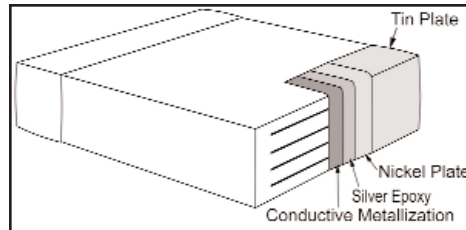
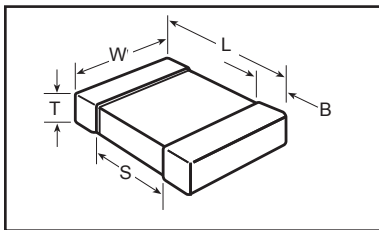


Surface Mount Ceramic Chip Capacitors / **FT-CAP** / Flexible Terminations

Outline Drawing



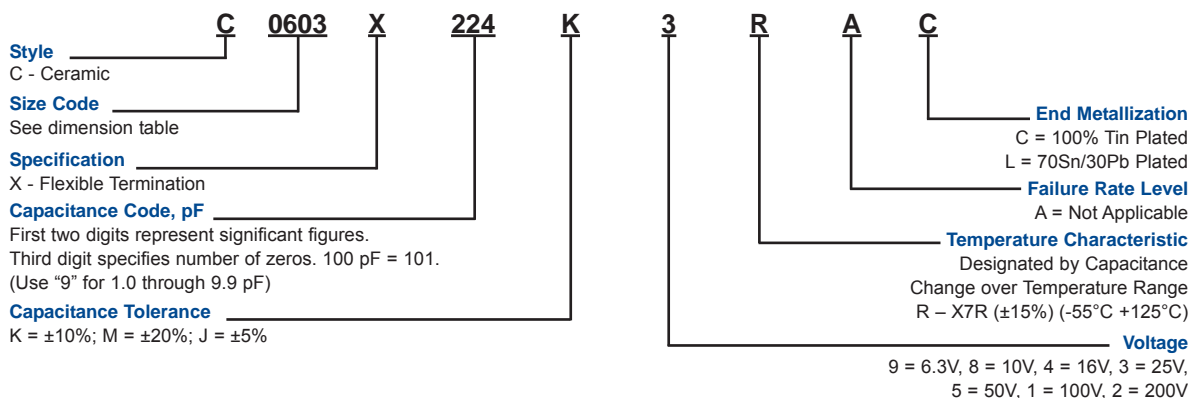
The FT-CAP is a surface mount multi-layer ceramic capacitor that incorporates a unique and flexible termination system. Integrated with KEMET's standard termination materials, a conductive epoxy is utilized between the conductive metallization and nickel barrier finish in order to establish pliability while maintaining terminal strength, solderability and electrical performance. This technology directs board flex stress away from the ceramic body and into the termination area. As a result, this termination system mitigates the risk of low-IR or short-circuit failures associated with board flex. The FT-CAP complements our current "Open Mode" and "Floating Electrode (FE-CAP)" products by providing our customers with a complete portfolio of flex solutions.

Dimensions – Millimeters (Inches)

| EIA Size Code | Metric Size Code | L Length                 | W Width                   | B Bandwidth               | S Separation |
|---------------|------------------|--------------------------|---------------------------|---------------------------|--------------|
| 0603          | 1608             | 1.6 (.063) ± 0.15 (.006) | 0.8 (.032) ± 0.15 (.006)  | 0.35 (.014) ± 0.15 (.006) | 0.70 (.028)  |
| 0805          | 2012             | 2.0 (.079) ± 0.20 (.008) | 1.25 (.049) ± 0.20 (.008) | 0.05 (.02) ± 0.25 (.010)  | 0.75 (.030)  |
| 1206          | 3216             | 3.2 (.126) ± 0.20 (.008) | 1.6 (.063) ± 0.20 (.008)  | 0.50 (.02) ± .25 (.010)   | N/A          |
| 1210          | 3225             | 3.2 (.126) ± 0.20 (.008) | 2.5 (.098) ± 0.20 (.008)  | 0.50 (.02) ± .25 (.010)   | N/A          |

See Capacitance Value Table next page for thickness dimension.

Ordering Information



# X7R Capacitance Range

| Cap pF     | Cap Code | Cap Tol. | C0603 |     |     |     |     |      |      | C0805 |     |     |     |     |      |      | C1206 |     |     |     |     |      |      | C1210 |     |     |     |     |      |      |  |
|------------|----------|----------|-------|-----|-----|-----|-----|------|------|-------|-----|-----|-----|-----|------|------|-------|-----|-----|-----|-----|------|------|-------|-----|-----|-----|-----|------|------|--|
|            |          |          | 6.3V  | 10V | 16V | 25V | 50V | 100V | 200V | 6.3V  | 10V | 16V | 25V | 50V | 100V | 200V | 6.3V  | 10V | 16V | 25V | 50V | 100V | 200V | 6.3V  | 10V | 16V | 25V | 50V | 100V | 200V |  |
| 180        | 181      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CB   |       |     |     |     |     |      |      |       |     |     |     |     |      |      |       |     |     |     |     |      |      |  |
| 220        | 221      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CB   | DC    | DC  | DC  | DC  | DC  | DC   | DC   |       |     |     |     |     |      |      |       |     |     |     |     |      |      |  |
| 270        | 271      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CB   | DC    | DC  | DC  | DC  | DC  | DC   | DC   |       |     |     |     |     |      |      |       |     |     |     |     |      |      |  |
| 330        | 331      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CB   | DC    | DC  | DC  | DC  | DC  | DC   | DC   |       |     |     |     |     |      |      |       |     |     |     |     |      |      |  |
| 390        | 391      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CB   | DC    | DC  | DC  | DC  | DC  | DC   | DC   |       |     |     |     |     |      |      |       |     |     |     |     |      |      |  |
| 470        | 471      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CB   | DC    | DC  | DC  | DC  | DC  | DC   | DC   |       |     |     |     |     |      |      |       |     |     |     |     |      |      |  |
| 560        | 561      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CB   | DC    | DC  | DC  | DC  | DC  | DC   | DC   |       |     |     |     |     |      |      |       |     |     |     |     |      |      |  |
| 680        | 681      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CB   | DC    | DC  | DC  | DC  | DC  | DC   | DC   |       |     |     |     |     |      |      |       |     |     |     |     |      |      |  |
| 820        | 821      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CB   | DC    | DC  | DC  | DC  | DC  | DC   | DC   |       |     |     |     |     |      |      |       |     |     |     |     |      |      |  |
| 1,000      | 102      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CB   | DC    | DC  | DC  | DC  | DC  | DC   | DC   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    |     |     |     |     |      |      |  |
| 1,200      | 122      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CC   | DC    | DC  | DC  | DC  | DC  | DC   | DC   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    |     |     |     |     |      |      |  |
| 1,500      | 152      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CC   | DC    | DC  | DC  | DC  | DC  | DC   | DC   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    |     |     |     |     |      |      |  |
| 1,800      | 182      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CC   | DC    | DC  | DC  | DC  | DC  | DC   | DC   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    |     |     |     |     |      |      |  |
| 2,200      | 222      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CC   | DC    | DC  | DC  | DC  | DC  | DC   | DC   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    | FB  | FB  | FB  | FB  | FB   |      |  |
| 2,700      | 272      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CC   | DC    | DC  | DC  | DC  | DC  | DC   | DC   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    | FB  | FB  | FB  | FB  | FB   |      |  |
| 3,300      | 332      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CC   | DC    | DC  | DC  | DC  | DC  | DC   | DC   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    | FB  | FB  | FB  | FB  | FB   |      |  |
| 3,900      | 392      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CC   | DC    | DC  | DC  | DC  | DC  | DC   | DC   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    | FB  | FB  | FB  | FB  | FB   |      |  |
| 4,700      | 472      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CC   | DC    | DC  | DC  | DC  | DC  | DC   | DC   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    | FB  | FB  | FB  | FB  | FB   |      |  |
| 5,600      | 562      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CC   | DC    | DC  | DC  | DC  | DC  | DC   | DC   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    | FB  | FB  | FB  | FB  | FB   |      |  |
| 6,800      | 682      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CC   | DC    | DC  | DC  | DC  | DC  | DC   | DC   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    | FB  | FB  | FB  | FB  | FB   |      |  |
| 8,200      | 822      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CC   | DC    | DC  | DC  | DC  | DC  | DC   | DC   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    | FB  | FB  | FB  | FB  | FB   |      |  |
| 10,000     | 103      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CB   | CC   | DC    | DC  | DC  | DC  | DC  | DC   | DC   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    | FB  | FB  | FB  | FB  | FB   |      |  |
| 12,000     | 123      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CC   |      | DC    | DC  | DC  | DC  | DC  | DC   | DC   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    | FB  | FB  | FB  | FB  | FB   |      |  |
| 15,000     | 153      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CC   |      | DC    | DC  | DC  | DC  | DC  | DD   | DC   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    | FB  | FB  | FB  | FB  | FB   |      |  |
| 18,000     | 183      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CC   |      | DC    | DC  | DC  | DC  | DC  | DD   | DC   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    | FB  | FB  | FB  | FB  | FB   |      |  |
| 22,000     | 223      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CC   |      | DC    | DC  | DC  | DC  | DC  | DD   | DC   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    | FB  | FB  | FB  | FB  | FB   |      |  |
| 27,000     | 273      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CC   |      | DC    | DC  | DC  | DC  | DC  | DD   | DE   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    | FB  | FB  | FB  | FB  | FB   |      |  |
| 33,000     | 333      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CC   |      | DC    | DC  | DC  | DC  | DC  | DD   | DE   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EB    | FB  | FB  | FB  | FB  | FB   |      |  |
| 39,000     | 393      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CC   |      | DC    | DC  | DC  | DC  | DC  | DD   | DE   | EB    | EB  | EB  | EB  | EB  | EB   | EC   | ED    | FB  | FB  | FB  | FB  | FB   |      |  |
| 47,000     | 473      | K,M,J    | CB    | CB  | CB  | CB  | CB  | CC   |      | DC    | DC  | DC  | DC  | DC  | DE   | DG   | EB    | EB  | EB  | EB  | EB  | EB   | EB   | EC    | ED  | FB  | FB  | FB  | FB   | FC   |  |
| 56,000     | 563      | K,M,J    | CB    | CB  | CB  | CB  | CC  |      |      | DD    | DD  | DD  | DD  | DE  | DG   | EB   | EB    | EB  | EB  | EB  | EB  | EB   | ED   | FB    | FB  | FB  | FB  | FB  | FC   |      |  |
| 68,000     | 683      | K,M,J    | CB    | CB  | CB  | CB  | CC  |      |      | DD    | DD  | DD  | DD  | DE  |      | EB   | EB    | EB  | EB  | EB  | EB  | EB   | ED   | FB    | FB  | FB  | FB  | FB  | FC   |      |  |
| 82,000     | 823      | K,M,J    | CB    | CB  | CB  | CB  | CC  |      |      | DD    | DD  | DD  | DD  | DE  |      | EB   | EB    | EB  | EB  | EB  | EB  | EB   | ED   | FB    | FB  | FB  | FB  | FB  | FC   |      |  |
| 100,000    | 104      | K,M,J    | CB    | CB  | CB  | CB  | CC  |      |      | DD    | DD  | DD  | DD  | DE  |      | EB   | EB    | EB  | EB  | EB  | EB  | EB   | EM   | FB    | FB  | FB  | FB  | FB  | FD   | FG   |  |
| 120,000    | 124      | K,M,J    | CB    | CB  | CB  |     |     |      |      | DC    | DC  | DC  | DC  | DD  | DG   |      | EC    | EC  | EC  | EC  | EC  | EC   | EM   | FB    | FB  | FB  | FB  | FB  | FD   |      |  |
| 150,000    | 154      | K,M,J    | CB    | CB  | CB  |     | CD  |      |      | DC    | DC  | DC  | DC  | DD  |      |      | EC    | EC  | EC  | EC  | EC  | EC   | EG   | FC    | FC  | FC  | FC  | FC  | FD   |      |  |
| 180,000    | 184      | K,M,J    | CB    | CB  | CB  |     |     |      |      | DC    | DC  | DC  | DC  | DD  |      |      | EC    | EC  | EC  | EC  | EC  | EC   |      | FC    | FC  | FC  | FC  | FC  | FD   |      |  |
| 220,000    | 224      | K,M,J    | CB    | CB  | CB  | CD  |     |      |      | DC    | DC  | DC  | DC  | DD  | DG   |      | EC    | EC  | EC  | EC  | EC  | EC   |      | FC    | FC  | FC  | FC  | FC  | FD   |      |  |
| 270,000    | 274      | K,M,J    | CB    | CB  | CB  |     |     |      |      | DD    | DD  | DD  | DD  |     |      |      | EB    | EB  | EB  | EB  | EC  | EM   |      | FC    | FC  | FC  | FC  | FC  | FD   |      |  |
| 330,000    | 334      | K,M,J    | CB    | CB  | CB  |     |     |      |      | DE    | DE  | DE  | DE  |     |      |      | EB    | EB  | EB  | EB  | EC  | EG   |      | FD    | FD  | FD  | FD  | FD  | FD   |      |  |
| 390,000    | 394      | K,M,J    | CB    | CB  | CB  |     |     |      |      | DG    | DG  | DG  | DG  |     |      |      | EB    | EB  | EB  | EB  | EG  | EG   |      | FD    | FD  | FD  | FD  | FD  | FD   |      |  |
| 470,000    | 474      | K,M,J    | CB    | CB  | CB  |     |     |      |      | DG    | DG  | DG  | DG  | DE  |      |      | EC    | EC  | EC  | EC  | EC  | EG   |      | FD    | FD  | FD  | FD  | FD  | FD   |      |  |
| 560,000    | 564      | K,M,J    |       |     |     |     |     |      |      | DG    | DG  | DG  | DG  |     |      |      | ED    | ED  | ED  | ED  | EC  |      |      | FD    | FD  | FD  | FD  | FD  | FD   |      |  |
| 680,000    | 684      | K,M,J    |       |     |     |     |     |      |      | DG    | DG  | DG  |     | DJ  |      |      | EE    | EE  | EE  | EE  | ED  |      |      | FD    | FD  | FD  | FD  | FD  | FD   |      |  |
| 820,000    | 824      | K,M,J    |       |     |     |     |     |      |      | DG    | DG  | DG  |     |     |      |      | EF    | EF  | EF  | EF  |     |      |      | FF    | FF  | FF  | FF  | FF  | FF   |      |  |
| 1,000,000  | 105      | K,M,J    |       |     |     |     |     |      |      | DG    | DG  | DG  | DJ  |     |      |      | EE    | EE  | EF  | EG  | ED  |      |      | FH    | FH  | FH  | FH  | FH  | FM   |      |  |
| 1,200,000  | 125      | K,M,J    |       |     |     |     |     |      |      | DE    | DE  | DE  |     |     |      |      | ED    | ED  | ED  | EG  |     |      |      | FH    | FH  | FH  | FH  | FH  |      |      |  |
| 1,500,000  | 155      | K,M,J    |       |     |     |     |     |      |      | DG    | DG  | DG  |     |     |      |      | EF    | EF  | EF  | EG  |     |      |      | FH    | FH  | FH  | FH  | FH  |      |      |  |
| 1,800,000  | 185      | K,M,J    |       |     |     |     |     |      |      | DG    | DG  | DG  |     |     |      |      | EF    | EF  | EF  |     |     |      |      | FH    | FH  | FH  | FH  | FH  |      |      |  |
| 2,200,000  | 225      | K,M,J    |       |     |     |     |     |      |      | DG    | DG  | DG  |     |     |      |      | EG    | EG  | EG  | EF  | EH  |      |      |       |     | FJ  | FG  |     |      |      |  |
| 2,700,000  | 275      | K,M,J    |       |     |     |     |     |      |      |       |     |     |     |     |      |      | EN    | EN  | EK  |     |     |      |      |       |     |     |     |     |      |      |  |
| 3,300,000  | 335      | K,M,J    |       |     |     |     |     |      |      |       |     |     |     |     |      |      | ED    | ED  | ED  |     |     |      |      |       |     |     |     | FM  |      |      |  |
| 3,900,000  | 395      | K,M,J    |       |     |     |     |     |      |      |       |     |     |     |     |      |      | EL    | EL  | EL  |     |     |      |      |       |     |     |     |     |      |      |  |
| 4,700,000  | 475      | K,M,J    |       |     |     |     |     |      |      |       |     |     |     |     |      |      | EM    | EM  | EM  | EH  |     |      |      |       | FC  | FC  | FC  | FG  | FS   |      |  |
| 5,600,000  | 565      | K,M,J    |       |     |     |     |     |      |      |       |     |     |     |     |      |      | EH    | EH  | EH  |     |     |      |      |       |     |     |     |     |      |      |  |
| 6,800,000  | 685      | K,M,J    |       |     |     |     |     |      |      |       |     |     |     |     |      |      | EH    | EH  | EH  |     |     |      |      |       |     |     |     | FM  |      |      |  |
| 8,200,000  | 825      | K,M,J    |       |     |     |     |     |      |      |       |     |     |     |     |      |      | EH    | EH  | EH  |     |     |      |      |       |     |     |     |     |      |      |  |
| 10,000,000 | 106      | K,M,J    |       |     |     |     |     |      |      |       |     |     |     |     |      |      | EH    | EH  | EH  |     |     |      |      |       |     | FH  | FH  | FH  | FS   |      |  |

## Electrical Parameters

As detailed in the KEMET Surface Mount Catalog F3102 for X7R, with following specific requirements based on room temperature (25°C) parameters:

- Operating Range: -55°C to +125°C, with no-bias capacitance shift limited to  $\pm 15\%$  over that range.
- Insulation Resistance (IR) measured after 2 minutes at rated voltage @ 25°C: Limit is 500 megohm microfarads or 100,000 M $\Omega$ , whichever of the two is smaller.
- Capacitance and Dissipation Factor (DF) measured under the following conditions:  
1kHz and 1 Vrms if capacitance  $\leq 10\mu\text{F}$   
120Hz and 0.5 Vrms if capacitance  $> 10\mu\text{F}$

- DF Limits are:

|                |      |
|----------------|------|
| 50 - 200 Volts | 2.5% |
| 16 - 25 Volts  | 3.5% |
| 6.3/10 Volts   | 5.0% |

## 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:

- 1210 case size - Solder Reflow
- 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.

## Qualification/Certification

AEC-Q200 Rev. C - Automotive  
RoHS 6 - 100% tin termination

***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.***

RoHS Compliant

