



Integrators Document for Radio Module

XRFModule-GEN2-868
XRFModule-GEN2-915USA
XRFModule-GEN2-915ANZ

868MHz variant for use in Europe
915MHz variant for use in North America/Canada
915MHz variant for use in Australia/NZ

revision 0.3
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Tyler Close, Normanton, Wakefield. WF6 1RL
Tel; +44 (0) 113 383 1000 Fax: +44 (0) 113 383 1010
E-mail: info@wimac.co.uk www.WiMAC.co.uk

Registered in England No. 5750381

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Revision History

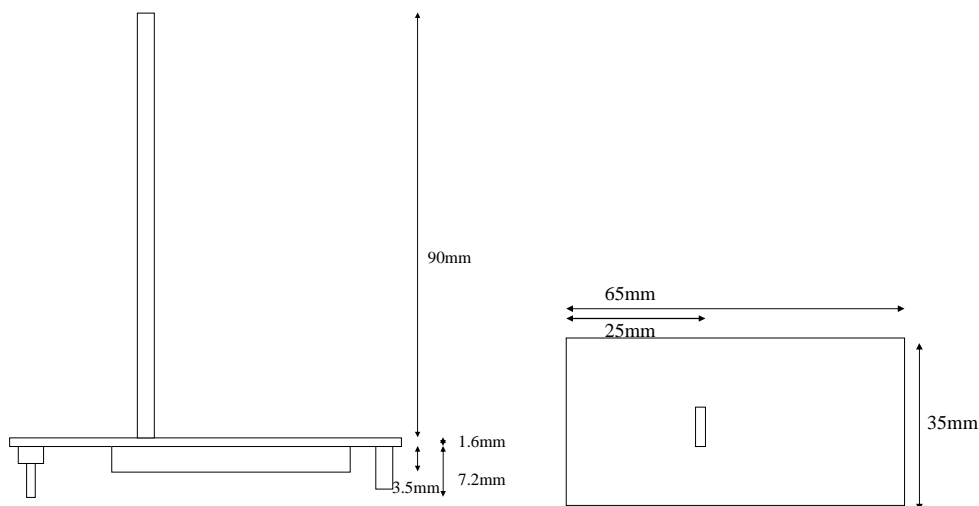
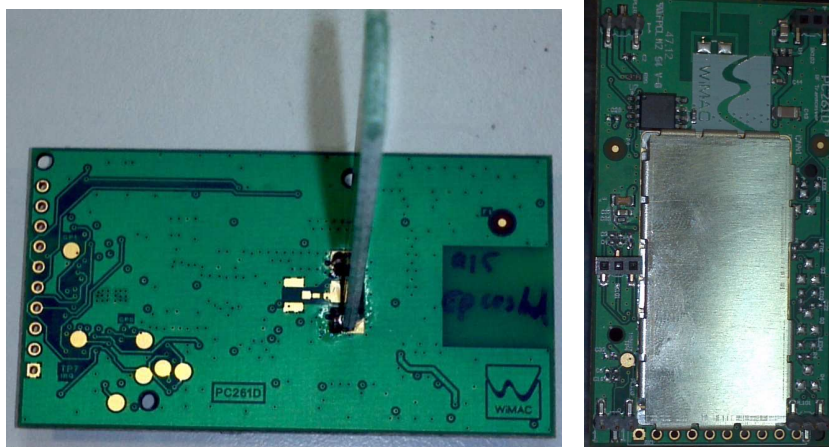
Description	Author	Date
Initial Draft – rev 0.1	AMW	27/3/13
Clarified power levels and timing Stated module dimensions Warned of ESD sensitivity Added FCC ID and IC-ID along with notes on labelling	AMW	11/4/13
Updated regulatory notes for integrators	AMW	17/4/13

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Product Overview

The XRFRModule-GEN2-xxx PCB is a module for adding a UHF interface to a device that is requiring an interface to a WiMAC installation.
The module has been designed as a replacement for the original XRFRModule-xxx (note the omission of "GEN2" from the product code) but uses an Si1000 UHF transceiver/microcontroller to replace the obsolete RF211 radio transceiver as used on the earlier boards.



Warning: This product is sensitive to ESD. To prevent damage observe handling precautions.

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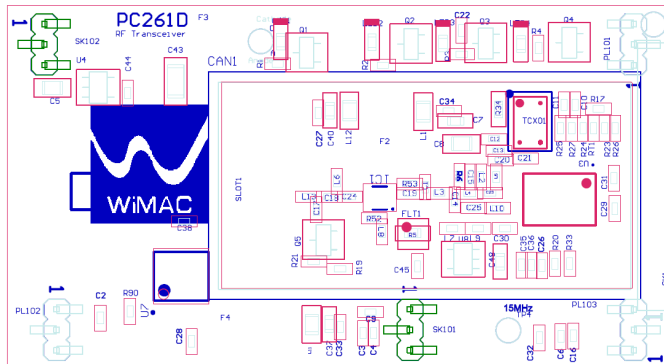
Interfaces

Supply: 5V (100mA max for RF circuit, up to 175mA max if external 3.3V output is loaded)

External Supply: 3.3V (50mA) for powering external devices.

Data: an IO line providing decoded data, or accepting the data with which to modulate the RF signal¹

Control: A 3 wire serial interface is used to clock control signals in and out of the interface board.



Port	Pin	Function
SK102	1	Gnd
	2	5V in
	3	Gnd
PL102	1	Gnd
	2	Do Not Connect
	3	3.3V out
SK101	1	SDATA
	2	SCK
	3	SLE
PL103	1	Gnd
	2	Buffered RF Data in/out
	3	15MHz clock out
PL101	1	Gnd
	2	3.3V out
	3	Do Not Connect

¹ The transmitted data is buffered to prevent the signal being modulated at greater than the desired baud rate.

Regional Operating Limitations

The Module XRF Module_GEN2_915 must be software configured to operate in one region only, and should not permit the user to alter the region of use.

Europe

The 868MHz variant of the module must be used (XRFFModule_GEN2_868)

The power level cannot exceed Leafnut level 7, which is a value of 5 in the radio board configuration packet. This equates to circa 14dBm EIRP.

The 8 channel hopping scheme must be used.

In addition to the packet length restrictions below, the module shall also have a duty cycle of $\leq 1\%$ measured over one hour.

North America / Canada

The USA 915MHz variant of the module must be used (XRFFModule-GEN2-915USA)

The power level cannot exceed Leafnut level 8, which is a value of 6 in the radio board configuration packet. This equates to circa 17dBm EIRP.

The 64 channel hopping scheme must be used.

Australia / New Zealand

The Australia 915MHz variant of the module must be used (XRFFModule-GEN2-915ANZ)

The power level cannot exceed Leafnut level 8, which is a value of 6 in the radio board configuration packet. This equates to circa 17dBm EIRP.

The 32 channel hopping scheme must be used.

General Operating Conditions

The data packet must comply with the Leafnut protocol for the data packet being transmitted or received.

This must use a baud rate of 2400.

This packet must be no more than 92mS long.

The data packet should be transmitted no more than once in every 2 second period.

The module shall not be used on any product that will be operated at less than 20cm from a person's body².

² Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields
http://transition.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65c.pdf

Leafnut Protocol Packet Structure

A valid data packet consists of a fixed amount of preamble, followed by 17 bytes of data.

Each byte consists of a start bit, 8 data bits and 1 stop bit.

The data within the packet is detailed in a separate (confidential) document.

“UHF Protocol Specification Version 5”

A branch will have a longer pre amble than any other device as all other devices have historically auto calibrated their own frequency of operation to that of the branch, although with this radio board recalibration does not take place as a high accuracy TCXO is utilized.

Channel Usage

The Branchnode shall hop through the channels for a particular region in a predefined order. The table of channels to use is generated from a given formula such that the channels are used in a pseudo random order with equal probability of any one channel being selected, and with a guarantee that the same channel will not be selected more than 3 times in any sequence of 10 results³

The other nodes shall receive an instruction from the branch as to where in this table it currently is and shall hop to the next channel in readiness for the branch to transmit on that channel.

To control the frequency used the band and channel should be supplied to the radio board each time the device hops to a new channel.

Region	Required Band Value	Required channel numbers	Range of frequencies
UK / Europe	1	0-7	868.125 – 868.475 MHz
North America / Canada	2	0-63	905.2 – 915.91 MHz
Australia / New Zealand	6	0-31	921.7 – 926.97 MHz

³ This meets the limit of 0.4 Seconds maximum channel usage in any 20 second period.

Modular Compliance

North America

In North America the module XRFFModule-GEN2-915USA should be used.

This has the following IDs

Model: XRFFModule-GEN2-915USA

FCC ID: YRURFMOD915

IC: 9215A-RFMOD915

Any equipment utilising this module must bear the text:

Contains FCC ID: YRURFMOD915

Contains IC: 9215A-RFMOD915

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Canada

In Canada the module XRFFModule-GEN2-915USA should be used.

This has the following IDs

Model: XRFFModule-GEN2-915USA

FCC ID: YRURFMOD915

IC: 9215A-RFMOD915

Any equipment utilising this module must bear the text:

Contains FCC ID: YRURFMOD915

Contains IC: 9215A-RFMOD915

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

INDUSTRY CANADA STATEMENTS

This device complies with Industry Canada licence-exempt RSS standard(s).

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter

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by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter (XRFFModule-GEN2-915USA) has been approved by Industry Canada to operate with the built in antenna. Alternative antennae are strictly prohibited for use with this device.

OEM Responsibilities

The XRFFModule-GEN2-915USA Module has been certified for integration into products only by OEM integrators under the following conditions:

1. The antenna(s) must be installed such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and all persons at all times.
2. The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter.

As long as the two conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

IMPORTANT NOTE: In the event that these conditions can not be met (for certain configurations or co-location with another transmitter), then Industry Canada certification is no longer considered valid and the IC Certification Number can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate Industry Canada authorization.

End Product Labeling

The XRFFModule-GEN2-915USA Module is labeled with its own IC Certification Number. If the IC Certification Number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

"Contains Transmitter Module IC: 9215A-RFMOD915"

or

"Contains IC: 9215A-RFMOD915"

The OEM of the XRFFModule-GEN2-915USA Module must only use the approved antenna(s) listed above, which have been certified with this module.

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module or change RF related parameters in the user's manual of the end product.

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The user's manual for the end product must include the following information in a prominent location:

“To comply with Industry Canada RF radiation exposure limits for general population, the antenna(s) used for this transmitter must be installed such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and all persons at all times and must not be co-located or operating in conjunction with any other antenna or transmitter.”

Australia / New Zealand

In Australia, New Zealand the module XRFFModule-GEN2-915ANZ should be used.

This has the following IDs

Model: XRFFModule-GEN2-915ANZ

Comment [AMW1]: Need to add RCM ID and any compulsory labelling

Europe

In Europe there are no additional marking requirements.