

## Surface Mount Multilayer Ceramic Chip Capacitors Prohibit Surface Arc-Over in High-Voltage Applications



HV Arc Guard® Capacitor with no Surface Arc-over



Standard Capacitor with Surface Arc-over

### FEATURES

#### For this Worldwide Patented Technology

- Specialty: High-voltage applications
- MLCC that protects against surface arc-over
- Excellent high-voltage performance
- Higher capacitances and smaller case sizes that save board space, as compared to standard high-voltage MLCCs
- Voltage breakdowns as much as twice that of competitors' products
- Available with polymer termination for increase resistance to board flex cracking. Please contact factory for availability
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)  
Available

### APPLICATIONS

- Power supplies
- DC/DC converters (buck and boost)
- Voltage multipliers for flyback converters
- For lighting and other AC applications please contact: [mlcc@vishay.com](mailto:mlcc@vishay.com)

### ELECTRICAL SPECIFICATIONS

#### COG (NP0)

##### GENERAL SPECIFICATION

###### Note

Electrical characteristics at + 25 °C unless otherwise specified

**Operating Temperature:** - 55 °C to + 125 °C

**Capacitance Range:** 10 pF to 8.2 nF

**Voltage Range:** 1000 V<sub>DC</sub> to 2500 V<sub>DC</sub>

**Temperature Coefficient of Capacitance (TCC):**  
0 ppm/°C ± 30 ppm/°C from - 55 °C to + 125 °C

##### Dissipation Factor (DF):

0.1 % maximum at 1.0 V<sub>RMS</sub> and  
1 MHz for values ≤ 1000 pF

0.1 % maximum at 1.0 V<sub>RMS</sub> and  
1 kHz for values > 1000 pF

##### Insulating Resistance:

At + 25 °C 100 000 MΩ min. or 1000 ΩF whichever is less  
At + 125 °C 10 000 MΩ min. or 100 ΩF whichever is less

**Aging Rate:** 0 % maximum per decade

##### Dielectric Strength Test:

Performed per method 103 of EIA 198-2-E

Applied test voltages

1000 V<sub>DC</sub>-rated: 150 % of rated voltage

1500 V<sub>DC</sub>, 2500 V<sub>DC</sub>-rated: 120 % of rated voltage

#### X7R

##### GENERAL SPECIFICATION

###### Note

Electrical characteristics at + 25 °C unless otherwise specified

**Operating Temperature:** - 55 °C to + 125 °C

**Capacitance Range:** 220 pF to 270 nF

**Voltage Range:** 250 V<sub>DC</sub> to 1000 V<sub>DC</sub>

**Temperature Coefficient of Capacitance (TCC):**  
± 15 % from - 55 °C to + 125 °C, with 0 V<sub>DC</sub> applied

##### Dissipation Factor (DF):

2.5 % maximum at 1.0 V<sub>RMS</sub> and 1 kHz

##### Insulating Resistance:

At + 25 °C 100 000 MΩ min. or 1000 ΩF whichever is less  
At + 125 °C 10 000 MΩ min. or 100 ΩF whichever is less

**Aging Rate:** 1 % maximum per decade

##### Dielectric Strength Test:

Performed per method 103 of EIA 198-2-E.

Applied test voltages

≤ 250 V<sub>DC</sub>-rated: 200 % of rated voltage

500 V<sub>DC</sub>-rated: min. 150 % of rated voltage

630 V<sub>DC</sub>, 1000 V<sub>DC</sub>-rated: 120 % of rated voltage

**QUICK REFERENCE DATA**

| DIELECTRIC | CASE | MAXIMUM VOLTAGE (V) | CAPACITANCE |         |
|------------|------|---------------------|-------------|---------|
|            |      |                     | MINIMUM     | MAXIMUM |
| C0G (NP0)  | 0805 | 1500                | 10 pF       | 390 pF  |
|            | 1206 | 1500                | 10 pF       | 1.5 nF  |
|            | 1210 | 1500                | 10 pF       | 2.7 nF  |
|            | 2220 | 1500                | 470 pF      | 5.6 nF  |
|            | 2225 | 2500                | 470 pF      | 8.2 nF  |
| X7R        | 0805 | 1000                | 470 pF      | 3.3 nF  |
|            | 1206 | 1000                | 220 pF      | 47 nF   |
|            | 1210 | 1000                | 220 pF      | 82 nF   |
|            | 1808 | 1000                | 220 pF      | 100 nF  |
|            | 1812 | 1000                | 220 pF      | 270 nF  |

**Note**

- Detail ratings see "Selection Chart"

**ORDERING INFORMATION (4)**

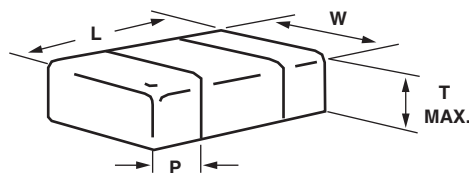
| VJ0805                                               | A                        | 101                                                                                                                                                   | J                                                 | X                                                                                                                                | G                                                                             | A            | C                                                                                                                                                                                                                                                                                         | 5Z (2)            |
|------------------------------------------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| CASE CODE                                            | DIELECTRIC               | CAPACITANCE NOMINAL CODE                                                                                                                              | CAPACITANCE TOLERANCE                             | TERMINATION                                                                                                                      | DC VOLTAGE RATING (1)                                                         | MARKING      | PACKAGING                                                                                                                                                                                                                                                                                 | PROCESS CODE      |
| 0805<br>1206<br>1210<br>1808<br>1812<br>2220<br>2225 | A = C0G (NP0)<br>Y = X7R | Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier.<br><b>Examples</b><br>102 = 1000 pF<br>223 = 22 000 pF | J = $\pm 5\%$<br>K = $\pm 10\%$<br>M = $\pm 20\%$ | X = Ni barrier<br>100 % tin plated<br>F, E = AgPd (3)<br>B = Polymer<br>100 % tin plated<br>matte finish (4)<br>N = Non-magnetic | P = 250 V<br>E = 500 V<br>L = 630 V<br>G = 1000 V<br>R = 1500 V<br>O = 2500 V | A = Unmarked | C = 7" reel/paper tape<br>T = 7" reel/plastic tape<br>P = 11 1/4"/13" reel/paper tape<br>R = 11 1/4"/13" reel/plastic tape<br>O = 7" reel/flamed paper tape<br>I = 11 1/4"/13" reel/flamed paper tape<br><br><b>Note:</b><br>"I" and "O" are used for "F", "E", "N" termination size 0805 | 5Z = HVArc Guard® |

**Notes**

- (1) DC voltage rating should not be exceeded in application. Other application factors may affect the MLCC performance. Consult for questions: [mlcc@vishay.com](mailto:mlcc@vishay.com)
- (2) Process code with 2 digits has to be added
- (3) Termination code "E" is for conductive epoxy assembly, contact [mlcc@vishay.com](mailto:mlcc@vishay.com) for availability
- (4) Please contact factory for polymer termination availability

**ENVIRONMENTAL STATUS**

| TERMINATION CODE | TERMINATION DESCRIPTION                      | RoHS COMPLIANT | VISHAY GREEN |
|------------------|----------------------------------------------|----------------|--------------|
| X                | Ni barrier 100 % tin plated matte finish     | Yes            | Yes          |
| E                | AgPd                                         | Yes            | Yes          |
| B                | Polymer layer, 100 % tin plated matte finish | Yes            | No           |
| F                | AgPd                                         | Yes            | No           |
| N                | Non-magnetic                                 | Yes            | No           |

**DIMENSIONS** in inches (millimeters)


| CASE CODE | STYLE  | LENGTH (L)                     | WIDTH (W)                       | MAXIMUM THICKNESS (T) | TERMINATION PAD (P) |              |
|-----------|--------|--------------------------------|---------------------------------|-----------------------|---------------------|--------------|
|           |        |                                |                                 |                       | MINIMUM             | MAXIMUM      |
| 0805      | VJ0805 | 0.079 ± 0.008<br>(2.00 ± 0.20) | 0.049 ± 0.008<br>(1.25 ± 0.020) | 0.057 (1.45)          | 0.010 (0.25)        | 0.028 (0.71) |
| 1206      | VJ1206 | 0.126 ± 0.008<br>(3.20 ± 0.20) | 0.063 ± 0.008<br>(1.60 ± 0.20)  | 0.067 (1.70)          | 0.010 (0.25)        | 0.030 (0.76) |
| 1210      | VJ1210 | 0.126 ± 0.008<br>(3.20 ± 0.20) | 0.098 ± 0.008<br>(2.50 ± 0.020) | 0.067 (1.70)          | 0.010 (0.25)        | 0.030 (0.76) |
| 1808      | VJ1808 | 0.180 ± 0.012<br>(4.57 ± 0.30) | 0.080 ± 0.010<br>(2.03 ± 0.25)  | 0.067 (1.70)          | 0.010 (0.25)        | 0.030 (0.76) |
| 1812      | VJ1812 | 0.177 ± 0.012<br>(4.50 ± 0.30) | 0.126 ± 0.008<br>(3.20 ± 0.20)  | 0.086 (2.18)          | 0.010 (0.25)        | 0.030 (0.76) |
| 2220      | VJ2220 | 0.220 ± 0.010<br>(5.59 ± 0.25) | 0.200 ± 0.010<br>(5.08 ± 0.25)  | 0.086 (2.18)          | 0.010 (0.25)        | 0.030 (0.76) |
| 2225      | VJ2225 | 0.220 ± 0.010<br>(5.59 ± 0.25) | 0.250 ± 0.010<br>(6.35 ± 0.25)  | 0.090 (2.30)          | 0.010 (0.25)        | 0.030 (0.76) |

**Note**

- Polymer (B-termination) have increased dimensions:  
Length 0.006" (0.15 mm)



| SELECTION CHART COG (NP0)  |        |           |      |        |      |        |      |        |      |        |      |      |
|----------------------------|--------|-----------|------|--------|------|--------|------|--------|------|--------|------|------|
| DIELECTRIC                 |        | COG (NP0) |      |        |      |        |      |        |      |        |      |      |
| STYLE                      |        | VJ0805    |      | VJ1206 |      | VJ1210 |      | VJ2220 |      | VJ2225 |      |      |
| CASE CODE                  |        | 0805      |      | 1206   |      | 1210   |      | 2220   |      | 2225   |      |      |
| VOLTAGE (V <sub>DC</sub> ) |        | 1000      | 1500 | 1000   | 1500 | 1000   | 1500 | 1000   | 1500 | 1000   | 1500 | 2500 |
| VOLTAGE CODE               |        | G         | R    | G      | R    | G      | R    | G      | R    | G      | R    | O    |
| CAP. CODE                  | CAP.   |           |      |        |      |        |      |        |      |        |      |      |
| 100                        | 10 pF  | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 120                        | 12 pF  | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 150                        | 15 pF  | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 180                        | 18 pF  | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 220                        | 22 pF  | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 270                        | 27 pF  | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 330                        | 33 pF  | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 390                        | 39 pF  | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 470                        | 47 pF  | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 560                        | 56 pF  | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 680                        | 68 pF  | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 820                        | 82 pF  | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 101                        | 100 pF | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 121                        | 120 pF | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 151                        | 150 pF | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 181                        | 180 pF | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 221                        | 220 pF | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 271                        | 270 pF | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 331                        | 330 pF | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 391                        | 390 pF | •         | •    | •      | •    | •      | •    |        |      |        |      |      |
| 471                        | 470 pF |           |      | •      | •    | •      | •    | •      | •    | •      | •    | •    |
| 561                        | 560 pF |           |      | •      | •    | •      | •    | •      | •    | •      | •    | •    |
| 681                        | 680 pF |           |      | •      | •    | •      | •    | •      | •    | •      | •    | •    |
| 821                        | 820 pF |           |      | •      | •    | •      | •    | •      | •    | •      | •    | •    |
| 102                        | 1.0 nF |           |      | •      | •    | •      | •    | •      | •    | •      | •    | •    |
| 122                        | 1.2 nF |           |      | •      | •    | •      | •    | •      | •    | •      | •    | •    |
| 152                        | 1.5 nF |           |      | •      | •    | •      | •    | •      | •    | •      | •    | •    |
| 182                        | 1.8 nF |           |      |        |      | •      | •    | •      | •    | •      | •    | •    |
| 222                        | 2.2 nF |           |      |        |      | •      | •    | •      | •    | •      | •    | •    |
| 272                        | 2.7 nF |           |      |        |      | •      | •    | •      | •    | •      | •    | •    |
| 332                        | 3.3 nF |           |      |        |      |        |      | •      | •    | •      | •    | •    |
| 392                        | 3.9 nF |           |      |        |      |        |      | •      | •    | •      | •    | •    |
| 472                        | 4.7 nF |           |      |        |      |        |      | •      | •    | •      | •    | •    |
| 562                        | 5.6 nF |           |      |        |      |        |      | •      | •    | •      | •    | •    |
| 682                        | 6.8 nF |           |      |        |      |        |      |        |      | •      | •    | •    |
| 822                        | 8.2 nF |           |      |        |      |        |      |        |      | •      | •    | •    |

**Notes**See soldering recommendations within this data book, or visit [www.vishay.com/doc?45034](http://www.vishay.com/doc?45034)

- Available in plastic carrier tape only

• RoHS-compliant



## SELECTION CHART X7R

| DIELECTRIC                 |        | X7R    |      |        |     |     |      |        |     |     |      |        |     |     |      |        |     |     |      |
|----------------------------|--------|--------|------|--------|-----|-----|------|--------|-----|-----|------|--------|-----|-----|------|--------|-----|-----|------|
| STYLE                      |        | VJ0805 |      | VJ1206 |     |     |      | VJ1210 |     |     |      | VJ1808 |     |     |      | VJ1812 |     |     |      |
| CASE CODE                  |        | 0805   |      | 1206   |     |     |      | 1210   |     |     |      | 1808   |     |     |      | 1812   |     |     |      |
| VOLTAGE (V <sub>DC</sub> ) |        | 630    | 1000 | 250    | 500 | 630 | 1000 | 250    | 500 | 630 | 1000 | 250    | 500 | 630 | 1000 | 250    | 500 | 630 | 1000 |
| VOLTAGE CODE               |        | L      | G    | P      | E   | L   | G    | P      | E   | L   | G    | P      | E   | L   | G    | P      | E   | L   | G    |
| CAP. CODE                  | CAP.   |        |      |        |     |     |      |        |     |     |      |        |     |     |      |        |     |     |      |
| 101                        | 100 pF |        |      |        |     |     |      |        |     |     |      |        |     |     |      |        |     |     |      |
| 121                        | 120 pF |        |      |        |     |     |      |        |     |     |      |        |     |     |      |        |     |     |      |
| 151                        | 150 pF |        |      |        |     |     |      |        |     |     |      |        |     |     |      |        |     |     |      |
| 181                        | 180 pF |        |      |        |     |     |      |        |     |     |      |        |     |     |      |        |     |     |      |
| 221                        | 220 pF |        |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 271                        | 270 pF |        |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 331                        | 330 pF |        |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 391                        | 390 pF |        |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 471                        | 470 pF | ••     | ••   | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 561                        | 560 pF | ••     | ••   | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 681                        | 680 pF | ••     | ••   | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 821                        | 820 pF | ••     | ••   | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 102                        | 1.0 nF | ••     | ••   | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 122                        | 1.2 nF | ••     | ••   | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 152                        | 1.5 nF | •      | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 182                        | 1.8 nF | •      | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 222                        | 2.2 nF | •      | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 272                        | 2.7 nF | •      | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 332                        | 3.3 nF | •      | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 392                        | 3.9 nF |        |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 472                        | 4.7 nF |        |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 562                        | 5.6 nF |        |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 682                        | 6.8 nF |        |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 822                        | 8.2 nF |        |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 103                        | 10 nF  |        |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 123                        | 12 nF  |        |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 153                        | 15 nF  |        |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 183                        | 18 nF  |        |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 223                        | 22 nF  |        |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 273                        | 27 nF  |        |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 333                        | 33 nF  |        |      | •      | •   |     |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 393                        | 39 nF  |        |      | •      | •   |     |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 473                        | 47 nF  |        |      | •      | •   |     |      | •      | •   | •   | •    | •      | •   | •   | •    | •      | •   | •   | •    |
| 563                        | 56 nF  |        |      |        |     |     |      | •      | •   | •   |      | •      | •   |     |      | •      | •   | •   | •    |
| 683                        | 68 nF  |        |      |        |     |     |      | •      | •   |     |      | •      |     |     |      | •      | •   | •   | •    |
| 823                        | 82 nF  |        |      |        |     |     |      | •      | •   |     |      | •      |     |     |      | •      | •   | •   | •    |
| 104                        | 100 nF |        |      |        |     |     |      |        |     |     |      | •      |     |     |      | •      | •   | •   |      |
| 124                        | 120 nF |        |      |        |     |     |      |        |     |     |      |        |     |     |      | •      |     |     |      |
| 154                        | 150 nF |        |      |        |     |     |      |        |     |     |      |        |     |     |      | •      |     |     |      |
| 184                        | 180 nF |        |      |        |     |     |      |        |     |     |      |        |     |     |      | •      |     |     |      |
| 224                        | 220 nF |        |      |        |     |     |      |        |     |     |      |        |     |     |      | •      |     |     |      |
| 274                        | 270 nF |        |      |        |     |     |      |        |     |     |      |        |     |     |      | •      |     |     |      |
| 334                        | 330 nF |        |      |        |     |     |      |        |     |     |      |        |     |     |      |        |     |     |      |

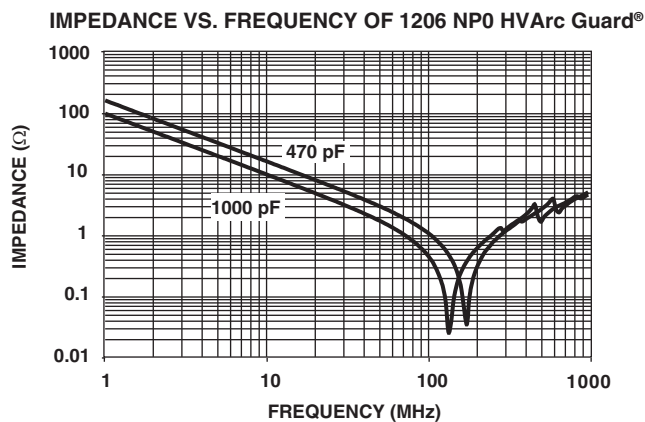
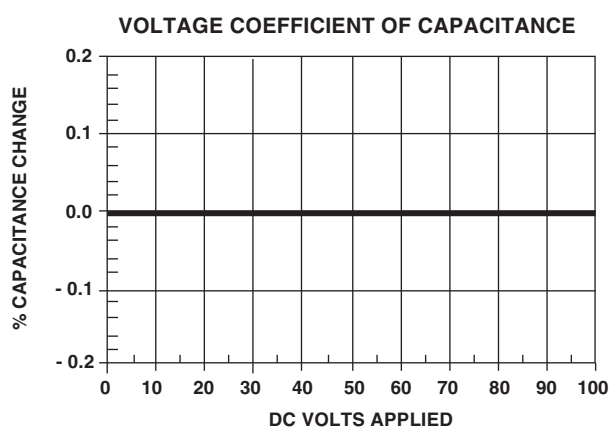
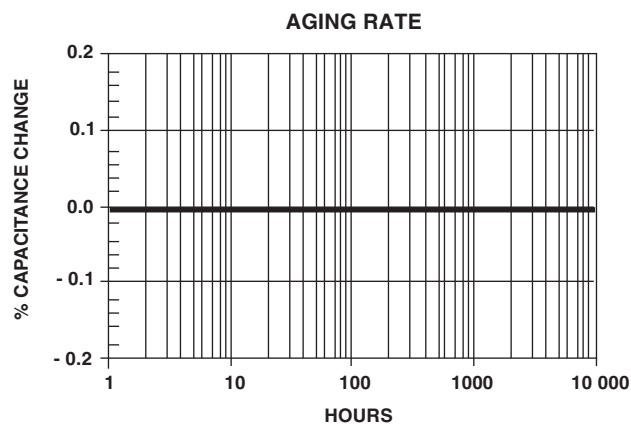
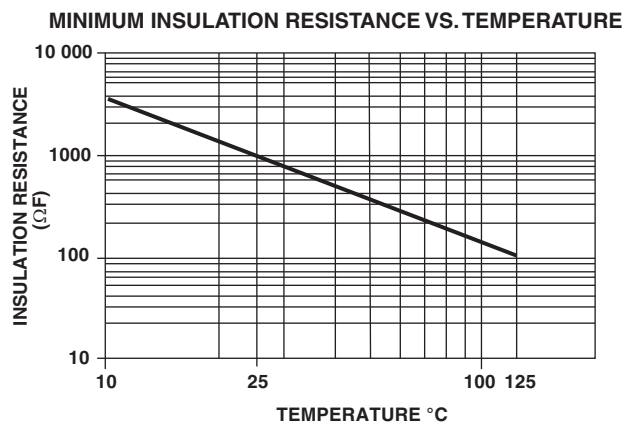
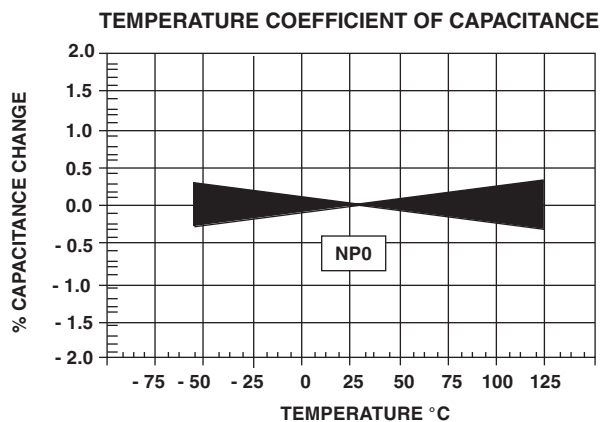
## Notes

See soldering recommendations within this data book, or visit [www.vishay.com/doc?45034](http://www.vishay.com/doc?45034)

• Available in plastic carrier tape only

•• Only available in paper carrier tape

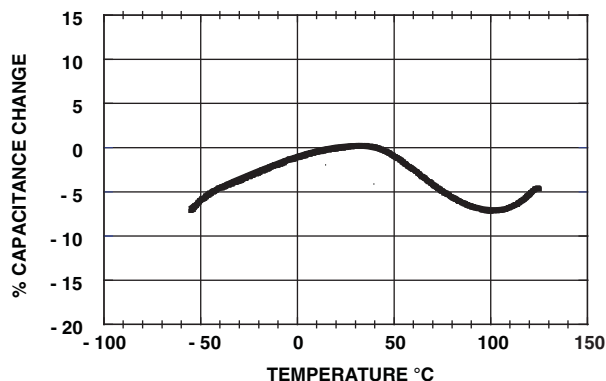
■ RoHS-compliant

**HVArc Guard® C0G (NP0) DIELECTRIC - TYPICAL PARAMETERS**


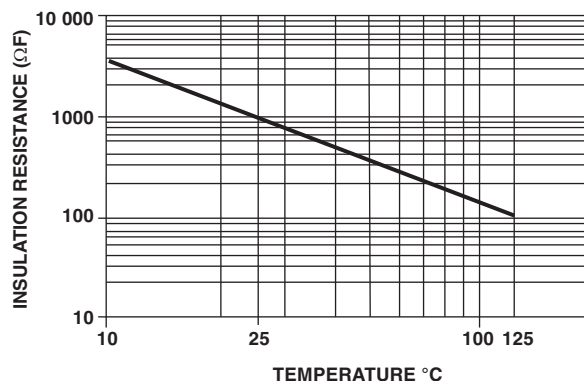


# HVArc Guard® X7R DIELECTRIC - TYPICAL PARAMETERS

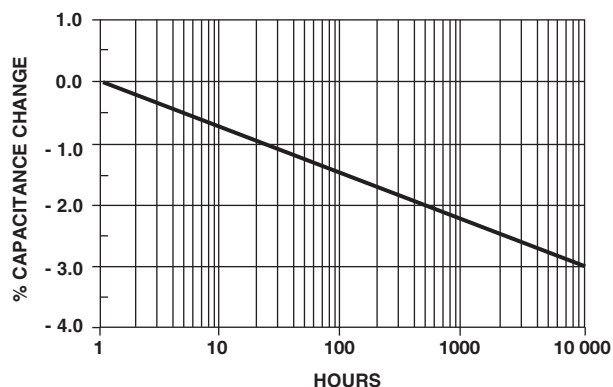
TEMPERATURE COEFFICIENT OF CAPACITANCE



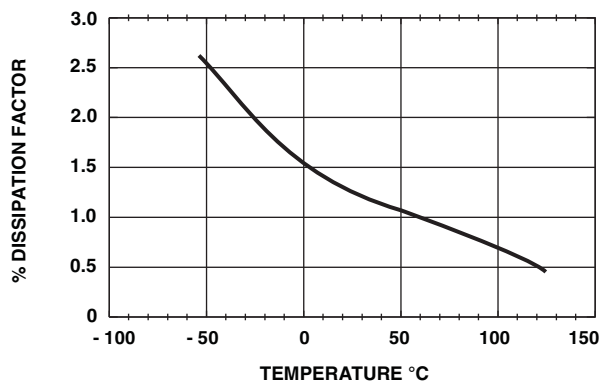
MINIMUM INSULATION RESISTANCE VS. TEMPERATURE



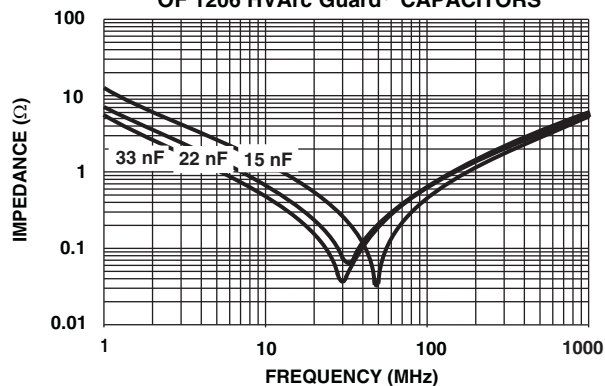
AGING RATE

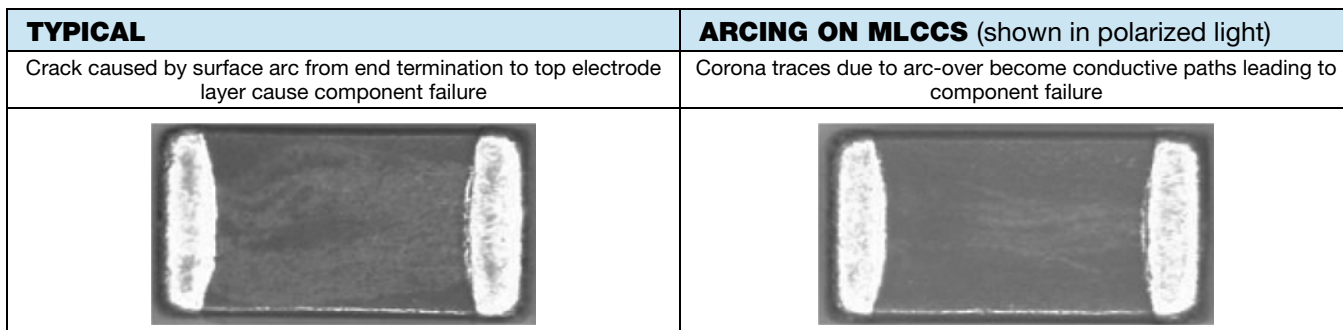
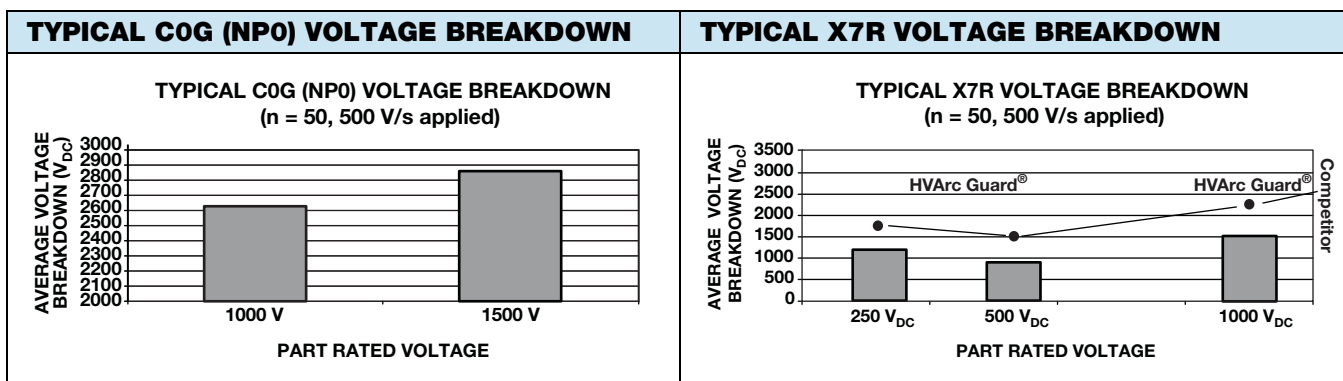


DISSIPATION FACTOR VS. TEMPERATURE



IMPEDANCE VS. FREQUENCY OF 1206 HVArc Guard® CAPACITORS





| STANDARD PACKAGING QUANTITIES (1)(2)(3)(4)(5) |           |                                   |                                 |                                   |                                 |
|-----------------------------------------------|-----------|-----------------------------------|---------------------------------|-----------------------------------|---------------------------------|
| CASE CODE                                     | TAPE SIZE | 7" REEL QUANTITIES                |                                 | 11 1/4" AND 13" REEL QUANTITIES   |                                 |
|                                               |           | PAPER TAPE PACKAGING CODE "C"/"O" | PLASTIC TAPE PACKAGING CODE "T" | PAPER TAPE PACKAGING CODE "P"/"I" | PLASTIC TAPE PACKAGING CODE "R" |
| 0805                                          | 8 mm      | 3000                              | 3000                            | 10 000                            | 10 000                          |
| 1206 <sup>(6)</sup>                           | 8 mm      | n/a                               | 2500                            | n/a                               | 10 000                          |
| 1210 <sup>(6)</sup>                           | 8 mm      | n/a                               | 2500                            | n/a                               | 10 000                          |
| 1808                                          | 12 mm     | n/a                               | 2000                            | n/a                               | 10 000                          |
| 1812                                          | 12 mm     | n/a                               | 1000                            | n/a                               | 4000                            |
| 2220                                          | 12 mm     | n/a                               | 1000                            | n/a                               | 4000                            |
| 2225                                          | 12 mm     | n/a                               | 1000                            | n/a                               | 4000                            |

**Notes**

- (1) Vishay Vitramon uses embossed plastic carrier tape and punch paper carrier tape
- (2) Paper tape is not available for case sizes > 1206 or for component thickness > 0.035" (0.89 mm)
- (3) 11 1/4" reel is standard for large quantities. 13" is maybe used for large "T" dimension parts
- (4) Reference: EIA standard RS 481 - "Taping of Surface Mount Components for Automatic Placement"
- (5) n/a = not available
- (6) Packaging quantity can vary with product thickness  
Contact [mlcc@vishay.com](mailto:mlcc@vishay.com) with respect to specific part number requirements

| STORAGE AND HANDLING CONDITIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>(1) Store the components at 5 °C to + 40 °C ambient temperature and ≤ 70 % related humidity conditions.</p> <p>(2) The product is recommended to be used within a time-frame of 2 years after shipment.<br/>Check solderability in case extended shelf life beyond the expiry date is needed.</p> <p>Precautions:</p> <ol style="list-style-type: none"> <li>a. Do not store products in an environment containing corrosive elements, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. This may cause corrosion or oxidation of the terminations, which can easily lead to poor soldering.</li> <li>b. Store products on the shelf and avoid exposure to moisture or dust.</li> <li>c. Do not expose products to excessive shock, vibration, direct sunlight and so on.</li> </ol> |



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**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

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