μF	223		B			X	C	C	C	C	X	C	C	E	E	M	M	M	C	C	F	F				
0.027μF	273		B			C	C	C			X	C	C	E	E	M	M	M	E	E	F	F				
0.033μF	333		B			C	C	C			X	E	E	E	E	M	M	M	E	E	F	F				
0.039μF	393		B			C	C	C			X	E	E	E	E	M	M	M	E	E	F	F				
0.047μF	473		B			C	C	C			X	E	E	E	E	M	C	C	E	E	F	F				
0.056μF	563		B			C	C	C			X	E	E	E	E	M	C	C	E	E	F	F				
0.068μF	683		B			C	C	C			X	E	E			M	E	E	F	F	F	F				
0.082μF	823		B			C	C				C	E	E			M	E	E	G	G	F	F				
0.10μF	104		B			C	C				C	E	E			M	E	E	G	G						
0.12μF	124					C					C					M	E	E	G	G						
0.15μF	154					C					E					C	G	G	G	G						
0.18μF	184					C					E					C	G	G								
0.22μF	224					C					E					C	G	G								
0.27μF	274					C					E					E	G	G								
0.33μF	334					C					E					E	G	G								
0.39μF	394					C					E					G	G	G								
0.47μF	474					I					E					G	G	G								
0.56μF	564										P					G	G	G								
0.68μF	684										P					F	G	G								
0.82μF	824										P					F										
1.00μF	105																									
1.20μF	125																									
1.50μF	155																									
1.80μF	185																									
2.20μF	225																									
2.70μF	275																									
3.30μF	335																									
3.90μF	395																									
4.70μF	475																									
5.60μF	565																									

MLCC

Chip R

Diode

Coil

## Mid-Voltage Capacitor Series (100V~630V)

### RATING

#### X7R

Size		1812					1825					2220					2225				
Cap	Code	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V
100pF	101																				
120pF	121																				
150pF	151																				
180pF	181																				
220pF	221																				
270pF	271	C	C	C	C	C															
330pF	331	C	C	C	C	C															
390pF	391	C	C	C	C	C															
470pF	471	C	C	C	C	C															
560pF	561	C	C	C	C	C															
680pF	681	C	C	C	C	C															
820pF	821	C	C	C	C	C															
1000pF	102	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
1200pF	122	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
1500pF	152	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
1800pF	182	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
2200pF	222	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
2700pF	272	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
3300pF	332	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
3900pF	392	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
4700pF	472	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
5600pF	562	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
6800pF	682	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
8200pF	822	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.010μF	103	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.012μF	123	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.015μF	153	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.018μF	183	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.022μF	223	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.027μF	273	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.033μF	333	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.039μF	393	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.047μF	473	C	C	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.056μF	563	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.068μF	683	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.082μF	823	C	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.10μF	104	E	C	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.12μF	124	E	C	C	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.15μF	154	E	F	F	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.18μF	184	E	F	F	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.22μF	224	E	F	F	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.27μF	274	E	F	F	G		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.33μF	334	E	F	F	G		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.39μF	394	E	F	F	G		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.47μF	474	E	F	F	G		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
0.56μF	564	F	G	G			F	F	F	G	G	F	F	F	G	G	F	F	F	F	F
0.68μF	684	F	G	G			F	F	F	G	G	F	F	F	G	G	F	F	F	F	F
0.82μF	824	F	G	G			F	F	F	H	H	F	F	F	H	H	F	F	F	G	G
1.00μF	105																				
1.20μF	125																				
1.50μF	155																				
1.80μF	185																				
2.20μF	225																				
2.70μF	275																				
3.30μF	335																				
3.90μF	395																				
4.70μF	475																				
5.60μF	565																				
6.80μF	685																				
8.20μF	825																				
10.0μF	106																				

MLCC

Chip R

Diode

Coil

## ■ Mid-Voltage Capacitor Series (100V~630V)

### RATING

#### Y5V

Size		0805			1206			1210			1812		
Cap	Code	100V	200V	250V	100V	200V	250V	100V	200V	250V	100V	200V	250V
0.01μF	103	B	B	B	B	B	B	C	C	C	D	D	D
0.015μF	153	B	B	B	B	B	B	C	C	C	D	D	D
0.022μF	223	B	B	B	B	B	B	C	C	C	D	D	D
0.033μF	333	B	B	B	B	B	B	C	C	C	D	D	D
0.047μF	473	B	B	B	B	B	B	C	C	C	D	D	D
0.068μF	683	B	B	B	B	B	B	C	C	C	D	D	D
0.1μF	104	B			B	B	B	C	C	C	D	D	D
0.15μF	154				C	C	C	C	C	C	D	D	D
0.22μF	224				C			C			D	D	D
0.33μF	334							C			D	D	D
0.47μF	474										D	D	D
0.68μF	684										D	D	D
1μF	105												

MLCC

Chip R

Diode

Coil



## High capacitance capacitor series ( $\geq 1\mu\text{F}$ )

### FEATURES

- Realize high capacitance in small sizes.
- Capacitor with lead-free termination (pure Tin).
- RoHS compliant.
- HALOGEM compliant.
- Surface mount suited for wave and reflow soldering.
- High reliability and no polarity.
- Excellent in high frequency characteristic.

### APPLICATION

- Digital circuit coupling or decoupling applications.
- For high frequency and high-density type power suppliers.
- For bypassing.
- Ideal for smoothing circuits.
- Suitable for DC-DC converter, personal computer and peripherals, telecommunication and general electronic equipment.

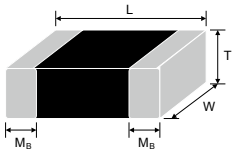
### PART NUMBER

FS	21	X	226	K	101	E	G	G
PDC Family	Size	Dielectric	Capacitance	Tolerance	Rated voltage	Packaging	Thickness	Control Code
<b>High Capacitance Series</b>	<b>03</b> 0201 (0603) <b>15</b> 0402 (1005) <b>18</b> 0603 (1608) <b>21</b> 0805 (2012)	<b>B</b> X5R <b>X</b> X7R <b>F</b> Y5V	<b>106</b> = $10 \times 10^6$ =10 $\mu\text{F}$	<b>K</b> = $\pm 10\%$ <b>M</b> = $\pm 20\%$ <b>Z</b> = -20/+80%	<b>6R3</b> =6.3V <b>100</b> =10V <b>160</b> =16V <b>250</b> =25V <b>500</b> =50V <b>101</b> =100V <b>201</b> =200V <b>251</b> =250V <b>501</b> =500V <b>631</b> =630V	<b>E</b> = Tape and 7" Reel, Embossed Tape <b>P</b> = Tape and 7" Reel, Paper Tape <b>L</b> = Tape and 13" Reel, Embossed <b>G</b> = Tape and 13"Reel, Paper Tape	Reference Thickness Description	<b>G</b> =RoHS Compliant
Rated voltage $\leq 250\text{Vdc}$	<b>31</b> 1206 (3216) <b>32</b> 1210 (3225)							
Capacitance $\geq 1.0\mu\text{F}$ Series Product	<b>43</b> 1812 (4532) <b>46</b> 1825 (4563) <b>55</b> 2220 (5750) <b>56</b> 2225 (5763)							

### GENERAL ELECTRICAL DATA

Dielectric	X7R	X5R	Y5V
<b>Size</b>	0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225	0201, 0402, 0603, 0805, 1206, 1210	0402, 0603, 0805, 1206, 1210, 1812
<b>Capacitance range*</b>	1 $\mu\text{F}$ to 47 $\mu\text{F}$	1 $\mu\text{F}$ to 220 $\mu\text{F}$	1 $\mu\text{F}$ to 100 $\mu\text{F}$
<b>Capacitance tolerance**</b>	K ( $\pm 10\%$ ), M ( $\pm 20\%$ )		Z (-20/+80%)
<b>Rated voltage (WVDC)</b>	6.3V, 10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V		
<b>Tan <math>\delta</math>*</b>	Please, refer to our sales spec.		
<b>Operating temperature</b>	-55 to +125°C	-55 to +85°C	-25 to +85°C
<b>Capacitance characteristic</b>	$\pm 15\%$		+30/-80%
<b>Termination</b>	Cu (or Ag) Ni/Sn (lead-free termination)		

### DIMENSIONS



Size inch (mm)	L (mm)	W (mm)	T (mm) code	M <sub>B</sub> min (mm)
0201 (0603)	0.60 $\pm$ 0.03	0.30 $\pm$ 0.03	Reference Thickness Description	0.15 $\pm$ 0.05
0402 (1005)	1.00 $\pm$ 0.10	0.50 $\pm$ 0.10		0.25+0.05/-0.10
0603 (1608)	1.60 $\pm$ 0.15	0.80 $\pm$ 0.15		0.40 $\pm$ 0.15
0805 (2012)	2.00 $\pm$ 0.20	1.25 $\pm$ 0.20		0.50 $\pm$ 0.20
1206 (3216)	3.20 $\pm$ 0.20	1.60 $\pm$ 0.20		0.60 $\pm$ 0.20
1210 (3225)	3.20 $\pm$ 0.30	2.50 $\pm$ 0.30		0.75 $\pm$ 0.35
1812 (4532)	4.50 $\pm$ 0.40	3.20 $\pm$ 0.30		0.75 $\pm$ 0.35
1825 (4563)	4.50 $\pm$ 0.40	6.30 $\pm$ 0.40		0.75 $\pm$ 0.35
2220 (5750)	5.70 $\pm$ 0.40	5.00 $\pm$ 0.40		0.85 $\pm$ 0.35
2225 (5763)	5.70 $\pm$ 0.40	6.30 $\pm$ 0.40		0.85 $\pm$ 0.35

## High capacitance capacitor series ( $\geq 1\mu\text{F}$ )

### RATING

		X7R																														
Size		0402					0603					0805					1206					1210					1812					
Cap(pF)	Code	6.3V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	35V	50V	100V	10V	16V	25V	50V	100V	200V	250V
1.0	105	N	B	B	B	B	B		C	C	C	C	I		J	J	J	P	P		C	C	C	C	F	C	C	C	F	F	G	G
1.2	125																P	P	P					G	G			C	F	F		
1.5	155								I	I	I			J	J	J	P	P				E	E	G	G			C	F	F		
1.8	185																P	P						G	G			E	F	F		
2.2	225		B	B	B			I	I	I	I		I	J	J	J	P	P	P				E	E	G	G		E	F	G		
2.7	275																							G	G			F	F	G		
3.3	335														P	P	P	P					E	E	G	G		F	F	G		
3.9	395																											F	F	G		
4.7	475		B					I	I	I	I			P	P	P	P	P				F	F	F	G	G		G	G	G		
5.6	565																											G	G	G		
6.8	685																											G	G			
8.2	825																											G	G			
10.0	106							I	I	I				P	P	P	P					F	F	F	G			G	G			
12.0	126													P	P	P																
15.0	156																															
18.0	186																															
22.0	226																						G	G	G							
47.0	476																						G	G								

		X7R																		
Size		1825					2220						2225							
Cap(pF)	Code	25V	50V	100V	200V	250V	25V	50V	100V	200V	250V	500V	630V	25V	50V	100V	200V	250V	500V	630V
1.0	105	G	F	F	F	F	F	F	F	F	F	H	H	F	F	F	F	F	G	G
1.2	125		F	F	G	G	F	F	F	G	G			F	F	F	G	G	H	H
1.5	155		F	F	G	G	F	F	F	G	G			F	F	F	G	G	H	H
1.8	185		F	F	G	G	F	F	F	G	G			F	F	F	G	G		
2.2	225		F	F	G	G	F	F	F	G	G			F	F	F	G	G		
2.7	275		F	F	H	H	F	F	F	H	H			F	F	F	G	G		
3.3	335		F	F			F	F	F					F	F	F	H	H		
3.9	395		F	F			F	F	F					F	F	F	H	H		
4.7	475		F	G			F	F	F					F	F	F				
5.6	565		G	G			F	F	F					F	F	F				
6.8	685		G	G			F	F	F					F	F	F				
8.2	825		G	G			G	G	G					G	G	G				
10.0	106		G	G			G	G	G					G	G	G				
12.0	126						H							H						
15.0	156						H							H						
18.0	186						H							H						
22.0	226						H	H						H	H					
47.0	476																			

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Chip R

Diode

Coil

# FS

## ■ High capacitance capacitor series (≥1μF)

### RATING

#### X5R

Size		0201				0402				0603					0805					1206					1210											
Cap(pF)	Code	6.3V	10V	16V	4V	6.3V	10V	16V	25V	4V	6.3V	10V	16V	25V	50V	4V	6.3V	10V	16V	25V	50V	4V	6.3V	10V	16V	25V	50V	4V	6.3V	10V	16V	25V	35V	50V		
1.0	105	L	L	L		N	N	N	N		B	B	B	B	B			C	C	C	I						P									
1.5	155										B						I	I	I	I				J	J				F	F						
2.2	225	L	L			N	N	K	K		B	B	B	B	B		I	I	I	I	I			J	J	P	P			F	F					
3.3	335										B	B					I	I	I	I				P	P	P										
4.7	475					K	K	K			B	B	B	B			I	I	I	I	I		P	P	P	P	P		F	F	F					
6.8	685																						P	P												
10.0	106				K	K	K				B	B	B	B	B		I	I	I	I	I		P	P	P	P	P		F	F	F	F	G	G		
22.0	226										B	B	B				I	I	I	I			P	P	P	P			G	G	G	G	G			
47.0	476										B	B					I	I					P	P	P				G	G	G	G				
100.0	107																I	I					P						G	G	G					
220.0	227																						P						G	G						

#### Y5V

Size		0402				0603				0805					1206					1210					1812											
Cap(μF)	code	6.3V	10V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	35V	50V	6.3V	10V	16V	25V	35V	50V	10V	16V	25V	50V	100V							
1.0	105	N	N		S	B	B		X	X	C	C		M	M	M		M		M	M	M		M	C	C	C	C	C							
1.5	155				S				C	C				M	M	M				M	M	M			C	C	C	C								
2.2	225			S	S	B			C	C	I	I		M	M	M		J		M	M	M		E	C	C	C	C								
3.3	335								C	C				J	J	J				M	M	M			C	C	C	C								
4.7	475			B	B				C	C	I			J	J	J	J	P		M	M	C		E	C	C	C	C								
6.8	685								I					J	J					M	M	C		F	C	C	C	C								
10.0	106							I	I	I				J	J	P				C	C	E	F	F	C	C	C	F								
22.0	226							I	I					P	P					F	F															
47.0	476												P							F	F						G									
100.0	107																			G																

MLCC

Chip R

Diode

Coil

## ■ Ultra High Q & Low ESR Capacitor Series

### FEATURES

- High Q and low ESR performance at high frequency.
- Ultra low capacitance to 0.1pF.
- Can offer high precision tolerance to  $\pm 0.05\text{pF}$ .
- Quality improvement of telephone calls for low power loss and better performance.
- RoHS compliant.
- HALOGEM compliant.

### APPLICATION

- Telecommunication products & equipments: Mobile phone, WLAN, Base station.
- RF module: Power amplifier, VCO.
- Tuners.

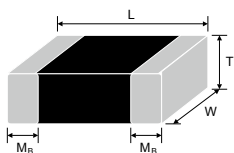
### PART NUMBER

RF	21	N	101	J	251	C	T
PDC Family	Size	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging
Ultra High Q & Low ESR	<b>02</b> 01005 (0402)	<b>N</b> =COG (NPO)	<b>0R5</b> =0.5pF	<b>A</b> = $\pm 0.05\text{pF}$	<b>6R3</b> =6.3V	<b>C</b> =Cu/Ni/Sn	<b>T</b> =7" reeled
	<b>03</b> 0201 (0603)		<b>1R0</b> =1.0pF	<b>B</b> = $\pm 0.1\text{pF}$	<b>100</b> =10V		<b>G</b> =13" reeled
	<b>11</b> 0505 (1414)		<b>100</b> = $10 \times 10^{-10}$	<b>C</b> = $\pm 0.25\text{pF}$	<b>250</b> =25V		
	<b>15</b> 0402 (1005)		=10pF	<b>D</b> = $\pm 0.5\text{pF}$	<b>500</b> =50V		
	<b>18</b> 0603 (1608)		<b>F</b> = $\pm 1\%$	<b>101</b> =100V			
	<b>21</b> 0805 (2012)		<b>G</b> = $\pm 2\%$	<b>251</b> =250V			
	<b>22</b> 1111 (2828)		<b>J</b> = $\pm 5\%$	<b>501</b> =500V			

### GENERAL ELECTRICAL DATA

Dielectric	NPO
<b>Size</b>	01005, 0201, 0402, 0505, 0603, 0805, 1111
<b>Capacitance*</b>	0.1pF to 1000pF
<b>Capacitance tolerance</b>	Cap $\leq 5\text{pF}$ : A ( $\pm 0.05\text{pF}$ ), B ( $\pm 0.1\text{pF}$ ), C ( $\pm 0.25\text{pF}$ ) 5pF<Cap<10pF: B ( $\pm 0.1\text{pF}$ ), C ( $\pm 0.25\text{pF}$ ), D ( $\pm 0.5\text{pF}$ ) Cap $\geq 10\text{pF}$ : F ( $\pm 1\%$ ), G ( $\pm 2\%$ ), J ( $\pm 5\%$ )
<b>Rated voltage (WVDC)</b>	6.3V, 10V, 25V, 50V, 100V, 200, 250V, 500V
<b>Q*</b>	01005, 0201, 0402/25V~50V: Cap<30pF:Q $\geq 400+20\text{C}$ ; Cap $\geq 30\text{pF}$ :Q $\geq 1000$ ; 0402/100V~200V, 0603, 0805, 0505, 1111: Cap<30pF:Q $\geq 800+20\text{C}$ ; Cap $\geq 30\text{pF}$ :Q $\geq 1400$
<b>Insulation resistance at Ur</b>	$\geq 10\text{G}\Omega$ or RxC $\geq 100\Omega \cdot \text{F}$ whichever is smaller
<b>Operating temperature</b>	-55 to +125°C
<b>Capacitance change</b>	$\pm 30\text{ppm}/^\circ\text{C}$ ; 0201 Cap $\geq 22\text{pF}$ , $\pm 60\text{ppm}/^\circ\text{C}$
<b>Termination</b>	Ni/Sn (lead-ree termination)

### DIMENSIONS



Size inch (mm)	L (mm)	W (mm)	T (mm)	Symbol	Remark	M <sub>B</sub> (mm)
01005 (0402)	0.40 $\pm$ 0.02	0.20 $\pm$ 0.02	0.20 $\pm$ 0.02	V	#	0.10 $\pm$ 0.03
0201 (0603)	0.60 $\pm$ 0.03	0.30 $\pm$ 0.03	0.30 $\pm$ 0.03	L	#	0.15 $\pm$ 0.05
0402 (1005)	1.00 $\pm$ 0.05	0.50 $\pm$ 0.05	0.50 $\pm$ 0.05	N	#	0.25+0.05/-0.10
0603 (1608)	1.60 $\pm$ 0.10	0.80 $\pm$ 0.10	0.80 $\pm$ 0.07	S		0.40 $\pm$ 0.15
	1.60+0.15/-0.10	0.80+0.15/-0.10	0.50 $\pm$ 0.10	H		
0805 (2012)	2.00 $\pm$ 0.15	1.25 $\pm$ 0.10	0.60 $\pm$ 0.10	A		0.50 $\pm$ 0.20
	2.00 $\pm$ 0.20	1.25 $\pm$ 0.20	0.85 $\pm$ 0.10	T		
0505 (1414)	1.40+0.38/-0.25	1.40 $\pm$ 0.38	1.15 $\pm$ 0.15	J	#	0.25+0.25/-0.13
1111 (2828)	2.79+0.51/-0.25	2.79 $\pm$ 0.38	$\leq 1.78$	G	#	0.38 $\pm$ 0.25

MLCC

Chip R

Diode

Coil

# RF

## Ultra High Q & Low ESR Capacitor Series

### RATING

#### NPO

Size		01005			0201				0402				0603			0805				0505			1111					Tolerance	
Cap	Code	16V	25V	6.3V	10V	25V	50V	100V	25V	50V	100V	200V	50V	100V	250V	50V	100V	250V	500V	50V	100V	250V	50V	100V	200V	250V	500V		
0.1pF	OR1			L	L	L	L	L	N	N	N	N	H	H	H														A, B
0.2pF	OR2	V	V	L	L	L	L	L	N	N	N	N	H	H	H	A	A	A	A										A, B
0.3pF	OR3	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T										A, B
0.4pF	OR4	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J							A, B
0.5pF	OR5	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J							A, B, C
0.6pF	OR6	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J							A, B, C
0.7pF	OR7	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J							A, B, C
0.75pF	R75	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J							A, B, C
0.8pF	OR8	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J							A, B, C
0.9pF	OR9	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J							A, B, C
1.0pF	1R0	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J							A, B, C
1.2pF	1R2	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J							A, B, C
1.5pF	1R5	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J							A, B, C
1.8pF	1R8	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J							A, B, C
2.0pF	2R0	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	A, B, C
2.2pF	2R2	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	A, B, C
2.7pF	2R7	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	A, B, C
3.0pF	3R0	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	A, B, C
3.3pF	3R3	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	A, B, C
3.9pF	3R9	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	A, B, C
4.0pF	4R0	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	A, B, C
4.7pF	4R7	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	A, B, C
5.0pF	5R0	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	A, B, C
5.6pF	5R6	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	B, C, D
6.0pF	6R0	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	B, C, D
6.8pF	6R8	V		L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	B, C, D
7.0pF	7R0	V		L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	B, C, D
8.0pF	8R0	V		L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	B, C, D
8.2pF	8R2	V		L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	B, C, D
9.0pF	9R0	V		L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	B, C, D
10pF	100	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
12pF	120	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
15pF	150	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
18pF	180	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
20pF	200	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
22pF	220	V	V	L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
24pF	240			L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
27pF	270			L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
30pF	300			L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
33pF	330			L	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
36pF	360								N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
39pF	390								N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
43pF	430								N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
47pF	470								N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
56pF	560								N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
68pF	680								N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
82pF	820								N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
100pF	101								N	N	N	N	S	S	S	T	T	T	T	J	J	J	G	G	G	G	G	G	F, G, J
120pF	120															T	T	T	T				G	G	G	G	G	G	F, G, J
150pF	150															T	T	T	T				G	G	G	G	G	G	F, G, J
180pF	180															T	T	T	T				G	G	G	G	G	G	F, G, J
220pF	221															T	T	T	T				G	G	G	G	G	G	F, G, J
270pF	271																						G	G	G	G	G	G	F, G, J
330pF	331																						G	G	G	G	G	G	F, G, J
390pF	391																						G	G	G	G	G	G	F, G, J
470pF	471																						G	G	G	G	G	G	F, G, J
560pF	561																						G	G	G	G	G	G	F, G, J
680pF	681																						G	G	G	G	G	G	F, G, J
820pF	821																						G	G	G	G	G	G	F, G, J
1000pF	102																						G	G	G	G	G	G	F, G, J

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Chip R

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Coil

1. The letter in cell is expressed the symbol of product thickness.  
 2. For more information about products with special capacitance or other Data, please contact local representative.

## ■ General purpose capacitor series

### FEATURES

- A wide selection of sizes is available (0201 to 2225).
- High capacitance in given case size.
- Capacitor with lead-free termination (pure Tin).
- RoHS & HALOGEN compliant.

### APPLICATION

- For general digital circuit.
- For power supply bypass capacitors.
- For consumer electronics.
- For telecommunication.
- DC to DC converter.

### PART NUMBER

FN	21	X	471	K	500	P	X	G
PDC Family	Size	Dielectric	Capacitance	Tolerance	Rated voltage	Packaging	Thickness	Control Code
General Purpose product ≤ 50Vdc	<b>03</b> 0201 (0603) <b>15</b> 0402 (1005) <b>18</b> 0603 (1608) <b>21</b> 0805 (2012) <b>31</b> 1206 (3216) <b>32</b> 1210 (3225) <b>42</b> 1808 (4520) <b>43</b> 1812 (4532) <b>46</b> 1825 (4563) <b>55</b> 2220 (5750) <b>56</b> 2225 (5763)	<b>N</b> COG(NPO) <b>X</b> X7R <b>B</b> X5R <b>F</b> Y5V	<b>102</b> =10x10 <sup>2</sup> =1000pF <b>100</b> =10x10 <sup>0</sup> =10pF	<b>J</b> =± 5% <b>K</b> =± 10% <b>M</b> =± 20% <b>Z</b> = -0/+80%	<b>6R3</b> =6.3V <b>100</b> =10V <b>160</b> =16V <b>250</b> =25V <b>500</b> =50V	<b>E</b> = Tape and 7" Reel, Embossed Tape <b>P</b> = Tape and 7" Reel, Paper Tape <b>L</b> = Tape and 13" Reel, Embossed <b>G</b> = Tape and 13" Reel, Paper Tape	Reference Thickness Description	<b>G</b> =RoHS Compliant

### GENERAL ELECTRICAL DATA

Dielectric	COG(NPO)	X7R	Y5V	X5R
<b>Size</b>	0201 to 2225	0201 to 2225	0201 to 1812	0201 to 0603
<b>Capacitance range*</b>	0.1pF ~ 390nF	100pF ~ 820nF	10nF ~ 680nF	100pF ~ 820nF
<b>Capacitance tolerance</b>	J (± 5%) K (± 10%)	J (± 5%) K (± 10%) M (± 20%)	Z (-20/+80%)	J (± 5%) K (± 10%) M (± 20%)
<b>Rated voltage (WVDC)</b>	10V, 16V, 25V, 50V	6.3V, 10V, 16V, 25V, 50V	6.3V, 10V, 16V, 25V, 50V	6.3V, 4V, 10V, 16V, 25V, 50V
<b>Tan δ*</b>	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000		Note 1	
<b>Operating temperature</b>		-55 to +125°C	-25 to +85°C	-55 to +85°C
<b>Capacitance characteristic</b>	± 30ppm	± 15%	± 30/-80%	± 15%
<b>Termination</b>		Cu (or Ag)/Ni/Sn (lead-free termination)		

\* Measured at the condition of 30~70% related humidity.

COG: Apply 1.0±0.2Vrms, 1.0MHz±10% for Cap≤1000pF and 1.0±0.2Vrms, 1.0kHz±10% for Cap>1000pF, 25°C at ambient temperature.

X7R: Apply 1.0±0.2Vrms, 1.0kHz±10%, at 25°C ambient temperature.

Y5V: Apply 1.0±0.2Vrms, 1.0kHz±10%, at 20°C ambient temperature.

Note 1:

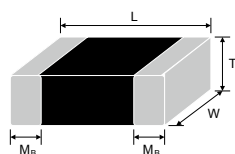
#### X7R/X5R

Rated vol.	D.F.	Exception of D.F.
≥50V	≤2.5%	≤3% 0603≥0.047μF; 0805≥0.18μF, 1206≥0.47μF
25V	≤3.5%	≤5% 0805≥1μF; 1210≥10μF ≤7% 0603≥0.33μF
16V	≤3.5%	≤5% 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF ≤10% 1210≥22μF; 0603≥0.68μF
10V	≤5.0%	≤10% 0603≥1μF; 0805≥2.2μF

#### Y5V

Rated vol.	D.F.	Exception of D.F.
≥50V	≤5.0%	7.0% 0603≥0.1μF; 0805≥0.47μF
25V	≤5.0%	≤7% 0402≥0.047μF; 0603≥0.1μF; 0805≥0.33μF; 1206≥1μF ≤9% 0402≥0.068μF; 0603≥0.47μF
16V (C<1.0μF)	≤7.0%	≤9% 0402≥0.068μF; 0603≥0.68μF
16V (C≥1.0μF)	≤9.0%	≤12.5% 0805≥4.7μF; 1206≥10μF; 1210≥22μF; 1812≥47μF
10V	≤12.5%	---

### DIMENSIONS



Size inch (mm)	L (mm)	W (mm)	T (mm) code	M <sub>B</sub> min (mm)
0201 (0603)	0.60±0.03	0.30±0.03		0.15±0.05
0402 (1005)	1.00±0.10	0.50±0.10		0.25±0.05/-0.10
0603 (1608)	1.60±0.15	0.80±0.15		0.40±0.15
0805 (2012)	2.00±0.20	1.25±0.20		0.50±0.20
1206 (3216)	3.20±0.20	1.60±0.20		0.60±0.20
1210 (3225)	3.20±0.30	2.50±0.30		0.75±0.35
1808 (4520)	4.50±0.40	2.00±0.25		0.75±0.35
1812 (4532)	4.50±0.40	3.20±0.30		0.75±0.35
1825 (4563)	4.50±0.40	6.30±0.40	Reference Thickness Description	0.75±0.35
2220 (5750)	5.70±0.40	5.00±0.40		0.85±0.35
2225 (5763)	5.70±0.40	6.30±0.40		0.85±0.35

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## ■ General purpose capacitor series

### RATING

#### X7R

Size		0201				0402				0603				0805				1206				1210				1808		1812				1825		2220		2225	
Cap	Code	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	10V	16V	25V	50V	25V	50V	10V	16V	25V	50V	25V	50V	25V	50V		
100pF	101			L	L	L			N	N	N	N			S	S	S	S			X	X	X	X													
120pF	121			L	L	L			N	N	N	N			S	S	S	S			X	X	X	X													
150pF	151			L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X									
180pF	181			L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X									
220pF	221			L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X									
270pF	271			L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X									
330pF	331			L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X									
390pF	391			L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X									
470pF	471			L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X									
560pF	561			L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X									
680pF	681			L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X									
820pF	821			L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X									
1000pF	102	L	L	L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	
1200pF	122	L	L	L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	
1500pF	152	L	L	L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	
1800pF	182	L	L	L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	
2200pF	222	L	L	L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	
2700pF	272	L	L	L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	
3300pF	332	L	L	L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	
3900pF	392	L	L	L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	
4700pF	472	L	L	L	L	L			N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	
5600pF	562	L	L						N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	
6800pF	682	L	L						N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	
8200pF	822	L	L						N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	
0.010μF	103	L	L	L	L				N	N	N	N			S	S	S	S			X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	
0.012μF	123								N	N	N				S	S	S	S			X	X	X	X	X	X	X	M	M	M	M	M	M	M	M		
0.015μF	153								N	N	N				S	S	S	S			X	X	X	X	X	X	X	M	M	M	M	M	M	M	M		
0.018μF	183								N	N	N				S	S	S	S			X	X	X	X	X	X	X	M	M	M	M	M	M	M	M		
0.022μF	223		L	L					N	N	N				S	S	S	S			X	X	X	X	X	X	X	M	M	M	M	M	M	M	M		
0.027μF	273								N	N	N				S	S	S	S			X	X	X	X	X	X	X	M	M	M	M	M	M	M	M		
0.033μF	333								N	N	N				S	S	S	B			X	X	X	X	X	X	X	M	M	M	M	M	M	M	M		
0.039μF	393								N	N	N				S	S	S	B			X	X	X	X	X	X	X	M	M	M	M	M	M	M	M		
0.047μF	473								N	N	N				S	S	S	B			X	X	X	X	X	X	X	M	M	M	M	M	M	M	M		
0.056μF	563								N	N	N				S	S	S	B			X	X	X	X	X	X	X	M	M	M	M	M	M	M	M		
0.068μF	683								N	N	N				S	S	S	B			X	X	X	X	X	X	X	M	M	M	M	M	M	M	M		
0.082μF	823								N	N	N				S	S	S	B			X	X	X	X	X	X	X	M	M	M	M	M	M	M	M		
0.10μF	104								N	N	N	N			S	S	S	B			X	X	X	X	X	X	X	M	M	M	M	M	M	M	M		
0.12μF	124														S	S	B				X	X	X	C	X	X	X	M	M	M	M	M	M	M	M		
0.15μF	154														S	S	B				C	C	C	C	M	M	M	M	M	M	M	M	M	M			
0.18μF	184														S	S	B				C	C	C	C	M	M	M	M	M	M	M	M	M	M			
0.22μF	224								N	N	N	N			S	S	B	B			C	C	C	C	M	M	M	M	M	M	M	M	M	M			
0.27μF	274														B	B	B	B			C	C	C	C	I	M	M	M	M	M	M	M	M	M			
0.33μF	334														B	B	B	B			C	C	C	C	I	M	M	M	M	M	M	M	M	M			
0.39μF	394														B	B	B	B			C	C	C	C	I	M	M	J	P	M	M	M	M	M	M		
0.47μF	474								N	N					B	B	B	B			C	C	C	C	I	J	J	P	M	M	M	M	M	M	M		
0.56μF	564														B	B					C	C	C		J	J	J	P	C	C	C	C	C	C	C		
0.68μF	684														B	B	B				C	C	C		J	J	J	P	C	C	C	C	C	C	C		
0.82μF	824														B	B					C	C	C		J	J	J	P	C	C	C	C	C	C	C		

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Chip R

Diode

Coil



## ■ General purpose capacitor series

### RATING

#### X5R

Size		0201						0402					0603				
Cap	Code	4V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
100pF	101				L	L	L										
120pF	121				L	L	L										
150pF	151				L	L	L										
180pF	181				L	L	L										
220pF	221				L	L	L										
270pF	271				L	L	L										
330pF	331				L	L	L										
390pF	391				L	L	L										
470pF	471				L	L	L										
560pF	561				L	L	L										
680pF	681				L	L	L										
820pF	821				L	L	L										
1000pF	102			L	L	L	L										
1500pF	152			L	L	L											
2200pF	222			L	L	L											
2700pF	272			L	L	L											
3300pF	332			L	L	L											
4700pF	472			L	L	L											
6800pF	682			L	L	L											
0.01μF	103		L	L	L	L	L										
0.015μF	153		L	L													
0.022μF	223		L	L													
0.027μF	273		L	L						N							
0.033μF	333		L	L						N							
0.039μF	393		L	L						N							
0.047μF	473		L	L				N	N	N							
0.056μF	563		L	L				N	N	N							
0.068μF	683		L	L				N	N	N							
0.082μF	823		L	L				N	N	N							
0.1μF	104		L	L	L	L		N	N	N	N					S	
0.15μF	154							N	N	N	N						
0.22μF	224		L	L	L			N	N	N	N	N	B	B	B	B	B
0.27μF	274								N					B	B	B	B
0.33μF	334		L					N	N				B	B	B	B	
0.39μF	394								N					B	B	B	
0.47μF	474	L	L					N	N	K	K	K	B	B	B	B	B
0.68μF	684							N	N				B	B	B	B	
0.82μF	824												B	B	B	B	

#### Y5V

Size		0201		0402				0603				0805				1206				1210				1812				
Cap	Code	6.3V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	10V	16V	25V	50V	10V	16V	25V	50V	10V	16V	25V	50V	10V	16V	25V	50V
0.010μF	103			N	N	N	N		S	S	S	S	A	A	A	A	X	X	X	X								
0.015μF	153			N	N	N	N		S	S	S	S	A	A	A	A	X	X	X	X								
0.022μF	223			N	N	N	N		S	S	S	S	A	A	A	A	X	X	X	X								
0.033μF	333			N	N	N	N		S	S	S	S	A	A	A	A	X	X	X	X								
0.047μF	473			N	N	N			S	S	S	S	A	A	A	A	X	X	X	X								
0.068μF	683			N	N	N			S	S	S	S	A	A	A	A	X	X	X	X								
0.10μF	104	L		N	N	N			S	S	S	S	A	A	A	A	X	X	X	X	M	M	M	M	C	C	C	C
0.15μF	154			N	N				S	S	S	S	A	A	A	A	X	X	X	X	M	M	M	M	C	C	C	C
0.22μF	224		N	N	N			S	S	S	S	S	A	A	A	A	X	X	X	X	M	M	M	M	C	C	C	C
0.33μF	334		N	N	N				S	S	S	B	X	X	X	X	X	X	X	X	M	M	M	M	C	C	C	C
0.47μF	474		N	N	N				S	S	B	B	X	X	X	X/C	X	X	X	X	M	M	M	M	C	C	C	C
0.68μF	684		N						S	B	B		X	X	C	C	X	X	X	X	M	M	M	M	C	C	C	C

MLCC

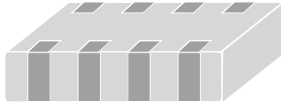
Chip R

Diode

Coil

# CAP ARRAY

## ■ 0612/0508 size Cap Array Series



### FEATURES

- High density mounting due to mounting space saving.
- Mounting cost saving.
- Increased throughput.
- RoHS compliant.
- HALOGEN compliant.

### APPLICATION

- For use as a bypass for digital and analog signal line noise.
- Computer motherboards and peripherals.
- The other common electronic circuits.

### PART NUMBER

Y	4C	3	X	103	K	500	C	T
Series	Cap. Nr.	Termination pitch	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging
Y=Capacitor array	4C=4xCap	3=0.03" pitch 2=0.02" pitch	N=COG(NPO) X=X7R F=Y5V	Two significant digits followed by no. of zeros. And R is in place of decimal point.	J=±5% K=±10% M=±20% Z=-20/+80%	Two significant digits followed by no. of zeros. And R is in place of decimal point.	C=Cu/Ni/Sn	T=7" reeled

Y4C3: 4x0603 (0612)  
Y4C2: 4x0402 (0508)

eg.:  
103=10x10<sup>3</sup>  
=10,000pF  
=10nF

eg.:  
100=10 VDC  
160=16 VDC  
250=25 VDC  
500=50 VDC  
101=100 VDC

### GENERAL ELECTRICAL DATA

Dielectric	NPO		X7R		Y5V
Size	4x0402 0508 (1220)	4x0603 0612 (1632)	4x0402 0508 (1220)	4x0603 0612 (1632)	4x0603 0612 (1632)
Capacitance*	10pF ~ 270pF		1000pF ~ 100nF		150pF ~ 100nF
Capacitance tolerance**	J (±5%), K (±10%)		K (±10%), M (±20%)		Z (-20/+80%)
Rated voltage (WVDC)	25, 50V, 100V		10V, 16V, 25V, 50V		16V, 25V, 50V
Q/Tan δ *	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000		Ur=50V, ≤2.5% Ur=25V & 16V, ≤3.5% Ur=10V, ≤5.0%		Ur=50V, ≤5% Ur=16V, ≤7%
Insulation resistance at Ur	≥10GΩ		≥10GΩ or RxC≥500ΩxF whichever is less		
Operating temperature	-55 to +125°C			-25 to +85°C	
Capacitance characteristic	±30ppm		±15%		+30/-80%
Termination	Ni/Sn (lead-free termination)				

\* Measured at 30~70% related humidity.

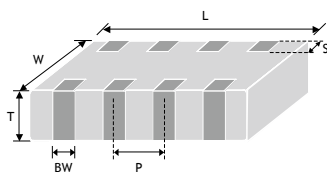
NPO: Apply 1.0±0.2Vrms, 1.0MHz±10% at the conditions of 25°C ambient temperature.

X7R: Apply 1.0±0.2Vrms, 1.0kHz±10%, at the conditions of 25°C ambient temperature.

Y5V: Apply 1.0±0.2Vrms, 1.0kHz±10%, at the conditions of 20°C ambient temperature.

\*\* Preconditioning for Class II MLCC: Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement.

### DIMENSIONS



Size inch (mm)	L (mm)	W (mm)	T (mm)	Symbol	S (mm)	BW (mm)	P (mm)
4x0402 0508 (1220)	2.00±0.15	1.25±0.15	0.85±0.10	T	0.20±0.10	0.25±0.10	0.50±0.10
4x0603 0612 (1632)	3.20±0.15	1.60±0.15	0.80±0.10	B	0.30±0.20	0.40±0.15	0.80±0.15

MLCC

Chip R

Diode

Coil

# CAP ARRAY

## ■ 0612/0508 size Cap Array Series

### RATING

Dielectric		NPO	X7R					NPO		X7R			Y5V	
Size		4 x 0402							4 x 0603					
Cap	Code	25V 50V 100V	10V	16V	25V	50V	25V	50V 100V	16V	25V	50V	16V	50V	
10pF	100	T					B	B						
15pF	150	T					B	B						
22pF	220	T					B	B						
33pF	330	T					B	B						
47pF	470	T					B	B						
68pF	680	T					B	B						
100pF	101	T					B	B						
150pF	151	T					B	B						
180pF	181	T					B	B		B	B			
220pF	221	T					B	B		B	B			
270pF	271	T					B	B		B	B			
330pF	331						B	B		B	B			
470pF	471						B	B		B	B			
6,80pF	681									B	B			
1,000pF	102		T	T	T	T				B	B			
1,500pF	152		T	T	T	T				B	B			
2,200pF	222		T	T	T	T				B	B			
3,300pF	332		T	T	T	T				B	B			
4,700pF	472		T	T	T	T				B	B			
6,800pF	682		T	T	T	T				B	B			
0.010μF	103		T	T	T	T				B	B		B	
0.015μF	153		T	T	T				B	B	B		B	
0.022μF	223		T	T	T				B	B	B		B	
0.033μF	333		T	T	T				B				B	
0.047μF	473		T	T	T				B				B	
0.068μF	683		T	T	T				B				B	
0.10μF	104		T	T	T				B			B	B	

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# Packaging Dimension and Quantity

Size	Thickness(mm)/Symbol		Paper tape		Plastic tape		Tray packaged (pcs/tray)
			7" reel	13" reel	7" reel	13" reel	
01005(0402)	0.20±0.02	V	20K				
0201(0603)	0.30±0.03	L	15k	70k			
0402 (1005)	0.50±0.05	N	10k	50K			
	0.50+0.02/-0.05	Q	10k	50K			
0603 (1608)	0.50±0.10	K	10k				
	0.50±0.10	U	4k				
	0.80±0.07	S	4k	15k			
0805 (2012)	0.80+0.15/-0.10	B	4k	15k			
	0.50±0.10	U	4k	15k			
	0.60±0.10	A	4k	15k			
	0.80±0.10	X	4k	15k			
1206 (3216)	0.85±0.10	T	4k	15k			
	1.25±0.10	C			3k	10k	
	1.25±0.20	I			3k	10k	
	0.80±0.10	X	4k	15k			
	0.85±0.10	T	4k	15k			
	0.95±0.10	M			3k	10k	
1210 (3225)	1.15±0.15	J			3k	10k	
	1.25±0.10	C			3k	10k	
	1.60±0.20	E			2k	10k	
	1.60+0.30/-0.10	P			2k	9k	
	0.85±0.10	T			4k	10k	
0505 (1414)	0.95±0.10	M			3k	10k	
	1.25±0.10	C			3k	10k	
	1.60±0.20	E			2k	10k	
	2.00±0.20	F			1k	6k	
	2.50±0.30	G			1k		
1808 (4520)	1.15±0.15	J			3K	-	
	1.25±0.10	C			2k	10k	
	1.60±0.20	E			2k	8k	
1812 (4532)	2.00±0.20	F			1k	6k	
	1.25±0.10	C			1k		
	1.60±0.20	E			1k		
	2.00±0.20	F			1k		
1825 (4563)	2.50±0.30	G			0.5k	3k	
	2.80±0.30	H			0.5k		
2211 (5728)	2.00±0.20	F			1k		
	2.50±0.30	G			0.5k		
2220 (5750)	2.00±0.20	F			1k		
	2.50±0.30	G			0.5k		
2225 (5763)	2.00±0.20	F			1k		
	2.50±0.30	G			0.5k		
1111 (2828)	≤ 1.78	G			2K	-	
2020							
3035							50pcs
3333							50pcs
3530							50pcs
3640							50pcs
3940							50pcs
4045							50pcs
4238							25pcs
4252							25pcs
4540							25pcs
5550	2.80±0.30	H					25pcs
5780	3.10±0.30	R					25pcs
5868	3.50±0.30	O					25pcs
6560							25pcs
7680							25pcs
7875							25pcs
7880							25pcs
8550							25pcs
8840							25pcs
42102							25pcs
10642							25pcs
13060							25pcs

THICKNESS DESCRIPTION	
Code	Description
A	0.60±0.10
B	0.8+0.15/-0.10
C	1.25±0.10
D	1.40±0.15
E	1.60±0.20
F	2.00±0.20
G	2.50±0.30
H	2.80±0.30
I	1.25±0.20
J	1.15±0.15
K	0.50±0.20
L	0.30±0.03
M	0.95±0.10
N	0.50±0.05
O	3.50±0.20
P	1.60+0.3/-0.10
Q	0.50+0.02/-0.05
R	3.10±0.30
S	0.80±0.07
S*	3.95±0.25 (For≥2225)
T	0.85±0.10
U	0.50±0.10
V	0.20±0.02
X	0.80±0.10
X*	4.45±0.25 (For≥2225)
Z	0.25±0.03

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