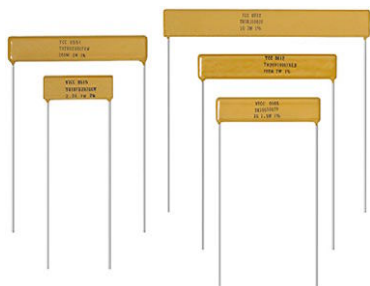


# Thick Film Planar Resistors, Through-Hole, High Voltage



## FEATURES

- 30 000 V capability
- Very low voltage coefficient to less than 1 ppm/V
- Outstanding stability under adverse conditions
- Stable cermet resistive element bonded to a high-purity alumina substrate
- Tough epoxy-based coating and high voltage stability
- Dividers available, see Vishay Techno's TD datasheet ([www.vishay.com/doc?68042](http://www.vishay.com/doc?68042))
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS\***  
Available  
**HALOGEN  
FREE**

## APPLICATIONS

Applications include power supplies, transformers and any application requiring operation within an environment where high voltages are used.

## 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 |                                               |                                             |                                             |                       |                                                              |
|------------------------------------|-----------------------------------------------|---------------------------------------------|---------------------------------------------|-----------------------|--------------------------------------------------------------|
| GLOBAL MODEL / SIZE                | POWER RATING<br>$P_{25^{\circ}\text{C}}$<br>W | MAXIMUM WORKING VOLTAGE <sup>(1)</sup><br>V | RESISTANCE RANGE <sup>(2)</sup><br>$\Omega$ | TOLERANCE<br>$\pm \%$ | TEMPERATURE COEFFICIENT<br>$\pm \text{ppm}/^{\circ}\text{C}$ |
| TR03C                              | 0.25                                          | 0.8K                                        | 300 to 3M                                   | 1, 2, 5, 10, 20       | 100                                                          |
|                                    |                                               |                                             | 300 to 25M                                  | 1, 2, 5, 10, 20       | 200, 300                                                     |
| TR03X                              |                                               | 2.5K                                        | 25M to 250M                                 | 1, 2, 5, 10, 20       | 200, 300                                                     |
|                                    |                                               |                                             | 260M to 2G                                  | 5, 10, 20             | 200, 300                                                     |
|                                    |                                               |                                             | 2.1G to 10G                                 | 5, 10, 20             | 500                                                          |
| TR05D                              | 0.5                                           | 4K                                          | 500 to 25M                                  | 1, 2, 5, 10, 20       | 100                                                          |
|                                    |                                               |                                             | 3K to 200M                                  | 1, 2, 5, 10, 20       | 200, 300                                                     |
| TR05X                              |                                               | 5K                                          | 30M to 1G                                   | 1, 2, 5, 10, 20       | 200, 300                                                     |
|                                    |                                               |                                             | 1.1G to 20G                                 | 5, 10, 20             | 200, 300                                                     |
|                                    |                                               |                                             | 21G to 100G                                 | 5, 10, 20             | 500                                                          |
| TR10F                              | 1                                             | 6.5K                                        | 1K to 16M                                   | 1, 2, 5, 10, 20       | 100                                                          |
|                                    |                                               |                                             | 2K to 120M                                  | 1, 2, 5, 10, 20       | 200, 300                                                     |
| TR10X                              |                                               | 10K                                         | 20M to 1G                                   | 1, 2, 5, 10, 20       | 200, 300                                                     |
|                                    |                                               |                                             | 1.1G to 15G                                 | 5, 10, 20             | 200, 300                                                     |
|                                    |                                               |                                             | 16G to 1T                                   | 5, 10, 20             | 500                                                          |
| TR15G                              | 1.5                                           | 12.5K                                       | 1.5K to 45M                                 | 1, 2, 5, 10, 20       | 100                                                          |
|                                    |                                               |                                             | 5K to 340M                                  | 1, 2, 5, 10, 20       | 200, 300                                                     |
| TR15X                              |                                               | 15K                                         | 60M to 1G                                   | 1, 2, 5, 10, 20       | 200, 300                                                     |
|                                    |                                               |                                             | 1.1G to 35G                                 | 5, 10, 20             | 200, 300                                                     |
|                                    |                                               |                                             | 36G to 1.5T                                 | 5, 10, 20             | 500                                                          |
| TR20H                              | 2                                             | 17.5K                                       | 2K to 64M                                   | 1, 2, 5, 10, 20       | 100                                                          |
|                                    |                                               |                                             | 8K to 480M                                  | 1, 2, 5, 10, 20       | 200, 300                                                     |
| TR20X                              |                                               | 20K                                         | 80M to 1G                                   | 1, 2, 5, 10, 20       | 200, 300                                                     |
|                                    |                                               |                                             | 1.1G to 50G                                 | 5, 10, 20             | 200, 300                                                     |
|                                    |                                               |                                             | 51G to 2T                                   | 5, 10, 20             | 500                                                          |
| TR30J                              | 3                                             | 25K                                         | 3K to 82M                                   | 1, 2, 5, 10, 20       | 100                                                          |
|                                    |                                               |                                             | 8.5K to 620M                                | 1, 2, 5, 10, 20       | 200, 300                                                     |
| TR30X                              |                                               | 30K                                         | 80M to 1G                                   | 1, 2, 5, 10, 20       | 200, 300                                                     |
|                                    |                                               |                                             | 1.1G to 60G                                 | 5, 10, 20             | 200, 300                                                     |
|                                    |                                               |                                             | 61G to 3T                                   | 5, 10, 20             | 500                                                          |

## Notes

- Custom sizes available
- Voltage coefficient: typically less than 1 ppm/V (tested per MIL-STD-202)
- (1) Continuous working voltage shall be  $\sqrt{P \times R}$  or maximum working voltage, whichever is less
- (2) All resistance values are calibrated at 100 V<sub>DC</sub>. Calibration at other voltages available upon request

## GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: TR20H1K00FKEB (preferred part number format)

| T                  | R                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2 | 0 | H | 1                                                                                                                                                                               | K | 0                                                                                                                                | 0 | F                                                                                    | K                                        | E | B                                  |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----------------------------------------------------------------------------------------------------------------------------------|---|--------------------------------------------------------------------------------------|------------------------------------------|---|------------------------------------|
| GLOBAL MODEL<br>TR | SIZE / POWER / VOLTAGE RATING                                                                                                                                                                                                                                                                                                                                                                                                      |   |   |   | RESISTANCE VALUE                                                                                                                                                                |   | TOLERANCE                                                                                                                        |   | TCR                                                                                  | TERMINAL FINISH                          |   | PACKAGING                          |
|                    | <b>03C</b> = 0.25 W, med. voltage<br><b>03X</b> = 0.25 W, max. voltage<br><b>05D</b> = 0.5 W, med. voltage<br><b>05X</b> = 0.5 W, max. voltage<br><b>10F</b> = 1 W, med. voltage<br><b>10X</b> = 1 W, max. voltage<br><b>15G</b> = 1.5 W, med. voltage<br><b>15X</b> = 1.5 W, max. voltage<br><b>20H</b> = 2 W, med. voltage<br><b>20X</b> = 2 W, max. voltage<br><b>30J</b> = 3 W, med. voltage<br><b>30X</b> = 3 W, max. voltage |   |   |   | R = $\Omega$<br>K = k $\Omega$<br>M = M $\Omega$<br>G = G $\Omega$<br>T = T $\Omega$<br><b>400R</b> = 400 $\Omega$<br><b>10M0</b> = 10 M $\Omega$<br><b>1T00</b> = 1 T $\Omega$ |   | <b>F</b> = $\pm 1.0\%$<br><b>G</b> = $\pm 2.0\%$<br><b>J</b> = $\pm 5.0\%$<br><b>K</b> = $\pm 10.0\%$<br><b>M</b> = $\pm 20.0\%$ |   | <b>K</b> = 100 ppm<br><b>N</b> = 200 ppm<br><b>M</b> = 300 ppm<br><b>P</b> = 500 ppm | <b>E</b> = Sn100<br><b>R</b> = Sn60/Pb40 |   | <b>B</b> = bag<br><b>S</b> = strip |

Historical Part Numbering: TR20H1001FKe3 (will continue to be accepted)

| TR               | 20H                 | 1001             | F         | K   | e3              |
|------------------|---------------------|------------------|-----------|-----|-----------------|
| HISTORICAL MODEL | SIZE / POWER RATING | RESISTANCE VALUE | TOLERANCE | TCR | TERMINAL FINISH |

### Notes

- For additional information on packaging, refer to the Through Hole Resistor Packaging document ([www.vishay.com/doc?31544](http://www.vishay.com/doc?31544))
- The TCR listed in this datasheet is for resistance values up to 1 G $\Omega$ . For resistance values > 1 G $\Omega$ , please contact factory

## MECHANICAL SPECIFICATIONS

**Resistive Element:** thick film

**Substrate:** 96 % pure alumina

**Encapsulation:** epoxy base, conformal coating

**Terminals:** solder plated copper leads

**Terminal Strength:** 4.5 pounds pull-test

**Power:** derated from ambient temperature +25 °C

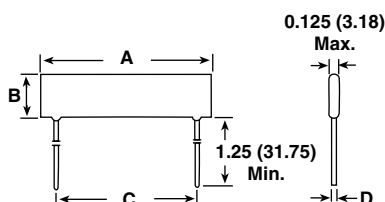
## ENVIRONMENTAL SPECIFICATIONS

**Temperature Range:** -55 °C to +125 °C

(for higher temperature range, consult factory)

**Load Life:** less than 0.15 %, 1000 h

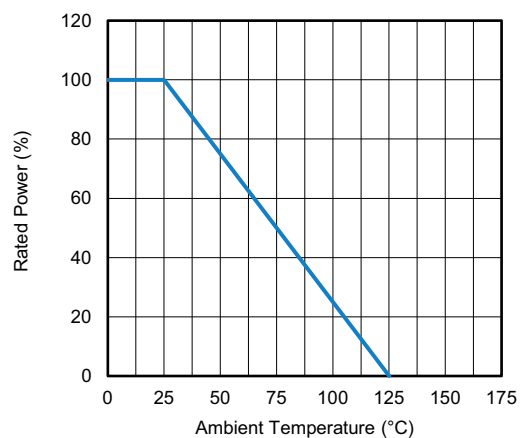
## DIMENSIONS in inches (millimeters)



| MODEL | A<br>(LENGTH)                           | B<br>(HEIGHT)                           | C<br>(LEAD SPACING)                     | D<br>(LEAD DIA.)                       |
|-------|-----------------------------------------|-----------------------------------------|-----------------------------------------|----------------------------------------|
| TR03  | 0.300 $\pm$ 0.030<br>(7.62 $\pm$ 0.76)  | 0.210 $\pm$ 0.021<br>(5.33 $\pm$ 0.53)  | 0.200 $\pm$ 0.020<br>(5.08 $\pm$ 0.51)  | 0.025 $\pm$ 0.002<br>(0.64 $\pm$ 0.05) |
| TR05  | 0.500 $\pm$ 0.050<br>(12.70 $\pm$ 1.27) | 0.300 $\pm$ 0.030<br>(7.62 $\pm$ 0.76)  | 0.400 $\pm$ 0.040<br>(10.16 $\pm$ 1.02) | 0.025 $\pm$ 0.002<br>(0.64 $\pm$ 0.05) |
| TR10  | 1.00 $\pm$ 0.100<br>(25.40 $\pm$ 2.54)  | 0.350 $\pm$ 0.035<br>(8.89 $\pm$ 0.89)  | 0.900 $\pm$ 0.090<br>(22.86 $\pm$ 2.29) | 0.032 $\pm$ 0.002<br>(0.81 $\pm$ 0.05) |
| TR15  | 1.50 $\pm$ 0.150<br>(38.10 $\pm$ 3.81)  | 0.350 $\pm$ 0.035<br>(8.89 $\pm$ 0.89)  | 1.40 $\pm$ 0.140<br>(35.56 $\pm$ 3.56)  | 0.032 $\pm$ 0.002<br>(0.81 $\pm$ 0.05) |
| TR20  | 2.00 $\pm$ 0.200<br>(50.80 $\pm$ 5.08)  | 0.350 $\pm$ 0.035<br>(8.89 $\pm$ 0.89)  | 1.90 $\pm$ 0.190<br>(48.26 $\pm$ 4.83)  | 0.032 $\pm$ 0.002<br>(0.81 $\pm$ 0.05) |
| TR30  | 3.00 $\pm$ 0.300<br>(76.20 $\pm$ 7.62)  | 0.400 $\pm$ 0.040<br>(10.16 $\pm$ 1.02) | 2.90 $\pm$ 0.290<br>(73.66 $\pm$ 7.37)  | 0.032 $\pm$ 0.002<br>(0.81 $\pm$ 0.05) |



## DERATING





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