Safety Certified capacitors

Syfer Technology's Safety Certified capacitors comply with international UL and TÜV specifications to offer designers the option of using a surface mount ceramic multilayer capacitor to replace leaded film types. Offering the benefits of simple pick-and-place assembly, reduced board space required and lower profile, they are also available in a FlexiCap™ version to reduce the risk of mechanical cracking. Syfer's high voltage capacitor expertise means the range offers among the highest range available of capacitance values in certain case sizes. Applications include: modems, AC-DC power supplies and where lightning strike or other voltage transients represent a threat to electronic equipment.

- Surface mount multilayer ceramic capacitors
- Meets Class Y2/X1, Y3/X2 and X2 requirements
- Approved for mains ac voltages, up to 250Vac
- Approved by UL and TÜV
- Sizes 1808, 1812, 2211, 2215 and 2220
- Smaller sizes suitable for use in equipment certified to EN60950

Safety Certified capacitors

Certification Chart

<table>
<thead>
<tr>
<th>CHIP SIZE</th>
<th>DIELECTRIC</th>
<th>CAP RANGE</th>
<th>SYFER FAMILY CODE</th>
<th>CLASSIFICATION</th>
<th>APPROVAL SPECIFICATION</th>
<th>APPROVAL BODY</th>
</tr>
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<tbody>
<tr>
<td>1808</td>
<td>COG/NP0</td>
<td>4.7pF to 1.5nF</td>
<td>Y3/X2, NWGQ2, NWGQ8</td>
<td>B16</td>
<td>IECS0384-14-2005, 1814-2005</td>
<td>TÜV, UL</td>
</tr>
<tr>
<td>1808</td>
<td>X7R</td>
<td>150pF to 2.2nF</td>
<td>Y3/X2, NWGQ2, NWGQ8</td>
<td>B16</td>
<td>IECS0384-14-2005, 1814-2005</td>
<td>TÜV, UL</td>
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<tr>
<td>1808</td>
<td>COG/NP0</td>
<td>4.7pF to 390pF</td>
<td>Y2/X1, NWGQ2, NWGQ8</td>
<td>B16</td>
<td>IECS0384-14-2005, 1814-2005</td>
<td>TÜV, UL</td>
</tr>
<tr>
<td>1808</td>
<td>X7R</td>
<td>150pF to 1nF</td>
<td>Y2/X1, NWGQ2, NWGQ8</td>
<td>B16</td>
<td>IECS0384-14-2005, 1814-2005</td>
<td>TÜV, UL</td>
</tr>
<tr>
<td>1812</td>
<td>COG/NP0</td>
<td>4.7pF to 1nF</td>
<td>Y2/X1, NWGQ2, NWGQ8</td>
<td>B16</td>
<td>IECS0384-14-2005, 1814-2005</td>
<td>TÜV, UL</td>
</tr>
<tr>
<td>1812</td>
<td>X7R</td>
<td>150pF to 1nF</td>
<td>Y2/X1, NWGQ2, NWGQ8</td>
<td>B16</td>
<td>IECS0384-14-2005, 1814-2005</td>
<td>TÜV, UL</td>
</tr>
<tr>
<td>2211</td>
<td>COG/NP0</td>
<td>4.7pF to 1nF</td>
<td>Y2/X1, NWGQ2, NWGQ8</td>
<td>B16</td>
<td>IECS0384-14-2005, 1814-2005</td>
<td>TÜV, UL</td>
</tr>
<tr>
<td>2211</td>
<td>X7R</td>
<td>150pF to 1nF</td>
<td>Y2/X1, NWGQ2, NWGQ8</td>
<td>B16</td>
<td>IECS0384-14-2005, 1814-2005</td>
<td>TÜV, UL</td>
</tr>
<tr>
<td>2215</td>
<td>COG/NP0</td>
<td>820pF to 10nF</td>
<td>Y2/X1, NWGQ2, NWGQ8</td>
<td>B16</td>
<td>IECS0384-14-2005, 1814-2005</td>
<td>TÜV, UL</td>
</tr>
<tr>
<td>2215</td>
<td>X7R</td>
<td>2.7nF to 3.3nF</td>
<td>Y2/X1, NWGQ2, NWGQ8</td>
<td>B16</td>
<td>IECS0384-14-2005, 1814-2005</td>
<td>TÜV, UL</td>
</tr>
<tr>
<td>2220</td>
<td>X7R</td>
<td>150pF to 4.7nF</td>
<td>Y2/X1, NWGQ2, NWGQ8</td>
<td>B16</td>
<td>IECS0384-14-2005, 1814-2005</td>
<td>TÜV, UL</td>
</tr>
<tr>
<td>2220</td>
<td>X7R</td>
<td>150pF to 10nF</td>
<td>Y2/X1, NWGQ2, NWGQ8</td>
<td>B16</td>
<td>IECS0384-14-2005, 1814-2005</td>
<td>TÜV, UL</td>
</tr>
</tbody>
</table>

Notes
- Termination Availability
  (1) Silver base with Nickel Barrier (100% Matte Tin Plating). RoHS compliant.
  (2) Y: FlexiCap™ termination base with Nickel Barrier (100% Tin Plating). RoHS compliant.
  H: FlexiCap™ termination base with Nickel Barrier (Tin Lead plating with min 10% Lead).
  (2) A: Silver base with Nickel Barrier (Tin/Lead Plating with min 10% Lead).
- Unmarked capacitors also available as released in accordance with approval specifications. Family code SY2 applies.
- Unmarked capacitors also available as released in accordance with approval specifications. Family code SP1 applies.

Class Rated voltage Impulse voltage Insulation bridging May be used in primary circuit
Y1 250Vac 8000V Double or reinforced Line to protective earth
Y2 250Vac 5000V Basic or supplementary* Line to protective earth
Y3 250Vac None Basic or supplementary -
Y4 150Vac 2500V Basic or supplementary* Line to protective earth
X1 250Vac 4000V - Line to line
X2 250Vac 2500V - Line to line
X3 250Vac None - Line to line

* 2 x Y2 or Y4 rated may bridge double or reinforced insulation when used in series.
### Safety Certified capacitors

**Ordering information**

#### 250Vac Non Safety Rated AC capacitors

Industry wide standard multilayer ceramic capacitors are supplied with a DC rating only. For AC use, Surge and Safety capacitors with an AC rating of 250Vac have been available but the capacitance range is limited as a result of the strict impulse and VP requirements in the international standards. Syfer Technology have developed a range which provides a solution for use at up to 250Vac 60Hz continuous use and provides for non-safety-critical applications where extended capacitance ranges are required.

**Capacitance range**

Case sizes 808S to 2220 are available in both X7R and C0G/NP0 dielectrics with capacitances of up to ±1200pF. The capacitance ranges are divided into four groups which are based on the voltage coefficient of capacitance, C0G/NP0 which has negligible capacitance shift with applied voltage and three subgroups of X7R. Type A with ±30% maximum capacitance shift 0V-240V, Type B with +30% to -50% maximum capacitance shift 0V-240V and Type C with ±30 to -80% maximum capacitance shift 0V to 240V.

#### Ordering information - 250Vac Non Safety Rated AC capacitors

<table>
<thead>
<tr>
<th>Chip size</th>
<th>Termination</th>
<th>Voltage</th>
<th>Capacitance in picofarads (pF)</th>
<th>Capacitance Tolerance</th>
<th>Dielectric codes</th>
<th>Packaging</th>
<th>Suffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>0805</td>
<td>J</td>
<td>A25</td>
<td>0102</td>
<td>J</td>
<td>C</td>
<td>T</td>
<td>SP</td>
</tr>
<tr>
<td>1.0µF - 4.0µF</td>
<td>±10%</td>
<td>±10%</td>
<td>C = ±0.25pF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0102</td>
<td>J</td>
<td>A25</td>
<td>0102</td>
<td>J</td>
<td>C</td>
<td>T</td>
<td>SP</td>
</tr>
<tr>
<td>0.1µF - 2.2µF</td>
<td>±5%</td>
<td>±5%</td>
<td>F = ±0.1pF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0µF</td>
<td>J</td>
<td>A25</td>
<td>0102</td>
<td>J</td>
<td>C</td>
<td>T</td>
<td>SP</td>
</tr>
<tr>
<td>0.1µF - 2.2µF</td>
<td>±10%</td>
<td>±10%</td>
<td>G = ±0.2pF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:**

- Values <1pF in 0.1pF steps, above this values are E24 series
- Measurement conditions described in Syfer Application Notes E6013

### Ordering information - Safety Certified capacitors - Class PY2/SY2

<table>
<thead>
<tr>
<th>Chip size</th>
<th>Termination</th>
<th>Voltage</th>
<th>Capacitance in picofarads (pF)</th>
<th>Capacitance Tolerance</th>
<th>Dielectric codes</th>
<th>Packaging</th>
<th>Suffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>1808</td>
<td>J</td>
<td>A25</td>
<td>0102</td>
<td>J</td>
<td>C</td>
<td>T</td>
<td>SP</td>
</tr>
<tr>
<td>1812</td>
<td>J</td>
<td>A25</td>
<td>0102</td>
<td>J</td>
<td>C</td>
<td>T</td>
<td>SP</td>
</tr>
</tbody>
</table>

**Ordering information - Safety Certified capacitors - Class B16/B17 ranges**

<table>
<thead>
<tr>
<th>Chip size</th>
<th>Termination</th>
<th>Voltage</th>
<th>Capacitance in picofarads (pF)</th>
<th>Capacitance Tolerance</th>
<th>Dielectric codes</th>
<th>Packaging</th>
<th>Suffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>2220</td>
<td>J</td>
<td>A25</td>
<td>0102</td>
<td>J</td>
<td>C</td>
<td>T</td>
<td>B16</td>
</tr>
</tbody>
</table>

#### Ordering information - Safety Certified capacitors - Class SPU/SP ranges

<table>
<thead>
<tr>
<th>Chip size</th>
<th>Termination</th>
<th>Voltage</th>
<th>Capacitance in picofarads (pF)</th>
<th>Capacitance Tolerance</th>
<th>Dielectric codes</th>
<th>Packaging</th>
<th>Suffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>1808</td>
<td>J</td>
<td>A25</td>
<td>0102</td>
<td>J</td>
<td>C</td>
<td>T</td>
<td>SP</td>
</tr>
</tbody>
</table>

**Examples**

- **X7R A** (±30%):
  - X7R A 2211 J A25 0102 J X T B16
  - X7R A 2220 J A25 0102 J X T B17

- **X7R C** (±50%):
  - X7R C 2220 J A25 0102 J X T B16
  - X7R C 2220 J A25 0102 J X T B17

- **X7R B** (±100%):
  - X7R B 2220 J A25 0102 J X T B16
  - X7R B 2220 J A25 0102 J X T B17

**CHIPS**

- **0805**: 1000 pieces
- **1210**: 1000 pieces
- **1206**: 1000 pieces
- **1808**: 1000 pieces
- **1812**: 1000 pieces
- **2220**: 1000 pieces

**Packaging**

- **B = Bulk pack - tubs**
- **R = 330mm (13”) reel**
- **T = 178mm (7”) reel**
- **H = FlexiCap™ termination base with nickel barrier (100% matte tin plating) RoHS compliant.**
- **M = Bulk pack - tubs**
- **J = Nickel barrier**
- **A = FlexiCap™ termination base with nickel barrier (100% matte tin plating). RoHS compliant.**
- **R = 1000 pieces**
- **B = Bulk pack - tubs**
- **T = 178mm (7”) reel**

**Suffixes**

- **J = Nickel barrier**
- **Y = FlexiCap™ termination base with nickel barrier (100% matte tin plating). RoHS compliant.**
- **H = FlexiCap™ termination base with Ni barrier (Tin/lead plating with min. 10% lead).**
- **K = ±10%**
- **L = ±20%**
- **X = X7R**
- **C = ±0.25pF**
- **D = ±0.5pF**
- **E = ±1pF**
- **F = ±1%**
- **G = ±2%**
- **H = ±5%**
- **K = ±10%**
- **M = ±20%**
- **N = ±50%**
- **P = Surge Protection capacitors (marked and approved) SP = Surge Protection capacitors (un-marked parts are in accordance with, but not certified)**

**Dielectric codes**

- **C = C0G/NP0**
- **X = X7R**