Q2687 Refreshed Wireless CPU® Migration Document

Migration from Q268x to Q2687 Refreshed

WA_DEV_Q26RD_UGD_001
003
January 28, 2010

SIERRA WIRELESS
HEART OF THE WIRELESS MACHINE®

Document History

Version	Date	Updates
001	November 23, 2009	Creation
002	December 03, 2009	Updated the following sections: • IMP-Precidip Connector • IMP-Precidip PCB Coordinate
003	January 28, 2010	Updated Table 6 Power Consumption of the Q26 Series.
		Updated the list of tests in section 6 Certification Continuity.
		Updated section 5 Software Constraint.

	Name	Function	Date	Signature
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1. Introduction

This document sums up the differences between the Q2687 Refreshed and legacy Q2687 / Q2687 Classic / Q2686. Q2687 Refreshed is a product enhancement of the legacy Q2687 with new RF chip set applied. It aims to extend the product life cycle.

2. Reference Documents

List of References

[1] AT Command Interface Guide for Open-AT® Firmware v7.4

Reference: WM_DEV_OAT_UGD_079-011

[2] Q2686 Wireless CPU® Product Technical Specification

Reference: WM_PRJ_Q2686_PTS_001-011

[3] Q2687 Wireless CPU® Product Technical Specification

Reference: WA_ENG_Q2687_PTS_001-007

[4] Q2687 Classic Wireless CPU® Product Technical Specification

Reference: WM_DEV_Q2687_PTS_001-004

[5] Q2687 Refreshed Wireless CPU® Product Technical Specification (Under Development)

Reference: WA_DEV_Q26RD_PTS_001-001

3. General Description

General Information

The Wireless CPU Q26 series is offered in three different versions. The table below defines each product of the Q26 series Wireless CPU®.

Table 1. Comparison Table Between the Q26 Series

Q2686	Q2687	Q2687 Classic	Q2687 Refreshed
			
Quad band GSM	Quad band GSM	Quad band GSM	Quad band GSM
GSM / GPRS Class 10	GSM / GPRS Class 10 / EDGE Class 10	GSM / GPRS Class 10	GSM / GPRS Class 10 / EDGE Class 10
ARM946, 32 bit, 104MHz	ARM946, 32 bit, 104MHz	ARM946, 32 bit, 104MHz	ARM946, 32 bit, 104MHz
-20°C / +55°C Class A -40°C / +85°C Class B	-20°C / +55°C Class A -40°C / +85°C Class B	-20°C / +55°C Class A -40°C / +85°C Class B	-30°C / +70°C Class A (-20°C to +55°C Min.) -40°C / +85°C Class B
1 UFL connector, 1 IMP connection which allows to support board to board solution, 1 RF solder pad, 100 I/O Pins connector	1 UFL connector, 1 IMP connection which allows to support board to board solution, 1 RF solder pad, 100 I/O Pins connector	1 UFL connector, 1 IMP connection which allows to support board to board solution, 1 RF solder pad, 100 I/O Pins connector	1 UFL connector, 1 IMP-Precidip connection which allows to support board to board solution, 1 RF solder pad, 100 I/O Pins connector
40mm x 32.2mm x 4mm	40mm x 32.2mm x 4mm	40mm x 32.2mm x 4mm	40mm x 32.2mm x 4mm

Correspondences PNMKT

Table 2. Correspondences PNMKT

Q26 series	Memory Size	PNMKT
Q2686H	32Mb Flash, 8Mb Ram	Q2686H
Q2686G	64Mb Flash, 16Mb Ram	Q2686G
Q2687H	32Mb Flash, 8Mb Ram	Q2687H
Q2687G	64Mb Flash, 16Mb Ram	Q2687G
Q2687 Classic	32Mb Flash, 8Mb Ram	Q2687CL01
Q2687 Classic	64Mb Flash, 16Mb Ram	Q2687CL02
Q2687 Refreshed	64Mb Flash, 16Mb Ram	Q2687RD

4. Hardware Constraint

Electrical Differences

Functional Differences

RF Band

The entire Q26 series Wireless CPU® supporting Quad GSM band at 900 / 1800 / 850 / 1900 MHz and GPRS Class 10 connection. Q2687 Refreshed and Q2687 also support EDGE CL 10. Following table show the summary of the RF capabilities of each Wireless CPU®.

Table 3. RF Band Supported by the Q26 Series

Product Reference	RF Band
Q2686	EGSM / GPRS CL 10 850 / 900 / 1800 /1900 MHz
Q2687	EGSM / GPRS CL 10 / EDGE CL 10 850 / 900 / 1800 /1900 MHz
Q2687 Classic	EGSM / GPRS CL 10 850 / 900 / 1800 /1900 MHz
Q2687 Refreshed	EGSM / GPRS CL 10 / EDGE CL 10 850 / 900 / 1800 /1900 MHz

Temperature Range

Q2687 Refreshed is under development with target to wider the temperature range in Class A. Following table could be used for comparisons.

Table 4. Operating Temperature Range of the Q26 Series

Product Reference	Operating Temperature Range
Q2686	-20°C to +55°C Class A *-40°C to +85°C Class B
Q2687	-20°C to +55°C Class A *-40°C to +85°C Class B
Q2687 Classic	-20°C to +55°C Class A *-40°C to +85°C Class B

Product Reference	Operating Temperature Range
Q2687 Refreshed	-30°C to +70°C Class A (-20°C to +55°C Minimum) -40°C to +85°C Class B

* Specific BOM version

Power Supply Differences

Among the Q26 series Wireless CPU®, the nominal voltage are 3.6V except the maximum voltage of Q2686 is higher at 4.8V. Please find the following table as reference.

Table 5. Operating Voltage of the Q26 Series

	Q2686	Q2687	Q2687 Classic	Q2687 Refreshed
V_{in} Max.	4.8 volt	4.5 volt	4.5 volt	4.8volt
V_{in} Nominal	3.6 volt	3.6 volt	3.6 volt	3.6 volt
V_{in} Min.	3.2 volt	3.2 volt	3.2 volt	3.2 volt

Performance Differences

Power Consumption Differences

Table 6. Power Consumption of the Q26 Series, typical value

Operating Mode	Parameters	I_{NOM} Average				Unit
		Q2686	Q2687	Q2687 Classic	Q287 Refreshed (Preliminary data)	
Alarm Mode		16	17.2	16.2	11.5	µA
Fast Idle Mode	Paging 9 (Rx burst occurrence ~2s)	17	15.3	19.3	15.3 tbc	mA
	Paging 2 (Rx burst occurrence ~0,5s)	18	16.8	21.2	16.8 tbc	mA
Slow Idle Mode*	Paging 9 (Rx burst occurrence ~2s)	1.6	1.84	1.76	1.80	
	Paging 2 (Rx burst occurrence ~0,5s)	4.4	4.4	5.09	4.4 tbc	mA
Fast Standby Mode		36	37.8	41.54	37.8 tbc	mA
Slow Standby Mode		1.4	1.1	0.56	0.44	mA

Operating Mode	Parameters		I_{NOM} Average				Unit
			Q2686	Q2687	Q2687 Classic	Q287 Refreshed (Preliminary data)	
Connected Mode	850/900 MHz	PCL5 (TX power 33dBm)	218	242	247	243	mA
		PCL19 (TX power 5dBm)	89	96	97	100	mA
	1800/ 1900 MHz	PCL0 (TX power 30dBm)	153	235	241	193	mA
		PCL15 (TX power 0dBm)	85	97	100	96	mA
Transfer Mode	GPRS Class 10 (max power)		372	415	423	416	mA
	EGPRS Class 10 (max power)		--	310	--	322	mA

RF Performance

Table 7. RF Performance of the Q26 Series

Parameters	Q2686	Q2687	Q2687 Classic	Q2687 Refreshed (typical value)
Receiver Parameters				
GSM850 Reference Sensitivity	-107dBm Static	-107dBm Static	-107dBm Static	-109dBm Static
E-GSM900 Reference Sensitivity	-107dBm Static	-107dBm Static	-107dBm Static	-109dBm Static
DCS1800 Reference Sensitivity	-106dBm Static	-106dBm Static	-106dBm Static	-108dBm Static
PCS1900 Reference Sensitivity	-106dBm Static	-106dBm Static	-106dBm Static	-108dBm Static
Selectivity @ 200 kHz	> +9dBc	> +9dBc	> +9dBc	> +9dBc
Selectivity @ 400 kHz	> +41dBc	> +41dBc	> +41dBc	> +41dBc
Linear dynamic range	63dB	63dB	63dB	63dB
Co-channel rejection	>= 9dBc	>= 9dBc	>= 9dBc	>= 9dBc
Transmitter Parameters (Output Power)				
EGSM & GSM850 (Maximum)	33dBm +/- 2dB	33dBm +/- 2dB	33dBm +/- 2dB	33dBm +/- 2dB
GSM1800 & PCS1900 (Maximum)	30dBm +/- 2dB	30dBm +/- 2dB	30dBm +/- 2dB	30dBm +/- 2dB
EGSM & GSM850 (Minimum)	5dBm +/- 5dB	5dBm +/- 5dB	5dBm +/- 5dB	5dBm +/- 5dB

Parameters	Q2686	Q2687	Q2687 Classic	Q2687 Refreshed (typical value)
GSM1800 & PCS1900 (Minimum)	0dBm +/- 5dB	0dBm +/- 5dB	0dBm +/- 5dB	0dBm +/- 5dB

Delta Part List

Q2687 Refreshed is modified from the Q2687. The following table shows the Delta for the Parts List of both the Q2687 and Q2687 Refreshed.

Table 8. Delta Part List from Q2687 to Q2687 Refreshed

Description	Q2687 Q2687 Classic	Q2687 Refreshed
RF Transceiver	R2A60163BG	AERO4223EL/C1
Front End – Power Amplifier	Power Amplifier RPF09036B-TB	SKY77528
SAW Filter	Front-End + SAW HWXR594-1	B39941B9504L310 B39202B9502L310
PAD for B2B RF connection	IMP	IMP and Precidip

General Purpose Connector Pin Out Differences

Table 9. Pin Out Difference Between the Q26 Series

Pin #	Q2686			Q2687 / Q2687 Classic			Q2687 Refreshed		
	Signal Name	Function	Value	Signal Name	Function	Value	Signal Name	Function	Value
5	VCC_1V8	1.8V Supply Output	1V8 with 15 mA (max)	VCC_1V8	1.8V Supply Output	1V8 with 15 mA (max)	VCC_1V8	1.8V Supply Output	1V8 with 15 mA (max) tbc
10	VCC_2V8	2.8V Supply Output	2V8 with 15 mA (max)	VCC_2V8	2.8V Supply Output	2V8 with 15 mA (max)	VCC_2V8	2.8V Supply Output	2V8 with 15 mA (max) tbc
42	Reserved	Not in Use	-	A1	Address Bus	1V8	A1	Address Bus	1V8
51	GPIO1	General Purpose IO	1V8	CS2 /A25 /GPIO1	Chip Select, Address bus, General Purpose IO	1V8	CS2 /A25 /GPIO1	Chip Select, Address bus, General Purpose IO	1V8
53	GPIO2	General Purpose IO	1V8	A24 / GPIO2	Address bus, General Purpose IO	1V8	A24 / GPIO2	Address bus, General Purpose IO	1V8
83	NC-5	Not Connected	-	/CS3	Chip Select 3	1V8	/CS3	Chip Select 3	1V8
81, 84-100	NC	Not Connected	-	Parallel Interface	Parallel Bus Interface	1V8	Parallel Interface	Parallel Bus Interface	1V8

Mechanical Differences

RF Connection, Connector Type and Position

All the Q26 series Wireless CPU® support the same type of UFL connector on bottom side

Table 10. Available RF Connection Between the Q26 Series

Product Reference	UFL on Bottom Side	Antenna Pad on Top Side	IMP on Bottom Side	Precidip on Bottom Side
Q2686	×	×	×	
Q2687	×	×	×	
Q2687 Classic	×	×	×	
Q2687 Refreshed	×	×	×	×

Compatibility of IMP and Precidip

Q2687 Refreshed as a replacement of Q268x Wireless CPU®, the Precidip Antenna PAD on Q2687 Refreshed is considered to be compatible with the IMP Connector on the original Q268x Wireless CPU® Adaptor board, except the mechanical tolerance will be reduced accordingly.

Table 11. X-Y Tolerance of IMP and Precidip Connectors

Antenna Connector applied on Application Board	X-axis Tolerance Q2687 Refreshed	X-axis Tolerance Q268x	Y-axis Tolerance Q2687 Refreshed	Y-axis Tolerance Q268x
IMP Connector	+/- 0.45mm	+/- 0.45mm	+/- 0.45mm	+/- 0.45mm
Precidip Connector	+/- 0.2mm	Not supported	+ 0.2 / - 0.17mm	Not Supported

(*) The tolerance measured needs to be verified with the finalized PCB layout.

IMP Connector

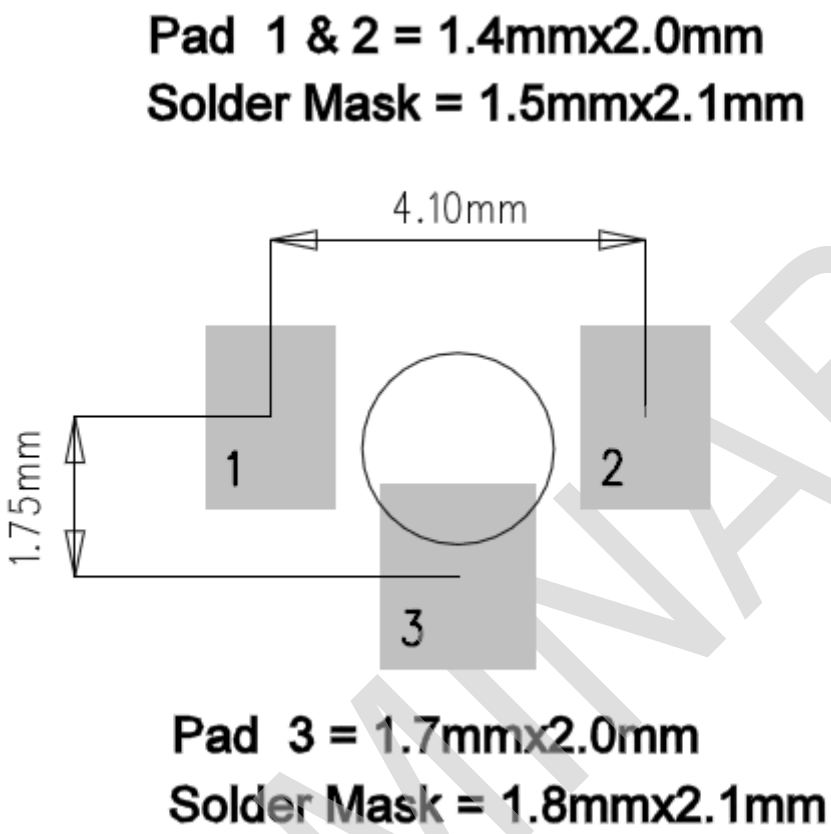

Figure 1. IMP PADS on Q268x

IMP-Precidip Connector

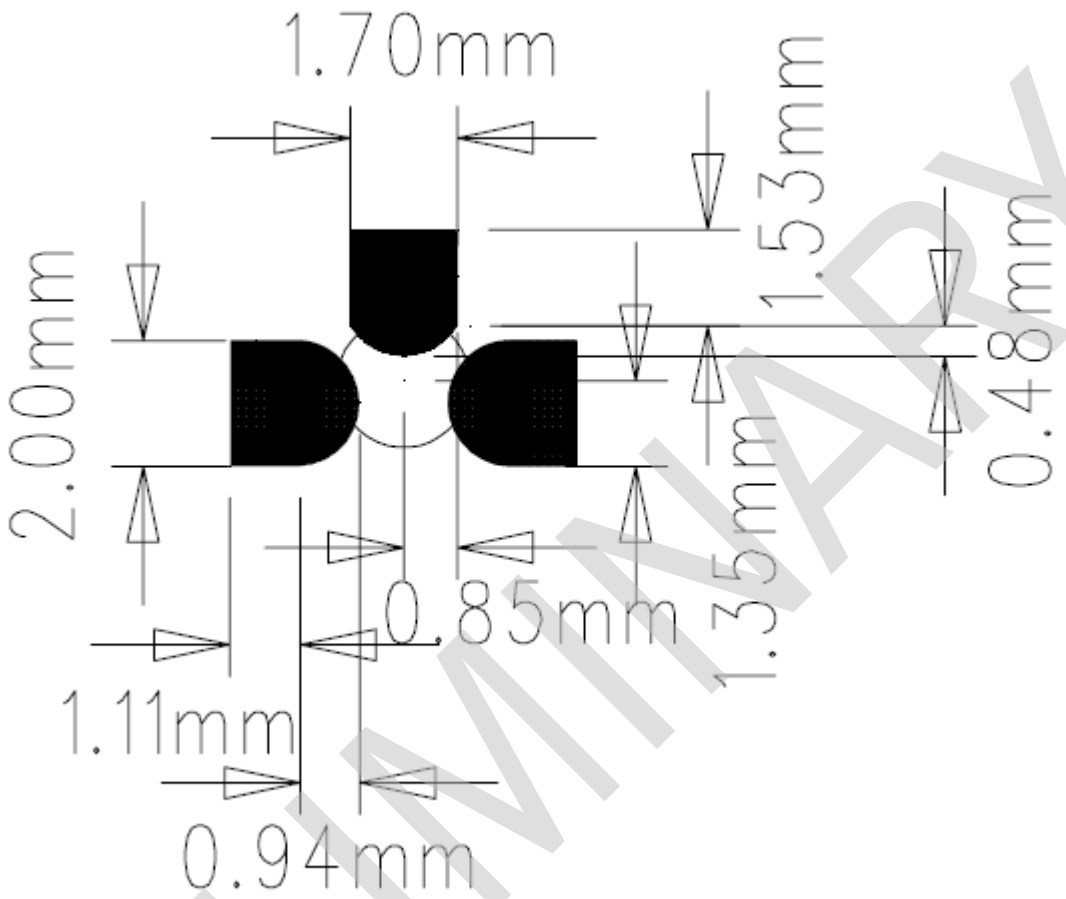

Figure 2. IMP-Precidip PADS on Q2687 Refreshed

IMP-Precidip PCB Coordinate

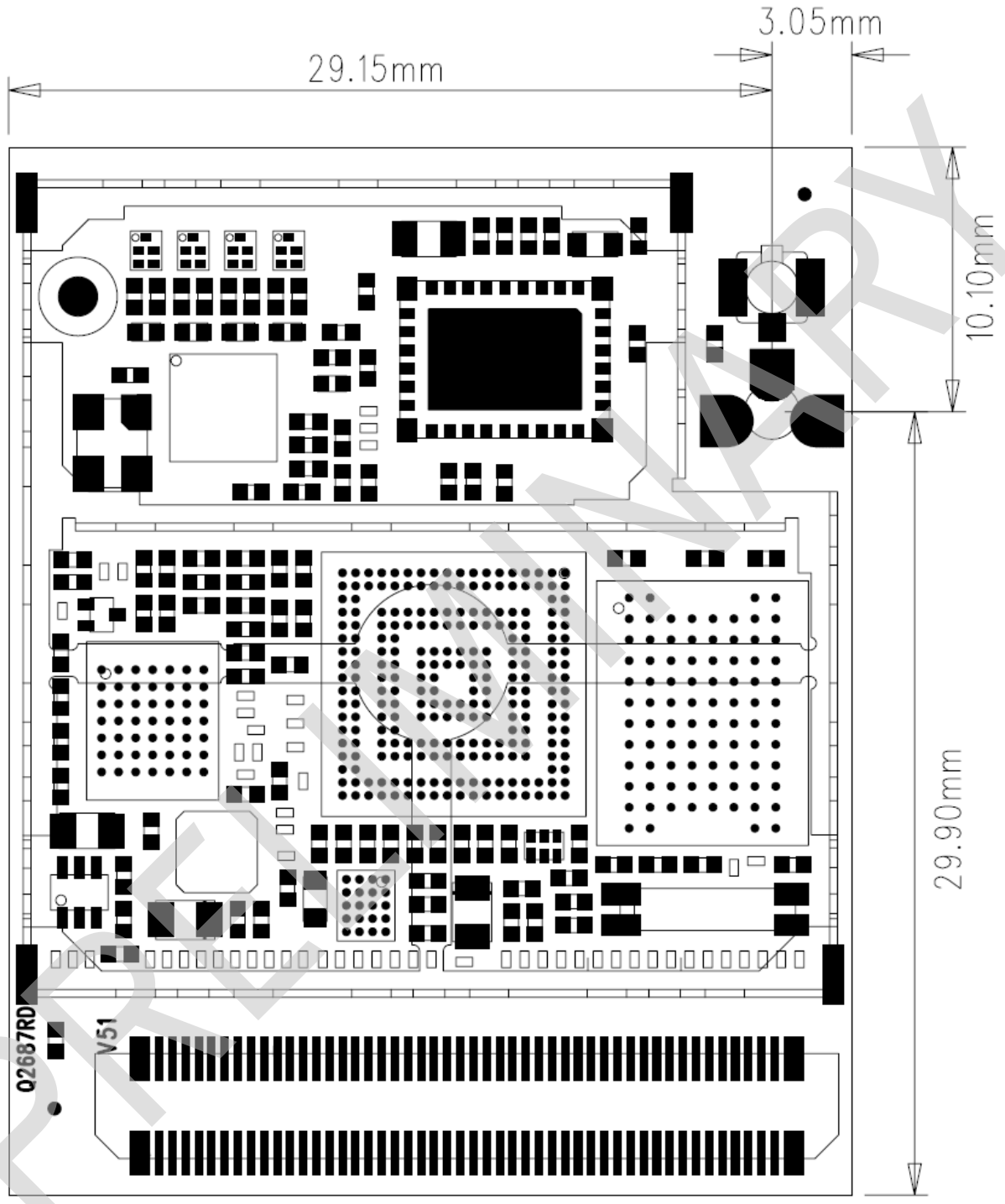

Figure 3. IMP-Precidip PCB Coordinates

Physical Dimensions

There is no Physical Dimension difference among the Q26 series. The standard dimensions are as listed below:

- Length : 40mm
- Width : 32.2mm
- Height : 4mm (except shielding pins)

Shielding Can

The bottom side shielding frame provides 4 legs for connecting to the application board, as the starter kit, for a GND connection between two boards. The positions of the 4 legs are the same.

5. Software Constraint

The Q2687 Refreshed Wireless CPU® will be supported with Open AT Software suite 2.33.

The Q2687 Refreshed Wireless CPU® will embed a new Firmware release 7.43.

The new Firmware 7.43 embedded inside the Q2687 Refreshed Wireless CPU® will offer 100% AT command compatibility with OASiS2.31 and OASiS2.32.

All functionalities and plug in provided within Open AT Software Suite 2.31 and 2.32 with Q268X will be available within the first Open AT Software Suite 2.33 supported by the Q2687 Refreshed Wireless CPU®. The upgrade compatibility will consequently cover:

- AT parser
- Open AT apps
- TCP /IP
- Internet
- Security: SSL, Crypto, Jamming
- C-GPS
- Intelligent Device Service

The Q2687 Refreshed Wireless CPU® software modification mainly consists of RF transceiver and FEM driver development.

6. Certification Continuity

The Q2687 Refreshed Wireless CPU® will be certified covering the same standards as the previous generation of the Q2687. This certification update for the Q2687 Refreshed will ensure update according to standard most recent evolutions and compatibility for customer use. The scope of this update will cover the following certification:

- GCF and R&TTE
- PTCRB, FCC and IC
- Other standards, operators or local approval such as: AT&T and RTE

For customer products, the migration to Q2687 Refreshed will be facilitated* with a much reduced need and scope of testing. The target (based on ongoing discussion with Cetecom Worldwide) results in the following list of tests:

- RSE (Radiated Spurious Emission) will be spot-checked
  - No full span testing
  - No extreme conditions since it will be fully tested on the module itself
- OTA (Over The Air)
  - Only required if applicable to the customer device (antenna fixed or less than 20 cm long).
  - Fully tested (since it is a CTIA rule to perform it in full span)
- IMEISV Check
  - Mandatory
  - Test duration is 2 minutes
- SIM Electric
  - Not required if the customer application design is not modified.
- FCC/IC/SAR
  - Not required provided that the results on the module tests are equivalent or better than before and if the customer is using the same FCC/IC Id as our module.

*Note:

In addition to certification and mandatory requirement, Sierra Wireless can propose to its customers a testing service to demonstrate the success of product migration to Q2687 Refresh (*Please contact our FAE team for more detail and booking*):

- Evaluation Check list (covering RF performance and base band interface)
- Full Certification Service (Evaluation Check List plus Product Certification-using accredited laboratory with pass verdict from Notified Body Expert Opinion)

This test list scope has been negotiated with CETECOM Worldwide so any customer willing to manage this certification upgrade by itself will have to handle negotiations directly with the test lab it selected.

AT&T Approval:

As far as the AT&T approval on the migrated application is concerned, the amount of tests is still being discussed.

But a limited re-run at AT&T is expected.


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