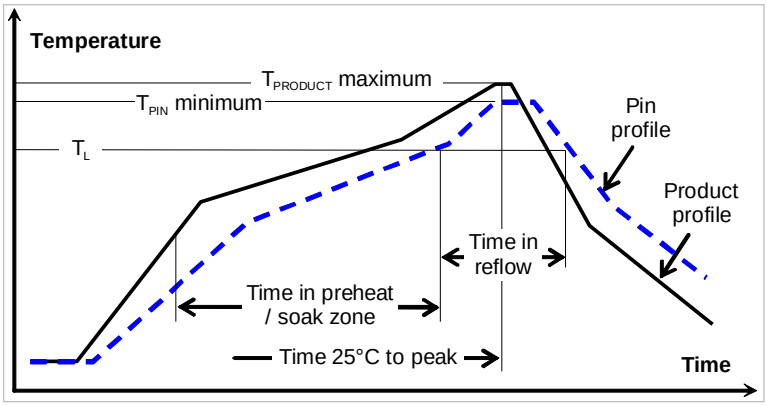
# TECHNICAL REFERENCE DOCUMENT: SOLDERING

## Soldering information—hole mounted through pin-in-paste assembly

The pin-in-paste mount product is intended for forced convection or vapor phase reflow soldering in SnPB and Pb-free process.
Reflow soldering is not preferred for through-hole mounted power modules due to challenges resulting in reduced reliability. High temperature reflow soldering causing IMC layer thickness increase results in shorten solder joint lifetime. To avoid component or solder failure a module peak temperature higher than 245 degrees and above 217 degrees more than 90 seconds is not recommended. To prevent re-melt of module internal solder joints shielding cap is required during reflow process.
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 time reliability and isolation voltage.

| General relfow process | | SnPb eutectic | Pb-free |
|---|---|---|---|
| Average temperature ($T_{product}$) | | 3 °C/s max | 3 °C/s max |
| Typical sodler melting temp. | $T_L$ | 183 ° C | 221 ° C |
| Min. Reflow time above $T_L$ | $T_{pin}$ | 60 s | 60 s |
| Min. pin temp. | $T_{pin}$ | 210 °C | 235 °C |
| Peak product temp. | $T_{product}$ | 225 °C | 245 °C |
| Average ramp-down ($T_{product}$) | | 6°C/s max | 6°C/s max |
| Max. time 25° C to peak | | 6 minutes | 8 minutes |




*Typical soldering profile*

## Thermocoupler attachment

$T_{PRODUCT}$ is measured on the baseplate top side since this will likely be the warmest part of the product during the reflow process.
$T_{PIN}$ temperature is measured on the power module output power pin solder joints at the customer board.

## Product reflow classification

The product has been tested for the following:

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

## Product reflow processes

**Lead-free (Pb-free) solder processes**

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

## Dry pack information

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).
Using products in high temperature Pb-free soldering processes requires dry pack storage and handling. 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.

## Soldering information - hole mounting

The hole mounted product is intended for plated through hole mounting by wave or manual soldering. The pin temperature is specified to maximum to 270°C 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.
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. The cleaning residues may affect long time reliability and isolation voltage.