

## Lower Voltage Ceramic Singlelayer DC Disc Capacitors 2 kV<sub>DC</sub> to 7.5 kV<sub>DC</sub>


**FEATURES**

- Low losses
- High capacitance in small sizes
- High stability
- Radial leads
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS  
COMPLIANT**
**APPLICATIONS**

- Lighting ballasts
- SMPS
- DC and pulse high voltage

**DESIGN**

The capacitors consist of a ceramic disc of which both sides are silver-plated. Connection leads are made of tinned copper having diameters of 0.025" (0.64 mm) or 0.032" (0.81 mm).

The capacitors may be supplied with radial kinked or straight leads having lead spacing of 0.250" (6.35 mm) or 0.375" (9.5 mm) or 0.500" (12.7 mm).

The standard tolerances are  $\pm 10\%$  or  $\pm 20\%$ .

Coating is made of resin coating or flame retardant epoxy resin in accordance with "UL 94 V-0".

**CAPACITANCE RANGE**

10 pF to 0.10  $\mu$ F

**RATED VOLTAGE**

2 kV<sub>DC</sub>  
3 kV<sub>DC</sub>  
6 kV<sub>DC</sub>  
7.5 kV<sub>DC</sub>

**DIELECTRIC STRENGTH BETWEEN LEADS**

Component test:

2 kV<sub>DC</sub>      3600 V<sub>DC</sub>, 2 s  
3 kV<sub>DC</sub>      5000 V<sub>DC</sub>, 2 s  
6 kV<sub>DC</sub>      10 500 V<sub>DC</sub>, 2 s  
7.5 kV<sub>DC</sub>     11 250 V<sub>DC</sub>, 2 s

**CERAMIC DIELECTRIC**

C0G, U2J, R3L (Class 1)  
X7R, X5F, X5S, Y5S, Y5U, Y5V, Z5U (Class 2)

| QUICK REFERENCE DATA       |          |               |                         |                                   |                    |               |
|----------------------------|----------|---------------|-------------------------|-----------------------------------|--------------------|---------------|
| DESCRIPTION                | VALUE    |               |                         |                                   |                    |               |
| Ceramic Class              | 1        |               | 2                       |                                   |                    |               |
| Ceramic Dielectric         | U2J, R3L | C0G, U2J, R3L | X7R, Y5S, Y5U, Z5U, Y5V | X5F, X5R, X5S, X7R, Y5S, Y5U, Z5U | X5F, X5S, Y5U, Z5U | X5F, Y5U, Z5U |
| Voltage (V <sub>DC</sub> ) | 3000     | 6000          | 2000                    | 3000                              | 6000               | 7500          |
| Min. Capacitance (pF)      | 10       | 10            | 100                     | 47                                | 100                | 100           |
| Max. Capacitance (pF)      | 33       | 47            | 100 000                 | 33 000                            | 10 000             | 2500          |
| Mounting                   | Radial   |               |                         |                                   |                    |               |

**INSULATION RESISTANCE**

2 kV<sub>DC</sub>      min. 10 000 M $\Omega$   
3 kV<sub>DC</sub>      min. 50 000 M $\Omega$  <sup>(1)</sup>  
6 kV<sub>DC</sub>      min. 75 000 M $\Omega$   
7.5 kV<sub>DC</sub>    min. 200 000 M $\Omega$

**Note**

<sup>(1)</sup> Exemption: 565R30GASS33 min. 25 000 M $\Omega$

**TOLERANCE ON CAPACITANCE**

$\pm 10\%$ ,  $\pm 20\%$ ,  $-20\%$  to  $+80\%$

**DISSIPATION FACTOR**

Class 1: 0.2 % max. at 1 MHz; 1 V  
Class 2: 2.0 % max. at 1 kHz; 1 V

**CATEGORY TEMPERATURE RANGE**

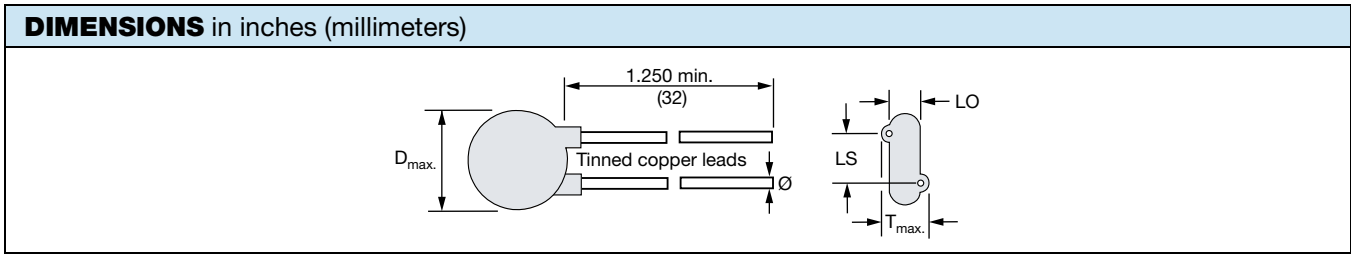
-25 °C to +85 °C

**CLIMATIC CATEGORY ACC. TO EN 60068-1**

25/085/21

**OPERATING TEMPERATURE RANGE**

-25 °C to +105 °C



| ORDERING INFORMATION, CERAMIC 2 kV <sub>DC</sub> |             |  |   |   |  |           |              |                  |              |             |             |
|--|-------------|--|---|---|--|-----------|--------------|------------------|--------------|-------------|-------------|
| C<br>(pF)  | TOL.<br>(%) | D <sub>max.</sub><br>DIAMETER<br>INCH (mm) | T <sub>max.</sub><br>THICKNESS<br>INCH (mm) | LS<br>LEAD SPACE<br>INCH (mm)<br>± 1 mm | LO<br>LEAD OFFSET<br>INCH (mm)<br>± 0.5 mm | WIRE SIZE |              | ORDERING<br>CODE |              |             |             |
|  |             |  |   |   |  | AWG       | INCH (mm)    |                  |              |             |             |
| <b>X7R</b>                                       |             |  |   |   |  |           |              |                  |              |             |             |
| 100  | ± 10        | 0.330 (8.4)                                | 0.190 (4.8)                                 | 0.250 (6.4)                             | 0.075 (1.9)                                | 20        | 0.032 (0.81) | 564R20TST10      |              |             |             |
| 220  |             |  | 0.180 (4.6)                                 |   |  |           |              | 564R20TST22      |              |             |             |
| 330  |             |  | 0.170 (4.3)                                 |   |  |           |              | 564R20TST33      |              |             |             |
| 470  |             |  | 0.185 (4.7)                                 |   |  |           |              | 564R20TST47      |              |             |             |
| 560  |             |  | 0.175 (4.4)                                 |   |  |           |              | 564R20TST56      |              |             |             |
| 680  |             |  | 0.170 (4.3)                                 |   |  |           |              | 564R20TST68      |              |             |             |
| 1000   |             | 0.400 (10.2)                               | 0.160 (4.1)                                 |   |  |           |              | 0.083 (2.1)      | 564R20TSD10  |             |             |
| 1500   |             | 0.460 (11.7)                               | 0.170 (4.3)                                 |   |  |           |              | 0.063 (1.6)      | 564R20TSD15  |             |             |
| 1800   |             |  |   |   |  |           |              | 0.055 (1.4)      | 564R20TSD18  |             |             |
| 2200   |             |  |   |   |  |           |              | 0.067 (1.7)      | 564R20TSD22  |             |             |
| 3300   |             |  |   |   |  |           |              | 0.530 (13.5)     | 0.063 (1.6)  | 564R20TSD33 |             |
| 3900   |             |  |   |   |  |           |              | 0.680 (17.3)     | 0.170 (4.3)  | 0.075 (1.9) | 564R20TSD39 |
| 4700   |             |  |   |   |  |           |              |                  |              | 0.375 (9.5) | 0.071 (1.8) |
| <b>Y5S</b>                                       |             |  |   |   |  |           |              |                  |              |             |             |
| 1000   | ± 20        | 0.330 (8.4)                                | 0.175 (4.4)                                 | 0.250 (6.4)                             | 0.067 (1.7)                                | 20        | 0.032 (0.81) | 564R20TSSD10     |              |             |             |
| 2200   |             | 0.460 (11.7)                               | 0.170 (4.3)                                 |   | 0.071 (1.8)                                |           |              | 564R20TSSD22     |              |             |             |
| 5600   |             | 0.790 (20.0)                               | 0.190 (4.8)                                 |   | 0.375 (9.5)                                |           |              | 0.091 (2.3)      | 564R20TSSD56 |             |             |
| <b>Y5U</b>                                       |             |  |   |   |  |           |              |                  |              |             |             |
| 1000   | ± 20        | 0.330 (8.4)                                | 0.170 (4.3)                                 | 0.250 (6.4)                             | 0.067 (1.7)                                | 20        | 0.032 (0.81) | 564R20GAD10      |              |             |             |
| 1500   |             | 0.330 (8.4)                                | 0.170 (4.3)                                 |   | 0.071 (1.8)                                |           |              | 564R20GAD15      |              |             |             |
| <b>Z5U</b>                                       |             |  |   |   |  |           |              |                  |              |             |             |
| 1800   | ± 20        | 0.360 (9.1)                                | 0.170 (4.3)                                 | 0.250 (6.4)                             | 0.071 (1.8)                                | 20        | 0.032 (0.81) | 564R20GAD18      |              |             |             |
| 2200   |             | 0.400 (10.2)                               | 0.175 (4.4)                                 |   | 0.075 (1.9)                                |           |              | 564R20GAD22      |              |             |             |
| 3300   |             | 0.430 (10.9)                               |   |   | 0.071 (1.8)                                |           |              | 564R20GAD33      |              |             |             |
| 4700   |             | 0.530 (13.5)                               |   |   | 0.075 (1.9)                                |           |              | 564R20GAD47      |              |             |             |
| 6800   |             | 0.560 (14.2)                               | 0.170 (4.3)                                 |   | 0.375 (9.5)                                |           |              | 0.067 (1.7)      | 564R20GAD68  |             |             |
| <b>Y5V</b>                                       |             |  |   |   |  |           |              |                  |              |             |             |
| 0.01 μF  | ± 20        | 0.620 (15.7)                               | 0.170 (4.3)                                 | 0.375 (9.5)                             | 0.067 (1.7)                                | 20        | 0.032 (0.81) | 564R20GASS10     |              |             |             |
| 0.05 μF  |             | 0.950 (24.1)                               | 0.174 (4.4)                                 |   | 0.067 (1.7)                                |           |              | 20               | 564R20GAS50  |             |             |
| 0.10 μF  |             | 0.950 (24.1)                               | 0.240 (6.1)                                 |   | 0.067 (1.7)                                |           |              | 22               | 0.025 (0.64) | 565R20GAP10 |             |



| ORDERING INFORMATION, CERAMIC 3 kV <sub>DC</sub> |              |  |   |   |  |              |              |                  |
|--|--------------|--|---|---|--|--------------|--------------|------------------|
| C<br>(pF)  | TOL.<br>(%)  | D <sub>max.</sub><br>DIAMETER<br>INCH (mm) | T <sub>max.</sub><br>THICKNESS<br>INCH (mm) | LS<br>LEAD SPACE<br>INCH (mm)<br>± 1 mm | LO<br>LEAD OFFSET<br>INCH (mm)<br>± 0.5 mm | WIRE SIZE    |              | ORDERING<br>CODE |
|  |              |  |   |   |  | AWG          | INCH (mm)    |                  |
| <b>U2J (N750)</b>                                |              |  |   |   |  |              |              |                  |
| 10   | ± 20         | 0.330 (8.4)                                | 0.210 (5.3)                                 | 0.250 (6.4)                             | 0.110 (2.8)                                | 20           | 0.032 (0.81) | 564R30GAQ10      |
| <b>R3L (N2200)</b>                               |              |  |   |   |  |              |              |                  |
| 22   | ± 20         | 0.330 (8.4)                                | 0.200 (5.1)                                 | 0.250 (6.4)                             | 0.102 (2.6)                                | 20           | 0.032 (0.81) | 564R30GAQ22      |
| 27   |              |  | 0.190 (4.8)                                 |   | 0.091 (2.3)                                |              |              | 564R30GAQ27      |
| 33   |              |  | 0.170 (4.3)                                 |   | 0.071 (1.8)                                |              |              | 564R30GAQ33      |
| <b>X5F</b>                                       |              |  |   |   |  |              |              |                  |
| 56   | ± 20         | 0.330 (8.4)                                | 0.190 (4.8)                                 | 0.250 (6.4)                             | 0.091 (2.3)                                | 20           | 0.032 (0.81) | 564R30GAQ56      |
| 68   |              |  | 0.200 (5.1)                                 |   | 0.102 (2.6)                                |              |              | 564R30GAQ68      |
| 270  |              |  | 0.180 (4.6)                                 |   | 0.083 (2.1)                                |              |              | 564R30GAT27      |
| <b>X5R</b>                                       |              |  |   |   |  |              |              |                  |
| 330  | ± 20         | 0.330 (8.4)                                | 0.175 (4.4)                                 | 0.250 (6.4)                             | 0.075 (1.9)                                | 20           | 0.032 (0.81) | 564R30GAT33      |
| <b>X5S</b>                                       |              |  |   |   |  |              |              |                  |
| 470  | ± 20         | 0.330 (8.4)                                | 0.175 (4.4)                                 | 0.250 (6.4)                             | 0.075 (1.9)                                | 20           | 0.032 (0.81) | 564R30GAT47      |
| <b>X7R</b>                                       |              |  |   |   |  |              |              |                  |
| 47   | ± 20         | 0.330 (8.4)                                | 0.230 (5.8)                                 | 0.250 (6.4)                             | 0.130 (3.3)                                | 20           | 0.032 (0.81) | 564R30GAQ47      |
| 100  |              |  | 0.180 (4.6)                                 |   | 0.083 (2.1)                                |              |              | 564R30GAT10      |
| 150  |              |  | 0.190 (4.8)                                 |   | 0.091 (2.3)                                |              |              | 564R30GAT15      |
| 220  |              |  | 0.175 (4.4)                                 |   | 0.075 (1.9)                                |              |              | 564R30GAT22      |
| 390  |              |  | 0.180 (4.6)                                 |   | 0.079 (2.0)                                |              |              | 564R30GAT39      |
| 680  | ± 10         | 0.400 (10.2)                               | 0.190 (4.8)                                 | 0.091 (2.3)                             | 0.087 (2.2)                                | 20           | 0.032 (0.81) | 564R30TST68      |
| 1000   |              |  | 0.185 (4.7)                                 |   |  |              |              | 0.079 (2.0)      |
| 1500   |              | 0.490 (12.5)                               | 0.185 (4.7)                                 | 0.087 (2.2)                             | 564R30TSD15                                |              |              |                  |
| 1800   |              | 0.530 (13.5)                               | 0.180 (4.6)                                 | 0.079 (2.0)                             | 564R30TSD18                                |              |              |                  |
| 2200   |              |  | 0.185 (4.7)                                 | 0.083 (2.1)                             | 564R30TSD22                                |              |              |                  |
| 2700   |              | 0.620 (15.7)                               | 0.170 (4.3)                                 | 0.075 (1.9)                             | 564R30TSD27                                |              |              |                  |
| 3300   |              |  | 0.185 (4.7)                                 | 0.087 (2.2)                             | 564R30TSD33                                |              |              |                  |
| 3900   |              | 0.720 (18.3)                               | 0.175 (4.4)                                 | 0.075 (1.9)                             | 564R30TSD39                                |              |              |                  |
| 4700   |              |  | 0.185 (4.7)                                 | 0.087 (2.2)                             | 564R30TSD47                                |              |              |                  |
| 6800   |              |  | 0.185 (4.7)                                 | 0.087 (2.2)                             | 564R30TSD68                                |              |              |                  |
| <b>Y5S</b>                                       |              |  |   |   |  |              |              |                  |
| 1000   | ± 20         | 0.400 (10.2)                               | 0.190 (4.8)                                 | 0.250 (6.4)                             | 0.098 (2.5)                                | 20           | 0.032 (0.81) | 564R30TSSD10     |
| 1500   |              | 0.460 (11.7)                               |   |   | 0.091 (2.3)                                |              |              | 564R30TSSD15     |
| 1800   |              | 0.490 (12.4)                               | 0.185 (4.7)                                 | 0.375 (9.5)                             | 0.087 (2.2)                                |              |              | 564R30TSSD18     |
| 2200   |              | 0.530 (13.5)                               |   |   | 0.083 (2.1)                                |              |              | 564R30TSSD22     |
| 2700   |              | 0.560 (14.2)                               | 0.087 (2.2)                                 | 564R30TSSD27                            |  |              |              |                  |
| 3300   |              | 0.620 (15.7)                               | 0.083 (2.1)                                 | 564R30TSSD33                            |  |              |              |                  |
| 3900   |              | 0.680 (17.3)                               | 0.087 (2.2)                                 | 564R30TSSD39                            |  |              |              |                  |
| 4700   |              |  | 0.091 (2.3)                                 | 564R30TSSD47                            |  |              |              |                  |
| 5600   |              | 0.790 (20.0)                               | 0.190 (4.8)                                 | 0.091 (2.3)                             | 564R30TSSD56                               |              |              |                  |
| 6800   |              | 0.900 (22.9)                               | 0.205 (5.2)                                 | 0.102 (2.6)                             | 564R30TSSD68                               |              |              |                  |
| <b>Y5U</b>                                       |              |  |   |   |  |              |              |                  |
| 680  | ± 20         | 0.330 (8.4)                                | 0.175 (4.4)                                 | 0.250 (6.4)                             | 0.075 (1.9)                                | 20           | 0.032 (0.81) | 564R30GAT68      |
| 0.010 µF   |              | 0.720 (18.3)                               | 0.185 (4.7)                                 | 0.375 (9.5)                             | 0.091 (2.3)                                |              |              | 564R30GAS10      |
| <b>Z5U</b>                                       |              |  |   |   |  |              |              |                  |
| 1000   | ± 20         | 0.330 (8.4)                                | 0.190 (4.8)                                 | 0.250 (6.4)                             | 0.098 (2.5)                                | 20           | 0.032 (0.81) | 564R30GAD10      |
| 1500   |              | 0.360 (9.1)                                |   |   | 0.091 (2.3)                                |              |              | 564R30GAD15      |
| 1800   |              | 0.400 (10.2)                               | 0.098 (2.5)                                 | 564R30GAD18                             |  |              |              |                  |
| 2200   |              | 0.430 (10.9)                               | 0.091 (2.3)                                 | 564R30GAD22                             |  |              |              |                  |
| 2700   |              | 0.460 (11.7)                               | 0.200 (5.1)                                 | 0.098 (2.5)                             | 564R30GAD27                                |              |              |                  |
| 3300   |              | 0.530 (13.5)                               | 0.185 (4.7)                                 | 0.087 (2.2)                             | 564R30GAD33                                |              |              |                  |
| 3900   |              |  |   | 0.091 (2.3)                             | 564R30GAD39                                |              |              |                  |
| 4700   |              | 0.620 (15.7)                               | 0.195 (5.0)                                 | 0.102 (2.6)                             | 564R30GAD47                                |              |              |                  |
| 6800   |              | 0.720 (18.3)                               | 0.200 (5.1)                                 | 0.375 (9.5)                             | 0.102 (2.6)                                |              |              | 564R30GAD68      |
| 8200   |              |  |   |   |  |              |              | 564R30GAD82      |
| 0.033 µF   | 0.900 (22.9) | 0.240 (6.1)                                | 0.087 (2.2)                                 | 22                                      | 0.025 (0.64)                               | 565R30GASS33 |              |                  |



| ORDERING INFORMATION, CERAMIC 6 kV <sub>DC</sub> |             |  |   |   |  |           |              |                  |
|--|-------------|--|---|---|--|-----------|--------------|------------------|
| C<br>(pF)  | TOL.<br>(%) | D <sub>max.</sub><br>DIAMETER<br>INCH (mm) | T <sub>max.</sub><br>THICKNESS<br>INCH (mm) | LS<br>LEAD SPACE<br>INCH (mm)<br>± 1 mm | LO<br>LEAD OFFSET<br>INCH (mm)<br>± 0.5 mm | WIRE SIZE |              | ORDERING<br>CODE |
|  |             |  |   |   |  | AWG       | INCH (mm)    |                  |
| <b>C0G (NP0)</b>                                 |             |  |   |   |  |           |              |                  |
| 10   | ± 20        | 0.400 (10.2)                               | 0.220 (5.6)                                 | 0.375 (9.5)                             | 0.122 (3.1)                                | 20        | 0.032 (0.81) | 564R60GAQ10      |
| <b>U2J (N750)</b>                                |             |  |   |   |  |           |              |                  |
| 22   | ± 20        | 0.460 (11.7)                               | 0.240 (6.1)                                 | 0.375 (9.5)                             | 0.142 (3.6)                                | 20        | 0.032 (0.81) | 564R60GAQ22      |
| <b>R3L (N2200)</b>                               |             |  |   |   |  |           |              |                  |
| 33   | ± 20        | 0.400 (10.2)                               | 0.230 (5.8)                                 | 0.375 (9.5)                             | 0.130 (3.3)                                | 20        | 0.032 (0.81) | 564R60GAQ33      |
| 47   |             | 0.460 (11.7)                               |   |   | 0.126 (3.2)                                |           |              | 564R60GAQ47      |
| <b>X5F</b>                                       |             |  |   |   |  |           |              |                  |
| 100  | ± 20        | 0.400 (10.2)                               | 0.240 (6.1)                                 | 0.375 (9.5)                             | 0.142 (3.6)                                | 20        | 0.032 (0.81) | 564R60GAT10      |
| 220  |             |  | 0.265 (6.7)                                 |   | 0.165 (4.2)                                |           |              | 564R60GAT22      |
| <b>X5S</b>                                       |             |  |   |   |  |           |              |                  |
| 330  | ± 20        | 0.400 (10.2)                               | 0.260 (6.6)                                 | 0.375 (9.5)                             | 0.161 (4.1)                                | 20        | 0.032 (0.81) | 564R60GAT33      |
| <b>Y5U</b>                                       |             |  |   |   |  |           |              |                  |
| 470  | ± 20        | 0.400 (10.2)                               | 0.290 (7.4)                                 | 0.375 (9.5)                             | 0.193 (4.9)                                | 20        | 0.032 (0.81) | 564R60GAT47      |
| 560  |             |  | 0.240 (6.1)                                 |   | 0.142 (3.6)                                |           |              | 564R60GAT56      |
| <b>Z5U</b>                                       |             |  |   |   |  |           |              |                  |
| 1000   | ± 20        | 0.400 (10.2)                               | 0.270 (6.9)                                 | 0.375 (9.5)                             | 0.173 (4.4)                                | 20        | 0.032 (0.81) | 564R60GAD10      |
| 1500   |             | 0.460 (11.7)                               | 0.280 (7.1)                                 |   | 0.157 (4.0)                                |           |              | 564R60GAD15      |
| 2200   |             | 0.530 (13.5)                               | 0.240 (6.1)                                 |   | 0.142 (3.6)                                |           |              | 564R60GAD22      |
| 3300   |             | 0.620 (15.7)                               | 0.260 (6.6)                                 |   | 0.169 (4.3)                                |           |              | 564R60GAD33      |
| 4700   |             | 0.790 (20.0)                               |   |   | 0.161 (4.1)                                |           |              | 564R60GAD47      |
| 0.010 μF   |             | 0.950 (24.1)                               | 0.250 (6.4)                                 |   | 0.150 (3.8)                                |           |              | 564R60GAS10      |

| ORDERING INFORMATION, CERAMIC 7.5 kV <sub>DC</sub> |             |  |   |   |  |           |              |                  |
|--|-------------|--|---|---|--|-----------|--------------|------------------|
| C<br>(pF)  | TOL.<br>(%) | D <sub>max.</sub><br>DIAMETER<br>INCH (mm) | T <sub>max.</sub><br>THICKNESS<br>INCH (mm) | LS<br>LEAD SPACE<br>INCH (mm)<br>± 1 mm | LO<br>LEAD OFFSET<br>INCH (mm)<br>± 0.5 mm | WIRE SIZE |              | ORDERING<br>CODE |
|  |             |  |   |   |  | AWG       | INCH (mm)    |                  |
| <b>X5F</b>   |             |  |   |   |  |           |              |                  |
| 100  | ± 20        | 0.530 (13.5)                               | 0.310 (7.9)                                 | 0.500 (12.7)                            | 0.181 (4.6)                                | 20        | 0.032 (0.81) | 564R75GAT10      |
| 470  |             | 0.620 (15.7)                               | 0.270 (6.9)                                 |   | 0.161 (4.1)                                |           |              | 564R75GAT47      |
| <b>Y5U</b>   |             |  |   |   |  |           |              |                  |
| 1000   | + 80 / - 20 | 0.620 (15.7)                               | 0.320 (8.1)                                 | 0.500 (12.7)                            | 0.181 (4.6)                                | 20        | 0.032 (0.81) | 564R75GAD10      |
| <b>Z5U</b>   |             |  |   |   |  |           |              |                  |
| 2500   | + 80 / - 20 | 0.620 (15.7)                               | 0.280 (7.1)                                 | 0.500 (12.7)                            | 0.181 (4.6)                                | 20        | 0.032 (0.81) | 564R75GAD25      |

**TAPE AND REEL OPTIONS**

Part number codes and specifications for tape and reel packaging are found in the general information document - find web-link below.

| RELATED DOCUMENTS   |  |
|---------------------|--|
| General Information | <a href="http://www.vishay.com/doc?23140">www.vishay.com/doc?23140</a> |



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