Technical Note TN001: Advice on Storage Conditions for Fixed Resistors

General Advice on Storage

Ideal storage conditions are +10 to +30°C, avoiding temperature changes greater than ±10°C in a 24 hour period, and 30 to 60% RH. Chemical fumes, sulphur-bearing gases and particulate air pollution should not be present. Original packaging should remain intact until first use. Most SMT resistors have an MSL of 1, but some are 2. Details of MSL of SMT parts are available on the Processing tab of the product search results pages of our website https://www.ttelectronics.com/resistors.

Shelf Life

TT Electronics does not specify a resistor shelf life as such. There are two factors to consider relating to long term storage of resistors.

1. Stability

This is really only an issue with precision resistors. Maximum drift in ohmic value after 12 months storage is stated under Performance Data on the datasheet. (Note that this is referred to as a "shelf life" test, but this does not mean the shelf life is 12 months; it is simply the name of this environmental test.)

For a typical nichrome precision metal film resistor you can estimate drift for longer periods on the basis of multiplying the stated drift by the cube root of the multiple of the time. For example, for 8 years storage, the maximum drift is scaled by $\sqrt[3]{(8)} = 2$, and so is twice the drift stated for 1 year.

2. Solderability

We recheck solderability after 2 years in our stores. There is not normally a problem. However a solderability check before use is advisable if a customer has kept stock for several years before use.

Long-term Storage in Nitrogen

Storage in nitrogen halts oxidation. It has no detrimental effects - air is mainly nitrogen anyway. Its effectiveness as a long-term storage strategy for resistors is limited, however.

Tin or tin-lead does not suffer significant loss of solderability through oxidation at room temperature. Long-term loss of solderability comes from two processes –

1. Growth of an intermetallic layer of copper & tin. Depending on time, temperature and plating thickness, at some time this layer will break through to the outer surface.

2. Oxidation of exposed tin-copper which, if the proportion of the termination surface area affected exceeds 5%, can cause failure of a standard solderability test.

Storage in nitrogen will do nothing to slow process 1 (although it should be noted that storage at low temperature could help.) It will however halt process 2, but the time from removal from storage until soldering then becomes critical.