

**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.<br>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.<br>信昌電子陶瓷併購台灣精密材料公司。   |
| 2002 | Public Listed in OTC.<br>信昌電子陶瓷正式上櫃。  |
| 2005 | PDC was strategically allied with Wasin Tech.<br>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.<br>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.<br>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.<br>生產製造圓板電容粉末、開發。   |
| 1990 | Manufacturing Multilayer Ceramic Capacitors.<br>生產製造積層陶瓷晶片電容。  |
| 1995 | Manufacturing Ceramic Chip Resistors and Ceramic Chip Coil<br>生產陶瓷晶片電阻、陶瓷晶片電感。   |
| 2001 | As the 1 <sup>st</sup> manufacturer and provider in Taiwan for ceramic dielectric powders and multilayer ceramic chip capacitors (MLCC).<br>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.<br>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.<br>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.<br>亞洲第一家獲得 SEMKO 安全規格認證之供應商。  |
| 2003 | ISO 9001 certified.<br>獲 ISO 9001 驗證通過。   |
| 2004 | Industrial Sustainable Excellence Award.<br>榮獲經濟部工業局工業精銳獎。  |
| 2004 | TS16949、ISO 14000 and OHSAS 18000 certified.<br>獲 TS16949、ISO 14000 及 OHSAS 18000 驗證。   |
| 2007 | Common Wealth Magazine Top 1000 Manufacturers in Taiwan Ranked in No. 705.<br>天下雜誌 1000 大製造業排名第 705 名。  |
| 2008 | IECQ QC080000 HSF certified.<br>獲 IECQ QC080000 HSF 驗證。<br>Common Wealth Magazine Top 1000 Manufacturers in Taiwan Ranked in No. 682.<br>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.<br>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.<br>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<br>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.<br>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.<br>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<br>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术，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                |
| <b>FK</b>                     | <b>06</b> 1206 (3216)                          | <b>N</b> COG(NPO) | <b>102</b> =10x10 <sup>2</sup><br>=1000pF | <b>J</b> = ± 5%                      | <b>302:</b><br>2.5KV Impulse                             | <b>E</b> =<br>Tape and 7" Reel,<br>Embossed Tape   | Reference<br>Thickness<br>Description | <b>G</b> =RoHS<br>Compliant |
| Safety X1 & Y2 series         | <b>08</b> 1808 (4520)<br><b>12</b> 1812 (4532) | <b>X</b> X7R      | <b>100</b> =10x10 <sup>0</sup><br>=10pF   | <b>K</b> = ± 10%<br><b>M</b> = ± 20% | <b>502:</b><br>5KV Impulse<br><b>602:</b><br>6KV Impulse | <b>P</b> =<br>Tape and 7" Reel,<br>Paper Tape<br><b>L</b> =<br>Tape and 13"<br>Reel, Embossed<br><b>G</b> =<br>Tape and 13"Reel,<br>Paper Tape |                                       |                             |
| <b>FH</b><br>Safety X2 series | <b>21</b> 2211 (5728)<br><b>20</b> 2220 (5750) |                   |   |                                      |  |  |                                       |                             |

### GENERAL ELECTRICAL DATA

| Dielectric  | COG (NPO)                                  | X7R   | X7R  |
|---|--|---|--|
| <b>Size</b>   | 1808, 1812, 2211                           | 1808, 1812, 2211, 2220                                | 1206   |
| <b>Rated voltage</b>                                  | 250VAC                                     |   | 2.5KVDC  |
| <b>Capacitance range*</b>                             | X1/Y2 Class(Impulse 6KV)                   | 4pF ~ 100pF   | X1/Y2 Class 100pF ~ 4.7nF  |
|   | X1/Y2 Class(Impulse 5KV)                   | 3pF ~ 720pF   | X2 Class 150pF ~ 56nF  |
|   | X2 Class                                   | 3pF ~ 1000pF  |  |
| <b>Capacitance tolerance</b>                          | Cap<10pF:                                  | D (± 0.5pF)   | J (± 5%)<br>K (± 10%)<br>M (± 20%)   |
|   | Cap≥10pF:                                  | F (± 1%), G (± 2%), J (± 5%),<br>K (± 10%), M (± 20%) |  |
| <b>Tan δ *<br/>(Tangent of loss angle)</b>            | Cap. Rang                                  | Q Spec.   |  |
|   | Cap<30pF:                                  | Q≥400+20C   | ≤2.5%  |
|   | Cap≥30pF:                                  | Q≥1000  |  |
| Measured at the condition of 30~70% related humidity. |  |   |  |
| <b>Capacitance &amp; Tan δ<br/>Test Condition</b>     | for 25°C at ambient temperature            |   | Class II MLCC: Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement. |
|   | Cap. Rang                                  | Test Condition  |  |
|   | Cap≤1000pF                                 | 1.0±0.2Vrms, 1.0MHz±10%                               | 1.0±0.2Vrms, 1.0kHz±10%, at 25°C ambient temperature.  |
| Cap>1000pF  | 1.0±0.2Vrms, 1.0kHz±10%                    |   |  |
| <b>Insulation resistance</b>                          | ≥100GΩ or R • C≥1000 whichever is smaller  |   | ≥10GΩ or R • C≥500Ω-F whichever is smaller   |
| <b>Operating temperature</b>                          | - 55°C to + 125°C                          |   |  |
| <b>Temperature coefficient</b>                        | ± 30ppm / °C                               |   | ± 15%  |
| <b>Termination</b>                                    | Cu or Ag / Ni / Sn (lead-free termination) |   |  |

### DIMENSIONS



| Size inch (mm) | L (mm)        | W (mm)    | T (mm) code | M <sub>B</sub> min (mm) |
|----------------|---------------|-----------|-------------|-------------------------|
| 1206 (3216)    | 3.30±0.40     | 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        |
| <b>High Voltage Series</b> | 21 0805 (2012)                        | N COG(NPO)     | 102=10x10 <sup>∧</sup> 2 | J= ± 5%   | 102=1000V     | E=<br>Tape and 7" Reel,<br>Embossed Tape   | Reference<br>Thickness<br>Description | G=RoHS<br>Compliant |
|                            | 31 1206 (3216)                        | X X7R          | =1000pF                  | K= ± 10%  | 152=1500V     |  |                                       |                     |
|                            | 32 1210 (3225)                        |                | 100=10x10 <sup>∧</sup> 0 | M= ± 20%  | 202=2000V     | P=<br>Tape and 7" Reel,<br>Paper Tape<br><br>L=<br>Tape and 13" Reel,<br>Embossed<br><br>G=<br>Tape and 13"Reel,<br>Paper Tape |                                       |                     |
|                            | High voltage application with ≥ 1KVdc | 42 1808 (4520) |                          | =10pF     | 302=3000V     |  |                                       |                     |
|                            | 43 1812 (4532)                        |                |                          |           | 402=4000V     |  |                                       |                     |
|                            | 46 1825 (4563)                        |                |                          |           |               |  |                                       |                     |
|                            | 52 2211 (5728)                        |                |                          |           |               |  |                                       |                     |
| 55 2220 (5750)             |                                       |                |                          |           |               |  |                                       |                     |
| 56 2225 (5763)             |                                       |                |                          |           |               |  |                                       |                     |

### GENERAL ELECTRICAL DATA

| Dielectric  | COG(NPO)                                       | X7R   |  |
|---|--|---|--|
| <b>Size</b>   | 0805,1206, 1210, 1808, 1812, 1825, 2220, 2225  | 0805,1206, 1210, 1808, 1812, 1825, 2211, 2220, 2225 |  |
| <b>Rated voltage (WVDC)</b>                           | 1KV, 1.5KV, 2KV, 3KV,4KV                       | 1KV, 1.5KV, 2KV, 3KV,4KV                            |  |
| <b>Capacitance range*</b>                             | 1.5pf ~ 10nF                                   | 100pF ~ 220nF                                       |  |
| <b>Capacitance tolerance</b>                          | Cap≤5pF: B (±0.1pF), C (±0.25pF)               | J (±5%)   |  |
|   | 5pF<Cap<10pF: C (±0.25pF), D (±0.5pF)          | K (±10%)  |  |
|   | Cap≥10pF: F (±1%), G (±2%), J (±5%), K (±10%)  | M (±20%)  |  |
| <b>Tan δ *</b>  | Cap. Rang                                      | Q Spec.   |  |
|   | Cap<30pF: Q≥400+20C                            |   |  |
|   | Cap≥30pF: Q≥1000                               | ≤2.5%   |  |
| Measured at the condition of 30~70% related humidity. |  |   |  |
| <b>Capacitance &amp; Tan δ Test Condition</b>         | for 25°C at ambient temperature                |   | Preconditioning for Class II MLCC: Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement. |
|   | Cap. Rang                                      | Test Condition                                      |  |
|   | 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%                             |  |
| <b>Insulation resistance</b>                          | ≥10GΩ or R • C≥ 500Ω-F whichever is smaller    | ≥10GΩ or R • C≥100Ω-F whichever is smaller          |  |
| <b>Operating temperature</b>                          | -55 to +125°C                                  |   |  |
| <b>Temperature coefficient</b>                        | ±30ppm / °C                                    | ±15%  |  |
| <b>Termination</b>                                    | Ag (or Cu)/Ni/Sn or Au (lead-free termination) |   |  |

### DIMENSIONS



| Size inch (mm) | L (mm)    | W (mm)    | T (mm) code            | M <sub>B</sub> min (mm) |
|----------------|-----------|-----------|------------------------|-------------------------|
| 0805 (2012)    | 2.10±0.20 | 1.25±0.20 |                        | 0.50±0.20               |
| 1206 (3216)    | 3.30±0.30 | 1.60±0.20 |                        | 0.60±0.20               |
| 1210 (3225)    | 3.30±0.40 | 2.50±0.30 |                        | 0.75±0.35               |
| 1808 (4520)    | 4.60+0.50 | 2.00±0.25 | Reference<br>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





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

### RATING

#### X7R

| Size    | Code | 0805 |     |       | 1206 |       |     | 1210  |     |     | 1808  |     |     |       | 1812 |     |     |     | 1825  |     |     |     | 2211 |     | 2220 |       |     |     | 2225 |     |       |     |     |     |    |  |
|---------|------|------|-----|-------|------|-------|-----|-------|-----|-----|-------|-----|-----|-------|------|-----|-----|-----|-------|-----|-----|-----|------|-----|------|-------|-----|-----|------|-----|-------|-----|-----|-----|----|--|
|         |      | 1KV  | 1KV | 1.5KV | 2KV  | 2.5KV | 1KV | 1.5KV | 2KV | 1KV | 1.5KV | 2KV | 1KV | 1.5KV | 2KV  | 3KV | 4KV | 1KV | 1.5KV | 2KV | 3KV | 4KV | 3KV  | 4KV | 1KV  | 1.5KV | 2KV | 3KV | 4KV  | 1KV | 1.5KV | 2KV | 3KV | 4KV |    |  |
| 100pF   | 101  | X    | C   | C     | C    | C     | C   | C     |     |     |       |     |     |       |      |     |     |     |       |     |     |     |      |     |      |       |     |     |      |     |       |     |     |     |    |  |
| 120pF   | 121  | X    | C   | C     | C    | C     | C   | C     |     |     |       |     |     |       |      |     |     |     |       |     |     |     |      |     |      |       |     |     |      |     |       |     |     |     |    |  |
| 150pF   | 151  | X    | C   | C     | C    | C     | C   | C     | C   | C   | C     | C   | C   | F*    |      |     |     |     |       |     |     |     |      |     |      |       |     |     |      |     |       |     |     |     |    |  |
| 180pF   | 181  | X    | C   | C     | C    | C     | C   | C     | C   | C   | C     | C   | C   | F*    |      |     |     |     |       |     |     |     |      |     |      |       |     |     |      |     |       |     |     |     |    |  |
| 220pF   | 221  | X    | C   | C     | C    | C     | C   | C     | E   | C   | C     | C   | F*  |       |      |     |     |     |       |     |     |     |      |     |      |       |     |     |      |     |       |     |     |     |    |  |
| 270pF   | 271  | X    | C   | C     | C    | C     | C   | C     | E   | C   | C     | C   | F*  | C     | C    | F   | F*  |     |       |     |     |     | F*   | F   | F*   |       |     |     |      | F*  |       |     |     | F*  |    |  |
| 330pF   | 331  | X    | C   | C     | C    | C     | C   | C     | E   | C   | C     | F   | F*  | C     | C    | F   | F*  |     |       |     |     |     | F*   | F   | F*   |       |     |     |      | F*  |       |     |     | F*  |    |  |
| 390pF   | 391  | X    | C   | C     | C    | C     | C   | C     | E   | C   | C     | F   | F*  | C     | C    | F   | F*  |     |       |     |     |     | F*   | F   | F*   |       |     |     |      | F*  |       |     |     | F*  |    |  |
| 470pF   | 471  | X    | C   | C     | C    | C     | C   | C     | E   | C   | C     | F   | F*  | C     | C    | F   | F*  |     |       |     |     |     | F*   | F   | F*   |       |     |     |      | F*  |       |     |     | F*  |    |  |
| 560pF   | 561  | X    | C   | C     | C    | C     | C   | C     | E   | C   | C     | F   | F*  | C     | C    | F   | F*  |     |       |     |     |     | F*   | F   | F*   |       |     |     |      | F*  |       |     |     | F*  |    |  |
| 680pF   | 681  | X    | C   | C     | C    | C*    | C   | C     | E   | C   | C     | F   | F*  | C     | C    | F   | F*  |     |       |     |     |     | F*   | F   | F*   |       |     |     |      | F*  |       |     |     | F*  |    |  |
| 820pF   | 821  | X    | C   | C     | C    | C*    | C   | C     | E   | C   | C     | F   | F*  | C     | C    | F   | F*  |     |       |     |     |     | F*   | F   | F*   |       |     |     |      | F*  |       |     |     | F*  |    |  |
| 1000pF  | 102  | X    | C   | C     | C    | C*    | C   | C     | E   | C   | C     | F   | F*  | C     | C    | F   | F*  | F   | F     | F   | F   | F*  | F    | F*  | F    | F     | F   | F*  | F    | F   | F     | F*  | F   | F   | F* |  |
| 1200pF  | 122  | X    | C   | E     | E    | E     | C   | G     | F   | C   | F     | F   |     | C     | C    | F   | G*  | F   | F     | F   | F   | G*  | G    | G*  | F    | F     | F   | G*  | F    | F   | F     | G*  | F   | F   | G* |  |
| 1500pF  | 152  | C    | C   | E     | E    | E     | C   | G     | F   | C   | F     | F   |     | C     | C    | F   | G*  | F   | F     | F   | F   | G*  | G    | G*  | F    | F     | F   | G*  | F    | F   | F     | G*  | F   | F   | G* |  |
| 1800pF  | 182  | C    | C   | E     | E    | E     | C   | G     | F   | C   | F     | F   |     | C     | C    | G   | G*  | F   | F     | F   | F   | G*  | G    | G*  | F    | F     | F   | G*  | F    | F   | F     | G*  | F   | F   | G* |  |
| 2200pF  | 222  | C    | C   | E     | E    | E     | C   | G     | F   | C   | F     | F   |     | C     | C    | G*  |     | F   | F     | F   | F*  |     | G    |     | F    | F     | F*  |     | F    | F   | F     | F*  | F   | F   | F* |  |
| 2700pF  | 272  | C    | C   | E     | E    |       | C   | G     | G   | C   | F     | F   |     | C     | C    | G*  |     | F   | F     | F   | F*  |     | G    |     | F    | F     | F*  |     | F    | F   | F     | F*  | F   | F   | F* |  |
| 3300pF  | 332  | C    | C   | E     | E    |       | C   | G     | G   | C   | F     | F   |     | C     | F    | G*  |     | F   | F     | F   | F*  |     | G    |     | F    | F     | F*  |     | F    | F   | F     | F*  | F   | F   | F* |  |
| 3900pF  | 392  | C    | C   | E     | E    |       | E   | G     | G   | C   | F     |     |     | C     | F    | G*  |     | F   | F     | F   | F*  |     |      |     | F    | F     | F*  |     | F    | F   | F     | F*  | F   | F   | F* |  |
| 4700pF  | 472  | C    | E   | E     |      |       | E   | G     | G   | C   | F     |     |     | C     | F    |     |     | F   | F     | F   | F*  |     |      |     | F    | F     | F*  |     | F    | F   | F     | F*  | F   | F   | F* |  |
| 5600pF  | 562  |      | E   | E     |      |       | E   | G     | G*  | F   | F     |     |     | C     | G    |     |     | F   | F     | F   | G*  |     |      |     | F    | F     | F*  |     | F    | F   | F     | G*  | F   | F   | G* |  |
| 6800pF  | 682  |      | E   | E     |      |       | E   | G     | G*  | F   | F     |     |     | C     | G    |     |     | F   | F     | F   | G*  |     |      |     | F    | F     | G*  |     | F    | F   | F     | G*  | F   | F   | G* |  |
| 8200pF  | 822  |      | E   | E     |      |       | E   | G     | G*  | F   |       |     |     | C     | G    |     |     | F   | F     | F   | G*  |     |      |     | F    | G     | G*  |     | F    | F   | F     | G*  | F   | F   | G* |  |
| 0.010μF | 103  |      | E   | E     |      |       | E   |       |     | F   |       |     |     | C     | G    |     |     | F   | F     | F   | G*  |     |      |     | F    | G     | G*  |     | F    | F   | F     | G*  | F   | F   | G* |  |
| 0.012μF | 123  |      | E   |       |      |       | E   |       |     | F   |       |     |     | F     |      |     |     | F   | G     | G   | H*  |     |      |     | F    | G     | H*  |     | F    | G   | G     | G*  | F   | G   | G* |  |
| 0.015μF | 153  |      | E   |       |      |       | E   |       |     | F   |       |     |     | F     |      |     |     | F   | G     | G   | H*  |     |      |     | F    | G     | H*  |     | F    | G   | G     | G*  | F   | G   | G* |  |
| 0.018μF | 183  |      | E   |       |      |       | E   |       |     | F   |       |     |     | G     |      |     |     | F   | G     | G   | H*  |     |      |     | F    | H     | H*  |     | F    | G   | G     | H*  | F   | G   | H* |  |
| 0.022μF | 223  |      | E   |       |      |       | E   |       |     | F   |       |     |     | G     |      |     |     | F   | G     | G   |     |     |      |     | F    | H     |     |     | F    | G   | G     |     | F   | G   | G  |  |
| 0.027μF | 273  |      |     |       |      |       | E   |       |     | F   |       |     |     | G     |      |     |     | F   | H     | H   |     |     |      |     | F    | H     |     |     | F    | G   | G     |     | F   | G   | G  |  |
| 0.033μF | 333  |      |     |       |      |       | E   |       |     | F   |       |     |     | G     |      |     |     | F   | H     | H   |     |     |      |     | F    | H     |     |     | F    | G   | G     |     | F   | G   | G  |  |
| 0.039μF | 393  |      |     |       |      |       | F   |       |     | F   |       |     |     | G     |      |     |     | F   | H     | H   |     |     |      |     | F    | H     |     |     | F    | G   | H     |     | F   | G   | H  |  |
| 0.047μF | 473  |      |     |       |      |       | G   |       |     | F   |       |     |     | G     |      |     |     | F   | H     | H   |     |     |      |     | F    | H     |     |     | F    | G   | H     |     | F   | G   | H  |  |
| 0.056μF | 563  |      |     |       |      |       |     |       |     | F   |       |     |     | G     |      |     |     | F   | H     |     |     |     |      |     | F    | H     |     |     | F    | G   | H     |     | F   | G   | H  |  |
| 0.068μF | 683  |      |     |       |      |       |     |       |     |     |       |     |     | G     |      |     |     | F   |       |     |     |     |      |     | F    |       |     |     | F    | G   |       |     | F   | G   |    |  |
| 0.082μF | 823  |      |     |       |      |       |     |       |     |     |       |     |     | G     |      |     |     | F   |       |     |     |     |      |     | F    |       |     |     | F    | G   |       |     | F   | G   |    |  |
| 0.10μF  | 104  |      |     |       |      |       |     |       |     |     |       |     |     | G     |      |     |     |     |       |     |     |     |      |     | G    |       |     |     | G    | G   |       |     | F   | G   |    |  |
| 0.12μF  | 124  |      |     |       |      |       |     |       |     |     |       |     |     |       |      |     |     |     |       |     |     |     |      |     | G    |       |     |     | H    |     |       |     |     |     |    |  |
| 0.15μF  | 154  |      |     |       |      |       |     |       |     |     |       |     |     |       |      |     |     |     |       |     |     |     |      |     | H    |       |     |     | H    |     |       |     |     |     |    |  |
| 0.18μF  | 184  |      |     |       |      |       |     |       |     |     |       |     |     |       |      |     |     |     |       |     |     |     |      |     | H    |       |     |     | H    |     |       |     |     |     |    |  |
| 0.22μF  | 224  |      |     |       |      |       |     |       |     |     |       |     |     |       |      |     |     |     |       |     |     |     |      |     | H    |       |     |     | H    |     |       |     |     |     |    |  |
| 0.27μF  | 274  |      |     |       |      |       |     |       |     |     |       |     |     |       |      |     |     |     |       |     |     |     |      |     |      |       |     |     |      |     |       |     |     |     |    |  |
| 0.33μF  | 334  |      |     |       |      |       |     |       |     |     |       |     |     |       |      |     |     |     |       |     |     |     |      |     |      |       |     |     |      |     |       |     |     |     |    |  |
| 0.39μF  | 394  |      |     |       |      |       |     |       |     |     |       |     |     |       |      |     |     |     |       |     |     |     |      |     |      |       |     |     |      |     |       |     |     |     |    |  |

\* Surface coating only

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   |
| <b>Medium Voltage Series</b> | <b>15</b> 0402 (1005)<br><b>18</b> 0603 (1608)<br><b>21</b> 0805 (2012)<br><b>31</b> 1206 (3216)<br><b>32</b> 1210 (3225)<br><b>42</b> 1808 (4520)<br><b>43</b> 1812 (4532)<br><b>46</b> 1825 (4563)<br><b>55</b> 2220 (5750)<br><b>56</b> 2225 (5763) | <b>N</b> COG(NPO)<br><b>X</b> X7R<br><b>F</b> Y5V | <b>102</b> = $10 \times 10^2$<br>=1000pF<br><b>100</b> = $10 \times 10^0$<br>=10pF | <b>J</b> = $\pm 5\%$<br><b>K</b> = $\pm 10\%$<br><b>M</b> = $\pm 20\%$<br><b>Z</b> = -20/+80% | <b>101</b> =100V<br><b>201</b> =200V<br><b>251</b> =250V<br><b>501</b> =500V<br><b>631</b> =630V | <b>E</b> =<br>Tape and 7" Reel,<br>Embossed Tape<br><b>P</b> =<br>Tape and 7" Reel,<br>Paper Tape<br><b>L</b> =<br>Tape and 13" Reel,<br>Embossed<br><b>G</b> =<br>Tape and 13"Reel,<br>Paper Tape | Reference<br>Thickness<br>Description | <b>G</b> =RoHS<br>Compliant<br><b>Q</b> = Surface<br>Coating (Size<br>1206~2225) |

### GENERAL ELECTRICAL DATA

| Dielectric                     | COG(NPO)   | X7R  | Y5V                              |
|--------------------------------|--|--|----------------------------------|
| <b>Size</b>                    | 0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225   | 0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225 | 0805, 1206, 1210, 1812           |
| <b>Rated voltage (WVDC)</b>    | 100V, 200V, 250V, 500V, 630V   | 100V, 200V, 250V, 500V, 630V                               | 100V, 200V, 250V                 |
| <b>Capacitance range*</b>      | 0.5pF ~ 100nF  | 100pF ~ 820nF  | 10nF ~ 680nF                     |
| <b>Capacitance tolerance</b>   | Cap $\leq$ 5pF: B ( $\pm 0.1$ pF), C ( $\pm 0.25$ pF)<br>5pF<Cap<10pF: C ( $\pm 0.25$ pF), D ( $\pm 0.5$ pF)<br>Cap $\geq$ 10pF: F ( $\pm 1\%$ ), G ( $\pm 2\%$ ), J ( $\pm 5\%$ ), K ( $\pm 10\%$ ) | J ( $\pm 5\%$ )<br>K ( $\pm 10\%$ )<br>M ( $\pm 20\%$ )    | M ( $\pm 20\%$ )<br>Z (-20/+80%) |
| <b>Tan <math>\delta</math></b> | Cap. Rang Q Spec.<br>Cap<30pF: Q $\geq$ 400+20C<br>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 $\delta$ 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

$\pm 30$ 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 <sub>B</sub> 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<br>Thickness<br>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    | Code | 0402 |      |      | 0603 |      |      | 0805 |      |      |      |      | 1206 |      |      |      |      | 1210 |      |      |      |      | 1808 |      |      |      |      |
|---------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|         |      | 100V | 200V | 250V | 100V | 200V | 250V | 100V | 200V | 250V | 500V | 630V | 100V | 200V | 250V | 500V | 630V | 100V | 200V | 250V | 500V | 630V | 100V | 200V | 250V | 500V | 630V |
| 0.5pF   | 0R5  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 1pF     | 1R0  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 1.2pF   | 1R2  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    |      |      | X    |      |      |      |      |      |      |      |      |      |      |      |
| 1.5pF   | 1R5  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    |      |      |      |      |      |      |      |      |      |      |
| 1.8pF   | 1R8  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    |      |      |      |      |      |      |      |      |      |      |
| 2.2pF   | 2R2  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    |      |      |      |      |      | C    | C    | C    | C    | C    |
| 2.7pF   | 2R7  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    |      |      |      |      |      | C    | C    | C    | C    | C    |
| 3.3pF   | 3R3  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    |      |      |      |      |      | C    | C    | C    | C    | C    |
| 3.9pF   | 3R9  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    |      |      |      |      |      | C    | C    | C    | C    | C    |
| 4.7pF   | 4R7  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    |      |      |      |      |      | C    | C    | C    | C    | C    |
| 5.6pF   | 5R6  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    |      |      |      |      |      | C    | C    | C    | C    | C    |
| 6.8pF   | 6R8  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    |      |      |      |      |      | C    | C    | C    | C    | C    |
| 8.2pF   | 8R2  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    |      |      |      |      |      | C    | C    | C    | C    | C    |
| 10pF    | 100  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    | M    | M    | M    | M    | M    | C    | C    | C    | C    | C    |
| 12pF    | 120  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    | M    | M    | M    | M    | M    | C    | C    | C    | C    | C    |
| 15pF    | 150  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    | M    | M    | M    | M    | M    | C    | C    | C    | C    | C    |
| 18pF    | 180  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    | M    | M    | M    | M    | M    | C    | C    | C    | C    | C    |
| 22pF    | 220  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    | M    | M    | M    | M    | M    | C    | C    | C    | C    | C    |
| 27pF    | 270  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    | M    | M    | M    | M    | M    | C    | C    | C    | C    | C    |
| 33pF    | 330  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    | M    | M    | M    | M    | M    | C    | C    | C    | C    | C    |
| 39pF    | 390  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    | M    | M    | M    | M    | M    | C    | C    | C    | C    | C    |
| 47pF    | 470  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    | M    | M    | M    | M    | M    | C    | C    | C    | C    | C    |
| 56pF    | 560  | N    | N    | N    | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    | M    | M    | M    | M    | M    | C    | C    | C    | C    | C    |
| 68pF    | 680  | N    | N    |      | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    | M    | M    | M    | M    | M    | C    | C    | C    | C    | C    |
| 82pF    | 820  | N    | N    |      | S    | S    | S    | A    | A    | A    | A    | A    | X    | X    | X    | X    | X    | M    | M    | M    | M    | M    | C    | C    | C    | C    | C    |
| 100pF   | 101  | N    | N    |      | S    | S    | S    | A    | A    | X    | X    | X    | X    | X    | X    | X    | X    | M    | M    | M    | M    | M    | C    | C    | C    | C    | C    |
| 120pF   | 121  | N    |      |      | S    | S    | S    | A    | A    | X    | C    | C    | C    | X    | X    | X    | X    | M    | M    | M    | M    | M    | C    | C    | C    | C    | C    |
| 150pF   | 151  | N    |      |      | S    | S    | S    | A    | X    | X    | C    | C    | C    | X    | X    | X    | X    | M    | M    | M    | M    | M    | C    | C    | C    | C    | C    |
| 180pF   | 181  | N    |      |      | S    | S    | S    | A    | X    | C    | C    | C    | C    | X    | X    | X    | X    | M    | M    | M    | M    | M    | C    | C    | C    | C    | C    |
| 220pF   | 221  | N    |      |      | S    | S    | S    | A    | C    | C    | C    | C    | C    | X    | X    | X    | X    | M    | M    | M    | M    | M    | C    | C    | C    | C    | C    |
| 270pF   | 271  |      |      |      | S    | B    | B    | A    | C    | C    | C    | C    | C    | X    | X    | M    | M    | M    | M    | M    | M    | M    | C    | C    | C    | F    | F    |
| 330pF   | 331  |      |      |      | S    | B    | B    | A    | C    | C    | C    | C    | C    | X    | X    | M    | M    | M    | M    | M    | M    | M    | C    | C    | C    | F    | F    |
| 390pF   | 391  |      |      |      | S    | B    | B    | X    | C    | C    | C    | C    | C    | X    | X    | M    | M    | M    | M    | M    | M    | M    | C    | C    | C    | F    | F    |
| 470pF   | 471  |      |      |      | S    | B    | B    | X    | C    | C    | I    | I    | X    | M    | M    | M    | M    | M    | M    | M    | M    | M    | C    | C    | C    | F    | F    |
| 560pF   | 561  |      |      |      | S    | B    | B    | X    | C    | C    | I    | I    | X    | M    | C    | C    | C    | M    | M    | M    | M    | M    | C    | C    | C    | F    | F    |
| 680pF   | 681  |      |      |      | S    |      |      | X    | C    | C    | I    | I    | X    | M    | C    | C    | C    | C    | M    | M    | M    | M    | C    | C    | C    | F    | F    |
| 820pF   | 821  |      |      |      | S    |      |      | X    | C    | C    | I    | I    | X    | M    | E    | E    | E    | M    | M    | M    | M    | M    | C    | C    | C    | F    | F    |
| 1000pF  | 102  |      |      |      | S    |      |      | X    | C    | C    | I    | I    | X    | M    | E    | E    | E    | M    | C    | C    | C    | C    | C    | C    | C    | F    | F    |
| 1200pF  | 122  |      |      |      | B    |      |      | X    | C    | C    |      |      | X    | M    | E    | E    | E    | M    | C    | C    | C    | C    | C    | C    | C    | F    | F    |
| 1500pF  | 152  |      |      |      | B    |      |      | X    | C    | C    |      |      | X    | C    | E    | E    | E    | M    | C    | C    | C    | C    | C    | C    | C    | F    | F    |
| 1800pF  | 182  |      |      |      |      |      |      | X    | C    | C    |      |      | X    | C    | E    | E    | E    | M    | C    | C    | C    | C    | C    | C    | C    | F    | F    |
| 2200pF  | 222  |      |      |      |      |      |      | X    | C    | C    |      |      | M    | C    | E    | E    | E    | M    | C    | C    | C    | C    | C    | C    | C    | F    | F    |
| 2700pF  | 272  |      |      |      |      |      |      | C    | C    | C    |      |      | M    | C    | E    | E    | E    | M    | C    | C    | C    | C    | C    | C    | C    | F    | F    |
| 3300pF  | 332  |      |      |      |      |      |      | C    |      |      |      |      | C    | C    | E    | E    | E    | M    | C    | C    | C    | C    | C    | C    | C    | F    | F    |
| 3900pF  | 392  |      |      |      |      |      |      | C    |      |      |      |      | C    | E    | E    | E    | E    | M    | C    | E    | C    | C    | C    | C    | C    |      |      |
| 4700pF  | 472  |      |      |      |      |      |      | C    |      |      |      |      | C    | E    | E    | E    | E    | M    | E    | E    | C    | C    | C    | C    | C    |      |      |
| 5600pF  | 562  |      |      |      |      |      |      | C    |      |      |      |      | E    | E    | E    | E    | E    | C    | E    | E    | C    | C    | C    | E    | E    |      |      |
| 6800pF  | 682  |      |      |      |      |      |      | C    |      |      |      |      | E    | E    | E    | E    | E    | C    | E    | E    | E    | E    | C    | E    | E    |      |      |
| 8200pF  | 822  |      |      |      |      |      |      |      |      |      |      |      | E    | E    | E    |      |      | C    | E    | E    | E    | E    | E    | F    | F    |      |      |
| 0.010μF | 103  |      |      |      |      |      |      |      |      |      |      |      | E    | E    | E    |      |      | E    | F    | F    | F    | F    | E    | F    | F    |      |      |
| 0.012μF | 123  |      |      |      |      |      |      |      |      |      |      |      | P    |      |      |      |      | E    | F    |      |      |      |      |      |      |      |      |
| 0.015μF | 153  |      |      |      |      |      |      |      |      |      |      |      | P    |      |      |      |      | F    | G    |      |      |      |      |      |      |      |      |
| 0.018μF | 183  |      |      |      |      |      |      |      |      |      |      |      | P    |      |      |      |      | F/G  | G    |      |      |      |      |      |      |      |      |
| 0.022μF | 223  |      |      |      |      |      |      |      |      |      |      |      | P    |      |      |      |      | F/G  | G    |      |      |      |      |      |      |      |      |
| 0.027μF | 273  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | F    |      |      |      |      |      |      |      |      |      |
| 0.033μF | 333  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | F    |      |      |      |      |      |      |      |      |      |
| 0.039μF | 393  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | F    |      |      |      |      |      |      |      |      |      |
| 0.047μF | 473  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | F    |      |      |      |      |      |      |      |      |      |
| 0.056μF | 563  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 0.068μF | 683  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 0.082μF | 823  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 0.10μF  | 104  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

MLCC

Chip R

Coil

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

### RATING

#### COG(NPO)

| Size    |      | 1812 |      |      |      |      | 1825 |      |      |      |      | 2220 |      |      |      |      | 2225 |      |      |      |      |
|---------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Cap     | Code | 100V | 200V | 250V | 500V | 630V | 100V | 200V | 250V | 500V | 630V | 100V | 200V | 250V | 500V | 630V | 100V | 200V | 250V | 500V | 630V |
| 10pF    | 100  | C    | C    | C    | C    | C    | 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    |
| 15pF    | 150  | C    | C    | C    | C    | C    | 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    |
| 22pF    | 220  | C    | C    | C    | C    | C    | 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    |
| 33pF    | 330  | C    | C    | C    | C    | C    | 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    |
| 47pF    | 470  | C    | C    | C    | C    | C    | 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    |
| 68pF    | 680  | C    | C    | C    | C    | C    | 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    |
| 100pF   | 101  | C    | C    | C    | C    | C    | 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    |
| 150pF   | 151  | C    | C    | C    | C    | C    | 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    |
| 220pF   | 221  | C    | C    | C    | C    | C    | 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    |
| 330pF   | 331  | C    | C    | C    | C    | C    | 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    |
| 470pF   | 471  | C    | C    | C    | C    | C    | 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    |
| 680pF   | 681  | C    | C    | C    | C    | C    | 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    |
| 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    | E    | E    | E    | E    | 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    |
| 0.018μF | 183  | E    | 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    |
| 0.027μF | 273  | F    | G    | G    |      |      | E    | E    | E    | 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    |
| 0.039μF | 393  | G    |      |      |      |      | E    | F    | F    | F    |      | F    | F    | F    | G    |      | F    | F    | F    | F    | F    |
| 0.047μF | 473  | G    |      |      |      |      | E    | F    | F    |      |      | F    | G    | G    | G    |      | F    | F    | F    | F    | F    |
| 0.056μF | 563  | G    |      |      |      |      | F    | G    | G    |      |      | F    | G    | G    |      |      | F    | G    | G    | G    | G    |
| 0.068μF | 683  | G    |      |      |      |      | F    | G    | G    |      |      | F    | G    | G    |      |      | F    | 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  | <b>15</b> 0402(1005)  | <b>N</b> COG(NPO) | <b>106</b> =10x10 <sup>Λ</sup> 6 | <b>J</b> = ± 5%  | <b>6R3</b> =6.3V  | <b>E</b> =         | Reference   | <b>G</b> =RoHS |
| General    | <b>18</b> 0603 (1608) | <b>X</b> X7R      | =10μF                            | <b>K</b> =± 10 % | <b>100</b> =10V   | Tape and 7" Reel,  | Thickness   | Compliant      |
| Purpose    | <b>21</b> 0805 (2012) |                   | <b>100</b> =10x10 <sup>Λ</sup> 0 | <b>M</b> =± 20 % | <b>160</b> =16V   | Embossed Tape      | Description |                |
|            | <b>31</b> 1206 (3216) |                   | =10pF                            |                  | <b>250</b> =25V   | <b>P</b> =         |             |                |
|            | <b>32</b> 1210 (3225) |                   | <b>R47</b> =0.47pF               |                  | <b>500</b> =50V   | Tape and 7" Reel,  |             |                |
|            | <b>42</b> 1808 (4520) |                   | <b>OR5</b> =0.5pF                |                  | <b>101</b> =100V  | Paper Tape         |             |                |
|            | <b>43</b> 1812 (4532) |                   |                                  |                  | <b>201</b> =200V  | <b>L</b> =         |             |                |
|            | <b>46</b> 1825 (4563) |                   |                                  |                  | <b>251</b> =250V  | Tape and 13" Reel, |             |                |
|            | <b>55</b> 2220 (5750) |                   |                                  |                  | <b>501</b> =500V  | Embossed           |             |                |
|            | <b>56</b> 2225 (5763) |                   |                                  |                  | <b>631</b> =630V  | <b>G</b> =         |             |                |
|            |                       |                   |                                  |                  | <b>102</b> =1000V | Tape and 13"Reel,  |             |                |
|            |                       |                   |                                  |                  | <b>152</b> =1500V | Paper Tape         |             |                |
|            |                       |                   |                                  |                  | <b>202</b> =2000V |                    |             |                |
|            |                       |                   |                                  |                  | <b>302</b> =3000V |                    |             |                |
|            |                       |                   |                                  |                  | <b>402</b> =4000V |                    |             |                |

### GENERAL ELECTRICAL DATA

| Dielectric                                    | NPO  | X7R  |
|---|--|--|
| <b>Size</b>                                   | 0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225   | 0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225   |
| <b>Rated voltage (WVDC)</b>                   | 10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1KV, 1.5KV, 2KV, 3KV, 4KV  | 6.3V, 10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1KV, 1.5KV, 2KV, 3KV, 4KV  |
| <b>Capacitance range</b>                      | 0.1pF ~ 330nF  | 100pF ~ 22μF   |
| <b>Capacitance tolerance</b>                  | Cap≤5pF: B (±0.1pF), C (±0.25pF)<br>5pF<Cap<10pF: C (±0.25pF), D (±0.5pF)<br>Cap≥10pF: F (±1%), G (±2%), J (±5%), K (±10%) | J (±5%)<br>K (±10%)<br>M (±20%)  |
| <b>Tan δ</b>                                  | Cap. Rang: Q Spec.<br>Cap<30pF: Q≥400+20C<br>Cap≥30pF: Q≥1000  | ≤2.5% ~ ≤10%   |
| <b>Capacitance &amp; Tan δ Test Condition</b> | for 25°C at ambient temperature  | Preconditioning for Class II MLCC: Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement. |
|   | Cap. Rang: Test Condition  | 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, 120Hz±20%   |
| <b>Insulation resistance</b>                  | ≥10GΩ or R•C≥500Ω•F whichever is smaller   | ≥10GΩ or R•C≥100Ω•F whichever is smaller   |
| <b>Operating temperature</b>                  |  | -55 to +125°C  |
| <b>Temperature coefficient</b>                | ±30ppm/°C  | ±15%   |
| <b>Termination</b>                            |  | Cu / Ag polymer / Ni / Sn (lead-free termination)  |

### DIMENSIONS



| Size        | inch (mm) | L (mm)    | W (mm)    | T (mm) | code                            | M <sub>b</sub> (mm) |
|-------------|-----------|-----------|-----------|--------|---------------------------------|---------------------|
| 0402 (1005) |           | 1.00±0.20 | 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           |



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

### RATING

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

MLCC

Chip R

Coil

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

### RATING

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

MLCC

Chip R

Coil

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

### RATING

#### NPO

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

MLCC

Chip R

Coil

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

### RATING

#### X7R

| Size    |      | 0402 |            |     |     | 0603 |      |            |     |     | 0805 |              |      |     |     |     |     |      | 1206 |      |              |     |      |     |     |     |     |      |              |              |     |       |     |  |
|---------|------|------|------------|-----|-----|------|------|------------|-----|-----|------|--------------|------|-----|-----|-----|-----|------|------|------|--------------|-----|------|-----|-----|-----|-----|------|--------------|--------------|-----|-------|-----|--|
| Cap     | Code | 6.3V | 10V<br>16V | 25V | 50V | 100V | 6.3V | 10V<br>16V | 25V | 50V | 100V | 200V<br>250V | 6.3V | 10V | 16V | 25V | 50V | 100V | 200V | 250V | 500V<br>630V | 1KV | 6.3V | 10V | 16V | 25V | 50V | 100V | 200V<br>250V | 500V<br>630V | 1KV | 1.5KV | 2KV |  |
| 100pF   | 101  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | X   |      |     |     |     |     |      | C            | C            | C   | C     | C   |  |
| 120pF   | 121  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | X   |      |     |     |     |     |      | C            | C            | C   | C     | C   |  |
| 150pF   | 151  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | X   |      | C   | C   | C   | C   | C    | C            | C            | C   | C     | C   |  |
| 180pF   | 181  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | X   |      | C   | C   | C   | C   | C    | C            | C            | C   | C     | C   |  |
| 220pF   | 221  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | X   |      | C   | C   | C   | C   | C    | C            | C            | C   | C     | C   |  |
| 270pF   | 271  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | X   |      | C   | C   | C   | C   | C    | C            | C            | C   | C     | C   |  |
| 330pF   | 331  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | X   |      | C   | C   | C   | C   | C    | C            | C            | C   | C     | C   |  |
| 390pF   | 391  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | X   |      | C   | C   | C   | C   | C    | C            | C            | C   | C     | C   |  |
| 470pF   | 471  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | X   |      | C   | C   | C   | C   | C    | C            | C            | C   | C     | C   |  |
| 560pF   | 561  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | X   |      | C   | C   | C   | C   | C    | C            | C            | C   | C     | C   |  |
| 680pF   | 681  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | X   |      | C   | C   | C   | C   | C    | C            | C            | C   | C     | C   |  |
| 820pF   | 821  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | X   |      | C   | C   | C   | C   | C    | C            | C            | C   | C     | C   |  |
| 1000pF  | 102  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | X   |      | C   | C   | C   | C   | C    | C            | C            | C   | C     | C   |  |
| 1200pF  | 122  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | X   |      | C   | C   | C   | C   | C    | C            | C            | C   | E     | E   |  |
| 1500pF  | 152  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | C   |      | C   | C   | C   | C   | C    | C            | C            | C   | E     | E   |  |
| 1800pF  | 182  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | C   |      | C   | C   | C   | C   | C    | C            | C            | C   | E     | E   |  |
| 2200pF  | 222  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | C   |      | C   | C   | C   | C   | C    | C            | C            | C   | E     | E   |  |
| 2700pF  | 272  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            | C   |      | C   | C   | C   | C   | C    | C            | C            | C   | E     | E   |  |
| 3300pF  | 332  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            |     |      | C   | C   | C   | C   | C    | C            | C            | C   | E     | E   |  |
| 3900pF  | 392  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | X            |     |      | C   | C   | C   | C   | C    | C            | C            | C   | E     |     |  |
| 4700pF  | 472  |      | K          | K   | K   | K    |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | C            |     |      | C   | C   | C   | C   | C    | C            | C            | C   | E     |     |  |
| 5600pF  | 562  |      | K          | K   | K   |      |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | C            |     |      | C   | C   | C   | C   | C    | C            | C            | C   | E     |     |  |
| 6800pF  | 682  |      | K          | K   | K   |      |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | C            |     |      | C   | C   | C   | C   | C    | C            | C            | C   | E     |     |  |
| 8200pF  | 822  |      | K          | K   | K   |      |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | C            |     |      | C   | C   | C   | C   | C    | C            | C            | C   | E     |     |  |
| 0.010μF | 103  |      | K          | K   | K   |      |      | S          | S   | S   | S    | B            |      | C   | C   | C   | C   | C    | C    | C    | C            |     |      | C   | C   | C   | C   | C    | C            | C            | C   | E     |     |  |
| 0.012μF | 123  |      | K          | K   |     |      |      | S          | S   | S   | B    |              |      | C   | C   | C   | C   | C    | C    | C    | C            |     |      | C   | C   | C   | C   | C    | C            | C            | E   |       |     |  |
| 0.015μF | 153  |      | K          | K   |     |      |      | S          | S   | S   | B    |              |      | C   | C   | C   | C   | C    | C    | C    | C            |     |      | C   | C   | C   | C   | C    | C            | C            | E   |       |     |  |
| 0.018μF | 183  |      | K          | K   |     |      |      | S          | S   | S   | B    |              |      | C   | C   | C   | C   | C    | C    | C    | C            |     |      | C   | C   | C   | C   | C    | C            | C            |     |       |     |  |
| 0.022μF | 223  |      | K          | K   |     |      |      | S          | S   | S   | B    |              |      | C   | C   | C   | C   | C    | C    | C    | C            |     |      | C   | C   | C   | C   | C    | C            | E            |     |       |     |  |
| 0.027μF | 273  |      | K          | K   |     |      |      | S          | S   | S   | B    |              |      | C   | C   | C   | C   | C    | C    | C    | C            |     |      | C   | C   | C   | C   | C    | C            | E            |     |       |     |  |
| 0.033μF | 333  |      | K          | K   |     |      |      | S          | S   | B   | B    |              |      | C   | C   | C   | C   | C    | C    | C    | C            |     |      | C   | C   | C   | C   | C    | E            | E            |     |       |     |  |
| 0.039μF | 393  |      | K          | K   |     |      |      | S          | S   | B   | B    |              |      | C   | C   | C   | C   | C    | C    | C    | C            |     |      | C   | C   | C   | C   | C    | E            | E            |     |       |     |  |
| 0.047μF | 473  |      | K          | K   |     |      |      | S          | S   | B   | B    |              |      | C   | C   | C   | C   | C    | C    | C    | C            |     |      | C   | C   | C   | C   | C    | E            | E            |     |       |     |  |
| 0.056μF | 563  |      | K          |     |     |      |      | S          | S   | B   | B    |              |      | C   | C   | C   | C   | C    | C    | C    | C            |     |      | C   | C   | C   | C   | C    | E            | E            |     |       |     |  |
| 0.068μF | 683  |      | K          |     |     |      |      | S          | S   | B   | B    |              |      | C   | C   | C   | C   | C    | C    | C    | C            |     |      | C   | C   | C   | C   | C    | E            |              |     |       |     |  |
| 0.082μF | 823  |      | K          |     |     |      |      | S          | S   | B   | B    |              |      | C   | C   | C   | C   | C    | C    | C    | C            |     |      | C   | C   | C   | C   | C    | E            |              |     |       |     |  |
| 0.100μF | 104  | K    | K          |     |     |      |      | S          | S   | B   | B    |              |      | C   | C   | C   | C   | C    | C    | C    | C            |     |      | C   | C   | C   | C   | C    | E            |              |     |       |     |  |
| 0.120μF | 124  |      |            |     |     |      |      | S          | B   |     |      |              |      | C   | C   | C   | C   | I    |      |      |              |     |      | C   | C   | C   | C   | C    |              |              |     |       |     |  |
| 0.150μF | 154  |      |            |     |     |      |      | S          | B   |     |      |              |      | C   | C   | C   | C   | I    |      |      |              |     |      | M   | M   | M   | M   | E    |              |              |     |       |     |  |
| 0.180μF | 184  |      |            |     |     |      |      | S          | B   |     |      |              |      | C   | C   | C   | C   | I    |      |      |              |     |      | M   | M   | M   | M   | E    |              |              |     |       |     |  |
| 0.220μF | 224  |      |            |     |     |      |      | S          | B   | B   |      |              |      | C   | C   | C   | C   | I    |      |      |              |     |      | M   | M   | M   | M   | E    |              |              |     |       |     |  |
| 0.270μF | 274  |      |            |     |     |      | B    | B          | B   |     |      |              |      | I   | I   | I   | I   |      |      |      |              |     |      | M   | M   | M   | C   | E    |              |              |     |       |     |  |
| 0.330μF | 334  |      |            |     |     |      | B    | B          |     |     |      |              |      | I   | I   | I   | I   |      |      |      |              |     |      | M   | M   | M   | C   | E    |              |              |     |       |     |  |
| 0.390μF | 394  |      |            |     |     |      | B    | B          |     |     |      |              |      | I   | I   | I   | I   |      |      |      |              |     |      | M   | M   | J   | P   | E    |              |              |     |       |     |  |
| 0.470μF | 474  |      |            |     |     |      | B    | B          | B   |     |      |              |      | I   | I   | I   | I   | I    |      |      |              |     |      | J   | J   | J   | P   | E    |              |              |     |       |     |  |
| 0.560μF | 564  |      |            |     |     |      | B    | B          |     |     |      |              |      | I   | I   | I   | I   |      |      |      |              |     |      | J   | J   | J   | P   | P    |              |              |     |       |     |  |
| 0.680μF | 684  |      |            |     |     |      | B    | B          |     |     |      |              |      | I   | I   | I   | I   |      |      |      |              |     |      | J   | J   | J   | P   | P    |              |              |     |       |     |  |
| 0.820μF | 824  |      |            |     |     |      | B    |            |     |     |      |              |      | I   | I   | I   | I   |      |      |      |              |     |      | J   | J   | J   | P   | P    |              |              |     |       |     |  |
| 1μF     | 105  |      |            |     |     |      | B    | B          |     |     |      |              |      | I   | I   | I   | I   |      |      |      |              |     |      | J   | J   | J   | P   | P    |              |              |     |       |     |  |
| 1.5μF   | 155  |      |            |     |     |      |      |            |     |     |      |              |      | I   | I   | I   | I   |      |      |      |              |     |      | J   | J   | J   | P   | P    |              |              |     |       |     |  |
| 2.20μF  | 225  |      |            |     |     |      |      |            |     |     |      |              | I    | I   | I   | I   |     |      |      |      |              |     |      | J   | J   | J   | P   | P    |              |              |     |       |     |  |
| 3.3μF   | 335  |      |            |     |     |      |      |            |     |     |      |              |      |     |     |     |     |      |      |      |              |     |      | P   | P   | P   |     |      |              |              |     |       |     |  |
| 4.7μF   | 475  |      |            |     |     |      |      |            |     |     |      |              |      |     | I   |     |     |      |      |      |              |     |      | P   | P   | P   | P   |      |              |              |     |       |     |  |
| 10μF    | 106  |      |            |     |     |      |      |            |     |     |      |              |      |     |     |     |     |      |      |      |              |     |      | P   | P   | P   | P   |      |              |              |     |       |     |  |
| 12μF    | 126  |      |            |     |     |      |      |            |     |     |      |              |      |     |     |     |     |      |      |      |              |     |      |     |     |     |     |      |              |              |     |       |     |  |
| 15μF    | 156  |      |            |     |     |      |      |            |     |     |      |              |      |     |     |     |     |      |      |      |              |     |      |     |     |     |     |      |              |              |     |       |     |  |
| 18μF    | 186  |      |            |     |     |      |      |            |     |     |      |              |      |     |     |     |     |      |      |      |              |     |      |     |     |     |     |      |              |              |     |       |     |  |
| 22μF    | 226  |      |            |     |     |      |      |            |     |     |      |              |      |     |     |     |     |      |      |      |              |     |      |     | P   |     |     |      |              |              |     |       |     |  |
| 47μF    | 476  |      |            |     |     |      |      |            |     |     |      |              |      |     |     |     |     |      |      |      |              |     |      |     |     |     |     |      |              |              |     |       |     |  |

MLCC

Chip R

Coil

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

### RATING

### X7R

| Size    |      | 1210 |     |     |     |      |              |              |     |       |     | 1808         |     |              |     | 1812 |            |            |      |              |      |      |      |     |              |     |     |    |  |
|---------|------|------|-----|-----|-----|------|--------------|--------------|-----|-------|-----|--------------|-----|--------------|-----|------|------------|------------|------|--------------|------|------|------|-----|--------------|-----|-----|----|--|
| Cap     | Code | 10V  | 16V | 25V | 50V | 100V | 200V<br>250V | 500V<br>630V | 1KV | 1.5KV | 2KV | 500V<br>630V | 1KV | 1.5KV<br>2KV | 3KV | 4KV  | 10V<br>16V | 25V<br>50V | 100V | 200V<br>250V | 400V | 500V | 630V | 1KV | 1.5KV<br>2KV | 3KV | 4KV |    |  |
| 150pF   | 151  |      |     |     |     |      |              |              |     |       |     | C            | C   | C            | C   | F*   |            |            |      |              |      |      |      |     |              |     |     |    |  |
| 180pF   | 181  |      |     |     |     |      |              |              |     |       |     | C            | C   | C            | C   | F*   |            |            |      |              |      |      |      |     |              |     |     |    |  |
| 220pF   | 221  |      |     | M   | M   | M    | M            | M            | M   | M     | C   | C            | C   | C            | F*  |      |            |            |      |              |      |      |      |     |              |     |     |    |  |
| 270pF   | 271  |      |     | M   | M   | M    | M            | M            | M   | M     | C   | C            | C   | C            | F*  |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | C   | C   | F* |  |
| 330pF   | 331  |      |     | M   | M   | M    | M            | M            | M   | M     | C   | C            | C   | C            | F*  |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | C   | C   | F* |  |
| 390pF   | 391  |      |     | M   | M   | M    | M            | M            | M   | M     | C   | C            | C   | C            | F*  |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | C   | C   | F* |  |
| 470pF   | 471  |      |     | M   | M   | M    | M            | M            | M   | M     | C   | C            | C   | C            | F*  |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | C   | C   | F* |  |
| 560pF   | 561  |      |     | M   | M   | M    | M            | M            | M   | M     | C   | C            | C   | E            | F*  |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | C   | C   | F* |  |
| 680pF   | 681  |      |     | M   | M   | M    | M            | M            | M   | M     | C   | C            | C   | E            | F*  |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | C   | C   | F* |  |
| 820pF   | 821  |      |     | M   | M   | M    | M            | M            | M   | M     | C   | C            | C   | E            | F*  |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | C   | C   | F* |  |
| 1000pF  | 102  | M    | M   | M   | M   | M    | M            | M            | M   | C     | C   | C            | C   | F            | F*  | C    | C          | C          | C    | C            | C    | C    | C    | C   | C            | C   | E   | F* |  |
| 1200pF  | 122  | M    | M   | M   | M   | M    | M            | M            | M   | E     | E   | C            | C   | C            | F   |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | C   | F   | G* |  |
| 1500pF  | 152  | M    | M   | M   | M   | M    | M            | M            | M   | E     | E   | C            | C   | C            | F   |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | C   | F   | G* |  |
| 1800pF  | 182  | M    | M   | M   | M   | M    | M            | M            | M   | E     | E   | C            | C   | C            | F   |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | C   | C   | G* |  |
| 2200pF  | 222  | M    | M   | M   | M   | M    | M            | M            | M   | F     | F   | C            | C   | E            | F   |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | C   | C   | G* |  |
| 2700pF  | 272  | M    | M   | M   | M   | M    | M            | M            | M   | F     | G   | C            | C   | F            | F   |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | C   | C   | G* |  |
| 3300pF  | 332  | M    | M   | M   | M   | M    | M            | M            | M   | F     | G   | C            | C   | F            | F   |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | E   | G*  |    |  |
| 3900pF  | 392  | M    | M   | M   | M   | M    | M            | M            | M   | G     | G   | C            | C   | F            |     |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | F   |     |    |  |
| 4700pF  | 472  | M    | M   | M   | M   | M    | M            | M            | M   | G     | G   | C            | C   | F            |     |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | F   |     |    |  |
| 5600pF  | 562  | M    | M   | M   | M   | M    | M            | M            | M   | G     | G*  | C            | C   | F            |     |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | G   |     |    |  |
| 6800pF  | 682  | M    | M   | M   | M   | M    | M            | M            | M   | G     | G*  | C            | C   | F            |     |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | G   |     |    |  |
| 8200pF  | 822  | M    | M   | M   | M   | M    | M            | M            | M   | G     | G*  | C            | C   |              |     |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | G   |     |    |  |
| 0.010μF | 103  | M    | M   | M   | M   | M    | M            | M            | C   |       |     | C            | C   |              |     |      | C          | C          | C    | C            | C    | C    | C    | C   | C            | G   |     |    |  |
| 0.012μF | 123  | M    | M   | M   | M   | M    | M            | M            | C   |       |     | E            | E   |              |     |      | C          | C          | C    | C            | C    | C    | C    | C   | C            |     |     |    |  |
| 0.015μF | 153  | M    | M   | M   | M   | M    | M            | M            | E   |       |     | E            | E   |              |     |      | C          | C          | C    | C            | C    | C    | C    | C   | C            |     |     |    |  |
| 0.018μF | 183  | M    | M   | M   | M   | M    | M            | C            | E   |       |     | F            | F   |              |     |      | C          | C          | C    | C            | C    | C    | C    | C   | E            |     |     |    |  |
| 0.022μF | 223  | M    | M   | M   | M   | M    | M            | C            | E   |       |     | F            | F   |              |     |      | C          | C          | C    | C            | C    | C    | C    | C   | E            |     |     |    |  |
| 0.027μF | 273  | M    | M   | M   | M   | M    | M            | C            | E   |       |     | F            | F   |              |     |      | C          | C          | C    | C            | C    | C    | C    | C   | F            |     |     |    |  |
| 0.033μF | 333  | M    | M   | M   | M   | M    | M            | E            | E   |       |     | F            | F   |              |     |      | C          | C          | C    | C            | C    | C    | C    | C   | F            |     |     |    |  |
| 0.039μF | 393  | M    | M   | M   | M   | M    | M            | E            | F   |       |     | F            | F   |              |     |      | C          | C          | C    | C            | C    | C    | C    | C   | G            |     |     |    |  |
| 0.047μF | 473  | M    | M   | M   | M   | M    | C            | E            | G   |       |     | F            | F   |              |     |      | C          | C          | C    | C            | C    | C    | C    | C   | G            |     |     |    |  |
| 0.056μF | 563  | M    | M   | M   | M   | M    | C            | E            |     |       |     | F            | F   |              |     |      | C          | C          | C    | C            | C    | E    | E    | G   |              |     |     |    |  |
| 0.068μF | 683  | M    | M   | M   | M   | M    | E            | F            |     |       |     | F            |     |              |     |      | C          | C          | C    | C            | C    | E    | E    | G   |              |     |     |    |  |
| 0.082μF | 823  | M    | M   | M   | M   | M    | E            | F            |     |       |     | F            |     |              |     |      | C          | C          | C    | C            | C    | E    | E    | G   |              |     |     |    |  |
| 0.100μF | 104  | M    | M   | M   | M   | M    | E            | F            |     |       |     |              |     |              |     |      | C          | C          | C    | C            | C    | E    | E    | G   |              |     |     |    |  |
| 0.120μF | 124  | M    | M   | M   | M   | M    | E            |              |     |       |     |              |     |              |     |      | C          | C          | C    | C            | C    | F    | F    |     |              |     |     |    |  |
| 0.150μF | 154  | M    | M   | M   | M   | C    | E            |              |     |       |     |              |     |              |     |      | C          | C          | C    | C            | C    | F    | F    |     |              |     |     |    |  |
| 0.180μF | 184  | M    | M   | M   | M   | C    | E            |              |     |       |     |              |     |              |     |      | C          | C          | C    | C            | C    | G    | G    |     |              |     |     |    |  |
| 0.220μF | 224  | M    | M   | M   | M   | C    | E            |              |     |       |     |              |     |              |     |      | C          | C          | C    | C            | C    | G    | G    |     |              |     |     |    |  |
| 0.270μF | 274  | M    | M   | M   | M   | E    | F            |              |     |       |     |              |     |              |     |      | C          | C          | C    | E            | E    | G    |      |     |              |     |     |    |  |
| 0.330μF | 334  | M    | M   | M   | C   | E    | F            |              |     |       |     |              |     |              |     |      | C          | C          | C    | E            | E    | G    |      |     |              |     |     |    |  |
| 0.390μF | 394  | M    | M   | M   | C   | G    | G            |              |     |       |     |              |     |              |     |      | C          | C          | C    | F            | F    | G    |      |     |              |     |     |    |  |
| 0.470μF | 474  | M    | M   | M   | C   | G    | G            |              |     |       |     |              |     |              |     |      | C          | C          | C    | F            | F    | G    |      |     |              |     |     |    |  |
| 0.560μF | 564  | C    | C   | C   | C   | G    | G            |              |     |       |     |              |     |              |     |      | C          | C          | C    | G            |      |      |      |     |              |     |     |    |  |
| 0.680μF | 684  | C    | C   | C   | C   | F    | G            |              |     |       |     |              |     |              |     |      | C          | C          | C    | G            |      |      |      |     |              |     |     |    |  |
| 0.820μF | 824  | C    | C   | C   | C   | F    |              |              |     |       |     |              |     |              |     |      | C          | C          | C    | G            |      |      |      |     |              |     |     |    |  |
| 1μF     | 105  | C    | C   | C   | C   | F    |              |              |     |       |     |              |     |              |     |      | C          | C          | C    | G            |      |      |      |     |              |     |     |    |  |
| 1.2μF   | 125  |      |     |     |     |      |              |              |     |       |     |              |     |              |     |      |            | C          | C    |              |      |      |      |     |              |     |     |    |  |
| 1.5μF   | 155  |      | F   | E   | G   | G    |              |              |     |       |     |              |     |              |     |      |            | C          | C    |              |      |      |      |     |              |     |     |    |  |
| 1.8μF   | 185  |      |     |     |     |      |              |              |     |       |     |              |     |              |     |      |            |            | E    | E            |      |      |      |     |              |     |     |    |  |
| 2.20μF  | 225  |      | F   | E   | G   | G    |              |              |     |       |     |              |     |              |     |      |            |            | E    | E            |      |      |      |     |              |     |     |    |  |
| 2.70μF  | 275  |      |     |     |     |      |              |              |     |       |     |              |     |              |     |      |            |            | F    | F            |      |      |      |     |              |     |     |    |  |
| 3.3μF   | 335  |      | F   | E   | G   | G    |              |              |     |       |     |              |     |              |     |      |            |            | F    | F            |      |      |      |     |              |     |     |    |  |
| 3.9μF   | 395  |      |     |     |     |      |              |              |     |       |     |              |     |              |     |      |            |            | F    | F            |      |      |      |     |              |     |     |    |  |
| 4.7μF   | 475  | F    | F   | F   | G   |      |              |              |     |       |     |              |     |              |     |      |            |            | G    | G            |      |      |      |     |              |     |     |    |  |
| 5.6μF   | 565  |      |     |     |     |      |              |              |     |       |     |              |     |              |     |      |            |            | G    |              |      |      |      |     |              |     |     |    |  |
| 6.8μF   | 685  |      |     |     |     |      |              |              |     |       |     |              |     |              |     |      |            |            | G    |              |      |      |      |     |              |     |     |    |  |
| 8.2μF   | 825  |      |     |     |     |      |              |              |     |       |     |              |     |              |     |      |            |            | G    |              |      |      |      |     |              |     |     |    |  |
| 10μF    | 106  | F    | F   | G   | G   |      |              |              |     |       |     |              |     |              |     |      |            |            | G    |              |      |      |      |     |              |     |     |    |  |
| 22μF    | 226  |      | G   |     |     |      |              |              |     |       |     |              |     |              |     |      |            |            |      |              |      |      |      |     |              |     |     |    |  |

\* Surface coating only

MLCC

Chip R

Coil

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

### RATING

### X7R

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

\* Surface coating only

MLCC

Chip R

Coil

## ■ High Reliability for Industrial Grade

### FEATURES

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

### APPLICATION

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

### PART NUMBER

| FR                               | 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)<br>21 0805 (2012)<br>31 1206 (3216)<br>32 1210 (3225)<br>42 1808 (4520)<br>43 1812 (4532)<br>46 1825 (4563)<br>55 2220 (5750)<br>56 2225 (5763) | N COG(NPO)<br>X X7R | 106=10x10 <sup>6</sup><br>=10μF<br>100=10x10 <sup>0</sup><br>=10pF | J= ±5%<br>K= ±10%<br>M= ±20% | 500=50V<br>101=100V<br>201=200V<br>251=250V<br>401=400V<br>501=500V<br>631=630V<br>102=1000V | E=<br>Tape and 7" Reel,<br>Embossed Tape<br>P=<br>Tape and 7" Reel,<br>Paper Tape<br>L=<br>Tape and 13" Reel,<br>Embossed<br>G=<br>Tape and 13" Reel,<br>Paper Tape | Reference<br>Thickness<br>Description | G=RoHS<br>Compliant<br>Q=Surface<br>Coating<br>(Size 1206~2225) |

### GENERAL ELECTRICAL DATA

| Dielectric                   | NPO  | X7R   |
|------------------------------|--|---|
| <b>Size</b>                  | 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225   | 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225                      |
| <b>Rated voltage (WVDC)</b>  | 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1000V, 1500V, 2000V, 3000V, 4000V  | 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1000V, 1500V, 2000V, 3000V, 4000V |
| <b>Capacitance range</b>     | 0.5pF ~ 330nF  | 100pF ~ 22μF  |
| <b>Capacitance tolerance</b> | Cap≤5pF: B (±0.1pF), C (±0.25pF)<br>5pF<Cap<10pF: C (±0.25pF), D (±0.5pF)<br>10pF≤Cap: F (±1%), G (±2%), J (±5%), K (±10%) | J (±5%)<br>K (±10%)<br>M (±20%)   |
| <b>Tan δ</b>                 | Cap. Rang: Q Spec.<br>Cap<30pF: Q≥400+20C<br>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% |
| Cap>1000pF | 1.0±0.2Vrms, 1.0kHz±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

### 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 <sub>B</sub> (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<br>Thickness<br>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

### NPO

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

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### RATING

### NPO

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

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### RATING

#### NPO

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

MLCC

Chip R

Coil

## High Reliability for Industrial Grade

### RATING

#### X7R

| Size    |      | 0603 |     |      |              | 0805 |     |      |              |              | 1206 |     |     |      |              |              |     |       |     |
|---------|------|------|-----|------|--------------|------|-----|------|--------------|--------------|------|-----|-----|------|--------------|--------------|-----|-------|-----|
| Cap     | Code | 25V  | 50V | 100V | 200V<br>250V | 25V  | 50V | 100V | 200V<br>250V | 500V<br>630V | 1KV  | 25V | 50V | 100V | 200V<br>250V | 500V<br>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  |      |     |      |              |      |     |      |              |              |      |     |     |      |              |              |     |       |     |

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## High Reliability for Industrial Grade

### RATING

#### X7R

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

\* Surface coating only

MLCC

Chip R

Coil

## ■ High Reliability for Industrial Grade

### RATING

#### X7R

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

\* Surface coating only

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<br>Second digit code : chip size (below)<br><br>A 1210 (3225)<br>C 1812 (4532)<br>G 1825 (4563)<br>H 2220 (5750)<br>I 2225 (5763) | N COG (NPO)<br>X X7R | 105=10x10 <sup>Λ</sup> 5<br>=1μF<br>106=10x10 <sup>Λ</sup> 6<br>=10μF | J= ± 5%<br>K= ± 10%<br>M= ± 20% | 500=50V<br>101=100V<br>201=200V<br>251=250V<br>501=500V<br>631=630V<br>102=1000V | B=Bulk<br>T=Tray package<br>L=Tape and 13"<br>Reel, Embossed Tape | Reference Thickness (Toble I) | L=L type lead<br>J=J type lead<br>K= K type lead<br>B= B type lead<br>S= Straight type lead | M= Automotive |

### GENERAL ELECTRICAL DATA

| Dielectric  | COG                                       | X7R                                      |   |                         |
|---|---|--|---|-------------------------|
| <b>Size</b>   | 1210, 1812, 1825, 2220, 2225              | 1210, 1812, 1825, 2220, 2225             |   |                         |
| <b>Rated voltage (WVDC)</b>                           | 50V, 100V, 200V, 250V, 500V, 630V         | 50V, 100V, 200V, 250V, 500V, 630V        |   |                         |
| <b>Capacitance range*</b>                             | 220nF Max.                                | 47μF Max.                                |   |                         |
| <b>Capacitance tolerance</b>                          | J (± 5%), K (± 10%), M (± 20%)            |  |   |                         |
| <b>Tan δ *e)</b>                                      | Cap. Rang                                 | Q Spec.                                  |   |                         |
|   | Cap<30pF:                                 | Q≥400+20C                                |   |                         |
|   | Cap≥30pF:                                 | Q≥1000                                   |   |                         |
| Measured at the condition of 30~70% related humidity  |   |  |   |                         |
| <b>Capacitance &amp; Tan δ Test Condition</b>         | for 25°C at ambient temperature           |  | Preconditioning for Class II MLCC: Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition (25°C ) for 24±2 hours before measurement |                         |
|   | Cap. Rang                                 | Test Condition                           | Cap. Rang   | 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%   |                         |
| <b>Insulation resistance at 500Vdc for 60 seconds</b> | ≥10GΩ or RxC≥ 500Ω-F whichever is smaller | ≥10GΩ or RxC≥100Ω-F whichever is smaller |   |                         |
| <b>Operating temperature</b>                          | - 55 to + 125°C                           |  |   |                         |
| <b>Capacitance characteristic</b>                     | ± 30ppm / °C                              | ± 15%                                    |   |                         |
| <b>Termination</b>                                    | L / J / Straight type lead                |  |   |                         |

### DIMENSIONS



| Size inch (mm) | L (mm)    | W (mm)    | T (mm) code | 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                           | <b>31</b> 1206 (3216)  | <b>N</b> COG(NPO) | <b>102</b> = $10 \times 10^2$                     | <b>J</b> = ±5%                     | <b>102</b> =1000V  | <b>E</b> =   | Reference                | <b>G</b> =RoHS |
| High voltage application with ≥ 1KVdc | <b>32</b> 1210 (3225)<br><b>42</b> 1808 (4520)<br><b>43</b> 1812 (4532)<br><b>46</b> 1825 (4563)<br><b>55</b> 2220 (5750)<br><b>52</b> 2211(5728)<br><b>56</b> 2225 (5763) | <b>X</b> X7R      | =1000pF<br><b>100</b> = $10 \times 10^0$<br>=10pF | <b>K</b> =± 10%<br><b>M</b> =± 20% | <b>152</b> =1500V<br><b>202</b> =2000V<br><b>302</b> =3000V<br><b>402</b> =4000V | Tape and 7" Reel,<br>Embossed Tape<br><b>P</b> =<br>Tape and 7" Reel,<br>Paper Tape<br><b>L</b> =<br>Tape and 13" Reel,<br>Embossed<br><b>G</b> =<br>Tape and 13"Reel,<br>Paper Tape | Thickness<br>Description | Compliant      |

### GENERAL ELECTRICAL DATA

| Dielectric  | NPO  | X7R  |
|---|--|--|
| <b>Size</b>   | 1206, 1210, 1808, 1812, 1825, 2220, 2225   | 1206, 1210, 1808, 1812, 1825, 2211, 2220, 2225   |
| <b>Rated voltage (WVDC)</b>                           | 1KV, 1.5KV, 2KV, 3KV, 4KV  | 1KV, 1.5KV, 2KV, 3KV, 4KV  |
| <b>Capacitance range*</b>                             | 1.5pF ~ 10nF   | 100pF ~ 220nF  |
| <b>Capacitance tolerance</b>                          | Cap ≤ 5pF: B (±0.1pF), C (±0.25pF)<br>5pF < Cap < 10pF: C (±0.25pF), D (±0.5pF)<br>Cap ≥ 10pF: F (±1%), G (±2%), J (±5%), K (±10%) | J (±5%)<br>K (±10%)<br>M (±20%)  |
| <b>Tan δ *</b>  | Cap. Rang<br>Cap < 30pF: Q ≥ 400+20C<br>Cap ≥ 30pF: Q ≥ 1000   | ≤ 2.5%   |
| Measured at the condition of 30~70% related humidity. |  |  |
| <b>Capacitance &amp; Tan δ Test Condition</b>         | for 25°C at ambient temperature  | Preconditioning for Class II MLCC: Perform a heat treatment at 150 ± 10°C for 1 hour, then leave in ambient condition for 24 ± 2 hours before measurement. |
|   | Cap. Rang  | Test Condition   |
|   | Cap ≤ 1000pF   | 1.0 ± 0.2Vrms, 1.0MHz ± 10%  |
|   | Cap > 1000pF   | 1.0 ± 0.2Vrms, 1.0kHz ± 10%  |
| <b>Insulation resistance</b>                          | ≥ 10GΩ or R · C ≥ 500Ω · F<br>whichever is smaller   | ≥ 10GΩ or R · C ≥ 100Ω · F<br>whichever is smaller   |
| <b>Operating temperature</b>                          |  | - 55 to + 125°C  |
| <b>Temperature coefficient</b>                        | ± 30ppm / °C   | ± 15%  |
| <b>Termination</b>                                    | Ag or Cu / Ni / Sn (lead-free termination)   |  |

### DIMENSIONS



| Size inch (mm) | L (mm)      | W (mm)      | T (mm) code                           | M <sub>b</sub> (mm) |
|----------------|-------------|-------------|---------------------------------------|---------------------|
| 1206 (3216)    | 3.3 ± 0.30  | 1.60 ± 0.20 | Reference<br>Thickness<br>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         |



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

### RATING

#### NPO

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

MLCC

Chip R

Coil



## ■ 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 | <b>03</b> 0201 (0603)<br><b>15</b> 0402 (1005)<br><b>18</b> 0603 (1608)<br><b>21</b> 0805 (2012)<br><b>31</b> 1206 (3216)<br><b>32</b> 1210 (3225) | <b>N</b> NPO<br><b>X</b> X7R | <b>102</b> =10x10 <sup>∧</sup> 2<br>=1000pF<br><b>100</b> =10x10 <sup>∧</sup> 0<br>=10pF | <b>J</b> = ± 5%<br><b>K</b> =± 10%<br><b>M</b> =± 20% | <b>6R3</b> =6.3V<br><b>100</b> =10V<br><b>101</b> =100V<br><b>251</b> =250V | <b>E</b> =<br>Tape and 7" Reel,<br>Embossed Tape<br><b>P</b> =<br>Tape and 7" Reel,<br>Paper Tape<br><b>L</b> =<br>Tape and 13"<br>Reel, Embossed<br><b>G</b> =<br>Tape and 13"Reel,<br>Paper Tape | Reference<br>Thickness<br>Description | <b>G</b> =RoHS<br>Compliant |

### GENERAL ELECTRICAL DATA

| Dielectric  | NPO(C0G)   | X7R  |
|---|--|--|
| <b>Size</b>   | 0201, 0402, 0603, 0805, 1206, 1210   | 0402, 0603, 0805, 1206, 1210   |
| <b>Rated voltage (WVDC)</b>                           | 10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1000V  |  |
| <b>Capacitance range*</b>                             | 0.1pF ~ 47nF   | 100pF ~ 2.2μF  |
| <b>Capacitance tolerance**</b>                        | Cap≤5pF: B (±0.1pF), C (±0.25pF)<br>5pF<Cap<10pF: C (±0.25pF), D (±0.5pF)<br>Cap≥10pF: F (±1%), G (±2%), J (±5%) | J (±5%)<br>K (±10%)<br>M (±20%)  |
| Measured at the condition of 30~70% related humidity. |  |  |
| <b>Capacitance &amp; Tan δ Test Condition</b>         | for 25°C at ambient temperature  | Preconditioning for Class II MLCC: Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement. |
|   | Cap. Rang  | Test Condition   |
|   | Cap≤1000pF   | 1.0±0.2Vrms, 1.0MHz±10%  |
|   | Cap>1000pF   | 1.0±0.2Vrms, 1.0kHz±10%  |
| <b>Tan δ *</b>  | Cap<30pF: Q≥400+20C<br>Cap≥30pF: Q≥1000  | ≤ 2.5%   |
| <b>Insulation resistance at Ur</b>                    | ≥10GΩ or R·C≥ 500Ω·F<br>whichever is smaller   | Follow No.17 Of 8. Reliability Test Conditions and Requirements  |
| <b>Operating temperature</b>                          | -55 to +125°C  |  |
| <b>Capacitance characteristic</b>                     | ± 30ppm / °C   | ± 15%  |
| <b>Termination</b>                                    | Cu/Ni/Sn (lead-free termination)   |  |

### DIMENSIONS



| Size inch (mm) | L (mm)    | W (mm)    | T (mm) code                           | M <sub>b</sub> min (mm) |
|----------------|-----------|-----------|---------------------------------------|-------------------------|
| 0201 (0603)    | 0.60±0.03 | 0.30±0.03 |                                       | 0.15±0.05               |
| 0402 (1005)    | 1.00±0.10 | 0.50±0.10 |                                       | 0.25+0.05/-0.10         |
| 0603 (1608)    | 1.60±0.15 | 0.80±0.15 | Reference<br>Thickness<br>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

### COG

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

MLCC

Chip R

Coil

## Automotive Capacitor Qualified to AEC-Q200

### RATING

#### NPO

| Size    |      | 1206 |     |     |     |      |      |      |      |      |       | 1210 |     |     |     |      |      |      |      |      |       |   |
|---------|------|------|-----|-----|-----|------|------|------|------|------|-------|------|-----|-----|-----|------|------|------|------|------|-------|---|
| Cap(pF) | Code | 10V  | 16V | 25V | 50V | 100V | 200V | 250V | 500V | 630V | 1000V | 10V  | 16V | 25V | 50V | 100V | 200V | 250V | 500V | 630V | 1000V |   |
| 0.1     | OR1  |      |     |     |     |      |      |      |      |      |       |      |     |     |     |      |      |      |      |      |       |   |
| 0.2     | OR2  |      |     |     |     |      |      |      |      |      |       |      |     |     |     |      |      |      |      |      |       |   |
| 0.3     | OR3  |      |     |     |     |      |      |      |      |      |       |      |     |     |     |      |      |      |      |      |       |   |
| 0.4     | OR4  |      |     |     |     |      |      |      |      |      |       |      |     |     |     |      |      |      |      |      |       |   |
| 0.5     | OR5  |      |     |     |     |      |      |      |      |      |       |      |     |     |     |      |      |      |      |      |       |   |
| 0.6     | OR6  |      |     |     |     |      |      |      |      |      |       |      |     |     |     |      |      |      |      |      |       |   |
| 0.7     | OR7  |      |     |     |     |      |      |      |      |      |       |      |     |     |     |      |      |      |      |      |       |   |
| 0.8     | OR8  |      |     |     |     |      |      |      |      |      |       |      |     |     |     |      |      |      |      |      |       |   |
| 0.9     | OR9  |      |     |     |     |      |      |      |      |      |       |      |     |     |     |      |      |      |      |      |       |   |
| 1       | 1R0  |      |     |     |     |      |      |      |      |      |       |      |     |     |     |      |      |      |      |      |       |   |
| 1.2     | 1R2  | X    | X   | X   | X   | X    | X    | X    | X    | X    |       |      |     |     |     |      |      |      |      |      |       |   |
| 1.5     | 1R5  | X    | X   | X   | X   | X    | X    | X    | X    | X    | X     |      |     |     |     |      |      |      |      |      |       |   |
| 1.8     | 1R8  | X    | X   | X   | X   | X    | X    | X    | X    | X    | X     |      |     |     |     |      |      |      |      |      |       |   |
| 2.2     | 2R2  | X    | X   | X   | X   | X    | X    | X    | X    | X    | X     |      |     |     |     |      |      |      |      |      |       |   |
| 2.7     | 2R7  | X    | X   | X   | X   | X    | X    | X    | X    | X    | X     |      |     |     |     |      |      |      |      |      |       |   |
| 3.3     | 3R3  | X    | X   | X   | X   | X    | X    | X    | X    | X    | X     |      |     |     |     |      |      |      |      |      |       |   |
| 3.9     | 3R9  | X    | X   | X   | X   | X    | X    | X    | X    | X    | X     |      |     |     |     |      |      |      |      |      |       |   |
| 4.7     | 4R7  | X    | X   | X   | X   | X    | X    | X    | X    | X    | X     |      |     |     |     |      |      |      |      |      |       |   |
| 5.6     | 5R6  | X    | X   | X   | X   | X    | X    | X    | X    | X    | X     |      |     |     |     |      |      |      |      |      |       |   |
| 6.8     | 6R8  | X    | X   | X   | X   | X    | X    | X    | X    | X    | X     |      |     |     |     |      |      |      |      |      |       |   |
| 8.2     | 8R2  | X    | X   | X   | X   | X    | X    | X    | X    | X    | X     |      |     |     |     |      |      |      |      |      |       |   |
| 10      | 100  | X    | X   | X   | X   | X    | X    | X    | X    | X    | X     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | M |
| 12      | 120  | X    | X   | X   | X   | X    | X    | X    | X    | X    | X     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | M |
| 15      | 150  | X    | X   | X   | X   | X    | X    | X    | X    | X    | X     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | M |
| 18      | 180  | X    | X   | X   | X   | X    | X    | X    | X    | X    | X     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | M |
| 22      | 220  | X    | X   | X   | X   | X    | X    | X    | X    | X    | C     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | M |
| 27      | 270  | X    | X   | X   | X   | X    | X    | X    | X    | X    | C     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | M |
| 33      | 330  | X    | X   | X   | X   | X    | X    | X    | X    | X    | C     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | M |
| 39      | 390  | X    | X   | X   | X   | X    | X    | X    | X    | X    | C     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | M |
| 47      | 470  | X    | X   | X   | X   | X    | X    | X    | X    | X    | C     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | M |
| 56      | 560  | X    | X   | X   | X   | X    | X    | X    | X    | X    | C     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | M |
| 68      | 680  | X    | X   | X   | X   | X    | X    | X    | X    | X    | C     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | M |
| 82      | 820  | X    | X   | X   | X   | X    | X    | X    | X    | X    | C     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | M |
| 100     | 101  | X    | X   | X   | X   | X    | X    | X    | X    | X    | C     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | C |
| 120     | 121  | X    | X   | X   | X   | X    | X    | X    | X    | X    | C     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | C |
| 150     | 151  | X    | X   | X   | X   | X    | X    | X    | X    | X    | C     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | C |
| 180     | 181  | X    | X   | X   | X   | X    | X    | X    | X    | X    | E     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | C |
| 220     | 221  | X    | X   | X   | X   | X    | X    | X    | X    | X    | E     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | E |
| 270     | 271  | X    | X   | X   | X   | X    | X    | M    | M    | M    | E     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | E |
| 330     | 331  | X    | X   | X   | X   | X    | X    | M    | M    | M    | E     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | E |
| 390     | 391  | X    | X   | X   | X   | X    | X    | M    | M    | M    | E     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | E |
| 470     | 471  | X    | X   | X   | X   | X    | M    | M    | M    | M    | E     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | E |
| 560     | 561  | X    | X   | X   | X   | X    | M    | C    | C    | C    | E     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | E |
| 680     | 681  | X    | X   | X   | X   | X    | M    | C    | C    | C    | E     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | E |
| 820     | 821  | X    | X   | X   | X   | X    | M    | E    | E    | E    | E     | M    | M   | M   | M   | M    | M    | M    | M    | M    | M     | E |
| 1000    | 102  | X    | X   | X   | X   | X    | M    | E    | E    | E    | E     | M    | M   | M   | M   | M    | C    | C    | C    | C    | C     | E |
| 1200    | 122  | X    | X   | X   | X   | X    | M    | E    | E    | E    |       | M    | M   | M   | M   | M    | C    | C    | C    | C    | C     |   |
| 1500    | 152  | X    | X   | X   | X   | X    | C    | E    | E    | E    |       | M    | M   | M   | M   | M    | C    | C    | C    | C    | C     |   |
| 1800    | 182  | X    | X   | X   | X   | X    | C    | E    | E    | E    |       | M    | M   | M   | M   | M    | C    | C    | C    | C    | C     |   |
| 2200    | 222  | X    | X   | X   | X   | X    | C    | E    | E    | E    |       | M    | M   | M   | M   | M    | C    | C    | C    | C    | C     |   |
| 2700    | 272  | X    | X   | X   | X   | X    | C    | E    | E    | E    |       | M    | M   | M   | M   | M    | C    | C    | C    | C    | C     |   |
| 3300    | 332  | X    | X   | X   | X   | X    | C    | E    | E    | E    |       | M    | M   | M   | M   | M    | C    | C    | C    | C    | C     |   |
| 3900    | 392  | X    | X   | X   | X   | X    | C    | E    | E    | E    |       | M    | M   | M   | M   | M    | C    | C    | C    | C    | C     |   |
| 4700    | 472  | X    | X   | X   | X   | X    | C    | E    | E    | E    |       | M    | M   | M   | M   | M    | E    | E    |      |      |       |   |
| 5600    | 562  | X    | X   | X   | X   | X    |      |      |      |      |       | M    | M   | M   | M   | M    | E    | E    |      |      |       |   |
| 6800    | 682  | M    | M   | M   | M   | M    |      |      |      |      |       | M    | M   | M   | M   | M    | E    | E    |      |      |       |   |
| 8200    | 822  | C    | C   | C   | C   | C    |      |      |      |      |       | M    | M   | M   | M   | M    | E    | E    |      |      |       |   |
| 10000   | 103  | C    | C   | C   | C   | C    |      |      |      |      |       | M    | M   | M   | M   | M    | E    | E    |      |      |       |   |
| 12000   | 123  |      |     |     |     |      |      |      |      |      |       | C    | C   | C   | C   | C    |      |      |      |      |       |   |
| 15000   | 153  |      |     |     |     |      |      |      |      |      |       | C    | C   | C   | C   | C    |      |      |      |      |       |   |
| 18000   | 183  |      |     |     |     |      |      |      |      |      |       | F    | F   | F   | F   | F    |      |      |      |      |       |   |
| 22000   | 223  |      |     |     |     |      |      |      |      |      |       | F    | F   | F   | F   | F    |      |      |      |      |       |   |
| 27000   | 273  |      |     |     |     |      |      |      |      |      |       | F    | F   | F   | F   | F    |      |      |      |      |       |   |
| 33000   | 333  |      |     |     |     |      |      |      |      |      |       | F    | F   | F   | F   | F    |      |      |      |      |       |   |
| 47000   | 473  |      |     |     |     |      |      |      |      |      |       | F    | F   | F   | F   | F    |      |      |      |      |       |   |

MLCC

Chip R

Coil

## 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 | <b>03</b> 0201 (0603)<br><b>15</b> 0402 (1005)<br><b>18</b> 0603 (1608)<br><b>21</b> 0805 (2012)<br><b>31</b> 1206 (3216)<br><b>32</b> 1210 (3225)<br><b>43</b> 1812 (4532) | <b>N</b> NPO<br><b>B</b> X5R<br><b>X</b> X7R | <b>106</b> = $10 \times 10^6$<br>=10 $\mu$ F<br><b>100</b> = $10 \times 10^0$<br>=10pF | <b>J</b> = $\pm 5\%$<br><b>K</b> = $\pm 10\%$<br><b>M</b> = $\pm 20\%$ | <b>6R3</b> =6.3V<br><b>100</b> =10V<br><b>160</b> =16V<br><b>250</b> =25V<br><b>500</b> =50V<br><b>101</b> =100V<br><b>201</b> =200V<br><b>251</b> =250V | <b>E</b> =<br>Tape and 7" Reel,<br>Embossed Tape<br><b>P</b> =<br>Tape and 7" Reel,<br>Paper Tape<br><b>L</b> =<br>Tape and 13" Reel,<br>Embossed<br><b>G</b> =<br>Tape and 13"Reel,<br>Paper Tape | Reference<br>Thickness<br>Description | <b>G</b> =RoHS<br>Compliant |

### GENERAL ELECTRICAL DATA

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

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

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

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

\*\* Preconditioning for Class II MLCC: Perform a heat treatment at 150 $\pm 10$  $^{\circ}$ C for 1 hour, then leave in ambient condition for 24 $\pm 2$  hours before measurement.

### DIMENSIONS



| Size inch (mm) | L (mm)          | W (mm)          | T (mm) code                           | M <sub>b</sub> min (mm) |
|----------------|-----------------|-----------------|---------------------------------------|-------------------------|
| 0201 (0603)    | 0.6 $\pm 0.03$  | 0.3 $\pm 0.03$  | Reference<br>Thickness<br>Description | 0.15 $\pm 0.05$         |
| 0402 (1005)    | 1.00 $\pm 0.05$ | 0.50 $\pm 0.05$ |                                       | 0.25+0.05/-0.10         |
| 0603 (1608)    | 1.60 $\pm 0.10$ | 0.80 $\pm 0.10$ |                                       | 0.40 $\pm 0.15$         |
| 0805 (2012)    | 2.00 $\pm 0.20$ | 1.25 $\pm 0.20$ |                                       | 0.50 $\pm 0.20$         |
| 1206 (3216)    | 3.20 $\pm 0.20$ | 1.60 $\pm 0.20$ |                                       | 0.60 $\pm 0.20$         |
| 1210 (3225)    | 3.20 $\pm 0.30$ | 2.50 $\pm 0.20$ |                                       | 0.75 $\pm 0.25$         |
| 1812 (4532)    | 4.50 $\pm 0.40$ | 3.20 $\pm 0.30$ |                                       | 0.75 $\pm 0.25$         |







## ■ 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                |
| <b>High Capacitance Series</b>                 | <b>03</b> 0201 (0603)<br><b>15</b> 0402 (1005)<br><b>18</b> 0603 (1608)<br><b>21</b> 0805 (2012)   | <b>B</b> X5R<br><b>S</b> X6S<br><b>X</b> X7R<br><b>F</b> Y5V<br><b>A</b> X7S | <b>106</b> = $10 \times 10^6$<br>= $10\mu\text{F}$ | <b>J</b> = $\pm 5\%$<br><b>K</b> = $\pm 10\%$<br><b>M</b> = $\pm 20\%$<br><b>Z</b> = $-20/+80\%$ | <b>6R3</b> =6.3V<br><b>100</b> =10V<br><b>101</b> =100V<br><b>251</b> =250V | <b>E</b> =<br>Tape and 7" Reel,<br>Embossed Tape<br><b>P</b> =<br>Tape and 7" Reel,<br>Paper Tape<br><b>L</b> =<br>Tape and 13"<br>Reel, Embossed<br><b>G</b> =<br>Tape and 13"Reel,<br>Paper Tape | Reference<br>Thickness<br>Description | <b>G</b> =RoHS<br>Compliant |
| Capacitor $\geq 1.0\mu\text{F}$ Series Product | <b>31</b> 1206 (3216)<br><b>32</b> 1210 (3225)<br><b>43</b> 1812 (4532)<br><b>46</b> 1825 (4563)<br><b>55</b> 2220 (5750)<br><b>56</b> 2225 (5763) |  |  |  |   |  |                                       |                             |

### GENERAL ELECTRICAL DATA

| Dielectric                        | X7R  | X7S                                  | X6S                                  | X5R                                  | Y5V                                  |
|-----------------------------------|--|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| <b>Size</b>                       | 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,  |
| <b>Capacitance range*</b>         | 1 $\mu\text{F}$ to 47 $\mu\text{F}$                  | 1 $\mu\text{F}$ to 100 $\mu\text{F}$ | 1 $\mu\text{F}$ to 100 $\mu\text{F}$ | 1 $\mu\text{F}$ to 220 $\mu\text{F}$ | 1 $\mu\text{F}$ to 100 $\mu\text{F}$ |
| <b>Capacitance tolerance**</b>    | K( $\pm 10\%$ ), M( $\pm 20\%$ )                     | K( $\pm 10\%$ ), M( $\pm 20\%$ )     | K( $\pm 10\%$ ), M( $\pm 20\%$ )     | K( $\pm 10\%$ ), M( $\pm 20\%$ )     | Z ( $-20/+80\%$ )                    |
| <b>Rated voltage (WVDC)</b>       | 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  |
| <b>Tan <math>\delta</math> *</b>  | Pls refer to our sales spec                          |                                      |                                      |                                      |                                      |
| <b>Operating temperature</b>      | -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 $^{\circ}\text{C}$        |
| <b>Capacitance characteristic</b> | $\pm 15\%$   | $\pm 22\%$                           | $\pm 22\%$                           | $\pm 15\%$                           | +30/-80%                             |
| <b>Termination</b>                | Cu or Ag/Ni/Sn (lead-free termination)               |                                      |                                      |                                      |                                      |

### DIMENSIONS



| Size inch (mm) | L (mm)  | W (mm)  | T (mm) code                           | M <sub>b</sub> min (mm) |
|----------------|---|---|---------------------------------------|-------------------------|
| 0201 (0603)    | 0.60 $\pm$ 0.03                                   | 0.30 $\pm$ 0.03                                   | Reference<br>Thickness<br>Description | 0.15 $\pm$ 0.05         |
|                | 0.60 $\pm$ 0.05 (Cap. $\geq$ 0.68 $\mu\text{F}$ ) | 0.30 $\pm$ 0.05 (Cap. $\geq$ 0.68 $\mu\text{F}$ ) |                                       |                         |
|                | 0.60 $\pm$ 0.09 (Cap. $\geq$ 1.0 $\mu\text{F}$ )  | 0.30 $\pm$ 0.09 (Cap. $\geq$ 1.0 $\mu\text{F}$ )  |                                       |                         |
| 0402 (1005)    | 1.00 $\pm$ 0.10                                   | 0.50 $\pm$ 0.10                                   |                                       | 0.25+0.05/-0.10         |
|                | 1.00 $\pm$ 0.20 <sup>#1</sup>                     | 0.50 $\pm$ 0.20 <sup>#1</sup>                     |                                       |                         |
| 0603 (1608)    | 1.60 $\pm$ 0.15                                   | 0.80 $\pm$ 0.15                                   |                                       | 0.40 $\pm$ 0.15         |
|                | 1.60 $\pm$ 0.20 <sup>#2</sup>                     | 0.80 $\pm$ 0.20 <sup>#2</sup>                     |                                       |                         |
| 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 |     |     |      |  |
|---------|------|------|------|-----|-----|-----|------|------|-----|-----|-----|------|------|-----|-----|-----|------|-----|------|------|-----|------|-----|-----|------|--|
| Cap(pF) | Code | 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    |      | 1812 |     |     |     |      |      | 1825 |     |     |      |      | 2220 |     |     |      |      | 2225 |     |     |      |      |      |   |
|---------|------|------|-----|-----|-----|------|------|------|-----|-----|------|------|------|-----|-----|------|------|------|-----|-----|------|------|------|---|
| Cap(pF) | Code | 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 |
| 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 ( $\geq 1\mu\text{F}$ )

### RATING

#### X7S

| Size                 |      | 0402 |     |     |     | 0603 |     |     |     |      | 0805 |     |     |     |     |      | 1206 |     |     |     | 1210 |     |     |      |  |
|----------------------|------|------|-----|-----|-----|------|-----|-----|-----|------|------|-----|-----|-----|-----|------|------|-----|-----|-----|------|-----|-----|------|--|
| Cap( $\mu\text{F}$ ) | 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  |      |     |     |     |      |     |     |     |      |      |     |     |     |     |      |      |     |     | p*  |      |     |     |      |  |
| 47                   | 476  |      |     |     |     |      |     |     |     |      |      |     |     |     |     |      |      |     | p*  |     |      |     |     |      |  |
| 100                  | 107  |      |     |     |     |      |     |     |     |      |      |     |     |     |     |      |      |     |     |     |      |     | G*  |      |  |

#### X6S

| Size                 |      | 0201 |      | 0402 |     |     |     | 0603 |      |     |     |     | 0805 |    |      |     |     |     | 1206 |      |     |     |     | 1210 |      |     |     |     |      |   |
|----------------------|------|------|------|------|-----|-----|-----|------|------|-----|-----|-----|------|----|------|-----|-----|-----|------|------|-----|-----|-----|------|------|-----|-----|-----|------|---|
| Cap( $\mu\text{F}$ ) | 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   |     |      |      |     |     |     |      |      |     | P   |     |      |   |
| 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 | <b>02</b> 01005 (0402) | <b>N</b> =COG (NPO) | <b>0R5</b> =0.5pF<br><b>1R0</b> =1.0pF<br><b>100</b> = $10 \times 10^{\wedge}0$ =10pF | <b>A</b> = $\pm 0.05\text{pF}$<br><b>B</b> = $\pm 0.1\text{pF}$<br><b>C</b> = $\pm 0.25\text{pF}$<br><b>D</b> = $\pm 0.5\text{pF}$<br><b>F</b> = $\pm 1\%$<br><b>G</b> = $\pm 2\%$<br><b>J</b> = $\pm 5\%$ | <b>6R3</b> =6.3V<br><b>100</b> =10V<br><b>250</b> =25V<br><b>500</b> =50V<br><b>101</b> =100V<br><b>251</b> =250V<br><b>501</b> =500V | <b>C</b> =Cu/Ni/Sn | <b>T</b> =7" reeled<br><b>G</b> =13" reeled |
|                        | <b>03</b> 0201 (0603)  |                     |   |  |   |                    |   |
|                        | <b>11</b> 0505 (1414)  |                     |   |  |   |                    |   |
|                        | <b>15</b> 0402 (1005)  |                     |   |  |   |                    |   |
|                        | <b>18</b> 0603 (1608)  |                     |   |  |   |                    |   |
|                        | <b>21</b> 0805 (2012)  |                     |   |  |   |                    |   |
| <b>22</b> 1111 (2828)  |                        |                     |   |  |   |                    |   |

### GENERAL ELECTRICAL DATA

| Dielectric                         | NPO   |
|------------------------------------|---|
| <b>Size</b>                        | 01005, 0201, 0402, 0505, 0603, 0805, 1111   |
| <b>Capacitance*</b>                | 0.1pF to 1000pF   |
| <b>Capacitance tolerance</b>       | Cap $\leq 5\text{pF}$ : A ( $\pm 0.05\text{pF}$ ), B ( $\pm 0.1\text{pF}$ ), C ( $\pm 0.25\text{pF}$ )<br>5pF<Cap<10pF: B ( $\pm 0.1\text{pF}$ ), C ( $\pm 0.25\text{pF}$ ), D ( $\pm 0.5\text{pF}$ )<br>Cap $\geq 10\text{pF}$ : F ( $\pm 1\%$ ), G ( $\pm 2\%$ ), J ( $\pm 5\%$ ) |
| <b>Rated voltage (WVDC)</b>        | 6.3V, 10V, 25V, 50V, 100V, 200V, 250V, 500V, 1500V  |
| <b>Q*</b>                          | 01005, 0201, 0402/25V~50V: Cap<30pF:Q $\geq 400+20\text{C}$ ; Cap $\geq 30\text{pF}$ :Q $\geq 1000$ ; 0402/100V~200V, 0603, 0805, 0505, 1111: Cap<30pF:Q $\geq 800+20\text{C}$ ; Cap $\geq 30\text{pF}$ :Q $\geq 1400$  |
| <b>Insulation resistance at Ur</b> | $\geq 10\text{G}\Omega$ or Rx $\text{C} \geq 100\Omega \cdot \text{F}$ whichever is smaller   |
| <b>Operating temperature</b>       | -55 to +125 $^{\circ}\text{C}$  |
| <b>Capacitance change</b>          | $\pm 30\text{ppm}/^{\circ}\text{C}$ ; 0201 Cap $\geq 22\text{pF}$ , $\pm 60\text{ppm}/^{\circ}\text{C}$   |
| <b>Termination</b>                 | Ni/Sn (lead-ree termination)  |

### DIMENSIONS



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



## Ultra High Q & Low ESR Capacitor Series

### RATING

#### NPO

| Size   | 01005 |      | 0201 |     |      |     | 0402 |     |      |     | 0603 |      |      |     | 0805 |      |      |     | 0505 |      |      | 1111 |      |      |     |      | Tolerance |      |      |      |         |         |
|--------|-------|------|------|-----|------|-----|------|-----|------|-----|------|------|------|-----|------|------|------|-----|------|------|------|------|------|------|-----|------|-----------|------|------|------|---------|---------|
|        | Cap   | Code | 16V  | 25V | 6.3V | 10V | 25V  | 50V | 100V | 25V | 50V  | 100V | 200V | 25V | 50V  | 100V | 250V | 50V | 100V | 250V | 500V | 50V  | 100V | 250V | 50V | 100V |           | 200V | 250V | 500V | 1.5KV   |         |
| 0.1pF  | 0R1   |      |      |     | L    | L   | L    | L   | L    | N   | N    | N    | N    | H   | H    | H    | H    |     |      |      |      |      |      |      |     |      |           |      |      |      |         | A, B    |
| 0.2pF  | 0R2   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | H   | H    | H    | H    | A   | A    | A    | A    |      |      |      |     |      |           |      |      |      |         | A, B    |
| 0.3pF  | 0R3   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    |      |      |      |     |      |           |      |      |      |         | A, B    |
| 0.4pF  | 0R4   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    |     |      |           |      |      |      |         | A, B    |
| 0.5pF  | 0R5   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    |     |      |           |      |      |      |         | A, B, C |
| 0.6pF  | 0R6   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    |     |      |           |      |      |      |         | A, B, C |
| 0.7pF  | 0R7   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    |     |      |           |      |      |      |         | A, B, C |
| 0.75pF | R75   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    |     |      |           |      |      |      |         | A, B, C |
| 0.8pF  | 0R8   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    |     |      |           |      |      |      |         | A, B, C |
| 0.9pF  | 0R9   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    |     |      |           |      |      |      |         | A, B, C |
| 1.0pF  | 1R0   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | A, B, C |
| 1.2pF  | 1R2   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | A, B, C |
| 1.5pF  | 1R5   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | A, B, C |
| 1.8pF  | 1R8   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | A, B, C |
| 2.0pF  | 2R0   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | A, B, C |
| 2.2pF  | 2R2   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | A, B, C |
| 2.7pF  | 2R7   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | A, B, C |
| 3.0pF  | 3R0   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | A, B, C |
| 3.3pF  | 3R3   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | A, B, C |
| 3.9pF  | 3R9   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | A, B, C |
| 4.0pF  | 4R0   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | A, B, C |
| 4.7pF  | 4R7   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | A, B, C |
| 5.0pF  | 5R0   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | A, B, C |
| 5.6pF  | 5R6   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | B, C, D |
| 6.0pF  | 6R0   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | B, C, D |
| 6.8pF  | 6R8   | V    |      | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | B, C, D |
| 7.0pF  | 7R0   | V    |      | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | B, C, D |
| 8.0pF  | 8R0   | V    |      | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | B, C, D |
| 8.2pF  | 8R2   | V    |      | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | B, C, D |
| 9.0pF  | 9R0   | V    |      | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | B, C, D |
| 10pF   | 100   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 12pF   | 120   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 15pF   | 150   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 18pF   | 180   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 20pF   | 200   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 22pF   | 220   | V    | V    | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 24pF   | 240   |      |      | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 27pF   | 270   |      |      | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 30pF   | 300   |      |      | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 33pF   | 330   |      |      | L   | L    | L   | L    | L   | L    | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 36pF   | 360   |      |      |     |      |     |      |     |      | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 39pF   | 390   |      |      |     |      |     |      |     |      | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 43pF   | 430   |      |      |     |      |     |      |     |      | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 47pF   | 470   |      |      |     |      |     |      |     |      | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 56pF   | 560   |      |      |     |      |     |      |     |      | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 68pF   | 680   |      |      |     |      |     |      |     |      | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 82pF   | 820   |      |      |     |      |     |      |     |      | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 100pF  | 101   |      |      |     |      |     |      |     |      | N   | N    | N    | N    | S   | S    | S    | S    | T   | T    | T    | T    | J    | J    | J    | G   | G    | G         | G    | G    | G    | G       | F, G, J |
| 120pF  | 120   |      |      |     |      |     |      |     |      |     |      |      |      | S   | S    |      |      | T   | T    | T    |      |      |      |      | G   | G    | G         | G    | G    | G    | F, G, J |         |
| 150pF  | 150   |      |      |     |      |     |      |     |      |     |      |      |      | S   | S    |      |      | T   | T    | T    |      |      |      |      | G   | G    | G         | G    | G    | G    | F, G, J |         |
| 180pF  | 180   |      |      |     |      |     |      |     |      |     |      |      |      | S   | S    |      |      | T   | T    | T    |      |      |      |      | G   | G    | G         | G    | G    | G    | F, G, J |         |
| 220pF  | 221   |      |      |     |      |     |      |     |      |     |      |      |      | S   | S    |      |      | T   | T    | T    |      |      |      |      | G   | G    | G         | G    | G    | G    | F, G, J |         |
| 270pF  | 271   |      |      |     |      |     |      |     |      |     |      |      |      |     |      |      |      |     |      |      |      |      |      |      |     | G    | G         | G    | G    | G    | F, G, J |         |
| 330pF  | 331   |      |      |     |      |     |      |     |      |     |      |      |      |     |      |      |      |     |      |      |      |      |      |      |     | G    | G         | G    | G    | G    | F, G, J |         |
| 390pF  | 391   |      |      |     |      |     |      |     |      |     |      |      |      |     |      |      |      |     |      |      |      |      |      |      |     | G    | G         | G    | G    | G    | F, G, J |         |
| 470pF  | 471   |      |      |     |      |     |      |     |      |     |      |      |      |     |      |      |      |     |      |      |      |      |      |      |     | G    | G         | G    | G    | G    | F, G, J |         |
| 560pF  | 561   |      |      |     |      |     |      |     |      |     |      |      |      |     |      |      |      |     |      |      |      |      |      |      |     | G    | G         | G    | G    | G    | F, G, J |         |
| 680pF  | 681   |      |      |     |      |     |      |     |      |     |      |      |      |     |      |      |      |     |      |      |      |      |      |      |     | G    | G         | G    | G    | G    | F, G, J |         |
| 820pF  | 821   |      |      |     |      |     |      |     |      |     |      |      |      |     |      |      |      |     |      |      |      |      |      |      |     | G    | G         | G    | G    | G    | F, G, J |         |
| 1000pF | 102   |      |      |     |      |     |      |     |      |     |      |      |      |     |      |      |      |     |      |      |      |      |      |      |     | G    | G         | G    | G    | G    | F, G, J |         |

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

MLCC

Chip R

Coil

## General purpose capacitor series

### FEATURES

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

### APPLICATION

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

### PART NUMBER

| FN                              | 21   | X   | 471  | K  | 500  | P   | X                               | G                        |
|---------------------------------|--|---|--|--|--|---|---------------------------------|--------------------------|
| PDC Family                      | Size   | Dielectric  | Capacitance  | Tolerance  | Rated voltage  | Packaging   | Thickness                       | Control Code             |
| General Purpose product ≤ 50Vdc | <b>03</b> 0201 (0603)<br><b>15</b> 0402 (1005)<br><b>18</b> 0603 (1608)<br><b>21</b> 0805 (2012)<br><b>31</b> 1206 (3216)<br><b>32</b> 1210 (3225)<br><b>42</b> 1808 (4520)<br><b>43</b> 1812 (4532)<br><b>46</b> 1825 (4563)<br><b>52</b> 2211 (5728)<br><b>55</b> 2220 (5750)<br><b>56</b> 2225 (5763) | <b>N</b> COG(NPO)<br><b>X</b> X7R<br><b>B</b> X5R<br><b>F</b> Y5V | <b>102</b> =10x10 <sup>Λ</sup> 2<br>=1000pF<br><b>100</b> =10x10 <sup>Λ</sup> 0<br>=10pF | <b>J</b> =±5%<br><b>K</b> =±10%<br><b>M</b> =±20%<br><b>Z</b> =-20%~+80% | <b>6R3</b> =6.3V<br><b>100</b> =10V<br><b>160</b> =16V<br><b>250</b> =25V<br><b>500</b> =50V | <b>E</b> =<br>Tape and 7" Reel,<br>Embossed Tape<br><b>P</b> =<br>Tape and 7" Reel,<br>Paper Tape<br><b>L</b> =<br>Tape and 13"<br>Reel, Embossed<br><b>G</b> =<br>Tape and 13" Reel,<br>Paper Tape | Reference Thickness Description | <b>G</b> =RoHS Compliant |

### GENERAL ELECTRICAL DATA

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

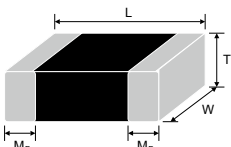
#### X7R/X5R

| 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%    | ---                                       |
| 35V           | ≤7%    | ---                                       |
|               | ≤5.0%  | ≤7% 0402≥0.047μF; 0603≥0.1μF; 0805≥0.33μF |
| 25V           | ≤5.0%  | ≤9% 0402≥0.068μF; 0603≥0.47μF             |
|               | ≤7.0%  | ≤9% 0402≥0.068μF; 0603≥0.68μF             |
| 16V (C<1.0μF) | ≤7.0%  | ≤12.5% 0402≥0.22μF                        |
|               | ≤12.5% | ≤20% 0402≥0.47μF                          |
| 10V           | ≤12.5% | ≤20% 0402≥0.47μF                          |
| 6.3V          | ≤20%   | ---                                       |

### DIMENSIONS



| Size inch (mm) | L (mm)    | W (mm)    | T (mm) code                     | M <sub>B</sub> min (mm) |
|----------------|-----------|-----------|---------------------------------|-------------------------|
| 0201 (0603)    | 0.60±0.03 | 0.30±0.03 |                                 | 0.15±0.05               |
| 0402 (1005)    | 1.00±0.10 | 0.50±0.10 |                                 | 0.25+0.05/-0.10         |
| 0603 (1608)    | 1.60±0.15 | 0.80±0.15 |                                 | 0.40±0.15               |
| 0805 (2012)    | 2.10±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   | B   |
| 0.33μF  | 334  |      | L    |     |     |     |     | N    | N   |     |     |     |      | B   | B   | B   | B   |
| 0.39μF  | 394  |      |      |     |     |     |     |      | N   |     |     |     |      |     | B   | B   | B   |
| 0.47μF  | 474  | L    | L    |     |     |     |     | N    | N   | K   | K   | K   |      | B   | B   | B   | B   |
| 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   |

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# Packaging Dimension and Quantity

| Size        | Thickness(mm)/Symbol | Symbol | Paper tape |          | Plastic tape |          | Tray packaged<br>(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      |              |          |                             |
|             | 0.50±0.05            | N      | 10k        | 50K      |              |          |                             |
| 0402 (1005) | 0.50 +0.02/-0.05     | Q      | 10k        | 50K      |              |          |                             |
|             | 0.50±0.20            | K      | 10k        |          |              |          |                             |
| 0603 (1608) | 0.50±0.10            | U      | 4k         |          |              |          |                             |
|             | 0.80±0.07            | S      | 4k         | 15k      |              |          |                             |
|             | 0.80±0.15/-0.10      | B      | 4k         | 15k      |              |          |                             |
| 0805 (2012) | 0.50±0.10            | U      | 4k         | 15k      |              |          |                             |
|             | 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      |                             |
| 1206 (3216) | 0.80±0.10            | X      | 4k         | 15k      |              |          |                             |
|             | 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       |                             |
| 1210 (3225) | 0.85±0.10            | T      |            |          | 4k           | 10k      |                             |
|             | 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           | -        |                             |
|             | 1.25±0.10            | C      |            |          | 2k           | 10k      |                             |
| 1808 (4520) | 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            |

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Prosperity Dielectrics Co., Ltd.

## ■ Sales offices

**台灣營業處 Taiwan Sales Office**  
**總公司營業處 Sales Office - Headquarter**  
32668 桃園市楊梅區高獅路 566-1 號  
No. 566-1, Kao-Shi Rd., Yangmei,  
Taoyuan 32668, Taiwan  
Tel: +886-3-475-3355  
Fax: +886-3-485-4959  
E-mail: service@pdc.com.tw

**桃園營業處 Sales Office - Tao Yuan**  
33860 桃園市蘆竹區南山路二段 220-1 號  
No. 220-1, Sec. 2, Nanshan Rd., Lujhu,  
Taoyuan 33860, Taiwan  
Tel: +886-3-322-4471  
Fax: +886-3-322-9671  
E-mail: service@pdc.com.tw  
service-powder@pdc.com.tw

**中國營業處 China Sales Office**  
**東莞營業處 Sales Office - Dong Guan, China**  
523799 中國廣東省東莞市大朗鎮  
犀牛陂象山工業區美景西路 638 號  
No. 638, Mei Jing West Road Xiniupo  
Administrative Zone Dalang Town,  
Dong Guan City, Guangdong Province, China  
Tel: +86-769-8555-0979  
Fax: +86-769-8555-0972  
E-mail: service@pdc.com.tw

## ■ Plants

**楊梅廠 (MLCC) Yang Mei Plant**  
32668 桃園市楊梅區高獅路 566-1 號  
No. 566-1, Kaoshi Rd., Yangmei,  
Taoyuan 32668, Taiwan  
Tel: +886-3-475-3355  
Fax: +886-3-485-4959

**桃園廠 (Chip-R, Powder) Tao Yuan Plant**  
33860 桃園市蘆竹區南山路二段 220-1 號  
No. 220-1, Sec. 2, Nanshan Rd., Lujhu,  
Taoyuan 33860, Taiwan  
Tel: +886-3-322-4471  
Fax: +886-3-322-9671

**吳江廠 (Powder) Wu Jiang Plant**  
215200 中國江蘇省吳江市連東經濟開發區  
龐金路 2588 路  
No.2588, Pangjin Rd., Economic Development Zone,  
Wujiang, Jiangsu 215200  
Tel: +86-512-6300-8899  
Fax: +86-512-6300-9988

**永州廠 (Coil) Yong Zhou Plant**  
425000 中國湖南省永州市冷水灘區鳳凰園  
陶源西路 136 號  
No.136, Taoyuan West Road,  
Phoenix Industrial Park, Lengshuitan District,  
Yongzhou City, Hunan Province, China 42500  
Tel: +86-746-8610-180  
Fax: +86-746-8610-616

**深圳廠 (Molding) Shen Zhen Plant**  
518104 中國廣東省深圳市寶安區  
沙井街道步涌大興一路 16 號  
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