

# Storage and Shelf Life

## Ceramic Capacitors (MLCCs)

Ceramic capacitors shelf life depends on storage conditions and packaging type. Venkel's official stated time for storage and shelf life for SMT passive components is two years (24 months).

The main concerns with the storage of ceramic capacitors are humidity content, temperature and Tape & Reel degradation which could ultimately affect solderability along with other additional factors that affect ceramic capacitors. One factor is the ageing affect of class II or non-linear (X7R, X5R, Z5U and Y5V) and causes capacitance to drop logarithmically over time. The dielectric material that composes the internal layers and insulating material of a capacitor will not exhibit either intrinsic or extrinsic failures due to shelf storage.

The terminations of ceramic capacitors will typically oxidize over time degrading solderability and affecting the wetting characteristics of the capacitor if not stored properly. Contact with Sulfur Dioxide or Chlorine gas will accelerate an oxidation layer forming on the terminations. Tape and Reel products should be protected from direct sunlight and used on a "first-in, first-out" basis (FIFO). This is especially the case for class II dielectric materials where ageing characteristics will continue to drop capacitance over time. Typical ageing rates can be found in the product data sheet or specifications. All components and their corresponding packaging should not be opened until the components are ready for use and should be re-sealed and properly stored as soon as possible. Palladium Silver terminated components should be stored in Nitrogen cabinets or (minimally) with Silver-Saver paper and completely resealed. We recommend the use and consumption of Palladium-Silver terminated parts as soon as possible or within 6 months maximum.

### **Venkel recommends\* that all products be stored under the following conditions:**

- 1) Components are to be stored indoors and in their original packaging where environmental conditions can be monitored and controlled.
- 2) Storage temperature should be from +5C to +35C (41F to 95F).
- 3) A maximum of 60% relative humidity.

### **\*Shelf Life & Phase Transition:**

Please note that these are "recommended" storage conditions and parts can be stored outside these parameters without affecting solderability or short term reliability. However, components not stored as recommended may see issues such as solderability and tape and reel degradation where the paper tape may not separate as designed.