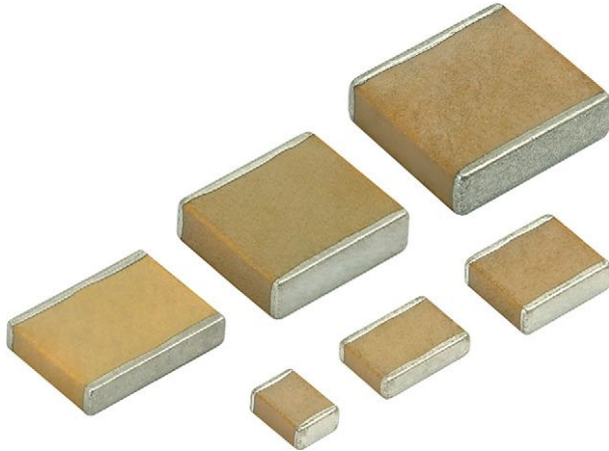


## Surface Mount Multilayer Ceramic Capacitors for Pulse Current Applications



### FEATURES

- Low electrostrictive ceramic formulation for repeated charge and discharge cycles
- High pulse discharge currents
- Excellent reliability and high voltage performance
- Available with tin / lead barrier termination (code "L")
- Wet built process
- Reliable Noble Metal Electrode (NME) system
- Made with a combination of design, materials and tight process control to achieve very high field reliability
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



Available  
**RoHS\***  
Available  
**HALOGEN  
FREE**

### Note

\* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details

### APPLICATIONS

- Power supplies
- Converters
- Voltage multipliers

### ELECTRICAL SPECIFICATIONS

#### Note

- Electrical characteristics at +25 °C unless otherwise specified

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

**Capacitance Range:** 4.7 nF to 560 nF

**Voltage Range:** 1000 V<sub>DC</sub>, 1500 V<sub>DC</sub>

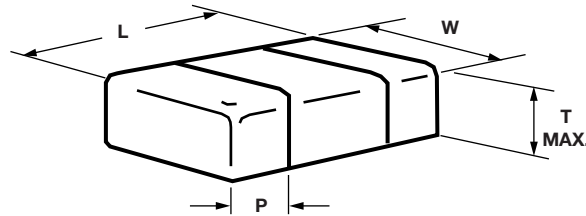
**Temperature Coefficient of Capacitance (TCC):**  
X7R: ± 15 % from -55 °C to +125 °C, with 0 V<sub>DC</sub> applied

**Dissipation Factor (DF):**  
2.5 % max. at 1.0 V<sub>RMS</sub> and 1 kHz

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

**Insulation Resistance (IR):**  
at +25 °C and rated voltage: 100 000 MΩ minimum or 1000 ΩF, whichever is less  
at +125 °C and rated voltage: 10 000 MΩ minimum or 100 ΩF, whichever is less

**Dielectric Strength Test:**  
performed per method 103 of EIA 198-2-E.  
Applied test voltages:  
1000 V<sub>DC</sub> / 1500 V<sub>DC</sub>-rated: min. 120 % of rated voltage

**DIMENSIONS** in inches [millimeters]


| CASE CODE | PART ORDERING NUMBER | LENGTH (L)                      | WIDTH (W)                       | MAXIMUM THICKNESS (T) |                                | TERMINATION (P) |                 |
|-----------|----------------------|---------------------------------|---------------------------------|-----------------------|--------------------------------|-----------------|-----------------|
|           |                      |                                 |                                 |                       |                                | MINIMUM         | MAXIMUM         |
| 1812      | VJ1812               | 0.177 ± 0.012<br>[4.50 ± 0.30]  | 0.126 ± 0.008<br>[3.20 ± 0.20]  | 0.086<br>[2.18]       |                                | 0.010<br>[0.25] | 0.035<br>[0.90] |
| 1825      | VJ1825               | 0.177 ± 0.012<br>[4.50 ± 0.30]  | 0.252 ± 0.010<br>[6.40 ± 0.25]  | 0.086<br>[2.18]       |                                | 0.010<br>[0.25] | 0.035<br>[0.90] |
| 2225      | VJ2225               | 0.220 ± 0.010<br>[5.59 ± 0.25]  | 0.250 ± 0.010<br>[6.35 ± 0.25]  | 0.086<br>[2.18]       |                                | 0.010<br>[0.25] | 0.037<br>[0.95] |
| 3040      | VJ3040               | 0.300 ± 0.015<br>[7.62 ± 0.38]  | 0.400 ± 0.015<br>[10.20 ± 0.38] | 0.100<br>[2.54]       |                                | 0.010<br>[0.25] | 0.039<br>[1.00] |
| 3640      | VJ3640               | 0.360 ± 0.015<br>[9.14 ± 0.38]  | 0.400 ± 0.015<br>[10.20 ± 0.38] | 0.120<br>[3.05]       | 0.130 <sup>(1)</sup><br>[3.30] | 0.010<br>[0.25] | 0.039<br>[1.00] |
| 4044      | VJ4044               | 0.400 ± 0.015<br>[10.16 ± 0.38] | 0.440 ± 0.015<br>[11.17 ± 0.38] | 0.120<br>[3.05]       |                                | 0.020<br>[0.50] | 0.040<br>[1.00] |

**Note**

<sup>(1)</sup> Thickness used for 3640 - 1500 V - 220 nF and 270 nF

**QUICK REFERENCE DATA**

| DIELECTRIC | CASE | MAXIMUM VOLTAGE (V) | CAPACITANCE |         |
|------------|------|---------------------|-------------|---------|
|            |      |                     | MINIMUM     | MAXIMUM |
| X7R (X5P)  | 1812 | 1500                | 4.7 nF      | 27 nF   |
|            | 1825 | 1500                | 10 nF       | 56 nF   |
|            | 2225 | 1500                | 18 nF       | 100 nF  |
|            | 3040 | 1500                | 33 nF       | 220 nF  |
|            | 3640 | 1500                | 47 nF       | 330 nF  |
|            | 4044 | 1500                | 100 nF      | 560 nF  |

**Note**

- Detail ratings see "Selection Chart"

**ORDERING INFORMATION**

| VJ3640                                       | Y          | 184  | K                                     | X   | R                                | A            | T   | SE                          |
|--|------------|--|---------------------------------------|---|----------------------------------|--------------|---|-----------------------------|
| CASE CODE                                    | DIELECTRIC | CAPACITANCE NOMINAL CODE   | CAPACITANCE TOLERANCE                 | TERMINATION   | DC VOLTAGE RATING <sup>(1)</sup> | MARKING      | PACKAGING <sup>(3)</sup>  | PROCESS CODE <sup>(2)</sup> |
| 1812<br>1825<br>2225<br>3040<br>3640<br>4044 | Y = X7R    | Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier.<br><b>Examples:</b><br>184 = 180 000 pF | J = ± 5 %<br>K = ± 10 %<br>M = ± 20 % | X = Ni barrier<br>100 % tin matte plated<br>L = Ni barrier with tin lead plated finish<br>min. 4 % lead | G = 1000 V<br>R = 1500 V         | A = unmarked | T = 7" reel / plastic tape<br>J = 7" reel / plastic tape (low quantity) |                             |

**Notes**

- <sup>(1)</sup> DC voltage rating should not be exceeded in application.  
<sup>(2)</sup> Process code with 2 digits has to be added.  
<sup>(3)</sup> All types of packaging may not be available for all case sizes, see table end of this datasheet.



| SELECTION CHART            |         |                       |      |                       |      |                       |      |                       |      |                       |      |                       |      |
|----------------------------|---------|-----------------------|------|-----------------------|------|-----------------------|------|-----------------------|------|-----------------------|------|-----------------------|------|
| DIELECTRIC                 |         | X7R                   |      |                       |      |                       |      |                       |      |                       |      |                       |      |
| STYLE                      |         | VJ1812 <sup>(1)</sup> |      | VJ1825 <sup>(1)</sup> |      | VJ2225 <sup>(1)</sup> |      | VJ3040 <sup>(1)</sup> |      | VJ3640 <sup>(1)</sup> |      | VJ4044 <sup>(1)</sup> |      |
| CASE CODE                  |         | 1812                  |      | 1825                  |      | 2225                  |      | 3040                  |      | 3640                  |      | 4044                  |      |
| VOLTAGE (V <sub>DC</sub> ) |         | 1000                  | 1500 | 1000                  | 1500 | 1000                  | 1500 | 1000                  | 1500 | 1000                  | 1500 | 1000                  | 1500 |
| VOLTAGE CODE               |         | G                     | R    | G                     | R    | G                     | R    | G                     | R    | G                     | R    | G                     | R    |
| CAP. CODE                  | CAP.    |                       |      |                       |      |                       |      |                       |      |                       |      |                       |      |
| 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  |                       |      |                       |      |                       |      |                       |      | •                     |      | •                     | •    |
| 394                        | 390 nF  |                       |      |                       |      |                       |      |                       |      |                       |      | •                     |      |
| 474                        | 470 nF  |                       |      |                       |      |                       |      |                       |      |                       |      | •                     |      |
| 564                        | 560 nF  |                       |      |                       |      |                       |      |                       |      |                       |      | •                     |      |
| 684                        | 680 nF  |                       |      |                       |      |                       |      |                       |      |                       |      |                       |      |
| 824                        | 820 nF  |                       |      |                       |      |                       |      |                       |      |                       |      |                       |      |
| 105                        | 1000 nF |                       |      |                       |      |                       |      |                       |      |                       |      |                       |      |

**Notes**

• RoHS-compliant except when supplied with lead (Pb)-containing termination, code "L"

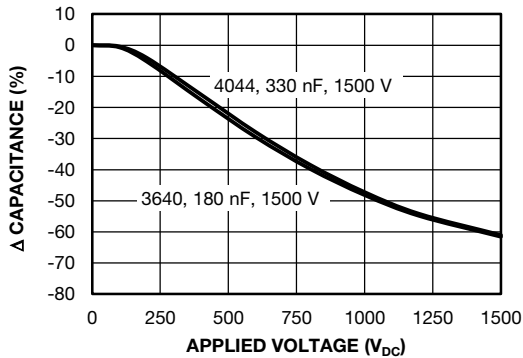
• Plastic tape

<sup>(1)</sup> See soldering recommendations within this data book, or visit [www.vishay.com/doc?45034](http://www.vishay.com/doc?45034)

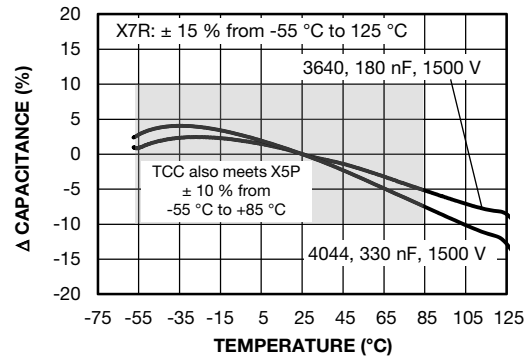


## TYPICAL PARAMETERS

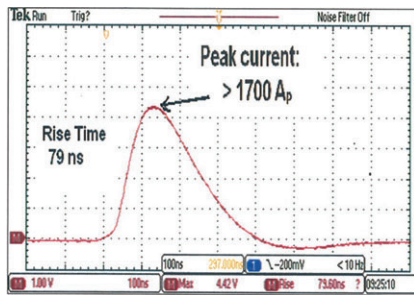
### VOLTAGE COEFFICIENT OF CAPACITANCE



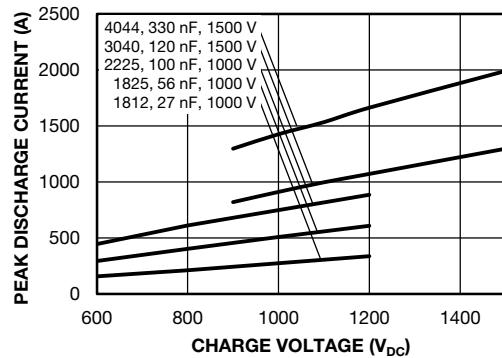
### TEMPERATURE COEFFICIENT OF CAPACITANCE



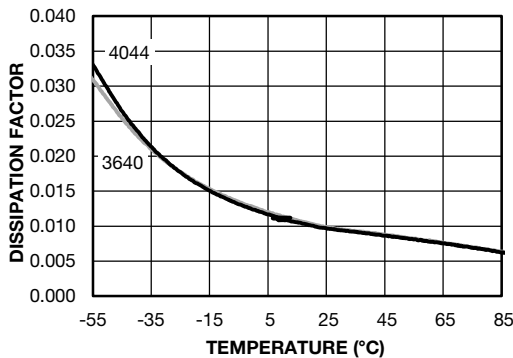
### DISCHARGE PULSE OF 330 nF, 4044 SEC



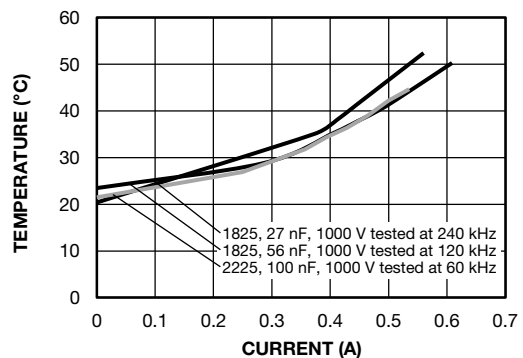
### DISCHARGE CURRENT VS. CHARGE VOLTAGE



### DISSIPATION FACTOR VS. TEMPERATURE



### TEMPERATURE VS. RIPPLE CURRENT





| STANDARD PACKAGING QUANTITIES |           |                                 |                                 |
|-------------------------------|-----------|---------------------------------|---------------------------------|
| CASE CODE                     | TAPE SIZE | 7" REEL QUANTITIES              |                                 |
|                               |           | PLASTIC TAPE PACKAGING CODE "T" | LOW QUANTITY PACKAGING CODE "J" |
| 1812                          | 12 mm     | 1000                            | 500                             |
| 1825                          | 12 mm     | 1000                            | 500                             |
| 2225                          | 12 mm     | 500                             | 250                             |
| 3040                          | 16 mm     | 500                             | n/a                             |
| 3640                          | 16 mm     | 350                             | n/a                             |
| 4044                          | 24 mm     | 300                             | n/a                             |

**Notes**

- Reference: EIA standard RS 481 - "Taping of Surface Mount Components for Automatic Placement"
- n/a = not available

| STORAGE AND HANDLING CONDITIONS   |
|---|
| <p>(1) Store the components at 5 °C to 40 °C ambient temperature and ≤ 70 % relative 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>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.</li> <li>Store products on the shelf and avoid exposure to moisture or dust.</li> <li>Do not expose products to excessive shock, vibration, direct sunlight and so on.</li> </ol> |



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