

MLCC



CHIP-R



COIL



ABOUT PDC

Milestone 歷史沿革



| | |
|------|---|
| 1990 | 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。 |
| 1995 | PDC merged with Taiwan Precision Material Corporation. 信昌電子陶瓷併購台灣精密材料公司。 |
| 2002 | Public Listed in OTC. 信昌電子陶瓷正式上櫃。 |
| 2005 | PDC was strategically allied with Wasin Tech. 與華新科技(股)公司策略聯盟。 |
| 2007 | To be strategically allied with Frontier, and setting up new production lines, Magnetic components. 與弘電電子工業(股)公司策略聯盟，生產磁性材料元件。 |
| 2008 | 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。 |

Core Technology 關鍵技術



| | |
|------|--|
| 1988 | Manufacturing and developing ceramic dielectric materials. 生產製造圓板電容粉末、開發。 |
| 1990 | Manufacturing Multilayer Ceramic Capacitors. 生產製造積層陶瓷晶片電容。 |
| 1995 | Manufacturing Ceramic Chip Resistors and Ceramic Chip Coil 生產陶瓷晶片電阻、陶瓷晶片電感。 |
| 2001 | As the 1 st 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。 |
| 2001 | 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。 |
| 2007 | Manufacturing magnetic components. 生產磁性材料元件。 |

Brand Value 品牌價值



| | |
|------|---|
| 2001 | 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。 |
| 2003 | ISO 9001 certified. 獲 ISO 9001 驗證通過。 |
| 2004 | Industrial Sustainable Excellence Award. 榮獲經濟部工業局工業精銳獎。 |
| 2004 | TS16949、ISO 14000 and OHSAS 18000 certified. 獲 TS16949、ISO 14000 及 OHSAS 18000 驗證。 |
| 2007 | 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。 |
| 2008 | IECQ QC080000 HSF certified. 獲 IECQ QC080000 HSF 驗證。 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。 |
| 2009 | 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。 |
| 2012 | 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」 |
| 2013 | SMD High Voltage Chip Resistor passed UL Safety certification in 2013 電阻產品取得安規認證證書 |
| 2015 | MLCC product have obtained the IECQ certificate & 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。 |
| 2016 | Aerospace Quality Management Systems AS 9100 certified. 晶片電容取得車規第三方認證 |
| 2019 | PDC was selected fastest growing Top 100 companies in 2019 by commonwealth magazine PDC 榮獲天下雜誌 2019 年成長 100 強企業 |

Market Performance 市場表現



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。
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。

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 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 series, PDC gradually set up the manufacturing equipments for coil and transformer in Yongzhou and Shenzhen Plant. The improvement of the production capability is able to increase the sales performance.

近年來，為了擴展磁性元件系列產品的產能，信昌電陶陸續在中國永州廠、深圳廠增置電感、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)

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)

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，提升品牌價值
- 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

Key to the 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資最深者

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

FEATURES

- Safety standard approval by
EN 60384-14: 2013, IEC 60384-14: 2013,
UL 60384-14 (Ed 2.0) / UL 62368-1 (2nd Edition)
- Certificate number:
R 50041666 and R 50359148 by TUV
E346791 (FOWX2/8) by UL, E231248 By UL
- HALOGEN & RoHS 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 | Impulse voltage | Packaging | Thickness | Control Code |
| FK | 06 1206 (3216) | N COG(NPO) | 102 =10x10 ² =1000pF | J = ± 5% | 302: 2.5KV Impulse | E = Tape and 7" Reel, Embossed Tape | Reference Thickness Description | G =RoHS Compliant |
| Safety X1 & Y2 series | 08 1808 (4520) 12 1812 (4532) | X X7R | 100 =10x10 ⁰ =10pF | K = ± 10% M = ± 20% | 502: 5KV Impulse 602: 6KV Impulse | P = Tape and 7" Reel, Paper Tape L = Tape and 13" Reel, Embossed G = Tape and 13"Reel, Paper Tape | | |
| FH Safety X2 series | 21 2211 (5728) 20 2220 (5750) | | | | | | | |

GENERAL ELECTRICAL DATA

| Dielectric | COG (NPO) | X7R | X7R |
|---|--|---|--|
| Size | 1808, 1812, 2211 | 1808, 1812, 2211, 2220 | 1206 |
| Rated voltage | 250VAC | | 2.5KVDC |
| Capacitance range* | X1/Y2 Class(Impulse 6KV) | 4pF ~ 100pF | X1/Y2 Class 100pF ~ 4.7nF |
| | X1/Y2 Class(Impulse 5KV) | 3pF ~ 720pF | X2 Class 150pF ~ 56nF |
| | X2 Class | 3pF ~ 1000pF | |
| Capacitance tolerance | Cap<10pF: | D (± 0.5pF) | J (± 5%) K (± 10%) M (± 20%) |
| | Cap≥10pF: | F (± 1%), G (± 2%), J (± 5%), K (± 10%), M (± 20%) | |
| Tan δ * (Tangent of loss angle) | Cap. Rang | Q Spec. | |
| | Cap<30pF: | Q≥400+20C | ≤2.5% |
| | Cap≥30pF: | Q≥1000 | |
| Measured at the condition of 30~70% related humidity. | | | |
| Capacitance & Tan δ Test Condition | 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% | | |
| Insulation resistance | ≥100GΩ or R • C≥1000 whichever is smaller | | ≥10GΩ or R • C≥500Ω-F whichever is smaller |
| Operating temperature | - 55°C to + 125°C | | |
| Temperature coefficient | ± 30ppm / °C | | ± 15% |
| Termination | Cu or Ag / Ni / Sn (lead-free termination) | | |

DIMENSIONS



| Size inch (mm) | L (mm) | W (mm) | T (mm) code | M _B min (mm) |
|----------------|---------------|-----------|-------------|-------------------------|
| 1206 (3216) | 3.30±0.40 | 1.60±0.20 | | 0.5±0.25 |
| 1808 (4520) | 4.50+0.6/-0.3 | 2.00±0.30 | Reference | 0.5±0.25 |
| 1812 (4532) | 4.50+0.6/-0.3 | 3.20±0.40 | Thickness | 0.5±0.25 |
| 2211 (5728) | 5.70±0.50 | 2.80±0.40 | Description | |
| 2220 (5750) | 5.70±0.50 | 5.00±0.50 | | 0.60±0.30 |

FK-FH

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

RATING

| Class | | X1/Y2 (FK Series) | | | | | | | X2 (FH Series) | | | | | | |
|---------------|---------|---------------------------|------|------|------|------|------|------|----------------|-------|------|----------|------|------|-------|
| Rated Voltage | | 250Vac | | | | | | | | | | 2.5KVdc | | | |
| Certificated | | TUV IEC60384-14 /UL-60384 | | | | | | | | | | UL-62368 | | | |
| Dielectric | | COG | | | | X7R | | | | COG | | X7R | | | X7R |
| Cap | Size | 1808 | 1812 | 2211 | 2211 | 1808 | 1812 | 2211 | 2220 | 1808 | 1812 | 1808 | 1812 | 2220 | 1206 |
| | Impulse | 5KV | | | 6KV | 5KV | | | | 2.5KV | | | | | (252) |
| 3pF | 3R0 | D | | | | | | | | D | | | | | |
| 3.3pF | 3R3 | D | | | | | | | | | | | | | |
| 1pF | 4R0 | D | | F | F | | | | | D | | | | | |
| 1.7pF | 4R7 | D | | F | F | | | | | | | | | | |
| 5pF | 5R0 | D | | F | F | | | | | D | | | | | |
| 5.6pF | 5R6 | D | | F | F | | | | | | | | | | |
| 6.0pF | 6R0 | D | | F | F | | | | | D | | | | | |
| 6.8pF | 6R8 | D | | F | F | | | | | | | | | | |
| 7.0pF | 7R0 | D | | F | F | | | | | D | | | | | |
| 8.0pF | 8R0 | D | | F | F | | | | | D | | | | | |
| 8.2pF | 8R2 | D | | F | F | | | | | | | | | | |
| 9.0pF | 9R0 | D | | | | | | | | D | | | | | |
| 10pF | 100 | D | C | F | F | | | | | D | C | | | | |
| 12pF | 120 | D | C | F | F | | | | | D | C | | | | |
| 15pF | 150 | D | C | F | F | | | | | D | C | | | | |
| 18pF | 180 | D | C | F | F | | | | | D | | | | | |
| 22pF | 220 | D | C | F | F | | | | | D | C | | | | |
| 27pF | 270 | D | C | F | F | | | | | D | C | | | | |
| 33pF | 330 | D | C | F | F | | | | | D | C | | | | |
| 39pF | 390 | E | C | F | F | | | | | E | C | | | | |
| 47pF | 470 | E | C | F | F | | | | | E | C | | | | |
| 56pF | 560 | E | C | F | F | | | | | E | C | | | | |
| 68pF | 680 | E | C | F | G | | | | | E | C | | | | |
| 82pF | 820 | E | C | F | G | | | | | E | C | | | | |
| 0.1nF | 101 | F | C | F | H | E* | | E* | | F | C | | | | C |
| 0.12nF | 121 | F | C | G | | E* | | E* | | F | C | | | | C |
| 0.13nF | 131 | F | C | | | | | E* | | | | | | | C |
| 0.15nF | 151 | F | C | G | | E* | E* | E* | | F | C | E | | | C |
| 0.16nF | 161 | F | C | G | | E* | | | F* | | | E | | | C |
| 0.18nF | 181 | F | C | G | | E* | E* | E* | F* | F | C | E | | | C |
| 0.22nF | 221 | F | F | G | | E* | E* | E* | F* | F | C | E | | | C |
| 0.27nF | 271 | F | F | G | | F* | E* | E* | F* | F | C | E | E | | C |
| 0.3nF | 301 | | F | | | | | | | | | E | E | | C |
| 0.33nF | 331 | | F | G | | F* | E* | E* | F* | F | C | E | E | | C |
| 0.39nF | 391 | | F | G | | F* | E* | E* | F* | F | C | E | E | | C |
| 0.47nF | 471 | | F | G | | F* | E* | F* | F* | F | C | E | E | | C |
| 0.56nF | 561 | | | G | | F* | E* | F* | F* | F | C | E | E | | C |
| 0.68nF | 681 | | | G | | F* | F* | F* | F* | F | F | E | E | | C |
| 0.72nF | 721 | | | | | | | | F* | F | | | E | | C |
| 0.82nF | 821 | | | | | F* | F* | F* | F* | F | F | E | E | | C |
| 1nF | 102 | | | | | F* | G* | G* | F* | F | F | F | E | | C |
| 1.2nF | 122 | | | | | | | G* | G* | | | F | E | | |
| 1.5nF | 152 | | | | | | | G* | G* | | | F | F | | |
| 1.8nF | 182 | | | | | | | G* | G* | | | F | F | | |
| 2.2nF | 222 | | | | | | | G* | G* | | | F | G | | |
| 2.7nF | 272 | | | | | | | H* | G* | | | | G | | |
| 3.3nF | 332 | | | | | | | | G* | | | | G | | |
| 3.9nF | 392 | | | | | | | | G* | | | | G | | |
| 4.7nF | 472 | | | | | | | | G* | | | | G | | |
| 5.6nF | 562 | | | | | | | | | | | | G | | |
| 10nF | 103 | | | | | | | | | | | | | G | |
| 12nF | 123 | | | | | | | | | | | | | G | |
| 15nF | 153 | | | | | | | | | | | | | G | |
| 18nF | 183 | | | | | | | | | | | | | G | |
| 22nF | 223 | | | | | | | | | | | | | H | |
| 27nF | 273 | | | | | | | | | | | | | H* | |
| 33nF | 333 | | | | | | | | | | | | | H* | |
| 39nF | 393 | | | | | | | | | | | | | H* | |
| 47nF | 473 | | | | | | | | | | | | | H* | |
| 56nF | 563 | | | | | | | | | | | | | H* | |

* Surface coating only

MLCC

Chip R

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

GENERAL ELECTRICAL DATA

| Dielectric | COG(NPO) | X7R | |
|---|--|---|--|
| Size | 0805,1206, 1210, 1808, 1812, 1825, 2220, 2225 | 0805,1206, 1210, 1808, 1812, 1825, 2211, 2220, 2225 | |
| Rated voltage (WVDC) | 1KV, 1.5KV, 2KV, 3KV,4KV | 1KV, 1.5KV, 2KV, 3KV,4KV | |
| Capacitance range* | 1.5pf ~ 10nF | 100pF ~ 220nF | |
| Capacitance tolerance | 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%) | |
| Tan δ * | 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% | Apply 1.0±0.2Vrms, 1.0kHz±10%, at 25°C ambient temperature. |
| | Cap > 1000pF | 1.0±0.2Vrms, 1.0kHz±10% | |
| Insulation resistance | ≥10GΩ 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 | Ag (or Cu)/Ni/Sn or Au (lead-free termination) | | |

DIMENSIONS



| Size inch (mm) | L (mm) | W (mm) | T (mm) code | M _B 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) | 4.60+0.50 | 2.00±0.25 | Reference Thickness | 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 | Description | 0.75±0.35 |
| 2211 (5728) | 5.70±0.50 | 2.80±0.30 | | 0.85±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 |

MLCC

Chip R

Coil

FM

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

FEATURES

- Medium 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 | E | C | G |
|------------------------------|--|---|--|---|--|--|---------------------------------------|--|
| PDC Family | Size | Dielectric | Capacitance | Tolerance | Rated voltage | Packaging | Thickness | Control Code |
| Medium Voltage Series | 15 0402 (1005) 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 F Y5V | 102 = 10×10^2 =1000pF 100 = 10×10^0 =10pF | J = $\pm 5\%$ K = $\pm 10\%$ M = $\pm 20\%$ Z = -20/+80% | 101 =100V 201 =200V 251 =250V 501 =500V 631 =630V | 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 | COG(NPO) | X7R | Y5V |
|--------------------------------|--|--|----------------------------------|
| Size | 0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225 | 0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225 | 0805, 1206, 1210, 1812 |
| Rated voltage (WVDC) | 100V, 200V, 250V, 500V, 630V | 100V, 200V, 250V, 500V, 630V | 100V, 200V, 250V |
| Capacitance range* | 0.5pF ~ 100nF | 100pF ~ 820nF | 10nF ~ 680nF |
| Capacitance tolerance | Cap \leq 5pF: B (± 0.1 pF), C (± 0.25 pF) 5pF<Cap<10pF: C (± 0.25 pF), D (± 0.5 pF) Cap \geq 10pF: F ($\pm 1\%$), G ($\pm 2\%$), J ($\pm 5\%$), K ($\pm 10\%$) | J ($\pm 5\%$) K ($\pm 10\%$) M ($\pm 20\%$) | M ($\pm 20\%$) Z (-20/+80%) |
| Tan δ | Cap. Rang Q Spec. Cap<30pF: Q \geq 400+20C Cap \geq 30pF: Q \geq 1000 | $\leq 2.5\% \sim \leq 10.0\%$ | $\leq 5\%$ |

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

Capacitance & Tan δ Test Condition

| Cap. Rang | Test Condition | 1.0 \pm 0.2Vrms, 1.0kHz \pm 10%, at 25°C ambient temperature. | 1.0 \pm 0.2Vrms, 1.0kHz \pm 10%, at 20°C ambient temperature. |
|-------------------|-------------------------------------|---|---|
| Cap \leq 1000pF | 1.0 \pm 0.2Vrms, 1.0MHz \pm 10% | | |
| Cap > 1000pF | 1.0 \pm 0.2Vrms, 1.0kHz \pm 10% | | |

Insulation resistance at Ur

$\geq 10G\Omega$ or $R \cdot C \geq 500\Omega \cdot F$ whichever is smaller

$\geq 10G\Omega$ or $R \cdot C \geq 100\Omega \cdot F$ whichever is smaller

Operating temperature

-55 to +125°C

-25 to +85°C

Capacitance characteristic

± 30 ppm / °C

$\pm 15\%$

+30/-80%

Termination

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

DIMENSIONS



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

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 | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 12pF | 120 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 15pF | 150 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 18pF | 180 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 22pF | 220 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 27pF | 270 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 33pF | 330 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 39pF | 390 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 47pF | 470 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 56pF | 560 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 68pF | 680 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 82pF | 820 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 100pF | 101 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 120pF | 121 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 150pF | 151 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 180pF | 181 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 220pF | 221 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 270pF | 271 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 330pF | 331 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 390pF | 391 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 470pF | 471 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 560pF | 561 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 680pF | 681 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 820pF | 821 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 1000pF | 102 | C | C | C | C | C | F | 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 | F |
| 1500pF | 152 | C | C | C | C | C | F | 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 | F |
| 2200pF | 222 | C | C | C | C | C | F | 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 | F |
| 3300pF | 332 | C | C | C | C | C | F | 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 | F |
| 4700pF | 472 | C | C | C | C | C | F | 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 | F |
| 6800pF | 682 | C | C | C | C | C | F | 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 | F |
| 0.010μF | 103 | C | C | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 0.012μF | 123 | C | E | E | E | E | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 0.015μF | 153 | C | E | E | E | E | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 0.018μF | 183 | E | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 0.022μF | 223 | E | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 0.027μF | 273 | F | G | G | | | E | E | E | F | | F | F | F | F | | F | F | F | F | F | F |
| 0.033μF | 333 | F | | | | | E | E | E | F | | F | F | F | F | | F | F | F | F | F | F |
| 0.039μF | 393 | G | | | | | E | F | F | F | | F | F | F | G | | F | F | F | F | F | F |
| 0.047μF | 473 | G | | | | | E | F | F | | | F | G | G | G | | F | F | F | F | F | F |
| 0.056μF | 563 | G | | | | | F | G | G | | | F | G | G | | | F | G | G | G | G | G |
| 0.068μF | 683 | G | | | | | F | G | G | | | F | G | G | | | F | G | G | G | H | H |
| 0.082μF | 823 | G | | | | | G | | | | | G | | | | | F | G | G | R | | |
| 0.10μF | 104 | G | | | | | G | | | | | G | | | | | G | G | G | | | |
| 0.12μF | 124 | | | | | | | | | | | | | | | | | | | | | |
| 0.15μF | 154 | | | | | | | | | | | | | | | | | | | | | |
| 0.18μF | 184 | | | | | | | | | | | | | | | | | | | | | |
| 0.22μF | 224 | | | | | | | | | | | | | | | | | | | | | |

MLCC

Chip R

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 | X | X | 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 | X | X | 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 | | | X | C | C | C | C | X | C | C | C | C | M | M | M | C | C | F | F | | | | |
| 0.015μF | 153 | | 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 | C | C | X | C | C | E | E | M | M | M | E | E | F | F | | | | |
| 0.033μF | 333 | | B | | | C | 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 | E | 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 | F | F | F | F | | | | |
| 0.10μF | 104 | | B | | | C | C | | | | C | E | E | | | M | E | E | F | F | | | | | | |
| 0.12μF | 124 | | | | | I | | | | | C | E | E | | | M | E | E | | | | | | | | |
| 0.15μF | 154 | | | | | I | | | | | E | E | E | | | C | G | G | | | | | | | | |
| 0.18μF | 184 | | | | | I | | | | | E | E | E | | | C | G | G | | | | | | | | |
| 0.22μF | 224 | | | | | I | | | | | E | E | E | | | C | G | G | | | | | | | | |
| 0.27μF | 274 | | | | | I | | | | | E | | | | | E | G | G | | | | | | | | |
| 0.33μF | 334 | | | | | I | | | | | E | | | | | E | G | G | | | | | | | | |
| 0.39μF | 394 | | | | | I | | | | | E | | | | | G | G | G | | | | | | | | |
| 0.47μF | 474 | | | | | I | | | | | E | | | | | G | G | G | | | | | | | | |
| 0.56μF | 564 | | | | | | | | | | P | | | | | G | G | G | | | | | | | | |
| 0.68μF | 684 | | | | | | | | | | P | | | | | G | G | G | | | | | | | | |
| 0.82μF | 824 | | | | | | | | | | P | | | | | 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 | | | | | | | | | | | | | | | | | | | | | | | | | |

MLCC

Chip R

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 | C | C | C | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 0.12μF | 124 | C | C | C | G | G | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 0.15μF | 154 | C | F | F | G | G | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 0.18μF | 184 | C | F | F | G | G | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 0.22μF | 224 | C | F | F | G | G | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 0.27μF | 274 | C | F | F | G | | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 0.33μF | 334 | C | F | F | G | | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 0.39μF | 394 | C | F | F | G | | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 0.47μF | 474 | F | 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 | | | F | F | F | F | F |
| 0.68μF | 684 | F | G | G | | | F | F | F | | | F | F | F | | | F | F | F | | |
| 0.82μF | 824 | F | G | G | | | F | F | F | | | F | F | F | | | F | F | 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 | | | | | | | | | | | | | | | | | | | | |
| 6.80μF | 685 | | | | | | | | | | | | | | | | | | | | |
| 8.20μF | 825 | | | | | | | | | | | | | | | | | | | | |
| 10.0μF | 106 | | | | | | | | | | | | | | | | | | | | |

MLCC

Chip R

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

Coil

■ Anti-Bend (Soft termination) Capacitor Series

FEATURES

- High performance to withstanding 3~5mm of substrate bending test guarantee.
- A wide selection of sizes is available (0402 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 | 32 | X | 225 | K | 101 | E | G | G |
|------------|----------------|------------|--------------------------|-----------|---------------|--------------------|-------------|--------------|
| PDC Family | Size | Dielectric | Capacitance | Tolerance | Rated voltage | Packaging | Thickness | Control Code |
| Anti-bend | 15 0402(1005) | N COG(NPO) | 106=10x10 ^Λ 6 | J= ± 5% | 6R3=6.3V | E= | Reference | G=RoHS |
| General | 18 0603 (1608) | X X7R | =10μF | K=± 10 % | 100=10V | Tape and 7" Reel, | Thickness | Compliant |
| Purpose | 21 0805 (2012) | | 100=10x10 ^Λ 0 | M=± 20 % | 160=16V | Embossed Tape | Description | |
| | 31 1206 (3216) | | =10pF | | 250=25V | P= | | |
| | 32 1210 (3225) | | R47=0.47pF | | 500=50V | Tape and 7" Reel, | | |
| | 42 1808 (4520) | | OR5=0.5pF | | 101=100V | Paper Tape | | |
| | 43 1812 (4532) | | | | 201=200V | L= | | |
| | 46 1825 (4563) | | | | 251=250V | Tape and 13" Reel, | | |
| | 55 2220 (5750) | | | | 501=500V | Embossed | | |
| | 56 2225 (5763) | | | | 631=630V | G= | | |
| | | | | | 102=1000V | Tape and 13"Reel, | | |
| | | | | | 152=1500V | Paper Tape | | |
| | | | | | 202=2000V | | | |
| | | | | | 302=3000V | | | |
| | | | | | 402=4000V | | | |

GENERAL ELECTRICAL DATA

| Dielectric | NPO | X7R |
|---|--|--|
| Size | 0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225 | 0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225 |
| Rated voltage (WVDC) | 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 |
| Capacitance range | 0.1pF ~ 330nF | 100pF ~ 22μF |
| Capacitance tolerance | 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%) |
| Tan δ | Cap. Rang Q Spec. Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000 | ≤2.5% ~ ≤10% |
| Capacitance & Tan δ Test Condition | 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. Cap. Rang Test Condition Cap≤10μF 1.0±0.2Vrms, 1.0kHz±10% Cap≥10μF, 0.5±0.2Vrms, 120Hz±20% |
| Insulation resistance | ≥10GΩ 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 / Ag polymer / Ni / Sn (lead-free termination) |

DIMENSIONS



| Size inch (mm) | L (mm) | W (mm) | T (mm) code | M _b (mm) |
|----------------|-----------|-----------|---------------------------------|---------------------|
| 0402 (1005) | 1.00±0.20 | 0.50±0.20 | | 0.25+0.05/-0.10 |
| 0603 (1608) | 1.60±0.20 | 0.80±0.20 | | 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±0.35 |
| 1808 (4520) | 4.60±0.50 | 2.00±0.25 | 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 |

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 | 31 | X | 471 | K | 251 | E | C | 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 ⁶ =10μF 100=10x10 ⁰ =10pF | J= ±5% K= ±10% M= ±20% | 500=50V 101=100V 201=200V 251=250V 401=400V 501=500V 631=630V 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 Q=Surface Coating (Size 1206~2225) |

GENERAL ELECTRICAL DATA

| Dielectric | NPO | X7R |
|---|--|--|
| Size | 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225 | 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225 |
| Rated voltage (WVDC) | 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1000V, 1500V, 2000V, 3000V, 4000V | 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1000V, 1500V, 2000V, 3000V, 4000V |
| Capacitance range | 0.5pF ~ 330nF | 100pF ~ 22μF |
| Capacitance tolerance | 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%) |
| Tan δ | Cap. Rang Q Spec. Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000 | ≤2.5% ~ ≤10% |
| 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% | 1.0±0.2Vrms, 1.0kHz±10% for C≤10μF; 0.5±0.2Vrms, 120Hz±20% for C>10μF, at 25°C ambient temperature |
| Cap>1000pF | 1.0±0.2Vrms, 1.0kHz±10% | |
| 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 or Au(lead-free termination) | |

DIMENSIONS



| Size inch (mm) | L (mm) | W (mm) | T (mm) code | M _B (mm) |
|----------------|-----------|-----------|---------------------------------|---------------------|
| 0603 (1608) | 1.60±0.20 | 0.80±0.20 | | 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±0.35 |
| 1808 (4520) | 4.60±0.50 | 2.00±0.25 | 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 |

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 | C | C | C | C | C |
| 120pF | 121 | S | S | S | B | 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 | C | C | C | C | C |
| 180pF | 181 | S | S | S | B | 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 | C | C | C | C | C |
| 270pF | 271 | S | S | S | B | 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 | C | C | C | C | C |
| 390pF | 391 | S | S | S | B | 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 | C | C | C | C | C |
| 560pF | 561 | S | S | S | B | 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 | C | C | C | C | C |
| 820pF | 821 | S | S | S | B | 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 | C | C | C | C | C |
| 1200pF | 122 | S | S | S | B | 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 | X | X | C | C | C | E | E |
| 1800pF | 182 | S | S | S | B | X | X | X | X | X | | X | X | X | C | C | C | E | E |
| 2200pF | 222 | S | S | S | B | X | X | X | X | X | | X | X | X | C | C | C | E | E |
| 2700pF | 272 | S | S | S | B | X | X | X | X | X | | X | X | X | C | C | C | E | E |
| 3300pF | 332 | S | S | S | B | X | X | X | X | X | | X | X | X | C | C | C | E | E |
| 3900pF | 392 | S | S | S | B | X | X | X | X | X | | X | X | X | C | C | C | E | |
| 4700pF | 472 | S | S | S | B | X | X | X | X | C | | X | X | X | C | C | C | E | |
| 5600pF | 562 | S | S | S | B | X | X | X | X | C | | X | X | X | C | C | C | | |
| 6800pF | 682 | S | S | S | B | X | X | X | X | C | | X | X | X | C | C | C | | |
| 8200pF | 822 | S | S | S | B | X | X | X | C | C | | X | X | X | C | C | C | | |
| 0.010μF | 103 | S | S | S | B | X | X | X | C | C | | X | X | X | C | C | C | | |
| 0.012μF | 123 | S | S | B | | X | X | X | C | C | | X | X | X | C | C | E | | |
| 0.015μF | 153 | S | S | B | | X | X | X | C | C | | X | X | X | C | C | E | | |
| 0.018μF | 183 | S | S | B | | X | X | X | C | C | | X | X | X | C | C | E | | |
| 0.022μF | 223 | S | S | B | | X | X | X | C | C | | X | X | X | C | E | E | | |
| 0.027μF | 273 | S | S | B | | X | X | C | C | | | X | X | X | C | E | | | |
| 0.033μF | 333 | B | B | B | | X | X | C | C | | | X | X | X | E | E | | | |
| 0.039μF | 393 | B | B | B | | X | X | C | | | | X | X | X | E | E | | | |
| 0.047μF | 473 | B | B | B | | X | X | C | | | | X | X | X | E | E | | | |
| 0.056μF | 563 | B | B | B | | X | X | C | | | | X | X | X | E | | | | |
| 0.068μF | 683 | B | B | B | | X | X | C | | | | X | X | X | E | | | | |
| 0.082μF | 823 | B | B | | | X | X | C | | | | X | X | C | E | | | | |
| 0.10μF | 104 | B | 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 | | | | | | |
| 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

Coil

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.

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 | 106 | K | 500 | L | F | K | M |
|---------------------------|---|----------------------|---|---------------------------------|--|---|-------------------------------|---|---------------|
| PDC Family | Chip Q'ty and size | Dielectric | Capacitance | Tolerance | Rated voltage | Packaging | Thickness | Control Code | Serial 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 ^Λ 5 =1μF 106=10x10 ^Λ 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 L=Tape and 13" Reel, Embossed Tape | Reference Thickness (Toble I) | L=L type lead J=J type lead K= K type lead B= B type lead S= Straight type lead | M= Automotive |

GENERAL ELECTRICAL DATA

| Dielectric | COG | X7R | | |
|---|---|--|---|-------------------------|
| Size | 1210, 1812, 1825, 2220, 2225 | 1210, 1812, 1825, 2220, 2225 | | |
| Rated voltage (WVDC) | 50V, 100V, 200V, 250V, 500V, 630V | 50V, 100V, 200V, 250V, 500V, 630V | | |
| Capacitance range* | 220nF Max. | 47μF Max. | | |
| Capacitance tolerance | J (± 5%), K (± 10%), M (± 20%) | | | |
| Tan δ *e) | Cap. Rang | Q Spec. | | |
| | Cap<30pF: | Q≥400+20C | | |
| | Cap≥30pF: | Q≥1000 | | |
| 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 (25°C) for 24±2 hours before measurement | |
| | Cap. Rang | Test Condition | Cap. Rang | Test Condition |
| | Cap≤1000pF | 1.0±0.2Vrms, 1.0MHz±10% | Cap≤10μF | 1.0±0.2Vrms, 1.0KHz±10% |
| Cap>1000pF | 1.0±0.2Vrms, 1.0KHz±10% | Cap>10μF | 0.5±0.2Vrms, 120KHz±20% | |
| Insulation resistance at 500Vdc for 60 seconds | ≥10GΩ or RxC≥ 500Ω-F whichever is smaller | ≥10GΩ or RxC≥100Ω-F whichever is smaller | | |
| Operating temperature | - 55 to + 125°C | | | |
| Capacitance characteristic | ± 30ppm / °C | ± 15% | | |
| Termination | L / J / Straight type lead | | | |

DIMENSIONS



| Size inch (mm) | L (mm) | W (mm) | T (mm) code | E (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±0.50 | 5.00±0.50 | Description | 1.70±0.15 |
| 2225 (5763) | 6.00±0.50 | 6.30±0.50 | | 1.70±0.15 |

■ Mega cap Stacked Capacitors

CAPACITANCE RANGE (MAX.)

COG

| Size | Code | Rated Voltage | | | | | |
|------|------|---------------|---------|---------|---------|---------|---------|
| | | 50V | 100V | 200V | 250V | 500V | 630V |
| 1210 | 1A | 393 | 223 | 103 | 103 | 103 | 103 |
| 1812 | 1C | 104 | 473 | 273 | 273 | 223 | 223 |
| | 2C | 224 (M) | 104 | 563 | 563 | 473(M) | 473 (M) |
| 1825 | 1G | 104 | 104 | 683 | 683 | 473 | 223 |
| | 2G | 224 (M) | 224 (M) | 134 | 134 | 104 | 473 (M) |
| 2220 | 1H | 104 | 104 | 683 | 683 | 473 | 223 |
| | 2H | 224 (M) | 224 (M) | 134 | 134 | 104 | 473 (M) |
| 2225 | 1I | 104 | 104 | 104 | 104 | 823 | 683 |
| | 2I | 224 (M) | 224 (M) | 224 (M) | 224 (M) | 184 (M) | 134 |

X7R

| Size | Code | Rated Voltage | | | | | |
|------|------|---------------|---------|---------|---------|---------|---------|
| | | 50V | 100V | 200V | 250V | 500V | 630V |
| 1210 | 1A | 475 | 335 | 684 | 684 | 104 | 104 |
| 1812 | 1C | 106 | 475 | 105 | 105 | 474 | 224 |
| | 2C | 226 (M) | 106 | 225 (M) | 225 (M) | 105 | 474 (M) |
| 1825 | 1G | 106 | 106 | 105 | 105 | 564 | 564 |
| | 2G | 226 (M) | 226 (M) | 225 (M) | 225 (M) | 125 (M) | 125 (M) |
| 2220 | 1H | 226 | 106 | 225 | 225 | 474 | 474 |
| | 2H | 476 (M) | 226 (M) | 475 (M) | 475 (M) | 105 | 105 |
| 2225 | 1I | 106 | 106 | 275 | 275 | 564 | 564 |
| | 2I | 226 (M) | 226 (M) | 565 | 565 | 125 (M) | 125 (M) |

• (M) means M tolerance only.

RATING

TABLE 1

| Code | Description | Code | Description | Code | Description |
|------|--------------|------|---------------|------|---------------|
| A | 3.00±0.35 mm | J | 7.80±0.35 mm | S | 12.60±0.35 mm |
| B | 3.60±0.35 mm | K | 8.40±0.35 mm | T | 13.20±0.35 mm |
| C | 4.20±0.35 mm | L | 9.00±0.35 mm | U | 1.70±0.25 mm |
| D | 4.80±0.35 mm | M | 9.60±0.35 mm | V | 2.10±0.25 mm |
| E | 5.40±0.35 mm | N | 10.20±0.35 mm | W | 2.50±0.25 mm |
| F | 6.00±0.35 mm | P | 10.80±0.35 mm | | |
| G | 6.60±0.35 mm | Q | 11.40±0.35 mm | | |
| H | 7.20±0.35 mm | R | 12.00±0.35 mm | | |

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

MLCC

Chip R

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

GENERAL ELECTRICAL DATA

| Dielectric | NPO | X7R |
|---|--|--|
| Size | 1206, 1210, 1808, 1812, 1825, 2220, 2225 | 1206, 1210, 1808, 1812, 1825, 2211, 2220, 2225 |
| Rated voltage (WVDC) | 1KV, 1.5KV, 2KV, 3KV, 4KV | 1KV, 1.5KV, 2KV, 3KV, 4KV |
| Capacitance range* | 1.5pF ~ 10nF | 100pF ~ 220nF |
| Capacitance tolerance | 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%) |
| Tan δ * | 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 | 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% | |
| Insulation resistance | ≥ 10GΩ 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 | Ag or Cu / Ni / Sn (lead-free termination) | |

DIMENSIONS



| Size inch (mm) | L (mm) | W (mm) | T (mm) code | M _b (mm) |
|----------------|-------------|-------------|---------------------------------|---------------------|
| 1206 (3216) | 3.3 ± 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 |
| 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 |
| 2211 (5728) | 5.70 ± 0.50 | 2.80 ± 0.30 | | 0.85 ± 0.35 |
| 2225 (5763) | 5.70 ± 0.50 | 6.30 ± 0.40 | | 0.85 ± 0.35 |

■ Automotive Capacitor Qualified to AEC-Q200

FEATURES

- A wide selection of sizes is available (0201 to 1210).
- 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 | E | C | G |
|--|--|------------------------------|--|---|---|--|---------------------------------------|-----------------------------|
| PDC Family | Size | Dielectric | Capacitance | Tolerance | Rated voltage | Packaging | Thickness | Control Code |
| Automotive Capacitor Qualified to AEC-Q200 | 03 0201 (0603) 15 0402 (1005) 18 0603 (1608) 21 0805 (2012) 31 1206 (3216) 32 1210 (3225) | N NPO X X7R | 102 =10x10 [∧] 2 =1000pF 100 =10x10 [∧] 0 =10pF | J = ± 5% K =± 10% M =± 20% | 6R3 =6.3V 100 =10V 101 =100V 251 =250V | 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 |

GENERAL ELECTRICAL DATA

| Dielectric | NPO(C0G) | X7R |
|---|--|--|
| Size | 0201, 0402, 0603, 0805, 1206, 1210 | 0402, 0603, 0805, 1206, 1210 |
| Rated voltage (WVDC) | 10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1000V | |
| Capacitance range* | 0.1pF ~ 47nF | 100pF ~ 2.2μF |
| Capacitance tolerance** | 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. | | |
| 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% |
| Tan δ * | Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000 | ≤ 2.5% |
| Insulation resistance at Ur | ≥10GΩ or R·C≥ 500Ω·F whichever is smaller | Follow No.17 Of 8. Reliability Test Conditions and Requirements |
| Operating temperature | -55 to +125°C | |
| Capacitance characteristic | ± 30ppm / °C | ± 15% |
| Termination | Cu/Ni/Sn (lead-free termination) | |

DIMENSIONS



| Size inch (mm) | L (mm) | W (mm) | T (mm) code | M _b 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 | Reference Thickness Description | 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 |

Automotive Capacitor Qualified to AEC-Q200

RATING

X7R

| Size | | 0201 | | | | 0402 | | | | 0603 | | | | | 0805 | | | | | | | | |
|---------|------|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|------|------|-----|-----|-----|------|------|------|------|------|
| Cap(pF) | Code | 10V | 16V | 25V | 50V | 10V | 16V | 25V | 50V | 10V | 16V | 25V | 50V | 100V | 10V | 16V | 25V | 50V | 100V | 200V | 250V | 500V | 630V |
| 100 | 101 | L | L | L | L | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 120 | 121 | L | L | L | L | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 150 | 151 | L | L | L | L | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 180 | 181 | L | L | L | L | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 220 | 221 | L | L | L | L | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 270 | 271 | L | L | L | L | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 330 | 331 | L | L | L | L | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 390 | 391 | L | L | L | L | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 470 | 471 | L | L | L | L | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 560 | 561 | L | L | L | L | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 680 | 681 | L | L | L | L | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 820 | 821 | L | L | L | L | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 1000 | 102 | L | L | L | L | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 1200 | 122 | L | L | L | | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 1500 | 152 | L | L | L | | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 1800 | 182 | L | L | L | | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 2200 | 222 | L | L | L | | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 2700 | 272 | L | L | L | | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 3300 | 332 | L | L | L | | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 3900 | 392 | L | L | L | | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | X | X |
| 4700 | 472 | L | L | L | | N | N | N | N | S | S | S | S | S | X | X | X | X | X | X | X | C | C |
| 5600 | 562 | L | L | L | | N | N | N | N | S | S | S | S | S | X | X | X | X | X | C | C | C | C |
| 6800 | 682 | L | | | | N | N | N | N | S | S | S | S | S | X | X | X | X | X | C | C | C | C |
| 8200 | 822 | L | | | | N | N | N | N | S | S | S | S | S | X | X | X | X | X | C | C | C | C |
| 10000 | 103 | L | | | | N | N | N | N | S | S | S | S | S | X | X | X | X | X | C | C | C | C |
| 12000 | 123 | | | | | N | N | N | | S | S | S | S | B | X | X | X | X | X | C | C | | |
| 15000 | 153 | | | | | N | N | N | | S | S | S | S | B | X | X | X | X | X | C | C | | |
| 18000 | 183 | | | | | N | N | N | | S | S | S | S | B | X | X | X | X | X | C | C | | |
| 22000 | 223 | | | | | N | N | N | | S | S | S | S | B | X | X | X | X | X | C | C | | |
| 27000 | 273 | | | | | N | N | N | | S | S | S | S | B | X | X | X | X | C | | | | |
| 33000 | 333 | | | | | N | N | N | | S | S | S | B | B | X | X | X | X | C | | | | |
| 39000 | 393 | | | | | N | N | N | | S | S | S | B | B | X | X | X | X | C | | | | |
| 47000 | 473 | | | | | N | N | N | | S | S | S | B | B | X | X | X | X | C | | | | |
| 56000 | 563 | | | | | N | N | | | S | S | S | B | | X | X | X | X | C | | | | |
| 68000 | 683 | | | | | N | N | | | S | S | S | B | | X | X | X | X | C | | | | |
| 82000 | 823 | | | | | N | N | | | S | S | S | B | | X | X | X | C | C | | | | |
| 100000 | 104 | | | | | N | N | | | S | S | S | B | | X | X | X | C | C | | | | |
| 120000 | 124 | | | | | | | | | B | B | B | | | X | X | X | C | | | | | |
| 150000 | 154 | | | | | | | | | B | B | B | B | | C | C | C | C | | | | | |
| 180000 | 184 | | | | | | | | | B | B | B | | | C | C | C | C | | | | | |
| 220000 | 224 | | | | | | | | | B | B | B | B | | C | C | C | C/I | | | | | |
| 270000 | 274 | | | | | | | | | | | | | | C | C | C | | | | | | |
| 330000 | 334 | | | | | | | | | B | B | B | B | | C | C | C | | | | | | |
| 390000 | 394 | | | | | | | | | | | | | | C | C | C | | | | | | |
| 470000 | 474 | | | | | | | | | | | | | | C | C | C | | | | | | |
| 560000 | 564 | | | | | | | | | | | | | | C | C | C | | | | | | |
| 680000 | 684 | | | | | | | | | | | | | | C | C | C | | | | | | |
| 820000 | 824 | | | | | | | | | | | | | | C | C | C | | | | | | |
| 1000000 | 105 | | | | | | | | | | | | | | C | C | C | | | | | | |

MLCC

Chip R

Coil

■ Automotive Capacitor Qualified to AEC-Q200

RATING

X7R

| Size | | 1206 | | | | | | | | | 1210 | | | | | | | |
|---------|------|------|-----|-----|-----|------|------|------|------|------|------|-----|-----|-----|------|------|------|-------|
| Cap(pF) | Code | 10V | 16V | 25V | 50V | 100V | 200V | 250V | 500V | 630V | 10V | 16V | 25V | 50V | 100V | 250V | 500V | 1000V |
| 100 | 101 | | | | | | C | C | C | C | | | | | | C | C | C |
| 120 | 121 | | | | | | C | C | C | C | | | | | | C | C | C |
| 150 | 151 | X | X | X | X | X | C | C | C | C | | | | | | C | C | C |
| 180 | 181 | X | X | X | X | X | C | C | C | C | | | | | | C | C | C |
| 220 | 221 | X | X | X | X | X | C | C | C | C | | | | | | C | C | C |
| 270 | 271 | X | X | X | X | X | C | C | C | C | | | | | | C | C | C |
| 330 | 331 | X | X | X | X | X | C | C | C | C | | | | | | C | C | C |
| 390 | 391 | X | X | X | X | X | C | C | C | C | | | | | | C | C | C |
| 470 | 471 | X | X | X | X | X | C | C | C | C | | | | | | C | C | C |
| 560 | 561 | X | X | X | X | X | C | C | C | C | | | | | | C | C | C |
| 680 | 681 | X | X | X | X | X | C | C | C | C | | | | | | C | C | C |
| 820 | 821 | X | X | X | X | X | C | C | C | C | | | | | | C | C | C |
| 1000 | 102 | X | X | X | X | X | C | C | C | C | M | M | M | M | M | M | C | C |
| 1200 | 122 | X | X | X | X | X | C | C | C | C | M | M | M | M | M | M | C | C |
| 1500 | 152 | X | X | X | X | X | C | C | C | C | M | M | M | M | M | M | C | C |
| 1800 | 182 | X | X | X | X | X | C | C | C | C | M | M | M | M | M | M | C | C |
| 2200 | 222 | X | X | X | X | X | C | C | C | C | M | M | M | M | M | M | C | C |
| 2700 | 272 | X | X | X | X | X | C | C | C | C | M | M | M | M | M | M | C | C |
| 3300 | 332 | X | X | X | X | X | C | C | C | C | M | M | M | M | M | M | C | C |
| 3900 | 392 | X | X | X | X | X | C | C | C | C | M | M | M | M | M | M | C | E |
| 4700 | 472 | X | X | X | X | X | C | C | C | C | M | M | M | M | M | M | C | E |
| 5600 | 562 | X | X | X | X | X | C | C | C | C | M | M | M | M | M | M | C | E |
| 6800 | 682 | X | X | X | X | X | C | C | C | C | M | M | M | M | M | M | C | E |
| 8200 | 822 | X | X | X | X | X | C | C | C | C | M | M | M | M | M | M | C | E |
| 10000 | 103 | X | X | X | X | X | C | C | C | C | M | M | M | M | M | M | C | E |
| 12000 | 123 | X | X | X | X | X | C | C | | | M | M | M | M | M | M | C | |
| 15000 | 153 | X | X | X | X | X | C | C | | | M | M | M | M | M | M | C | |
| 18000 | 183 | X | X | X | X | X | C | C | | | M | M | M | M | M | M | C | |
| 22000 | 223 | X | X | X | X | X | C | C | | | M | M | M | M | M | M | C | |
| 27000 | 273 | X | X | X | X | X | | | | | M | M | M | M | M | M | | |
| 33000 | 333 | X | X | X | X | X | | | | | M | M | M | M | M | M | | |
| 39000 | 393 | X | X | X | X | X | | | | | M | M | M | M | M | M | | |
| 47000 | 473 | X | X | X | X | X | | | | | M | M | M | M | M | C | | |
| 56000 | 563 | X | X | X | X | X | | | | | M | M | M | M | M | | | |
| 68000 | 683 | X | X | X | X | X | | | | | M | M | M | M | M | | | |
| 82000 | 823 | X | X | X | X | C | | | | | M | M | M | M | M | | | |
| 100000 | 104 | X | X | X | X | C | | | | | M | M | M | M | M | | | |
| 120000 | 124 | X | X | X | X | C | | | | | M | M | M | M | | | | |
| 150000 | 154 | M | M | M | M | E | | | | | M | M | M | M | | | | |
| 180000 | 184 | M | M | M | M | E | | | | | M | M | M | M | | | | |
| 220000 | 224 | M | M | M | M | E | | | | | M | M | M | M | | | | |
| 270000 | 274 | M | M | M | C | | | | | | M | M | M | M | | | | |
| 330000 | 334 | M | M | M | C | | | | | | M | M | M | C | | | | |
| 390000 | 394 | M | M | J | P | | | | | | M | M | M | C | | | | |
| 470000 | 474 | J | J | J | P | | | | | | M | M | M | C | | | | |
| 560000 | 564 | J | J | J | P | | | | | | C | C | C | C | | | | |
| 680000 | 684 | J | J | J | P | | | | | | C | C | C | C | | | | |
| 820000 | 824 | J | J | J | P | | | | | | C | C | C | C | | | | |
| 1000000 | 105 | J | J | J | P | | | | | | C | C | C | C | | | | |
| 1500000 | 155 | | | | | | | | | | | F | | | | | | |
| 2200000 | 225 | | | | | | | | | | | F | | | | | | |

MLCC

Chip R

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 | E | C | G |
|---|---|--|--|--|--|--|---------------------------------------|-----------------------------|
| PDC Family | Size | Dielectric | Capacitance | Tolerance | Rated voltage | Packaging | Thickness | Control Code |
| Automotive Caps without AEC- Q200 certification | 03 0201 (0603) 15 0402 (1005) 18 0603 (1608) 21 0805 (2012) 31 1206 (3216) 32 1210 (3225) 43 1812 (4532) | N NPO B X5R X X7R | 106 = 10×10^6 =10 μ F 100 = 10×10^0 =10pF | J = $\pm 5\%$ K = $\pm 10\%$ M = $\pm 20\%$ | 6R3 =6.3V 100 =10V 160 =16V 250 =25V 500 =50V 101 =100V 201 =200V 251 =250V | 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 |

GENERAL ELECTRICAL DATA

| Dielectric | NPO | X7R | X5R |
|------------------------------------|--|---|------------------------------|
| Size | 0201, 0402, 0603, 0805, 1206, 1210, 1812 | | |
| Capacitance range* | 0.1pF to 0.047 μ F | 100pF to 2.2 μ F | 0.068 μ F to 6.8 μ F |
| Capacitance tolerance** | Cap \leq 5pF: B (± 0.1 pF), C (± 0.25 pF) 5pF<Cap<10pF: C (± 0.25 pF), D (± 0.5 pF) 10pF \leq Cap: F ($\pm 1\%$), G ($\pm 2\%$), J ($\pm 5\%$) | J ($\pm 5\%$), K ($\pm 10\%$), M ($\pm 20\%$) | |
| Rated voltage (WVDC) | 10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1000V | 6.3V, 10V, 16V, 25V, | |
| Tan δ * | Cap<30pF: Q \geq 400+20C Cap \geq 30pF: Q \geq 1000 | 1.0 ± 0.2 Vrms, 1.0kHz $\pm 10\%$, at 25 $^{\circ}$ C ambient temperature. | |
| Insulation resistance at Ur | ≥ 10 G Ω or RxC ≥ 500 Ω -F whichever is less | | |
| Operating temperature | -55 to +125 $^{\circ}$ C | | -55 to +85 $^{\circ}$ C |
| Capacitance characteristic | ± 30 ppm / $^{\circ}$ C | | $\pm 15\%$ |
| Termination | Ni/Sn (lead-free termination) | | |

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

NPO: Apply 1.0 ± 0.2 Vrms, 1.0MHz $\pm 10\%$ for Cap ≤ 1000 pF and 1.0 ± 0.2 Vrms, 1.0kHz $\pm 10\%$ for Cap > 1000 pF, 25 $^{\circ}$ C at ambient temperature

Measured at 1.0 ± 0.2 Vrms, 1.0kHz $\pm 10\%$ for C ≤ 10 μ F; 0.5 ± 0.2 Vrms, 120Hz $\pm 20\%$ for C > 10 μ F, 30~70% related humidity, 25 $^{\circ}$ C ambient temperature for X7R, X5R.

** Preconditioning for Class II MLCC: Perform a heat treatment at 150 ± 10 $^{\circ}$ 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 _b min (mm) |
|----------------|-----------------|-----------------|---------------------------------------|-------------------------|
| 0201 (0603) | 0.6 ± 0.03 | 0.3 ± 0.03 | Reference Thickness Description | 0.15 ± 0.05 |
| 0402 (1005) | 1.00 ± 0.05 | 0.50 ± 0.05 | | 0.25+0.05/-0.10 |
| 0603 (1608) | 1.60 ± 0.10 | 0.80 ± 0.10 | | 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 ± 0.20 | | 0.75 ± 0.25 |
| 1812 (4532) | 4.50 ± 0.40 | 3.20 ± 0.30 | | 0.75 ± 0.25 |

■ Automotive Caps without AEC-Q200 Certification

RATING

X5R

| Size | | 0402 | | | 0603 | | | | 0805 | | | | 1206 | | | | 1210 | |
|---------|------|------|-----|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|
| Cap | Code | 6.3V | 10V | 16V | 6.3V | 10V | 16V | 25V | 6.3V | 10V | 16V | 25V | 6.3V | 10V | 16V | 25V | 10V | 16V |
| 0.027μF | 273 | | | | | | | | | | | | | | | | | |
| 0.033μF | 333 | | | | | | | | | | | | | | | | | |
| 0.039μF | 393 | | | | | | | | | | | | | | | | | |
| 0.047μF | 473 | | | | | | | | | | | | | | | | | |
| 0.056μF | 563 | | | | | | | | | | | | | | | | | |
| 0.068μF | 683 | | N | | | | | | | | | | | | | | | |
| 0.082μF | 823 | | | | | | | | | | | | | | | | | |
| 0.10μF | 104 | | N | N | | | | | | | | | | | | | | |
| 0.15μF | 154 | | | | | | | | | | | | | | | | | |
| 0.22μF | 224 | N | N | N | | | | | | | | | | | | | | |
| 0.27μF | 274 | | | | | | | | | | | | | | | | | |
| 0.33μF | 334 | N | N | | | B | B | B | | | | | | | | | | |
| 0.39μF | 394 | | | | | | | | | | | | | | | | | |
| 0.47μF | 474 | N | | | | B | B | B | | | | | | | | | | |
| 0.68μF | 684 | N | | | | B | | | | | | | | | | | | |
| 0.82μF | 824 | | | | | | | | | | | | | | | | | |
| 1.0μF | 105 | | | | B | B | | | | | | | | | | | | |
| 1.5μF | 155 | | | | | | | | I | I | | | | J | J | P | F | F |
| 2.2μF | 225 | | | | | | | | I | I | I | I | | J | J | P | F | F |
| 3.3μF | 335 | | | | | | | | | | I | I | P | P | P | P | F | F |
| 4.7μF | 475 | | | | | | | | | | I | I | P | P | P | P | F | F |
| 6.8μF | 685 | | | | | | | | | | | | P | | | | | |
| 10μF | 106 | | | | | | | | | | | | | | | | | |

MLCC

Chip R

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 | 55 | X | 106 | K | 500 | E | G | G |
|--|--|--|--|--|---|--|---------------------------------------|-----------------------------|
| PDC Family | Size | Dielectric | Capacitance | Tolerance | Rated voltage | Packaging | Thickness | Control Code |
| High Capacitance Series | 03 0201 (0603) 15 0402 (1005) 18 0603 (1608) 21 0805 (2012) | B X5R S X6S X X7R F Y5V A X7S | 106 = 10×10^6 = $10\mu\text{F}$ | J = $\pm 5\%$ K = $\pm 10\%$ M = $\pm 20\%$ Z = $-20/+80\%$ | 6R3 =6.3V 100 =10V 101 =100V 251 =250V | 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 |
| Capacitor $\geq 1.0\mu\text{F}$ Series Product | 31 1206 (3216) 32 1210 (3225) 43 1812 (4532) 46 1825 (4563) 55 2220 (5750) 56 2225 (5763) | | | | | | | |

GENERAL ELECTRICAL DATA

| Dielectric | X7R | X7S | X6S | X5R | Y5V |
|-----------------------------------|--|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Size | 0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225 | 0402, 0603, 0805, 1206, 1210 | 0201, 0402, 0603, 0805, 1206, 1210 | 0201, 0402, 0603, 0805, 1206, 1210 | 0402, 0603, 0805, 1206, 1210, 1812, |
| Capacitance range* | 1 μF to 47 μF | 1 μF to 100 μF | 1 μF to 100 μF | 1 μF to 220 μF | 1 μF to 100 μF |
| Capacitance tolerance** | K($\pm 10\%$), M($\pm 20\%$) | K($\pm 10\%$), M($\pm 20\%$) | K($\pm 10\%$), M($\pm 20\%$) | K($\pm 10\%$), M($\pm 20\%$) | Z ($-20/+80\%$) |
| Rated voltage (WVDC) | 6.3V, 10V, 16V, 25V, 50V, 100V, 250V, 500V, 630V | 6.3V, 10V, 16V, 25V, 50V, 100V | 6.3V, 10V, 16V, 25V, 35V, 50V | 4V, 6.3V, 10V, 16V, 25V, 35V, 50V | 6.3V, 10V, 16V, 25V, 35V, 50V, 100V |
| Tan δ * | Pls refer to our sales spec | | | | |
| Operating temperature | -55 to +25 $^{\circ}\text{C}$ | -55 to +125 $^{\circ}\text{C}$ | -55 to +105 $^{\circ}\text{C}$ | -55 to +85 $^{\circ}\text{C}$ | -25 to +85 $^{\circ}\text{C}$ |
| Capacitance characteristic | $\pm 15\%$ | $\pm 22\%$ | $\pm 22\%$ | $\pm 15\%$ | +30/-80% |
| Termination | Cu or Ag/Ni/Sn (lead-free termination) | | | | |

DIMENSIONS



| Size inch (mm) | L (mm) | W (mm) | T (mm) code | M _b min (mm) |
|----------------|---|---|---------------------------------------|-------------------------|
| 0201 (0603) | 0.60 \pm 0.03 | 0.30 \pm 0.03 | Reference Thickness Description | 0.15 \pm 0.05 |
| | 0.60 \pm 0.05 (Cap. \geq 0.68 μF) | 0.30 \pm 0.05 (Cap. \geq 0.68 μF) | | |
| | 0.60 \pm 0.09 (Cap. \geq 1.0 μF) | 0.30 \pm 0.09 (Cap. \geq 1.0 μF) | | |
| 0402 (1005) | 1.00 \pm 0.10 | 0.50 \pm 0.10 | | 0.25+0.05/-0.10 |
| | 1.00 \pm 0.20 ^{#1} | 0.50 \pm 0.20 ^{#1} | | |
| 0603 (1608) | 1.60 \pm 0.15 | 0.80 \pm 0.15 | | 0.40 \pm 0.15 |
| | 1.60 \pm 0.20 ^{#2} | 0.80 \pm 0.20 ^{#2} | | |
| 0805 (2012) | 2.10 \pm 0.20 | 1.25 \pm 0.20 | | 0.50 \pm 0.20 |
| 1206 (3216) | 3.30 \pm 0.30 | 1.60 \pm 0.20 | | 0.60 \pm 0.20 |
| 1210 (3225) | 3.30 \pm 0.40 | 2.50 \pm 0.30 | | 0.75 \pm 0.35 |
| 1812 (4532) | 4.60 \pm 0.50 | 3.20 \pm 0.30 | | 0.75 \pm 0.35 |
| 1825 (4563) | 4.60 \pm 0.50 | 6.30 \pm 0.40 | | 0.75 \pm 0.35 |
| 2220 (5750) | 5.70 \pm 0.50 | 5.00 \pm 0.40 | | 0.85 \pm 0.35 |
| 2225 (5763) | 5.70 \pm 0.50 | 6.30 \pm 0.40 | | 0.85 \pm 0.35 |

• #1 For 0402 size K thickness products.

• #2 For 0603/Cap. $\geq 10\mu\text{F}$ or 0603($\leq 6.3\text{V}$)/Cap. $\geq 4.7\mu\text{F}$ For 0603($> 10\text{V}$)/Cap. $> 1\mu\text{F}$ products.

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

RATING

X7R

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

X7R

| Size | Code | 1812 | | | | | | 1825 | | | | | 2220 | | | | | 2225 | | | | | | | |
|------|------|------|-----|-----|-----|------|------|------|-----|-----|------|------|------|-----|-----|------|------|------|-----|-----|------|------|------|---|---|
| | | 10V | 16V | 25V | 50V | 100V | 200V | 250V | 25V | 50V | 100V | 200V | 250V | 25V | 50V | 100V | 200V | 250V | 25V | 50V | 100V | 200V | 250V | | |
| 1.0 | 105 | C | C | C | F | F | G | G | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 1.2 | 125 | | | C | F | F | | | F | F | F | | | F | F | F | G | G | F | F | F | G | G | | |
| 1.5 | 155 | | | C | F | F | | | F | F | F | | | F | F | F | G | G | F | F | F | G | G | | |
| 1.8 | 185 | | | E | F | F | | | F | F | F | | | F | F | F | G | G | F | F | F | G | G | | |
| 2.2 | 225 | | | E | F | G | | | F | F | F | | | F | F | F | G | G | F | F | F | G | G | | |
| 2.7 | 275 | | | F | F | G | | | F | F | F | | | F | F | F | | | F | F | F | G | G | | |
| 3.3 | 335 | | | F | F | G | | | F | F | F | | | F | F | F | | | F | F | F | | | | |
| 3.9 | 395 | | | F | F | G | | | F | F | F | | | F | F | F | | | F | F | F | | | | |
| 4.7 | 475 | | | G | G | G | | | F | F | G | | | F | F | F | | | F | F | G | | | | |
| 5.6 | 565 | | | G | G | | | | G | G | G | | | F | F | F | | | F | F | G | | | | |
| 6.8 | 685 | | | G | G | | | | G | G | G | | | F | F | F | | | F | F | G | | | | |
| 8.2 | 825 | | | G | G | | | | G | G | G | | | G | G | G | | | G | G | G | | | | |
| 10.0 | 106 | | | G | G | | | | G | 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 | | | | | | | | | | |
| 47.0 | 476 | | | | | | | | | | | | | | | | | | | | | | | | |

MLCC

Chip R

Coil

■ High capacitance capacitor series (≥1μF)

RATING

X7S

| Size | | 0402 | | | | 0603 | | | | | 0805 | | | | | | 1206 | | | | 1210 | | | | |
|---------|------|------|-----|-----|-----|------|-----|-----|-----|------|------|-----|-----|-----|-----|------|------|-----|-----|-----|------|-----|-----|------|--|
| Cap(μF) | Code | 6.3V | 10V | 16V | 25V | 6.3V | 10V | 16V | 25V | 100V | 6.3V | 10V | 16V | 25V | 50V | 100V | 6.3V | 10V | 16V | 25V | 6.3V | 10V | 16V | 100V | |
| 0.1 | 104 | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.15 | 154 | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.22 | 224 | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.33 | 334 | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.47 | 474 | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.68 | 684 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 105 | | K | | | | | | | | | | | | I | | | | | | | | | | |
| 1.5 | 155 | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.2 | 225 | K | K | | | | | B | B | | | | | | | | | | | | | | | | |
| 3.3 | 335 | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.7 | 475 | | | | | | | B | | | | | | I | | | | | | | | | | | |
| 6.8 | 685 | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 106 | | | | | | | | | | | | I | I | | | | | | | | | | | |
| 22 | 226 | | | | | | | | | | | | | | | | | | | | | | | | |
| 47 | 476 | | | | | | | | | | | | | | | | | | | | | | | | |
| 100 | 107 | | | | | | | | | | | | | | | | | | | | | | | | |

X6S

| Size | | 0201 | | 0402 | | | | 0603 | | | | | 0805 | | | | | | 1206 | | | | | 1210 | | | | | | | | | |
|---------|------|------|------|------|-----|-----|-----|------|------|-----|-----|-----|------|----|------|-----|-----|-----|------|------|-----|-----|-----|------|------|-----|-----|-----|------|---|----|----|---|
| Cap(μF) | Code | 4V | 6.3V | 6.3V | 10V | 16V | 25V | 4V | 6.3V | 10V | 16V | 25V | 50V | 4V | 6.3V | 10V | 16V | 25V | 50V | 6.3V | 10V | 16V | 25V | 50V | 6.3V | 10V | 16V | 25V | 100V | | | | |
| 1 | 105 | L | L* | K | K | K | K | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.5 | 155 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.2 | 225 | | | K | K | K | | | B | B | B | B | | | | | I | | | | | | | | | | | | | | | | |
| 3.3 | 335 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.7 | 475 | | | | | K* | | | B | | | | | | | | | I | | | | | | | | | | | | F | | | |
| 6.8 | 685 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 106 | | | K* | | | | | B* | B* | B* | | | | I | I | I | | | | | | | | | | | | | | | | |
| 22 | 226 | | | | | | | | B* | B* | | | | | I | I* | I* | I* | | | | | | | | | P | P* | | | G | | |
| 47 | 476 | | | | | | | | | | | | | | I* | I* | | | | | | | | | | | P | | | | G | G | G |
| 100 | 107 | | | | | | | | | | | | | | I* | | | | | | | | | | | | | | | | G* | G* | |

* Means M Tolerance only

MLCC

Chip R

Coil

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

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* | | K | K | 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* | | | | N | N | K | | | 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 | | | | 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* | | | | | B | B | B | B | B* | | | I | I | I | I | | 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* | | | | | | | | | G* | G* | G* | | | | | |
| 220.0 | 227 | | | | | | | | | | | | | | | | | | | | | | P* | | | | | G* | G* | | | | | | |

Y5V

| Size | | 0603 | | | 0805 | | | | | 1210 | | | | | | 1812 | | | | | | | | | |
|---------|------|------|-----|-----|------|-----|-----|-----|-----|------|-----|-----|-----|-----|------|------|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Cap(μF) | code | 6.3V | 10V | 16V | 6.3V | 10V | 16V | 25V | 50V | 10V | 16V | 25V | 35V | 50V | 6.3V | 10V | 16V | 25V | 35V | 50V | 10V | 16V | 25V | 50V | 100V |
| 1.0 | 105 | | S | 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 | | | C | C | | | M | M | M | | | | 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 | | | | | C | C | | | J | J | J | J | | | M | M | C | | E | C | C | C | C | |
| 6.8 | 685 | | | | | I | | | | J | J | | | | | M | M | C | | | C | C | C | C | |
| 10.0 | 106 | | | | I | I | | | | J | J | | | | | C | C | E | F | | C | C | C | C | |
| 22.0 | 226 | | | | | | | | | | | | | | | F | F | | | | | | | | |
| 47.0 | 476 | | | | | | | | | | | | | | F | F | | | | | | G | | | |
| 100.0 | 107 | | | | | | | | | | | | | | G | | | | | | | | | | |

* * Means M Tolerance only

MLCC

Chip R

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 | 02 01005 (0402) | N=COG (NPO) | 0R5=0.5pF | A= $\pm 0.05\text{pF}$ | 6R3=6.3V | C=Cu/Ni/Sn | T=7" reeled |
| | 03 0201 (0603) | | 1R0=1.0pF | B= $\pm 0.1\text{pF}$ | 100=10V | | G=13" reeled |
| | 11 0505 (1414) | | 100=10x10 ^{^0} | C= $\pm 0.25\text{pF}$ | 250=25V | | |
| | 15 0402 (1005) | | =10pF | D= $\pm 0.5\text{pF}$ | 500=50V | | |
| | 18 0603 (1608) | | | F= $\pm 1\%$ | 101=100V | | |
| | 21 0805 (2012) | | | G= $\pm 2\%$ | 251=250V | | |
| 22 1111 (2828) | | J= $\pm 5\%$ | 501=500V | | | | |

GENERAL ELECTRICAL DATA

| Dielectric | NPO |
|------------------------------------|---|
| Size | 01005, 0201, 0402, 0505, 0603, 0805, 1111 |
| Capacitance* | 0.1pF to 1000pF |
| Capacitance tolerance | Cap \leq 5pF: 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 10pF: F ($\pm 1\%$), G ($\pm 2\%$), J ($\pm 5\%$) |
| Rated voltage (WVDC) | 6.3V, 10V, 25V, 50V, 100V, 200V, 250V, 500V, 1500V |
| Q* | 01005, 0201, 0402/25V~50V: Cap<30pF:Q \geq 400+20C; Cap \geq 30pF:Q \geq 1000; 0402/100V~200V, 0603, 0805, 0505, 1111: Cap<30pF:Q \geq 800+20C; Cap \geq 30pF:Q \geq 1400 |
| Insulation resistance at Ur | $\geq 10\text{G}\Omega$ or Rx $\text{C}\geq 100\Omega\cdot\text{F}$ whichever is smaller |
| Operating temperature | -55 to +125 $^{\circ}\text{C}$ |
| Capacitance change | $\pm 30\text{ppm}/^{\circ}\text{C}$; 0201 Cap $\geq 22\text{pF}$, $\pm 60\text{ppm}/^{\circ}\text{C}$ |
| Termination | Ni/Sn (lead-ree termination) |

DIMENSIONS



| Size | inch (mm) | L (mm) | W (mm) | T (mm) | Symbol | Remark | M _B (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 | ≤ 1.78 | G | # | 0.38 \pm 0.25 |

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 | 03 0201 (0603) 15 0402 (1005) 18 0603 (1608) 21 0805 (2012) 31 1206 (3216) 32 1210 (3225) 42 1808 (4520) 43 1812 (4532) 46 1825 (4563) 52 2211 (5728) 55 2220 (5750) 56 2225 (5763) | N COG(NPO) X X7R B X5R F Y5V | 102 =10x10 ^Λ 2 =1000pF 100 =10x10 ^Λ 0 =10pF | J =±5% K =±10% M =±20% Z =-20%~+80% | 6R3 =6.3V 100 =10V 160 =16V 250 =25V 500 =50V | 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 |

GENERAL ELECTRICAL DATA

| Dielectric | COG(NPO) | X7R | Y5V | X5R |
|-----------------------------------|---|--|--------------------------|------------------------------|
| Size | 0201 to 2225 | 0201 to 2225 | 0201 to 1812 | 0201 to 0603 |
| Capacitance range* | 0.1pF ~ 100nF | 100pF ~ 820nF | 10nF ~ 680nF | 100pF ~ 820nF |
| Capacitance tolerance | B(±0.1pF), C(±0.25pF), D(±0.5pF), F(±1%), G(±2%), J(±5%), K(±10%) | J(±5%) K(±10%) M(±20%) | Z(-20/+80%) | J(±5%) K(±10%) M(±20%) |
| Rated voltage (WVDC) | 10V, 16V, 25V, 50V | 6.3V, 10V, 16V, 25V, 50V | 6.3V, 10V, 16V, 25V, 50V | 6.3V, 4V, 10V, 16V, 25V, 50V |
| Tan δ* | Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000 | | Note 1 | |
| Operating temperature | | -55 to +125°C | -25 to +85°C | -55 to +85°C |
| Capacitance characteristic | ±30ppm | ±15% | +30/-80% | ±15% |
| Termination | | Cu (or Ag)/Ni/Sn or Au (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/X5R: 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:

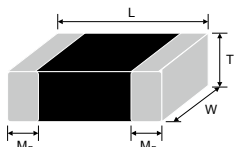
X7R/X5R

| Rated vol. | D.F. | Exception of D.F. |
|------------|--------|---|
| 50V | ≤2.5% | ≤3.5% 0201(50V); 0603≥0.047μF; 0805≥0.1μF; 1206≥0.47μF |
| | ≤5% | 0201≥0.01μF |
| | ≤10% | 0402≥0.12μF; 0603>0.1μF |
| 25V | ≤5% | 0201≥0.01μF |
| | ≤7% | 0603≥0.33μF |
| | ≤10% | 0201≥0.1μF; 0402≥0.10μF; 0603≥0.47μF |
| | ≤12.5% | 0402≥0.47μF |
| 16V | ≤5% | 0201≥0.01μF; 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF |
| | ≤10% | 0201≥0.1μF(0201/X7R≥0.022μF); 0402≥0.22μF; 0603≥0.68μF |
| 10V | ≤10% | 0201≥0.012μF; 0402≥0.33μF(0402/X7R≥0.22μF); 0603≥0.33μF |
| | ≤15% | 0201≥0.1μF |
| 6.3V | ≤10% | 0201≥0.1μF |
| 4V | ≤15% | --- |

Y5V

| Rated vol. | D.F. | Exception of D.F. |
|---------------|--------|---|
| 50V | ≤5.0% | 7.0% 0603≥0.1μF; 0805≥0.47μF |
| | ≤7% | --- |
| 25V | ≤5.0% | ≤7% 0402≥0.047μF; 0603≥0.1μF; 0805≥0.33μF |
| | ≤9% | 0402≥0.068μF; 0603≥0.47μF |
| 16V (C<1.0μF) | ≤7.0% | ≤9% 0402≥0.068μF; 0603≥0.68μF |
| | ≤12.5% | 0402≥0.22μF |
| 10V | ≤12.5% | ≤20% 0402≥0.47μF |
| 6.3V | ≤20% | --- |

DIMENSIONS



| Size inch (mm) | L (mm) | W (mm) | T (mm) code | M _B 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) | 2.10±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) | 4.60±0.50 | 2.00±0.25 | 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 |

■ 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 | | | | | | | | | | | | | K |
| 0.022μF | 223 | | L | L | | | | | | | | N | | | | | K |
| 0.027μF | 273 | | L | L | | | | | | | N | | | | | | K |
| 0.033μF | 333 | | L | L | | | | | | | N | | | | | | K |
| 0.039μF | 393 | | L | L | | | | | | | N | | | | | | K |
| 0.047μF | 473 | | L | L | | | | N | N | N | | | | | | | K |
| 0.056μF | 563 | | L | L | | | | N | N | N | | | | | | | K |
| 0.068μF | 683 | | L | L | | | | N | N | N | | | | | | | K |
| 0.082μF | 823 | | L | L | | | | N | N | N | | | | | | | K |
| 0.1μF | 104 | | L | L | L | L | | N | N | N | N | | | | | | S |
| 0.15μF | 154 | | | | | | | N | N | N | N | | | | | | |
| 0.22μF | 224 | | | | | | | N | N | N | N | N | | B | B | B | B |
| 0.27μF | 274 | | | | | | | | N | | | | | | B | B | |
| 0.33μF | 334 | | L | | | | | N | N | | | | | B | B | B | B |
| 0.39μF | 394 | | | | | | | | N | | | | | B | B | B | B |
| 0.47μF | 474 | L | L | | | | | N | N | K | K | K | | B | B | B | B |
| 0.68μF | 684 | | | | | | | N | N | | | | | B | B | B | B |
| 0.82μF | 824 | | | | | | | | | | | | | B | B | B | B |

Y5V

| Size | | 0402 | | | | 0603 | | | | | 0805 | | | | 1206 | | | | 1210 | | | | 1812 | | | |
|---------|------|------|-----|-----|-----|------|-----|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|
| Cap | Code | 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 | 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 | | | | | | S | S | S | S | A | A | A | A | X | X | X | X | M | M | M | M | C | C | C | C |
| 0.22μF | 224 | | | | | S | S | S | S | S | A | A | A | A | X | X | X | X | M | M | M | M | C | C | C | C |
| 0.33μF | 334 | | | | | | | | | | X | X | X | X | X | X | X | X | M | M | M | M | C | C | C | C |
| 0.47μF | 474 | | | | | | | | | | X | X | X | C | X | X | X | X | M | M | M | M | C | C | C | C |
| 0.68μF | 684 | | | | | | | | | | X | X | C | C | X | X | X | X | M | M | M | M | C | C | C | C |

MLCC

Chip R

Coil

Packaging Dimension and Quantity

| Size | Thickness(mm)/Symbol | 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 | | | |
| 0805 (2012) | 0.60±0.10 | A | 4k | 15k | | | |
| | 0.80±0.10 | X | 4k | 15k | | | |
| | 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 | | | |
| 1206 (3216) | 0.85±0.10 | T | 4k | 15k | | | |
| | 0.95±0.10 | M | | | 3k | 10k | |
| | 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 | |
| 1210 (3225) | 0.95±0.10 | M | | | 3k | 10k | |
| | 1.25±0.10 | C | | | 3k | 10k | |
| | 1.60±0.20 | E | | | 2k | | |
| | 2.00±0.20 | F | | | 1k | 6k | |
| | 2.50±0.30 | G | | | 1k | | |
| | 0505 (1414) | 1.15±0.15 | J | | | 3K | - |
| 1808 (4520) | 1.25±0.10 | C | | | 2k | 10k | |
| | 1.60±0.20 | E | | | 2k | 8k | |
| | 2.00±0.20 | F | | | 1k | 6k | |
| 1812 (4532) | 1.25±0.10 | C | | | 1k | | |
| | 1.60±0.20 | E | | | 1k | | |
| | 2.00±0.20 | F | | | 1k | | |
| | 2.50±0.30 | G | | | 0.5k | 3k | |
| 1825 (4563) | 2.80±0.30 | H | | | 0.5k | | |
| | 2.00±0.20 | F | | | 1k | | |
| 2211 (5728) | 2.50±0.30 | G | | | 0.5k | | |
| | 2.00±0.20 | F | | | 1k | | |
| 2220 (5750) | 2.50±0.30 | G | | | 0.5k | | |
| | 2.00±0.20 | F | | | 1k | | |
| 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 |

MLCC

Chip R

Coil



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Prosperity Dielectrics Co., Ltd.

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