SIOV metal oxide varistors

Soldering instructions

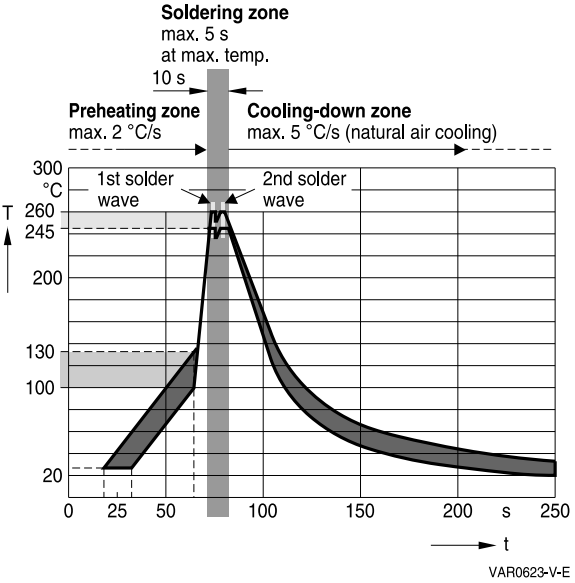
Date: January 2018

EPCOS AG is a TDK Group Company.

1 Soldering instructions for leaded, strap terminals or encapsulated varistors (CU types)

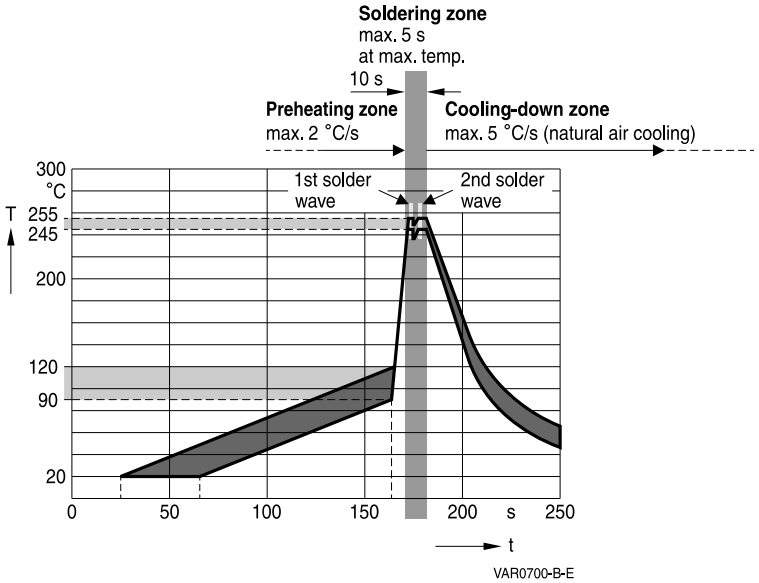
Varistors with wire leads or strap terminals as well as encapsulated varistors can be soldered using all conventional methods.

1.1 Recommended temperature profile for wave soldering - leaded and strap terminals (except ETFV and T series)



1.2 Recommended temperature profile for wave soldering - ETFV and T series

Note: Temperatures of all preheat stages and the solder bath must be strictly controlled.

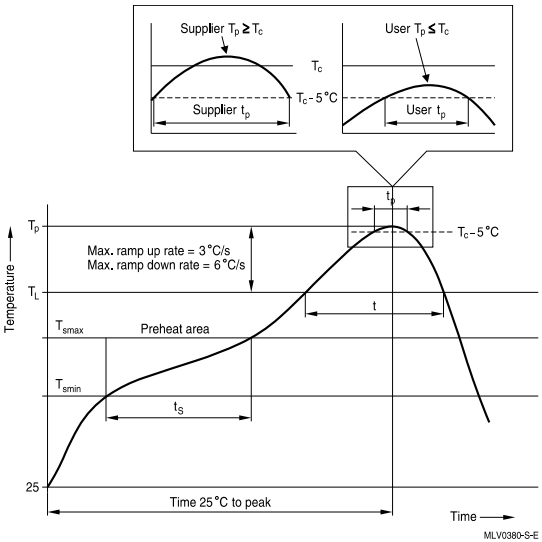


Manual soldering for ETFV and T series

Maximum soldering temperature 350 °C for 3 s.It is recommended to heat sink the lead wires of the ThermoFuse varistors (T series).

1.3 Reflow and wave soldering temperature profile for CU varistors (encapsulated varistors)

1.3.1 Recommended reflow soldering temperature profile for CU varistors according to JEDEC J-STD-020D



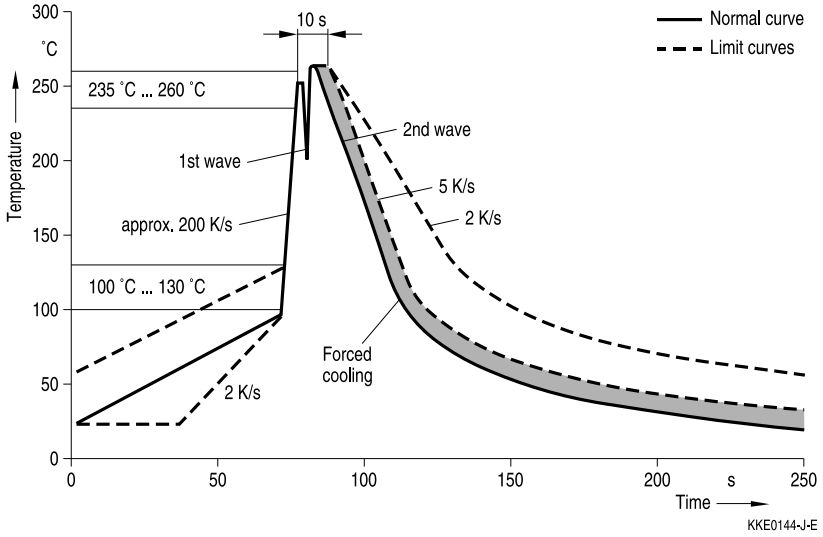
Profile feature		Sn-Pb eutectic assembly	Pb-free assembly
Preheat and soak			
- Temperature min	T_{smin}	100 °C	150 °C
- Temperature max	T_{smax}	150 °C	200 °C
- Time	t_{smin} to t_{smax}	60 ... 120 s	60 ... 180 s
Average ramp-up rate	T_{smax} to T_p	3 °C/ s max.	3 °C/ s max.
Liquidus temperature	T_L	183 °C	217 °C
Time at liquidus	t_L	60 ... 150 s	60 ... 150 s
Peak package body temperature	T_p [1)]	220 °C ... 235 °C[2)]	245 °C ... 260 °C[2)]
Time (t_P)[3)] within 5 °C of specified classification temperature (T_c)		20 s[3)]	30 s[3)]
Average ramp-down rate	T_p to T_{smax}	6 °C/ s max.	6 °C/ s max.
Time 25 °C to peak temperature		max. 6 minutes	max. 8 minutes

1) Tolerance for peak profile temperature (T_P) is defined as a supplier minimum and a user maximum.
2) Depending on package thickness. For details please refer to JEDEC J-STD-020D.
3) Tolerance for time at peak profile temperature (t_P) is defined as a supplier minimum and a user maximum.

Note: All temperatures refer to the topside of the package, measured on the package body surface. Number of reflow cycles: 3

1.3.2 Wave soldering temperature profile for CU varistors (encapsulated varistors)

Temperature characteristics at component terminal with dual-wave soldering



2 Notes for proper soldering of CU varistors

2.1 Repair/ rework

Manual soldering with a soldering iron must be avoided, hot-air methods are recommended for rework purposes.

2.2 Cleaning

Common cleaners based on organic solvents (e.g. dowanol or alcohol) may be used to clean ceramic and solder joints. Flux must be completely removed for sufficient cleaning.

The temperature difference between the components and cleaning liquid must not exceed 100 °C.

Solvents may cause plastic encapsulations to swell or detach. So be sure to check the suitability of a solvent before using it.

Ultrasonic cleaning should be carried out with the utmost caution. If the sound power is too high, for example, it can degrade the adhesive strength of the terminal metallization or cause the encapsulation to detach. Prompt drying is necessary after cleaning.

2.3 Solder paste printing (reflow soldering)

An excessive application of solder paste can result in too high a solder fillet, thus making the chip more susceptible to mechanical and thermal stress. Too little solder paste can reduce the adhesive strength on the outer electrodes and thus weaken the bonding to the PCB. The solder should be
applied smoothly to the end surface.

2.4 Adhesive application

Thin or insufficient adhesive can cause chips to loosen or become disconnected during curing. Low viscosity of the adhesive can cause chips to slip after mounting. It is advised to consult the manufacturer of the adhesive or proper usage and amounts of adhesive to use.

2.5 Selection of flux

The flux should contain less than or equal to 0.1 wt % of halogenated substances, since flux residue after soldering could lead to corrosion of the termination and/or increased leakage current on the surface of the component. Strong acidic flux must not be used. The amount of flux applied should be carefully controlled, since an excess may generate flux gas, which in turn is detrimental to the solderability of the component.

2.6 Placement of components on circuit board

Especially in the case of dual-wave soldering, it is advantageous to place the components on the board before soldering in such a way that their two terminals enter the solder bath simultaneously.

2.7 Storage

After shipment from EPCOS the SIOV type series should be soldered within the following time period:

SIOV-S, -Q, -LS, -SNF	24 months
SIOV-ETFV, -T, -CU	12 months

The parts are to be left in the original packing to prevent oxidized terminals which can cause soldering problems.

Storage temperature:	−25 to 45 °C
Max. relative humidity (without condensation):	< 75% annual average,
	< 95% on max. 30 days per annum.