

# Safety Chip Capacitors



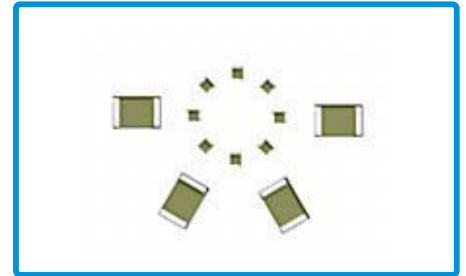
**MSC Series**  
(X1Y2/X2Y3)

**MERITEK**

## FEATURES

- High reliability and stability
- Small size and high capacitance
- RoHS compliant
- Safety standard approval by UL60950

UL No. E342565



MERITEK MSC series safety Chip Capacitors are designed for surge or lightning protection in across the line and line bypass applications, such as telephone, computer network, modem, and other electronic equipments.

## SPECIFICATIONS

|   |   |              |  |                |
|---|---|--------------|--|----------------|
| <b>Dielectric</b>                                     | NPO   |              | X7R                                      |                |
| <b>Size</b>   | 1808, 1812  |              | 1808, 1812, 2211                         |                |
| <b>Rated voltage (WVDC)</b>                           | 250Vac  |              | 250Vac                                   |                |
| <b>Capacitance range*</b>                             | X1Y2 Class  | 3pF ~ 470pF  | X1Y2 Class                               | 100pF ~ 2200pF |
|   | X2Y3 Class  | 3pF ~ 1000pF | X2Y3 Class                               | 150pF ~ 4700pF |
| <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%), K (±10%), M (±20%)              |                |
| <b>Tan δ*</b>   | Cap<30pF : D.F≤1/(400+20C)<br>Cap≥30pF : D.F≤0.10%  |              | ≤2.5%                                    |                |
| <b>Insulation resistance at 500Vdc for 60 seconds</b> | ≥100GΩ or R·C≥1000 whichever is smaller   |              | ≥10GΩ or R·C≥500Ω·F whichever is smaller |                |
| <b>Operating temperature</b>                          | -55 to +125°C   |              |  |                |
| <b>Capacitance characteristic</b>                     | ±30ppm / °C   |              | ±15%                                     |                |
| <b>Termination</b>                                    | Ag/Ni/Sn (lead-free termination)  |              |  |                |

\* NPO: Apply 1.0±0.2Vrms, 1.0MHz±10%, at 25°C ambient temperature

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

## PART NUMBERING SYSTEM

| Meritek Series | <b>MSC</b>   | <b>08</b> | <b>X</b>  | <b>101</b> | <b>K</b>  | <b>302</b> |      |           |      |           |      |           |      |      |    |     |    |     |     |      |    |        |       |          |  |  |
|----------------|--|-----------|-----------|------------|-----------|------------|------|-----------|------|-----------|------|-----------|------|------|----|-----|----|-----|-----|------|----|--------|-------|----------|--|--|
| Size           | <table border="1"> <tr> <th>Code</th> <th>08</th> <th>12</th> <th>21</th> </tr> <tr> <td></td> <td>1808</td> <td>1812</td> <td>2211</td> </tr> </table>  |           | Code      | 08         | 12        | 21         |      | 1808      | 1812 | 2211      |      |           |      |      |    |     |    |     |     |      |    |        |       |          |  |  |
| Code           | 08   | 12        | 21        |            |           |            |      |           |      |           |      |           |      |      |    |     |    |     |     |      |    |        |       |          |  |  |
|                | 1808   | 1812      | 2211      |            |           |            |      |           |      |           |      |           |      |      |    |     |    |     |     |      |    |        |       |          |  |  |
| Dielectric     | <table border="1"> <tr> <th>CODE</th> <th>N</th> <th>X</th> </tr> <tr> <td></td> <td>NPO</td> <td>X7R</td> </tr> </table>  |           | CODE      | N          | X         |            | NPO  | X7R       |      |           |      |           |      |      |    |     |    |     |     |      |    |        |       |          |  |  |
| CODE           | N  | X         |           |            |           |            |      |           |      |           |      |           |      |      |    |     |    |     |     |      |    |        |       |          |  |  |
|                | NPO  | X7R       |           |            |           |            |      |           |      |           |      |           |      |      |    |     |    |     |     |      |    |        |       |          |  |  |
| Capacitance    | <table border="1"> <tr> <th>CODE</th> <th>8R2</th> <th>101</th> <th>102</th> <th>152</th> </tr> <tr> <td>pF</td> <td>8.2</td> <td>100</td> <td>1000</td> <td>1500</td> </tr> <tr> <td>nF</td> <td>--</td> <td>.1</td> <td>1</td> <td>1.5</td> </tr> <tr> <td>μF</td> <td>--</td> <td>0.0001</td> <td>0.001</td> <td>0.0015</td> </tr> </table> |           |           |            | CODE      | 8R2        | 101  | 102       | 152  | pF        | 8.2  | 100       | 1000 | 1500 | nF | --  | .1 | 1   | 1.5 | μF   | -- | 0.0001 | 0.001 | 0.0015   |  |  |
| CODE           | 8R2  | 101       | 102       | 152        |           |            |      |           |      |           |      |           |      |      |    |     |    |     |     |      |    |        |       |          |  |  |
| pF             | 8.2  | 100       | 1000      | 1500       |           |            |      |           |      |           |      |           |      |      |    |     |    |     |     |      |    |        |       |          |  |  |
| nF             | --   | .1        | 1         | 1.5        |           |            |      |           |      |           |      |           |      |      |    |     |    |     |     |      |    |        |       |          |  |  |
| μF             | --   | 0.0001    | 0.001     | 0.0015     |           |            |      |           |      |           |      |           |      |      |    |     |    |     |     |      |    |        |       |          |  |  |
| Tolerance      | <table border="1"> <tr> <th>Code</th> <th>Tolerance</th> <th>Code</th> <th>Tolerance</th> <th>Code</th> <th>Tolerance</th> </tr> <tr> <td>F</td> <td>±1%</td> <td>G</td> <td>±2%</td> <td>J</td> <td>±5%</td> </tr> <tr> <td>K</td> <td>±10%</td> <td>M</td> <td>±20%</td> <td>Z</td> <td>+80/-20%</td> </tr> </table>                         |           |           |            |           |            | Code | Tolerance | Code | Tolerance | Code | Tolerance | F    | ±1%  | G  | ±2% | J  | ±5% | K   | ±10% | M  | ±20%   | Z     | +80/-20% |  |  |
| Code           | Tolerance  | Code      | Tolerance | Code       | Tolerance |            |      |           |      |           |      |           |      |      |    |     |    |     |     |      |    |        |       |          |  |  |
| F              | ±1%  | G         | ±2%       | J          | ±5%       |            |      |           |      |           |      |           |      |      |    |     |    |     |     |      |    |        |       |          |  |  |
| K              | ±10%   | M         | ±20%      | Z          | +80/-20%  |            |      |           |      |           |      |           |      |      |    |     |    |     |     |      |    |        |       |          |  |  |
| Rated Voltage  | <table border="1"> <tr> <th>Code</th> <th>302</th> <th>502</th> </tr> <tr> <td></td> <td>X2Y3</td> <td>X1Y2</td> </tr> </table>  |           | Code      | 302        | 502       |            | X2Y3 | X1Y2      |      |           |      |           |      |      |    |     |    |     |     |      |    |        |       |          |  |  |
| Code           | 302  | 502       |           |            |           |            |      |           |      |           |      |           |      |      |    |     |    |     |     |      |    |        |       |          |  |  |
|                | X2Y3   | X1Y2      |           |            |           |            |      |           |      |           |      |           |      |      |    |     |    |     |     |      |    |        |       |          |  |  |

# Safety Chip Capacitors

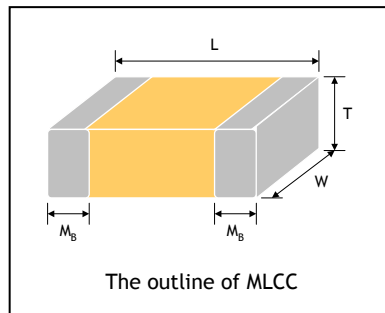


MSC Series  
(X1Y2/X2Y3)

MERITEK

## DIMENSIONS

| Size<br>Inch (mm) | L (mm)    | W (mm)    | Tmax (mm) | M <sub>b</sub> min (mm) |
|-------------------|-----------|-----------|-----------|-------------------------|
| 1808 (4520)       | 4.60±0.30 | 2.00±0.20 | 2.20      | 0.26                    |
| 1812 (4532)       | 4.60±0.30 | 3.20±0.30 | 2.80      | 0.26                    |
| 2211 (5728)       | 5.70±0.40 | 2.80±0.30 | 2.80      | 0.30                    |



## CAPACITANCE RANGE

### X1Y2 Class

| SIZE          | 1808        | 1812   | 2211   |
|---------------|-------------|--------|--------|
| DIELECTRIC    | NPO         | X7R    | X7R    |
| RATED VOLTAGE | 250Vac      | 250Vac | 250Vac |
| CERTIFICATED  | UL          | UL     | UL     |
| CLASS         | X1Y2        | X1Y2   | X1Y2   |
| Capacitance   | 3.0pF (3R0) |        |        |
|               | 3.3pF (3R3) |        |        |
|               | 3.9pF (3R9) |        |        |
|               | 4.7pF (4R7) |        |        |
|               | 5.0pF (5R0) |        |        |
|               | 5.6pF (5R6) |        |        |
|               | 6.8pF (6R8) |        |        |
|               | 8.2pF (8R2) |        |        |
|               | 10pF (100)  |        |        |
|               | 12pF (120)  |        |        |
|               | 15pF (150)  |        |        |
|               | 18pF (180)  |        |        |
|               | 22pF (220)  |        |        |
|               | 27pF (270)  |        |        |
|               | 33pF (330)  |        |        |
|               | 39pF (390)  |        |        |
|               | 47pF (470)  |        |        |
|               | 56pF (560)  |        |        |
|               | 68pF (680)  |        |        |
|               | 82pF (820)  |        |        |
|               | 100pF (101) |        |        |
|               | 120pF (121) |        |        |
|               | 130pF (131) |        |        |
|               | 150pF (151) |        |        |
|               | 180pF (181) |        |        |
|               | 220pF (221) |        |        |
|               | 270pF (271) |        |        |
|               | 330pF (331) |        |        |
|               | 390pF (391) |        |        |
|               | 470pF (471) |        |        |
| 560pF (561)   |             |        |        |
| 680pF (681)   |             |        |        |
| 820pF (821)   |             |        |        |
| 1,000pF (102) |             |        |        |
| 1,200pF (122) |             |        |        |
| 1,500pF (152) |             |        |        |
| 1,800pF (182) |             |        |        |
| 2,200pF (222) |             |        |        |



### CAPACITANCE RANGE

#### X2Y3 Class

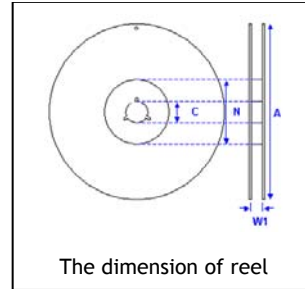
| SIZE          | 1808        | 1808    | 1812    |
|---------------|-------------|---------|---------|
| DIELECTRIC    | NPO         | X7R     | X7R     |
| RATED VOLTAGE | 250Vac      | 250Vac  | 250Vac  |
| CERTIFICATED  | .....UL     | .....UL | .....UL |
| CLASS         | X2Y3        | X2Y3    | X2Y3    |
| Capacitance   | 3.0pF (3R0) |         |         |
|               | 3.3pF (3R3) |         |         |
|               | 3.9pF (3R9) |         |         |
|               | 4.7pF (4R7) |         |         |
|               | 5.0pF (5R0) |         |         |
|               | 5.6pF (5R6) |         |         |
|               | 6.8pF (6R8) |         |         |
|               | 8.2pF (8R2) |         |         |
|               | 10pF (100)  |         |         |
|               | 12pF (120)  |         |         |
|               | 15pF (150)  |         |         |
|               | 18pF (180)  |         |         |
|               | 22pF (220)  |         |         |
|               | 27pF (270)  |         |         |
|               | 33pF (330)  |         |         |
|               | 39pF (390)  |         |         |
|               | 47pF (470)  |         |         |
|               | 56pF (560)  |         |         |
|               | 68pF (680)  |         |         |
|               | 82pF (820)  |         |         |
|               | 100pF (101) |         |         |
|               | 120pF (121) |         |         |
|               | 130pF (131) |         |         |
|               | 150pF (151) |         |         |
|               | 180pF (181) |         |         |
|               | 220pF (221) |         |         |
|               | 270pF (271) |         |         |
|               | 300pF (301) |         |         |
|               | 330pF (331) |         |         |
|               | 390pF (391) |         |         |
|               | 470pF (471) |         |         |
|               | 560pF (561) |         |         |
|               | 680pF (681) |         |         |
|               | 820pF (821) |         |         |
| 1,000pF (102) |             |         |         |
| 1,200pF (122) |             |         |         |
| 1,500pF (152) |             |         |         |
| 1,800pF (182) |             |         |         |
| 2,200pF (222) |             |         |         |
| 2,700pF (272) |             |         |         |
| 3,300pF (332) |             |         |         |
| 3,900pF (392) |             |         |         |
| 4,700pF (472) |             |         |         |



### PACKAGE DIMENSIONS

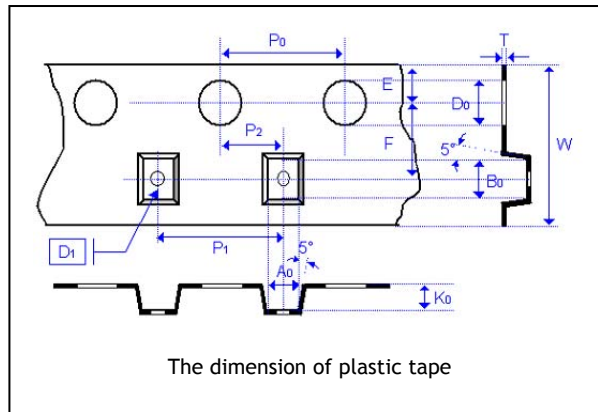
| Size        | Thickness (mm) | Plastic tape |          |
|-------------|----------------|--------------|----------|
|             |                | 7" reel      | 13" reel |
| 1808 (4520) | 1.25±0.10      | 2k           | -        |
|             | 1.40±0.15      | 2k           | -        |
|             | 1.60±0.20      | 2k           | -        |
|             | 2.00±0.20      | 1k           | -        |
| 1812 (4532) | 1.25±0.10      | 1k           | -        |
|             | 1.60±0.20      | 1k           | -        |
|             | 2.00±0.20      | 1k           | -        |
|             | 2.50±0.30      | 0.5k         | 3k       |
| 2211 (5728) | 1.60±0.20      | 1k           | -        |
|             | 2.00±0.20      | 1k           | -        |
|             | 2.50±0.30      | 0.5k         | -        |

| Size           | 1808, 1812, 2211 |
|----------------|------------------|
| Reel size      | 7"               |
| C              | 13.0+0.5/-0.2    |
| W <sub>1</sub> | 12.4+2.0/-0      |
| A              | 178.0±0.10       |
| N              | 80.0±1.0         |



Unit: pieces

### EMBOSSED TAPE DIMENSIONS



The dimension of plastic tape

| Size              | 1808         |              | 1812         |              | 2211         |              |
|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Chip Thickness    | 1.25±0.10    |              | 1.25±0.10    |              | 1.60±0.20    | 2.50±0.30    |
|                   | 1.40±0.15    | 2.00±0.20    | 1.60±0.20    | 2.50±0.30    | 2.00±0.20    |              |
|                   | 1.60±0.20    |              | 2.00±0.20    |              |              |              |
| A <sub>0</sub>    | <2.50        | <2.50        | <3.90        | <3.90        | <3.30        | <3.30        |
| B <sub>0</sub>    | <5.30        | <5.30        | <5.30        | <5.30        | <6.50        | <6.50        |
| T                 | 0.25±0.05    | 0.25±0.05    | 0.25±0.05    | 0.25±0.05    | 0.30±0.10    | 0.30±0.10    |
| K <sub>0</sub>    | <2.50        | <2.50        | <2.50        | <3.00        | <2.50        | <3.10        |
| W                 | 12.0±0.20    | 12.0±0.20    | 12.0±0.20    | 12.0±0.20    | 12.0±0.20    | 12.0±0.20    |
| P <sub>0</sub>    | 4.00±0.10    | 4.00±0.10    | 4.00±0.10    | 4.00±0.10    | 4.00±0.10    | 4.00±0.10    |
| 10xP <sub>0</sub> | 40.0±0.20    | 40.0±0.20    | 40.0±0.20    | 40.0±0.20    | 40.0±0.20    | 40.0±0.20    |
| P <sub>1</sub>    | 4.00±0.10    | 4.00±0.10    | 8.00±0.10    | 8.00±0.10    | 8.00±0.10    | 8.00±0.10    |
| P <sub>2</sub>    | 2.00±0.05    | 2.00±0.05    | 2.00±0.05    | 2.00±0.05    | 2.00±0.05    | 2.00±0.05    |
| D <sub>0</sub>    | 1.50+0.10/-0 | 1.50+0.10/-0 | 1.50±0.10/-0 | 1.50+0.10/-0 | 1.50+0.10/-0 | 1.50+0.10/-0 |
| D <sub>1</sub>    | 1.50±0.10    | 1.50±0.10    | 1.50±0.10    | 1.50+/-0.10  | 1.50±0.10    | 1.50±0.10    |
| E                 | 1.75±0.10    | 1.75±0.10    | 1.75±0.10    | 1.75+/-0.1   | 1.75±0.1     | 1.75±0.10    |
| F                 | 5.50±0.05    | 5.50±0.05    | 5.50±0.05    | 5.50+/-0.05  | 5.50±0.05    | 5.50±0.05    |