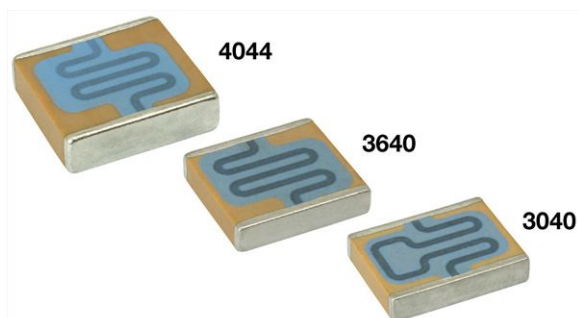


## Surface Mount Multilayer Ceramic Chip Capacitors with Integrated Resistor for High Pulse Current Applications



### FEATURES

- Integrated resistor on the surface of the capacitor
- 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
- Resistor glass overglaze contains lead
- 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

- Detonation devices (munitions, pyrotechnic, blasting)
- Down hole drilling
- Electronic fuzing

### ELECTRICAL SPECIFICATIONS

#### Note

- Electrical characteristics at + 25 °C unless otherwise specified

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

**Capacitance Range:** 33 nF to 560 nF

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

#### Temperature Coefficient of Capacitance (TCC):

X5P: ± 10 % from - 55 °C to + 85 °C, with 0 V<sub>DC</sub> applied

X7R: ± 15 % from - 55 °C to + 125 °C, with 0 V<sub>DC</sub> applied

**Parallel Resistor:** 500 MΩ ± 30 %

#### Dissipation Factor (DF):

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

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

#### Insulation Resistance (IR):

At + 25 °C without resistor: 100 000 MΩ minimum or 1000 ΩF, whichever is less.

At + 125 °C without resistor: 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: 120 % of rated voltage



## QUICK REFERENCE DATA

| DIELECTRIC | CASE | MAXIMUM VOLTAGE<br>(V) | CAPACITANCE |         |
|------------|------|------------------------|-------------|---------|
|            |      |                        | MINIMUM     | MAXIMUM |
| X7R (X5P)  | 3040 | 1500                   | 33 nF       | 220 nF  |
|            | 3640 | 1500                   | 47 nF       | 330 nF  |
|            | 4044 | 1500                   | 100 nF      | 560 nF  |

## Note

- Detail ratings see "Selection Chart"

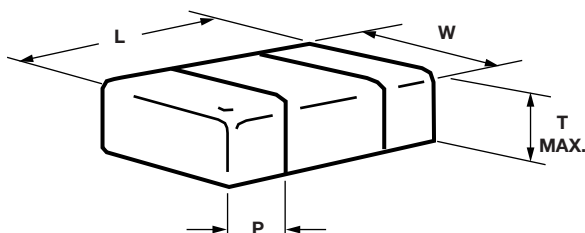
## ORDERING INFORMATION

| VJ3640 <sup>(3)</sup> | Y             | 184                                                                                                                                                | K                                                 | X                                                                                                                      | R                                | A            | T                        | 8R <sup>(2)</sup> |
|-----------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------|--------------------------|-------------------|
| CASE CODE             | DIELECTRIC    | CAPACITANCE NOMINAL CODE                                                                                                                           | CAPACITANCE TOLERANCE                             | TERMINATION                                                                                                            | DC VOLTAGE RATING <sup>(1)</sup> | MARKING      | PACKAGING                | PROCESS CODE      |
| 3040<br>3640<br>4044  | Y = X7R (X5P) | Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier.<br><b>Examples:</b><br>184 = 180 nF<br>334 = 330 nF | J = $\pm 5\%$<br>K = $\pm 10\%$<br>M = $\pm 20\%$ | X = Ni barrier<br>100 % tin plate<br>matte finish<br>L = Ni barrier<br>with tin lead<br>plated finish<br>min. 4 % lead | G = 1000 V<br>R = 1500 V         | A = Unmarked | T = 7" reel/plastic tape |                   |

## 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 must be added to control special requirements
- (3) Size designator may be replaced by four digit drawing number used to control non-standard products and/or special requirements

## DIMENSIONS in inches [millimeters]



| CASE CODE | PART ORDERING NUMBER | LENGTH (L)                              | WIDTH (W)                               | MAXIMUM THICKNESS (T) | TERMINATION (P) |                 |
|-----------|----------------------|-----------------------------------------|-----------------------------------------|-----------------------|-----------------|-----------------|
|           |                      |                                         |                                         |                       | MINIMUM         | MAXIMUM         |
| 3040      | VJ3040               | 0.300 $\pm$ 0.015<br>[7.62 $\pm$ 0.38]  | 0.400 $\pm$ 0.015<br>[10.20 $\pm$ 0.38] | 0.100<br>[2.54]       | 0.010<br>[0.25] | 0.030<br>[0.76] |
| 3640      | VJ3640               | 0.360 $\pm$ 0.015<br>[9.14 $\pm$ 0.38]  | 0.400 $\pm$ 0.015<br>[10.20 $\pm$ 0.38] | 0.120<br>[3.05]       | 0.010<br>[0.25] | 0.030<br>[0.76] |
| 4044      | VJ4044               | 0.400 $\pm$ 0.015<br>[10.16 $\pm$ 0.38] | 0.440 $\pm$ 0.015<br>[11.17 $\pm$ 0.38] | 0.120<br>[3.05]       | 0.020<br>[0.50] | 0.040<br>[1.00] |

| SELECTION CHART            |               |                       |      |                       |      |                       |      |
|----------------------------|---------------|-----------------------|------|-----------------------|------|-----------------------|------|
| DIELECTRIC                 |               | X7R (X5P)             |      |                       |      |                       |      |
| STYLE                      |               | VJ3040 <sup>(1)</sup> |      | VJ3640 <sup>(1)</sup> |      | VJ4044 <sup>(1)</sup> |      |
| CASE CODE                  |               | 3040                  |      | 3640                  |      | 4044                  |      |
| VOLTAGE (V <sub>DC</sub> ) |               | 1000                  | 1500 | 1000                  | 1500 | 1000                  | 1500 |
| VOLTAGE CODE               |               | G                     | R    | G                     | R    | G                     | R    |
| CAP. CODE                  | CAP.          |                       |      |                       |      |                       |      |
| 223                        | 0.022 $\mu$ F |                       |      |                       |      |                       |      |
| 273                        | 0.027 $\mu$ F |                       |      |                       |      |                       |      |
| 333                        | 0.033 $\mu$ F |                       | •    |                       |      |                       |      |
| 393                        | 0.039 $\mu$ F |                       | •    |                       |      |                       |      |
| 473                        | 0.047 $\mu$ F |                       | •    |                       | •    |                       |      |
| 563                        | 0.056 $\mu$ F | •                     | •    |                       | •    |                       |      |
| 683                        | 0.068 $\mu$ F | •                     | •    |                       | •    |                       |      |
| 823                        | 0.082 $\mu$ F | •                     | •    |                       | •    |                       |      |
| 104                        | 0.10 $\mu$ F  | •                     | •    | •                     | •    |                       | •    |
| 124                        | 0.12 $\mu$ F  | •                     | •    | •                     | •    |                       | •    |
| 154                        | 0.15 $\mu$ F  | •                     |      | •                     | •    | •                     | •    |
| 184                        | 0.18 $\mu$ F  | •                     |      | •                     | •    | •                     | •    |
| 224                        | 0.22 $\mu$ F  | •                     |      | •                     |      | •                     | •    |
| 274                        | 0.27 $\mu$ F  |                       |      | •                     |      | •                     | •    |
| 334                        | 0.33 $\mu$ F  |                       |      | •                     |      | •                     | •    |
| 394                        | 0.39 $\mu$ F  |                       |      |                       |      | •                     |      |
| 474                        | 0.47 $\mu$ F  |                       |      |                       |      | •                     |      |
| 564                        | 0.56 $\mu$ F  |                       |      |                       |      | •                     |      |
| 684                        | 0.68 $\mu$ F  |                       |      |                       |      |                       |      |
| 824                        | 0.82 $\mu$ F  |                       |      |                       |      |                       |      |
| 105                        | 1.0 $\mu$ F   |                       |      |                       |      |                       |      |
| 125                        | 1.2 $\mu$ F   |                       |      |                       |      |                       |      |
| 155                        | 1.5 $\mu$ F   |                       |      |                       |      |                       |      |
| 185                        | 1.8 $\mu$ F   |                       |      |                       |      |                       |      |
| 225                        | 2.2 $\mu$ F   |                       |      |                       |      |                       |      |
| 275                        | 2.7 $\mu$ F   |                       |      |                       |      |                       |      |
| 335                        | 3.3 $\mu$ F   |                       |      |                       |      |                       |      |

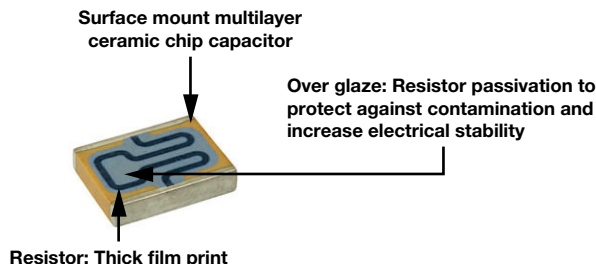
## Notes

■ 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)

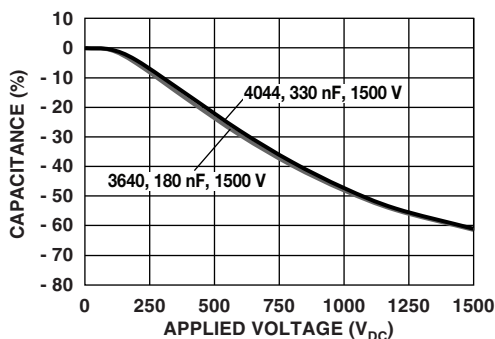
## CONSTRUCTION



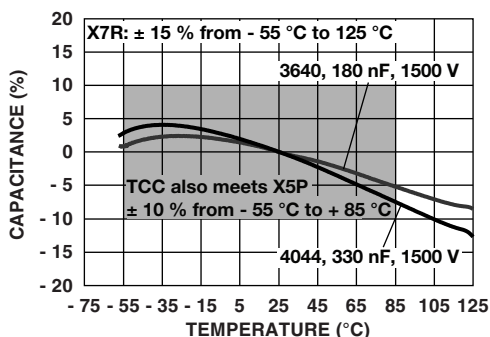


## TYPICAL PARAMETERS

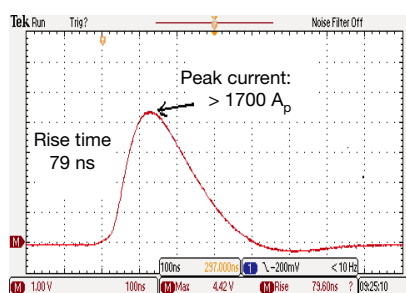
### VOLTAGE COEFFICIENT OF CAPACITANCE



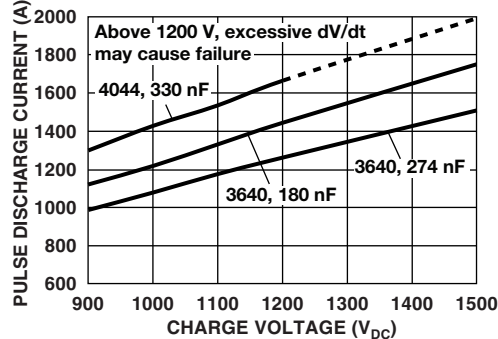
### TEMPERATURE COEFFICIENT OF CAPACITANCE



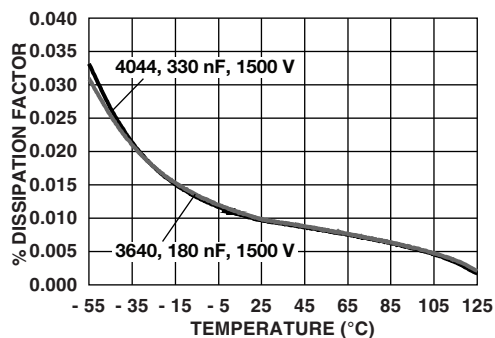
### DISCHARGE PULSE OF 4044 CDC



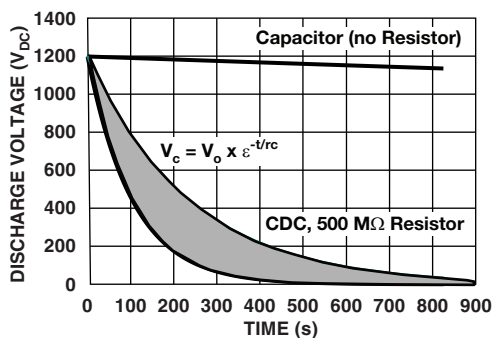
### DISCHARGE CURRENT VS. CHARGE VOLTAGE



### DISSIPATION FACTOR VS. TEMPERATURE



### SELF DISCHARGE VS. TIME





| STANDARD PACKAGING QUANTITIES (1)(2)(3) |           |                                    |
|-----------------------------------------|-----------|------------------------------------|
| CASE CODE                               | TAPE SIZE | 7" REEL QUANTITIES                 |
|                                         |           | PLASTIC TAPE PACKAGING CODE<br>"T" |
| 3040                                    | 16 mm     | 500                                |
| 3640                                    | 16 mm     | 500                                |
| 4044                                    | 24 mm     | 300                                |

**Notes**

(1) Vishay Vitramon uses embossed plastic carrier tape

(2) REFERENCE: EIA standard RS 481 - "Taping of Surface Mount Components for Automatic Placement"

(3) n/a = not available

| STORAGE AND HANDLING CONDITIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>(1) Store the components at 5 °C to + 40 °C ambient temperature and <math>\leq 70</math> % 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> <ul 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 oxidization 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></ul> |



## RoHS COMPLIANCE UPDATE

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**The RoHS compliance of the parts in this datasheet is currently under review. For more information, please contact your local Vishay sales representative.**



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#### Как с нами связаться

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