Hermetic Package Lead-Forming and Solder Reflow Profiles

Reflow Profiles

- Board level solder reflow profiles are dependent on numerous factors including, but not limited to, solder type, flux, package type, number of components, board layers, board size, reflow oven type and accuracy as well as pre and post cleaning processes. Because of the number of variables it is not possible to provide a single reflow profile that is representative of every board using a specific package type. Typically manufacturing houses have reflow profiles in place and modify them for specific hardware.

- TI suggests using the flux manufacturer's recommended profile as a starting point. In general ceramic parts are compatible with ramp-rates of less than or equal to 5°C/second with a maximum temperature of +265°C. Variations of course need to be comprehended based on time required to volatize the flux prior to the solder reaching liquidus.

- Metal lid packages use an 80%Au-20%Sn solder preform to attach the lid. Gold-tin solder will begin to soften at +270°C and has a eutectic point of +280°C. The package body temperature must not be allowed to exceed +265°C at any time or permanent damage will occur due to compromising the package's hermetic seal. Note that though-hole hermetic devices specify a maximum temperature for soldering as a lead-temperature of +300°C for 10 seconds. This is not a reflow temperature.

Lead-Forming

- Hermetic surface mount packages are typically sold non-formed as most customers have a preferred final form factor which can vary from customer to customer. Some use the default form factor available from third party service providers such as Fancort or Corfin. Fancort maintains a library of form factors on their website at www.fancort.com/Standard-SMT-Footprints.aspx for reference. Fancort can also provide a lead-forming service or sell the fixtures for a customer to form in house. General information is found at http://fancort.com/Products/Lead-Forming-Services.aspx. TI does not endorse or recommend these companies but only mentions them as example service providers.

Special Considerations for Gold-Plated Termination-Finishes

- TI offers a variety of termination finishes for compliant hermetic packages, for example:
  - Alloy-42 leads with Sn63Pb37 hot solder dip
  - Alloy-42 or Kovar leads with 50µ-in to 350 µ-in of nickel underplate and 60 µ-in to 225 µ-in of gold finish plate
  - Alloy-42 or Kovar leads with 50µ-in to 350 µ-in of nickel underplate and SN63Pb37 hot solder dip

- MIL-PRF-38535 TABLE A-III specifies composition and coating thickness requirements as shown below.

Coating	Minimum	Maximum
Hot solder dip (for all round leads)	60 µ-in	Not Specified
Hot solder dip (for all shapes other than round leads which have ≤ 25 mil pitch)	150 µ-in	Not Specified
Hot solder dip (for all shapes other than round leads with > 25 mil pitch)	200 µ-in	Not Specified
Tin-lead plate (as plated)	300 µ-in	Not Specified

Coating	Minimum	Maximum
Tin-lead plate (fused)	200 µ-in	Not Specified
Gold plate	50 µ-in	225 µ-in
Nickel plate (electroplate)	50 µ-in	350 µ-in
Nickel plate (electroless)	50 µ-in	250 µ-in
Nickel cladding	50 µ-in	350 µ-in

- The electronics industry currently recognizes a threshold level of 3% gold by weight that can be dissolved into eutectic tin-lead solder above which the solder-joint is likely to exhibit gold embrittlement.

- With the specified gold thickness it is recommended that gold-plated leads be pre-tinned (solder-dipped) before board mounting to scavenge the gold from the leads. If this is not done there is a chance of gold-embrittlement of the board-level solder-joints. A flowing solder-pot or two passes in a static solder-part is recommended. Solder-pot solder composition should be periodically monitored for gold content.

For additional information or technical support please contact the Texas Instruments Customer Support Center at www.ti.com/support