

Solder Down Module SMT Process Suggestion

Version 05

| Document release | Date | Modification | Initials | Approved |
|-------------------|-------------------|---------------------------------|----------------|--------------------|
| Version 01 | 2014/05/15 | Revise Reflow condition | Allen Huang | Chihhao Liao |
| Version 02 | 2015/07/30 | Revise bake condition | Allen Huang | Chihhao Liao |
| Version 03 | 2019/10/21 | Add repair condition | Allen Huang | Chihhao Liao |
| Version 04 | 2019/12/17 | Add SOM product stencil suggest | Allen Huang | Chihhao Liao |
| Version 05 | 2020/01/07 | Revise template | Hank Wu | Allen Huang |
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1 Purpose

To define board level SMT process suggestion when customer used Solder down Module mounting

2 Scope

For all AzureWave's Solder Down Module.

3 Production rule

3.1 Footprint and stencil aperture recommendation

3.1.1 Footprint: Footprint shares the same center with pin pad land, and follows below rule to define the size.

3.1.1.1 Rectangle type:

3.1.1.1.1 Outermost layer: Increase the pin pad size about 10% in length & width.

Footprint length = 1.1 * (pin pad land length)

Footprint width = 1.1 * (pin pad land width)

3.1.1.1.2 Others: the same size with pin pad.

3.1.1.2 Round type:

3.1.1.2.1 Outermost layer: Increase the pin pad size about 10% in diameter.

Footprint diameter = 1.1 * (pin pad land diameter)

3.1.1.2.2 Others: the same size with pin pad.

3.1.2 Stencil aperture suggestion

3.1.2.1 The Pad size is same size with footprint.

3.1.3 Stencil Thickness suggestion:

3.1.3.1 Normal type product thickness: 0.1mm

3.1.3.2 SOM type product thickness: 0.13mm, the SOM product suggest to using step-up / step-down stencil.

3.2 Reflow soldering profile

Table 4-1 SnPb Eutectic Process - Classification Temperatures (T_c)

| Package Thickness | Volume mm ³ <350 | Volume mm ³ ≥350 |
|-------------------|-----------------------------|-----------------------------|
| <2.5 mm | 235 °C | 220 °C |
| ≥2.5 mm | 220 °C | 220 °C |

Table 4-2 Pb-Free Process - Classification Temperatures (T_c)

| Package Thickness | Volume mm ³ <350 | Volume mm ³ 350 - 2000 | Volume mm ³ >2000 |
|-------------------|-----------------------------|-----------------------------------|------------------------------|
| <1.6 mm | 260 °C | 260 °C | 260 °C |
| 1.6 mm - 2.5 mm | 260 °C | 250 °C | 245 °C |
| >2.5 mm | 250 °C | 245 °C | 245 °C |

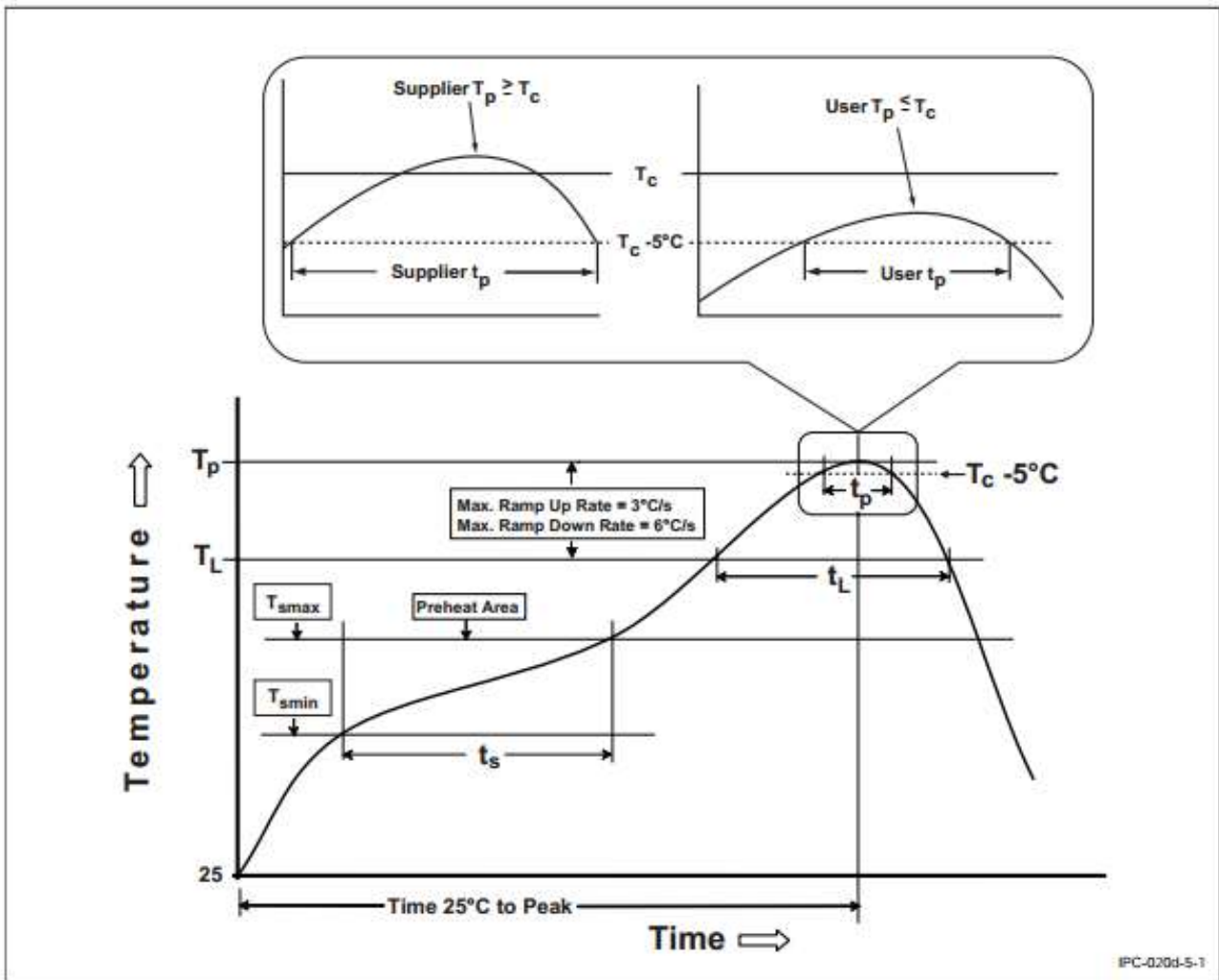


Table 5-2 Classification Reflow Profiles

| Profile Feature | Sn-Pb Eutectic Assembly | Pb-Free Assembly |
|---|---|---|
| Preheat/Soak | | |
| Temperature Min (T_{amin}) | 100 °C | 150 °C |
| Temperature Max (T_{amax}) | 150 °C | 200 °C |
| Time (t_2) from (T_{amin} to T_{amax}) | 60-120 seconds | 60-120 seconds |
| Ramp-up rate (T_L to T_p) | 3 °C/second max. | 3 °C/second max. |
| Liquidous temperature (T_L) | 183 °C | 217 °C |
| Time (t_L) maintained above T_L | 60-150 seconds | 60-150 seconds |
| Peak package body temperature (T_p) | For users T_p must not exceed the Classification temp in Table 4-1. For suppliers T_p must equal or exceed the Classification temp in Table 4-1. | For users T_p must not exceed the Classification temp in Table 4-2. For suppliers T_p must equal or exceed the Classification temp in Table 4-2. |
| Time (t_p)* within 5 °C of the specified classification temperature (T_c), see Figure 5-1. | 20* seconds | 30* seconds |
| Ramp-down rate (T_p to T_L) | 6 °C/second max. | 6 °C/second max. |
| Time 25 °C to peak temperature | 6 minutes max. | 8 minutes max. |
| * Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum. | | |

- Note:**
1. Recommend to supply N_2 for reflow oven
 2. N_2 atmosphere during reflow ($O_2 < 300ppm$)

4 Solder Down Module USE

4.1 Shelf life in Moisture Barrier Bag (MBB): 12 months, at $<30^\circ C$ and $<60\%$ relative humidity (RH)

4.2 Opened MBB: After the dry pack (MBB) has been opened, all Solder down module's within that bag must complete all solder reflow processing, including rework, prior to the floor life (168 hours), if not, need dry baking to reset the floor life.

4.3 General Consideration for Baking: The oven used for baking shall be vented and capable of maintaining the required temperatures at less than 5% RH.

4.3.1 High Temperature Carriers (Tray): Solder down module shipped in high temperature carriers can be baked in the carriers at $125^\circ C$

4.3.2 Low Temperature Carriers (Tape & Reel): Solder down module shipped in low temperature carriers may not be baked at any temperature higher than $60^\circ C$

4.4 Baking Condition:

4.4.1 High Temperature Carriers

4.4.1.1 Exceeding Floor Life > 72 hours: bake @ $125^\circ C$ 8 hours

4.4.1.2 Exceeding Floor Life ≤ 72 hours: bake @ $125^\circ C$ 6 hours

4.4.2 Low Temperature Carriers

4.4.2.1 Exceeding Floor Life > 72 hours: bake @ $60^\circ C \leq 5\%$ RH 72 hrs or $65^\circ C \leq 5\%$ RH 48 hrs.

4.4.2.2 Exceeding Floor Life ≤ 72 hours: bake @ $60^\circ C \leq 5\%$ RH 48 hrs.

4.4.2.3 If a higher bake temperature is required, solder down module must be removed from the low

temperature carriers to thermally safe carriers, baked, and returned to the low temperature carriers.

4.5 Recommend to baking oven with N2 supplied

4.6 Recommend to reflow oven with N2 supplied

4.7 Baked required with 24 hours at 125 +/-5°C before rework process for two modules, one is new module and two is board with module

4.8 Recommend to store at $\leq 10\%$ RH with vacuum packing

4.9 If SMT process needs twice reflow:

4.9.1 Process flow: (1) Bottom side SMT and reflow → (2) Top side SMT and reflow

4.9.1.1 Case 1: Solder down Module mounted on Top side. Need to bake when bottom side process over 72 hours window time

4.9.1.2 Case 2: Solder down Module mounted on bottom side, follow normal bake rule before process.

Note: Window time means from last bake end to next reflow start that has 168 hours space.

5 Repair:

5.1 Tool and Material:

5.1.1 Soldering Station

5.1.2 Soldering braid

5.1.3 Iron

5.1.4 Stencil fixture for Module

5.1.5 Soldering Pastes

5.2 Stencil Opening size:

5.2.1 Stencil thickness: 0.1mm(100um)

5.2.2 Stencil pad size opening: Footprint 100%

5.3 Repair Steps:

5.3.1 Before repair, the product need to baking 2 hrs(125°C).

5.3.2 Using soldering station to de-mount the module.

5.3.3 Using soldering braid and Iron to clean solder of pads.

5.3.4 Using stencil fixture and Soldering pastes to pasts on the pads.

5.3.5 Take the module to put it on the main board.

5.3.6 Using soldering station to mount the module.

5.3.7 Retest the product.



6 Suggest:

- 6.1 Make sure the packaging appearance condition if you want to use this product.**
- 6.2 Low-temperature baking before the production, please.**