HiT range

200°C MLC capacitors

Description

The HiT range of multilayer ceramic capacitors is suitable for a variety of high temperature applications including: oil exploration, geothermal, military, automotive under-hood and avionics. This range is manufactured to exacting standards using our unique screen printing process. This provides a high quality component suitable for demanding applications.

Specification

Capacitance Values

<table>
<thead>
<tr>
<th></th>
<th>C0G/NP0 (1B)</th>
<th>X7R (2R1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.9pF - 47nF</td>
<td>100pF - 4.7µF</td>
<td></td>
</tr>
</tbody>
</table>

Operating Temperature

-55°C to +200°C

Temperature Coefficient of Capacitance (Typical)

<table>
<thead>
<tr>
<th></th>
<th>C0G/NP0 (1B)</th>
<th>X7R (2R1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>±30ppm/°C to +125°C</td>
<td>±15% to +125°C</td>
<td></td>
</tr>
</tbody>
</table>

Dielectric Withstand Voltage

≤200V 2.5 times

>200V to <500V Rated voltage +250V

500V to <1kV 1.5 times

Insulation Resistance

Time constant (Ri x Cr) (whichever is the least)

25°C >100GΩ or 1000s

200°C >1GΩ or 10s

Ageing Rate

C0G/NP0 (1B) X7R (2R1) typically less than 2% per time decade

Termination Material

X7R (2R1) Sn over Ni termination

Sample kits available

Solderability


Lead Free Soldering

Pb Free. This range is fully compliant with the RoHS, REACH and WEEE directives and parts are compatible with lead free and high melting point solders. Standard finish is Sn plate over Ni undercoat.

Climatic Category

55/200/56

RoHS Compliant

Pb Free

Sn Finish

HiT range features

- 200°C operating temperature
- 0603 to 2220 chip sizes
- C0G/NP0 (1B) and X7R (2R1) dielectric options
- Capacitance range C0G/NP0 (1B) from 3.9pF up to 47nF
- Capacitance range X7R (2R1) from 100pF up to 4.7µF
- Voltage ratings from 10V to 630V
- RoHS compliant / Pb Free
- Sn over Ni termination
- Sample kits available

Dimensions

<table>
<thead>
<tr>
<th>Size</th>
<th>Length (L1)</th>
<th>Width (W)</th>
<th>Thickness (T)</th>
<th>Termination Band (L2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mm ~ inches</td>
<td>mm ~ inches</td>
<td>mm ~ inches</td>
<td>mm ~ inches</td>
</tr>
<tr>
<td>0603</td>
<td>1.6 ± 0.15</td>
<td>0.063 ± 0.006</td>
<td>0.80 ~ 0.032</td>
<td>0.20 ~ 0.004</td>
</tr>
<tr>
<td>0805</td>
<td>2.0 ± 0.20</td>
<td>0.079 ± 0.008</td>
<td>1.25 ~ 0.054</td>
<td>0.25 ~ 0.010</td>
</tr>
<tr>
<td>1206</td>
<td>3.2 ± 0.20</td>
<td>0.126 ± 0.008</td>
<td>1.60 ± 0.068</td>
<td>0.25 ~ 0.010</td>
</tr>
<tr>
<td>1210</td>
<td>3.2 ± 0.20</td>
<td>0.126 ± 0.008</td>
<td>2.50 ± 0.098</td>
<td>0.25 ~ 0.010</td>
</tr>
<tr>
<td>1808</td>
<td>4.5 ± 0.35</td>
<td>0.180 ± 0.014</td>
<td>2.0 ± 0.080</td>
<td>0.25 ~ 0.010</td>
</tr>
<tr>
<td>1812</td>
<td>4.5 ± 0.30</td>
<td>0.180 ± 0.012</td>
<td>3.2 ± 0.126</td>
<td>0.25 ~ 0.010</td>
</tr>
<tr>
<td>2220</td>
<td>5.7 ± 0.40</td>
<td>0.225 ± 0.016</td>
<td>5.0 ± 0.197</td>
<td>0.25 ~ 0.010</td>
</tr>
</tbody>
</table>

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**HiT range**

200°C MLC capacitors

### Typical Performance Data

#### TCC

- **Ultra Stable C0G/NP0 (1B) dielectric**
- **Stable X7R (2R1) dielectric**

#### VCC

- **Ultra Stable CDG/NP0 (1B) dielectric**

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#### df vs Temp.

- **Ultra Stable C0G/NP0 (1B) dielectric**
- **Stable X7R (2R1) dielectric**

#### Hot IR result

- **Ultra Stable CDG/NP0 (1B) dielectric**
- **Stable X7R (2R1) dielectric**

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Note: Data is typical only and does not constitute a specification. Knowles Precision Devices reserves the right to modify or substitute with equivalent parts that meet or exceed the specification.

VCC performance of X7R (1B) parts is design specific. Consult factory for more information.

COG/NP0 (1B) parts life tested at maximum rated voltage and temperature for 4000Hr duration.
## HiT range

### 200°C MLC capacitors

**Ultra Stable C0G/NP0 (1B) dielectric**

- ESR vs Frequency
  - Frequency (MHz) vs Impedance (Ohms)
  - Various capacitance values shown.

**Stable X7R (2R1) dielectric**

- ESR vs Frequency
  - Frequency (MHz) vs Impedance (Ohms)
  - Various capacitance values shown.

---

**Maximum capacitance values - HiT range - 200°C capacitors**

<table>
<thead>
<tr>
<th>Chip Size</th>
<th>Rated Voltage</th>
<th>C0G/NP0 (1B)</th>
<th>X7R (2R1)</th>
<th>C0G/NP0 (1B)</th>
<th>X7R (2R1)</th>
<th>C0G/NP0 (1B)</th>
<th>X7R (2R1)</th>
<th>C0G/NP0 (1B)</th>
<th>X7R (2R1)</th>
<th>C0G/NP0 (1B)</th>
<th>X7R (2R1)</th>
<th>C0G/NP0 (1B)</th>
<th>X7R (2R1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0603</td>
<td>Min Cap</td>
<td>3.9pF</td>
<td>100pF</td>
<td>4.7pF</td>
<td>100pF</td>
<td>10pF</td>
<td>100pF</td>
<td>22pF</td>
<td>100pF</td>
<td>22pF</td>
<td>100pF</td>
<td>47pF</td>
<td>100pF</td>
</tr>
<tr>
<td>10V</td>
<td>470pF</td>
<td>100pF</td>
<td>4.7pF</td>
<td>100pF</td>
<td>4.7pF</td>
<td>10pF</td>
<td>100pF</td>
<td>22pF</td>
<td>100pF</td>
<td>22pF</td>
<td>100pF</td>
<td>47pF</td>
<td>100pF</td>
</tr>
<tr>
<td>16V</td>
<td>470pF</td>
<td>100pF</td>
<td>1.8nF</td>
<td>220nF</td>
<td>3.9nF</td>
<td>820nF</td>
<td>820nF</td>
<td>8.2nF</td>
<td>220nF</td>
<td>3.9nF</td>
<td>820nF</td>
<td>8.2nF</td>
<td>220nF</td>
</tr>
<tr>
<td>25V</td>
<td>470pF</td>
<td>100pF</td>
<td>1.8nF</td>
<td>220nF</td>
<td>3.9nF</td>
<td>820nF</td>
<td>820nF</td>
<td>8.2nF</td>
<td>220nF</td>
<td>3.9nF</td>
<td>820nF</td>
<td>8.2nF</td>
<td>220nF</td>
</tr>
<tr>
<td>50V</td>
<td>470pF</td>
<td>100pF</td>
<td>1.8nF</td>
<td>220nF</td>
<td>3.9nF</td>
<td>820nF</td>
<td>820nF</td>
<td>8.2nF</td>
<td>220nF</td>
<td>3.9nF</td>
<td>820nF</td>
<td>8.2nF</td>
<td>220nF</td>
</tr>
<tr>
<td>100V</td>
<td>390pF</td>
<td>8.2nF</td>
<td>1.5nF</td>
<td>33nF</td>
<td>3.3nF</td>
<td>100nF</td>
<td>100nF</td>
<td>5.6nF</td>
<td>330nF</td>
<td>3.3nF</td>
<td>100nF</td>
<td>5.6nF</td>
<td>330nF</td>
</tr>
<tr>
<td>200V</td>
<td>180pF</td>
<td>8.2nF</td>
<td>1.5nF</td>
<td>33nF</td>
<td>3.3nF</td>
<td>100nF</td>
<td>100nF</td>
<td>5.6nF</td>
<td>330nF</td>
<td>3.3nF</td>
<td>100nF</td>
<td>5.6nF</td>
<td>330nF</td>
</tr>
<tr>
<td>250V</td>
<td>120pF</td>
<td>820pF</td>
<td>1.5nF</td>
<td>33nF</td>
<td>3.3nF</td>
<td>100nF</td>
<td>100nF</td>
<td>5.6nF</td>
<td>330nF</td>
<td>3.3nF</td>
<td>100nF</td>
<td>5.6nF</td>
<td>330nF</td>
</tr>
<tr>
<td>500V</td>
<td>100pF</td>
<td>270pF</td>
<td>1.5nF</td>
<td>33nF</td>
<td>3.3nF</td>
<td>100nF</td>
<td>100nF</td>
<td>5.6nF</td>
<td>330nF</td>
<td>3.3nF</td>
<td>100nF</td>
<td>5.6nF</td>
<td>330nF</td>
</tr>
<tr>
<td>630V</td>
<td>-</td>
<td>68pF</td>
<td>-</td>
<td>330pF</td>
<td>-</td>
<td>820pF</td>
<td>-</td>
<td>820pF</td>
<td>-</td>
<td>820pF</td>
<td>-</td>
<td>820pF</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>82pF</td>
<td>-</td>
<td>330pF</td>
<td>-</td>
<td>820pF</td>
<td>-</td>
<td>820pF</td>
<td>-</td>
<td>820pF</td>
<td>-</td>
<td>820pF</td>
<td>-</td>
</tr>
</tbody>
</table>

**Note:** Other capacitance values may become available, please contact the Sales Office if you need values other than those shown in the above table.

For dimensions and soldering information, please go to our website [www.knowlescapacitors.com](http://www.knowlescapacitors.com).

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**Taped quantities - HiT range - 200°C capacitors**

<table>
<thead>
<tr>
<th>Chip Size</th>
<th>0603</th>
<th>0805</th>
<th>1206</th>
<th>1210</th>
<th>1808</th>
<th>1812</th>
<th>2220</th>
</tr>
</thead>
<tbody>
<tr>
<td>7” Reel</td>
<td>4,000</td>
<td>3,000</td>
<td>2,500</td>
<td>2,000</td>
<td>1,500</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>13” Reel</td>
<td>16,000</td>
<td>12,000</td>
<td>10,000</td>
<td>8,000</td>
<td>6,000</td>
<td>2,000</td>
<td>2,000</td>
</tr>
</tbody>
</table>

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### Ordering information (Syfer Brand) - HiT range - 200°C 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</th>
<th>Packaging</th>
<th>Suffix Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>0603</td>
<td>J</td>
<td>010</td>
<td>10V</td>
<td>0.10pF &amp; &lt;1pF</td>
<td>COG/NP0 (1B)</td>
<td>H20</td>
<td></td>
</tr>
<tr>
<td>0805</td>
<td>J</td>
<td>016</td>
<td>16V</td>
<td>0.10pF &amp; &lt;1pF</td>
<td>COG/NP0 (1B)</td>
<td>H20</td>
<td></td>
</tr>
<tr>
<td>1206</td>
<td>J</td>
<td>025</td>
<td>25V</td>
<td>0.25pF</td>
<td>C</td>
<td>H20</td>
<td></td>
</tr>
<tr>
<td>1210</td>
<td>J</td>
<td>050</td>
<td>50V</td>
<td>0.50pF</td>
<td>D</td>
<td>H20</td>
<td></td>
</tr>
<tr>
<td>1808</td>
<td>J</td>
<td>100</td>
<td>100V</td>
<td>1.00pF</td>
<td>F</td>
<td>H20</td>
<td></td>
</tr>
<tr>
<td>1812</td>
<td>J</td>
<td>200</td>
<td>200V</td>
<td>2.00pF</td>
<td>G</td>
<td>H20</td>
<td></td>
</tr>
<tr>
<td>2220</td>
<td>J</td>
<td>250</td>
<td>250V</td>
<td>2.50pF</td>
<td>J</td>
<td>H20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>J</td>
<td>630</td>
<td>630V</td>
<td>6.30pF</td>
<td>K</td>
<td>H20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>J</td>
<td>001</td>
<td>&gt;10pF</td>
<td></td>
<td>L</td>
<td>H20</td>
<td></td>
</tr>
</tbody>
</table>

Insert a P for the decimal point as the second character. e.g., 8P20 = 8.2pF

<table>
<thead>
<tr>
<th>Dielectric Capacitance in picofarads (pF)</th>
<th>Capacitance tolerance</th>
<th>Dielectric</th>
<th>Packaging</th>
<th>Suffix Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>J = Nickel barrier with 100% matte tin plating. RoHS compliant. Lead free.</td>
<td>X7R (2R1)</td>
<td>±5%</td>
<td>±10%</td>
<td>±20%</td>
</tr>
</tbody>
</table>

### Ordering information (Novacap Brand) - HiT range - 200°C capacitors

<table>
<thead>
<tr>
<th>Case size</th>
<th>Dielectric</th>
<th>Capacitance in picofarads (pF)</th>
<th>Capacitance tolerance</th>
<th>Voltage</th>
<th>Termination</th>
<th>Screening</th>
<th>Packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>0603</td>
<td>RE</td>
<td>010</td>
<td>10V</td>
<td>0.10pF</td>
<td>C0G/NP0 (1B) (200°C)</td>
<td>H20</td>
<td>H20</td>
</tr>
<tr>
<td>0805</td>
<td>RE</td>
<td>016</td>
<td>16V</td>
<td>0.10pF</td>
<td>COG/NP0 (1B) (200°C)</td>
<td>H20</td>
<td>H20</td>
</tr>
<tr>
<td>1206</td>
<td>RE</td>
<td>025</td>
<td>25V</td>
<td>0.25pF</td>
<td>X7R (2R1)</td>
<td>H20</td>
<td>H20</td>
</tr>
<tr>
<td>1210</td>
<td>RE</td>
<td>050</td>
<td>50V</td>
<td>0.50pF</td>
<td>X7R (2R1)</td>
<td>H20</td>
<td>H20</td>
</tr>
<tr>
<td>1808</td>
<td>RE</td>
<td>100</td>
<td>100V</td>
<td>1.00pF</td>
<td>X7R (2R1)</td>
<td>H20</td>
<td>H20</td>
</tr>
<tr>
<td>1812</td>
<td>RE</td>
<td>200</td>
<td>200V</td>
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<td>X7R (2R1)</td>
<td>H20</td>
<td>H20</td>
</tr>
<tr>
<td>2220</td>
<td>RE</td>
<td>250</td>
<td>250V</td>
<td>2.50pF</td>
<td>X7R (2R1)</td>
<td>H20</td>
<td>H20</td>
</tr>
<tr>
<td></td>
<td>RE</td>
<td>630</td>
<td>630V</td>
<td>6.30pF</td>
<td>X7R (2R1)</td>
<td>H20</td>
<td>H20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dielectric Capacitance in picofarads (pF)</th>
<th>Capacitance tolerance</th>
<th>Dielectric</th>
<th>Packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>J = Nickel barrier with 100% matte tin plating. RoHS compliant. Lead Free.</td>
<td>X7R (2R1)</td>
<td>±5%</td>
<td>±10%</td>
</tr>
</tbody>
</table>

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