

TECHNICAL REFERENCE DOCUMENT: SOLDERING

Reflow soldering profile for surface mount and pin-in-paste assembly

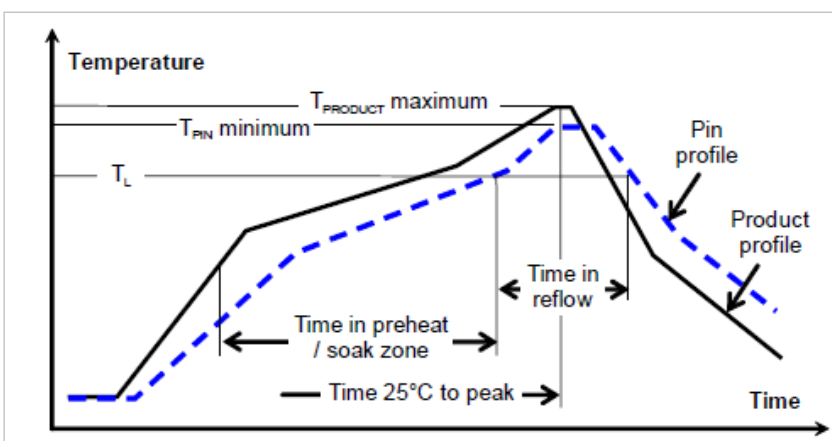
Products intended for surface mount or pin-in-paste assembly are qualified for use in a Pb-free forced convection or vapor phase reflow soldering process.

For Pb-free solder processes, a pin temperature (T_{pin}) in excess of the solder melting temperature (T_L , 217 to 221°C for SnAgCu solder alloys) for more than 60 seconds and a peak temperature of 245°C on all solder joints is recommended to ensure a reliable solder joint.

The preferred method for soldering through-hole mount products is wave solder. If pin-in-paste reflow soldering is used, exposure above the maximum peak temperature of 245 °C or exceeding the maximum reflow time above T_L must be avoided to ensure long term reliability. The power module temperatures must be measured via thermocouple at a minimum of 2 locations.

T_L is the typical solder melting (liquidous) temperature
 $T_{product}$ is measured on the power module's hotspot
 T_{pin} is measured on the power module output power pins solder joints at the customer board

General reflow process specification		Pb-free, SAC305
Average ramp-up rate ($T_{product}$)		3 °C/s max
Typical solder melting temp.	T_L	217 °C
Min/Max. reflow time above T_L	T_{pin}	60 –150 s
Min. pin temp.	T_{pin}	235 °C
Peak product temp.	$T_{product}$	245 °C
Average ramp-down ($T_{product}$)		6°C/s max
Max. time 25° C to peak		8 minutes



Typical soldering profile

Wave and manual soldering information - through-hole mounting

The through-hole mounted product is intended for solder attachment by wave or manual soldering. The pin temperature is specified for 270°C peak for maximum 10 seconds.

A maximum preheat rate of 4°C/s and maximum preheat temperature of 150°C is suggested. When soldering by hand, be careful to avoid direct contact between the hot soldering iron tip and the pins for more than a few seconds in order to prevent overheating.

Moisture reflow classification

For Pb-free reflow solder processes, the product is qualified for MSL 3 according to IPC/JEDEC standard J-STD-020C.

For wave solder processes, the moisture sensitivity level does not apply.

Dry pack information

Using products in high temperature reflow soldering processes requires dry pack storage and handling. Products intended for Pb-free reflow soldering processes are delivered in standard moisture barrier bags according to IPC/JEDEC standard J-STD-033 (handling, packing, shipping and use of moisture/reflow sensitivity surface mount devices). In case the products have been stored in an uncontrolled environment and no longer can be considered dry, floor life according to MSL 3, the modules must be baked according to J-STD-033.

Post solder cleaning

A no-clean flux is recommended to avoid entrapment of cleaning fluids in cavities inside the product or between the product and the host board, since cleaning residues may affect long term reliability and isolation voltage.