FCC PART 15 SUBPART C
TEST AND MEASUREMENT REPORT

For

Everex Communications, Inc.

1045 Mission Court,

Fremont, CA 94539, USA

FCC ID: TF7WX-31-1000

Report Type:	**Product Type:**
CIIPC Report	2.4 GHz 802.15.4 Module

Prepared By: Cipher Chu

Report Number: R1310152-247

Report Date: 2014-01-29

Reviewed By: Bo Li, RF Test Engineer

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1310152-247	Original Report	2014-01-29

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *Everex Communications, Inc.* and their embedded radio *WC-31* with FCC ID: TF7WX-31-1000. The radio module is built into the host unit, building control gateway with model: *EC1*-XX3.

1.2 Mechanical Description of EUT

The EUT measures approximately 19.7 cm (L) x 16.3 cm (W) x 2.9 cm (H) and weighs 0.35kg.

The test data gathered are from a typical production sample provided by the manufacturer.

1.3 Objective

This report is prepared on behalf of *Everex Communication, Inc.* in accordance with Part 2, Subpart J, and Part 15, Subparts B and C of the Federal Communication Commission's rules.

The objective is to determine Class II permissive change compliance with FCC Part 15.247 for Output Power, Antenna Requirements, Spurious Emissions, and AC line Conducted Spurious Emissions.

1.4 Related Submittal(s)/Grant(s)

N/A

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz and ANSI C63.10-2009, American National Standard for Testing Unlicensed Wireless Devices.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR16-4-2:2003, The Treatment of Uncertainty in EMC Measurements, the values ranging from $\pm$2.0 dB for Conducted Emissions tests and $\pm$4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

1.7 Test Facility

Bay Area Compliance Laboratories Corp. (BACL) is:
1- An independent Commercial Test Laboratory accredited to ISO 17025:2005 by A2LA, in the fields of: Electromagnetic Compatibility & Telecommunications covering Emissions, Immunity, Radio, RF Exposure, Safety and Telecom. This includes NEBS (Network Equipment Building System), Wireless RF, Telecommunications Terminal Equipment (TTE); Network Equipment; Information Technology Equipment (ITE); Medical Electrical Equipment; Industrial, Commercial, and Medical Test Equipment; Professional Audio and Video Equipment; Electronic (Digital) Products; Industrial and Scientific Instruments; Cabled Distribution Systems and Energy Efficiency Lighting.
2- An ENERGY STAR Recognized Laboratory, for the LM80 Testing, a wide variety of Luminares and Computers.
3- A NIST Designated Phase-I and Phase-II CAB including: ACMA (Australian Communication and Media Authority), BSMI (Bureau of Standards, Metrology and Inspection of Taiwan), IDA (Infocomm Development Authority of Singapore), IC (Industry Canada), Korea (Ministry of Communications Radio Research Laboratory), NCC (Formerly DGT; Directorate General of Telecommunication of Chinese Taipei) OFTA (Office of the Telecommunications Authority of Hong Kong), Vietnam, VCCI - Voluntary Control Council for Interference of Japan and a designated EU CAB (Conformity Assessment Body) (Notified Body) for the EMC and R&TTE Directives.
4 - A Product Certification Body accredited to ISO Guide 65:1996 by A2LA to certify:
1- Unlicensed, Licensed radio frequency devices and Telephone Terminal Equipment for the FCC. Scope A1, A2, A3, A4, B1, B2, B3, B4 & C.
2. Radio Standards Specifications (RSS) in the Category I Equipment Standards List and All Broadcasting Technical Standards (BETS) in Category I Equipment Standards List for Industry Canada.
3. Radio Communication Equipment for Singapore.
4. Radio Equipment Specifications, GMDSS Marine Radio Equipment Specifications, and Fixed Network Equipment Specifications for Hong Kong.
5. Japan MIC Telecommunication Business Law (A1, A2) and Radio Law (B1, B2 and B3).
6. Audio/Video, Battery Charging Systems, Computers, Displays, Enterprise Servers, Imaging Equipment, Set-Top Boxes, Telephony, Televisions, Ceiling Fans, CFLs (including GU24s), Decorative Light Strings, Integral LED Lamps, Luminaires, Residential Ventilating Fans.

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz, as well as ANSI C63.4-2009, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24: 2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: A-0027. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is an American Association for Laboratory Accreditation (A2LA) accredited laboratory (Lab Code 3297-02). The current scope of accreditations can be found at

http://www.a2la.org/scopepdf/3297-02.pdf?CFID=1132286&CFTOKEN=e42a3240dac3f6ba-6DE17DCB-1851-9E57-477422F667031258&jsessionid=8430d44f1f47cf2996124343c704b367816b

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.4-2009.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the average power, peak power and PPSD across all data rates bandwidths, and modulations.

2.2 EUT Exercise Software

The test utility used was WC31sm-fcc.hex was provided by *Everex Communications*, Inc., and was verified by *Bo Li* to comply with the standard requirements being tested against.

2.3 Special Equipment

There were no special accessories were required, included, or intended for use with EUT during these tests.

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment

Manufacturer	Description	Model	Serial Number
Everex	RS485 Traffic Indicator	-	-

Note: Turns on its LED light to indicate it has received a RS485 data from EUT.

2.6 EUT Internal Configuration Details

Manufacturer	Description	Model	Serial Number
Everex	PCB board 1	PWB-1229B6-00Rev.B6	-
Everex	PCB board 2	PWB-1273A2-0000 REV.A2	-

2.7 Interface Ports and Cables

Cable Description	Length (m)	To	From
RJ45	>1.0	EUT	Laptop

2.8 Power Supply List and Details

Manufacturer	Description	Model	Part Number
DVE	Switching Adapter	DSA-15P-05US050100	E135856

3 Summary of Test Results

Results reported relate only to the product tested.

FCC Rules	Description of Test	Results
FCC §15.247(i), §2.1091	RF Exposure	Compliant
FCC §15.203	Antenna Requirement	Compliant
FCC §15.207(a)	AC Line Conducted Emissions	Compliant
FCC §15.247 (d)	Spurious Emissions at Antenna Port	Compliant*
FCC §15.209, §15.247 (d) FCC §15.205	Radiated Spurious Emissions Including Restricted Band	Compliant
FCC §15.247(a)(2)	6 dB Emission Bandwidth	Compliant*
FCC §15.247(b)(3)	Maximum Peak Output Power	Compliant
FCC §15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliant*
FCC §15.247(e)	Power Spectral Density	Compliant*

Note: *please refer to the original FCC ID: TF7WX-31-1000.

4 FCC §15.247 (i) & §2.1091– RF Exposure

4.1 Applicable Standard

According to FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	* (100)	30
1.34-30	824/f	2.19/f	* ($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

4.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

4.3 MPE Results

Maximum peak output power at antenna input terminal (dBm):	18.35
Maximum peak output power at antenna input terminal (mW):	68.39
Prediction distance (cm):	20
Prediction frequency (MHz):	2440
Maximum Antenna Gain, typical (dBi):	2.0
Maximum Antenna Gain (numeric):	1.585
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.022
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	0.22

The device is compliant with the requirement MPE limit for uncontrolled exposure.

5 FCC §15.203 – Antenna Requirements

5.1 Applicable Standard

According to FCC §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.2 Antenna List

Frequency Range (MHz)	External/Internal/Integral	Antenna Type/Pattern	Antenna Gain (dBi) @ 2.4 GHz
2.4 GHz	External	Dipole	2

5.3 Result

The antenna of the EUT has maximum gain of 2 dBi and consists of a reversed SMA connector, which in accordance to sections FCC §15.203, is considered sufficient to comply with the provisions of these sections. Please refer to the EUT photos.

EUT Antenna

6 FCC §15.207 - AC Power Line Conducted Emissions

6.1 Applicable Standard

Section 15.207 Conducted limits:

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

** Decreases with the logarithm of the frequency.*

6.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.4-2003 measurement procedure. The specification used was FCC Part15.207 limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The 24VAC power transformer of the unit was connected with LISN which provided 120 V/60 Hz AC power.

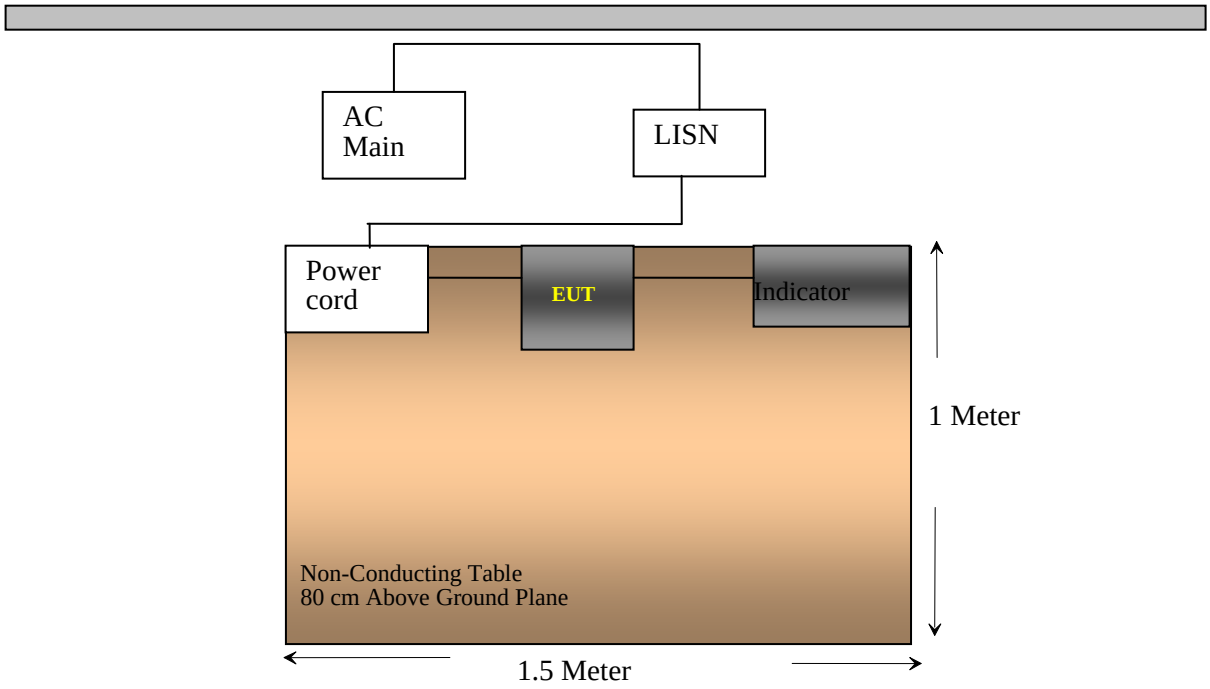
6.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100044	2013-04-18	1 year
Solar Electronics	LISN	9252-R-24-BNC	511205	2013-06-25	1 year
TTE	Filter, High Pass	H9962-150K-50-21378	K7133	2013-05-30	1 year

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

6.4 Test Setup Block Diagram

Conducted Emissions



6.5 Test Procedure

During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-2.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with a "QP". Average readings are distinguished with an "Ave".

6.6 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	42 %
ATM Pressure:	102 kPa

The testing was performed by Cipher Chu on 2013-11-27 at 5 meter 3.

6.7 Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15C standard's conducted emissions limits, with the *worst* margin reading of:

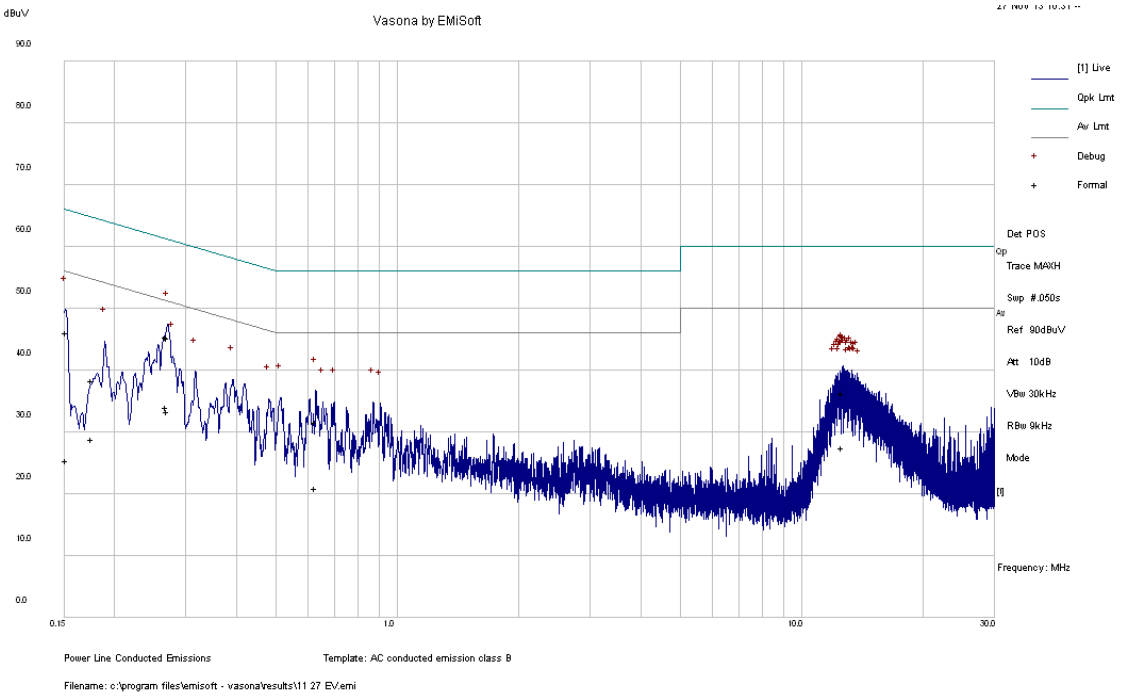
Connection: 24VAC power transformer connected to 120 V/60 Hz AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Live/Neutral)**	**Range (MHz)**
-15.68	0.268683	Line	0.15 to 30

6.8 Conducted Emissions Test Plots and Data

Please refer to the following plots and tables.

Frequency: 2440 MHz (worst case)

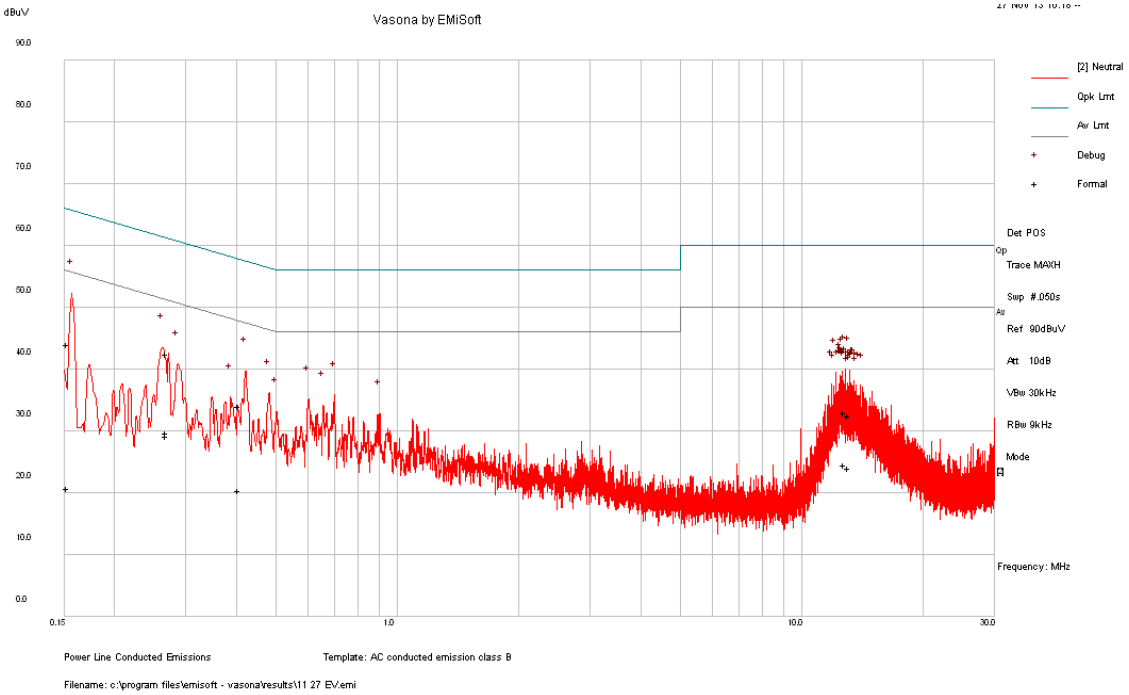
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave)
0.268683	45.48	Line	61.16	-15.68	QP
0.270582	45.35	Line	61.10	-15.75	QP
0.151923	46.05	Line	65.89	-19.84	QP
12.62754	36.23	Line	60	-23.77	QP
0.628341	31.70	Line	56	-24.30	QP
0.1761	38.41	Line	64.67	-26.26	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave)
0.268683	34.05	Line	51.16	-17.11	Ave
0.270582	33.35	Line	51.1	-17.75	Ave
12.62754	27.43	Line	50	-22.57	Ave
0.628341	21.01	Line	46	-24.99	Ave
0.1761	28.89	Line	54.67	-25.78	Ave
0.151923	25.41	Line	55.89	-30.49	Ave

120 V, 60 Hz – Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave)
0.268632	42.59	Neutral	61.16	-18.57	QP
0.268707	42.50	Neutral	61.16	-18.65	QP
0.152913	44.10	Neutral	65.84	-21.74	QP
0.40698	34.07	Neutral	57.71	-23.64	QP
12.7764	33.10	Neutral	60	-26.90	QP
13.0956	32.49	Neutral	60	-27.51	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave)
0.268707	29.69	Neutral	51.16	-21.47	Ave
0.268632	29.31	Neutral	51.16	-21.85	Ave
12.7764	24.59	Neutral	50	-25.41	Ave
13.0956	24.08	Neutral	50	-25.92	Ave
0.40698	20.39	Neutral	47.71	-27.32	Ave
0.152913	20.72	Neutral	55.84	-35.12	Ave

7 FCC §15.205, §15.209 & §15.247(d) – Spurious Radiated Emissions

7.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As per FCC §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 (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	960 – 1240	4. 5 – 5. 15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5. 35 – 5. 46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 –167.17	3.332 – 3.339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3 3458 – 3 358	23.6 – 24.0
12.29 – 12.293	240 – 285	3.600 – 4.400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

As per FCC §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 §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

7.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

7.3 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

7.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

7.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-2	2013-08-12	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2013-06-09	1 year
Mini-Circuits	Pre-amplifier	ZVA-183-S	570400946	2013-05-09	1 year
Agilent	Spectrum Analyzer	E4440A	US42221851	2013-02-28	1 year
EMCO	Horn Antenna	3315	9511-4627	2013-10-17	1 year
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2013-03-22	1 year

Statement of Traceability: BACL *attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.*

7.6 Test Environmental Conditions

Temperature:	20-22 °C
Relative Humidity:	40-42 %
ATM Pressure:	101-102 kPa

The testing was performed by Cipher Chu on 2013-11-11 and 2013-11-27 at 5 meter 3.

7.7 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15C standard's radiated emissions limits, and had the worst margin of:

30-1000 MHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel**
-30.22	42.8115	Vertical	Low Channel

1 – 25 GHz:

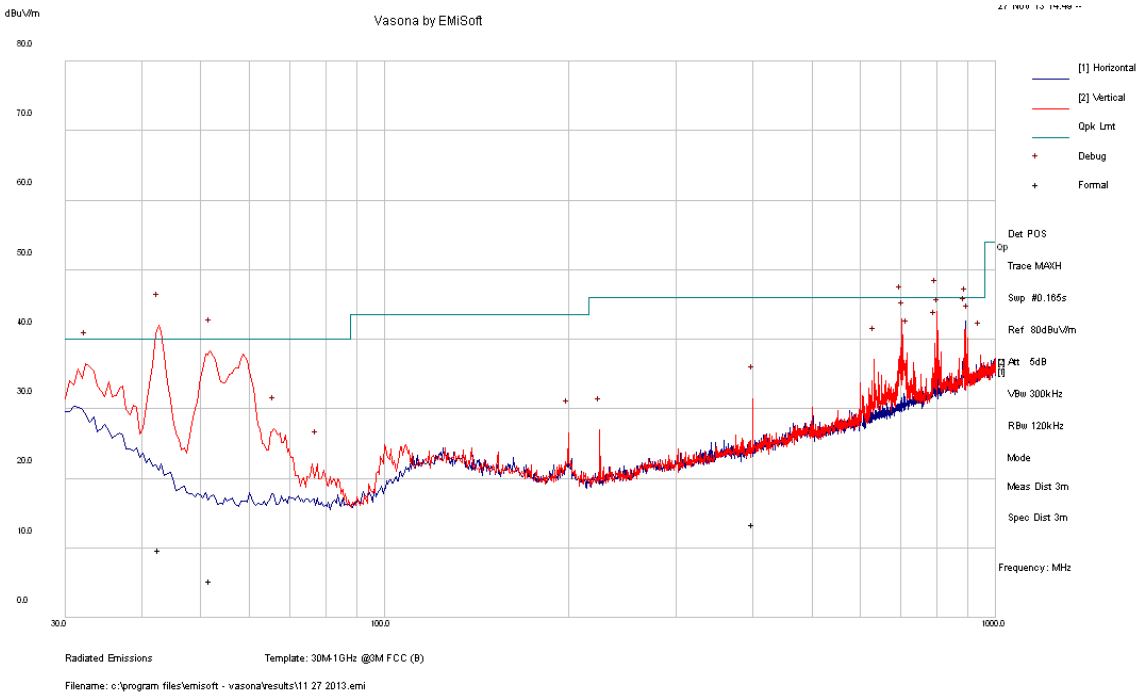
Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel**
-2.729	9760	Horizontal	Middle Channel

Please refer to the following table for specific test result details.

7.8 Radiated Emissions Test Data and Plots

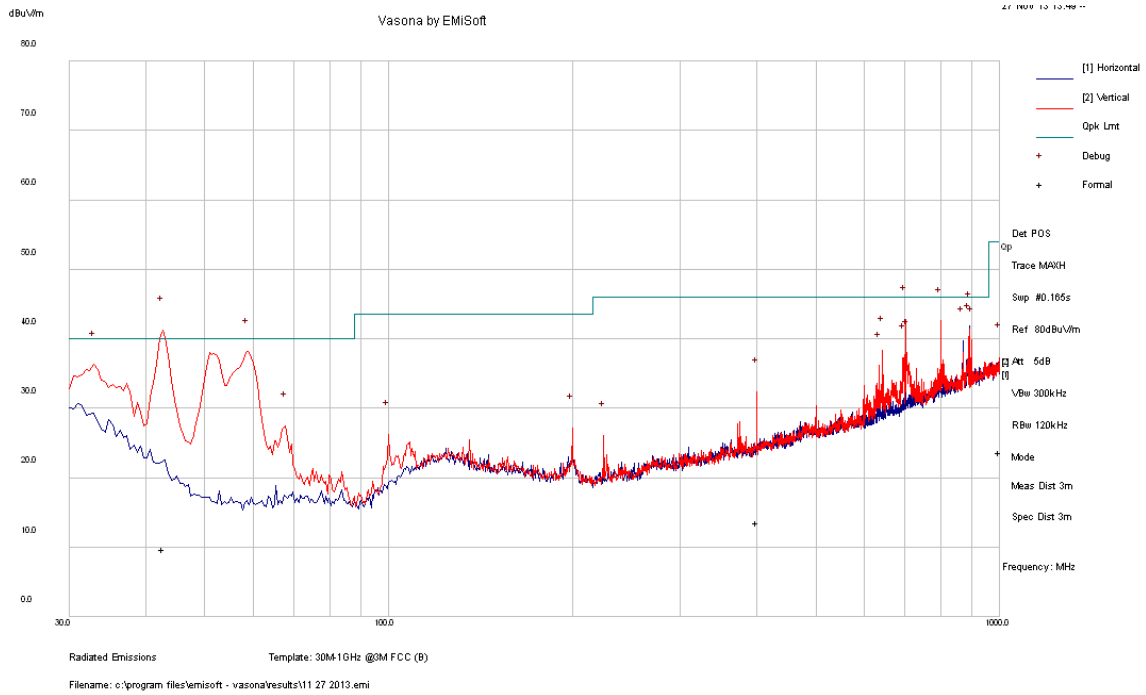
1) 30 – 1000 MHz, measured at 3 meters

Low Channel: 2405 MHz



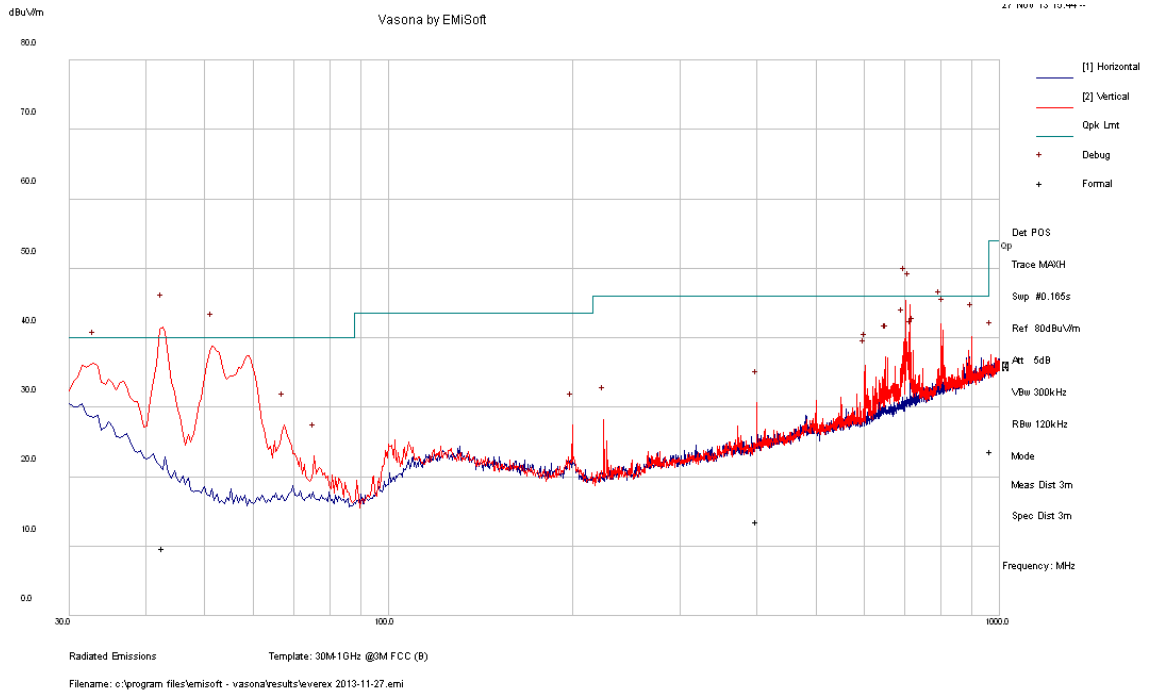
Frequency (MHz)	Corrected Amplitude (dBuV)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBuV)	Margin (dB)	Detector (PK/QP)
42.8115	9.78	123	V	266	40	-30.22	QP
51.73875	5.25	146	V	344	40	-34.75	QP
399.9788	13.49	374	V	242	46	-32.51	QP

Middle Channel: 2440 MHz



Frequency (MHz)	Corrected Amplitude (dBuV)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBuV)	Margin (dB)	Detector (PK/QP)
1000	23.75	125	V	111	54	-30.25	QP
42.77975	9.68	98	V	123	40	-30.32	QP
400.2595	13.55	115	V	288	46	-32.45	QP

High Channel: 2475 MHz



Frequency (MHz)	Corrected Amplitude (dBuV)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBuV)	Margin (dB)	Detector (PK/QP)
42.70775	9.73	138	V	347	40	-30.27	QP
400.0653	13.49	293	V	112	46	-32.51	QP
967.5958	23.74	347	V	309	54	-30.26	QP

2) Above 1 GHz, measured at 3 meters

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC Part 15C		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2405 MHz, measured at 3 meters											
2405	85.43	67	100	V	28.956	3.12	0	117.506	N/R	N/R	Fun/Peak
2405	78.77	315	100	H	28.956	3.12	0	110.846	N/R	N/R	Fun/Peak
2405	28.63	67	100	V	28.956	3.12	0	60.706	N/R	N/R	Fun/Ave
2405	28.93	315	100	H	28.956	3.12	0	61.006	N/R	N/R	Fun/Ave
2390 [1]	25.5	67	100	V	28.956	3.12	0	57.576	74	-16.424	Peak
2390 [1]	23.35	315	100	H	28.956	3.12	0	55.426	74	-18.574	Peak
2390 [1]	-31.3	67	100	V	28.956	3.12	0	0.776	54	-53.224	Ave
2390 [1]	-26.49	315	100	H	28.956	3.12	0	5.586	54	-48.414	Ave
4810	44.93	180	100	V	33.097	4.56	27.7	54.887	74	-19.113	Peak
4810	38.74	267	100	H	33.097	4.56	27.7	48.697	74	-25.303	Peak
4810	23.29	180	100	V	33.097	4.56	27.7	33.247	54	-20.753	Ave
4810	20.82	267	100	H	33.097	4.56	27.7	30.777	54	-23.223	Ave
7215	34.99	0	100	V	35.928	5.49	27.58	48.828	97.506	-48.678	Peak
7215	33.7	0	100	H	35.928	5.49	27.58	47.538	90.846	-43.308	Peak
7215	20.79	0	100	V	35.928	5.49	27.58	34.628	40.706	-6.078	Ave
7215	20.78	0	100	H	35.928	5.49	27.58	34.618	41.006	-6.388	Ave
9620	34.19	0	100	V	37.954	6.54	27.06	51.624	97.506	-45.882	Peak
9620	33.95	0	100	H	37.954	6.54	27.06	51.384	90.846	-39.462	Peak
9620	19.59	0	100	V	37.954	6.54	27.06	37.024	40.706	-3.682	Ave
9620	19	0	100	H	37.954	6.54	27.06	36.434	41.006	-4.572	Ave
Middle Channel 2440 MHz, measured at 3 meters											
2440	85.2	71	100	V	28.956	3.12	0	117.276	N/R	N/R	Fun/Peak
2440	78.13	322	100	H	28.956	3.12	0	110.206	N/R	N/R	Fun/Peak
2440	29.43	71	100	V	28.956	3.12	0	61.506	N/R	N/R	Fun/Ave
2440	26.75	322	100	H	28.956	3.12	0	58.826	N/R	N/R	Fun/Ave
4880	44.4	67	100	V	33.327	4.54	27.76	54.507	74	-19.493	Peak
4880	40.26	218	100	H	33.327	4.54	27.76	50.367	74	-23.633	Peak
4880	19.55	67	100	V	33.327	4.54	27.76	29.657	54	-24.343	Ave
4880	21.54	218	100	H	33.327	4.54	27.76	31.647	54	-22.353	Ave
7320	33.76	0	100	V	36.369	5.57	27.51	48.189	74	-25.811	Peak
7320	34.25	0	100	H	36.369	5.57	27.51	48.679	74	-25.321	Peak
7320	19.75	0	100	V	36.369	5.57	27.51	34.179	54	-19.821	Ave
7320	19.31	0	100	H	36.369	5.57	27.51	33.739	54	-20.261	Ave
9760	32.63	0	100	V	38.087	6.62	26.98	50.357	97.276	-46.919	Peak
9760	33.99	0	100	H	38.087	6.62	26.98	51.717	90.206	-38.489	Peak
9760	18.62	0	100	V	38.087	6.62	26.98	36.347	41.506	-5.159	Ave
9760	18.37	0	100	H	38.087	6.62	26.98	36.097	38.826	-2.729	Ave

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC Part 15C		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2475 MHz, measured at 3 meters											
2475	86.53	63	100	V	29.155	3.25	0	118.935	N/R	N/R	Fun/Peak
2475	78.71	332	100	H	29.155	3.25	0	111.115	N/R	N/R	Fun/Peak
2475	33.92	63	100	V	29.155	3.25	0	66.325	N/R	N/R	Fun/Ave
2475	25.46	332	100	H	29.155	3.25	0	57.865	N/R	N/R	Fun/Ave
2483.5 [1]	30.66	63	100	V	29.155	3.25	0	63.065	74	-10.935	Peak
2483.5 [1]	31.46	332	100	H	29.155	3.25	0	63.865	74	-10.135	Peak
2483.5 [1]	-21.95	63	100	V	29.155	3.25	0	10.455	54	-43.545	Ave
2483.5 [1]	-21.79	332	100	H	29.155	3.25	0	10.615	54	-43.385	Ave
4950	44.67	201	100	V	33.327	4.52	27.75	54.767	74	-19.233	Peak
4950	40.65	235	100	H	33.327	4.52	27.75	50.747	74	-23.253	Peak
4950	22.87	201	100	V	33.327	4.52	27.75	32.967	54	-21.033	Ave
4950	21.41	235	100	H	33.327	4.52	27.75	31.507	54	-22.493	Ave
7425	33.4	0	100	V	36.565	5.62	27.51	48.075	74	-25.925	Peak
7425	33.81	0	100	H	36.565	5.62	27.51	48.485	74	-25.515	Peak
7425	18.97	0	100	V	36.565	5.62	27.51	33.645	54	-20.355	Ave
7425	18.92	0	100	H	36.565	5.62	27.51	33.595	54	-20.405	Ave
9900	35.87	170	100	V	38.287	6.55	26.98	25.51	98.935	-73.425	Peak
9900	32.87	113	100	H	38.287	6.55	26.98	25.51	91.115	-65.605	Peak
9900	19.32	170	100	V	38.287	6.55	26.98	25.51	46.325	-20.815	Ave
9900	18.8	113	100	H	38.287	6.55	26.98	25.51	37.865	-12.355	Ave

[1] *Note: All the restricted band edges used Marker-Delta Method.*

8 FCC §15.247(b) – Peak Output Power Measurement

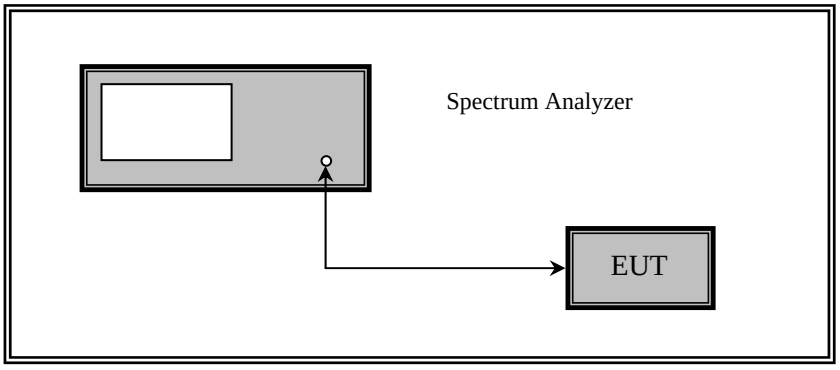
8.1 Applicable Standard

FCC §15.247(b) the maximum peak output power of the intentional radiator shall not exceed the following:

FCC §15.247(b) (3) For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

8.2 Measurement Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to a spectrum analyzer.
3. Add a correction factor to the display.



8.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	US42221851	2012-02-28	1 year

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

8.4 Test Environmental Conditions

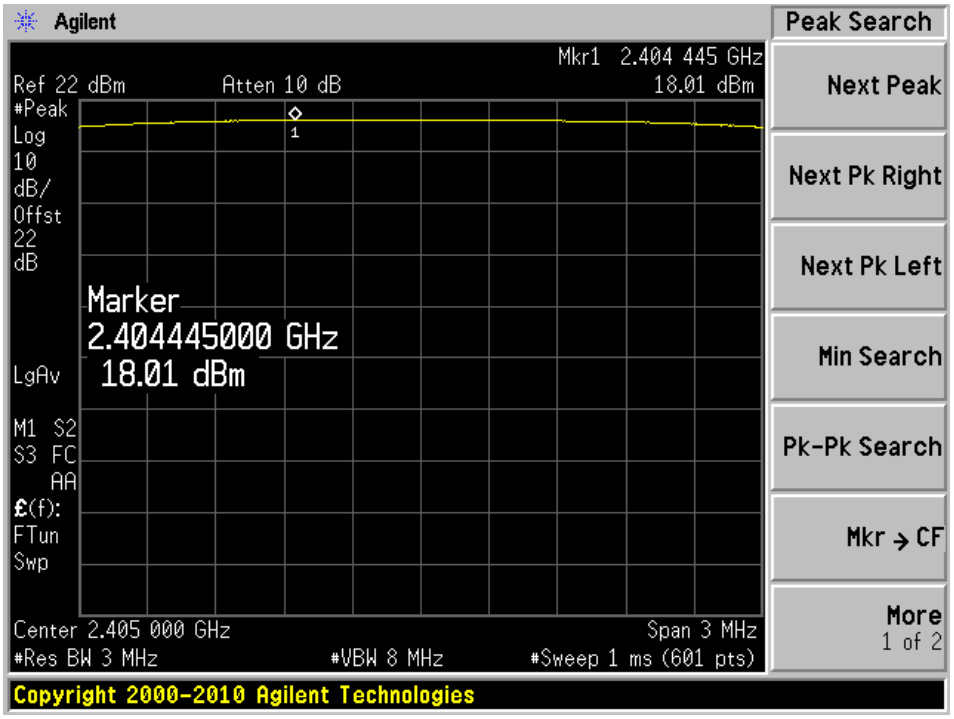
Temperature:	21 °C
Relative Humidity:	42 %
ATM Pressure:	102 kPa

The testing was performed by Chaoran Chu on 2013-11-11 at RF site.

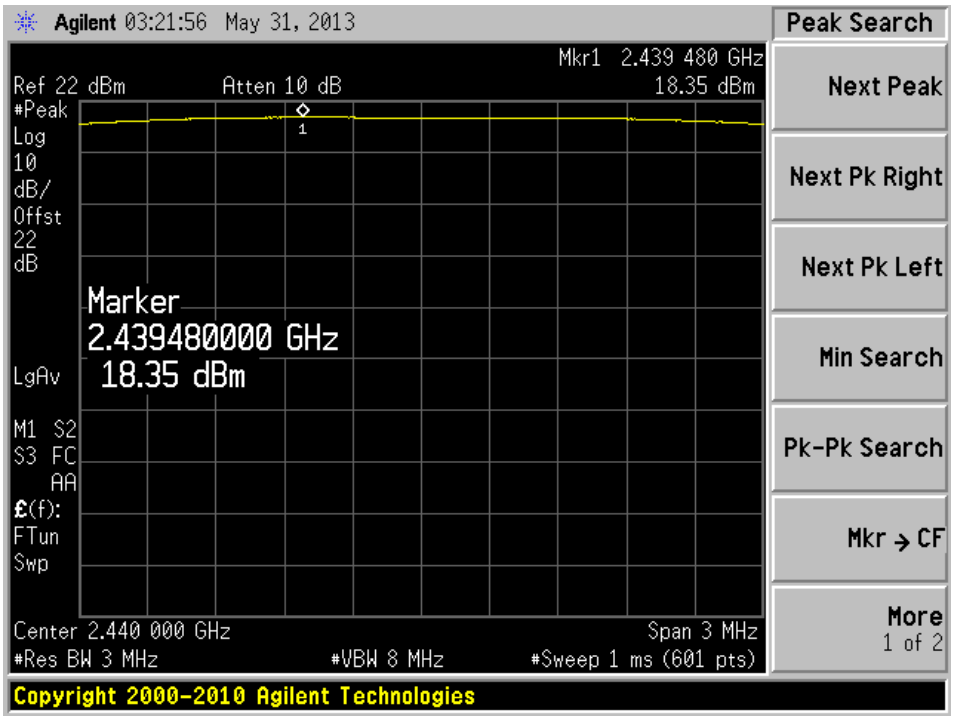
8.5 Test Results

Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)	FCC Limit (dBm)	Margin (dB)
Low	2405	18.01	30	-11.99
Middle	2440	18.35	30	-11.65
High	2475	17.52	30	-12.48

Low Channel: 2405 MHz



Middle Channel: 2440 MHz



High Channel: 2475 MHz