

# 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.

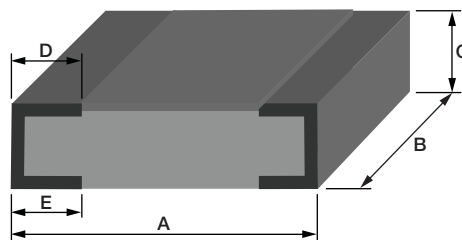
## FEATURES

- 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)



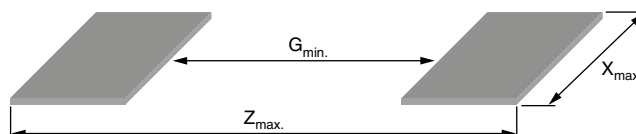
**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## 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**

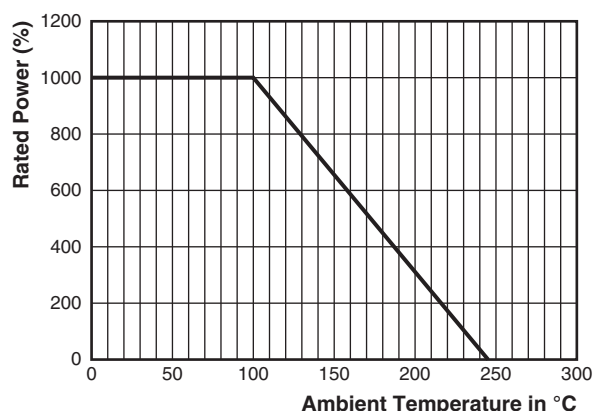
|              |                                                                                                                                                                   |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|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

**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

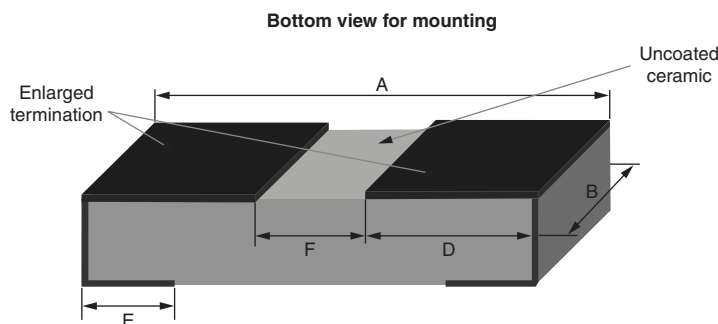
For any option it is recommended to consult Vishay Sfernice for availability first.

### 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)).

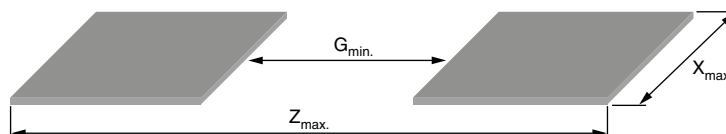
Option to order: 0063 (applies to size 1206/2010).

## 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<br>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<br>are significant<br>figures and the<br>last digit specifies<br>the number of<br>zeros to follow.<br>R designates<br>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 =<br>Waffle pack<br>T =<br>Tape and reel<br>PT =<br>Paper tape (3) | Leave blank<br>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



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,  
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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