



Wireless CPU Q24 Series Customer Process Guidelines

Revision: 001

Date: October 2006

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Wireless CPU Q24 Series

Customer Process Guidelines

Reference: **WM_PGM_Q24NG_PTS_003**
Revision: **001**
Date: **October 03, 2006**



Powered by Open AT[®] Software Suite

Cautions

This platform contains a modular transmitter. This device is used for wireless applications. Note that all electronics parts and elements are ESD sensitive.

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Website Support

General information about Wavecom and its range of products: www.wavecom.com

Specific support is available for the Q24 Classic, Plus, Extended and Auto Wireless CPU:

- www.wavecom.com/Q24Classic,
- www.wavecom.com/Q24Plus,
- www.wavecom.com/Q24Extended,
- www.wavecom.com/Q24Auto

Carrier/Operator approvals: www.wavecom.com/approvals

Open AT® Introduction: www.wavecom.com/OpenAT

Developer support for software and hardware: www.wavecom.com/forum

Overview

This document gives recommendations and general guidelines to help manufacturing product using the Wireless CPU Q24 Series.

The Wireless CPU Q24 Series is available in four different versions of GSM/GPRS Class 10 quad-band versions:

Q24 Classic: EGSM 900/1800/850/1900 MHz version with 32 Mb of Flash memory and 16 Mb of PSRAM (32/16), T° range [-20°C / +55°C].

Q24 Plus: EGSM/GPRS 900/1800/850/1900 MHz version with 32 Mb of Flash memory and 16 Mb of PSRAM (32/16), T° range [-20°C / +55°C].

Q24 Extended: EGSM/GPRS 900/1800/850/1900 MHz version with 32 Mb of Flash memory and 4 Mb of SRAM (32/4), extended T° range.

Q24 Automotive: EGSM/GPRS 900/1800/850/1900 MHz version with 32 Mb of Flash memory and 4 Mb of PSRAM (32/4), extended T° range.

This version is dedicated to automotive applications.

For further information about the Wireless CPU Q24 Series, refer to the Product Technical Specification [1]

For detailed software programming guides, refer to the documents shown in the "Reference documents" section.

Open AT® Software Suites allow developers to natively execute ANSI C software programs directly on the Wireless CPU.

Document History

Revision	Date	List of revisions	
001	03/10/06	Creation (Preliminary version)	

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1 References

1.1 Reference documents

For more details, several reference documents may be consulted. The Wavecom reference documents are provided in the Wavecom documents package contrary to the general reference documents, which are not Wavecom owned.

1.1.1 Wavecom reference documents

- [1] Wireless CPU Q24 Series Product Technical Specification
WM_PRJ_Q24NG_PTS_002
- [2] Wireless CPU Q24 Series Process Customer Guidelines
WM_PRJ_Q24NG_PTS_003
- [3] Environmental Control Plan for Wireless CPU Q24 Series
WM_PRJ_Q24NG_DCP_002
- [4] Automotive Environmental Control Plan for Wireless CPU Q24 Series
WM_PRJ_Q24NG_DCP_001
- [5] ADL User Guide for Open AT® V3.1
WM_ASW_OAT_UGD_0044
- [6] AT Commands Interface Guide for OS 6.57
WM_ASW_OAT_UGD_006
- [7] AT Commands Interface Guide (Bluetooth)
WM_ASW_BLU_UGD_001

1.1.2 General reference documents

- [8] "I²C Bus Specification", Version 2.0, Philips Semiconductor 1998
- [9] ISO 7816-3 Standard

1.2 Abbreviations

Abbreviation	Definition
---------------------	-------------------

AC	Alternating Current
ADC	Analog to Digital Converter
A/D	Analog to Digital conversion
AF	Audio-Frequency
AT	ATtention (prefix for modem commands)
AUX	AUXiliary
CAN	Controller Area Network
CB	Cell Broadcast
CEP	Circular Error Probable
CLK	CLock
CMOS	Complementary Metal Oxide Semiconductor
CS	Coding Scheme
CTS	Clear To Send
DAC	Digital to Analog Converter
dB	Decibel
DC	Direct Current
DCD	Data Carrier Detect
DCE	Data Communication Equipment
DCS	Digital Cellular System
DR	Dynamic Range
DSR	Data Set Ready
DTE	Data Terminal Equipment
DTR	Data Terminal Ready
EFR	Enhanced Full Rate
E-GSM	Extended GSM
EMC	ElectroMagnetic Compatibility
EMI	ElectroMagnetic Interference
EMS	Enhanced Message Service
EN	ENable
ESD	ElectroStatic Discharges
FIFO	First In First Out

Abbreviation Definition

FR	Full Rate
FTA	Full Type Approval
GND	Ground
GPI	General Purpose Input
GPC	General Purpose Connector
GPIO	General Purpose Input Output
GPO	General Purpose Output
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile communications
HR	Half Rate
I/O	Input / Output
LED	Light Emitting Diode
LNA	Low Noise Amplifier
MAX	MAXimum
MIC	MICrophone
MIN	MINimum
MMS	Multimedia Message Service
MO	Mobile Originated
MT	Mobile Terminated
na	Not Applicable
NF	Noise Factor
NMEA	National Marine Electronics Association
NOM	NOMinal
NTC	Négative Temperature Coefficient
PA	Power Amplifier
Pa	Pascal (for speaker sound pressure measurements)
PBCCH	Packet Broadcast Control Channel
PC	Personal Computer
PCB	Printed Circuit Board
PDA	Personal Digital Assistant
PFM	Power Frequency Modulation
PSM	Phase Shift Modulation
PWM	Pulse Width Modulation

Abbreviation Definition

RAM	Random Access Memory
RF	Radio Frequency
RFI	Radio Frequency Interference
RHCP	Right Hand Circular Polarization
RI	Ring Indicator
RST	ReSeT
RTC	Real Time Clock
RTCM	Radio Technical Commission for Maritime services
RTS	Request To Send
RX	Receive
SCL	Serial CLock
SDA	Serial Data
SIM	Subscriber Identification Wireless CPU
SMS	Short Message Service
SPI	Serial Peripheral Interface
SPL	Sound Pressure Level
SPK	SPeaKer
SRAM	Static RAM
TBC	To Be Confirmed
TDMA	Time Division Multiple Access
TP	Test Point
TVS	Transient Voltage Suppressor
TX	Transmit
TYP	TYPical
UART	Universal Asynchronous Receiver-Transmitter
USB	Universal Serial Bus
USSD	Unstructured Supplementary Services Data
VSWR	Voltage Standing Wave Ratio

2 Storage conditions

The Wireless CPU may be stored in the following conditions:

-40°C to +85°C for 1 year

3 Product packaging and labeling

Wireless CPU Q24 is shipped in a box (inner package), which contains 100 products (5 lines of 20 products).

3.1 Packaging Elements

3.1.1 Packaging "pizza box"

Specifications:

- Material: Collective ESD Box type "pizza box"
- Type: FEFCO 0427
- Dimension: 267 x 222 x 61 for all versions, except 345 x 225 x 65 for Q24 Automotive
- Capacity: 100 Wireless CPUs

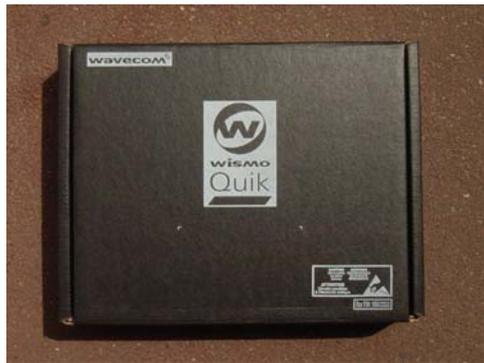


Figure 1: Wireless CPU Q24 Series box

This packaging is stamped with the Wireless CPU logo, the RESY specification, and a warning label indicating of static sensitive device.

3.1.2 Outer Package

Specifications:

- Material: Double-wall (or double-face) corrugated brown carton (three sheets of linerboard with two mediums in between)
- Type: FEFCO 0201
- Dimension: 470 x 300 x 220 for all versions, except 465 x 350 x 220 for Q24 Automotive
- Capacity: 6 Pizza boxes (2x3)

Wireless CPU Q24 Series Product packaging and labeling

This packaging is stamped with RESY specification.

The dimension is defined to be filled with boxes, without any empty space.

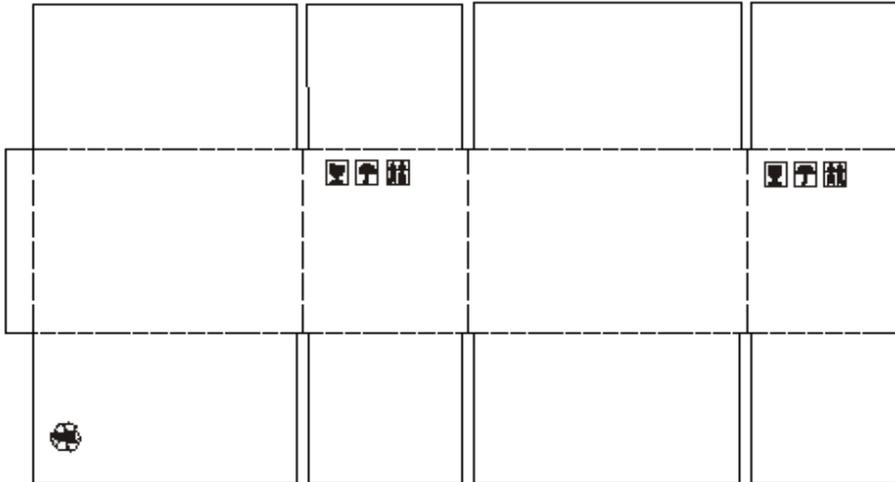


Figure 2: Collective packaging design

3.1.3 EUR pallet

Specifications:

Weight:	22 kg
Dimension:	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:	Shrunked plastic bag.
Dimension:	At least 20 micron.

3.2 Summary of recyclable elements

Packaging Elements	Recyclable
Inner package	Yes
Outer package	Yes

3.3 Product label specifications

These specifications are given for information only. Wavecom, at any time and without notice, may make changes to the labels.

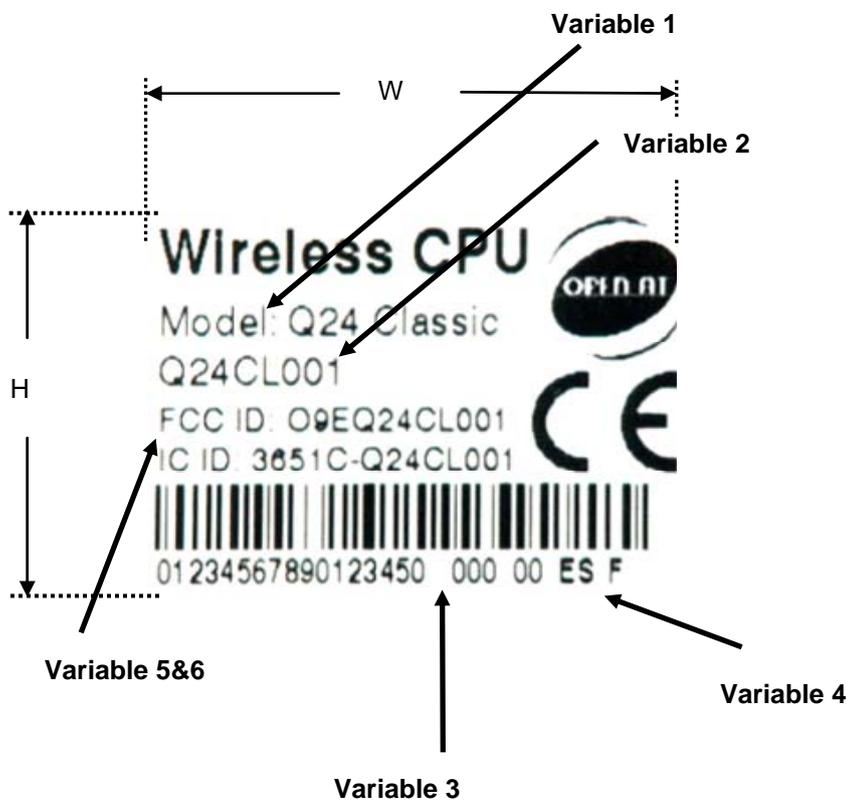


Figure 3: Product label specifications

- Wireless CPU Q24 Series labeling layout:
 - W: 29mm (max)
 - H: 20mm (max)
 - Material: Polyester

Wireless CPU Q24 Series Product packaging and labeling

Note:

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

- Variable 1:

Model reference:

Q24 Classic

Q24 Plus

Q24 Extended

Q24 Auto

- Variable 2:

Ordering reference:

Q24CL001

Q24CL002

Q24CL003

Q24CL004

Q24PL001

Q24PL002

Q24PL003

Q24PL004

Q24PL005

Q24PL006

Q24EX001

Q24EX002

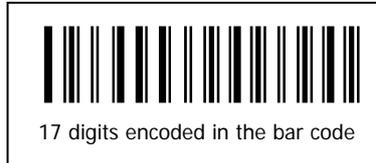
Q24AU001

Q24AU002

Q24AU003

Wireless CPU Q24 Series
Product packaging and labeling

- Variable 3:



A

	Product type	Unit for the year	Week	Chronological number	Numeric test bench ID	PCB version + part-list	Retrofit version
Format	2 digits 0-99	1 digit 0-9	2 digits 1-53	5 digits 0-99999	2 digits 0-32	3 digits (xxx) 0-999	2 digits (xx) 0-99
Example	54 for Q2406-C	3 for y.2003	01	00170	01	401 for hw version V401	01 (V401, no retrofit)

Digits printed but not encoded in the bar code

B

	RF test bench ID
Format	3 digits 0-999
Example	136

C

Production site ID
Blank or 2 digits 0-99
Blank for WM internal

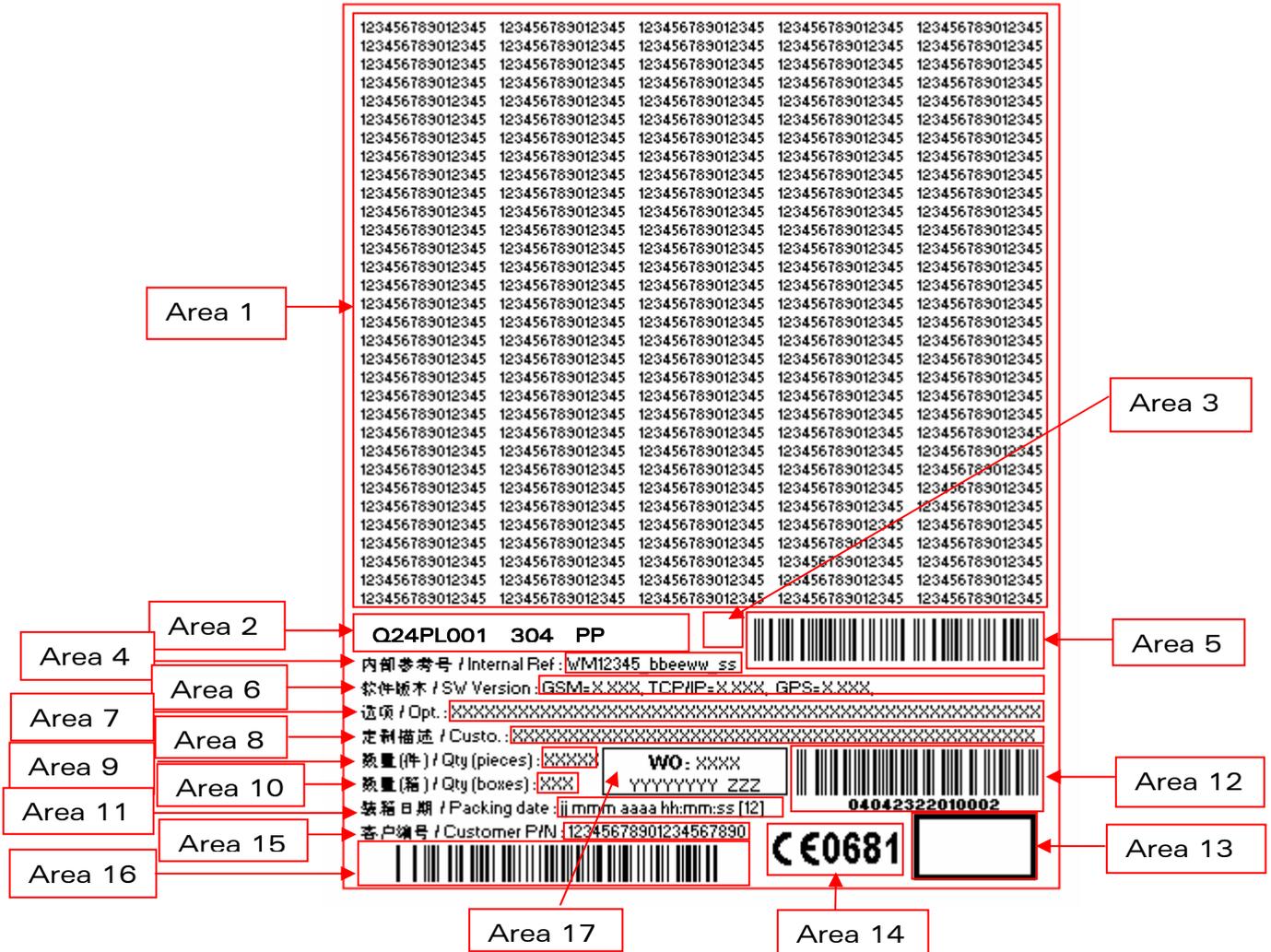
- Variable 4:
ES (Engineering Sample)
PP (Pre-Production)
"" (mass production)

Wireless CPU Q24 Series Product packaging and labeling

- Variable 5&6:
FCC ID and IC ID
 - The FCC ID may be printed only on version:
Q24CL001/Q24CL003/Q24PL001/Q24PL003/Q24PL005/Q24PL006/Q24EX001/Q24AU001/Q24AU002
Q24CL002/Q24CL004/Q24PL002/Q24PL004/Q24EX002 may not have any FCC ID identifier
 - The IC ID may be printed only on version:
Q24CL001/Q24CL003/Q24PL001/Q24PL003/Q24PL005/Q24PL006/Q24EX001/Q24AU001/Q24AU002
Q24CL002/Q24CL004/Q24PL002/Q24PL004/Q24EX002 may not have any FCC ID identifier

3.4 Manufacturing and outer box label

Dimension: 102 x 127 mm



Wireless CPU Q24 Series
Product packaging and labeling

Area	Description
1	Serial Number area. 5 colons by 32 lines MAX. (160 number MAX)
2	Product
3	Repair mode
4	Product reference
5	Product barcode
6	Software version
7	Feature options
8	Customisation description
9	Quantity of modules in box
10	Quantity of boxes
11	Date of packing
12	Serial number of manufacturing box and barcode
13	Quality stamp
14	CE marking
15	Customer serial number
16	Customer serial number barcode
17	Manufacturer work order

4 Caution

4.1 Handling

Wireless CPU Q24 is ESD sensitive (Voltage < 1kV).

For ESD handling, please refer to the norm JESD625.

ESD	
Ground equipments (tables and shelves)	✓
No plastic bags	✓
ESD chairs	✓
Avoid any non-useful material	✓
Wear cotton blouse (avoid any synthetic blouse)	✓
Wear either 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 Wireless CPU based on IPC A610, refer to section 3.	✓
SOLDERING	
Soldering reflow is forbidden	✓

5 Assembly process

This section gives recommendations for the Wireless CPU industrial assembly on the application.

5.1 General

Gloves must be worn when handling the CPU.

No CPU cleaning is allowed.

No warm air should be blown on the CPU.

Be careful not to damage the CPU label (warranty condition).

5.2 Lead-free process

According to directive "2002/95/CE", Wavecom prohibit the following hazardous substances: mercury (Hg), lead (Pb), cadmium (Cd), hexavalent chromium (Cr+6), polybrominated diphenyl ether (PBDE), polybrominated biphenyl (PBB). Therefore, Wavecom Wireless CPU Q24 is:

- with lead-free terminals and
- with lead-free inner materials (components and solder paste)

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

But the Wireless CPU Q24 may also be mounted with a leaded process.

However, in this case, we recommend using lead-free solder wire to guarantee that even if the Wavecom CPU Q24 is removed, the CPU is still lead-free.

5.3 RF connections

The different types of RF connections are:

- via UFL/SMA cable on top side
- via UFL or MMS cable on bottom side
- via coaxial cable
- via IMP connector

Wireless CPU Q24 Series
Assembly process

Product reference	UFL on top side	UFL or MMS on bottom side	Antenna pad	IMP
Q24 Classic	X		X	X
Q24 Plus	X		X	X
Q24 Extended	X		X	X
Q24 Automotive		X	X	X

5.3.1 UFL/SMA connector on top side

The antenna may be connected to the Wireless CPU via an UFL connector present on the Wireless CPU Q24 CPU (all versions, except Automotive).

Insert the plug in the receptacle

This step is performed prior to CPU mounting.

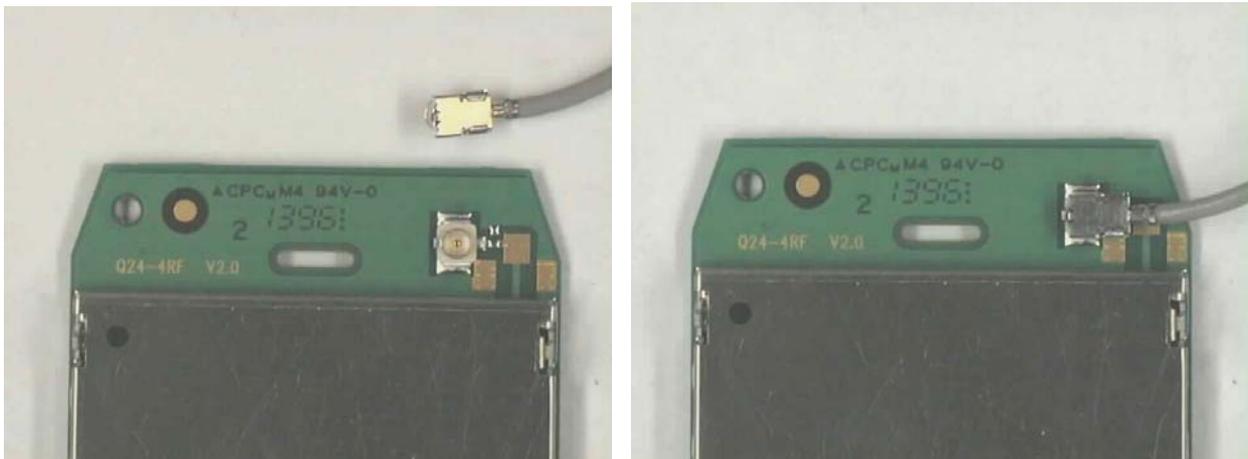


Figure 4: Assembly process - UFL/SMA connector

Extraction tool (mandatory)

Manufacturer: HIROSE

Reference: CL331-0441-9

Wireless CPU Q24 Series Assembly process

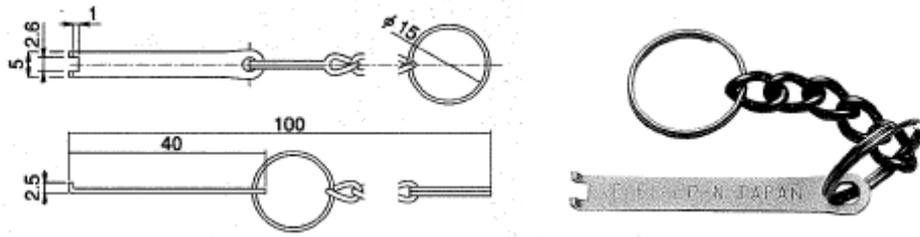


Figure 5: UFL connector – Extraction tool

5.3.2 MMS connector on bottom side

The antenna may be connected to the Wireless CPU Q24 via an MMS connector present on one version of the Wireless CPU Q24 Auto (Q24AU001).

Insert the plug in the receptacle

This step is performed prior to and after the Wireless CPU Q24 mounting.



Figure 6: Assembly process - MMS connector

Wireless CPU Q24 Series Assembly process

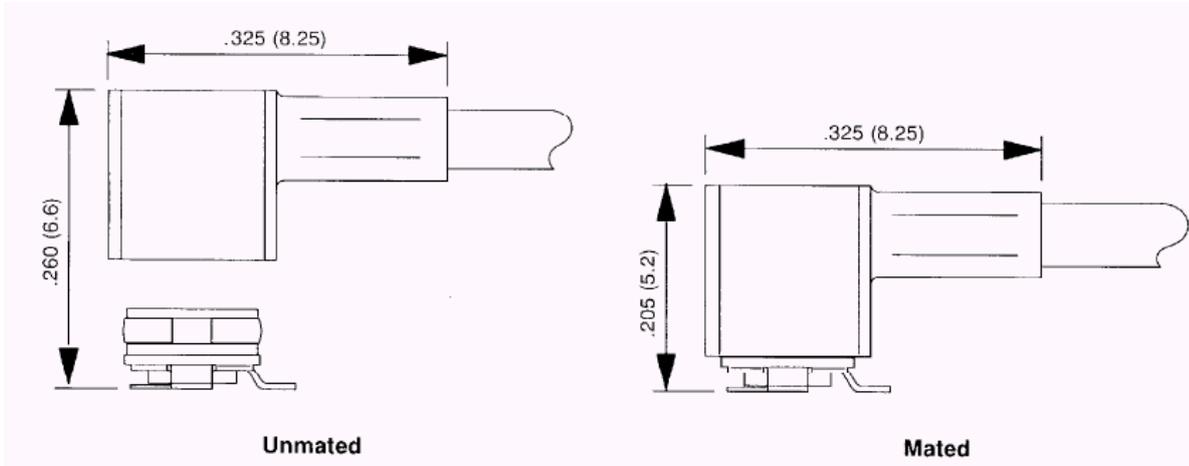


Figure 7: MMS connector dimension

Extraction tool (mandatory)

Manufacturer: RADIALL

Reference: R282 868 100

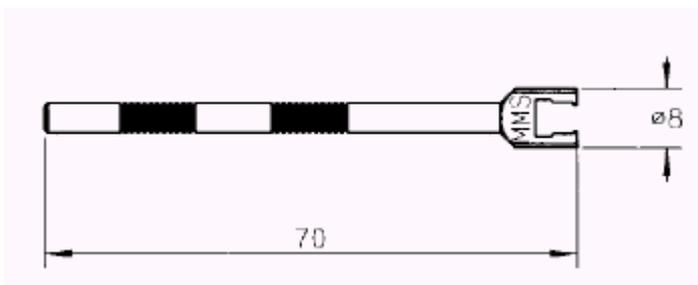


Figure 8: MMS connector – Extraction tool

Wireless CPU Q24 Series Assembly process

The use of extraction tool is shown in the following figure:

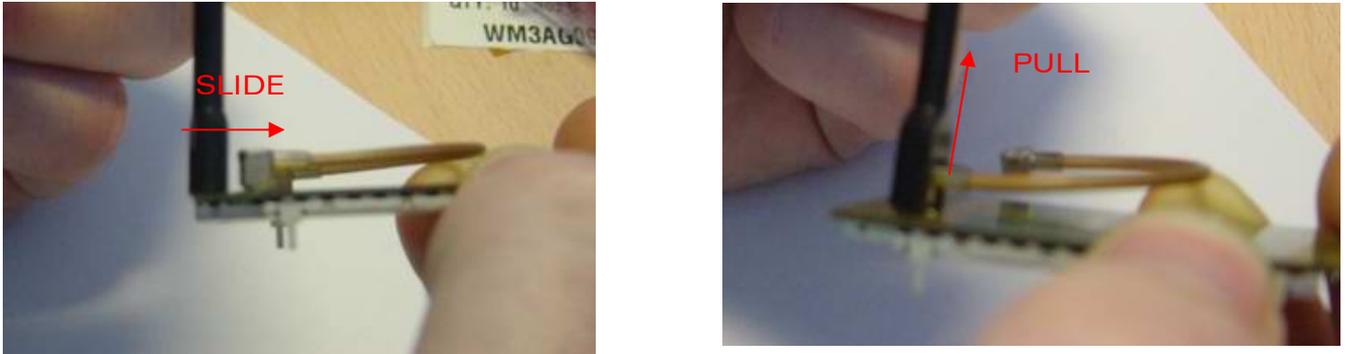


Figure 9: MMS connector – Extraction tool use

5.3.3 UFL/SMA connector on bottom side

The antenna may be connected to the Wireless CPU Q24 via an UFL connector present on one version of the Wireless CPU Q24 Auto (Q24AU002).

Insert the plug in the receptacle

This step is performed after the Wireless CPU Q24 mounting.

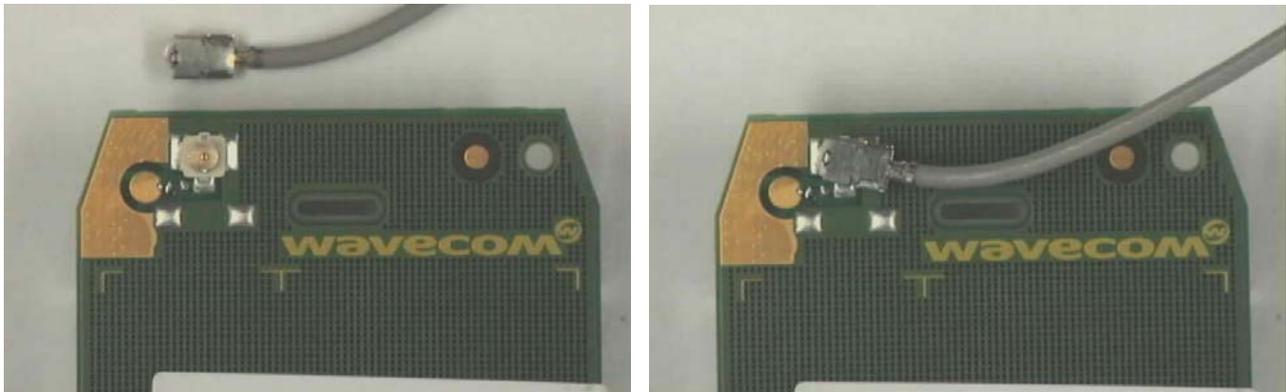


Figure 10: Assembly process - UFL/SMA connector

Extraction tool (mandatory)

Please refer to section 5.3.1. UFL/SMA connector on top side.

5.3.4 Coaxial cable on the Wireless CPU rear side

The antenna may be connected to the CPU via 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 an RG178 coaxial cable:

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

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

The antenna cable shielding must be soldered to the "Ground pad".

The antenna 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 Wireless CPU Q24 mounting.

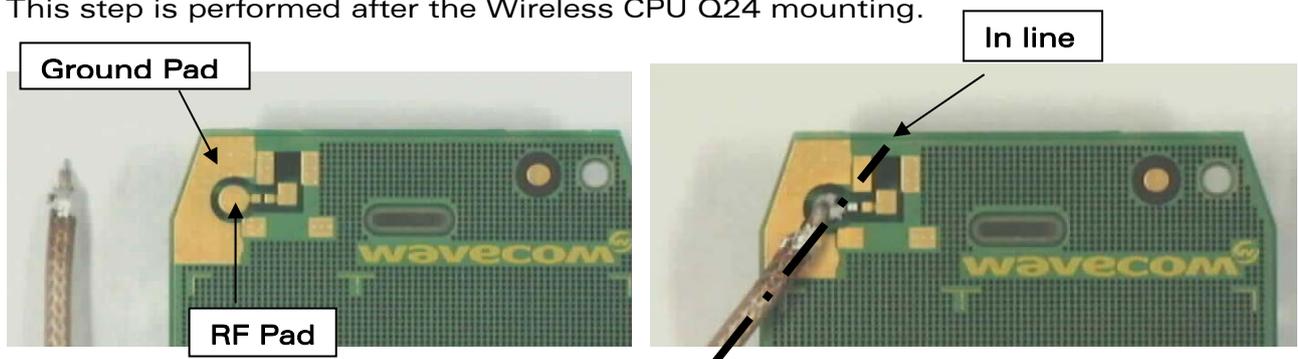
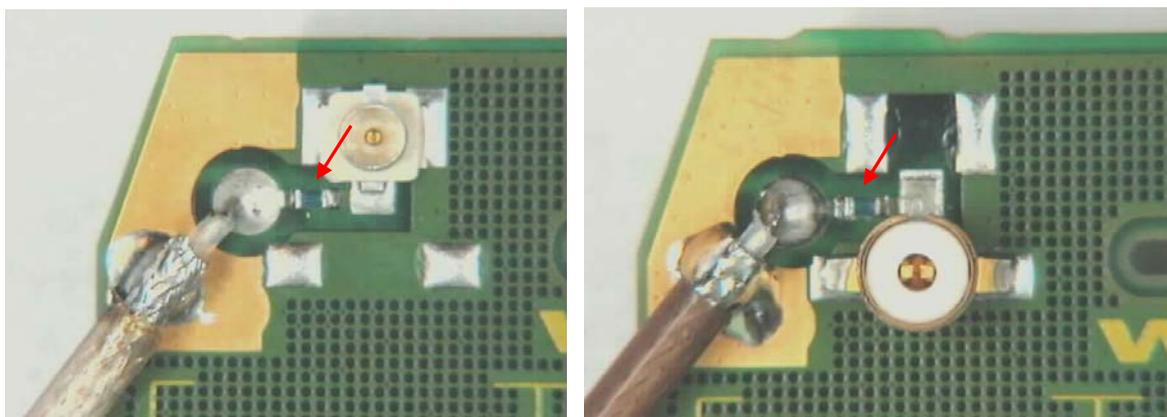


Figure 11: Assembly process - Coaxial cable connection

In case of Wireless CPU Q24 Auto, please take a special care not to de-solder and damage the resistance that links the antenna pad to the connectors.



Hand soldering recommendations:

- Soldering iron: WSD80 (Weller) or equivalent
- Solder wire: Kester 245 Cored 58 (Sn96.5Ag3Cu0.5) or X39 60-40 (Multi-core) (SnPb or SnPbAg)
- 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

The Figure 12 describes the cable preparation and positioning.

Wireless CPU Q24 Series
Assembly process

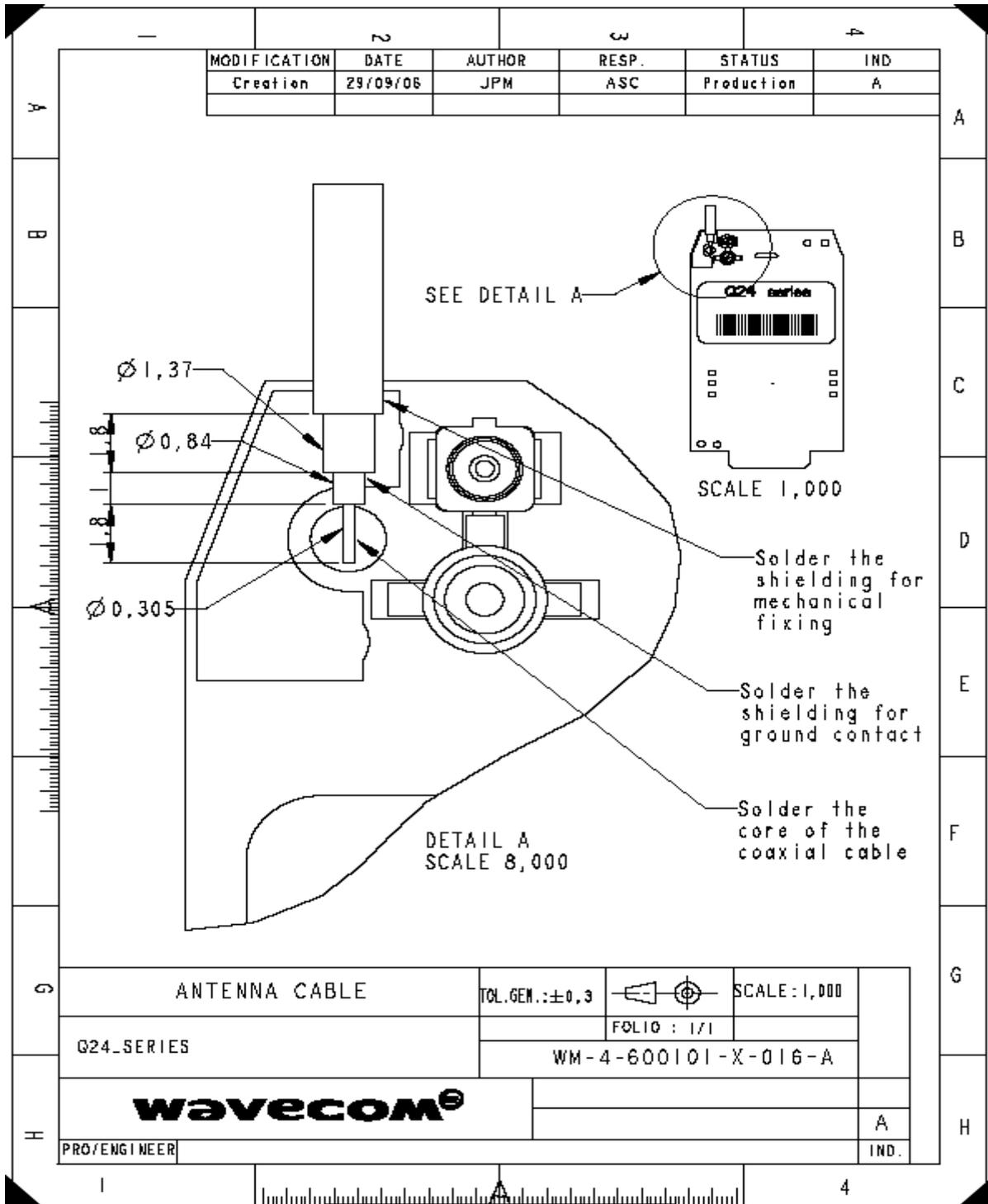


Figure 12: Antenna cable connection

Wireless CPU Q24 Series Assembly process

5.3.5 IMP connector

The antenna may be connected to the Wireless CPU via an IMP connector that must be assembled on the customer board.

The contact pad description on Q24 Series CPU is given in the "Appendixes".



Figure 13: Assembly process - IMP connector

The IMP connector is fragile. Special attention should be taken when handling the customer board, in order to prevent any damage to it.

No additional process step is required.

Concerning mounting, assembling and handling of this component, please contact the supplier, Radiall. Wavecom cannot support the customer regarding use of this connector.

5.4 60-lead connector process insertion

Insert the Wireless CPU Q24 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 "Appendixes".

Wireless CPU Q24 Series Assembly process

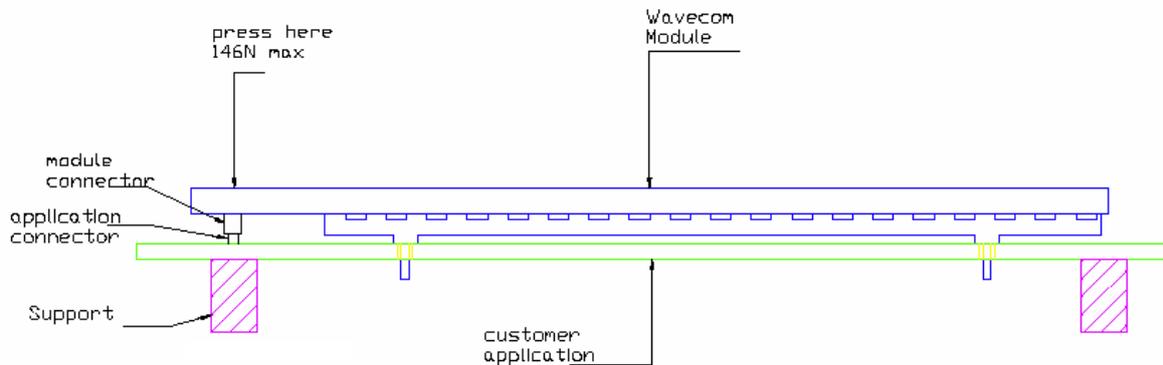


Figure 14: 60-lead connector process insertion

5.5 Soldering the legs

The Wireless CPU Q24 legs must be soldered according to the following instructions:

- The type and size of connection holes must be selected in accordance with Wavecom recommendations (see layout requirement document and mechanical drawing in the "Appendixes").
- The soldering quality must be in accordance with IPC-A-610 Rev-C, (refer to the chapter 6 on "Soldering"):
 - Class 2: general case
 - Class 3: for automotive

The Figure below gives the Wireless CPU Q24 position before hand soldering, and caution for the Wireless CPU Q24 Series.

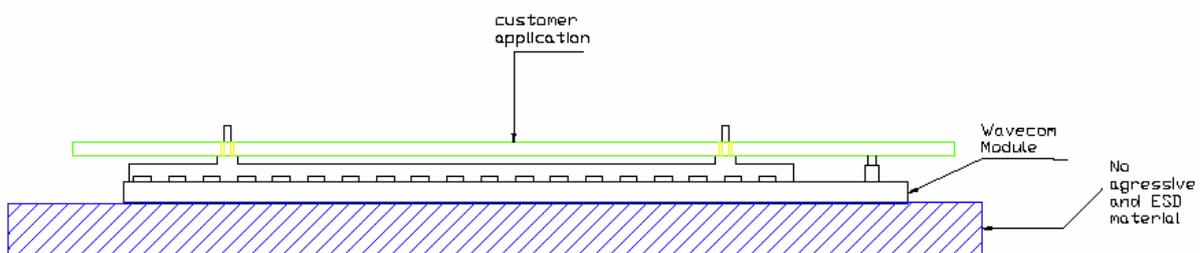


Figure 15: CPU position before hand soldering

5.5.1 Hand soldering recommendations

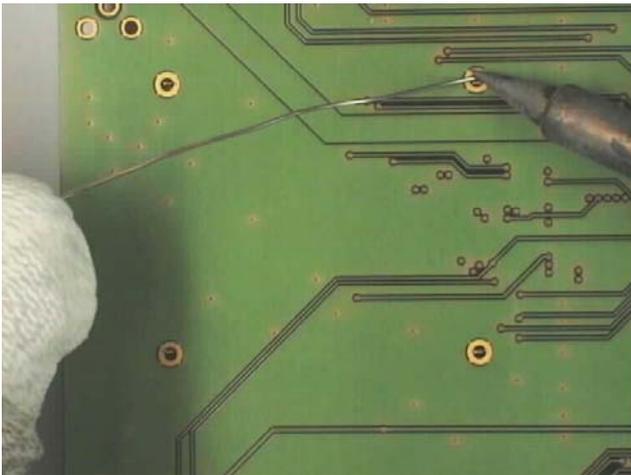
- Soldering iron: WSD80 (Weller) or equivalent
- Solder wire: Kester 245 Cored 58 (Sn96.5Ag3Cu0.5) or X39 60-40 (Multi-core) (SnPb or SnPbAg)

Wireless CPU Q24 Series

Assembly process

- Diameter = 0.5 mm
- Binocular type: Mantis (Vision engineering) or equivalent
- Soldering tip type: length 2.4 mm x 0.8 mm width (LT BLF type)
- T max = 385 sec for 3 to 5 sec

5.5.2 Assembly process



Assemble the CPU in the customer application.

A characteristic click may be heard.

On the opposite side, solder the 4 legs.



Turn the application board and solder the 4 legs on this side.

Check the quality of the solder on both sides with a binocular.

Figure 16: Assembly process - Hand soldering

Note:

If an IMP connector is used, a special attention should be taken during leg soldering.

Soldering of the Wireless CPU Q24 on the customer board requires a special tool to ensure that the module is closely maintained on the board in the IMP connector area and that the IMP legs are in contact with the Wireless CPU Q24 Series RF pad.

The maximum force that may be applied on the module is 100 N (charge spreads 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 (see the chapter 6 on "Soldering").

There must be no gap between the Wavecom product and the customer application.

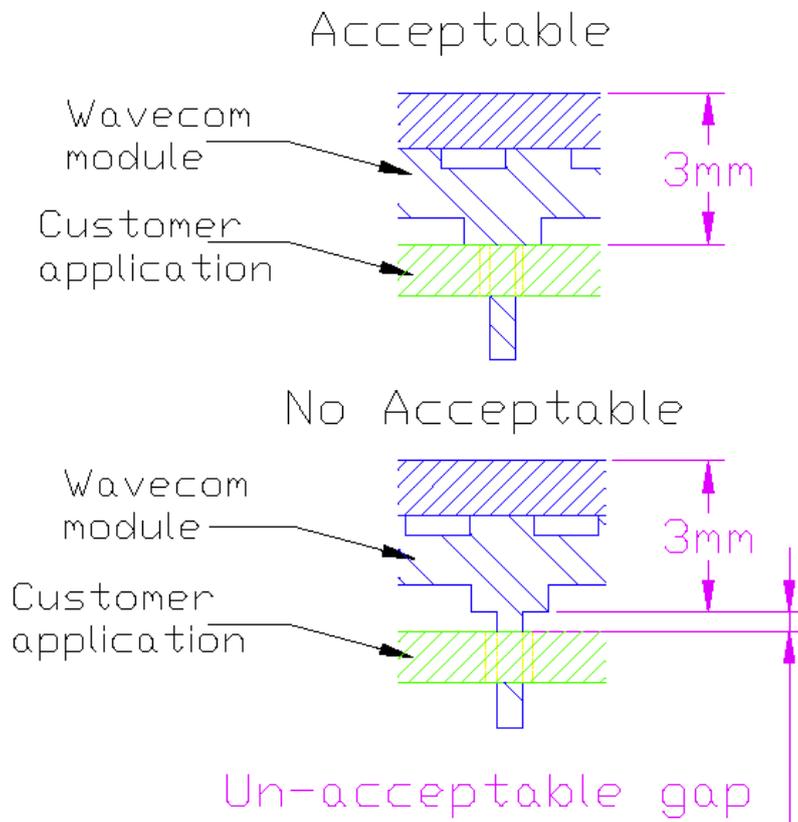


Figure 17: Assembly process – Acceptance criteria

Wireless CPU Q24 Series

Assembly process

Excessive soldering must be avoided in order not to damage the PCBA and to prevent future repair.

Therefore, soldering is allowed only in the lower-half of shielding belt.

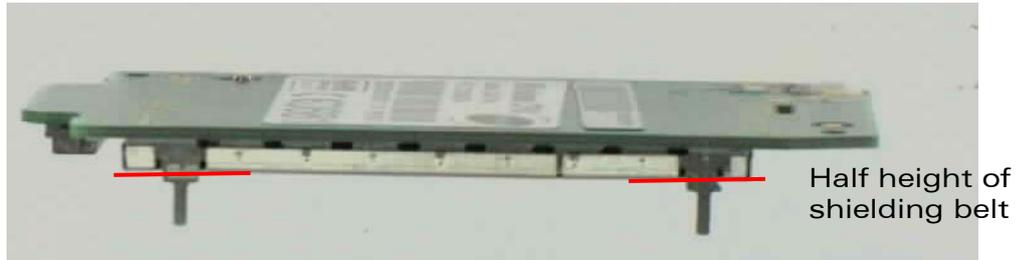


Figure 18: Assembly process - Half height of shielding belt

6 Rework and Wireless CPU Q24 exchange processes

6.1 General

The Wireless CPU Q24 may be changed 3 times.

The soldering iron temperature 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 an unsoldering station is used, set the parameters to:

- o Max temperature: 385 °C
- o Unsoldering pipe. Inner diameter: 1mm

If a soldering iron is used:

- o Max temperature: 385 °C
- o Same solder tip as of initial assembly

To unsolder the Wireless CPU Q24 leg by leg:

- o Put either the unsoldering pipe or the soldering iron on one leg.
- o Wait for few seconds (3 to 5) until the solder is in fusion.
- o Activate the aspiration while pushing on the pedal or use solder wick with the soldering iron.
- o Ensure that there is no solder left, otherwise repeat the operation.
- o Repeat the operation for each leg.

Remove the Wireless CPU Q24.

Check there is no solder left and that the pads are OK.

Clean the pads, if necessary, either with the soldering iron or solder wick.

Wireless CPU Q24 Series

Rework and Wireless CPU Q24 exchange processes

6.3 Acceptance criteria

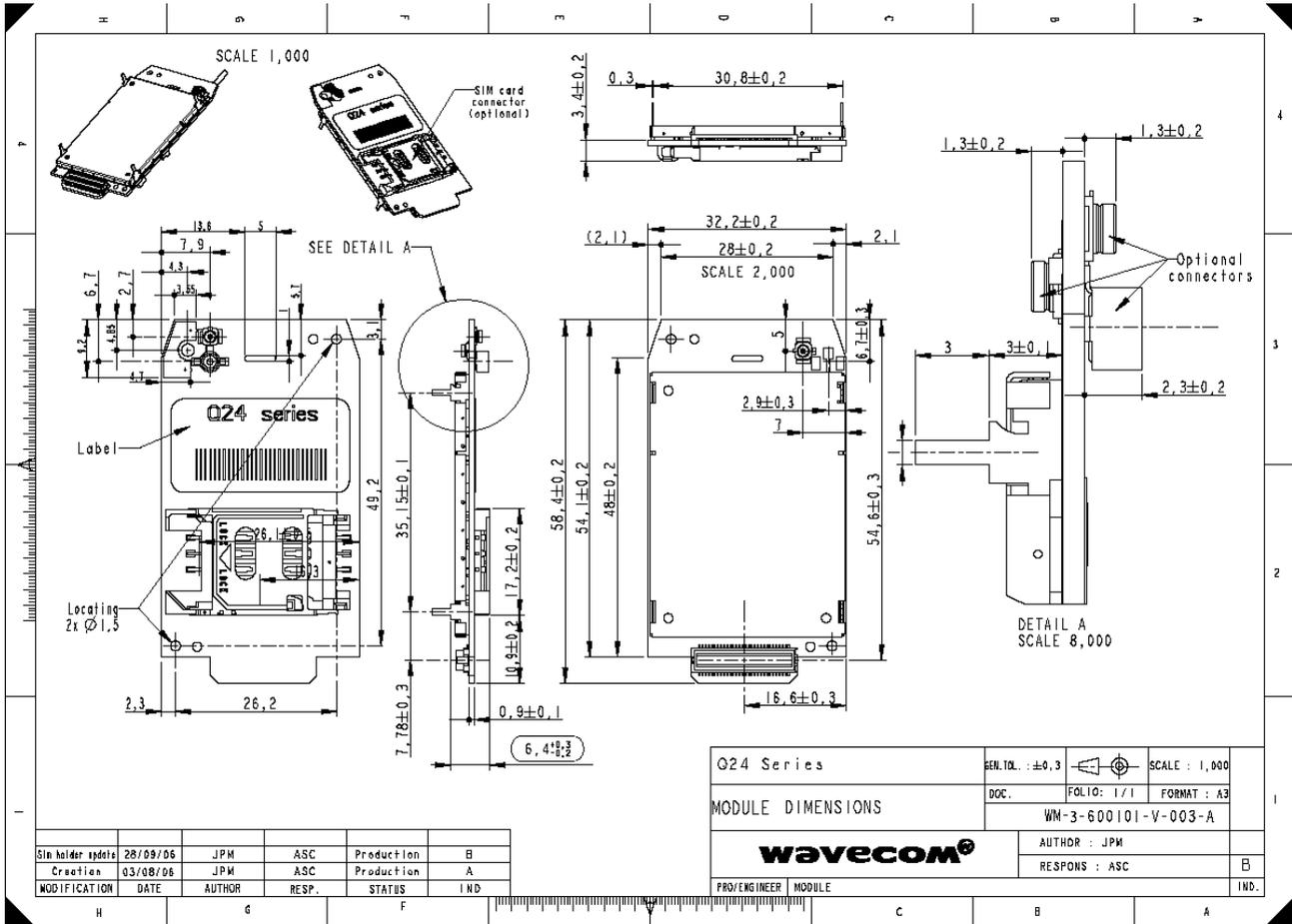
Purpose: To ensure the RMA Wireless CPU Q24 returned from customers are in good condition and may be repaired in the WM repair center.

Criteria: When removing Wireless CPU Q24 CPU from customer application board, ensure that the belt is not unsoldered from the PCB and the PCB is not deformed.

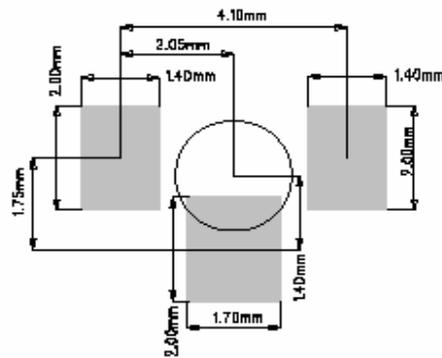
6.4 Soldering the new Wireless CPU Q24

Please refer to section 5.2.

APPENDIXES



IMP CONTACT PAD _ WAVECOM SIDE



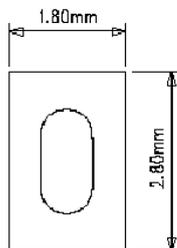
INDUSTRIAL NORMALIZATION	WRITTEN BY : HER	DATE : 07/02/08
	APPROVED BY : ASC	SECTION : 01P102
wavecom [®]	IMP CONNECTOR PAD DESIGN	

CHIPS & BORING DIAMETER

of the WISMO QUIK mechanical insertion pins

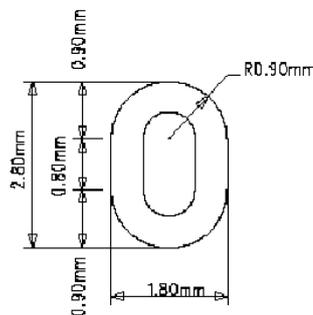
CASE N 1

To be used in priority

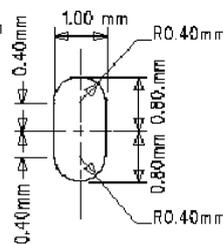


CASE N 2

on specific request

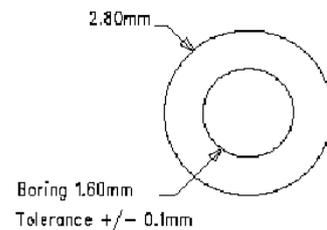


Tolerance +/- 0.1mm
1.00 mm reamer

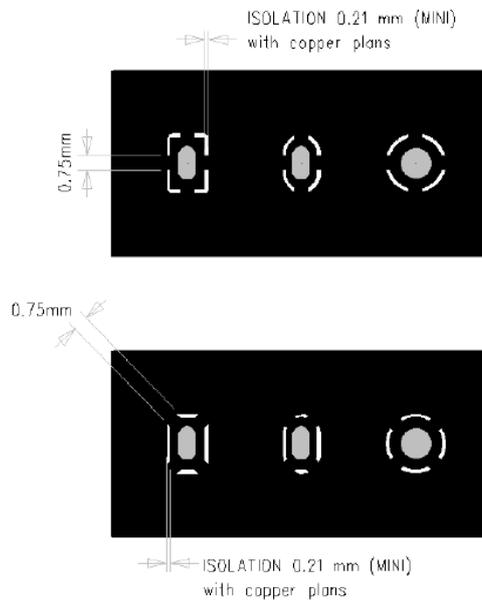


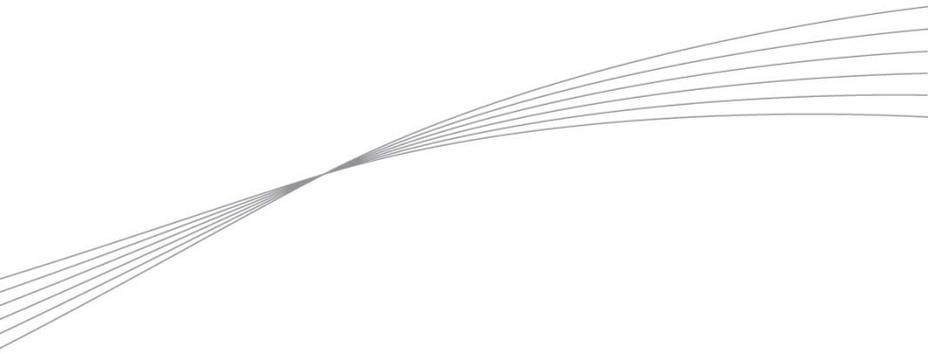
CASE N 3

Other



THERMAL BRAKES DEFINITION





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