Customer Process Guidelines

AirPrime HL Series Snap-in Socket

SIERRA WIRELESS®

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1.1
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Document History

Version	Date	Updates
1.0	February 19, 2014	Creation
1.1	February 21, 2014	Updated: • Figure 12 AirPrime Snap-in Socket Removal Tool • Figure 13 Snap-in Socket Removal Tool

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1. Introduction

1.1. Overview

This document presents guidelines for the industrial assembly of the AirPrime Snap-in Socket on an application.

1.2. Reference Documents

[1] AirPrime HL6528x Product Technical Specification

Reference number: 4114016

[2] AirPrime HL8548 and HL8548-G Product Technical Specification

Reference number: 4114663

2. Snap-in Socket Characteristics

2.1. Storage Temperature Range

Storage conditions are the range of ambient temperature where the connector housing can be stored without load.

Storage temperature is -40°C to 85°C

Relative humidity is 15% RH to 70% RH

2.2. Operating Temperature Range

The range of ambient temperature for the connector housing which can be operated continuously at rated voltage and rated current is –40°C to 85°C.

2.3. Standard Atmospheric Condition

Unless otherwise specified, specifications are given under the following atmospheric conditions:

Ambient temperature: 5°C to 35°C

Relative humidity: 45%RH to 85%RH

Air pressure: 86kPa to 106kPa

2.4. Electrical Characteristics

The tests are performed in mated condition with mating applicable modules.

Items	Conditions	Specifications
Rated voltage/ rated current		AC/DC 50V, 0.5A
Contact resistance	Connect with applicable modules, then contact resistance shall be measured between each coupled terminals.	30mΩ or less
Insulation resistance	100V DC shall be applied for 1 minute, then measurement shall be made.	Between conductors. 100MΩ or more
Withstand voltage	100V AC shall be applied for 1 minute, then measurement shall be made.	Between conductors without damages such as arcs or breakdowns, etc.

2.5. Mechanical Characteristics

Items	Conditions	Specifications
Appearance		No defects such as cracks, scratches or blemishes.
Terminal retention force	The retention force when the terminal is extracted from connector housing shall be measured.	0.7N or more

2.5.1. Mechanical Drawings

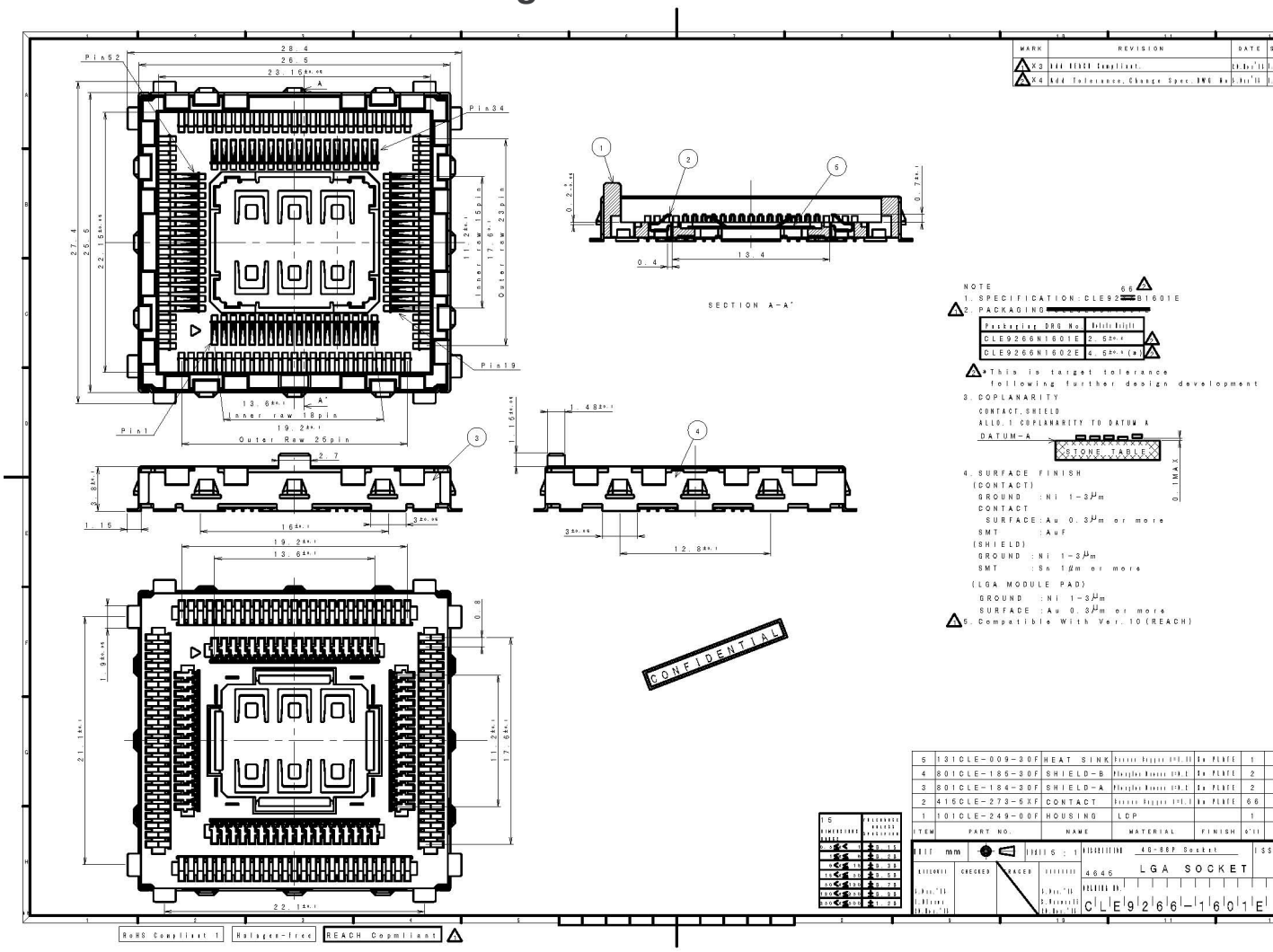


Figure 1. Snap-in Socket Diagram

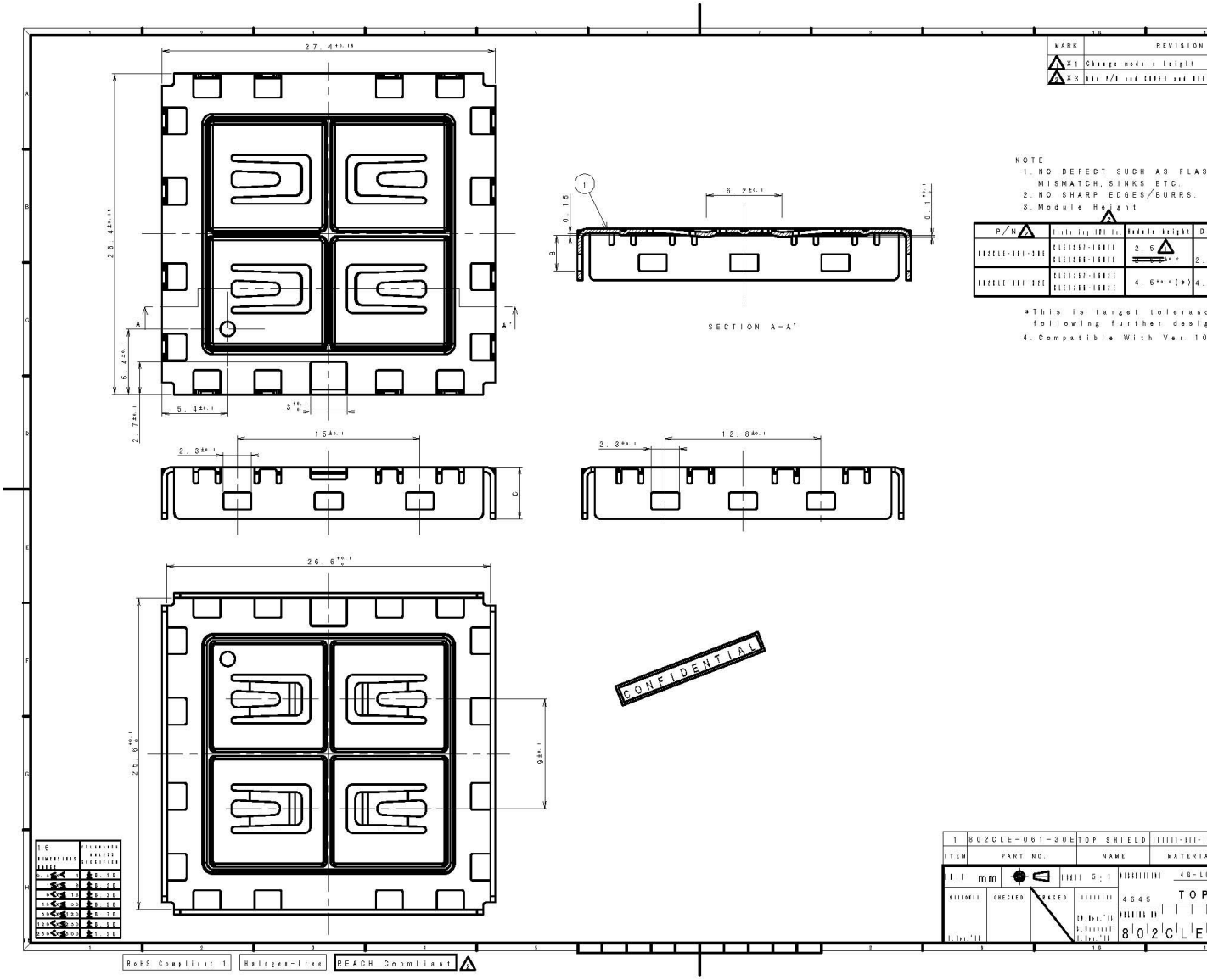


Figure 2. Snap-in Socket Cover Diagram

3. Handling

3.1. Storage of the AirPrime Snap-in Socket

3.1.1. Storage Condition

AirPrime Snap-in socket can be stored in their original packages, over the course of up to 1 year.

They can withstand a storage temperature range between -40°C to +85°C, nevertheless when packed into T&R the upper storage temperature is decreased to +40°C due to T&R packaging material.

Tip: *For optimal results, the recommended storage temperature is +20°C +/- 10 degrees.*

3.2. Component Package

3.2.1. Package Description

The AirPrime Snap-in socket is a scalable QFP 27.4x28.4 mm, pitch 0.8 mm.

Height with the cover assembled: 4.9 ±0.2 mm.

Number of contacts: 66 Pins

Weight: Snap-in socket with cover 2.5 mm: 4.7 g (TBC)

Note: *The AirPrime Snap-in socket if for use with the AirPrime HL Series modules.*

For additional information, refer to the product technical specifications listed in section 1.2 Reference Documents.

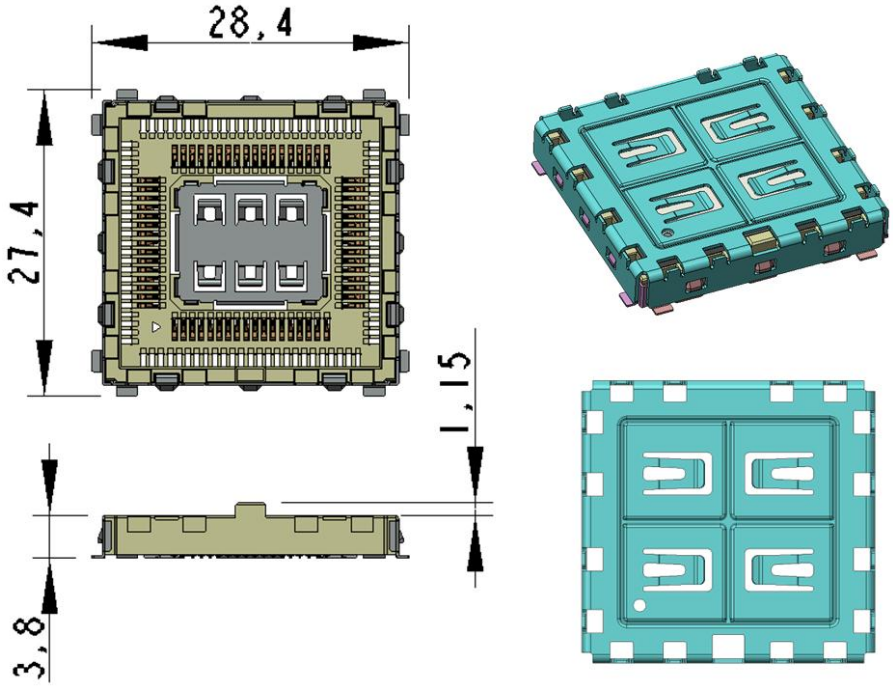


Figure 3. AirPrime Snap-in Socket

3.3. Component Packing

3.3.1. Packing Description

The AirPrime Snap-in socket is packed in box. Box dimensions are 400x400x200mm (TBC).

The quantity per each outer box is 450 AirPrime Snap-in frames and 450 covers.

The inner packaging is different for the frame and for the cover as shown in the figures below.

The frame of the Snap-in socket is delivered in tape and reel:

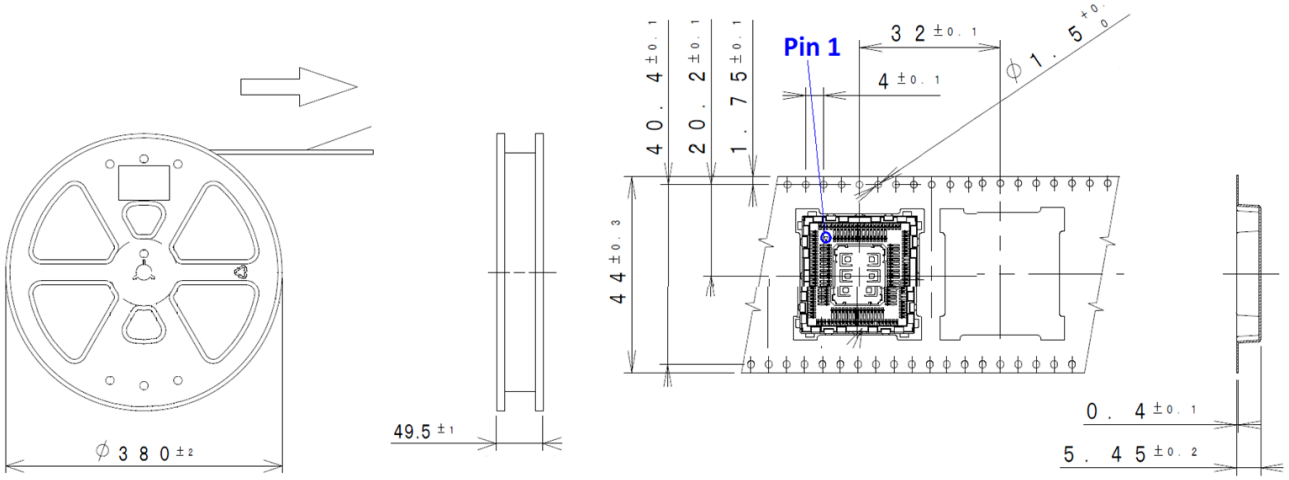


Figure 4. AirPrime Snap-in Socket Frame Delivered in Tape and Reel

The cover of the Snap-in socket is delivered in tray. The tray size is 380x380mm (TBC).

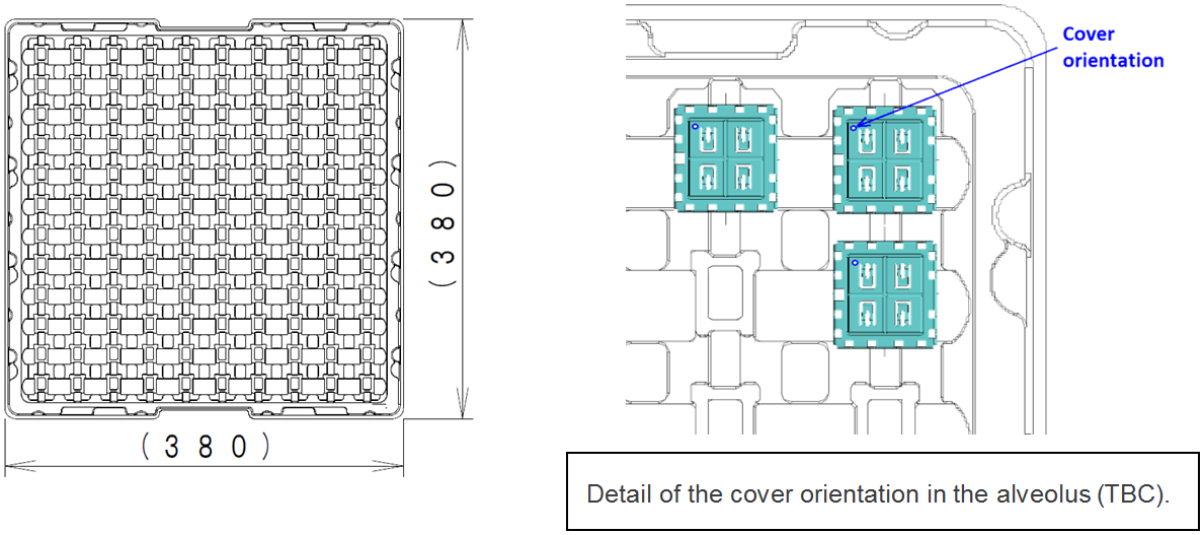


Figure 5. AirPrime Snap-in Socket Cover Delivered in Tray

3.3.2. Packing Label

TBD

4. SMT Assembly Process

This section presents information and recommendations for the industrial assembly of the AirPrime Snap-in socket on the application.

Note: The AirPrime Snap-in socket should be assembled by reflow process.

4.1. Lead-Free Process

In compliance with directive 2011/65/CE, Sierra Wireless products do not contain the following hazardous substances:

- mercury (Hg),
- lead (Pb),
- cadmium (Cd),
- hexavalent chromium (Cr+6),
- polybrominated diphenyl ether (PBDE),
- polybrominated biphenyl (PBB).

The AirPrime snap-in sockets are manufactured with RoHS compliant components and processes.

4.2. PCB Design Requirements

4.2.1. PCB Surface Finish

The PCB surface finish recommended is Electroless Nickel, immersion Gold. Organic Solderability Preservative (OSP) may also be used.

Caution: *Hot Air Solder Leveled finish (HASL) is not recommended because the process does not give consistent solder volumes on each pad because of poor pad flatness.*

4.2.2. Footprint

The following figure shows the position of the copper pads.

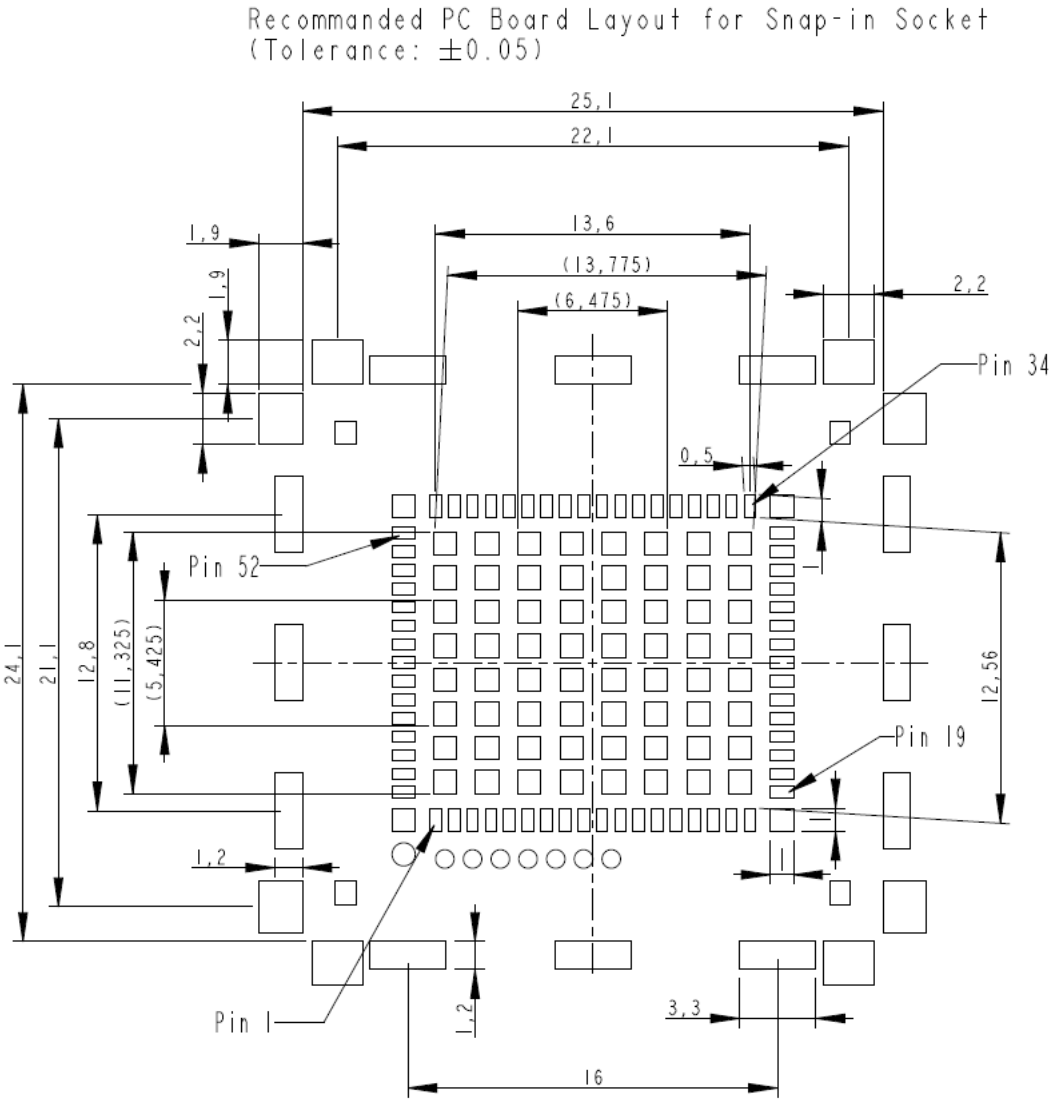


Figure 6. AirPrime Snap-in Socket Footprint Recommendation – Copper Layout Position

In order to produce high assembly yields and a reliable solder joint, the footprint design should match Figure 7 below.

This footprint is compatible for both soldering the module on its own and for soldering a Snap-in Socket.

For additional information, refer to the product technical specifications listed in section 1.2 Reference Documents.

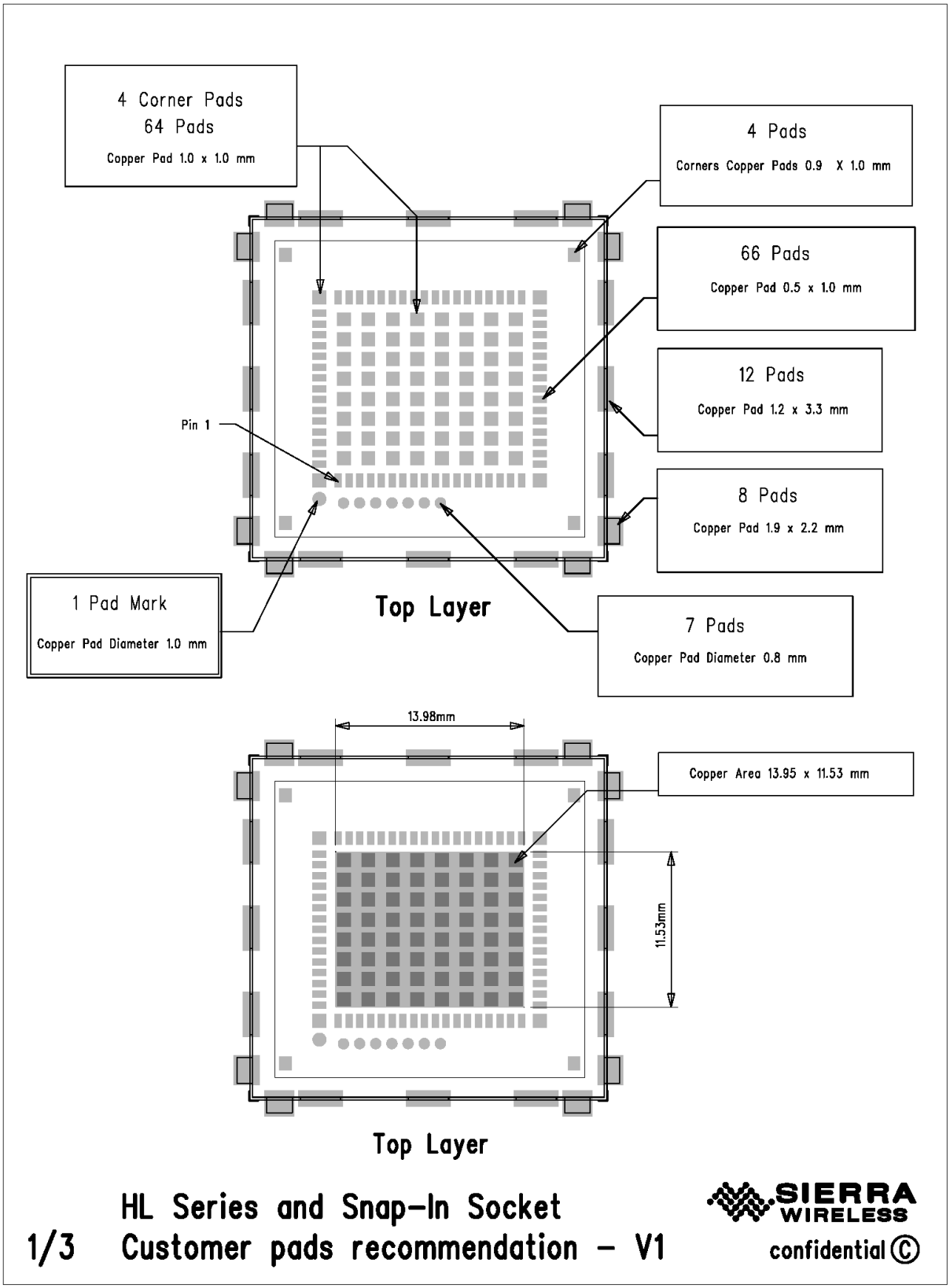


Figure 7. AirPrime Snap-in Socket Footprint Recommendation – Copper Layout

Note: The 64 inner pads and the 8 corner pads are ground pads.

Sierra Wireless suggests that customers place a copper pad under the pin #1 mark to avoid any risks of short circuits between pin#1 and the customer layout.

Warning: *It is recommended to have a GROUND area under the Snap-in socket. This ground area should be a whole area of copper with proper ground vias to provide a good grounding system between the application and the embedded module and improved thermal dissipation. It should be covered by solder resist on the non-soldered area.*

The ground vias may be micro-vias, filled or unfilled.

It is recommended to leave a component-free area of 2 mm around the Snap-in socket unit.

The recommended manufacturing tolerance for the copper pad is ± 30 µm.

4.3. Solder Mask

The pads on the printed circuit board are either Solder Mask Defined (SMD) or Non Solder Mask Defined (NSMD).

Since the copper etching process has tighter control than solder masking process, NSMD pads are preferred over SMD pads.

Moreover, NSMD pads with solder mask opening larger than the metal pad size also improve the reliability of solder joints, as this limits the stress concentration at the solder-to mask corner interface.

For the external pads, the solder mask opening should be 100 µm to 150 µm larger than the pad, resulting in 50 µm to 75 µm clearance between the copper pad and solder mask. This allows for solder mask registration tolerances, depending upon the PCB fabricator's capabilities.

For the ground pads, SMD should be used as a ground area is recommended under the AirPrime HL Series module.

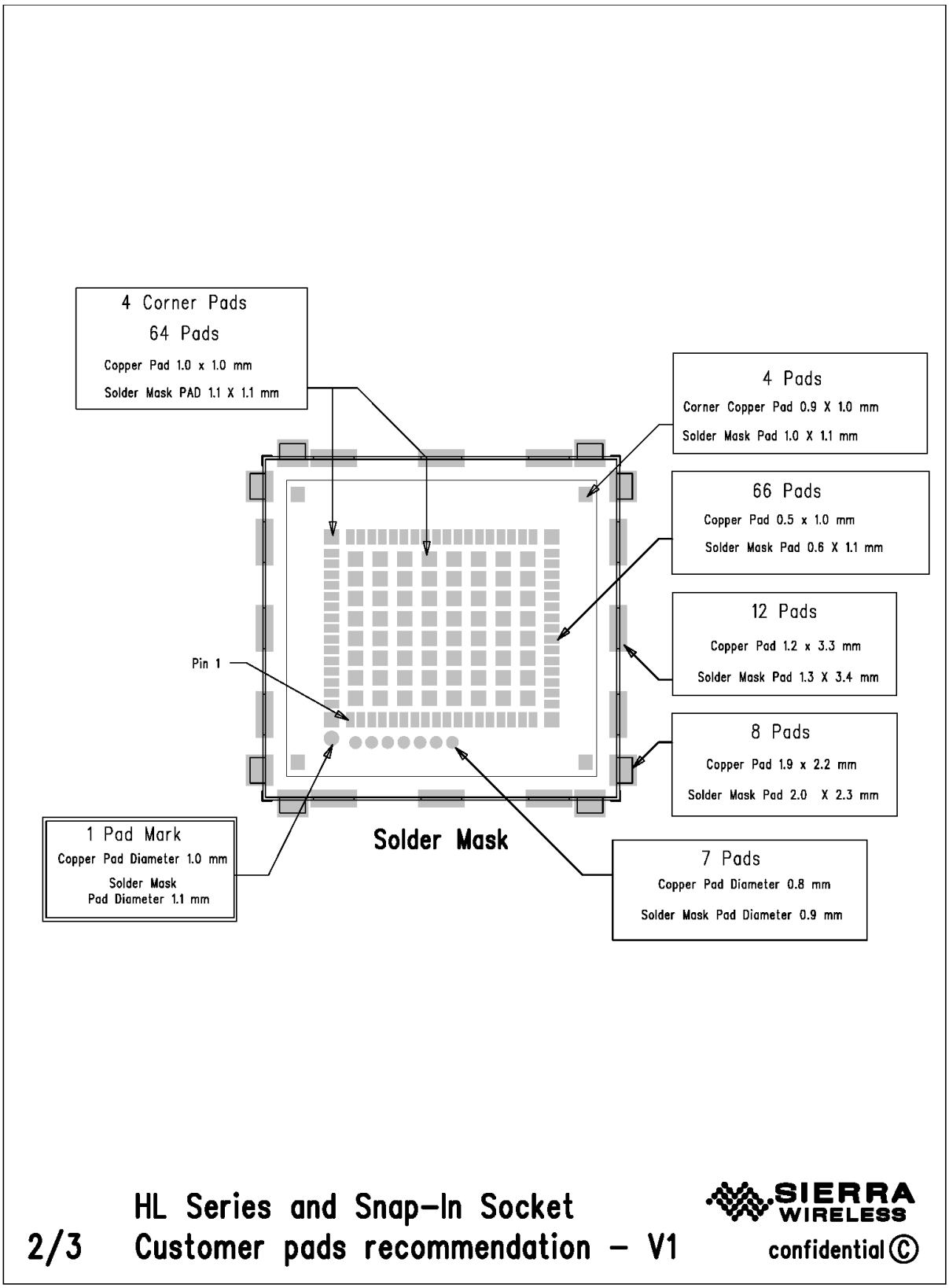


Figure 8. AirPrime Snap-in Socket Footprint Recommendation – Solder Mask Layout

Recommended solder mask thickness on the top copper is 10 to 30 µm.

5. Board Mounting Guidelines

5.1. Stencil Design

The recommended stencil thickness is 125 µm.

The proposed stencil design is presented in Figure 9 below. This stencil is compatible for both soldering the module on its own and for soldering a Snap-in Socket.

It is highly recommended to monitor the solder paste height, registration and proper placement during the squeegee printing.

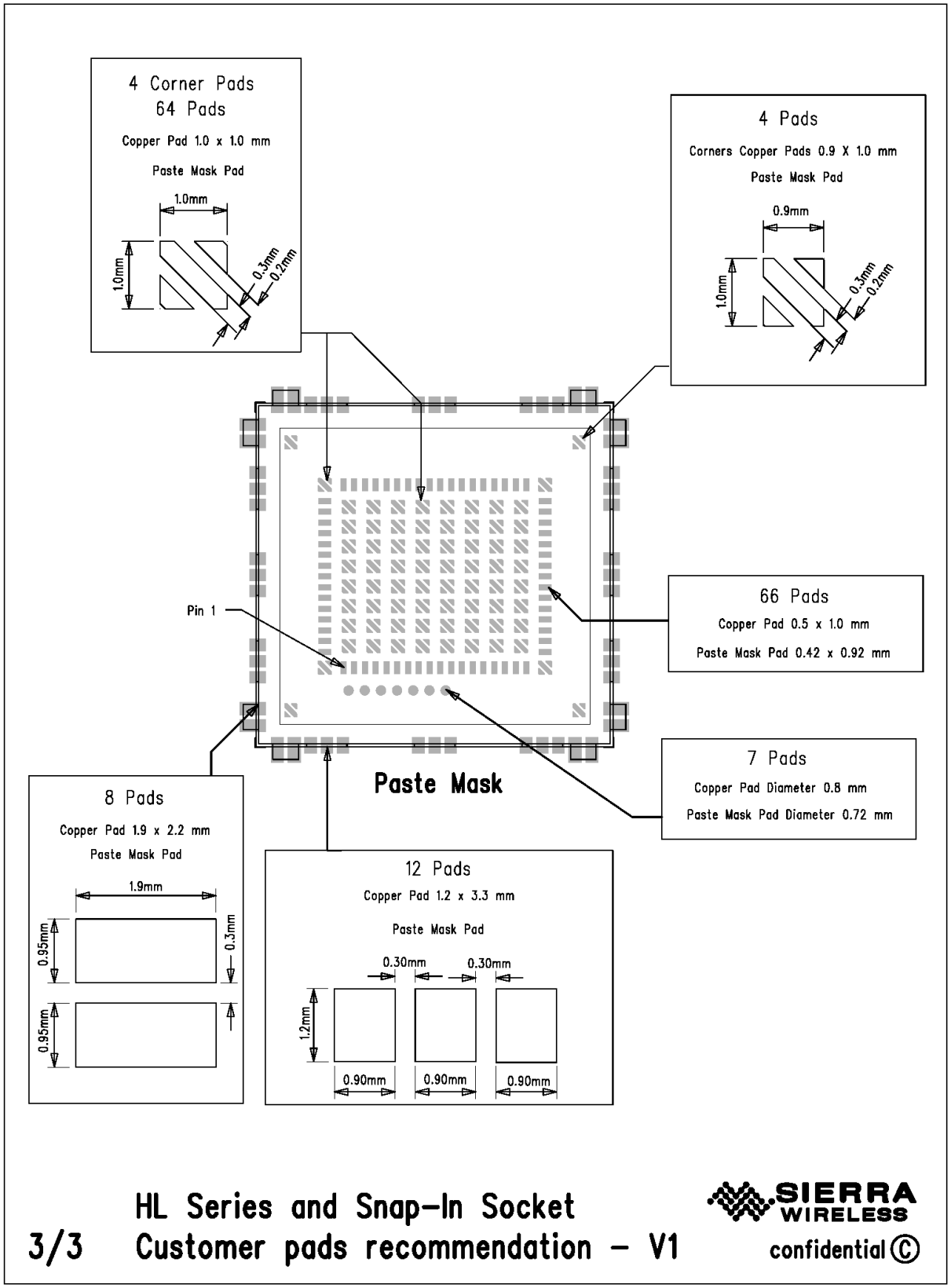


Figure 9. AirPrime Snap-in Socket Footprint Recommendation – Paste Mask Layout

5.2. SMT Process Parameters

The Pick & Place area to be used for the SMT process is 3.7 mm diameter, centered on the heat-sink.

Speed: Slowest speed for the machine.

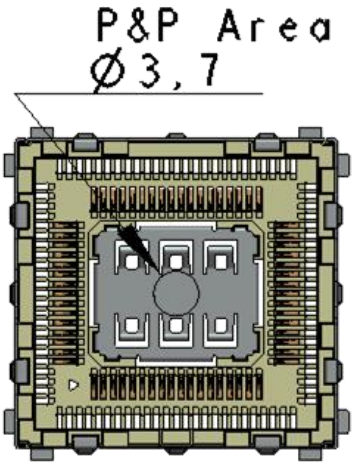


Figure 10. Pick & Place Area

5.3. Solder Reflow Profile

Lead-free SMT reflow profiles should be used to surface mount the AirPrime Snap-in socket.

The reflow profile depends on PCB density and type of solder paste being used. The paste manufacturer's recommendation should also be considered to determine the proper reflow profile.

Peak Temperature	245°C max

2 reflows are allowed on the customer PCB including one for rework of the component if necessary.

The figure below is an example of reflow profile.

Example of reflow profile:

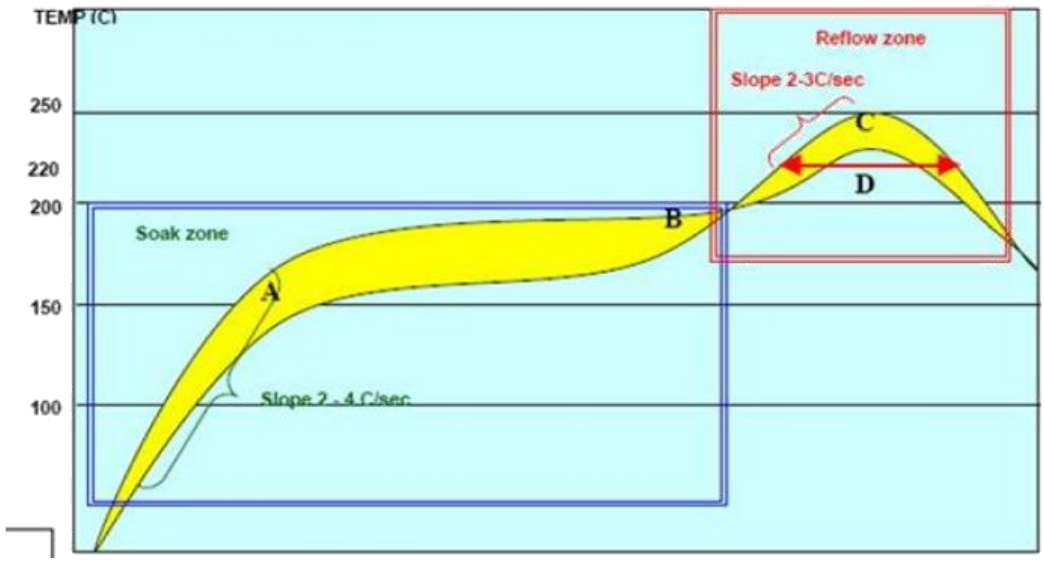


Figure 11. Recommended Reflow Profile

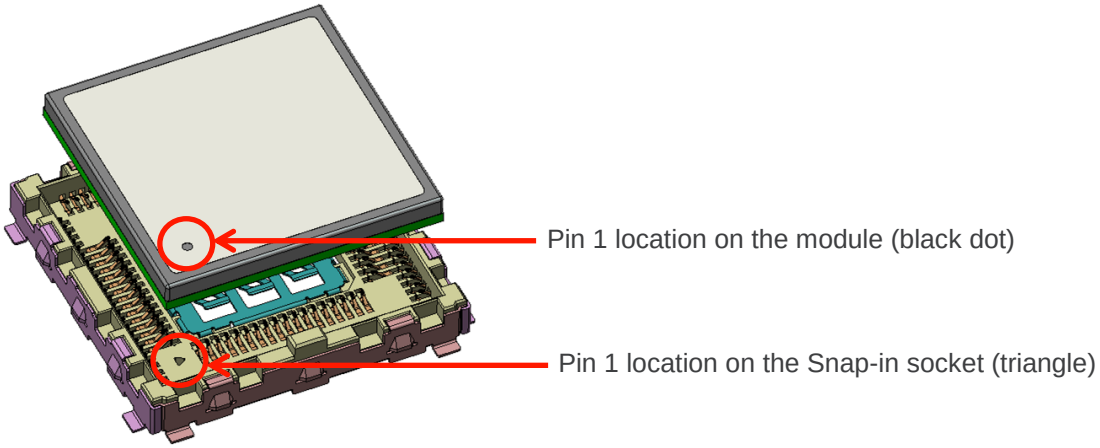
Additional recommendations are presented in the table below for consideration.

Factor	Recommendation
Max slope	2 to 4 °C / sec
Soak time (between A and B: 150 and 190 °C)	60 to 120 sec
Reflow time (D: over 220°C)	40 to 60 sec
Max temperature (C)	235 – 245 °C
Cooling down slope	1 to 3 °C / sec

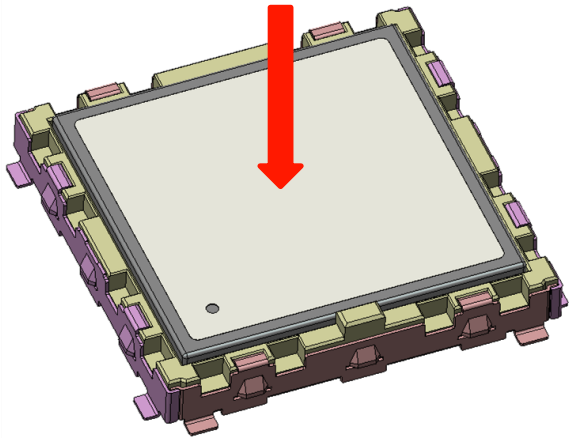
6. Insertion and Removal Guidelines

6.1. Insertion Guideline

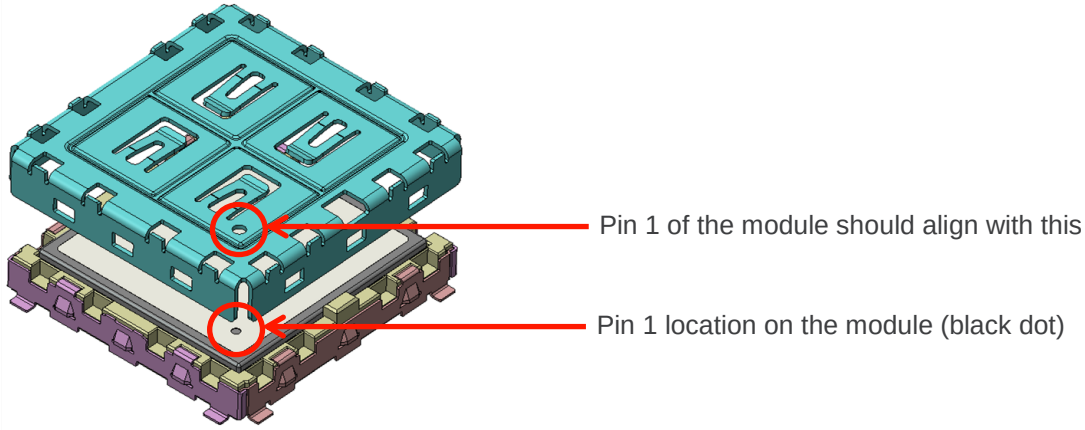
1. Check the alignment of Pin 1 on both the module and the Snap-in socket.



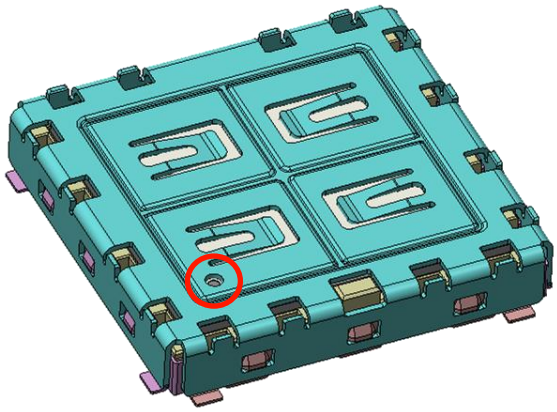
2. Put the module down in the socket. Use vertical motion to insert the module.



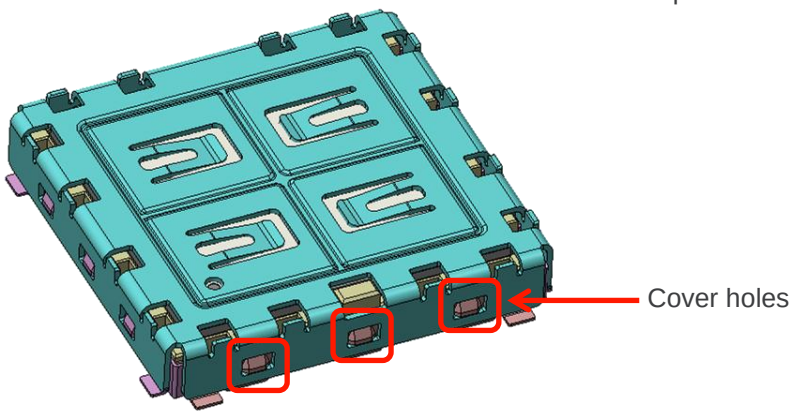
3. Check the orientation of the cover based on the location of Pin 1.



4. Smoothly press the cover on to the Snap-in socket. The cover should be properly aligned with Pin 1 of the module.



5. Check that the cover holes are locked on the socket bumps on all sides.



6.2. Removal Guidelines

Use the specific Snap-in removal tool to dismount the cover (P/N: 306CLE-001-00E).

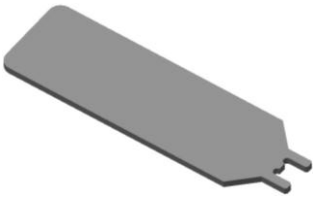


Figure 12. AirPrime Snap-in Socket Removal Tool

To dismount the cover from the Snap-in socket, insert the Snap-in removal tool in the socket cavity, and then smoothly push the tool to pull up the cover and disengage the cover holes from the socket bumps.

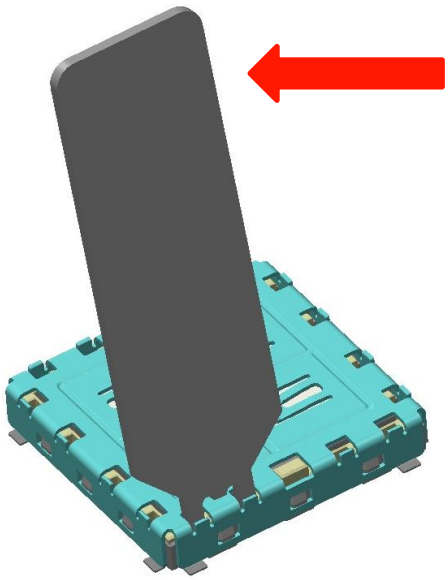


Figure 13. Snap-in Socket Removal Tool

Repeat the same operation on each side of the cover.

Do not apply excessive force that may damage the cover or the socket.

6.3. AirPrime Snap-in Socket Damage Prevention

Contact damage can be caused by incorrect operation. Refer to the following sub-sections for more information on what causes contact damage and how to prevent it.

6.3.1. Socket

- Touching or applying a force directly on the socket contacts would result in contact damage.
- Inserting/removing the module incorrectly would result in contact damage.

Note: Only use vertical motion to insert and/or remove the module.

- Do not apply force onto the heat sink legs, to avoid unexpected deformation.

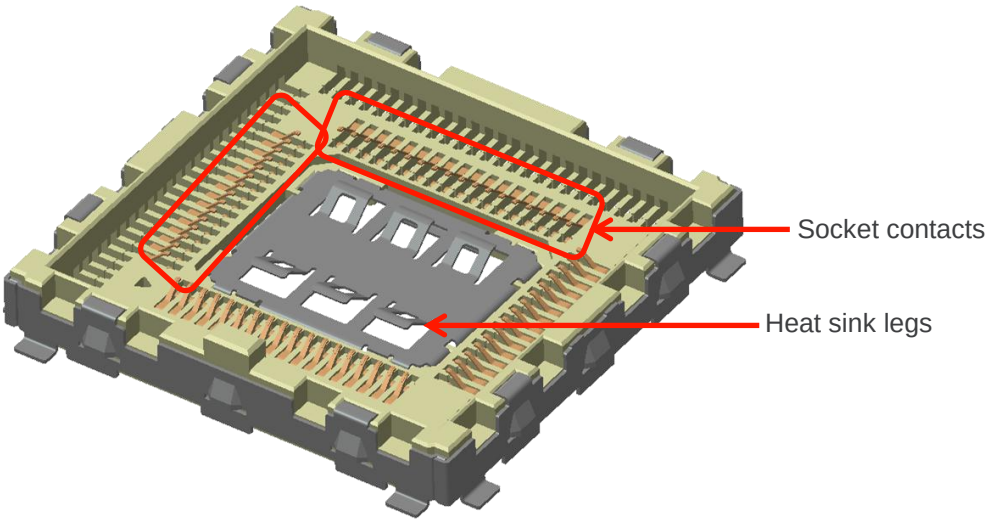


Figure 14. Socket Contacts and Heat Sink Legs Location

6.3.2. Cover

- Check that the cover is in the right position (based on Pin 1 location) before locking the cover on the socket. For more information, refer to section 6.1 Insertion Guideline.
- Use the removal tool to smoothly remove the cover without causing any damage.

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