

Glossary of Resistor Terms

Ambient Operating Temperature

The temperature of the air surrounding an object, neglecting small localized variations.

Critical Value of Resistance

For a given voltage rating and a given power rating, there is only one value of resistance that will dissipate full rated power at rated voltage. This value of resistance is commonly referred to as “critical value of resistance.” For values of resistance below the critical value, the maximum (element) voltage is never reached and for values of resistance above critical value, the power dissipated becomes lower than rated.

Current Noise

An AC component of voltage appearing across a resistor when current is passed through it. Usually expressed in RMS microvolts (μV) per volt, it may also be expressed in noise index figures of dB. (See Noise Index)

Current Sensor

A resistive device employed to sense levels of current.

Derating Curve

A graphical representation of the relationship between continuous rated power over an operating temperature range, expressed as a percentage of the maximum power rating, declining from the full-load maximum ambient temperature point to zero power at the maximum continuous exposure temperature allowed by a specification.

Dielectric Strength

The ultimate breakdown voltage of the dielectric or insulation of the resistor when the voltage is applied between the case and all terminals tied together.

Inductance

The property of a circuit element that opposes a change in current flow, thus causing current changes to lag behind voltage changes.

Insulation Resistance

The DC resistance measured between all terminals connected together and the case or exterior insulation.

Kelvin Connection

A connection consisting of a four point contact where two of the connections are for current and two are for sensing the voltage across the component.

Noise Index (See Current Noise)

db	$\mu\text{V}/\text{V}$
15	5.60
10	3.20
5	1.80
0	1.00
-5	0.56
-10	0.32
-15	0.18
-20	0.10
-25	0.056
-30	0.032
-35	0.018

Ohms Law

The formula used to determine the three basic building blocks of any circuit: volts (V), current in amps (I), resistance in ohms (R). $V = I \times R$

Operating Temperature Range

The lowest to the highest ambient temperature range within which a device is expected to operate for a prescribed period of time and remain within prescribed limits.

Power Rating

See Rated Load.

PPM

Parts Per Million (10^6). The terminology when describing the temperature coefficient.

PPM/°C

The amount of change in parts per million for every degree of change in temperature Celsius.

Rated Load

Amount of heat energy that can be dissipated without damaging the component expressed in watts.

Rated Operating Temperature

The maximum operating temperature at which a resistor is capable of being used continuously with the prescribed maximum rated power.

Rated Power

The maximum value of power which can be continuously loaded to a resistor at a rated operating temperature.

Rated Voltage

The maximum value of DC voltage or AC voltage (rms) capable of being applied continuously to a resistor at the rated ambient temperature.

Ratio Match

Deviation in resistance tolerance (\pm %) from the ratio specified: (i.e. 2/1 \pm 1%).
(Typically measured from R1 in multiple resistor configurations.)

Reliability

The degree of probability that a device will perform its desired function. The two ways of defining reliability.

A. Mean Time Between Failures (MTBF)

B. Failure Rate per specification.

Resistance

The limit in current flow when voltage is applied expresses in ohms (see Ohms Law).

Resistance Matching

See Ratio Match.

Resistor

A device that converts electrical energy to thermal energy and limits current flow according to Ohm's Law.

Stability

The overall ability of a resistor to maintain its initial resistance value over extended periods of time when subjected to any combination of environmental conditions and electrical stresses.

Thermal Noise

Noise typically created by resistors such that amplitude is independent of frequency (white noise), and the amplitude is related to the temperature of the resistor. (Thermal noise is interchanged with Johnson noise.)

Tolerance

The extent in percent from which the actual resistance reading may vary from the specified resistance value at a specified standard temperature.

T.C.R. (Temperature Coefficient of Resistance)

The magnitude of change in resistance due to temperature changes usually expressed in percent per degree Celsius ($\%/^{\circ}\text{C}$) or parts per million per degree C ($\text{ppm}/^{\circ}\text{C}$).

T.C.R. Tracking (Temperature Coefficient of Resistance Tracking)

The degree to which two resistors T.C.R.'s remain within a specific variation during temperature excursions.

Voltage Divider

A circuit of more than one resistor in series creating multiple voltage outputs.

Voltage Rating

Highest voltage that can be continuously applied in conformance with manufacturer specification.