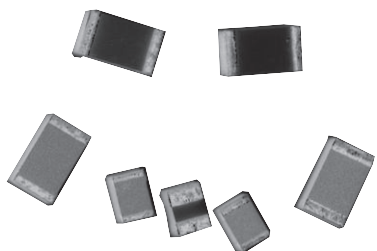




## Wraparound and Single-In-Line, Thin Film Nickel Temperature Sensors



### LINKS TO ADDITIONAL RESOURCES



Vacuum deposited nickel films are used to produce temperature sensors with various characteristics. The small size and small thermal mass of these devices result in a quick response to changes in temperature.

### FEATURES

- Conforms to the DIN 43760 specs in -60 °C to +180 °C temperature range
- TCR: 6180 ppm/°C (between 0 °C and 100 °C) <sup>(3)</sup>
- Wide resistance range: 25 Ω to 2500 Ω, TFS-S  
25 Ω to 250 Ω, TFS-W
- Packaging available: W/A, SIL
- 2 versions: SMD and through hole
- High stability ( $\frac{\Delta R}{R}$  and  $\frac{\Delta CT}{CT}$  < 0.2 % 1000 h at Pn at 150 °C)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### 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

### STANDARD ELECTRICAL SPECIFICATIONS

| MODEL | SIZE                             | RESISTANCE RANGE AT 23 °C <sup>(1)</sup><br>Ω | RATED POWER<br>W | MAX. CURRENT<br>mA | TOLERANCE<br>± % | TEMPERATURE COEFFICIENT <sup>(2) (3)</sup><br>± ppm/°C |
|-------|----------------------------------|---|------------------|--------------------|------------------|--|
| TFS-S | 0.2" lead spacing <sup>(4)</sup> | 25 to 2500                                    | 0.500            | 5                  | 1, 2             | 6180   |
| TFS-W | 0805                             | 25 to 100                                     | 0.200            | 4                  | 1, 2             | 6180   |
| TFS-W | 1206                             | 25 to 250                                     | 0.330            | 4.5                | 1, 2             | 6180   |

### Notes

<sup>(1)</sup> Nominal value

<sup>(2)</sup> Between 0 °C and 100 °C

<sup>(3)</sup> The ohmic value  $R_T$  at temperature  $T$  (°C) depends on  $R_0$  (ohmic value at 0 °C) according to the following equation:

$$R_T/R_0 = 1 + 5.485 \times 10^{-3} T + 6.65 \times 10^{-6} T^2 + 2.805 \times 10^{-11} T^4$$

**Example:** A  $T = 100$  °C

$$R_T/R_0 = 1.6180$$

$$TCR = \pm 6180 \text{ ppm/°C}$$

Vishay Sfernice can calculate ohmic value at  $T = 0$  °C (as ohmic value mentioned in ordering procedure is at 23 °C)

<sup>(4)</sup> TFS-S is a single in line (through-hole)

### CLIMATIC SPECIFICATIONS

|                             |                   |
|-----------------------------|-------------------|
| Operating temperature range | -55 °C to +125 °C |
| Storage temperature range   | -55 °C to +155 °C |

### MECHANICAL SPECIFICATIONS

|                    |                                   |
|--------------------|-----------------------------------|
| Resistive element  | Nickel, around 1.5 μm thick       |
| Substrate material | 99.6 % alumina                    |
| Leads (TFS-S)      | Tin/silver plated on copper alloy |
| Terminals (TFS-W)  | Tin silver over nickel            |

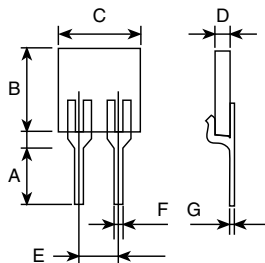
### TECHNICAL SPECIFICATIONS

| TEST                             | SPECIFICATIONS  | CONDITIONS              |
|----------------------------------|---|-------------------------|
| <b>MATERIAL</b>                  | <b>NICKEL</b>   |                         |
| Tolerance on temperature         | Up to 0, 33 °C  |                         |
| Stability                        | $\frac{\Delta R}{R} < 0.2 \%$ ; $\frac{\Delta CT}{CT} < 0.2 \%$ | 1000 h at Pn at +150 °C |
| Thermal conductance (TFS-S only) | $\frac{1}{R_{th}} = 6.7 \text{ mW/°C}$ (for information only)   | In air                  |



**DIMENSIONS**

TFS-S Single-In-Line

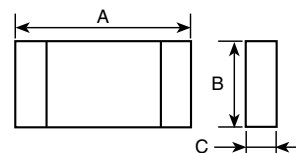


| DIMENSION | INCHES | MILLIMETERS |
|-----------|--------|-------------|
| A         | 0.200  | 3.17        |
| B         | 0.200  | 5           |
| C         | 0.200  | 5           |
| D         | 0.025  | 0.63        |
| E         | 0.100  | 2.54        |
| F         | 0.020  | 0.50        |
| G         | 0.010  | 0.25        |

**Note**

- Please refer to Vishay Sfernice Application Note “Guidelines for Vishay Sfernice Resistive and Inductive Products” for soldering recommendation (document number: 52029), paragraph 2: GENERAL SOLDERING RECOMMENDATION FOR THROUGH HOLE OR SMD COMPONENTS

TFS-W Chip for SMD



| 0805 DIMENSION | INCHES | MILLIMETERS |
|----------------|--------|-------------|
| A              | 0.075  | 1.90        |
| B              | 0.050  | 1.25        |
| C              | 0.020  | 0.50        |

| 1206 DIMENSION | INCHES | MILLIMETERS |
|----------------|--------|-------------|
| A              | 0.125  | 3.20        |
| B              | 0.063  | 1.60        |
| C              | 0.027  | 0.70        |

**Note**

- Please refer to Vishay Sfernice Application Note “Guidelines for Vishay Sfernice Resistive and Inductive Products” for soldering recommendation (document number: 52029), paragraph 3: GUIDELINES FOR SURFACE MOUNTING COMPONENTS (SMD). Profile #3 applies

| PACKAGING   |
|---|
| Waffle pack or tape and reel for TFS-W<br>Sticks or special packaging for TFS-S |

**HOW TO ORDER**

**Wraparound**

T F S W 0 8 0 5 - 5 6 R F

|       |       |              |  |                    |
|-------|-------|--------------|--|--------------------|
| MODEL | STYLE | SIZE         | OHMIC VALUE                            | TOLERANCE          |
| TFS   | W     | 0805<br>1206 | In clear<br>R stands for decimal point | F = 1 %<br>G = 2 % |

**Note**

- Ohmic value ordered is the one at 23 °C

**SIL**

T F S S - 2 K 5 F

|       |       |   |                    |
|-------|-------|---|--------------------|
| MODEL | STYLE | OHMIC VALUE   | TOLERANCE          |
| TFS   | S     | In clear<br>R stands for decimal point<br>K stands for 1000 | F = 1 %<br>G = 2 % |

**Note**

- Ohmic value ordered is the one at 23 °C

**Historical Part Number:**

TFS W 0805 56U 1 % e2  
TFS S 2K5 1 % e2



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