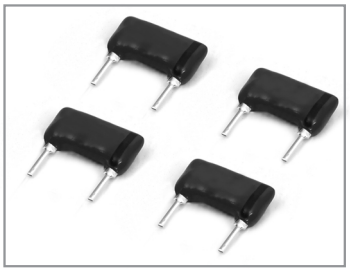
# 1/4 Watt Precision Thin Film Resistors

High precision, thin film resistors. A standard TCR of 2ppm/℃ is achieved with a Ni-Cr alloy spattered onto an alumina substrate. Operating temperatures from -55℃ to +125℃. These models also exhibit excellent long-term stability, low current noise, a low voltage coefficient and a low thermal EMF. Typical applications are: Discrete voltage dividers, common analog circuits of professional audio, sensor pre-amplifiers, industrial measurement, control, medical electronics, ATE, aerospace, and reliable power electronics.

## GENERAL SPECIFICATIONS

| Model | Resistance Range[Ω] | 1)TCR [±ppm/℃] | 1)Tolerance [%] | Standard Resistance | 2)Power Rating(W) | Working Voltage[V] |
|---|---|---|---|---|---|---|
| TP48<br>TP47<br>TP46<br>TP45 | 100~20K | ±1(X) | T [0.01] | E96 and E24(include 2.5 and 5.0) * any resistance value | 0.25 | $\sqrt{P \cdot R}$ |
| | 100~150K | ±2(Y), ±2.5[W] | Q [0.02] | | | |
| | | ±5(Z) | A [0.05] | | | |
| TP48, TP47 | 50~150K | ±10(N) | B [0.1] | | | |
| TP46, TP45 | 50~510K | | | | | |
| TP48, TP47 | 10~150K | ±25(E) | B [0.1] | | | |
| TP46, TP45 | 10~820K | | | | | |



1) Conditions: -55℃ to +125℃ 2) Conditions: -55℃ to +70℃

* 4 or more significant digits and odd resistances, please call factory about printing method

## CHARACTERISTICS

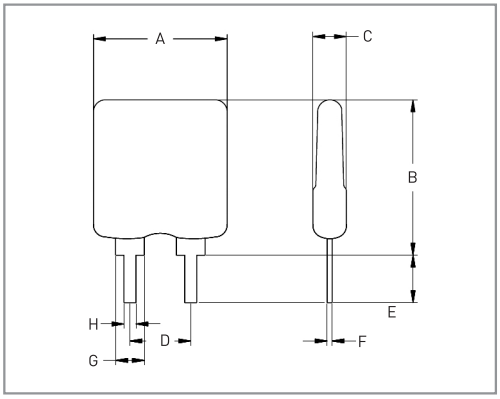
Values in [ ] mean change in Ω after test

| | | |
|---|---|---|
| Operating Temperature Range | | -55℃ to +125℃ |
| Storage Temperature Range | | -55℃ to +125℃ |
| Dielectric Withstanding Voltage | [±0.03%] | |
| Short Time Overload | [±0.05%] | 2.5 x Power rating, 5 seconds |
| Moisture Resistance | [±0.05%] | 1000 hours |
| Vibration | [Not Specified] | |
| Shelf Life Stability | [±0.03%] | One year at 25℃ |
| Voltage Coefficient | [<0.1ppm/V] | THD at rating power <-120dB |
| Temperature Cycle | [±0.05%] | -55℃ 30minutes, +120℃ 30minutes, 20cycles |
| Thermal EMF | [0.05μV/℃] | |
| Soldering Heat | [±0.03%] | 350℃, 3 seconds |
| Solvent | [No damage] | IPA test |
| Solderability | [Covered 95%] | 235℃, 2 seconds |
| Terminal Strength | [±0.05%] | |
| Noise | [<-43dB] | |
| Load Life | [±0.05%] | 1000 hours |

## ORDERING PROCEDURE EXAMPLE

| Ordering Example | Model | TCR[ppm/℃] | Resistance | Tolerance(%) | Option Code | Note |
|---|---|---|---|---|---|---|
| TP48Y100ohmTZ00 | TP48 | 2(Y) | 100Ω | T [0.01] | Z00 [Bulk] | 1/4W, 2.54mm |
| TP46W10kohmQZ00 | TP46 | 2.5(W) | 10kΩ | Q [0.02] | Z00 [Bulk] | 1/4W, 2.54mm |
| TP47Z100ohmAZ00 | TP47 | 5(Z) | 100Ω | A [0.05] | | 1/4W, 5.08mm |
| TP47N10kohmBZ00 | TP47 | 10(N) | 10kΩ | B [0.10] | | 1/4W, 3.81mm |
| TP45E10kohmD700 | TP45 | 25(E) | 10kΩ | D [0.25] | | 1/4W, 7.62mm |

## DIMENSIONS [mm]




| Model | TP48 | TP47 | TP46 | TP45 |
|---|---|---|---|---|
| A | 5.6maximum | 6.8maximum | 8.0maximum | 10.16maximum |
| B | 8.2maximum | 8.6maximum | 9.0maximum | 9.0maximum |
| C | 2.54maximum | 2.54maximum | 2.54maximum | 2.54maximum |
| D | 2.54±0.25 | 3.81±0.25 | 5.08±0.25 | 7.62±0.25 |
| E | 3.3±0.5 | 3.3±0.5 | 3.3±0.5 | 3.3±0.5 |
| F | 0.25 | 0.25 | 0.25 | 0.25 |
| G | 1.2 | 1.2 | 1.2 | 1.2 |
| H | 0.5±0.05 | 0.5±0.05 | 0.5±0.05 | 0.5±0.05 |

## RESISTANCES, E24, E96

| Standard Resistance E24+ | | | | | | | Standard Resistance E96 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 1.5 | 2.2 | 3.0 | 4.3 | 5.6 | 8.2 | 1.00 | 1.21 | 1.47 | 1.78 | 2.15 | 2.61 | 3.16 | 3.83 | 4.64 | 5.62 | 6.81 | 8.25 |
| 1.1 | 1.6 | 2.4 | 3.3 | 4.7 | 6.2 | 9.1 | 1.02 | 1.24 | 1.50 | 1.82 | 2.21 | 2.67 | 3.24 | 3.92 | 4.75 | 5.76 | 6.98 | 8.45 |
| 1.2 | 1.8 | (2.5) | 3.6 | (5.0) | 6.8 | | 1.05 | 1.27 | 1.54 | 1.87 | 2.26 | 2.74 | 3.32 | 4.02 | 4.87 | 5.90 | 7.15 | 8.66 |
| 1.3 | 2.0 | 2.7 | 3.9 | 5.1 | 7.5 | | 1.07 | 1.30 | 1.58 | 1.91 | 2.32 | 2.80 | 3.40 | 4.12 | 4.99 | 6.04 | 7.32 | 8.87 |
| | | | | | | | 1.10 | 1.33 | 1.62 | 1.96 | 2.37 | 2.87 | 3.48 | 4.22 | 5.11 | 6.19 | 7.50 | 9.09 |
| | | | | | | | 1.13 | 1.37 | 1.65 | 2.00 | 2.43 | 2.94 | 3.57 | 4.32 | 5.23 | 6.34 | 7.68 | 9.31 |
| | | | | | | | 1.15 | 1.40 | 1.69 | 2.05 | 2.49 | 3.01 | 3.65 | 4.42 | 5.36 | 6.49 | 7.87 | 9.53 |
| | | | | | | | 1.18 | 1.43 | 1.74 | 2.10 | 2.55 | 3.09 | 3.74 | 4.53 | 5.49 | 6.65 | 8.06 | 9.76 |

## TCR AND TOLERANCE INDENTIFICAITIONS

| TCR and Symbols | | Tolerance and Symbols | |
|---|---|---|---|
| X | ±1ppm/℃ | T | ±0.01% |
| Y | ±2ppm/℃ | Q | ±0.02% |
| W | ±2.5ppm/℃ | A | ±0.05% |
| Z | ±5ppm/℃ | B | ±0.10% |
| N | ±10ppm/℃ | D | ±0.50% |
| E | ±25ppm/℃ | F | ±1.0% |
| C | ±50ppm/℃ | | |