

Surface Mount Ceramic Chip Capacitors – Ultra Stable X8R Dielectric

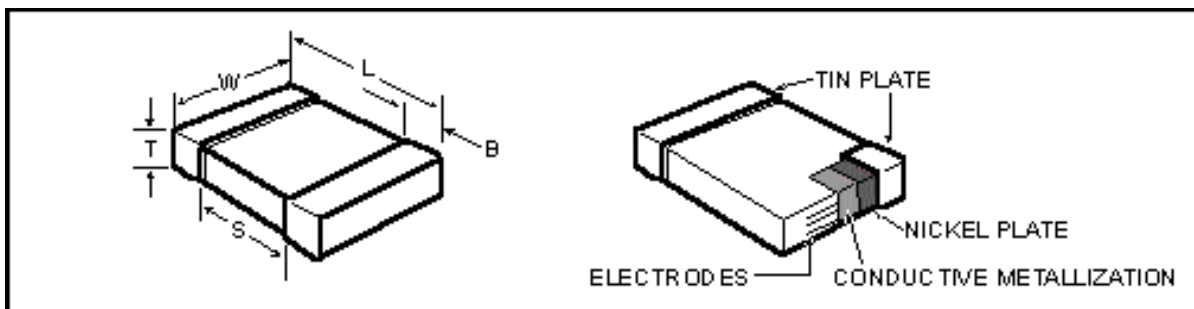


KEMET's Ultra Stable X8R Dielectric features a 150°C maximum operating temperature, offering the latest in high temperature dielectric technology and therefore a reliable choice for extreme temperature applications. It offers the same temperature capability as conventional X8R, but without the capacitance loss due to applied DC voltage. Ultra Stable X8R exhibits no capacitance loss and is a suitable replacement for higher capacitance and larger footprint devices that fail to offer capacitance stability. Product applications include harsh environments such as Down Hole (Oil Exploration), Automotive (Under Hood), Military and Aerospace.

Six standard package options are available which include EIA 0402, 0603, 0805, 1206, 1210, and 1812 case sizes. Devices are available in dc voltage ratings of 25V, 50V and 100V, with capacitance offerings ranging from 10pF to 0.22µF. Capacitance tolerances offerings include ±1%, ±2%, ±5%, ±10% and ±20%, with capacitance shift limited to ±15% from -55°C to +150°C.

All parts are environmentally friendly, in compliance with RoHS legislation (RoHS 6/6) and are being offered in both commercial and automotive grades with 100% pure matte tin-plated terminations that allow for excellent solderability. A Sn/Pb termination option is also available upon request.

Outline Drawing



Dimensions - Millimeters (Inches)

| EIA SIZE CODE | METRIC SIZE CODE | L - LENGTH | W - WIDTH | B - BANDWIDTH | S SEPARATION minimum | MOUNTING TECHNIQUE |
|---------------|------------------|-------------------------|--------------------------|--------------------------|----------------------|---|
| 0402 | 1005 | 1.0 (.04) ± .05 (.002) | 0.5 (.02) ± .05 (.002) | 0.30 (.012) ± .10 (.004) | 0.3 (.012) | Solder Reflow or Solder Wave + Solder Reflow |
| 0603 | 1608 | 1.6 (.063) ± .15 (.006) | 0.8 (.032) ± .15 (.006) | 0.35 (.014) ± .15 (.006) | 0.7 (.028) | |
| 0805 | 2012 | 2.0 (.079) ± .20 (.008) | 1.25 (.049) ± .20 (.008) | 0.50 (.02) ± .25 (.010) | 0.75 (.030) | |
| 1206 | 3216 | 3.2 (.126) ± .20 (.008) | 1.6 (.063) ± .20 (.008) | 0.50 (.02) ± .25 (.010) | N/A | Solder Reflow |
| 1210 | 3225 | 3.2 (.126) ± .20 (.008) | 2.5 (.098) ± .20 (.008) | 0.50 (.02) ± .25 (.010) | N/A | |
| 1812 | 4520 | 4.5 (.177) ± .3 (.012) | 3.2 (.126) ± .3 (.012) | 0.6 (.024) ± .35 (.014) | N/A | |

Qualification Certification:

Automotive Grade Available: AEC-Q200 Rev. C
 RoHS-PRC (6/6) - 100% matte Sn termination

Electrical Parameters:

As detailed in the KEMET Surface Mount Catalog F3102 for X8R, with following specific requirements based on room temperature (25°C) parameters:

- Operating Temperature Range: -55°C to +150°C
- Temperature Coefficient of Capacitance : ±15% (-55 to 150°C)
- Insulation Resistance (IR) measured after 2 minutes at rated voltage @ 25°C:
 Limit is 1000 megohm microfarads or 100GΩ, whichever of the two is smaller.
- Capacitance and Dissipation Factor (DF) measured under the following conditions:
 1kHz and 1 Vrms

DF Limits are:

25 - 100 Volts: 2.5%

Ordering Information

| C | 1210 | C | 184 | K | 3 | H | A | C |
|---------|--|-----------------------|---------------------------------|---|--------------------------------|------------------------|----------------------|--|
| Ceramic | Case Size (L"x W") | Specification/ Series | Capacitance Code (pF) | Capacitance Tolerance | Voltage | Dielectric | Failure Rate/ Design | End Metallization (Plated) |
| | 0402 0603 0805 1206 1210 1812 | C = Standard | 2 Sig. Digits + Number of Zeros | F = ±1% G = ±2% J = ±5% K = ±10% M = ±20% | 3 = 25V 5 = 50V 1 = 100V | H = X8R (Ultra Stable) | A = N/A | C = 100% Matte Sn L = SnPb (5% min) |

Soldering Process

All parts incorporate the standard KEMET barrier layer of pure nickel, with an overplate of pure tin to provide excellent solderability as well as resistance to leaching. The recommended techniques are as follows:

- 0402 and ≥1210 Case Sizes - Solder Reflow Only
- 0603/0805/1206 Case Sizes - Solder Wave/Solder Reflow

Marking

These chips will be supplied unmarked. If required, they can be laser-marked as an extra option. Details on the marking format are included in KEMET Surface Mount catalog F3102.

In general, the information in the KEMET Surface Mount catalog F3102 applies to these capacitors. The information in this bulletin supplements that in the catalog.

ULTRA STABLE X8R DIELECTRIC (0402 - 1812 Case Sizes)

| Cap pF | Cap Code | Series | C0402C | | | C0603C | | | C0805C | | | C1206C | | | C1210C | | | C1812 | | |
|---------|----------|---------------|--|-----|------|--------|-----|------|--------|-----|------|--------|-----|------|--------|-----|------|-------|-----|------|
| | | Voltage | 25V | 50V | 100V | 25V | 50V | 100V | 25V | 50V | 100V | 25V | 50V | 100V | 25V | 50V | 100V | 25V | 50V | 100V |
| | | Voltage Code | 3 | 5 | 1 | 3 | 5 | 1 | 3 | 5 | 1 | 3 | 5 | 1 | 3 | 5 | 1 | 3 | 5 | 1 |
| | | Cap Tolerance | Product Availability and Chip Thickness Codes See Page 78 for Chip Thickness Dimensions | | | | | | | | | | | | | | | | | |
| 100 | 101 | FG J KM | BB | BB | BB | | | | | | | | | | | | | | | |
| 110 | 111 | FG J KM | BB | BB | BB | | | | | | | | | | | | | | | |
| 120 | 121 | FG J KM | BB | BB | BB | | | | | | | | | | | | | | | |
| 130 | 131 | FG J KM | BB | BB | BB | | | | | | | | | | | | | | | |
| 150 | 151 | FG J KM | BB | BB | BB | | | | | | | | | | | | | | | |
| 160 | 161 | FG J KM | BB | BB | BB | | | | | | | | | | | | | | | |
| 180 | 181 | FG J KM | BB | BB | BB | | | | | | | | | | | | | | | |
| 200 | 201 | FG J KM | BB | BB | BB | | | | | | | | | | | | | | | |
| 220 | 221 | FG J KM | BB | BB | BB | | | | | | | | | | | | | | | |
| 240 | 241 | FG J KM | BB | BB | BB | | | | | | | | | | | | | | | |
| 270 | 271 | FG J KM | BB | BB | BB | | | | | | | | | | | | | | | |
| 300 | 301 | FG J KM | BB | BB | BB | | | | | | | | | | | | | | | |
| 330 | 331 | FG J KM | BB | BB | BB | | | | | | | | | | | | | | | |
| 360 | 361 | FG J KM | BB | BB | BB | | | | | | | | | | | | | | | |
| 390 | 391 | FG J KM | BB | BB | BB | | | | | | | | | | | | | | | |
| 430 | 431 | FG J KM | BB | BB | BB | CB | CB | CB | | | | | | | | | | | | |
| 470 | 471 | FG J KM | BB | BB | BB | CB | CB | CB | | | | | | | | | | | | |
| 510 | 511 | FG J KM | BB | BB | BB | CB | CB | CB | | | | | | | | | | | | |
| 560 | 561 | FG J KM | BB | BB | BB | CB | CB | CB | | | | | | | | | | | | |
| 620 | 621 | FG J KM | BB | BB | BB | CB | CB | CB | | | | | | | | | | | | |
| 680 | 681 | FG J KM | BB | BB | BB | CB | CB | CB | | | | | | | | | | | | |
| 750 | 751 | FG J KM | BB | BB | BB | CB | CB | CB | | | | | | | | | | | | |
| 820 | 821 | FG J KM | BB | BB | BB | CB | CB | CB | | | | | | | | | | | | |
| 910 | 911 | FG J KM | BB | BB | BB | CB | CB | CB | | | | | | | | | | | | |
| 1,000 | 102 | FG J KM | BB | BB | BB | CB | CB | CB | | | | | | | | | | | | |
| 1,100 | 112 | FG J KM | BB | BB | | CB | CB | CB | | | | | | | | | | | | |
| 1,200 | 122 | FG J KM | BB | BB | | CB | CB | CB | | | | | | | | | | | | |
| 1,300 | 132 | FG J KM | BB | BB | | CB | CB | CB | | | | | | | | | | | | |
| 1,500 | 152 | FG J KM | BB | BB | | CB | CB | CB | | | | | | | | | | | | |
| 1,600 | 162 | FG J KM | | | | CB | CB | CB | | | | | | | | | | | | |
| 1,800 | 182 | FG J KM | | | | CB | CB | CB | | | | | | | | | | | | |
| 2,000 | 202 | FG J KM | | | | CB | CB | CB | | | | | | | | | | | | |
| 2,200 | 222 | FG J KM | | | | CB | CB | CB | DC | DC | DC | | | | | | | | | |
| 2,400 | 242 | FG J KM | | | | CB | CB | CB | DC | DC | DC | | | | | | | | | |
| 2,700 | 272 | FG J KM | | | | CB | CB | CB | DC | DC | DC | | | | | | | | | |
| 3,000 | 302 | FG J KM | | | | CB | CB | CB | DC | DC | DC | | | | | | | | | |
| 3,300 | 332 | FG J KM | | | | CB | CB | CB | DC | DC | DC | | | | | | | | | |
| 3,600 | 362 | FG J KM | | | | CB | CB | CB | DC | DC | DC | | | | | | | | | |
| 3,900 | 392 | FG J KM | | | | CB | CB | CB | DC | DC | DC | | | | | | | | | |
| 4,300 | 432 | FG J KM | | | | CB | CB | CB | DC | DC | DC | | | | | | | | | |
| 4,700 | 472 | FG J KM | | | | CB | CB | CB | DC | DC | DC | | | | | | | | | |
| 5,100 | 512 | FG J KM | | | | CB | CB | CB | DC | DC | DC | | | | | | | | | |
| 5,600 | 562 | FG J KM | | | | CB | CB | CB | DC | DC | DC | | | | | | | | | |
| 6,200 | 622 | FG J KM | | | | CB | CB | CB | DC | DC | DC | | | | | | | | | |
| 6,800 | 682 | FG J KM | | | | CB | CB | CB | DC | DC | DC | EB | EB | EB | | | | | | |
| 7,500 | 752 | FG J KM | | | | CB | CB | CB | DC | DC | DC | EB | EB | EB | | | | | | |
| 8,200 | 822 | FG J KM | | | | CB | CB | CB | DC | DC | DC | EB | EB | EB | | | | | | |
| 9,100 | 912 | FG J KM | | | | CB | CB | CB | DC | DC | DC | EB | EB | EB | | | | | | |
| 10,000 | 103 | FG J KM | | | | CB | CB | CB | DC | DC | DC | EB | EB | EB | | | | | | |
| 12,000 | 123 | FG J KM | | | | CB | CB | CB | DC | DC | DC | EB | EB | EB | | | | | | |
| 15,000 | 153 | FG J KM | | | | | | | DC | DD | DG | EB | EB | EB | FB | FB | FB | GB | GB | |
| 18,000 | 183 | FG J KM | | | | | | | DC | DD | DG | EB | EB | EB | FB | FB | FB | GB | GB | |
| 22,000 | 223 | FG J KM | | | | | | | DD | DF | | EB | EB | EB | EC | FB | FB | GB | GB | |
| 27,000 | 273 | FG J KM | | | | | | | DF | | | EB | EB | EB | EE | FB | FB | GB | GB | |
| 33,000 | 333 | FG J KM | | | | | | | DG | | | EB | EB | EB | EE | FB | FB | GB | GB | |
| 47,000 | 473 | FG J KM | | | | | | | | | | EC | ED | EH | FB | FB | FE | GB | GB | |
| 56,000 | 563 | FG J KM | | | | | | | | | | ED | EF | EH | FB | FB | FE | GB | GB | |
| 68,000 | 683 | FG J KM | | | | | | | | | | EF | EH | EH | FB | FC | FG | GB | GB | |
| 82,000 | 823 | FG J KM | | | | | | | | | | EF | EH | EH | FB | FF | FG | GB | GB | |
| 100,000 | 104 | FG J KM | | | | | | | | | | EH | | | FE | FG | FM | GB | GD | |
| 120,000 | 124 | FG J KM | | | | | | | | | | | | | FG | FH | | GB | GH | |
| 150,000 | 154 | FG J KM | | | | | | | | | | | | | FH | FM | | GD | GN | |
| 180,000 | 184 | FG J KM | | | | | | | | | | | | | FJ | | | GH | | |
| 220,000 | 224 | FG J KM | | | | | | | | | | | | | | | | GK | | |
| Cap pF | Cap Code | Voltage Code | 3 | 5 | 1 | 3 | 5 | 1 | 3 | 5 | 1 | 3 | 5 | 1 | 3 | 5 | 1 | 3 | 5 | 1 |
| Cap pF | Cap Code | Voltage | 25V | 50V | 100V | 25V | 50V | 100V | 25V | 50V | 100V | 25V | 50V | 100V | 25V | 50V | 100V | 25V | 50V | 100V |
| Cap pF | Cap Code | Series | C0402C | | | C0603C | | | C0805C | | | C1206C | | | C1210C | | | C1812 | | |

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Packaging Specifications

| Thickness Code | Chip Size | Thickness ± Range (mm) | Qty per Reel 7" Plastic | Qty per Reel 13" Plastic | Qty per Reel 7" Paper | Qty per Reel 13" Paper | Qty per Bulk Cassette |
|----------------|-----------|------------------------|-------------------------|--------------------------|-----------------------|------------------------|-----------------------|
| AA | 01005 | 0.20 ± 0.02 | -- | -- | 15000 | -- | -- |
| AB | 0201 | 0.30 ± 0.03 | -- | -- | 15000 | -- | -- |
| BB | 0402 | 0.50 ± 0.05 | -- | -- | 10000 | 50000 | 50000 |
| CB | 0603 | 0.80 ± 0.07 | -- | -- | 4000 | 10000 | 15000 |
| CC | 0603 | 0.80 ± 0.10 | -- | -- | 4000 | 10000 | -- |
| CD | 0603 | 0.80 ± 0.15 | -- | -- | 4000 | 10000 | -- |
| DB | 0805 | 0.60 ± 0.10 | -- | -- | 4000 | 10000 | 10000 |
| DC | 0805 | 0.78 ± 0.10 | -- | -- | 4000 | 10000 | -- |
| DD | 0805 | 0.90 ± 0.10 | -- | -- | 4000 | 10000 | -- |
| DE | 0805 | 1.00 ± 0.10 | 2500 | 10000 | -- | -- | -- |
| DF | 0805 | 1.10 ± 0.10 | 2500 | 10000 | -- | -- | -- |
| DG | 0805 | 1.25 ± 0.15 | 2500 | 10000 | -- | -- | -- |
| DH | 0805 | 1.25 ± 0.20 | 2500 | 10000 | -- | -- | -- |
| DL | 0805 | 0.95 ± 0.10 | 4000 | 10000 | -- | -- | -- |
| EB | 1206 | 0.78 ± 0.10 | 4000 | 10000 | 4000 | 10000 | -- |
| EC | 1206 | 0.90 ± 0.10 | 4000 | 10000 | -- | -- | -- |
| ED | 1206 | 1.00 ± 0.10 | 2500 | 10000 | -- | -- | -- |
| EE | 1206 | 1.10 ± 0.10 | 2500 | 10000 | -- | -- | -- |
| EF | 1206 | 1.20 ± 0.15 | 2500 | 10000 | -- | -- | -- |
| EG | 1206 | 1.60 ± 0.15 | 2000 | 8000 | -- | -- | -- |
| EH | 1206 | 1.60 ± 0.20 | 2000 | 8000 | -- | -- | -- |
| EJ | 1206 | 1.70 ± 0.20 | 2000 | 8000 | -- | -- | -- |
| EK | 1206 | 0.80 ± 0.10 | 2000 | 8000 | -- | -- | -- |
| EM | 1206 | 1.25 ± 0.15 | 2500 | 10000 | -- | -- | -- |
| EN | 1206 | 0.95 ± 0.10 | 4000 | 10000 | -- | -- | -- |
| FB | 1210 | 0.78 ± 0.10 | 4000 | 10000 | -- | -- | -- |
| FC | 1210 | 0.90 ± 0.10 | 4000 | 10000 | -- | -- | -- |
| FD | 1210 | 0.95 ± 0.10 | 4000 | 10000 | -- | -- | -- |
| FE | 1210 | 1.00 ± 0.10 | 2500 | 10000 | -- | -- | -- |
| FF | 1210 | 1.10 ± 0.10 | 2500 | 10000 | -- | -- | -- |
| FG | 1210 | 1.25 ± 0.15 | 2500 | 10000 | -- | -- | -- |
| FH | 1210 | 1.55 ± 0.15 | 2000 | 8000 | -- | -- | -- |
| FJ | 1210 | 1.65 ± 0.20 | 2000 | 8000 | -- | -- | -- |
| FK | 1210 | 2.10 ± 0.20 | 2000 | 8000 | -- | -- | -- |
| FL | 1210 | 1.40 ± 0.15 | 2000 | 8000 | -- | -- | -- |
| FM | 1210 | 1.70 ± 0.20 | 2000 | 8000 | -- | -- | -- |
| FN | 1210 | 1.65 ± 0.20 | 2000 | 8000 | -- | -- | -- |
| FO | 1210 | 1.90 ± 0.20 | 2000 | 8000 | -- | -- | -- |
| FP | 1210 | 1.60 ± 0.20 | 2000 | 8000 | -- | -- | -- |
| FR | 1210 | 2.25 ± 0.20 | 2000 | 8000 | -- | -- | -- |
| FS | 1210 | 2.50 ± 0.20 | 1000 | 4000 | -- | -- | -- |
| FT | 1210 | 1.90 ± 0.20 | 1500 | 4000 | -- | -- | -- |
| GB | 1812 | 1.00 ± 0.10 | 1000 | 4000 | -- | -- | -- |
| GC | 1812 | 1.10 ± 0.10 | 1000 | 4000 | -- | -- | -- |
| GD | 1812 | 1.25 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| GE | 1812 | 1.30 ± 0.10 | 1000 | 4000 | -- | -- | -- |
| GF | 1812 | 1.50 ± 0.10 | 1000 | 4000 | -- | -- | -- |
| GG | 1812 | 1.55 ± 0.10 | 1000 | 4000 | -- | -- | -- |
| GH | 1812 | 1.40 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| GJ | 1812 | 1.70 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| GK | 1812 | 1.60 ± 0.20 | 1000 | 4000 | -- | -- | -- |
| GL | 1812 | 1.90 ± 0.20 | 1000 | 4000 | -- | -- | -- |
| GM | 1812 | 2.00 ± 0.20 | 1000 | 4000 | -- | -- | -- |
| GN | 1812 | 1.70 ± 0.20 | 1000 | 4000 | -- | -- | -- |
| GO | 1812 | 2.50 ± 0.20 | 500 | 2000 | -- | -- | -- |
| HB | 1825 | 1.10 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| HC | 1825 | 1.15 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| HD | 1825 | 1.30 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| HE | 1825 | 1.40 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| HF | 1825 | 1.50 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| HG | 1825 | 1.60 ± 0.20 | 1000 | 4000 | -- | -- | -- |
| JB | 2220 | 1.00 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| JC | 2220 | 1.10 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| JD | 2220 | 1.30 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| JE | 2220 | 1.40 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| JF | 2220 | 1.50 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| JG | 2220 | 1.70 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| JH | 2220 | 1.80 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| JO | 2220 | 2.40 ± 0.15 | 500 | 2000 | -- | -- | -- |
| JP | 2220 | 1.60 ± 0.20 | 1000 | 4000 | -- | -- | -- |
| KB | 2225 | 1.00 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| KC | 2225 | 1.10 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| KD | 2225 | 1.30 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| KE | 2225 | 1.40 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| KF | 2225 | 1.60 ± 0.20 | 1000 | 4000 | -- | -- | -- |
| LA | 1808 | 1.40 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| LB | 1808 | 1.60 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| LC | 1808 | 2.00 ± 0.15 | 1000 | 4000 | -- | -- | -- |
| LD | 1808 | 0.90 ± 0.10 | 2500 | 10000 | -- | -- | -- |
| MA | 1632 | 0.80 ± 0.10 | 4000 | 10000 | -- | -- | -- |
| NA | 1706 | 0.90 ± 0.10 | 4000 | 10000 | -- | -- | -- |
| NA | 1706 | 0.90 ± 0.10 | 4000 | 10000 | -- | -- | -- |
| PA | 1220 | 0.80 ± 0.10 | 4000 | 10000 | -- | -- | -- |

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