

# SMD Wraparound Ultra Low Value Thin Film Resistors



With extremely low resistance and high power capabilities, these ultra low value resistors are available with solderable or weldable terminations.

## FEATURES

- NiCr + Ta<sub>2</sub>O<sub>5</sub> resistive layer
- Pre-soldered or gold terminations
- No inductance for high frequency applications
- Alumina substrates for high power handling capability
- Resistance range: 0.1  $\Omega$  to 9.99  $\Omega$
- TCR down to 50 ppm/°C
- Power rating: Up to 2 W at + 70 °C
- Withstand AEC-Q200 humidity test
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS\***  
COMPLIANT  
**GREEN**  
(5-2008)  
Available

## Note

\* Lead (Pb)-containing terminations are not RoHS-compliant. Exemptions may apply.

## STANDARD ELECTRICAL SPECIFICATIONS

| MODEL | SIZE | RESISTANCE RANGE<br>$\Omega$ | RATED POWER<br>$P_{70^\circ\text{C}}$<br>W | LIMITING ELEMENT<br>VOLTAGE<br>V | TOLERANCE<br>$\pm$ % | TEMPERATURE<br>COEFFICIENT<br>$\pm$ ppm/°C |
|-------|------|------------------------------|--------------------------------------------|----------------------------------|----------------------|--------------------------------------------|
| L0603 | 0603 | 0.1 to 9.99                  | 0.125                                      | 50                               | 1, 3, 5              | 50, 100, 200, 300                          |
| L0805 | 0805 | 0.1 to 9.99                  | 0.2                                        | 50                               | 1, 3, 5              | 50, 100, 200, 300                          |
| L1206 | 1206 | 0.1 to 9.99                  | 0.33                                       | 50                               | 1, 3, 5              | 50, 100, 200, 300                          |
| L1505 | 1505 | 0.1 to 9.99                  | 0.5                                        | 50                               | 1, 3, 5              | 50, 100, 200, 300                          |
| L2010 | 2010 | 0.1 to 9.99                  | 1.0                                        | 50                               | 1, 3, 5              | 50, 100, 200, 300                          |
| L2512 | 2512 | 0.1 to 9.99                  | 2.0 <sup>(1)</sup>                         | 50                               | 1, 3, 5              | 50, 100, 200, 300                          |

## Note

<sup>(1)</sup> With special assembly care

## CLIMATIC SPECIFICATIONS

|                             |                   |
|-----------------------------|-------------------|
| Operating temperature range | - 55 °C; + 155 °C |
|-----------------------------|-------------------|

## MECHANICAL SPECIFICATIONS

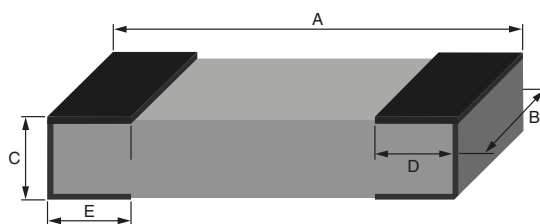
|              |                                                                                                                                             |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Substrate    | Alumina                                                                                                                                     |
| Technology   | NiCr + Ta <sub>2</sub> O <sub>5</sub>                                                                                                       |
| Coating      | Silicone                                                                                                                                    |
| Terminations | Solderable<br><b>B type:</b> SnPb over nickel barrier<br><b>N type:</b> SnAg over nickel barrier<br><b>G type:</b> Gold over nickel barrier |

## Note

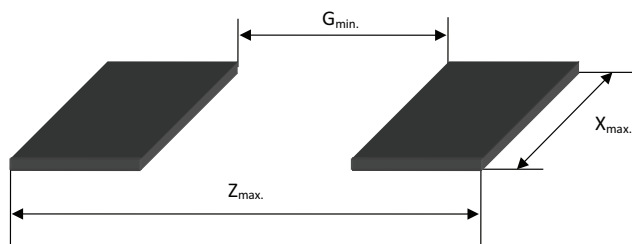
- Refer to Application Note "Guidelines for Vishay Sfernice Resistive and Inductive Components" (document number: 52029) for recommended reflow profile. Profile #3 applies.

## TOLERANCE AND TCR VS. OHMIC VALUE

| OHMIC VALUE RANGE in $\Omega$ | TIGHTEST TOLERANCE (%) | BEST TCR (ppm/°C) | TERMINATIONS |
|-------------------------------|------------------------|-------------------|--------------|
| 0R1 < 0R25                    | 1                      | 300               | N or B       |
| 0R25 < 0R5                    | 1                      | 200               | N or B       |
| 0R5 < 2R5                     | 1                      | 100               | N or B       |
| 2R5 < 9R99                    | 1                      | 50                | N or B       |
| 0R1 < 0R25                    | 5                      | 300               | G            |
| 0R25 < 0R5                    | 5                      | 200               | G            |
| 0R < 1R                       | 5                      | 100               | G            |
| 1R < 2R5                      | 3                      | 100               | G            |
| 2R5 to 9R99                   | 3                      | 50                | G            |

**DIMENSIONS** in millimeters (inches)


| CASE SIZE | A                       | B                       | C                     | D/E                     |
|-----------|-------------------------|-------------------------|-----------------------|-------------------------|
|           | $\pm 0.152 (\pm 0.006)$ | $\pm 0.127 (\pm 0.005)$ | $\pm 0.127 (+ 0.005)$ | $\pm 0.127 (\pm 0.005)$ |
| 0603      | 1.52 (0.060)            | 0.85 (0.033)            | 0.5 (0.020)           | 0.38 (0.015)            |
| 0805      | 1.91 (0.075)            | 1.27 (0.050)            |                       | 0.40 (0.016)            |
| 1206      | 3.06 (0.120)            | 1.60 (0.063)            |                       |                         |
| 1505      | 3.81 (0.150)            | 1.32 (0.052)            |                       | 0.48 (0.019)            |
| 2010      | 5.08 (0.200)            | 2.54 (0.100)            |                       |                         |
| 2512      | 6.30 (0.248)            | 3.30 (0.129)            |                       |                         |

**SUGGESTED LAND PATTERN** in millimeters (inches) (to IPC-7351A)


| CASE SIZE | Z <sub>max.</sub> | G <sub>min.</sub> | X <sub>max.</sub> |
|-----------|-------------------|-------------------|-------------------|
| 0603      | 2.37 (0.093)      | 0.35 (0.014)      | 0.98 (0.039)      |
| 0805      | 2.76 (0.109)      | 0.74 (0.029)      | 1.40 (0.055)      |
| 1206      | 3.91 (0.154)      | 1.85 (0.073)      | 1.73 (0.068)      |
| 1505      | 4.66 (0.183)      | 2.44 (0.096)      | 1.45 (0.057)      |
| 2010      | 5.93 (0.233)      | 3.71 (0.146)      | 2.67 (0.105)      |
| 2512      | 7.15 (0.281)      | 4.93 (0.194)      | 3.43 (0.135)      |

**Option: Enlarged Terminations: 0063**

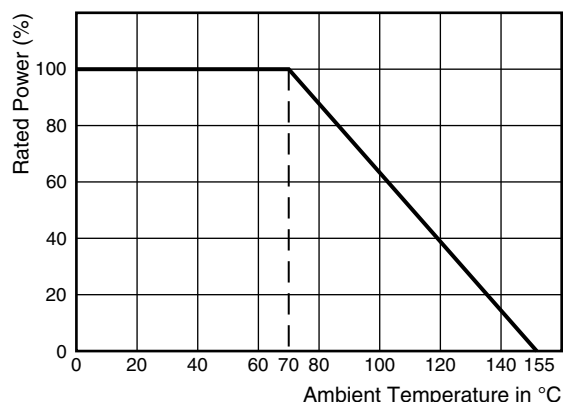
For stringent and special power dissipation requirements, the thermal resistance between the resistive layer and the solder joint can be reduced using enlarged terminations chip resistors which are soldered on large and thick copper pads acting as heat sinks (see application note: "Power Dissipation in High Precision Vishay Sfernice Chip Resistors and Arrays (P Thin Film, PRA Arrays, CHP Thick Film)": [www.vishay.com/doc?53048](http://www.vishay.com/doc?53048)).

For enlarged terminations: Please consult Vishay Sfernice.

**Option: AEC-Q200 withstanding**

Please order option 0058.

## POWER DERATING CURVE



## PACKAGING RULES

### Waffle Pack

Can be filled up to maximum quantity indicated in the table here above, taking into account the minimum order quantity. When quantity ordered exceeds maximum quantity of a single waffle pack, the waffle packs are stacked up on the top of each other and closed by one single cover.

**To get “not stacked up” waffle pack in case of ordered quantity > maximum number of pieces per package: Please consult Vishay/Sfernice for specific ordering code.**

## PACKAGING

Several types of packaging are proposed: waffle-pack and tape and reel

| SIZE | MOQ | NUMBER OF PIECES PER PACKAGE |                            | TAPE WIDTH |
|------|-----|------------------------------|----------------------------|------------|
|      |     | WAFFLE PACK<br>2" x 2"       | TAPE AND REEL<br>MIN. MAX. |            |
| 0603 | 100 | 100                          | 5000                       | 8 mm       |
| 0805 |     |                              |                            |            |
| 1206 |     | 140                          | 4000                       |            |
| 1505 |     | 60                           |                            |            |
| 2010 |     |                              | 2000                       |            |
| 2512 |     | 45                           |                            |            |

### Tape and Reel

Can be filled up to maximum quantity indicated in the table here above, taking into account the minimum order quantity. When quantity ordered is between the MOQ and the maximum reel capacity, only one reel is provided.

**When several reels are needed for ordered quantity within MOQ and maximum reel capacity: Please consult Vishay Sfernice for specific ordering code.**

| PERFORMANCE               |                                                                 |                          |                       |
|---------------------------|-----------------------------------------------------------------|--------------------------|-----------------------|
| TESTS                     | CONDITIONS                                                      | VALUES AND DRIFT         |                       |
|                           |                                                                 | MIL-R-55342 REQUIREMENTS | TYPICAL PERFORMANCES  |
| Thermal shock             | MIL-R-55342 C<br>MIL-STD-702, method 107                        | ± 0.25 %                 | ± 0.02 %              |
| Short time overload       | MIL-R-55342 C<br>PARA 3.10.4.7.5                                | ± 0.10 %                 | ± 0.01 %              |
| Low temperature operation | MIL-R-55342 C<br>PARA 3.9 and 4.7.4                             | ± 0.25 %                 | ± 0.01 %              |
| Resistance to solder heat | MIL-R-55342 C<br>PARA 3.12, 4.7.7, 4.7.1.2                      | ± 0.25 %                 | ± 0.04 %              |
| Moisture resistance       | MIL-R-55342 C<br>PARA 3.13 and 4.7.8<br>MIL-STD-202, method 106 | ± 0.40 %                 | ± 0.01 %              |
|                           | AEC-Q200<br>85 °C/85 % RH/0.1 Pn<br>1000 h                      | -                        | Max. < 0.5 % + 0.05 Ω |
| High temperature          | MIL-R-55342 C<br>PARA 3.11 and 4.7.6                            | ± 0.20 %                 | ± 0.075 %             |
| Load life                 | MIL-R-55342 C<br>2000 h Pn at 70 °C<br>MIL-STD-202, method 108  | ± 0.50 %                 | ± 0.15 %              |



| Global Part Number Information                              |                                              |   |     |                                                                 |       |                                                                                                                     |           |   |                                                                |   |                                                                                           |   |                                                                                                                   |   |                          |   |
|-------------------------------------------------------------|----------------------------------------------|---|-----|-----------------------------------------------------------------|-------|---------------------------------------------------------------------------------------------------------------------|-----------|---|----------------------------------------------------------------|---|-------------------------------------------------------------------------------------------|---|-------------------------------------------------------------------------------------------------------------------|---|--------------------------|---|
| New Global Part Numbering: L0805K1R00FBT0099                |                                              |   |     |                                                                 |       |                                                                                                                     |           |   |                                                                |   |                                                                                           |   |                                                                                                                   |   |                          |   |
| L                                                           | 0                                            | 8 | 0   | 5                                                               | K     | 1                                                                                                                   | R         | 0 | 0                                                              | F | B                                                                                         | T | 0                                                                                                                 | 0 | 9                        | 9 |
| GLOBAL MODEL                                                | SIZE                                         |   |     | TCR                                                             |       | VALUE                                                                                                               |           |   | TOLERANCE                                                      |   | TERMINATION                                                                               |   | PACKAGING (1)                                                                                                     |   | OPTION                   |   |
| L                                                           | 0603<br>0805<br>1206<br>1505<br>2010<br>2512 |   |     | H = ± 50 ppm<br>K = ± 100 ppm<br>L = ± 200 ppm<br>M = ± 300 ppm |       | R designated decimal point<br>For values under 1R<br>if 3 significant digits: Rxxx<br>if 2 significant digits: xRxx |           |   | F = ± 1 %<br>G = ± 2 %<br>H = ± 3 %<br>J = ± 5 %<br>K = ± 10 % |   | B: SnPb over nickel barrier<br>N: SnAg over nickel barrier<br>G: Gold over nickel barrier |   | Blank: Waffle pack<br>T: Tape and reel<br><br>B: Lead bearing version<br>N and G: Lead (Pb)-free/<br>RoHS version |   | Leave blank if no option |   |
| Historical Part Number example: L 0805 K 1R00 1 % B T R0099 |                                              |   |     |                                                                 |       |                                                                                                                     |           |   |                                                                |   |                                                                                           |   |                                                                                                                   |   |                          |   |
| L                                                           | 0805                                         |   | K   |                                                                 | 1R00  |                                                                                                                     | 1 %       |   | B                                                              |   | T                                                                                         |   | R0099                                                                                                             |   |                          |   |
| MODEL                                                       | SIZE                                         |   | TCR |                                                                 | VALUE |                                                                                                                     | TOLERANCE |   | TERMINATION                                                    |   | PACKAGING (1)                                                                             |   | OPTION                                                                                                            |   |                          |   |

Note

<sup>(1)</sup> For specific quantity of parts per packaging please consult Vishay Sfernice



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Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А