Leaded Multilayer Ceramic Capacitors

STORAGE

The capacitors must not be stored in a corrosive atmosphere where sulfide or chloride gas, acid, alkali, or salt are present. Moisture exposure should also be avoided.

The solderability of the leads is not affected by storage of up to 24 months. Temperature + 10°C to + 35°C, relative humidity up to 60%.

With reference to class 2 ceramic dielectric capacitors, see the last page of this general information.

SOLDERING

SOLDERING SPECIFICATIONS		
Soldering test for capacitors with wire leads: (According to IEC60068-2-20, solder bath method)		
	SOLDERABILITY	**RESISTANCE TO SOLDERING HEAT**
Soldering Temperature	(235 ± 5)°C	(260 ± 5)°C
Soldering Duration	(2 ± 0.5) sec	(10 ± 1) sec
Distance from Component Body	≥ 2mm	≥ 5mm

SOLDERING RECOMMENDATIONS

Soldering of the component should be achieved using a Sn60/40 type or a silver-bearing Sn62/36/2Ag type solder.

As ceramic capacitors are very sensitive to rapid changes in temperature (thermal shock), the solder heat resistance specification (see above table) should not be exceeded.

Subjecting the capacitor to excessive heat may result in thermal shocks that can crack the ceramic body and melt the internal solder junction.

CLEANING

The components should be cleaned with vapor degreasers immediately following the soldering operation.

SOLVENT RESISTANCE

The coating and marking of the capacitors are resistant to the following test method:
IEC 60068-2-45 (Method XA)

MOUNTING

We do not recommend modifying the lead terminals, e.g., bending or cropping as this action could break the coating or crack the ceramic insert. However, if the lead must be modified in such a way, we recommend supporting the lead with a clamping fixture next to the coating.

CAPACITANCE "AGEING" OF CERAMIC CAPACITORS

Following the final heat treatment, all class 2 ceramic capacitors reduce their capacitance value approximately according to logarithmic law due to their special crystalline construction. This change is called "ageing." If the capacitors are heat treated (for example when soldering), the capacitance increases again to a higher value deageing, and the ageing process begins again.

Note:
The level of this deageing is dependent on the temperature and the duration of the heat; an almost complete deageing is achieved at 150°C in one hour. These conditions also form the basis for reference measurements when testing. The capacitance change per time decade (ageing constant) differs for the various types of ceramic, but typical values can be taken from the equations below.

$$k = \frac{100 \cdot (C_{11} - C_{12})}{C_{11} \cdot \log_{10}(t1/t2)}$$

t1, t2 = measuring time point (h)
C_{11}, C_{12} = capacitance values for the times t1, t2
k = ageing constant (%)

$$C_{12} = C_{11} \cdot (1 - k/100 \cdot \log_{10}[t1/t2])$$

REFERENCE MEASUREMENT

Due to ageing, it is necessary to quote an age for reference measurements which can be related to the capacitance with fixed tolerance. According to EN 130700, this time period is 1000 hours.

If the shelf-life of the capacitor is known, the capacitance for t = 1000h can be calculated with the ageing constant.

In order to avoid the influence of ageing, it is important to deage the capacitors before stress-testing. The following procedure is adopted (see also EN 130700):

Deageing at 125°C, 1 hour

Storage for 24 hours at normal climate temperature

Initial measurement

Stress

Deageing at 125°C, 1 hour

Storage for 24 hours at normal climate temperature

Final measurement