



SMD NTC Thermistors

Mounting instructions

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Mounting instructions

1 Soldering

1.1 SMD NTC thermistors

SMD NTC thermistors can be provided with a nickel barrier termination or on special request with silver-palladium termination. The usage of mild, non-activated fluxes for soldering is recommended as well as a proper cleaning of the PCB.

The nickel barrier layer of the silver/nickel/tin termination (see figure 1) prevents leaching of the silver base metalization layer. This allows great flexibility in the selection of soldering parameters.

The tin prevents the nickel layer from oxidizing and thus ensures better wetting by the solder. The nickel barrier termination is suitable for all commonly-used soldering methods.

Note: SMD NTCs with AgPd termination are not approved for lead-free soldering.

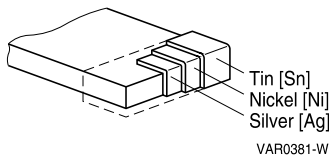


Figure 1
SMD NTC thermistors, structure of nickel barrier termination

Mounting instructions

1.1.1 Solderability (test to IEC 60068-2-58)

Preconditioning: Immersion into flux F-SW 32.

Evaluation criterion: Wetting of soldering areas $\geq 95\%$.

Solder	Bath temperature (°C)	Dwell time (s)
SnPb 60/40	215 \pm 3	3 \pm 0.3
SnAg (3.0 ... 4.0), Cu (0.5 ... 0.9)	245 \pm 3	3 \pm 0.3

1.1.2 Resistance to soldering heat (test to IEC 60068-2-58)

Preconditioning: Immersion into flux F-SW 32.

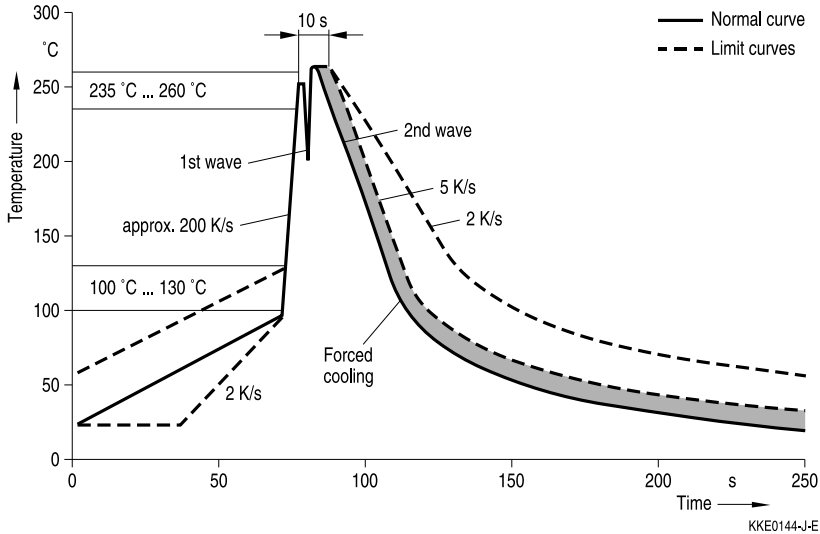
Evaluation criterion: Leaching of side edges $\leq 1/3$.

Solder	Bath temperature (°C)	Dwell time (s)
SnPb 60/40	260 \pm 5	10 \pm 1
SnAg (3.0 ... 4.0), Cu (0.5 ... 0.9)	260 \pm 5	10 \pm 1

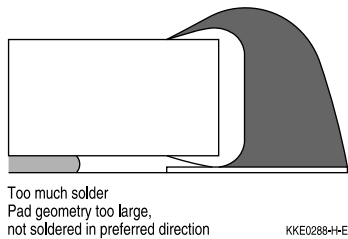
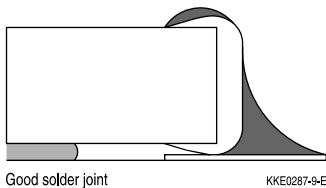
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Wave soldering

Temperature characteristic at component terminal with dual wave soldering



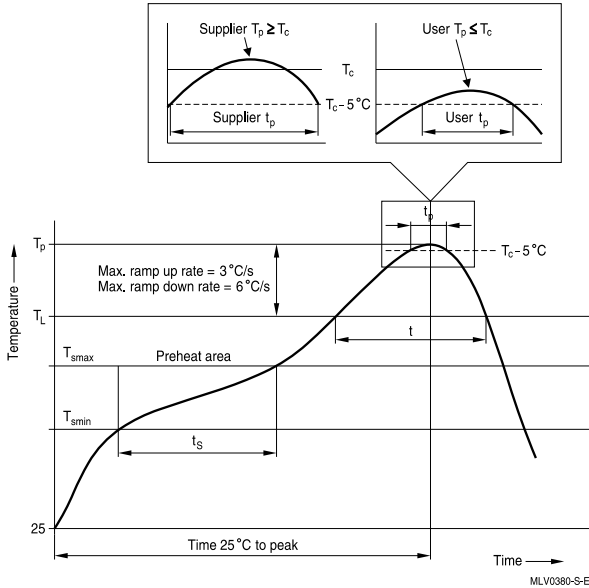
Solder joint profiles for silver/nickel/tin terminations



Mounting instructions

Reflow soldering

Recommended temperature characteristic for reflow soldering following 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.
Liquidous temperature	T_L	183 °C	217 °C
Time at liquidous	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		maximum 6 min	maximum 8 min

1) Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.

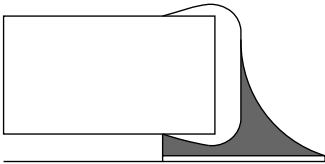
2) Depending on package thickness. For details please refer to JEDEC J-STD-020D.

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 topside of the package, measured on the package body surface.
Number of reflow cycles: 3

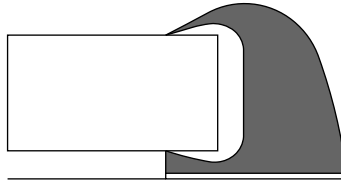
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Solder joint profiles for silver/nickel/tin terminations



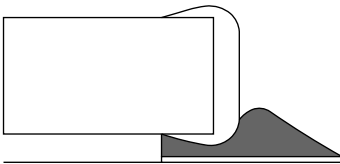
Good solder joint

TNT0565-G-E



Too much solder
Pad geometry too large

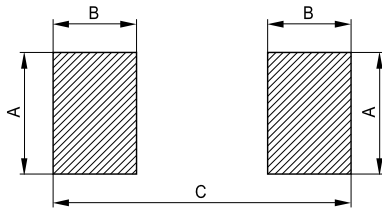
KKE0071-A-E



Poor wetting

KKE0072-I-E

1.1.3 Recommended geometry of solder pads



KKE0092-X

Recommended maximum dimensions (mm)

Case size inch/mm	A	B	C
0402/1005	0.6	0.6	1.7
0603/1608	1.0	1.0	3.0
0805/2012	1.3	1.2	3.4
1206/3216	1.8	1.2	4.5

1.1.4 Notes

Iron soldering should be avoided, hot air methods are recommended for repair purposes.

Mounting instructions

2 Conductive adhesion

An alternative to soldering is the gluing of thermistors with conductive adhesives. The benefit of this method is that it involves no thermal stress. The adhesives used must be chemically inert.

3 Clamp contacting

Pressure contacting by means of clamps is particularly suitable for applications involving frequent switching and high turn-on powers.

4 Sealing and potting

When thermistors are sealed, potted or overmolded, there must be no mechanical stress caused by thermal expansion during the production process (curing / overmolding process) and during later operation. The upper category temperature of the thermistor must not be exceeded. Ensure that the materials used (sealing / potting compound and plastic material) are chemically neutral.

5 Cleaning

If cleaning is necessary, mild cleaning agents such as ethyl alcohol and cleaning gasoline are recommended. Cleaning agents based on water are not allowed. Ultrasonic cleaning methods are permissible.

6 Storage

In order to maintain their solderability, thermistors must be stored in a non-corrosive atmosphere. Humidity, temperature and container materials are critical factors.

Do not store SMDs where they are exposed to heat or direct sunlight. Otherwise, the packing material may be deformed or SMDs may stick together, causing problems during mounting. After opening the factory seals, such as polyvinyl-sealed packages, use the SMDs as soon as possible.

The components should be left in the original packing. Touching the metallization of unsoldered thermistors may change their soldering properties.

Storage temperature: $-25\text{ }^{\circ}\text{C}$ up to $45\text{ }^{\circ}\text{C}$

Relative humidity (without condensation): $\leq 75\%$ annual mean

$< 95\%$, maximum 30 days per annum

Solder the thermistors listed in this data book after shipment from EPCOS within the time specified:

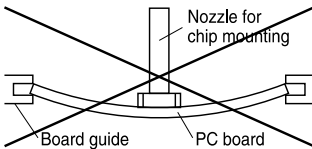
SMDs: 12 months for Ni-barrier termination
6 months for AgPd termination

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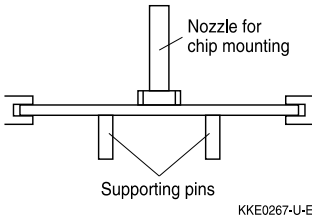
7 Placement and orientation of SMD NTC thermistors on PCB

a) Component placement

Incorrect



Correct

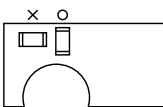


It is recommended that the PC board should be held by means of some adequate supporting pins such as shown left to prevent the SMDs from being damaged or cracked.

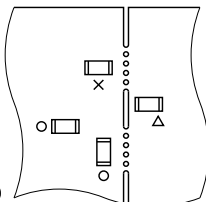
b) Cracks

SMDs located near an easily warped area

SMD breakage probability due to stress at a breakaway



O = correct
X = incorrect
Δ = incorrect (under certain conditions)

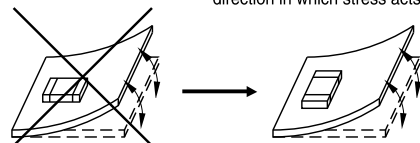


KKE0268-3-E

When placing a component near an area which is apt to bend or a grid groove on the PC board, it is advisable to have both electrodes subjected to uniform stress, or to position the component's electrodes at right angles to the grid groove or bending line (see c) Component orientation).

c) Component orientation

Locate chip horizontal to the direction in which stress acts



Incorrect orientation

Correct orientation

KKE0269-B-E

Choose a mounting position that minimizes the stress imposed on the chip during flexing or bending of the board.