

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



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

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 _{DC} to 2500 V _{DC} |
| 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 _{RMS} and 1 MHz for values ≤ 1000 pF 0.1 % maximum at 1.0 V _{RMS} 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 _{DC} -rated: 150 % of rated voltage 1500 V _{DC} , 2500 V _{DC} -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 _{DC} to 1000 V _{DC} |
| Temperature Coefficient of Capacitance (TCC): ± 15 % from -55 °C to +125 °C, with 0 V _{DC} applied |
| Dissipation Factor (DF): 2.5 % maximum at 1.0 V _{RMS} 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 _{DC} -rated: 200 % of rated voltage 500 V _{DC} -rated: min. 150 % of rated voltage 630 V _{DC} , 1000 V _{DC} -rated: min. 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

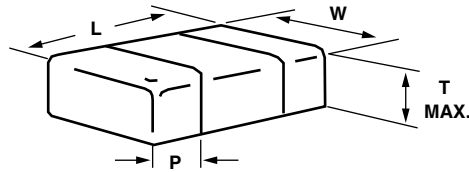
- Detail ratings see “Selection Chart”

| ORDERING INFORMATION (4) | | | | | | | | |
|--|--------------------------|---|---------------------------------------|--|---|--------------|---|-------------------|
| VJ0805 | A | 101 | J | X | G | A | T | 5Z (2) |
| CASE CODE | DIELECTRIC | CAPACITANCE NOMINAL CODE | CAPACITANCE TOLERANCE | TERMINATION (5) | DC VOLTAGE RATING (1) | MARKING | PACKAGING | PROCESS CODE |
| 0805 1206 1210 1808 1812 2220 2225 | A = C0G (NP0) Y = X7R | Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. Examples 102 = 1000 pF 223 = 22 000 pF | J = ± 5 % K = ± 10 % M = ± 20 % | X = Ni barrier 100 % matte tin plate finish F, E = AgPd (3) B = polymer 100 % matte tin plate finish (4) | P = 250 V E = 500 V L = 630 V G = 1000 V R = 1500 V O = 2500 V | A = unmarked | T = 7" reel / plastic tape R = 11 1/4" / 13" reel / plastic tape | 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
- (2) Process code has to be added
- (3) Termination code “E” is for conductive epoxy assembly, contact mlcc@vishay.com for availability
- (4) Please contact factory for polymer termination availability
- (5) Other termination options contact mlcc@vishay.com for 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 |

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 (2.00 ± 0.20) | 0.049 ± 0.008 (1.25 ± 0.20) | 0.057 (1.45) | 0.010 (0.25) | 0.030 (0.76) |
| 1206 | VJ1206 | 0.126 ± 0.008 (3.20 ± 0.20) | 0.063 ± 0.008 (1.60 ± 0.20) | 0.067 (1.70) | 0.010 (0.25) | 0.030 (0.76) |
| 1210 | VJ1210 | 0.126 ± 0.008 (3.20 ± 0.20) | 0.098 ± 0.008 (2.50 ± 0.20) | 0.067 (1.70) | 0.010 (0.25) | 0.030 (0.76) |
| 1808 | VJ1808 | 0.180 ± 0.012 (4.57 ± 0.30) | 0.080 ± 0.010 (2.03 ± 0.25) | 0.067 (1.70) | 0.010 (0.25) | 0.035 (0.90) |
| 1812 | VJ1812 | 0.177 ± 0.012 (4.50 ± 0.30) | 0.126 ± 0.008 (3.20 ± 0.20) | 0.086 (2.18) | 0.010 (0.25) | 0.035 (0.90) |
| 2220 | VJ2220 | 0.220 ± 0.010 (5.59 ± 0.25) | 0.200 ± 0.010 (5.08 ± 0.25) | 0.086 (2.18) | 0.010 (0.25) | 0.037 (0.95) |
| 2225 | VJ2225 | 0.220 ± 0.010 (5.59 ± 0.25) | 0.250 ± 0.010 (6.35 ± 0.25) | 0.090 (2.30) | 0.010 (0.25) | 0.037 (0.95) |

Note

- Polymer (B-termination) have increased dimensions: part length increased by 0.006" (0.15 mm)



| SELECTION CHART COG (NP0) | | | | | | | | | | | | |
|----------------------------|--------|-----------|------|-----------------------|------|-----------------------|------|-----------------------|------|-----------------------|------|------|
| DIELECTRIC | | COG (NP0) | | | | | | | | | | |
| STYLE | | VJ0805 | | VJ1206 ⁽¹⁾ | | VJ1210 ⁽¹⁾ | | VJ2220 ⁽¹⁾ | | VJ2225 ⁽¹⁾ | | |
| CASE CODE | | 0805 | | 1206 | | 1210 | | 2220 | | 2225 | | |
| VOLTAGE (V _{DC}) | | 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

⁽¹⁾ See soldering recommendations within this data book, or visit www.vishay.com/doc?45034

- Available in plastic carrier tape only

■ RoHS-compliant



| SELECTION CHART X7R | | | | | | | | | | | | | | | | | | | |
|----------------------------|--------|--------|------|-----------------------|-----|-----|------|-----------------------|-----|-----|------|-----------------------|-----|-----|------|-----------------------|-----|-----|------|
| DIELECTRIC | | X7R | | | | | | | | | | | | | | | | | |
| STYLE | | VJ0805 | | VJ1206 ⁽¹⁾ | | | | VJ1210 ⁽¹⁾ | | | | VJ1808 ⁽¹⁾ | | | | VJ1812 ⁽¹⁾ | | | |
| CASE CODE | | 0805 | | 1206 | | | | 1210 | | | | 1808 | | | | 1812 | | | |
| VOLTAGE (V _{DC}) | | 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 | | | | | | | | | | | | | | | | | | |

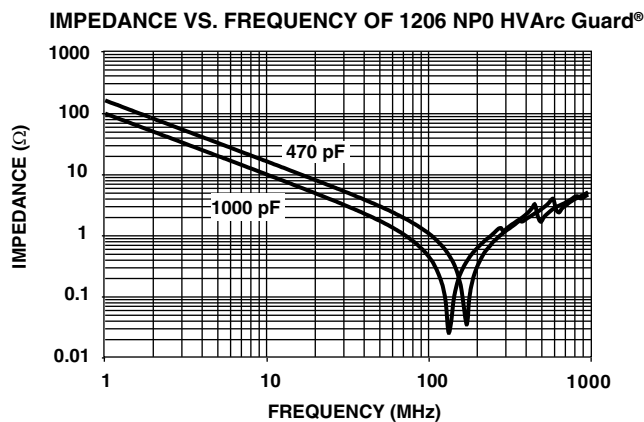
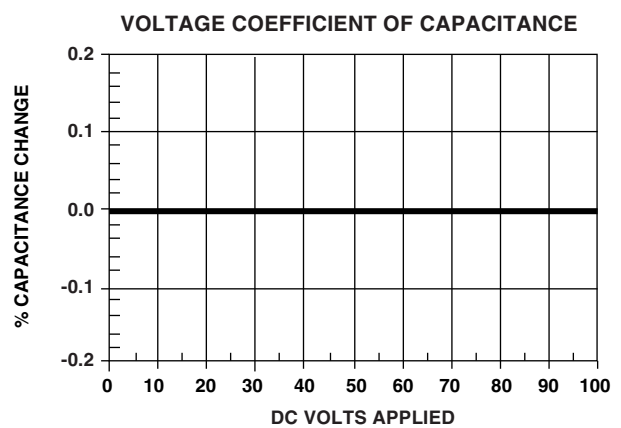
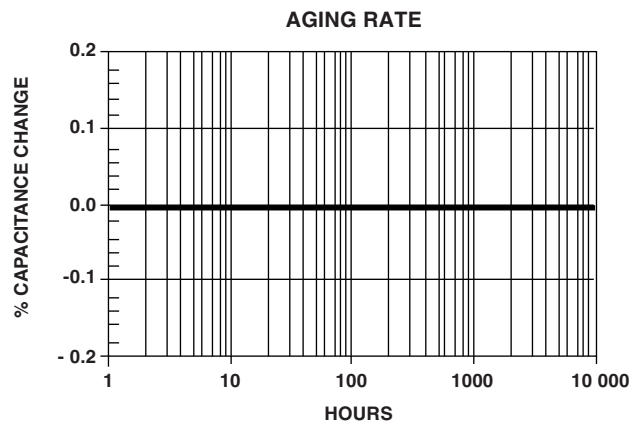
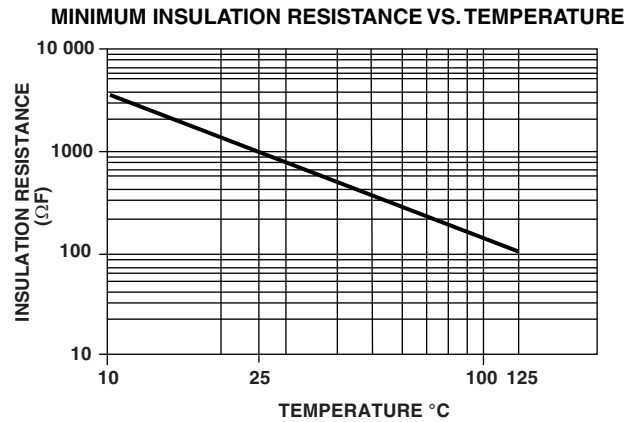
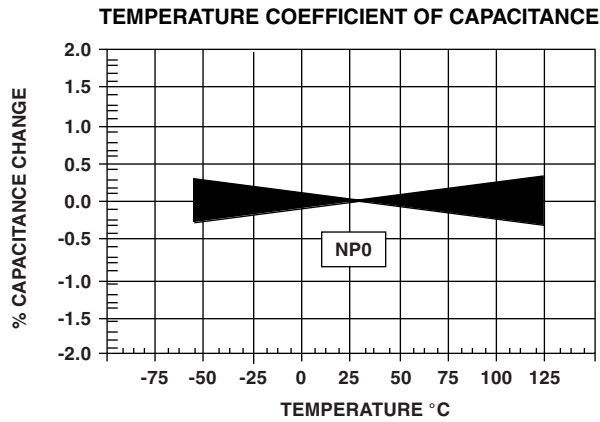
Notes

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

• Available in plastic carrier tape only

■ RoHS-compliant

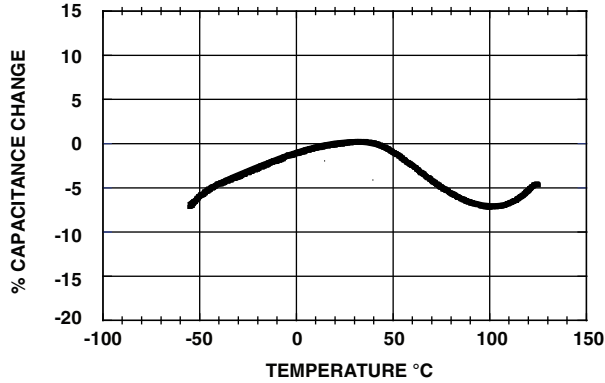
HVArc Guard® COG (NP0) DIELECTRIC - TYPICAL PARAMETERS



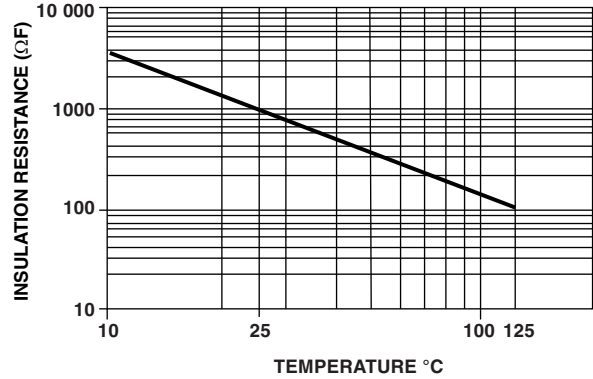


HVArc Guard® X7R DIELECTRIC - TYPICAL PARAMETERS

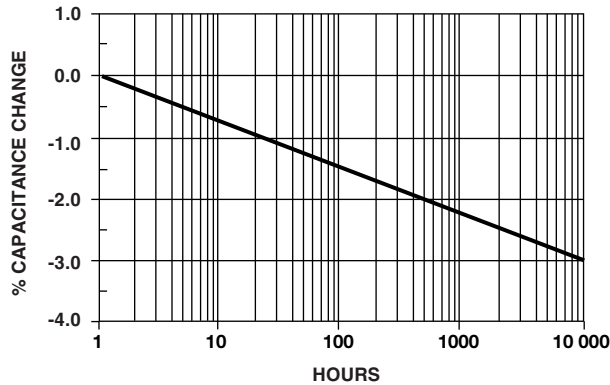
TEMPERATURE COEFFICIENT OF CAPACITANCE



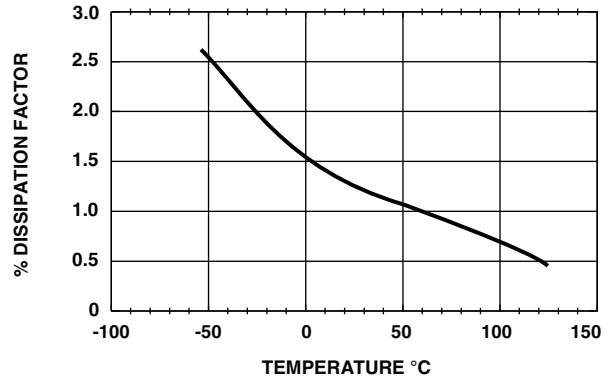
MINIMUM INSULATION RESISTANCE VS. TEMPERATURE



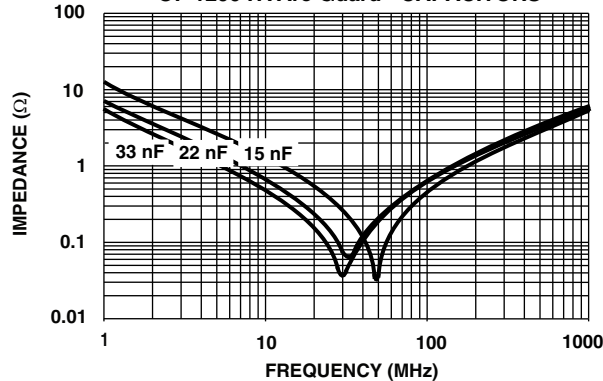
AGING RATE

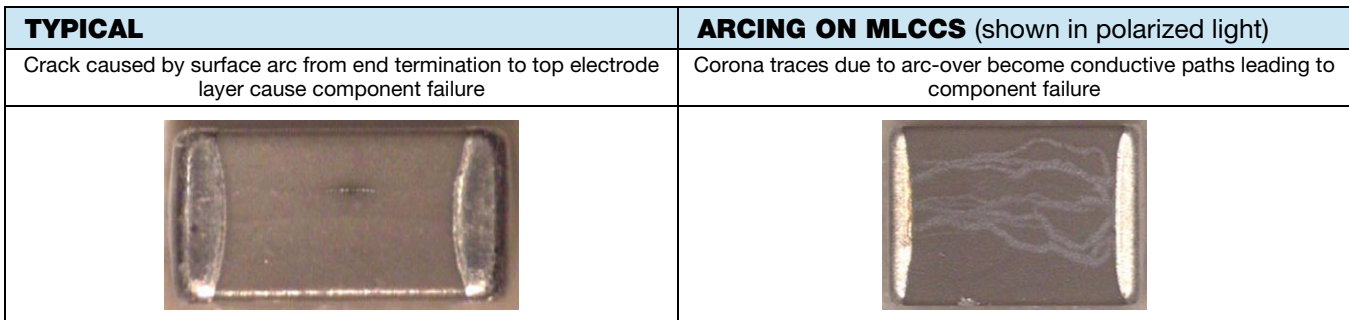
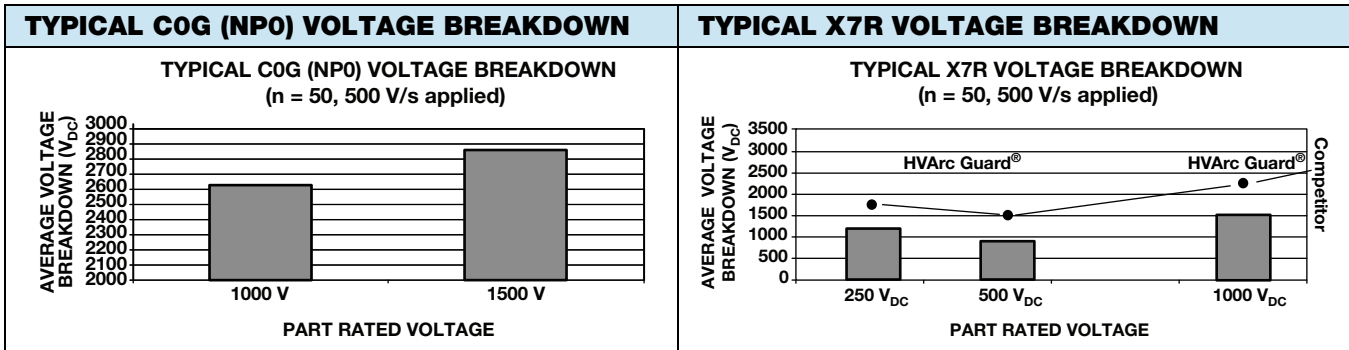


DISSIPATION FACTOR VS. TEMPERATURE



IMPEDANCE VS. FREQUENCY OF 1206 HVArc Guard® CAPACITORS





APPLICATION NOTE

- Suitable only for transient voltage and not for periodical pulse(s) chain
- 1000 V rated parts are not suitable for AC / lighting applications above 220 V_{AC}
- 500 V and 630 V are not suitable for AC / lighting applications above 110 V_{AC}
- If further questions, please contact: mlcc@vishay.com

| STANDARD PACKAGING QUANTITIES (1)(2)(3) | | | |
|---|-----------|---------------------------------|---------------------------------|
| CASE CODE | TAPE SIZE | 7" REEL QUANTITIES | 11 1/4" AND 13" REEL QUANTITIES |
| | | PLASTIC TAPE PACKAGING CODE "T" | PLASTIC TAPE PACKAGING CODE "R" |
| 0805 | 8 mm | 3000 | 10 000 |
| 1206 (4) | 8 mm | 2500 / 3000 | 10 000 |
| 1210 (4) | 8 mm | 2500 / 3000 | 10 000 |
| 1808 | 12 mm | 2000 | 10 000 |
| 1812 | 12 mm | 1000 | 4000 |
| 2220 | 12 mm | 1000 | n/a |
| 2225 | 12 mm | 500 | n/a |

Notes

- (1) Vishay Vitramon uses embossed plastic carrier tape
- (2) 11 1/4" reel is standard for large quantities. 13" is maybe used for large "T" dimension parts
- (3) Reference: EIA standard RS 481 - "Taping of Surface Mount Components for Automatic Placement"
- (4) Packaging quantity can vary with product thickness
Contact mlcc@vishay.com with respect to specific part number requirements

STORAGE AND HANDLING CONDITIONS

- (1) Store the components at 5 °C to 40 °C ambient temperature and ≤ 70 % relative humidity conditions.
- (2) The product is recommended to be used within a time-frame of 2 years after shipment.
Check solderability in case extended shelf life beyond the expiry date is needed.

Precautions:

- 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 oxidization of the terminations, which can easily lead to poor soldering.
- b. Store products on the shelf and avoid exposure to moisture or dust.
- c. Do not expose products to excessive shock, vibration, direct sunlight and so on.



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.