

# High Capacitance Chip - X7R, X5R

A range of High Capacitance value BME MLC chip capacitors, in stable Class II dielectrics X7R and X5R, with a spread of capacitance values offered up to 100µF.

Comparable circuit designs can be achieved at typically a third to a fifth of the capacitance values because of the low ESR characteristics these parts exhibit. As a consequence they are also ideal to replace Tantalum and Low ESR Electrolytic Capacitors without polarity concerns. They find application as power supply bypass capacitors, smoothing capacitors, input/output filters in DC-DC Converters and in digital circuits and LCD modules.

Parts are RoHS Compliant and suitable for reflow soldering process.

- Nickel Barrier terminations with tin, tin/lead or gold flash
- Capacitance tolerances available: ±10%, ±20%
- Available with high reliability screening. Contact the Knowles Capacitors Sales Office for details



## Capacitance values - High Capacitance Chip

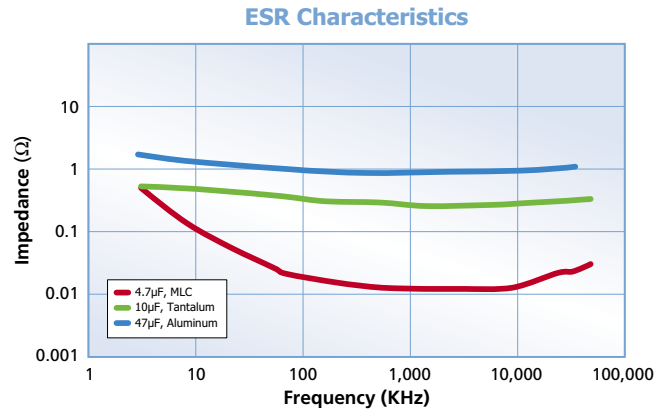
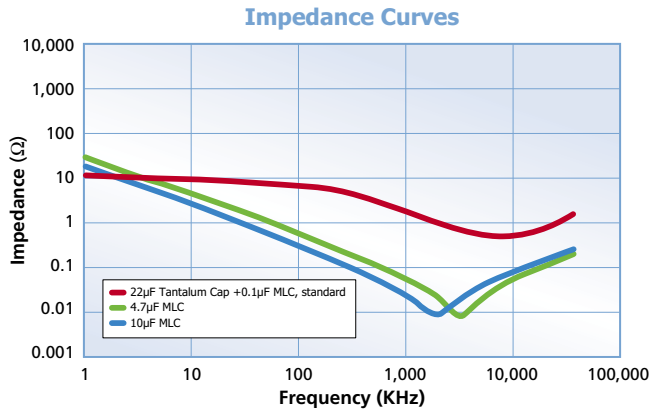
| Size                                   | 0402   |   | 0603           |                                  | 0805                              |                                  | 1206                             |               | 1210             |                  |                |                 | 1812           |     |
|--|--|---|----------------|----------------------------------|-----------------------------------|----------------------------------|----------------------------------|---------------|------------------|------------------|----------------|-----------------|----------------|-----|
| Tmax<br><small>inches:<br/>mm:</small> | 0.024<br>0.61                                  |   | 0.035<br>0.89  |                                  | 0.054<br>1.37                     |                                  | 0.072*<br>1.83                   |               | 0.085*<br>2.16   |                  | 0.110*<br>2.79 |                 | 0.110*<br>2.79 |     |
| Dielectric                             | X7R  | X5R                                       | X7R            | X5R                              | X7R                               | X5R                              | X7R                              | X5R           | X7R              | X5R              | X7R            | X5R             | X7R            | X5R |
| 4V                                     |  |   |                | 22µF†                            |                                   |                                  |                                  | 100µF†        |                  |                  |                |                 |                | -   |
| 6.3V                                   | 470nF  | 1µF<br>2.2µF†<br>4.7µF†                   |                | 4.7µF<br>10µF†                   |                                   | 22µF†                            |                                  | 47µF†         |                  | 47µF†            | 47µF†          | 100µF†          |                | -   |
| 10V                                    |  | 1µF                                       | 2.2µF          | 4.7µF<br>10µF†                   | 10µF†                             | 10µF                             | 22µF†                            | 22µF†         |                  | 22µF†            |                | 47µF†           |                | -   |
| 16V                                    | 15nF<br>22nF<br>33nF<br>47nF<br>100nF<br>220nF | 220nF<br>470nF<br>100nF<br>220nF<br>470nF | 100nF<br>1µF   | 2.2µF<br>4.7µF                   | 470nF<br>1.0µF<br>2.2µF<br>4.7µF† | 4.7µF<br>10µF                    | 10µF                             | 10µF<br>22µF† | 4.7µF†<br>10µF†  |                  |                | 22µF†           |                | -   |
| 25V                                    | 6.8nF<br>10nF<br>47nF<br>100nF                 | 10nF<br>220nF                             | 470nF<br>1.0µF | 220nF<br>470nF<br>1.0µF<br>2.2µF | 1.0µF<br>2.2µF<br>4.7µF           | 2.2µF<br>4.7µF                   | 2.2µF<br>4.7µF<br>10µF           | 4.7µF<br>10µF | 3.3µF†<br>4.7µF† | 4.7µF†<br>10µF†  | 22µF†          |                 |                | -   |
| 35V                                    |  |   |                |                                  |                                   |                                  |                                  |               |                  | 2.2µF†<br>4.7µF† |                | 10µF            |                | -   |
| 50V                                    | 10nF   | 100nF                                     | 220nF<br>470nF | 100nF<br>470nF<br>1.0µF          | 220nF<br>470nF<br>1.0µF           | 220nF<br>470nF<br>1.0µF<br>2.2µF | 470nF<br>1.0µF<br>2.2µF<br>4.7µF | 4.7µF         | 1.0µF            |                  | 4.7µF†         | 4.7µF†<br>10µF† |                | -   |
| 100V                                   |  |   | 100nF          |                                  | 220nF                             |                                  | 1.0µF                            |               | 1.0µF<br>2.2µF   |                  |                |                 | 1.0µF<br>2.2µF | -   |

\* Denotes non standard chip thickness. Order code needs to have an 'X' inserted together with the dimension in inches -e.g. X072 where dimension is 0.072".

† Denotes only available in ±20% capacitance tolerance

# High Capacitance Chip - X7R, X5R

## Comparison with other dielectric capacitors



## Dielectric characteristics

|                                  | X7R (BB) Stable   | X5R (BW) Stable   |
|----------------------------------|---|---|
| Operating temperature range:     | -55°C to 125°C  | -55°C to 85°C   |
| Temperature coefficient:         | ±15% ΔC Max.  | ±15% ΔC Max.  |
| Dissipation factor:              | 3.5% max except:<br>0402 ≥ 0.1µF = 5%,<br>0603 ≥ 0.22µF = 10%,<br>0805 ≥ 1.0µF = 5%,<br>0805 ≥ 2.2µF = 10%,<br>1206 ≥ 2.2µF = 10%,<br>1210 ≥ 4.7µF = 5%,<br>1210 ≥ 22µF = 10% | 5% max except:<br>0402 ≥ 1.0µF = 10%,<br>0603 ≥ 1.0µF = 10%,<br>0805 ≥ 4.7µF = 10%,<br>1206 ≥ 4.7µF = 10%,<br>1210 ≥ 10µF = 10% |
| Insulation resistance @25°C:     | >10GΩ or >100ΩF whichever is less   | >10GΩ or >100ΩF whichever is less   |
| Dielectric withstanding voltage: | 250%  | 250%  |
| Ageing Rate:                     | X7R 3.5% typical  | X5R 5% typical  |
| Test parameters @ 25°C:          | 1KHz, 1.0 ±0.2 VRMS   | 1KHz, 1.0 ±0.2 VRMS<br>120Hz, 0.5 ±0.1 VRMS for 22µF, 47µF & 100µF  |

## Ordering information - High Capacitance Chip Capacitors

| 1206   | W   | 476   | K                      | 6R3  | N  | X080   | T                                   |
|--|---|---|------------------------|--|--|--|-------------------------------------|
| Chip sizes                                   | Dielectric  | Capacitance   | Tolerance              | Voltage-VDCW   | Termination  | Thickness option   | Packing                             |
| 0402<br>0603<br>0805<br>1206<br>1210<br>1812 | BB* = X7R<br>BW* = X5R<br><br>*Formerly B & W codes | Value in Picofarads. Two significant figures, followed by number of zeros:<br>476 = 47µF (47,000,000pF) | K = ± 10%<br>M = ± 20% | Two significant figures, followed by number of zeros. R denotes decimal point:<br>6R3 = 6.3V<br>501 = 500V | N = Nickel Barrier (100% tin)<br>Y = Nickel Barrier (90% tin/10% lead)<br>NG = Nickel Barrier Gold Flash | Blank = Standard thickness<br>X = special thickness, specified in inches:<br>X085 = 0.085" | No suffix = Bulk<br>T = Tape & Reel |

Note: BME parts available with added high reliability test. Consult the factory.