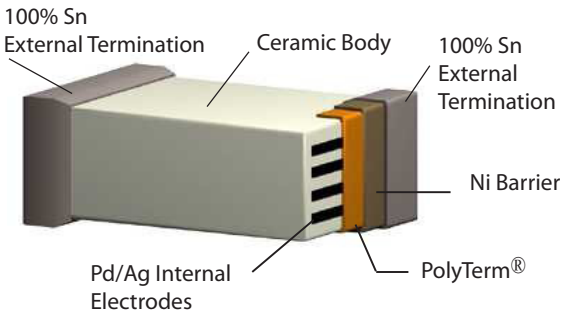
# High Voltage PolyTerm® Ceramic Capacitors

Standard MLCCs are prone to cracking due to mishandling, depanelization, and board flexing. In response to customer requests for higher resistance to mechanical stress, and as a result of continuous efforts to improve our products, JDI has introduced PolyTerm® termination ceramic capacitors to meet those customer requirements for increased resistance to flexure cracking.

PolyTerm® is a conductive epoxy termination material loaded with silver, allowing it to absorb much more bending force than standard termination material. After termination PolyTerm® parts are nickel and tin plated using the same process as standard parts. There is no effect on solderability or capability to withstand the soldering process.

PolyTerm® capacitors are ideal for use in telecom, power supply, inverter, and modem applications.




## Features

- Lead Free Terminations 100% Sn, Final Termination
- Electrodes: Pd/Ag
- Core Termination: PolyTerm®
- Middle Barrier Layer: Ni
- External Termination Layer: 100% Sn
- NP0 and X7R temperature coefficient
- Highly reliable performance
- Industry standard case sizes

## How to Order

| 302 | R29 | N | 1R0 | C | F | 4 | E |
|---|---|---|---|---|---|---|---|
| VOLTAGE | CASE SIZE | DIELECTRIC | CAPACITANCE | TOLERANCE | TERMINATION | MARKING | TAPE CODE |
| 1st two digits are significant; third digit denotes number of zeros to follow<br><br>eg:<br>302 = 3000 VDCW | R15 = 0805<br>R18 = 1206<br>S41 = 1210<br>S43 = 1812<br>S47 = 2220<br>S48 = 2225<br>S49 = 1825 | N = NP0<br>W = X7R | 1st two digits are significant; third digit denotes number of zeros to follow<br>eg: 101 = 100 pF<br><br>R denotes decimal<br>eg: 1R0 = 1.0 pF | B = ± 0.1 pF<br>C = ± 0.25 pF<br>D = ± 0.5 pF<br>J = ± 5%<br>K = ± 10%<br>M = ± 20% | F = PolyTerm® | 4 = Unmarked | E = 7" Plastic<br>T = Paper 7" reel |

Safety Certified capacitor p/ns end with "+SC" and are rated at 250 Volts AC.

Example Part Number: 302R29N1R0CF4E



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## High Voltage PolyTerm® Availability - NP0 Dielectric

| SIZE | 0805 | | | 1206 | | | | | 1210 | | | | | 1808 | | | | | | | | 1812 | | | | | | | 2211 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | 500V | 630V | 1000V | 500V | 630V | 1000V | 2000V | 3000V | 500V | 630V | 1000V | 2000V | 3000V | 500V | 630V | 1000V | 2000V | 3000V | 4000V | 5000V | X2Y3 | X1Y2 | 500V | 630V | 1000V | 2000V | 3000V | 4000V | 5000V | Y2 |
| 1.0 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 pF | | | | • | • | • | | | | | | | | | | | | | | | | | | | | | | | | |
| 27 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 33 pF | | | | • | • | • | • | | | | | | | | | | | | | | • | • | | | | | | | | • |
| 39 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 47 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 56 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 68 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 82 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100 pF | • | | | | | | | | | | | | | | | | | | | | • | | | | | | | | | |
| 120 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 150 pF | | | | | | | | | | | | | | | | | | | | | • | | | | | | | | | |
| 180 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 220 pF | | | | • | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 270 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 330 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 390 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 470 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 560 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 680 pF | | | | | | | | | • | • | • | | | | | | | | | | | | | | | | | | | |
| 820 pF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.0 nF | | | | • | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.2 nF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.5 nF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.8 nF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.2 nF | | | | | | | | | | | | | | • | • | • | | | | | | | | | | | | | | |
| 2.7 nF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.3 nF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.9 nF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.7 nF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.6 nF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.8 nF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8.2 nF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 nF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Note: Part values marked with "•" have better availability and shorter lead times.


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## High Voltage PolyTerm® Availability - NP0 Dielectric

| SIZE | 1825 | | | | | | | 2220 | | | | | | | 2225 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | 500V | 630V | 1000V | 2000V | 3000V | 4000V | 5000V | 500V | 630V | 1000V | 2000V | 3000V | 4000V | 5000V | 500V | 630V | 1000V | 2000V | 3000V | 4000V | 5000V |
| 1.0 pF | | | | | | | | | | | | | | | | | | | | | |
| 10 pF | | | | | | | | | | | | | | | | | | | | | |
| 15 pF | | | | | | | | | | | | | | | | | | | | | |
| 18 pF | | | | | | | | | | | | | | | | | | | | | |
| 22 pF | | | | | | | | | | | | | | | | | | | | | |
| 27 pF | | | | | | | | | | | | | | | | | | | | | |
| 33 pF | | | | | | | | | | | | | | | | | | | | | |
| 47 pF | | | | | | | | | | | | | | | | | | | | | |
| 56 pF | | | | | | | | | | | | | | | | | | | | | |
| 68 pF | | | | | | | | | | | | | | | | | | | | | |
| 82 pF | | | | | | | | | | | | | | | | | | | | | |
| 100 pF | | | | | | | | | | | | | | | | | | | | | |
| 150 pF | | | | | | | | | | | | | | | | | | | | | |
| 180 pF | | | | | | | | | | | | | | | | | | | | | |
| 220 pF | | | | | | | | | | | | | | | | | | | | | |
| 270 pF | | | | | | | | | | | | | | | | | | | | | |
| 330 pF | | | | | | | | | | | | | | | | | | | | | |
| 470 pF | | | | | | | | | | | | | | | | | | | | | |
| 560 pF | | | | | | | | | | | | | | | | | | | | | |
| 680 pF | | | | | | | | | | | | | | | | | | | | | |
| 820 pF | | | | | | | | | | | | | | | | | | | | | |
| 1.0 nF | | | | | | | | | | | | | | | | | | | | | |
| 1.2 nF | | | | | | | | | | | | | | | | | | | | | |
| 1.5 nF | | | | | | | | | | | | | | | | | | | | | |
| 1.8 nF | | | | | | | | | | | | | | | | | | | | | |
| 2.2 nF | | | | | | | | | | | | | | | | | | | | | |
| 2.7 nF | | | | | | | | | | | | | | | | | | | | | |
| 3.3 nF | | | | | | | | | | | | | | | | | | | | | |
| 4.7 nF | | | | | | | | | | | | | | | | | | | | | |
| 5.6 nF | | | | | | | | | | | | | | | | | | | | | |
| 6.8 nF | | | | | | | | | | | | | | | | | | | | | |
| 8.2 nF | | | | | | | | | | | | | | | | | | | | | |
| 10 nF | | | | | | | | | | | | | | | | | | | | | |
| 12 nF | | | | | | | | | | | | | | | | | | | | | |
| 15 nF | | | | | | | | | | | | | | | | | | | | | |
| 18 nF | | | | | | | | | | | | | | | | | | | | | |
| 22 nF | | | | | | | | | | | | | | | | | | | | | |
| 27 nF | | | | | | | | | | | | | | | | | | | | | |
| 33 nF | | | | | | | | | | | | | | | | | | | | | |
| 39 nF | | | | | | | | | | | | | | | | | | | | | |
| 47 nF | | | | | | | | | | | | | | | | | | | | | |

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## High Voltage PolyTerm® Availability - X7R Dielectric

| SIZE | 0805 | | | 1206 | | | | | 1210 | | | | | 1808 | | | | | | | | 1812 | | | | | | | | 2211 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | 500V | 630V | 1000V | 500V | 630V | 1000V | 2000V | 3000V | 500V | 630V | 1000V | 2000V | 3000V | 500V | 630V | 1000V | 2000V | 3000V | 4000V | 5000V | X2Y3 | X1Y2 | 500V | 630V | 1000V | 2000V | 3000V | 4000V | 5000V | X2Y3 | Y2 |
| 100 pF | | | ■ | | | ■ | ■ | ■ | | | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | | | | | | ■ | ■ | ■ | ■ | | | |
| 150 pF | | | ■ | | | ■ | ■ | ■ | | | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | | • | ■ | | | | ■ | • | • | ■ | ■ | | ■ |
| 180 pF | | | ■ | | | ■ | ■ | ■ | | | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | | | ■ | | | | ■ | ■ | ■ | ■ | ■ | | ■ |
| 220 pF | | | ■ | | | • | • | ■ | | | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | | | ■ | | | | ■ | ■ | ■ | ■ | ■ | | ■ |
| 270 pF | | | ■ | | | ■ | ■ | | | | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | | | ■ | | | | ■ | ■ | ■ | ■ | ■ | | ■ |
| 330 pF | | | ■ | | | ■ | ■ | | | | ■ | ■ | ■ | | | ■ | ■ | ■ | | | | ■ | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 470 pF | | | ■ | | | • | • | | | | ■ | ■ | ■ | | | ■ | ■ | ■ | | | | • | | | | ■ | • | ■ | ■ | ■ | ■ | ■ |
| 560 pF | | | ■ | | | ■ | ■ | | | | ■ | ■ | ■ | | | ■ | ■ | ■ | | | | ■ | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 680 pF | | | ■ | | | ■ | ■ | | | | ■ | ■ | | | | ■ | ■ | ■ | | | | ■ | | | | ■ | ■ | ■ | ■ | ■ | ■ | • |
| 820 pF | | | ■ | | | ■ | ■ | | | | ■ | ■ | | | | ■ | ■ | ■ | | | | ■ | | | | ■ | ■ | ■ | ■ | | ■ | ■ |
| 1.0 nF | • | • | • | • | • | • | • | | • | • | • | • | | • | • | • | • | • | | | • | ■ | | | ■ | • | • | ■ | | ■ | ■ |
| 1.2 nF | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | | ■ | | | | ■ | ■ | ■ | ■ | | ■ | ■ |
| 1.5 nF | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | | ■ | | | | ■ | ■ | ■ | | | ■ | ■ |
| 1.8 nF | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | | | | | | ■ | ■ | ■ | | | ■ | ■ |
| 2.2 nF | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | | | | | | ■ | ■ | ■ | | | ■ | ■ |
| 2.7 nF | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | | | | | | ■ | ■ | ■ | | | ■ | ■ |
| 3.3 nF | ■ | ■ | | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | | | | | | ■ | ■ | ■ | | | ■ | |
| 3.9 nF | ■ | ■ | | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | | | | | | | | ■ | ■ | ■ | | | ■ | |
| 4.7 nF | ■ | | | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | | | | | | | | ■ | ■ | ■ | | | ■ | |
| 5.6 nF | ■ | | | ■ | ■ | ■ | | | ■ | ■ | ■ | | | ■ | ■ | ■ | | | | | | | | | ■ | ■ | ■ | | | | |
| 6.8 nF | ■ | | | ■ | ■ | ■ | | | ■ | ■ | ■ | | | ■ | ■ | ■ | | | | | | | | | ■ | ■ | ■ | | | | |
| 8.2 nF | ■ | | | ■ | ■ | | | | ■ | ■ | ■ | | | ■ | ■ | ■ | | | | | | | | | ■ | ■ | ■ | | | | |
| 10 nF | ■ | | | ■ | ■ | | | | ■ | ■ | ■ | | | • | • | • | | | | | | | | | ■ | ■ | ■ | | | | |
| 12 nF | | | | ■ | | | | | ■ | ■ | ■ | | | ■ | ■ | ■ | | | | | | | | | ■ | ■ | ■ | | | | |
| 15 nF | | | | ■ | | | | | ■ | ■ | ■ | | | ■ | ■ | ■ | | | | | | | | | ■ | ■ | ■ | | | | |
| 18 nF | | | | ■ | | | | | ■ | ■ | | | | ■ | ■ | ■ | | | | | | | | | ■ | ■ | ■ | | | | |
| 22 nF | | | | ■ | | | | | ■ | ■ | | | | ■ | ■ | | | | | | | | | | ■ | ■ | ■ | | | | |
| 27 nF | | | | ■ | | | | | ■ | ■ | | | | ■ | ■ | | | | | | | | | | ■ | ■ | ■ | | | | |
| 33 nF | | | | | | | | | ■ | | | | | ■ | ■ | | | | | | | | | | ■ | ■ | ■ | | | | |
| 39 nF | | | | | | | | | ■ | | | | | ■ | ■ | | | | | | | | | | ■ | ■ | ■ | | | | |
| 47 nF | | | | | | | | | ■ | | | | | ■ | | | | | | | | | | | ■ | ■ | ■ | | | | |
| 56 nF | | | | | | | | | | | | | | ■ | | | | | | | | | | | ■ | ■ | ■ | | | | |
| 68 nF | | | | | | | | | | | | | | | | | | | | | | | | | ■ | ■ | | | | | |
| 82 nF | | | | | | | | | | | | | | | | | | | | | | | | | ■ | ■ | | | | | |
| 100 nF | | | | | | | | | | | | | | | | | | | | | | | | | ■ | ■ | | | | | |
| 120 nF | | | | | | | | | | | | | | | | | | | | | | | | | ■ | | | | | | |
| 150 nF | | | | | | | | | | | | | | | | | | | | | | | | | ■ | | | | | | |
| 180 nF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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## High Voltage PolyTerm® Availability - X7R Dielectric

| SIZE | 1825 | | | | | | | 2220 | | | | | | | | 2225 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | 500V | 630V | 1000V | 2000V | 3000V | 4000V | 5000V | 500V | 630V | 1000V | 2000V | 3000V | 4000V | 5000V | X1Y2 | 500V | 630V | 1000V | 2000V | 3000V | 4000V | 5000V |
| 270 pF | | | | | | | | | | | | | | | | | | | | | | |
| 330 pF | | | | | | | | | | | | | | | | | | | | | | |
| 470 pF | | | | | | | | | | | | | | | | | | | | | | |
| 560 pF | | | | | | | | | | | | | | | | | | | | | | |
| 680 pF | | | | | | | | | | | | | | | | | | | | | | |
| 820 pF | | | | | | | | | | | | | | | | | | | | | | |
| 1.0 nF | | | | | | | | | | | | | | | | | | | | | | |
| 1.2 nF | | | | | | | | | | | | | | | | | | | | | | |
| 1.5 nF | | | | | | | | | | | | | | | | | | | | | | |
| 1.8 nF | | | | | | | | | | | | | | | | | | | | | | |
| 2.2 nF | | | | | | | | | | | | | | | • | | | | | | | |
| 2.7 nF | | | | | | | | | | | | | | | | | | | | | | |
| 3.3 nF | | | | | | | | | | | | | | | | | | | | | | |
| 3.9 nF | | | | | | | | | | | | | | | | | | | | | | |
| 4.7 nF | | | | | | | | | | | | | | | | | | | | | | |
| 5.6 nF | | | | | | | | | | | | | | | | | | | | | | |
| 6.8 nF | | | | | | | | | | | | | | | | | | | | | | |
| 8.2 nF | | | | | | | | | | | | | | | | | | | | | | |
| 10 nF | | | | | | | | | | | | | | | | | | | | | | |
| 12 nF | | | | | | | | | | | | | | | | | | | | | | |
| 15 nF | | | | | | | | | | | | | | | | | | | | | | |
| 18 nF | | | | | | | | | | | | | | | | | | | | | | |
| 22 nF | | | | | | | | | | | | | | | | | | • | • | | | |
| 27 nF | | | | | | | | | | | | | | | | | | | | | | |
| 33 nF | | | | | | | | | | | | | | | | | | | | | | |
| 39 nF | | | | | | | | | | | | | | | | | | | | | | |
| 47 nF | | | | | | | | | | | | | | | | | | | | | | |
| 56 nF | | | | | | | | | | | | | | | | | | | | | | |
| 68 nF | | | | | | | | | | | | | | | | | | | | | | |
| 82 nF | | | | | | | | | | | | | | | | | | | | | | |
| 100 nF | | | | | | | | | | | | | | | | | | | | | | |
| 120 nF | | | | | | | | | | | | | | | | | | | | | | |
| 150 nF | | | | | | | | | | | | | | | | | | | | | | |
| 180 nF | | | | | | | | | | | | | | | | | | | | | | |
| 220 nF | | | | | | | | | | | | | | | | | | | | | | |
| 270 nF | | | | | | | | | | | | | | | | | | | | | | |
| 330 nF | | | | | | | | | | | | | | | | | | | | | | |
| 390 nF | | | | | | | | | | | | | | | | | | | | | | |
| 470 nF | | | | | | | | | | | | | | | | | | | | | | |
| 560 nF | | | | | | | | | | | | | | | | | | | | | | |
| 680 nF | | | | | | | | | | | | | | | | | | | | | | |

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## Bend Test Description

The test board is designed so that the capacitance of the part can be measured while the part is being flexed (See figure 1). The capacitor is mounted at the center of the board. The testing equipment has a pressing block that is located so that it applies force at the center of the test board from below the part at a constant rate. Since the edges of the board are held in place by the support pins, this causes the board to flex. The amount of flex is measured in millimeters from the center of the board to the edge, please see "A" in Figure 2.

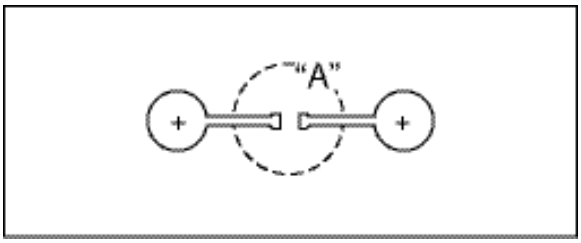



Figure 1

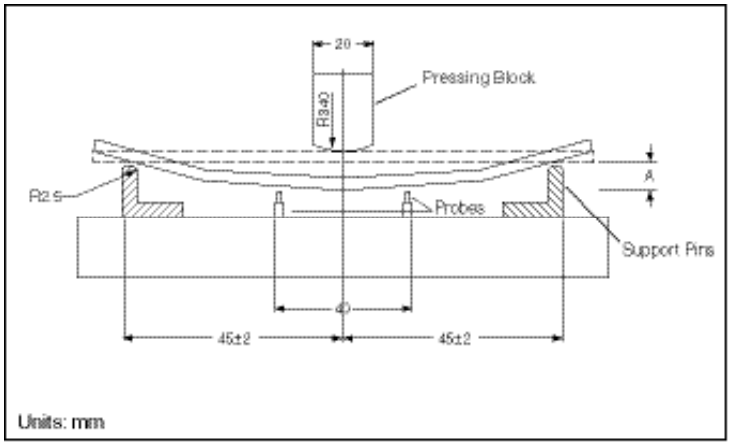
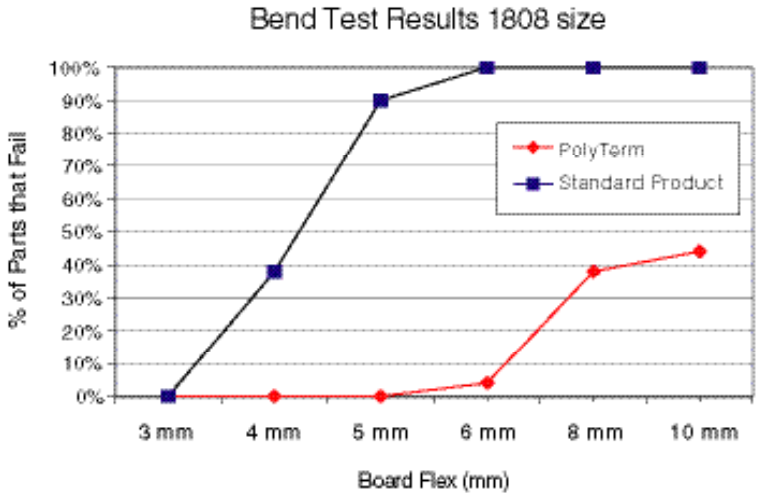



Figure 2

As the test board is flexed, the capacitance is constantly being measured by a capacitance meter which is connected to the test boards through capacitance probes. The capacitance is first measured at 0mm flex to establish the nominal value. The test board is then flexed to 1mm and held for at least on second, then the capacitance is measured, it is then flexed to 2mm, and so on up to 5mm. Any change in capacitance that exceeds 5% of the nominal value is considered a failure.





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## Example of Customer Application

Johanson Dielectrics receives a lot of requests from our customers to help them with cracking issues. One customer had cracking at a rate of 16% on 1206 size high voltage capacitors during their process. The top picture of Figure 3 shows a clear mechanical crack with a 45 degree angle at the termination solder pad interface. Re-populating the same board with PolyTerm® capacitors showed no cracking failures. The bottom picture of Figure 3 shows how PolyTerm® Capacitors solved these problems. No cracking was exhibited on any of the PolyTerm® capacitors during the customer assembly process.

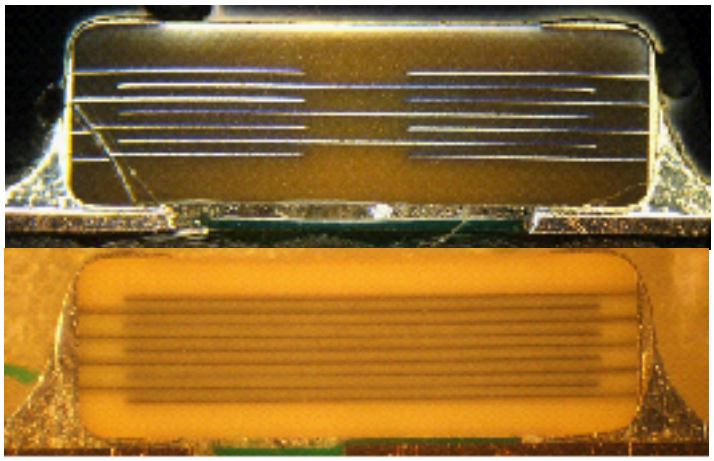

Figure 3

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Johanson:

631R18W103KF4E 102R15W222KF4E