



FCC
Test Report
for
3rd Generation wireless microcontroller
JN5139-Z01-M04R1

Report Number 02-231supp/3548/1/08
Supplementary to report number 02-231/3548/1/08
Report Produced by: -

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2. Summary of Test Results

The 3rd Generation wireless microcontroller JN5139-Z01-M04R1 was tested to the following standards: -

FCC Part 15C (effective date January 30, 2008); Class DTS Intentional Radiator

Any compliance statements are made reliant on the modes of operation as instructed to us by the Manufacturer based on their specific knowledge of the application and functionality of the equipment tested.

Title	Reference	Results
1. Band edge emissions	FCC Part 15C §15.205, §15.209, §15.247	

NOTE: For all other tests please refer to report # 02-231/3548/1/08.

This report relates to the equipment tested as identified by a unique serial number and at the time it was tested. It does not relate to any other similar equipment and performance of the product before or after the test cannot be guaranteed.

Date of Test: 23rd April 2008

Test Engineer:

Approved By:

Customer Representative:

3. Information about Equipment Under Test

Applicant Jennic Ltd
Furnival Street
Sheffield
S1 4QT

Manufacturer/Brand Name Jennic Ltd

Full name of EUT 3rd Generation wireless microcontroller

Model Number of EUT JN5139-Z01-M04R1

Serial Number of EUT 0802900277

FCC ID (if applicable): TYOJN5139M4

Date when equipment was received
by RN Electronics Limited 12th February 2008

Date of test: 23rd April 2008

Customer order number: PO 004561/CF

A visual description of EUT is as follows: A canned IC on small PCB with an UFL antenna port intended for dedicated antenna use only. For purposes of test mounted on a motherboard with battery / dc voltage input and RS232 communications fly lead. The unit was also positioned on a small plastic box containing an SMA adaptor for test purposes.

The main function of the EUT is: To provide 2.4GHz Zigbee / IEEE 802.15.4 communications.

Antenna: Dedicated antenna connected to antenna port. gigaAnt Titanis 2.4GHz swivel SMA antenna (4.4dBi gain).

Equipment Under Test Information specification:

Height	7mm
Width	20mm
Depth	35mm
Weight	0.001kg
Voltage	3Vdc
Current required from above voltage source	0.05A
Highest Frequencies used / generated	2480MHz

Description of ancillary equipment connected to the equipment under test, for the purpose of tests, can be found in Section 11.

Any modifications made to the **EUT**, whilst under test, can be found in Section 12.

This report was printed on: 24 April 2008

4. Specifications

The tests were performed by RN Electronics Engineer Paul Darragh who set up the tests, the test equipment, and operated it in accordance with the **R.N. Electronics Ltd** procedures manual, FCC Part 15 and those specifications incorporated by reference into 47CFR15 (e.g. ANSI C63.4-2003).

R.N. Electronics Ltd sites M and OATS are listed with the FCC. Registration Number 293246

4.1 Deviations

None

5. Tests, Methods and Results

5.1 Band Edge Emissions

5.1.1 Test Methods

Test Requirements FCC Part 15C, Reference (15.247, 15.209)

Test Method: FCC Part 15C, Reference (15.209)

5.1.1.1 Configuration of EUT

Radiated emissions testing was performed with the EUT in a test jig provided by the manufacturer. The jig allowed for communications to set the frequency and power level of the device. The 3V required dc input was supplied by new batteries. This set up also allowed for continuous operation of the transmitter which would normally have a duty cycle $\leq 1\%$.

The EUT was placed on a 0.8 metres high turntable. The front edge of the EUT was initially positioned facing the antenna. The EUT was measured at a distance of 3 metres. The EUT was rotated in all three orthogonal planes. Tests were repeated with the EUT transmit frequency channel set to 2405, 2440 and 2480 MHz.

5.1.1.2 Test Procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below.

Above 1GHz, measurements were made in a semi-anechoic chamber with appropriate absorbing material for use in this range. The antenna was placed level with the EUT, which was rotated through 360° to record the worst case emissions.

5.1.2 Test results

Tests were performed using Test Site B.

Test Environment:

B Temperature: 14°C Humidity: 46%

Analyser plots for the Peak / Average values as applicable and any table of signals within 20dB of the limit line can be found in Section 6.2 of this report.

These show that the EUT has this test.

Note that the EUT was measured in continuous transmit mode which is not used in the actual application, hence a duty cycle correction factor is required.

5.1.2.1 Test Equipment used

TMS6-2, E268, TMS82, E239
See Section 10 for more details

6. Plots and Results

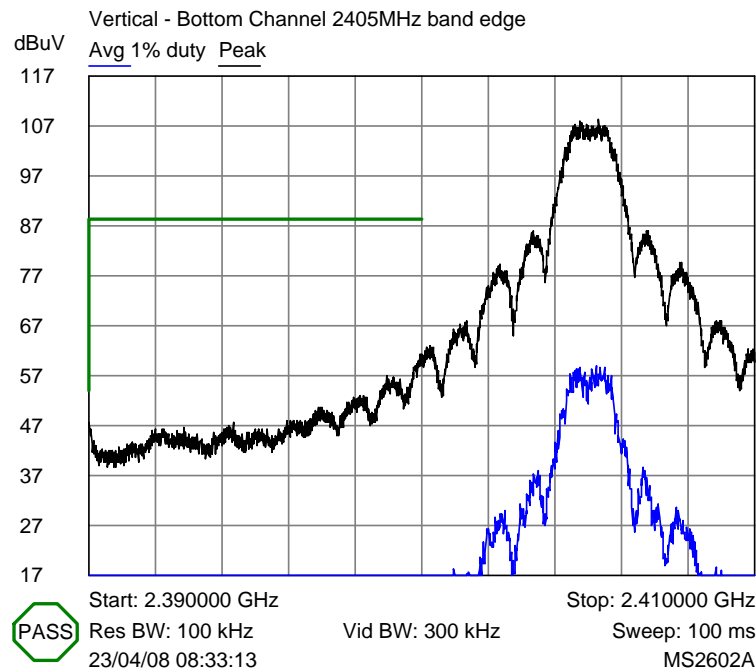
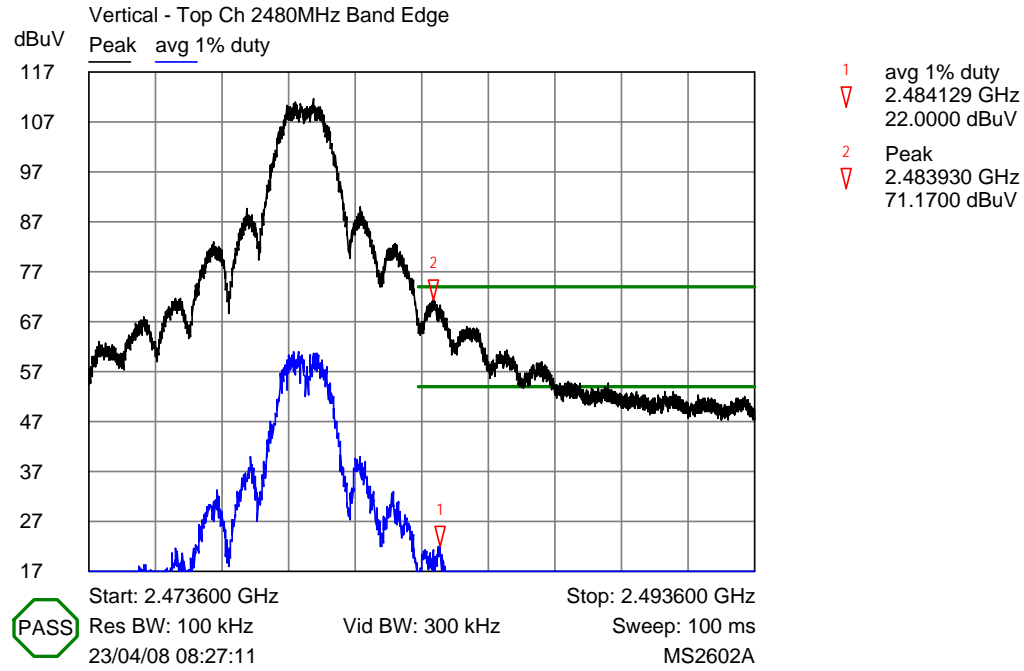
6.1 Conducted Emissions

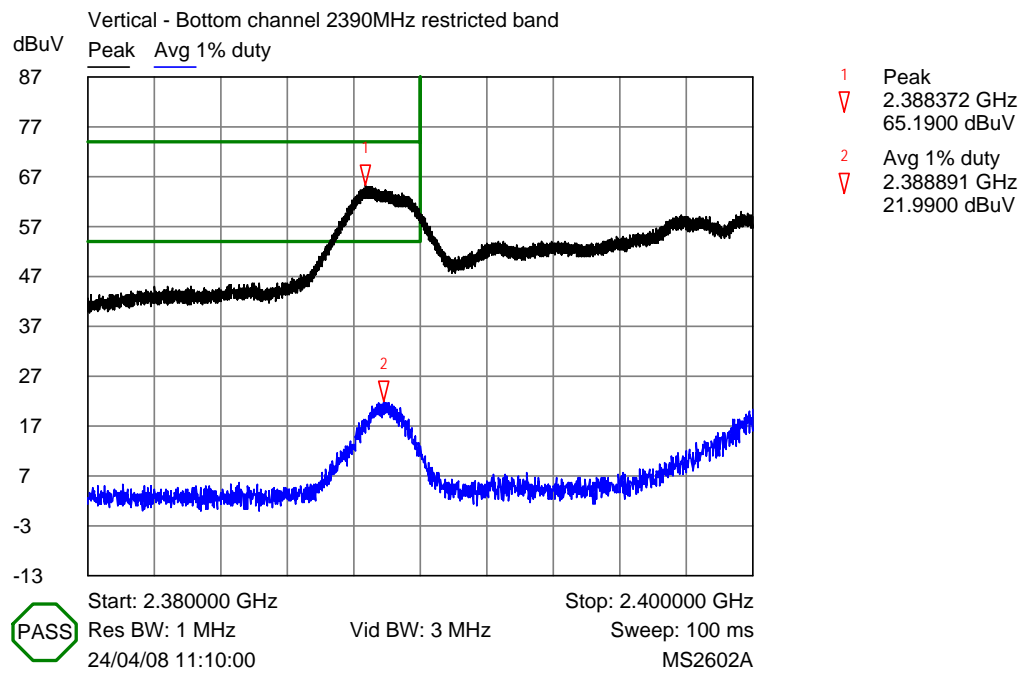
NONE - TEST NOT APPLICABLE

6.2 Radiated Emissions

Refer to report # 02-231/3548/1/08 for general results, duty cycle measurements, etc.

6.2.1 Band Edge Plots





Notes:

1. In the above plots, the Avg 1% duty traces include a 40dB offset to account for the duty cycle.
2. Limit for average emission is in restricted band (per 15.205 / 15.209) $500\mu\text{V/m}$ at 3m = $54\text{dB}\mu\text{V/m}$ at 3m.
3. Limit for peak emission is:
 - (a) in restricted band (per 15.205 / 15.209) 20 dB above average limit.
 - (b) in spurious domain (per 15.247) 20dB below peak emission in 100kHz RBW.

7 Explanatory Notes
7.1 Explanation of FAIL LIMIT 1 Statement

The **FAIL MARGIN 1** statement(s) may appear on the graphical plots when the receiver used to measure your equipment detects a signal that exceeds the dashed line. This does not mean that the **EUT**, has failed the test only that the 10 dB calculation margin set, has been exceeded on a peak measurement.

Following the indication that the margin has been exceeded, measurements are made at the frequency (ies) of the peaks. These peaks have been calculated to either Quasi Peak or Average Peak dependant on the test. A table of results has been printed on the reverse of the page. This table looks similar to the one illustrated below: -

Signal Number	Frequency (MHz)	Peak (dBμV)	PK Delta L 1 (dB)	Avg (dBμV)	Av Delta L 1 (dB)
1	12345.0000	12.9	-2.5	10.2	-5.2

The First column, labelled Signal Number, is a number that the receiver has given to each signal, which has been calculated.

Column Two, labelled Frequency (MHz), is the frequency of the signal received.

Column Three, labelled Peak (dBμV), (can also be labelled, in the case of Quasi Peak, Peak dBμV/m) is the Level that was received at peak amount in dB above 1μV.

Column Four, labelled PK Delta L1 (dB), is the same level as Column three but is given in a level relative to the limit line required.

Column Five, labelled AVG (dBμV), (can also be labelled, in the case of Quasi Peak, QP dBμV/m) when undertaking a Quasi peak test, This is the Average or Quasi peak calculation results given in dBμV or dBμV/m above 1μV.

Column Six, labelled AV Delta L 1 (dB), (can also be labelled, in the case of Quasi Peak, QP Delta L 1 (dB)) is the Average or Quasi Peak calculation relevant to the limit line. The results entered in this column indicate the signal level relative to the compliance limit required. Negative numbers indicate that the product is compliant.

7.2 Explanation of limit line calculations for radiated measurements

The limits given in the test standard are normally expressed as absolute values (e.g. in μV/m at a specified distance), whereas the measured values are expressed as peak, quasi peak or average values in dBμV/m referenced to the measuring instrument inputs. RN Electronics calibrate the test set-up to account for any path losses, antenna gains, etc. so that the value read at the receiver relates directly to the absolute value required, except that it is expressed in dB relative to one microVolt and may need to take account of any alternative measuring distance used. Examples:

- (a) limit of 500 μV/m equates to $20.\log(500) = 54$ dB μV/m.
- (b) limit of 300 μV/m at 10m equates to $20.\log(300 \cdot 10/3) = 60$ dB μV/m at 3m

8. Photographs

Refer to report # 02-231/3548/1/08.

9. Signal Leads

None. EUT battery powered.

n.b. Test jig included UFL to SMA coax connector to which the dedicated antenna was attached.

10. Test Equipment Calibration list

The following table lists the test equipment used, last calibration date and calibration interval. All test equipment used has been maintained within the calibration requirements of **R.N. Electronics Ltd.** test facility quality system. Calibration intervals are regularly reviewed dependent on equipment manufacturer's recommendations and actual usage of the equipment.

RN No	Model	Description	Manufacturer	Last Cal	Interval
E239	H-34-2720-01	2.0 - 2.9 GHz BPF	Marconi	n/a	n/a
E268	BHA 9118	1-18GHz horn antenna	Schaffner	26-May-06	60
TMS6-2	MS2602A	Spectrum Analyser	Anritsu	17-Mar-07	24
TMS82	8449B	Pre Amplifier 1 - 26GHz	Agilent	26-Oct-07	12

11. Auxiliary equipment

11.1 Auxiliary equipment supplied by Jennic Ltd

Auxiliary equipment used for the purpose of test supplied by the above has been listed below

Manufacturer	Description	Model Number	Serial Number
Jennic	Jig for adapting UFL connector to SMA for testing	TTL-232R-3V3	-
Jennic	Jig for dc supply / rs232 control	DR1080 v1.0	-
gigaAnt	Swivel SMA antenna	Titanis 2.4GHz	-

11.2 Auxiliary equipment supplied by RN Electronics Limited

Auxiliary equipment used for the purpose of test supplied by the above has been listed below

Manufacturer	Description	Model Number	Serial Number
HP	Laptop for setting frequency / power	NX9010	CNF3512U85

12. Modifications

In order for the EUT to produce the results shown within this report the following modifications, if any, were implemented.

NONE

n.b. The settings of the device - continuous transmit, power level, frequency were set by test software not normally available to the user.

13. Compliance information

Products subject to the Declaration of Conformity procedure are required to be supplied with a compliance information statement. A copy of this statement may be included here:

NOT APPLICABLE - Device to be Certified.