Customer Process Guidelines

AirPrime Q Series

SIERRA WIRELESS

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006
September 21, 2010

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Due to the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the Sierra Wireless modem are used in a normal manner with a well-constructed network, the Sierra Wireless modem should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. Sierra Wireless accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the Sierra Wireless modem, or for failure of the Sierra Wireless modem to transmit or receive such data.

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Contact Information

Sales Desk:	Phone:	1-604-232-1488
	Hours:	8:00 AM to 5:00 PM Pacific Time
	E-mail:	sales@sierrawireless.com
Post:	Sierra Wireless 13811 Wireless Way Richmond, BC Canada V6V 3A4	
Fax:	1-604-231-1109	
Web:	www.sierrawireless.com	

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Document History

Version	Date	Updates
001	02/09/05	Creation
002	24/11/05	Move from Q2686F to Q2686H
003	08/02/06	Add of IMP connector
004	17/05/06	Add of Q2687, Update of 5.3.4 for IMP connector
005	09/10/09	Add of Q26EL and Q26EX Update of 5.3.4 for Precidip connector
006	September 21, 2010	Removal of IMP connector Update of 5.4 : removable liner for Q26EX Update of **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.** and Figure 23

Contents

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1. Introduction

1.1. Overview

This document presents guidelines for the industrial assembly of an AirPrime Q Series Intelligent Embedded Module on an application.

The products included in the AirPrime Q Series of modules and addressed in this document include:

- Q2686
- Q2687
- Q26Extreme
- Q26Elite

1.2. Reference Documents

[1] JEDEC standard JESD625-A, Requirements for Handling Electrostatic Discharge-Sensitive (ESDS) Devices

2. Storage conditions

The module can be stored in the following conditions: -40°C to +85°C for 1 year.

3. Product packaging and labeling

AirPrime Q Series modules are shipped in a tray, in a box (inner package) which contains 100 products (5 lines of 20 products).

3.1. Packaging elements

3.1.1. ”Pizza box” packaging

Specifications:

Material:	Collective ESD Box type “pizza box”, including bottom and cover trays
	Trays : PETA dissipative material
Dimensions:	317mm * 255mm * 50 mm
Capacity:	100 modules

Figure 1. AirPrime Q Series module box

This packaging is stamped with the WISMO logo and with the RESY specification and with a warning label indicating a static sensitive device.

3.1.2. Outer package

Specification:

Material: Double wall (or double-face) corrugated brown carton (three sheets of linerboard with two mediums in between)

Dimensions: 535mm * 225mm * 160mm

Capacity: 6 Pizza boxes (2x3)

This packaging is stamped with the RESY specification.

The dimensions are defined to be filled with boxes without any empty spaces.

Figure 2. Collective box

3.1.3. EUR pallet

Specifications:

Weight: 22 kg

Dimensions: 1200mm x 800mm x 150 mm

Capacity: From 3 to 12 cartons

Weight Loaded: Up to 350 kg

3.1.4. Strap

Specifications:

Material: polypropylene.

Width: Minimum 08 mm.

3.1.5. Shrink plastic

Specifications:

Material: polyethylene.

Type: shrink plastic bag.

Thickness: at least 20 micron

3.2. Summary of recyclable elements

Packaging Elements	Recyclable
Inner package	Yes
Outer package	Yes

3.3. Product label specifications

This specification is given for information only. SIERRA WIRELESS may, at any time and without notice, make changes to the label.

3.3.1. Module label

- AirPrime Q Series labeling layout:
  - W: 29mm (max)
  - H: 20mm (max)
  - Material: Polyester

Note: The maximum temperature supported by the label is 100°C.

- SN number: serial number : 15 digits
  - XX : Num type
  - Y : Year
  - WW : Week
  - SSSSSPP : unique number for a given product, a given year and a given week
  - HHH : Hardware code
- Optional IMEI number: 14 digits
  - 8 digits for TACFAC
  - 6 digits for serial
  - 1 digit for VL

Figure 3. Product label specifications for Q2686 and Q2687

Figure 4. Product label specifications for Q26EX

3.3.2. Pizza box label

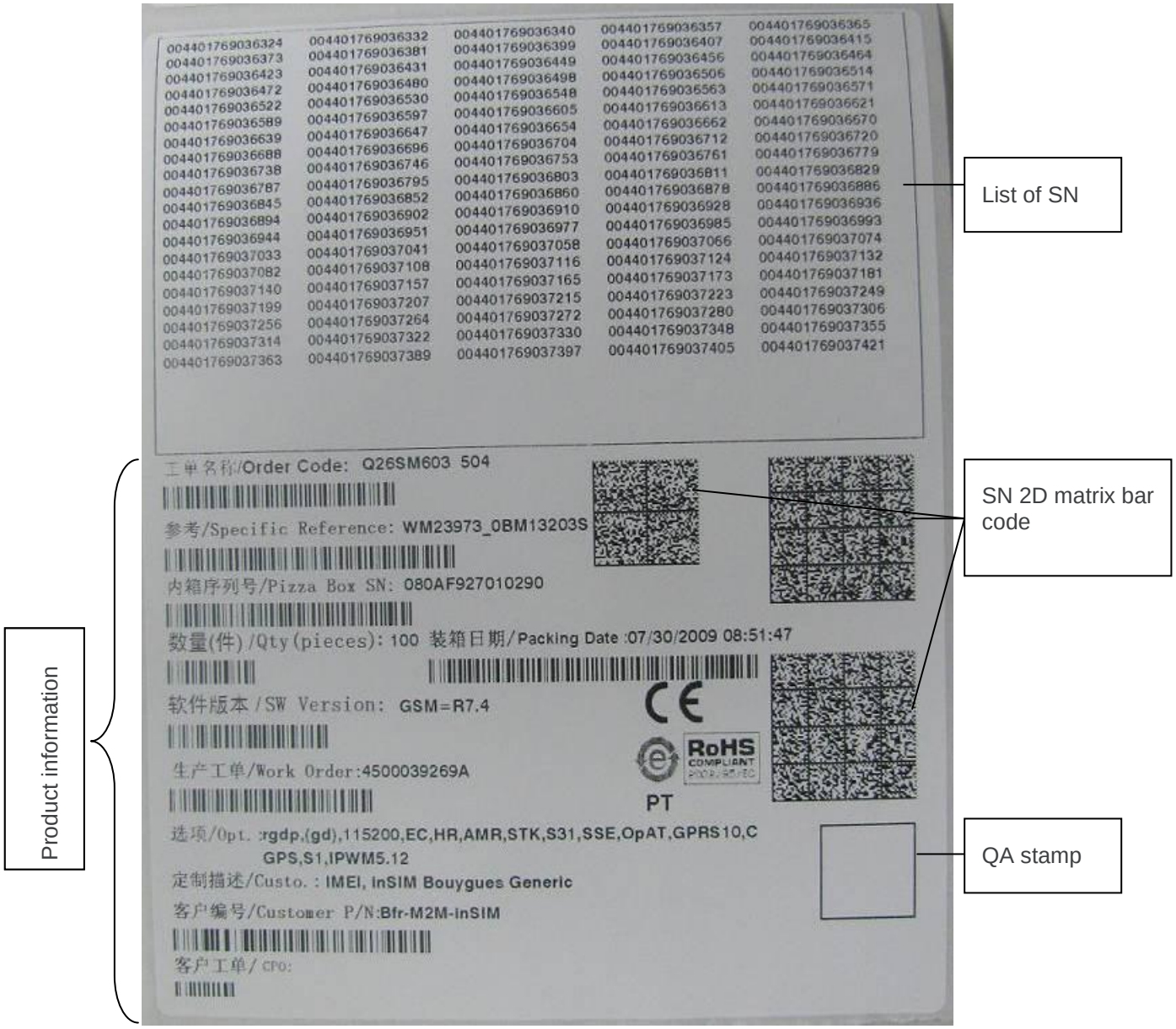


Figure 5. Pizza box label

3.3.3. Group box label

Figure 6. Group box packaging

4. Caution

4.1. Handling

AirPrime Q Series modules are ESD sensitive (Voltage < 1kV).

For ESD handling, please refer to the JESD625 standard.

ESD	
Ground Equipments (tables and shelves)	✓
No plastic bags	✓
ESD Chairs	✓
Avoid any non-useful material	✓
Wear Cotton smock (avoid any synthetic smock)	✓
Wear ESD shoes or heel straps	✓
When seated, wear a wrist strap	✓
BEFORE entering an ESD area, check the discharge and if necessary evacuate charge via the tester	✓
HUMIDITY	
Standard ranges for humidity are between 30 and 70% RH	✓
TEMPERATURE	
Standard ranges for Temperature are between 5 and 45°C	✓
HANDLING	
Wear gloves	✓
Handle Wismo Quik based on IPC A610, refer to chapter 3	✓
SOLDERING	
Soldering reflow is forbidden	✓

5. Assembly process

This section gives recommendations for the industrial assembly of the AirPrime Q Series module on the application.

5.1. General recommendations

- Gloves must be worn when handling the module
- No cleaning of the module is allowed
- No warm air shall be blown on the module
- Be careful not to damage the module label (warranty condition)

5.2. Lead-free process

In compliance with directive 2002/95/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 Sierra Wireless AirPrime Q Series modules are manufactured with RoHS compliant components and processes.

Therefore, the customer can have a lead-free customer application by using lead-free materials (lead-free SMD solder paste, lead-free components and lead-free solder wire...).

But the AirPrime Q Series modules may also be mounted with a leaded process.

However, in this case, we recommend using lead-free solder wires to guarantee that if the module is removed, it is still lead-free.

5.3. RF connection

There are three possible types of RF connection:

- via UFL/SMA cable
- via coaxial cable
- via spring contact (Precidip) connector

Product reference	UFL /SMA cable	Coaxial cable	Spring contact connector
Q2686	X	X	X
Q2687 and Q2687RD	X	X	X
Q26Elite	X		X

Product reference	UFL /SMA cable	Coaxial cable	Spring contact connector
Q26Extreme	X for main antenna	X for main antenna X for diversity antenna	

5.3.1. UFL/SMA connector

The antenna may be connected to the module through the UFL connector present on the module.

- **Insert the plug in the receptacle**
  This step is performed prior to module mounting.

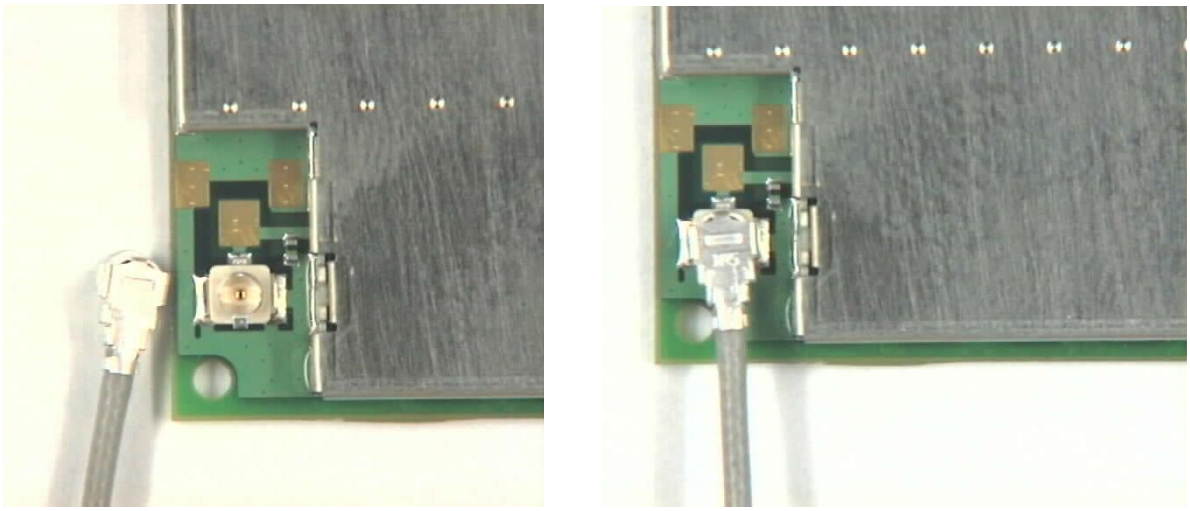


Figure 7. Assembly process - UFL/SMA connector on Q2686 and Q2687

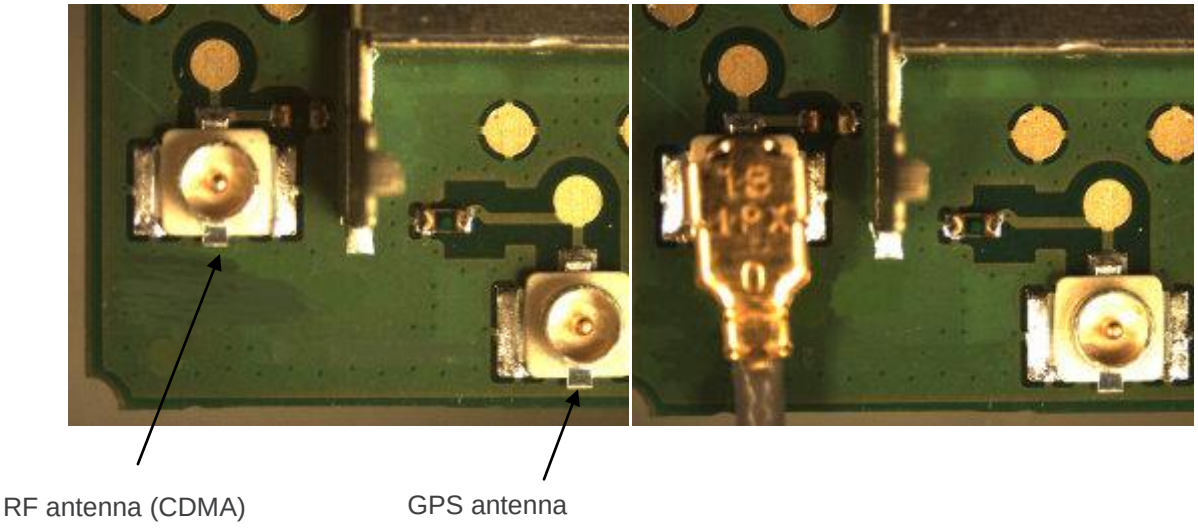


Figure 8. Assembly process - UFL/SMA connector on Q26EL

5.3.2. Extraction tool (mandatory)

Manufacturer: HIROSE

Reference: CL331-0441-9

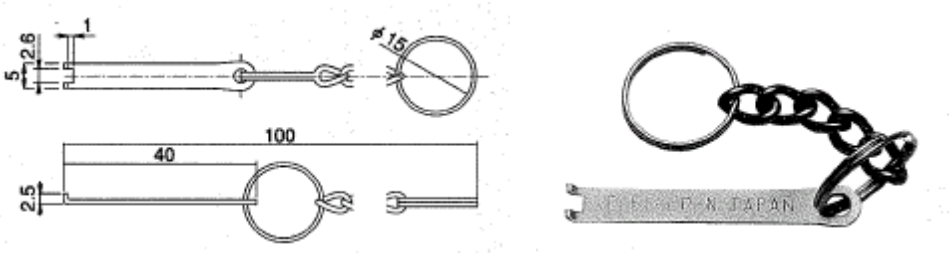


Figure 9. UFL connector – Extraction tool

5.3.3. Coaxial cable on the rear side of the module

The antenna may be connected to the AirPrime Q Series module through a coaxial cable.

The diversity antenna for Q26EX is to be connected to the module through a coaxial cable.

The coaxial cable is connected to both the "RF pad" (or Round pad) and the "Ground pad".

It is recommended to use a RG178 coaxial cable:

- Static curvature radius: 10mm
- Dynamic curvature radius: 20mm

The cable must be soldered as described on the mechanical drawing on the following page:

- The antenna/diversity cable shielding must be soldered to the “Ground pad”.
- The antenna/diversity cable core must be soldered only once positioned in line with the “RF pad” and “Ground Pad”.
- It is highly recommended to use a template to adjust the antenna cable to the “RF pad” and “Ground Pad” before soldering

This step is performed after the module mounting.

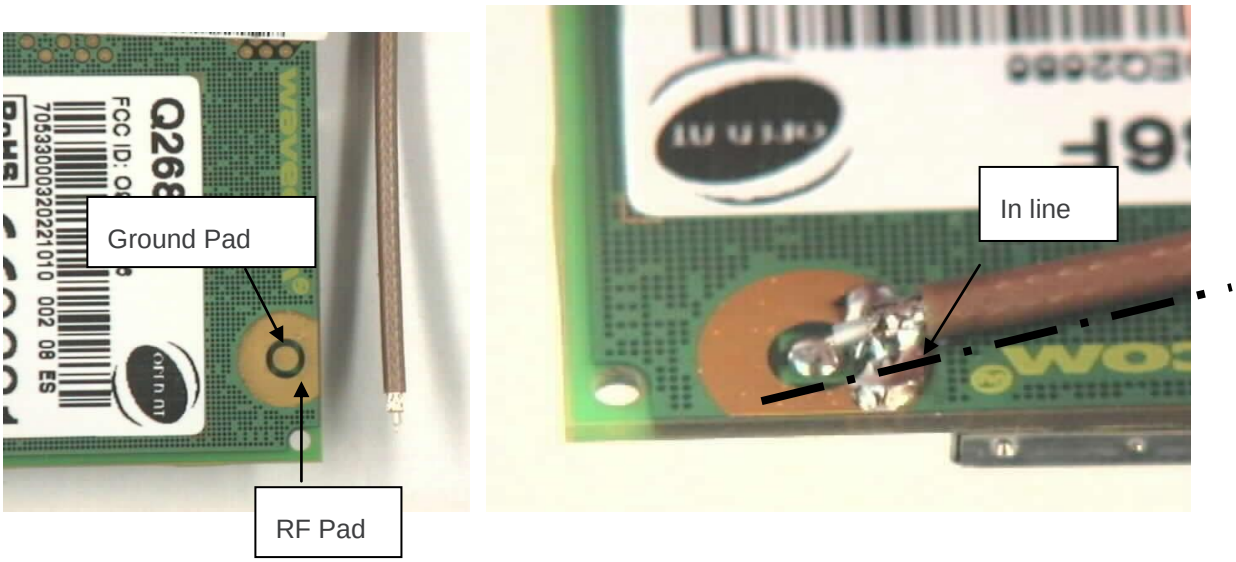


Figure 10. Assembly process - Coaxial cable connection

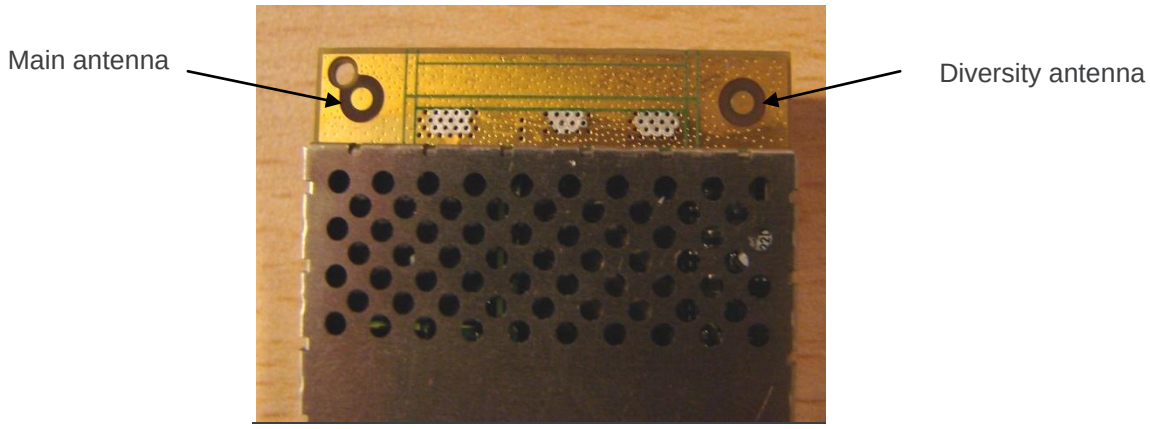


Figure 11. Assembly process - Coaxial cable connection location for Q26EX

5.3.3.1. Hand soldering recommendations:

- Soldering iron: WSD80 (Weller) or equivalent
  - Solder wire: Kester 245 Cored 58 (Sn96.5Ag3Cu0.5)
  - Diameter = 0.5 mm
- Binocular type: Mantis (Vision engineering) or equivalent
- Soldering tip type: Diameter 1.6 mm (LT ASLF type)
- T max = 385 °C for 3 to 5 sec

Note: The coaxial cable can be soldered in any direction; if space permits

The **Error! Reference source not found.** describes the cable preparation and positioning.

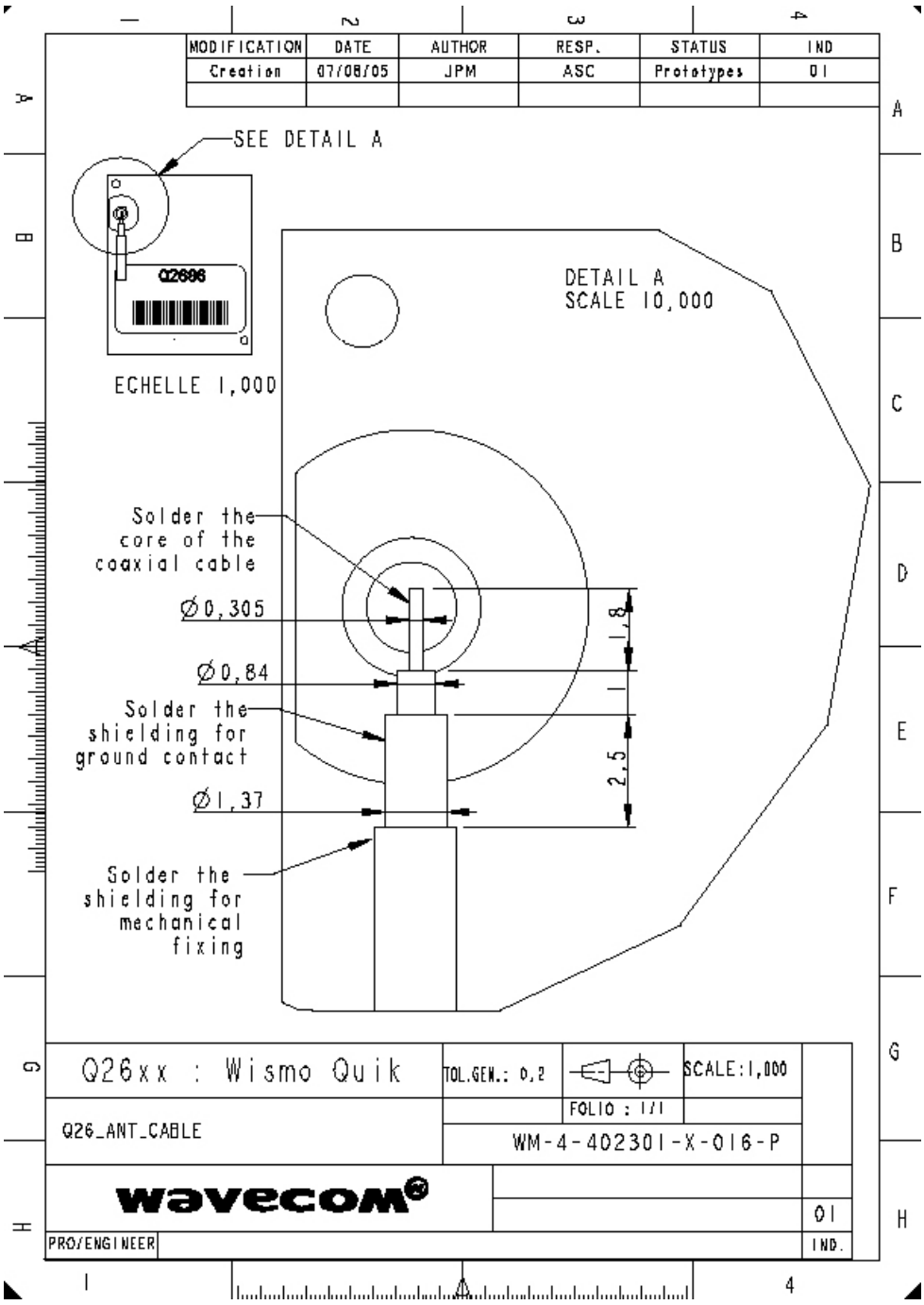


Figure 12. Antenna cable connection

5.3.4. Spring contact connector

The antenna may be connected to the AirPrime Q Series module through a compression connector that must be assembled on the customer board.

The contact pad description on the module side and the Precidip connector data-sheet are given in the "Appendixes".

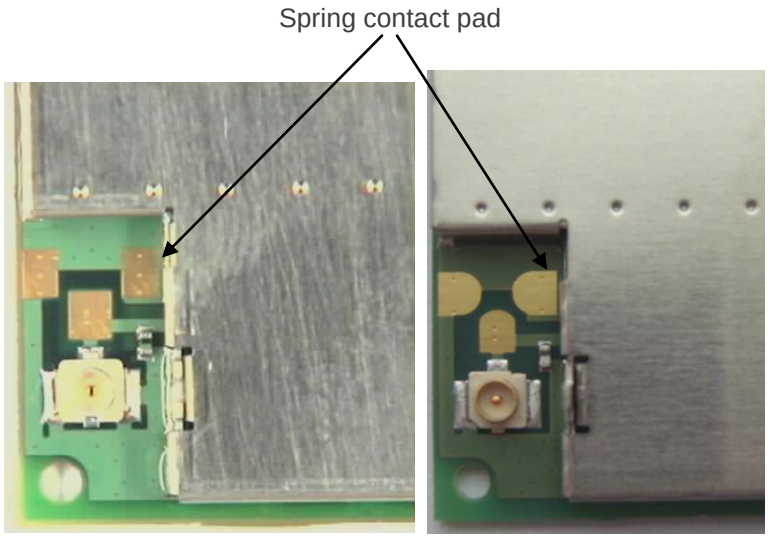


Figure 13. Assembly process – spring contact connector on Q2686 and Q2687

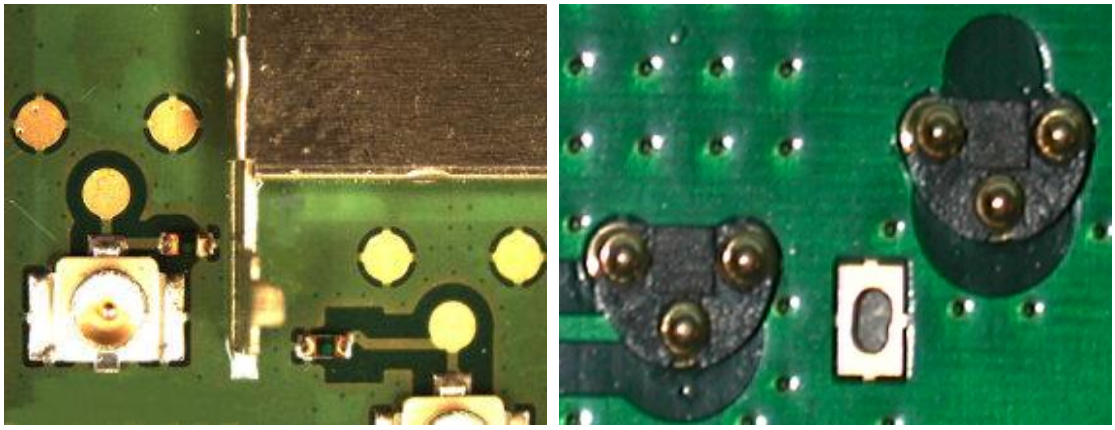


Figure 14. Assembly process – Precidip connector on Q26EL (CPU board and customer board)

No additional process step

For information on the mounting, assembly and handling of this component, please directly contact the supplier.

5.4. 100-lead connector process insertion

- Preliminary step for Q26EX:

The thermal foam is protected by a removable liner that must be removed prior to Q26EX assembly

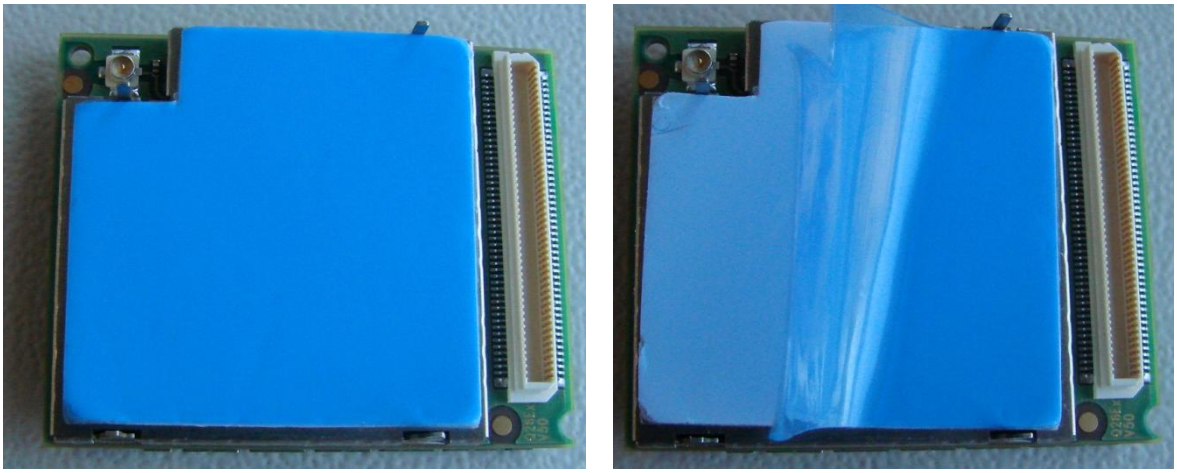


Figure 15. Removal of the thermal foam

- Insert the module connector in the motherboard connector until you hear a click by inserting the shielding leads in the through-holes.

The recommendations for these through-holes are shown in the appendix.

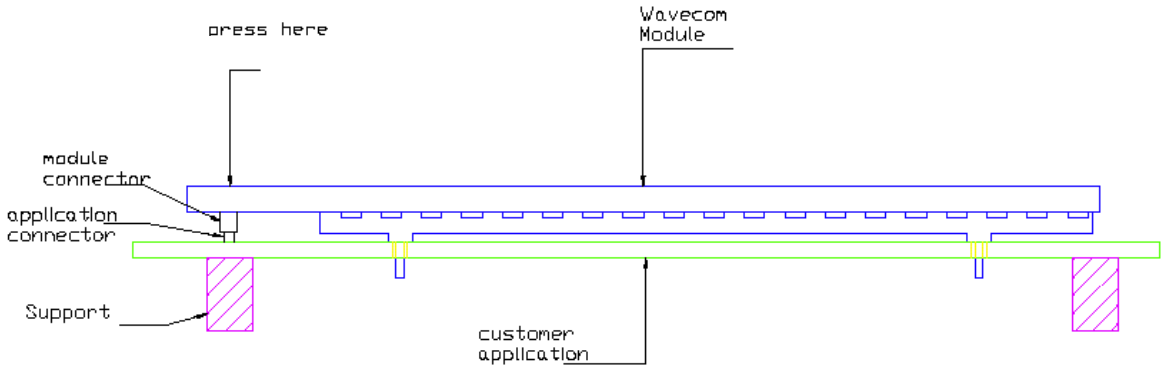


Figure 16. 100-lead connector process insertion

5.5. Soldering the legs

The legs of the module shall be soldered according to the following instructions:

- The type and size of connection holes shall be chosen according to Sierra Wireless recommendations (see layout requirement document in the “appendixes”).
- The quality of the soldering, must be in accordance with IPC-A-610 Rev-C chapter 6 Soldering.
  - Class 2: general case
  - Class 3: for automotive
- The Figure below gives the module position before hand soldering, and recommendations for the support material for the AirPrime Q Series.

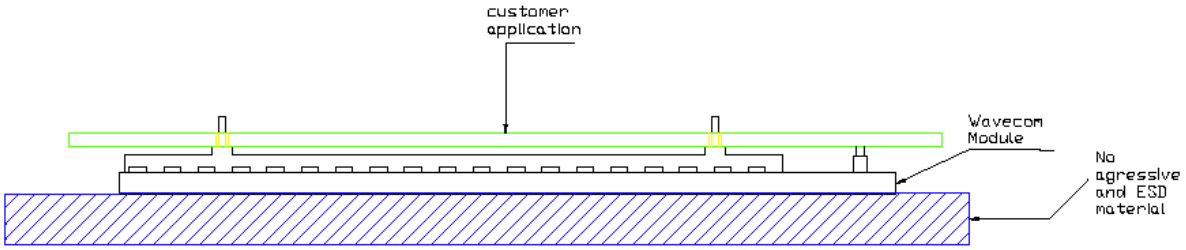
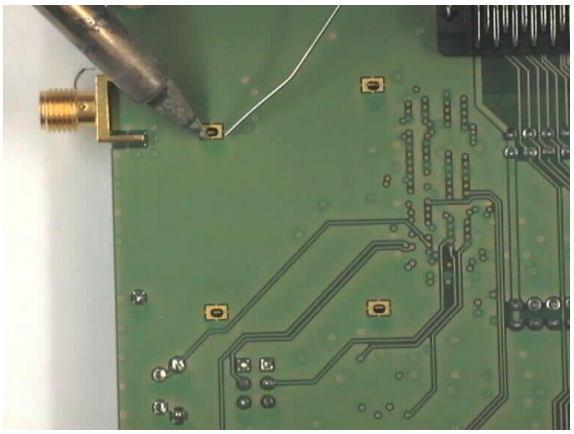


Figure 17. Module position before hand soldering

5.5.1. Recommended equipment

- Soldering iron WSD80 (Weller) or equivalent
  - Solder Wire: Kester 245 Cored 58 (Sn96.5Ag3Cu0.5)
  - Diameter = 0.52 mm
- Binocular type Mantis (Vision engineering) or equivalent
- Soldering tip type: Diameter 1.6 mm (LT ASLF type)
- T max = 385 °C for 3 to 5 sec

5.5.2. Hand soldering



- Assemble the module in the customer application
- A characteristic click can be heard
- On the opposite side, solder the 4 legs

- Turn the application board and solder the 3 legs accessible on this side

Figure 18. Assembly process - Hand soldering

- Check the quality of the solder on both sides with the binocular

Warning: *On Q26EX, due to the presence of thermal foam on the module shielding that needs to be compressed for thermal dissipation, it is important to maintain pressure on the module during soldering of the legs.*

The maximum force that can be applied on the module is 100 N (charge spread on the whole shielding).

Nominal force must be defined according to the customer application (depends on customer PCB thickness…)

5.6. Acceptance criteria

- Soldering quality must be in accordance with IPC-A-610 Rev-C chapter 6 Soldering.
- There must be no gap between the Sierra Wireless product and the customer application.

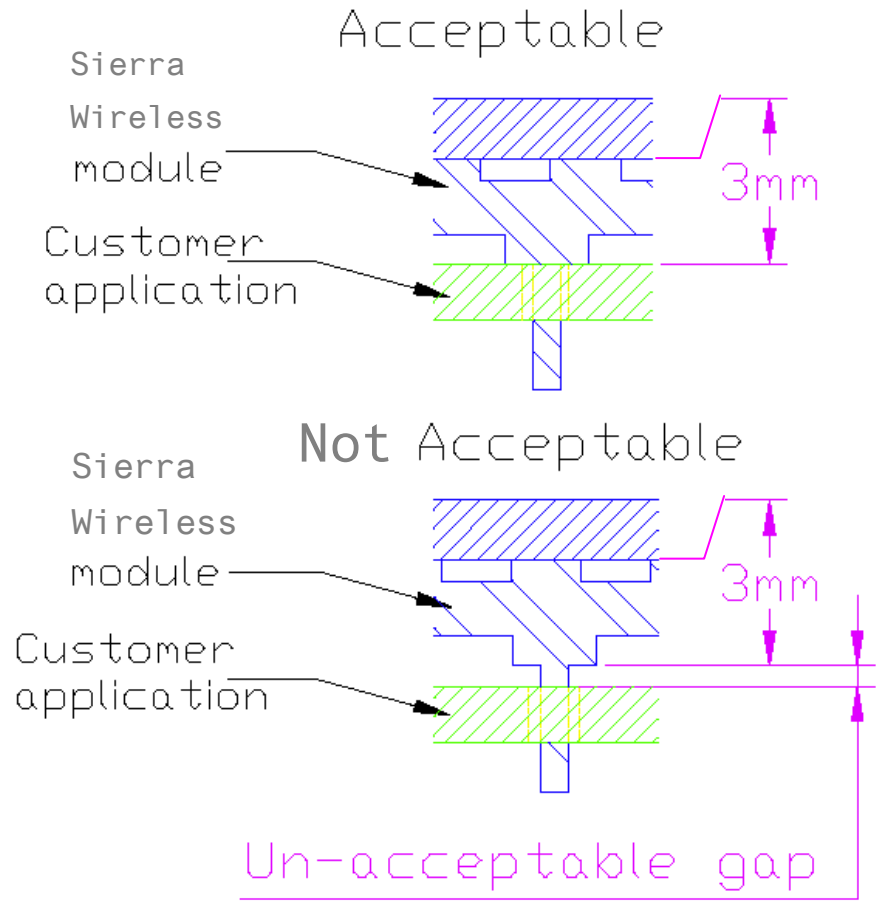


Figure 19. Assembly process – Acceptance criteria

- The thermal foam for Q26EX must be under compression to allow a good thermal dissipation.

Example of a non acceptable assembly: the connectors are not well plugged and the compression of the thermal foam is not homogeneous

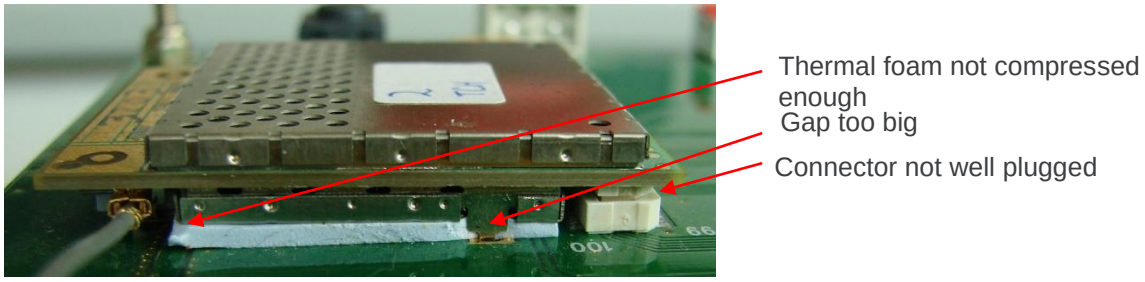


Figure 20. Assembly process – example of non acceptable assembly

- Excessive solder must be avoided in order not to damage the PCBA or to prevent future repair.

  Therefore, solder is only allowed in the lower-half of shielding belt (referring to Assembly process - Half height of shielding belt).

Figure 21. Assembly process - Half height of shielding belt

.

6. Rework and module exchange processes

6.1. General

The module can be changed up to 3 times.

The temperature of the soldering iron must not exceed 385°C.

6.2. Procedure

6.2.1. Equipment recommended

- Unsoldering station DSEA 4001 (SEM)
- Solder wick Easy Braid (no clean)
- Rework flux: Kester 952-D6

6.2.2. Process

- If using an unsoldering station: set the parameters of the unsoldering station
  - Max temperature: 385 °C
  - Unsoldering pipe. Inner diameter: 1mm
- If using a soldering iron:
  - Max temperature: 385 °C
  - Same solder tip as for initial assembly
- Unsolder the module leg by leg:
  - Put the unsoldering pipe or the soldering iron on one leg.
  - Wait a few seconds (3 to 5) until the solder is in fusion.
  - Activate the aspiration while pushing on the pedal or use solder wick with the soldering iron.
  - Ensure there is no solder left, otherwise repeat the operation.
  - Repeat the operation for each leg.
- Remove the module.
- Check there is no solder left and that the pads are OK.
- Clean the pads, if necessary, with the soldering iron or solder wick.

6.3. Acceptance criteria

Purpose: to ensure the RMA module returned from customers are in good condition and can be repaired in the repair center.

Criteria: When removing an AirPrime Q Series module from customer application board, ensure that the belt is not unsoldered from the PCB and that the PCB is not deformed.

6.4. Soldering the new module

See chapter 5 Assembly process for this information.

7. Appendix

PRECIDIP

Mechanical drawing

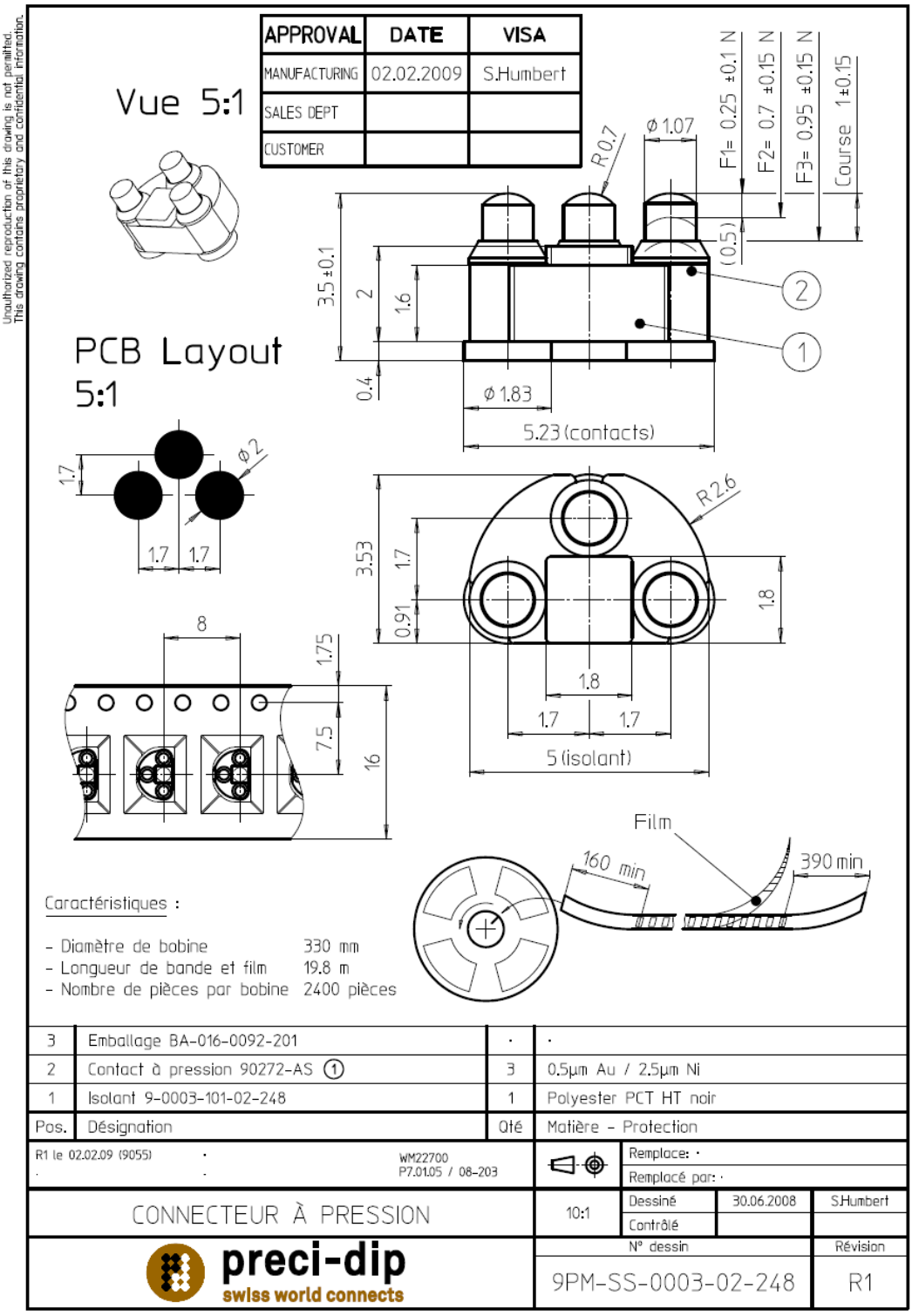


Figure 22. Precidip data-sheet

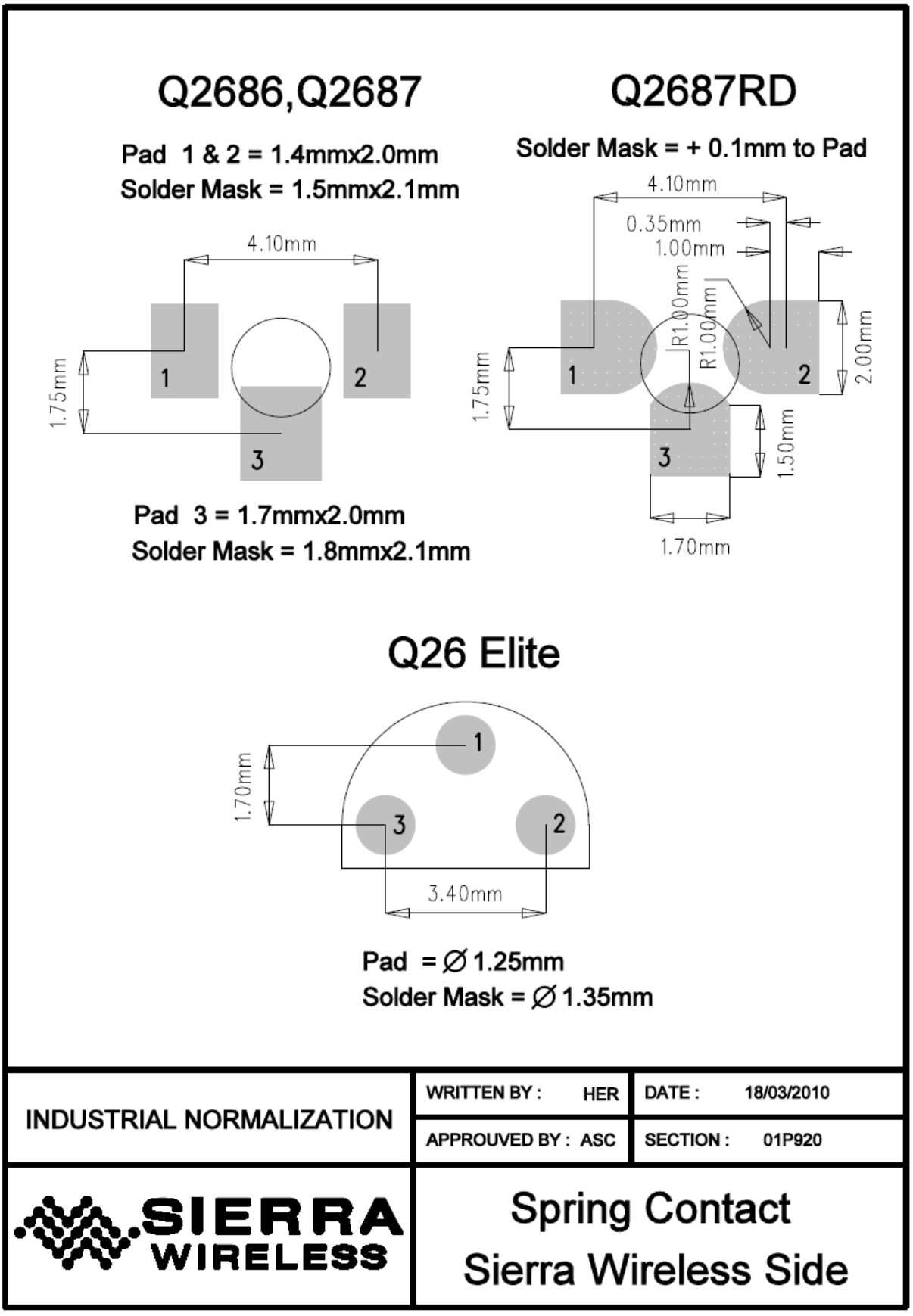


Figure 23. Spring contact Sierra wireless side

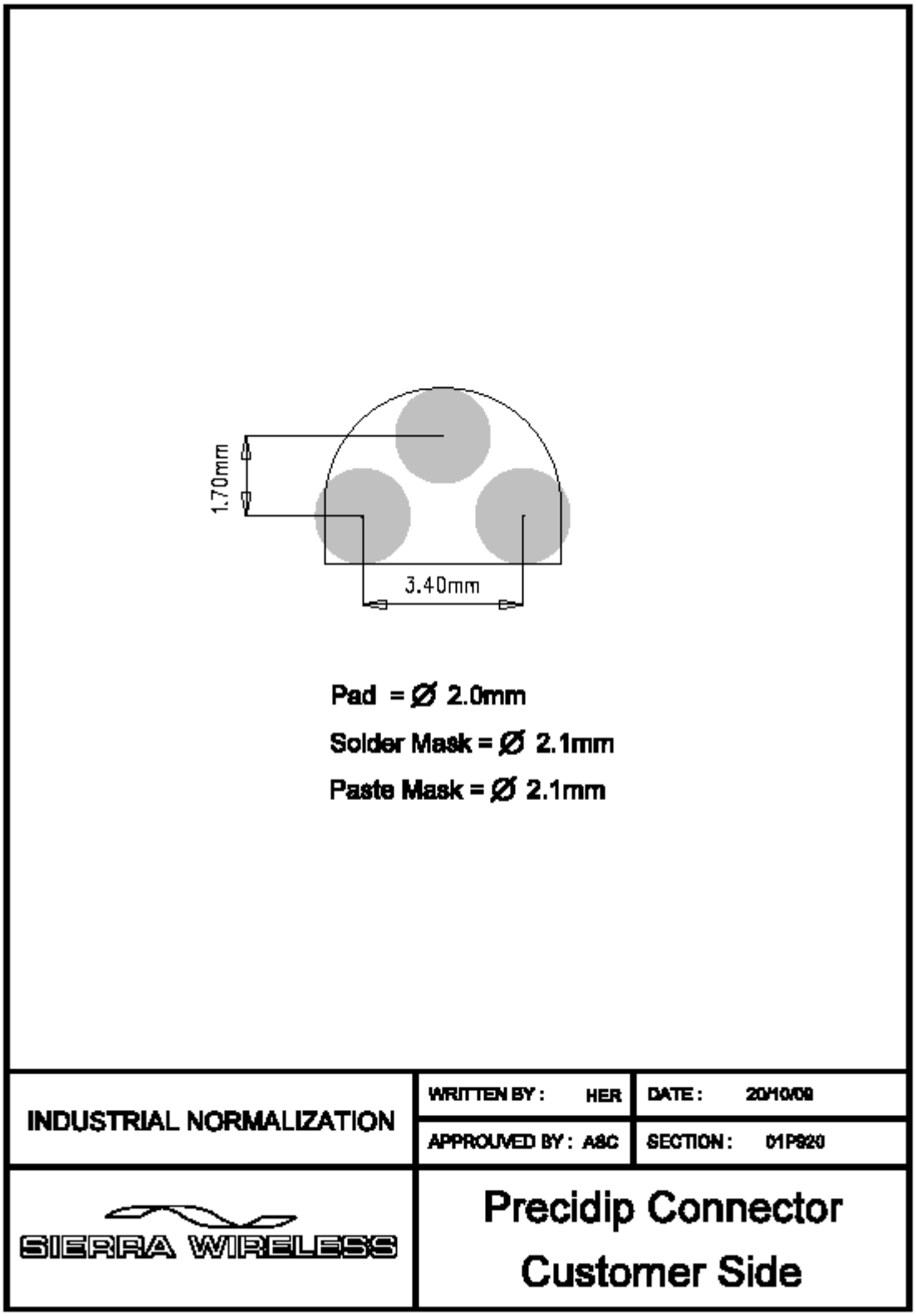


Figure 24. Precidip connector customer side

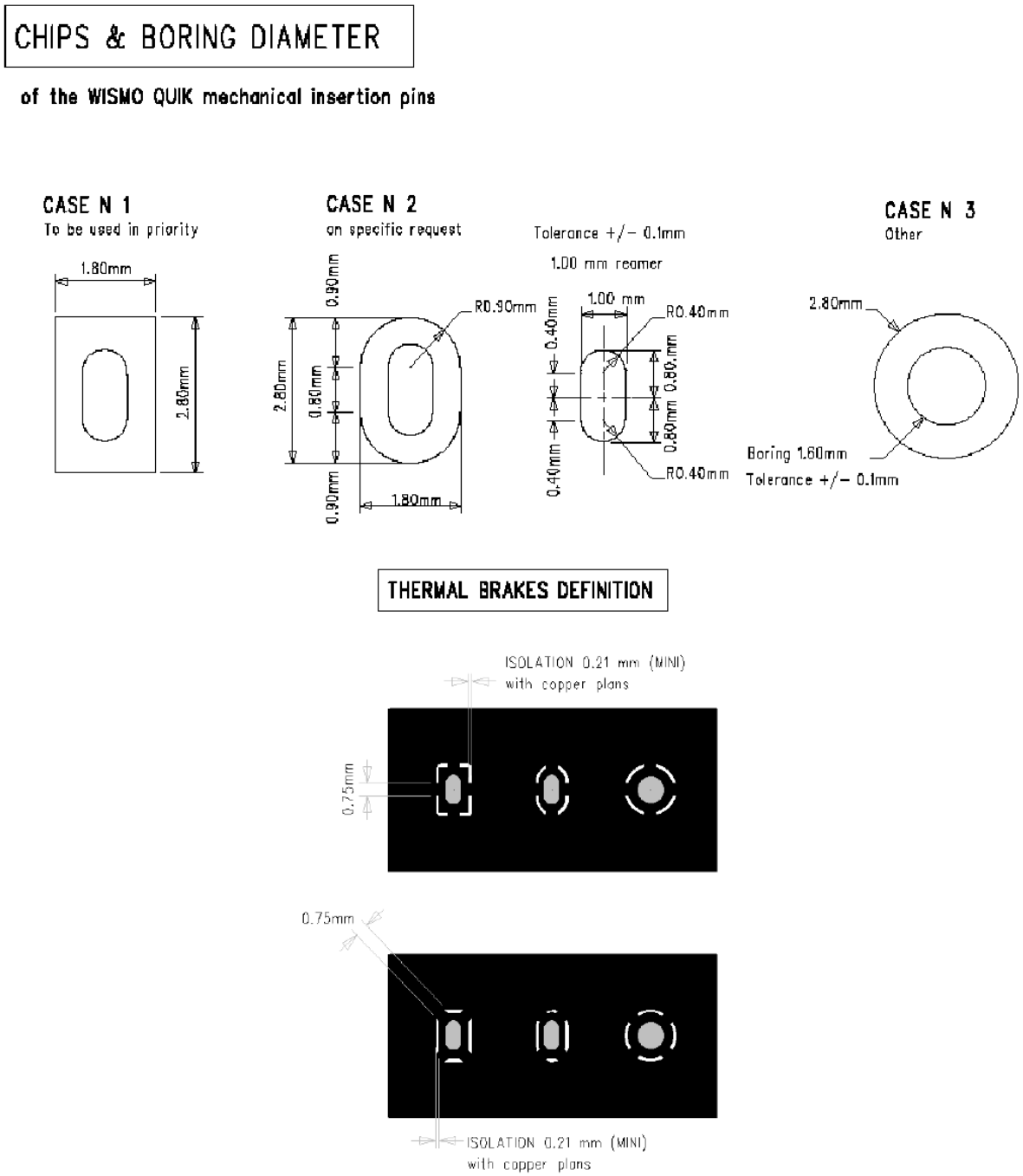


Figure 25. Layout of the mechanical insertion pins

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