

# High Temperature (245 °C) Thick Film Chip Resistor



For applications such as down hole applications or aircraft breaking systems, the need for parts able to withstand very severe conditions (temperature as high as 230 °C powered or up to 245 °C un-powered) has led Vishay Sfernice to push out the limit of the thick film technology. Designers might read the application note "Power Dissipation Considerations in High Precision Vishay Sfernice Thin Film Chips Resistors and Arrays (P, PRA etc.) (High Temperature Applications)" ([www.vishay.com/doc?53047](http://www.vishay.com/doc?53047)) in conjunction with this data sheet to help them to properly design their PCBs and get the best performances of the CHPHT. Vishay Sfernice R&D engineers will be willing to support any customer design considerations.

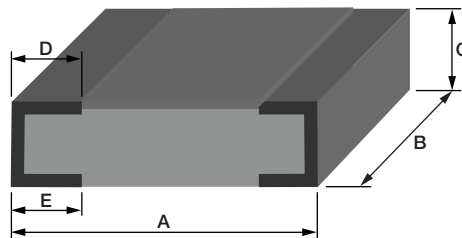
## FEATURES

- High temperature (245 °C)
- Large ohmic value range 0.1  $\Omega$  to 100 M $\Omega$
- Operating temperature range (- 55 °C to + 230 °C)
- SMD wraparound chip resistor
- Storage temperature range (- 55 °C to + 245 °C)
- Gold terminations for HMP process (< 1  $\mu$ m thick) for temperature up to 245 °C
- Tin/silver terminations for operating temperature up to 200 °C
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



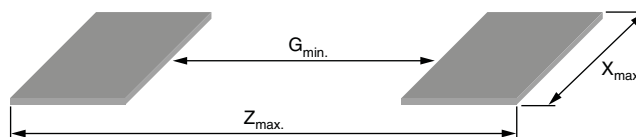
**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## DIMENSIONS in millimeters



| CASE SIZE | A           | B           | C           | D           | E           |
|-----------|-------------|-------------|-------------|-------------|-------------|
|           | $\pm 0.152$ | $\pm 0.127$ | $\pm 0.127$ | $\pm 0.127$ | $\pm 0.127$ |
| 0603      | 1.60        | 0.90        | 0.38        | 0.31        | 0.40        |
| 0805      | 1.85        | 1.25        | 0.38        | 0.31        | 0.50        |
| 1206      | 3.00        | 1.73        | 0.38        | 0.40        | 0.50        |
| 2010      | 5.03        | 2.64        | 0.50        | 0.50        | 0.50        |

## SUGGESTED LAND PATTERN (to IPC-7351A)



| CASE SIZE | Z <sub>max.</sub> | G <sub>min.</sub> | X <sub>max.</sub> |
|-----------|-------------------|-------------------|-------------------|
| 0603      | 2.15              | 0.39              | 1.03              |
| 0805      | 2.70              | 0.44              | 1.38              |
| 1206      | 3.85              | 1.59              | 1.85              |
| 2010      | 5.88              | 3.62              | 2.77              |

**STANDARD ELECTRICAL SPECIFICATIONS**

| MODEL | SIZE | RESISTANCE RANGE<br>$\Omega$ | RATED POWER<br>$P_n$<br>W<br>(at 230 °C) | LIMITING ELEMENT VOLTAGE<br>V | MAX. OVERLOAD VOLTAGE<br>V | TOLERANCE<br>$\pm$ % | TEMPERATURE COEFFICIENT<br>$\pm$ ppm/°C |
|-------|------|------------------------------|------------------------------------------|-------------------------------|----------------------------|----------------------|-----------------------------------------|
| CHPHT | 0603 | 0.1 to 25M                   | 0.0125                                   | 50                            | 100                        | 1, 2, 5              | 100, 200                                |
| CHPHT | 0805 | 0.1 to 25M                   | 0.02                                     | 150                           | 300                        | 1, 2, 5              | 100, 200                                |
| CHPHT | 1206 | 0.1 to 50M                   | 0.025                                    | 200                           | 400                        | 1, 2, 5              | 100, 200                                |
| CHPHT | 2010 | 0.1 to 100M                  | 0.1                                      | 200                           | 400                        | 1, 2, 5              | 100, 200                                |

**CLIMATIC SPECIFICATIONS**

|                             |                     |
|-----------------------------|---------------------|
| Operating temperature range | - 55 °C to + 230 °C |
| Storage temperature range   | - 55 °C to + 245 °C |

**MECHANICAL SPECIFICATIONS**

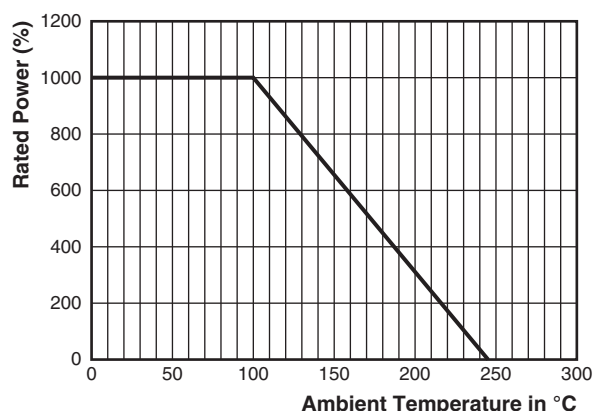
|              |                                                                                                                                                                   |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Substrate    | Alumina                                                                                                                                                           |
| Technology   | Thick film (Ruthenium oxyde)                                                                                                                                      |
| Protection   | Parts have double and organic coating (OR5 to 100M)                                                                                                               |
| Terminations | <b>N (W/A):</b> SnAg over nickel barrier for temperature up to 200 °C<br><b>G (W/A) type:</b> Gold (< 1 $\mu$ m) over nickel barrier for temperature up to 245 °C |

**Note**

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

**BEST TOL. AND TCR VERSUS OHMIC VALUE**

| TIGHTEST TOLERANCE | OHMIC VALUES                      | BEST TCR<br>ppm/°C |
|--------------------|-----------------------------------|--------------------|
| 1 % (F)            | $5 \Omega < R < 10M$              | 100 (K)            |
| 2 % (G)            | $1 \Omega < R < R \text{ max.}$   | 200 (L)            |
| 5 % (J)            | $0.1 \Omega < R < R \text{ max.}$ | 200 (L)            |

**POWER DERATING CURVE****PACKAGING**

ESD packaging available: Waffle pack and plastic tape and reel (low conductivity). Paper tapes available on request (ESD only). (For 0603, 0805, and 1206 only.)

| SIZE         | NUMBER OF PIECES PER PACKAGE |                                 | TAPE WIDTH |
|--------------|------------------------------|---------------------------------|------------|
|              | WAFFLE PACK                  | TAPE AND REEL<br>MIN.      MAX. |            |
| 0603         | 100                          | 100      5000                   | 8 mm       |
| 0805<br>0705 |                              | 100      4000                   |            |
| 1206         | 140                          | 100      2000                   |            |
| 2010         | 60                           | 100      2000                   |            |

**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**

**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**

## POPULAR OPTIONS

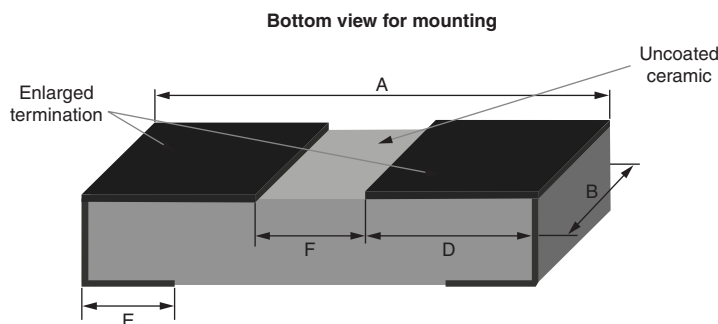
For any option it is recommended to consult Vishay Sfernice for availability first.

### Option: Enlarged terminations:

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)).

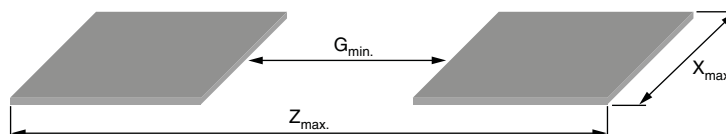
Option to order: 0063 (applies to size 1206/2010).

## DIMENSIONS (Option 0063) in millimeters



| CASE SIZE | A                                            | B                                            | E                                          | D                                          | F            |              |              |
|-----------|----------------------------------------------|----------------------------------------------|--------------------------------------------|--------------------------------------------|--------------|--------------|--------------|
|           | MAX. TOL.<br>+ 0.152<br>MIN. TOL.<br>- 0.152 | MAX. TOL.<br>+ 0.127<br>MIN. TOL.<br>- 0.127 | MAX. TOL.<br>+ 0.13<br>MIN. TOL.<br>- 0.13 | MAX. TOL.<br>+ 0.13<br>MIN. TOL.<br>- 0.13 |              |              |              |
|           | NOMINAL                                      | NOMINAL                                      | NOMINAL                                    | NOMINAL                                    | NOMINAL      | MIN.         | MAX.         |
| 1206      | 3.06 (0.120)                                 | 1.60 (0.063)                                 | 0.40 (0.016)                               | 1.22 (0.048)                               | 0.63 (0.024) | 0.50 (0.020) | 0.76 (0.030) |
| 2010      | 5.08 (0.200)                                 | 2.54 (0.100)                                 | 0.48 (0.019)                               | 2.23 (0.088)                               | 0.63 (0.024) | 0.50 (0.020) | 0.76 (0.030) |

## SUGGESTED LAND PATTERN (Option 0063)



| CHIP SIZE | DIMENSIONS (in millimeters) |                   |                   |
|-----------|-----------------------------|-------------------|-------------------|
|           | Z <sub>max.</sub>           | G <sub>min.</sub> | X <sub>max.</sub> |
| 1206      | 3.91 (0.154)                | 0.50 (0.020)      | 1.73 (0.068)      |
| 2010      | 5.93 (0.233)                | 0.50 (0.020)      | 2.67 (0.105)      |

| PERFORMANCE               |                                                                                             |                               |                             |
|---------------------------|---------------------------------------------------------------------------------------------|-------------------------------|-----------------------------|
| TESTS                     | CONDITIONS                                                                                  | REQUIREMENTS                  | TYPICAL VALUES AND DRIFTS   |
| Termination adhesion      | 5N for 10 s                                                                                 | $\pm (0.25 \% + 0.05 \Omega)$ | $< \pm 0.1 \%$              |
| Resistance to solder heat | Immersion 10 s<br>in Sn/Pb 60/40<br>at + 260 °C                                             | $\pm (0.25 \% + 0.05 \Omega)$ | $< \pm 0.1 \%$              |
| Rapid temperature change  | 5 cycles<br>- 55 °C to + 155 °C                                                             | $\pm (0.25 \% + 0.05 \Omega)$ | $< \pm 0.1 \%$              |
| Climatic sequence         | Phase A dry heat<br>Phase B damp heat<br>Phase C cold - 55 °C<br>Phase D damp heat 5 cycles | $\pm (1 \% + 0.05 \Omega)$    | $< \pm 0.2 \%$              |
| Humidity (steady state)   | 56 days                                                                                     | $\pm (1 \% + 0.05 \Omega)$    | $< \pm 0.2 \%$              |
| Moisture resistance       | AEC-Q200<br>85 °C/85 % RH/Pn<br>1000 h                                                      | $3 \% + 0.05 \Omega$          | Max. $< 3 \% + 0.05 \Omega$ |
| Short time overload       | 6.25 Pn<br>for 2 s                                                                          | $\pm (0.25 \% + 0.05 \Omega)$ | $< \pm 0.1 \%$              |
| Load life                 | 1000 h at rated power<br>at 230 °C                                                          | -                             | 1 % max.                    |
| Shelf life                | 1000 h at 245 °C                                                                            | -                             | 1 % max.                    |

| GLOBAL PART NUMBER INFORMATION           |                              |                            |                                                                                                                                                                                      |   |                                     |   |                                                            |   |                                                                 |   |                          |   |   |   |   |   |  |
|------------------------------------------|------------------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------------------------------|---|------------------------------------------------------------|---|-----------------------------------------------------------------|---|--------------------------|---|---|---|---|---|--|
| Global Part Numbering: CHPHT0805K1001FGT |                              |                            |                                                                                                                                                                                      |   |                                     |   |                                                            |   |                                                                 |   |                          |   |   |   |   |   |  |
| C                                        | H                            | P                          | H                                                                                                                                                                                    | T | 0                                   | 8 | 0                                                          | 5 | K                                                               | 1 | 0                        | 0 | 1 | F | G | T |  |
| GLOBAL MODEL                             | SIZE                         | TCR                        | VALUE                                                                                                                                                                                |   | TOLERANCE                           |   | TERMINATION (1)                                            |   | PACKAGING (2)                                                   |   | OPTION                   |   |   |   |   |   |  |
| CHPHT                                    | 0603<br>0805<br>1206<br>2010 | K = 100 ppm<br>L = 200 ppm | The first 3 digits are significant figures and the last digit specifies the number of zeros to follow. R designates decimal point<br><br>10R0 = 10 Ω<br>3901 = 3900 Ω<br>1004 = 1 MΩ |   | F = ± 1 %<br>G = ± 2 %<br>J = ± 5 % |   | N: SnAg over nickel barrier<br>G: Gold over nickel barrier |   | Blank = Waffle pack<br>T = Tape and reel<br>PT = Paper tape (3) |   | Leave blank if no option |   |   |   |   |   |  |

**Notes**

- (1) N terminations for temperature up to 200 °C  
G terminations for temperature up to 230 °C
- (2) For specific quantity of parts per packaging please consult Vishay Sfernice
- (3) For paper tape please consult Vishay Sfernice



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