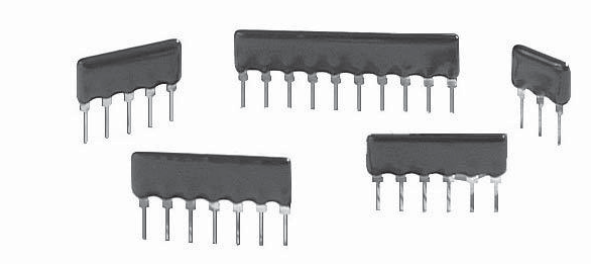
# Conformal, Single In-Line Thin Film Resistor, Through Hole Network (Custom)



Wirewound or metal film performance in a space saving package.

SIP networks available in 3 pins to 10 pins sizes can obtain important performance parameters in an economical, mass producible style. SIPs take up the least amount of board space and are the easiest possible configuration to hand-insert into printed circuit boards. Standard pin centers are 0.100". Passivation coatings plus a conformal coating of epoxy protect the active element from the outside environment.

## FEATURES

Pb-free Available

RoHS* COMPLIANT

- Minimal PC board space
- Standard 100 mil centers
- Exceptional ratio stability over time and temperature ($\Delta R$ ± 0.015 % at + 70 °C at 2000 h)
- Integrated construction
- Conformal coating flame resistant (UL 94 V-0 rating)
- Compliant to RoHS Directive 2002/95/EC

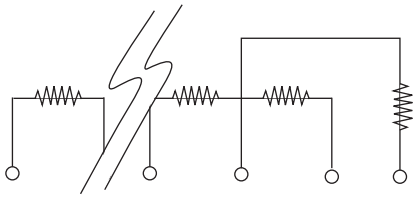
**Note**

* Pb containing terminations are not RoHS compliant, exemptions may apply

## TYPICAL PERFORMANCE

| ▲ | ABSOLUTE | TRACKING |
|---|---|---|
| TCR | 10 | 2 |
| | ABSOLUTE | RATIO |
| TOL. | 0.05 | 0.02 |

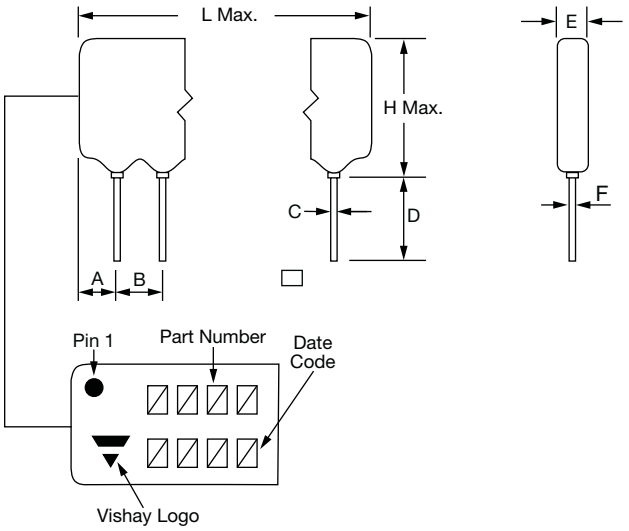
## SCHEMATIC



Custom schematics available.
Please consult factory.

| STANDARD ELECTRICAL SPECIFICATIONS | | |
|---|---|---|
| **TEST** | **SPECIFICATIONS** | **CONDITIONS** |
| **Material** | Passivated nichrome | - |
| **Pin/Lead Number** | 3 to 10 | - |
| **Resistance Range** | 100 Ω to 2 MΩ total | - |
| **TCR: Absolute** | ± 10 ppm/°C to ± 25 ppm/°C | - 55 °C to + 125 °C |
| **TCR: Tracking** | ± 2 ppm/°C to ± 5 ppm/°C | - 55 °C to + 125 °C |
| **Tolerance: Absolute** | ± 0.05 % to ± 1.0 % | + 25 °C |
| **Tolerance: Ratio** | ± 0.01 % to ± 0.5 % | + 25 °C |
| **Power Rating: Resistor** | 0.100 W (per element) | Maximum at + 70 °C |
| **Power Rating: Package** | - | Maximum at + 70 °C |
| **Stability: Absolute** | $\Delta R$ ± 0.05 % | 2000 h at + 70 °C |
| **Stability: Ratio** | $\Delta R$ ± 0.015 % | 2000 h at + 70 °C |
| **Voltage Coefficient** | < 0.1 ppm/V | - |
| **Working Voltage** | 100 V | - |
| **Operating Temperature Range** | - 55 °C to + 125 °C | - |
| **Storage Temperature Range** | - 55 °C to + 125 °C | - |
| **Noise** | < - 30 dB | - |
| **Thermal EMF** | < 0.10 µV/°C | - |
| **Shelf Life Stability: Absolute** | $\Delta R$ ± 0.01 % | 1 year at + 25 °C |
| **Shelf Life Stability: Ratio** | $\Delta R$ ± 0.002 % | 1 year at + 25 °C |

## DIMENSIONS AND IMPRINTING in inches and millimeters




| DIMENSION | INCHES | MILLIMETERS |
|---|---|---|
| A | 0.058 typ. | 1.47 typ. |
| B | 0.100 typ. | 2.54 typ. |
| C | 0.020 ± 0.003 | 0.51 ± 0.08 |
| D | 0.125 min. | 3.18 min. |
| E | 0.110 max. | 2.79 max. |
| F | 0.010 typ. | 0.25 typ. |
| L (3 Pins) | 0.320 | 8.13 |
| L (4 Pins) | 0.420 | 10.67 |
| L (5 Pins) | 0.520 | 13.21 |
| L (6 Pins) | 0.620 | 15.75 |
| L (7 Pins) | 0.720 | 18.29 |
| L (8 Pins) | 0.820 | 20.83 |
| L (9 Pins) | 0.920 | 23.37 |
| L (10 Pins) | 1.020 | 25.91 |
| H (3 Pins) | 0.280 (1) | 7 (1) |
| H (4 Pins) | | |
| H (5 Pins) | | |
| H (6 Pins) | | |
| H (7 Pins) | | |
| H (8 Pins) | | |
| H (9 Pins) | | |
| H (10 Pins) | | |

**Note**

(1) H dimension, R-value and schematic dependent

## MECHANICAL SPECIFICATIONS

| | |
|---|---|
| **Resistive Element** | Passivated nichrome |
| **Substrate Material** | Alumina |
| **Body** | Epoxy coated |
| **Terminals** | Copper alloy |
| **Tin/Lead Option** | Sn60 - Sn63 |
| **Lead (Pb)-free Option** | Sn96.5, Ag3.0, Cu0.5 |
| **Tin/Lead and Lead (Pb)-free Finish** | Hot solder dip |

## ORDERING INFORMATION CHECK LIST (Customs)

Special requirements should be identified in advance, but as a minimum, you should have the following information ready.

| ELECTRICAL | MECHANICAL |
|---|---|
| 1. Resistors, by value and tolerance<br>2. Reference resistor(s) and matching of which resistors to which reference resistors<br>3. Resistance by ratio<br>4. Absolute temperature coefficient of resistivity<br>5. Temperature tracking of subordinate resistors to reference resistor(s)<br>6. Maximum operating voltage<br>7. Resistor power ratings<br>8. Operating temperature range | 1. Maximum allowable seated height (from PC board to top of network)<br>2. Special marking concerns<br>3. Schematic pin out of package<br>4. Specify if lead (Pb)-free |

For additional assistance refer to Vishay Thin Film's guide to understanding Thin Film precision.
Resistor networks or application engineering.
All standard products may be ordered directly from Vishay Thin Film.

## GLOBAL PART NUMBER INFORMATION

**New Global Part Numbering: VTF211BX**

| V | T | F | 2 | 1 | 1 | | B | X |
|---|---|---|---|---|---|---|---|---|
| V | T | F | 1 | 0 | 0 | 4 | S | B | X |

| GLOBAL MODEL | PART NUMBER (3 or 4 digits) | LEAD (Pb)-FREE (0 or 1 digits) | PACKAGING |
|---|---|---|---|
| VTF | **xxx** or **xxxx**<br><br>Example: 214<br>1004 | **S** = Lead (Pb)-free (e1)<br>None = Tin lead | **BX** = Conductive foam box |

**Historical Part Number example: VTF Custom 211 (for reference purposes only)**

| VTF Custom | 211 |
|---|---|
| MODEL | PART NUMBER |

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