

CERTIFICATION TEST REPORT

Applicant:	INDYME SOLUTIONS, INC. 8295 AERO PLACE San Diego, CA 92123
Equipment Under Test (EUT):	Type B Wireless Call Box
Model:	CB938, CB982
FCC ID:	J69TYPEB
IC:	1809A-TYPEB
In Accordance With:	FCC Part 15 Subpart C, 15.247 IC RSS-210 Issue 8 December 2010 IC RSS-Gen Issue 3 December 2010
Authorized By:	Nemko USA Inc. 2210 Faraday Street, Suite 150 Carlsbad, CA 92008
Tested By:	<u>A. LAUDANI</u> , EMC/RF Test Engineer
Date:	MAY 13, 2013
Report Number:	2013 05224475 FCC
Project Number:	Q10228463
Nex Number:	224475
Total Number of Pages:	23



1. Applicant Affirmation

Steve Deal representing Indyme Solutions, Inc. hereby affirms:

- a) That he/she has reviewed and concurs that the test shown in this report are reflective of the operational characteristics of the device for which certification is sought;
- b) That the device in this test report will be representative of production units;
- c) That all changes (in hardware and software/firmware) to the subject device will be reviewed.
- d) That any changes impacting the attributes, functionality or operational characteristics documented in this report will be communicated to the body responsible for approving (certifying) the subject equipment.

Steve Deal, CEO
Date: December 6, 2012

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Telephone number

Regulatory.contact@indyme.com
Email address of official

NOTE—This affirmation must be signed by the responsible party before it is submitted to a regulatory body for approval.



Section 1. Summary of Test Results

1.1 General

All measurements are traceable to national standards

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15; Subpart C and RSS-210, Issue 8 December 2010. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made in the 10m anechoic chamber. A description of the test facility is on file with the FCC and IC.

The assessment summary is as follows:

Apparatus Assessed:	CB938, CB982
Specifications:	FCC Part 15 Subpart C, 15.247 IC RSS-210 Issue 8 December 2010 IC RSS 210 (Issue 8, December 2010) Annex 8
Date Received in Laboratory:	NOVEMBER 6, 2012
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None

1.2 Report Release History:

REVISION	DATE	COMMENTS
-	May 13, 2013	Prepared By: A. Laudani
-	May 13, 2013	Initial Release: Alan Laudani

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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TESTED BY:  Date: May 13, 2013
Alan Laudani, EMC Engineer

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Section 2: Equipment Under Test

2.1 Product Identification

DEVICE	MANUFACTURER MODEL # SERIAL #	POWER CABLE
EUT - Wireless Call Box	Indyme Solutions, Inc. Model: Type B Serial #: None	Internal Battery, 3V Lithium, Duracell 2/3A (CR123A)

Connection	I/O Cable
	None

2.2 Theory of Operation

The Type B is a Wireless Call Box. Its function is to alert an operator that there is somebody that requires assistance is waiting. Feedback to the user is giving via a flashing light according to the message received from an access point. The EUT was exercised by continuously transmitting in a test mode.

The EUT's performance during test was evaluated against the performance criterion specified by applicable test standards. Performance results are detailed in the test results section of this report.

2.3 Technical Specifications of the EUT

Manufacturer:	Indyme Solutions, Inc.
Operating Frequency:	918.1 – 923.0 MHz in the 902-928 MHz Band
Number of Operating Freq.:	50
Rated Power:	0.008 W
Modulation:	FSK
Antenna Connector:	Soldered to circuit board
Power Source:	3.3 V Battery



Section 3: Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.247

Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz and 24.0-24.25 GHz bands.

IC RSS-210 Issue 8 December 2010

Low-power Licence-exempt Radio-communication Devices (All Frequency Bands): Category I Equipment. Annex 8 - Frequency Hopping and Digital Modulation Systems Operating in the Bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

IC RSS-Gen Issue 3 December 2010

General Requirements and Information for the Certification of Radio-communication Equipment

3.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	15.6 – 23.3 °C
Humidity range	26 - 65 %
Pressure range	86 - 106 kPa
Power supply range	+/- 1% of rated voltages

3.4 Test Equipment

Asset No.	Description	Manufacturer	Model Number	Serial Number	Last Cal.	Cal due
111	Antenna, LPA	EMCO	3146	1382	1/9/2013	1/9/2014
E1045	Biconical Antenna	A.H. Systems Inc.	SAS-540	735	4/22/2013	4/22/2014
E1029	Preamplifier (20MHz to 18GHz)	A.H. Systems, Inc.	PAM-0118	343	1/21/2013	1/21/2014
529	Antenna, DRWG	EMCO	3115	2505	10/31/2012	10/31/2014
902	pre amp	Sonoma	310 N	185803	7/19/2012	7/19/2013
911	Spectrum Analyzer	Agilent	E4440A	US41421266	10/15/2012	10/15/2013
835	Spectrum Analyzer	Rohde & Schwarz	RHDFSEK	829058/005	9/6/2012	9/6/2013

Registration of the 10m anechoic chamber is on file with the Federal Communications Commission and with Industry Canada under Site Number 2040B-3.



Section 4: Observations

4.1 Modifications Performed During Assessment

No modifications were performed during assessment.

4.2 Record Of Technical Judgments

No technical judgements were made during the assessment.

4.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

4.4 Deviations From Laboratory Test Procedures

No deviations from Laboratory Test Procedure

4.5 Test Deleted

No Tests were deleted from this assessment.

4.6 Additional Observations

There were no additional observations made during this assessment.



Section 5: Results Summary

This section contains the following:

Test Results

The column headed “Required” indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

- N No: not applicable / not relevant
Y Yes: Mandatory i.e. the apparatus shall conform to these test.
N/T Not Tested, mandatory but not assessed. (See section 4.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

5.1 Test Results

Part 15	RSS-210	Test Description	Required	Result
15.207 (a)	RSS-Gen 7.2.2	Conducted Emission Limit	NA*	
15.247 a1i	A8.1(c)	20dB & 99% Bandwidth	Y	Pass
12.247a1	A8.1(c)	Channel Separation Average time of occupancy	Y	Pass
15.247a1i	A8.1(c)	Number of Hopping Channels	Y	Pass
15.247 b2	A8.4	Peak Output Power	Y	Pass
15.209 a	A8.5	Radiated Emissions within Restricted Bands	Y	Pass
15.247d	A8.5	Bandedge	Y	Pass
15.109	RSS-GEN 4.10	Receiver Spurious Emissions	Y	Pass

* Battery powered device.

Testing was started at 30 MHz as there are no RF signals generated below this frequency.
Refer to the test results section for further details.

Appendix A: Test Results

20 dB/ 99% Bandwidth

Clause 15.247(a)(1)(i)

(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500kHz.

Test Conditions:

Sample Number:	Type B	Temperature:	20°C
Date:	5/9/2013	Humidity:	54 %
Modification State:	Low /High Channels	Tester:	A. Laudani
		Laboratory:	10m Chamber

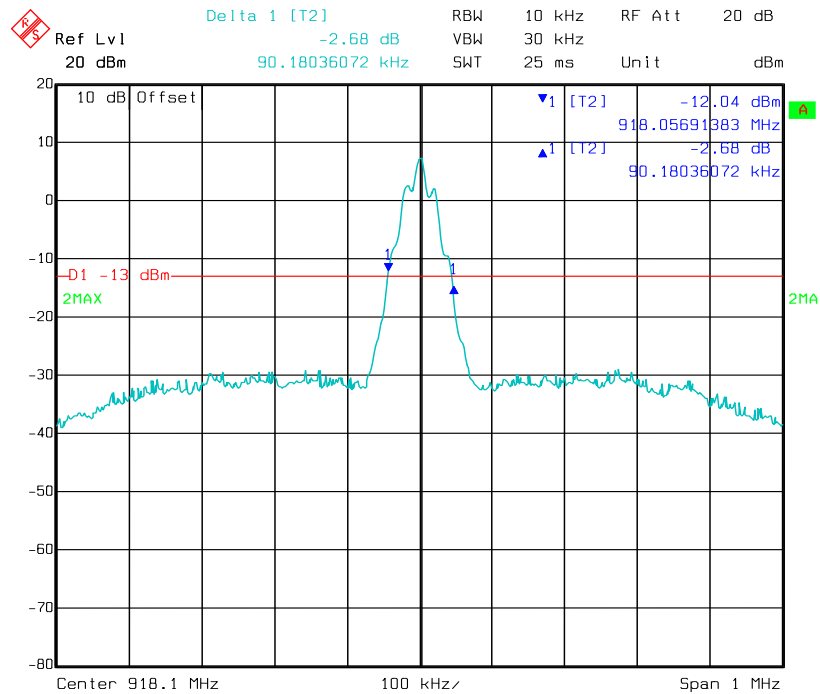
Test Results: EUT complies

- A sma connector "pigtail" cable was soldered into the circuit after the last RF power amplifier bypassing the on circuit antenna.
- The Spectrum Analyzer RES BW was set to 10 kHz VBW = 30kHz
- For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier.
- A PEAK output reading was taken, a DISPLAY line was drawn 20 dB lower than PEAK level.
- The 20 dB bandwidth was determined from where the channel output spectrum intersected the display line.
- Span is wide enough to capture the channel transmission
- Sweep is auto
- Detector is Peak
- Trace is Max Hold
- 99% bandwidth: Used Spectrum Analyzer's programmed function.
- 20 dB bandwidth: A peak output max hold reading was taken, a display line was drawn 20 dB lower than peak level. The 20 dB bandwidth was determined from where the channel output spectrum intersected the display line.
- Observed maximum 20 dB BW is 90.1 kHz (low channel).
- Observed maximum 20 dB BW is 92.2 kHz (high channel).
- $918.1 \text{ MHz} - (90.1/2) \text{ kHz} = 918.055 \text{ MHz}$ (within the frequency band)
- $923.0 \text{ MHz} + (92.2/2) \text{ kHz} = 923.046 \text{ MHz}$ (within the frequency band)

Frequency	20dB Bandwidth	99% Bandwidth
918.1 MHz	90.1 kHz	86.2 kHz
923.0 MHz	92.2 kHz	100.2 kHz

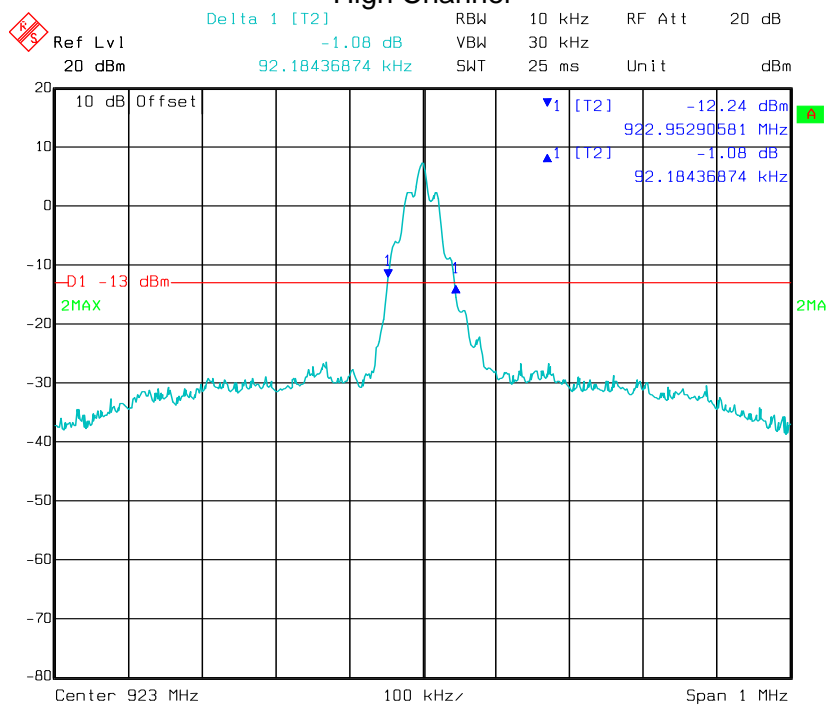
20dB Bandwidth

Low Channel



Date: 09.MAY 2013 05:10:24

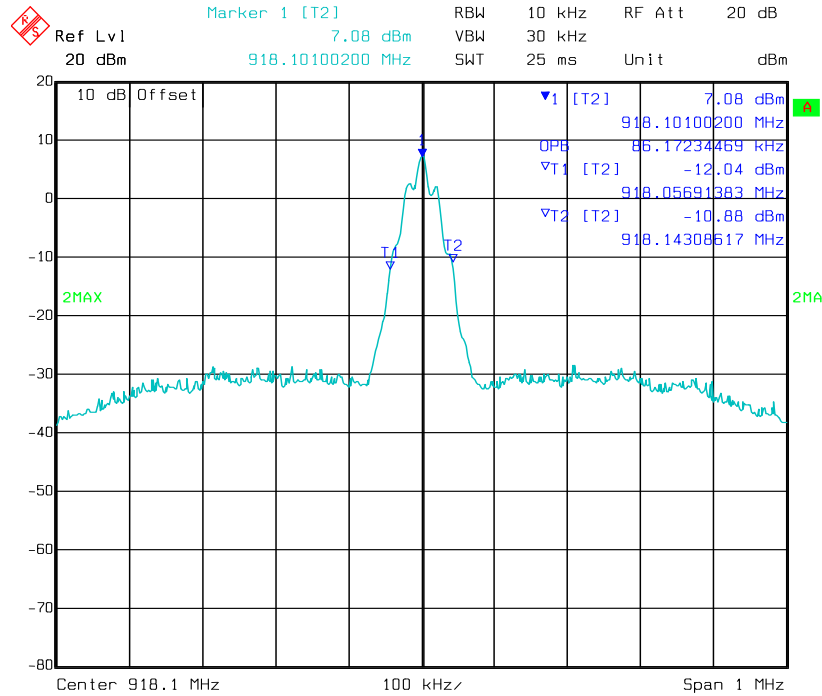
High Channel



Date: 09.MAY 2013 05:15:37

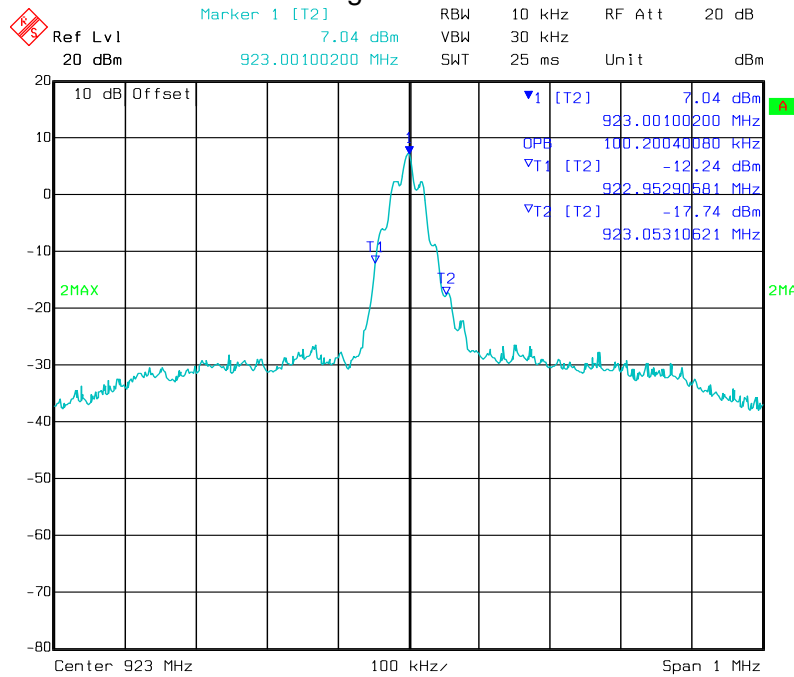
99% Bandwidth

Low Channel



Date: 09.MAY 2013 05:11:12

High Channel



Date: 09.MAY 2013 05:16:14

Frequency hopping systems operating in the 902-928 MHz band

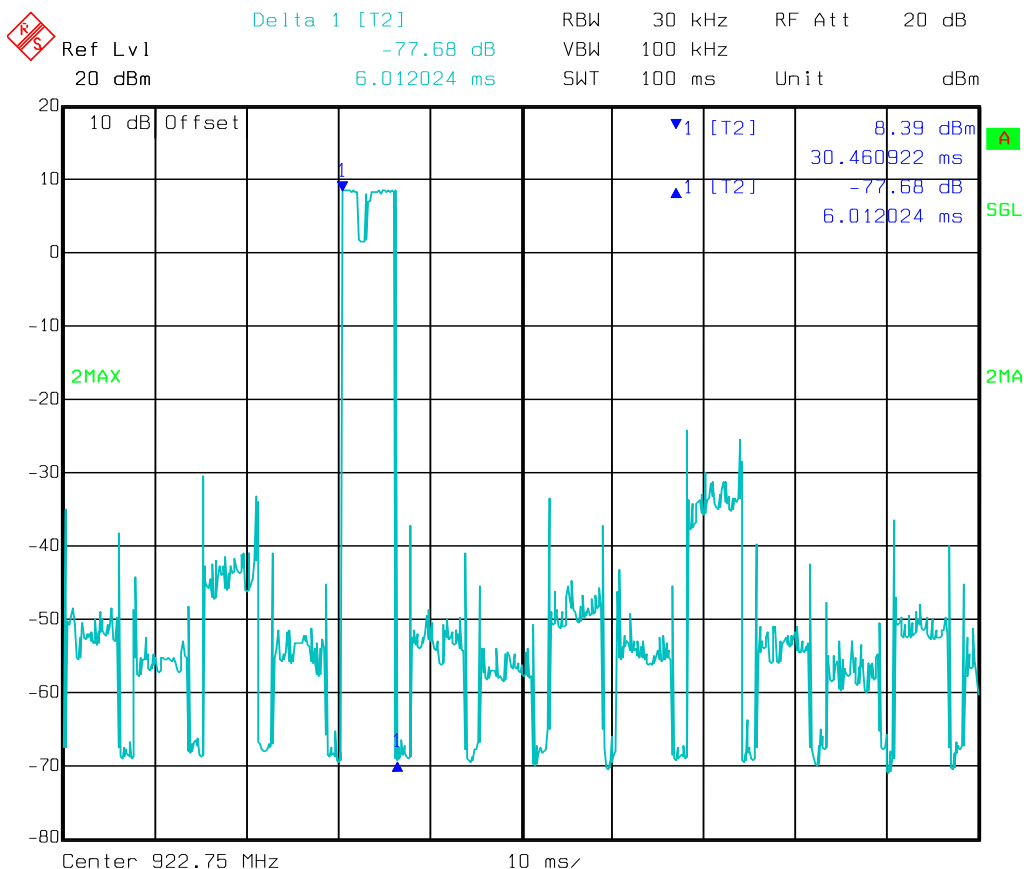
Clause 15.247(a)(1)(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Test Conditions:

Sample Number:	Type B	Temperature:	20°C
Date:	5/9/2013	Humidity:	54 %
Modification State:	Low /High Channels	Tester:	A. Laudani
		Laboratory:	10m Chamber

Test Results:

Channel width (on state) is 6.01 milli-seconds

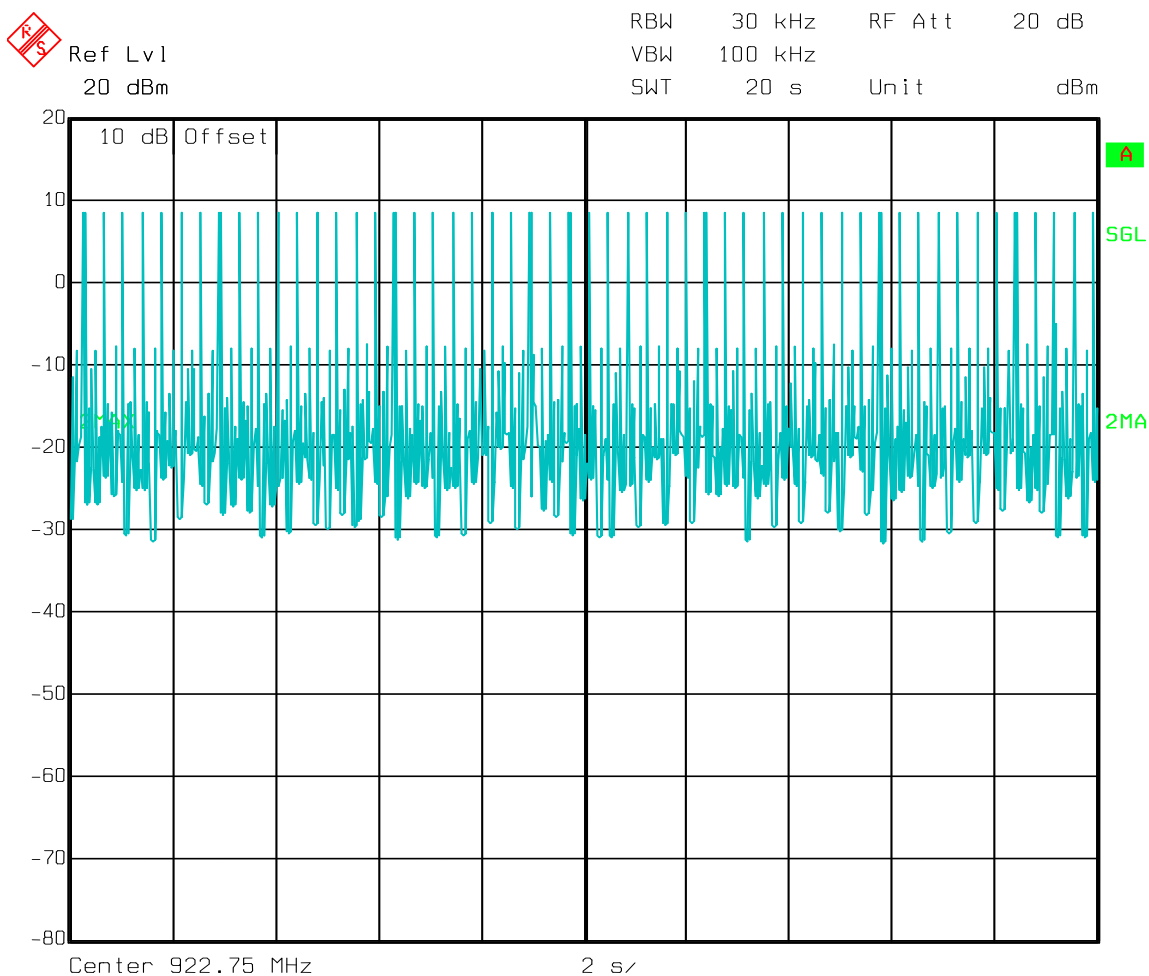


Date: 09.MAY 2013 05:30:12

Time of Occupancy

The EUT was placed <1m from the receiving antenna to allow a representative signal to fill the display > 30dB from the noise floor. The Spectrum Analyzer RES BW was set to 100 kHz. The test sample was set to hopping mode and the frequency span was set zero. The sweep was set to 20 seconds.

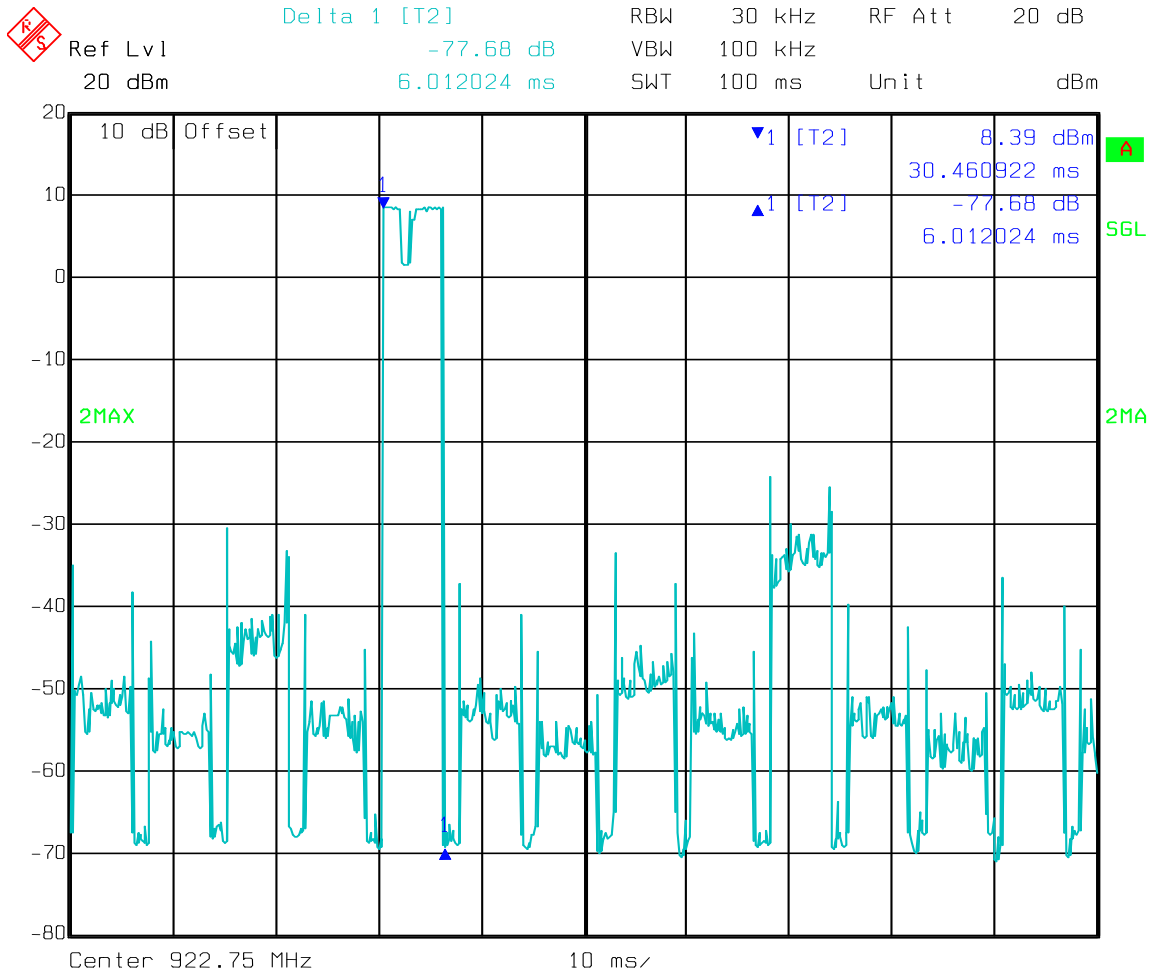
54 occurrences in 20 seconds x 6.01 ms = 324.5 ms which is less than 400 ms
EUT complies.



Date: 09.MAY 2013 05:29:15

Duty Cycle Factor Calculation

$$20 \times \log (6\text{ms}/100\text{ms}) = -24.4 \text{ dB}$$



Date: 09.MAY 2013 05:30:12

Channel Separation

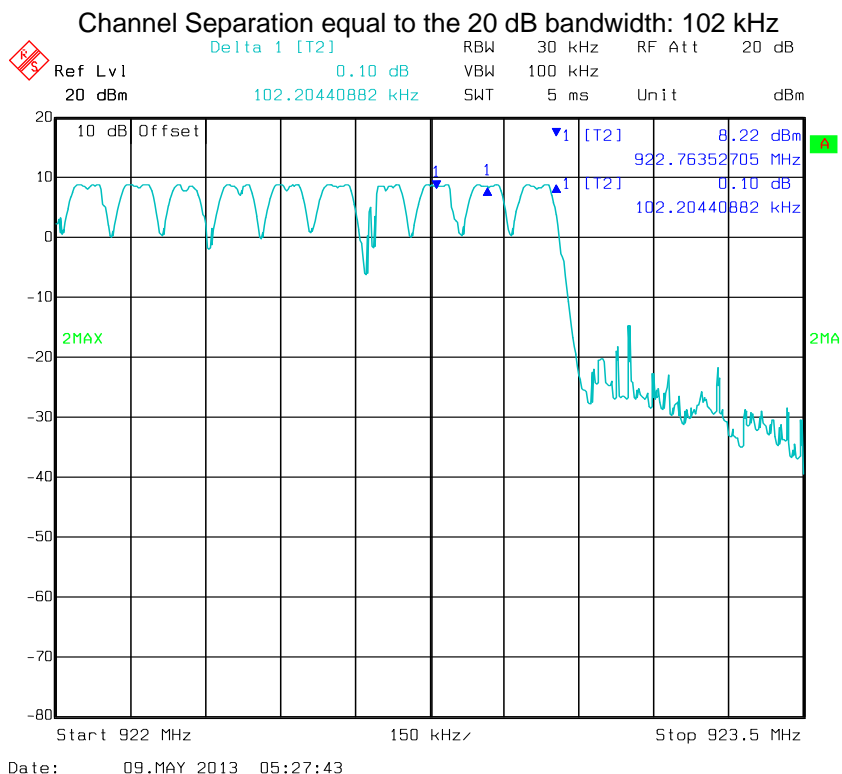
Clause 15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Test Conditions:

Sample Number:	Type B	Temperature:	20°C
Date:	5/9/2013	Humidity:	54 %
Modification State:	Low /High Channels	Tester:	A. Laudani
		Laboratory:	10m Chamber

Test Results: EUT Complies

- The Spectrum Analyzer RES BW was set to 10 kHz.
- Detector was peak, max hold.
- The test sample was set to hopping mode and the frequency span was set to a value to capture two or more hopping channels.
- Marker delta shows frequency separation.



Frequency Plan

Clause 15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Test Conditions:

Sample Number:	Type B	Temperature:	20°C
Date:	5/9/2013	Humidity:	54 %
Modification State:	Low /High Channels	Tester:	A. Laudani
		Laboratory:	10m Chamber

Test Results:

The Frequency Plan is discussed in the Technical Description exhibit and was reviewed by this test engineer and was found to comply.

- 50 channels: channel 1 at 918.1 to channel 50 at 923.0 MHz
- Psuedo-Random Hopping Sequence:

918.1	921.0	918.9	921.8	919.7	922.6	920.5	918.4	921.3	919.2	922.1
920.0	922.9	920.8	918.7	921.6	919.5	922.4	920.3	918.2	921.1	919.0
921.9	919.8	922.7	920.6	918.5	921.4	919.3	922.2	920.1	923.0	920.9
918.8	921.7	919.6	922.5	920.4	918.3	921.2	919.1	922.0	919.9	922.8
920.7	918.6	921.5	919.4	922.3	920.2					

Number of Hopping Channels

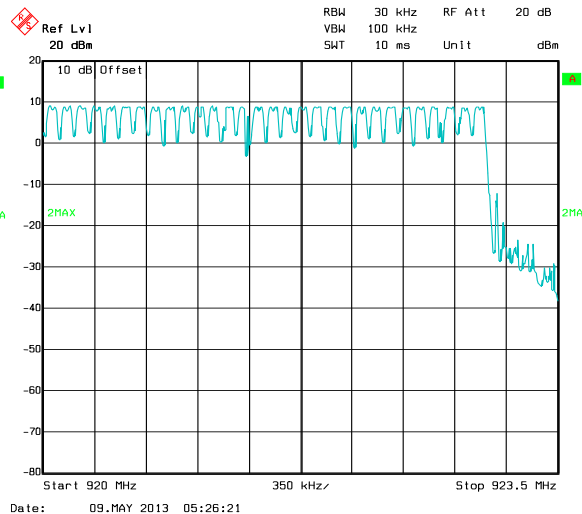
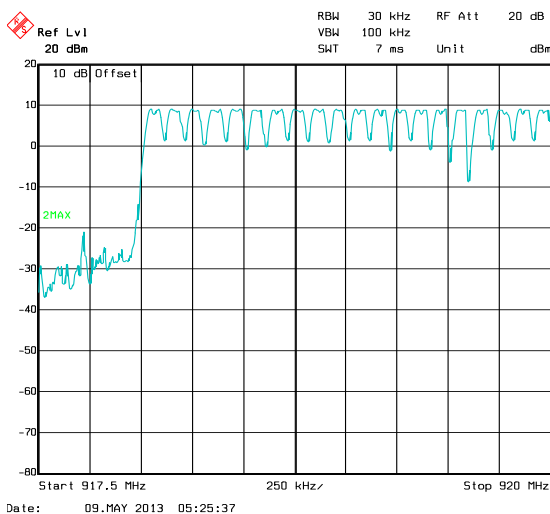
Clause 15.247(a)(1)(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Test Conditions:

Sample Number:	Type B	Temperature:	20°C
Date:	5/9/2013	Humidity:	54 %
Modification State:	Low /High Channels	Tester:	A. Laudani
		Laboratory:	10m Chamber

Test Results: 50 Channels, EUT complies.

- This is a conducted test
- The Spectrum Analyzer RES BW was set to 30 kHz to discriminate channels.



Radiated Emissions within Restricted Bands

Clause 15.209(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (uV/meter)	Measurement Distance (meter)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	3
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Sec. 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Sec. 15.205(a) must also comply with the radiated emission limits specified in Sec. 15.209(a) (see Sec. 15.205(c)).

Test Conditions:

Sample Number:	Type B	Temperature:	20°C
Date:	5/9/2013	Humidity:	54 %
Modification State:	Low /High Channels	Tester:	A. Laudani
		Laboratory:	10m Chamber

Test Results: No emissions within 20 dB of the limit.

Additional Observations:

The Spectrum was searched from 30 MHz to the 10th Harmonic.

Three orthogonal axes were tried to maximize emissions.

Worst case was used in measurements presented.

A new battery was installed initially and replaced every 20 minutes of test time.

Measurements below 1GHz were performed at 3m with a Quasi-Peak detector while Peak detector was used above 1GHz.

As the emission is pulsing, a duty cycle factor was introduced to spurious harmonics. See calculation in section on Time of Occupancy.

Math example:

CR/SL Dif = Limit – Corrected Reading. Pass if result is negative.

Max of Vertical or Horizontal measured + Antenna Factor + Cable Loss – preamplifier (if used). – Duty Cycle Factor

At 3672.4 MHz: 43.3 = 58.0 + 31.25 + 10.6 – 31.9 – 24.7

43.3 – 54 = -10.7

Conducted Spurious Emissions

15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Sec. 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Sec. 15.205(a) must also comply with the radiated emission limits specified in Sec. 15.209(a) (see Sec. 15.205(c)).

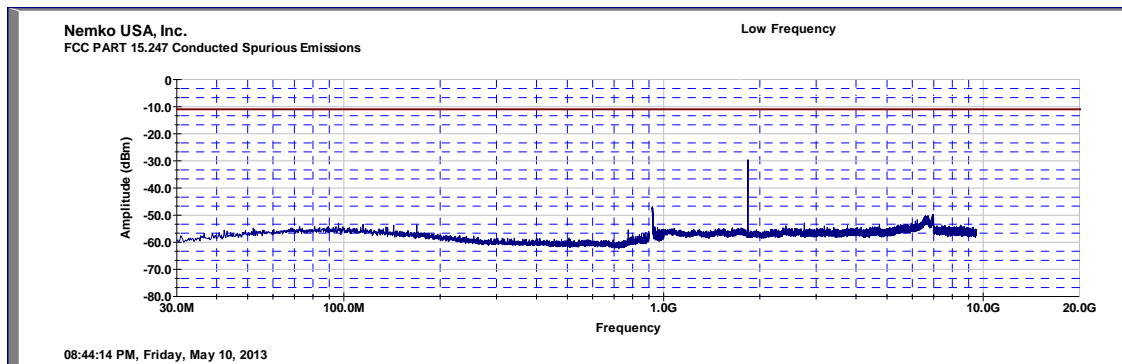
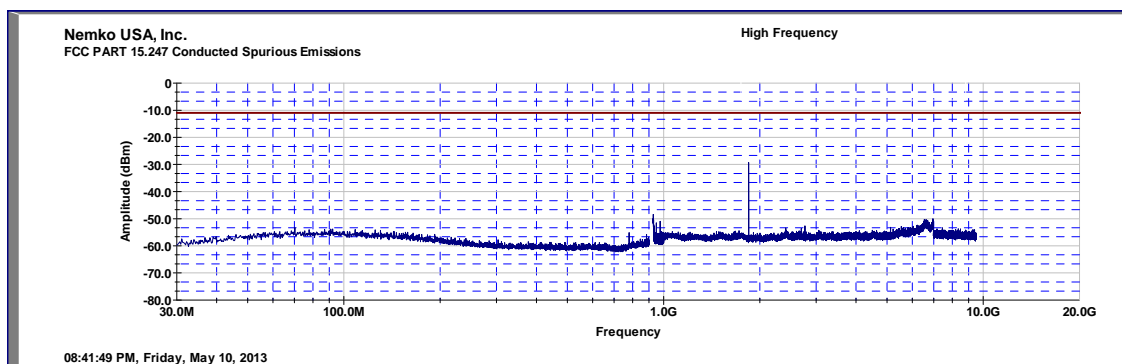
Test Conditions:

Sample Number:	Type B	Temperature:	23°C
Date:	5/10/2013	Humidity:	54 %
Modification State:	Low /High Channels	Tester:	A. Laudani
		Laboratory:	10m Chamber

Test Results: EUT complies.

Conducted Peak Output Power:

- A sma connector "pigtail" cable was soldered into the circuit after the last RF power amplifier bypassing the on circuit antenna
- All measurements were performed using a peak detector. Max hold.
- RBW =100 kHz; VBW= 300 kHz, Limit is 20 dBc.
- A 10dB attenuator was used to protect the spectrum analyzer input



Peak Output Power

Clause 15.247(b)(2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

Test Conditions:

Sample Number:	Type B	Temperature:	20°C
Date:	5/9/2013	Humidity:	54 %
Modification State:	Low /High Channels	Tester:	A. Laudani
		Laboratory:	10m Chamber

Test Results: EUT complies.

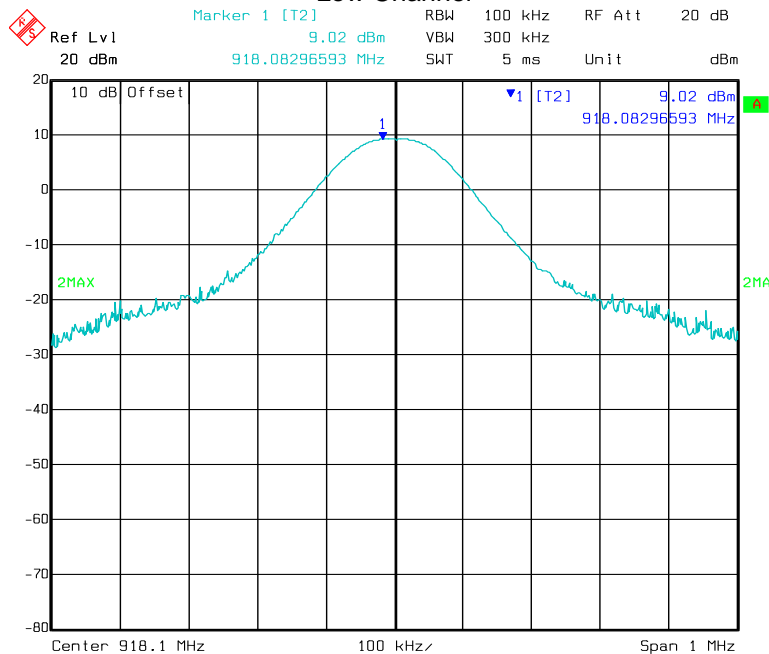
Radiated Peak Output Power:

- A sma connector "pigtail" cable was soldered into the circuit after the last RF power amplifier bypassing the on circuit antenna
- The power supply was varied +/- 15% of nominal during assessment, no variance of output power was observed.
- All measurements were performed using a peak detector. Max hold.
- RBW > OBW; VBW>RBW.
- A 10dB attenuator was used to protect the spectrum analyzer input

From operation description: Antenna gain: 1.282 dBi max

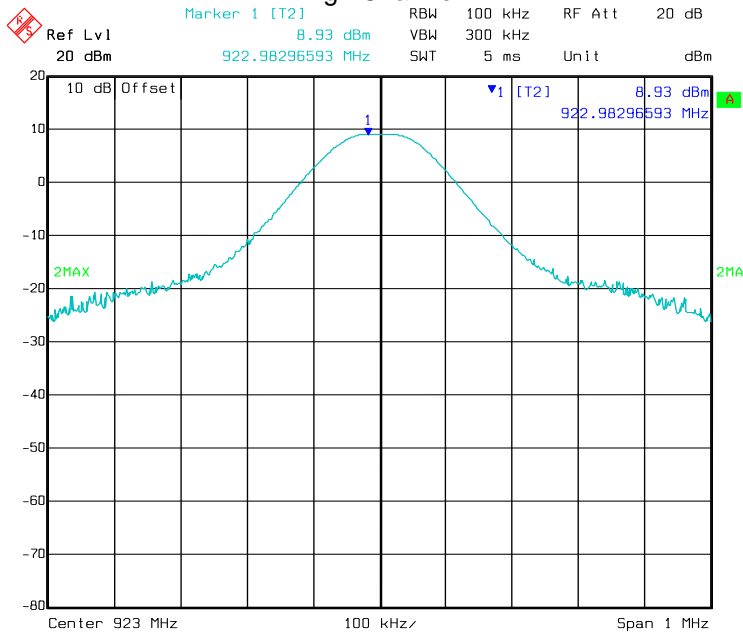
Channel	Frequency	Peak Output Power dBm	Calculated Output Power (W)	EIRP dBm
Low	918.1 MHz	9.02	0.008	10.3
High	923.0 MHz	8.93	0.008	10.2

Low Channel



Date: 09.MAY 2013 05:17:22

High Channel



Date: 09.MAY 2013 05:14:47

Receiver Spurious Emissions

The following receiver spurious emission limits shall be complied with:

(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

Table 1 - Spurious Emission Limits for Receivers

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 meters)
30-88	100
88-216	150
216-960	200
Above 960	500

Test Conditions:

Sample Number:	Type B	Temperature:	20°C
Date:	5/9/2013	Humidity:	54 %
Modification State:	Low /High Channels	Tester:	A. Laudani
		Laboratory:	10m Chamber

Test Results: Compliant

Additional Observations:

- The Spectrum was searched from 30MHz to 5000 MHz.
- EUT operated on "test receive mode".
- No other emissions within 20 dB of the limit were detected.