

Storage & Shelf Life of MLCC's

Ceramic capacitors shelf life depends on storage conditions and type of packaging. The three main concerns with SMT ceramic capacitors for storage are solderability, tape and reel degradation, and aging of class II dielectrics (X7R, Z5U, and Y5V). The ceramic dielectric will not exhibit either intrinsic or extrinsic failures due to shelf storage.

The terminations of ceramic capacitors will slowly oxidize with time degrading solderability and wetting characteristics of the capacitor. Contact with Sulfur Dioxide or Chlorine gas will accelerate the oxidation of the terminations. Tape & Reel products should be protected from direct sunlight and used on a "first-in, first-out" basis (FIFO). All forms of immediate packaging should not be opened until the capacitors are required for use and resealed as soon as possible.

Recommended Storage:

Venkel recommends all products be stored under the following conditions:

- 1) Parts are to be stored indoors in the original container where environmental conditions can be monitored and adjusted.
- 2) Storage Temperature should be from +5°C to +35°C (41°F to 95°F).
- 3) A maximum of 60% Relative Humidity.

Shelf Life & Phase Transition:

Venkel recommends the properly stored ceramic capacitors be used within two years of receipt to help minimize solderability and ageing issues. Class II ceramic capacitors such as X7R dielectric formulations are manufactured with Barium Titanate ferroelectric materials. This formulation exhibits a decay of capacitance with time in any storage condition. This phenomenon is called aging. The loss of capacitance with time is unavoidable with a ferroelectric formulation. The aging can be reversed by heating the dielectric above the Curie Point (120°C) for about 1 hour and reverting the crystal structure from a cubic (paraelectric dielectric phase) to a tetragonal (ferroelectric dielectric phase) and back to its original state. Please consult Venkel Ltd. if additional information is needed.