FCC PART 15, SUBPART C

TEST AND MEASUREMENT REPORT

For

Trimble Navigation Ltd.

935 Stewart Drive,

Sunnyvale, CA 94085, USA

FCC ID: JUP-8311891

Report Type:	Product Type:
Original Report	GNSS Receiver with 900 MHz FHSS Radio

Prepared By:	Todd Moy
Report Number:	R1504291–247
Report Date:	2015-06-16
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1504291-247	Original Report	2015-06-16

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *Trimble Navigation Ltd,*, and their product *FCC ID: JUP-8311891*, P/N: 83118-91, Model number: SPS855, Regulatory model: CBMRX-010B which will henceforth be referred to as the EUT (Equipment Under Test). The EUT is a GNSS Receiver with a 902-928 MHz FHSS radio and integrated Bluetooth functionality.

1.2 Mechanical Description of EUT

The EUT measures approximately 12 cm (W) x 24 cm (L) x 5 cm (H) and weighs 1.65 kg.

The test data gathered are from typical production sample, S/N: R1504291-01 assigned by BACL.

1.3 Objective

This report is prepared on behalf of *Trimble Navigation Ltd.* 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 compliance with FCC Part 15.247 rules for AC Line Conducted Emissions, Output Power, Antenna Requirements, 6 dB Bandwidth, Power Spectral Density, 100 kHz Bandwidth of Band Edges Measurement, and Conducted and Radiated 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 C63.10-2009, 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.

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.

The following calculation follows the procedures as set forth in clause 7.2.3, ETSI TR 100 028-1 V1.4.1 (2001-12), the expression of Uncertainty in Radiated RF Testing is in accordance to ISO/IEC 17025 and TR 100 028-1 V1.4.1 (2001-12).

The expanded Measurement Uncertainty value having a confidence factor of 95%, is within a range of 5.48 dB.

This means that the value of conducted RF carrier power test will be within +/- 2.74 dB of the measuring radiated emissions power versus the expected value.

The expected value is defined as the power at the antenna of the Transmitter under Test.

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 Luminaires 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 C63.10-2009, 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 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 software used, CommSet: Trimble Communication Setup Program and COM1 TrimTest, provided by the client and was verified by Todd Moy to comply with the standard requirements being tested against.

2.3 Special Equipment

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

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Internal Configuration

Manufacturers	Descriptions	Models	Serial Numbers
-	Main Board Gamel RoHS	66044-20-C	-
-	900 MHz carrier board	90925-90-A-03	-
-	900 MHz module	80385-00-C	-
Delta Electronics	AC/DC Power Supply	ADP-65JK AB (Trimble P/n: 78650)	-

2.6 Local Support Equipment

Manufacturer	Description	Model	Serial Number
DELL	Laptop	Latitude E6530	-
Trimble	GNSS Antenna	Zephyr 2 (Trimble P/n: 57971-10)	-

2.7 External I/O Cabling List and Details

Cable Description	Length (m)	From	To
Data/Power Cable	1	EUT	Laptop
59044 data/power cable	2	EUT	Laptop PC and power supply
65791-00 data/power cable	2	EUT	Laptop PC
58957-02 RF cable	1.6	EUT	GNSS antenna
51980 RF cable	5	EUT	900 MHz 5 dBi whip antenna (where applicable)

2.8 Power Supply List and Details

There were no power supplies used with the EUT.

3 Summary of Test Results

Results reported relate only to the product tested.

FCC Rules	Description of Test	Results
§15.247(i), §2.1091	RF Exposure	Compliant
§15.203	Antenna Requirements	Compliant
§15.207 (a)	AC Line Conducted Emissions	Compliant
§15.205, §15.209, §15.247(d)	Spurious Radiated Emissions	Compliant
§15.247 (a)(1)	20 dB Channel Bandwidth	Compliant
§15.247(a)	Maximum Peak Output Power	Compliant
§15.247(d)	Band Edge	Compliant
§15.247 (a)(1)	Hopping Channel Separation	Compliant
§15.247 (a)(1)	Dwell Time	Compliant
§15.247(b)(1)	Number of Hopping Channels	Compliant

4 FCC §2.1091 & §15.247 (i) – 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):	28.62
Maximum peak output power at antenna input terminal (mW):	727.78
Prediction distance (cm):	20
Prediction frequency (MHz):	902.6
Maximum Antenna Gain, typical (dBi):	5
Maximum Antenna Gain (numeric):	3.162
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.4579
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	0.6017

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

Manufacturers	Antenna Type/Pattern	Antenna Gain (dBi)
Trimble	Whip	5
Trimble	Monopole	0

The EUT used an external antenna; therefore it complies with the antenna requirement.

6 FCC §15.207– AC Line Conducted Emissions

6.1 Applicable Standards

As per FCC §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 C63.10-2009 measurement procedure. The specification used was FCC §15.207 limits.

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

The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V/60 Hz AC power.

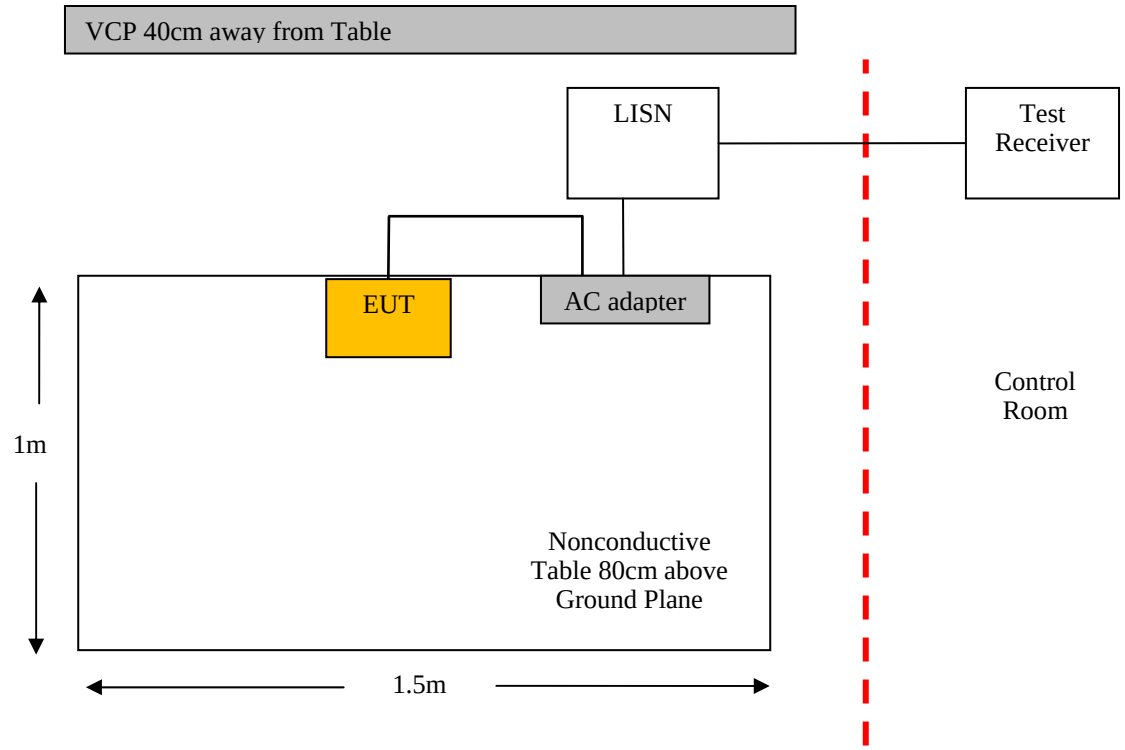
6.3 Test Procedure

During the conducted emissions test, the power adapter of the EUT was connected to a power strip on the table which is then connected to the LISN.

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”.

6.4 Test Setup Block Diagram



6.5 Corrected Amplitude & Margin Calculation

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

CA = Ai + CL + Atten

For example, a corrected amplitude of 46.2 dBuV = Indicated Reading (32.5 dBuV) + Cable Loss (3.7 dB) + Attenuator (10 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

6.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100044	2014-07-17	1 year
Keysight Technologies	RF Limiter	11867A	MY42242931	2014-12-17	1 year
Rohde & Schwarz	Impulse Limiter	ESH3-Z2	101963	2014-07-07	1 year
TTE INCORPORATED	High Pass Filter	H985-150k-50-720N	H 885	2015-01-09	1 year
FCC	LISN	FCC-LISN-50-2-10-CISPR16 1PA ANSI 14	160132	2015-04-07	1 year

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

6.7 Test Environmental Conditions

Temperature:	20° C
Relative Humidity:	45 %
ATM Pressure:	101.94 kPa

The testing was performed by Todd Moy on 2015-05-18 at 5m chamber 3.

6.8 Summary of Test Results

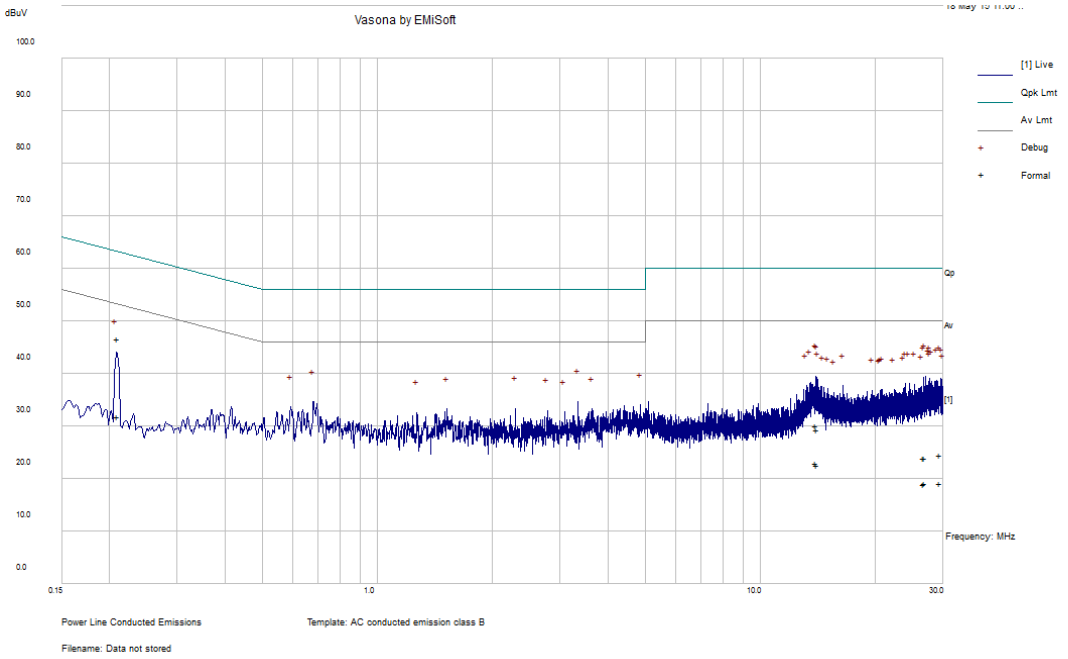
According to the recorded data in following table, the EUT complied with the FCC standard's conducted emissions limits, with the margin reading of:

Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-13.51	0.152687	Neutral	0.15-30

6.9 Conducted Emissions Test Plots and Data

Worst case – Low channel

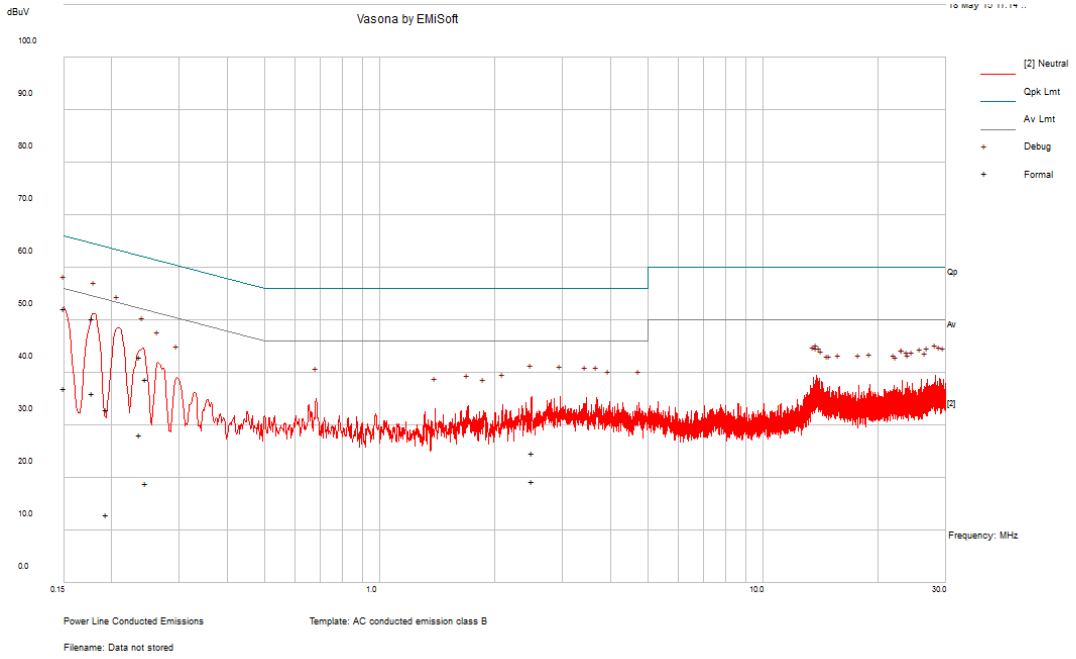
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.210243	46.57	Line	63.2	-16.63	QP
13.9705	30.05	Line	60	-29.95	QP
26.96637	23.91	Line	60	-36.09	QP
14.09036	29.46	Line	60	-30.54	QP
26.7156	24	Line	60	-36	QP
29.49634	24.48	Line	60	-35.52	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.210243	31.77	Line	53.2	-21.43	Ave
13.9705	23.1	Line	50	-26.9	Ave
26.96637	19.13	Line	50	-30.87	Ave
14.09036	22.59	Line	50	-27.41	Ave
26.7156	19.05	Line	50	-30.95	Ave
29.49634	19.19	Line	50	-30.81	Ave

120 V, 60 Hz – Neutral

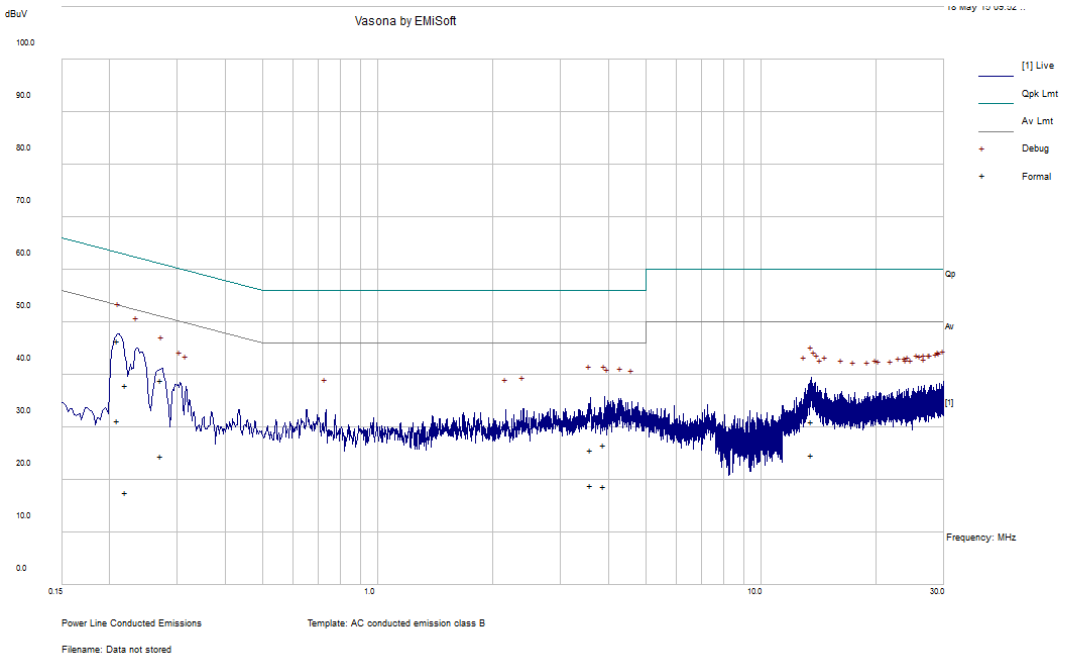


Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.178642	50.36	Neutral	64.55	-14.19	QP
0.1501	52.31	Neutral	65.99	-13.69	QP
0.193521	33.11	Neutral	63.88	-30.78	QP
0.236316	43.09	Neutral	62.22	-19.14	QP
0.245922	38.78	Neutral	61.89	-23.11	QP
2.503287	24.81	Neutral	56	-31.19	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.178642	36.05	Neutral	54.55	-18.5	Ave
0.1501	37.03	Neutral	55.99	-18.97	Ave
0.193521	13.06	Neutral	53.88	-40.83	Ave
0.236316	28.21	Neutral	52.22	-24.01	Ave
0.245922	18.93	Neutral	51.89	-32.97	Ave
2.503287	19.36	Neutral	46	-26.64	Ave

Co-Location

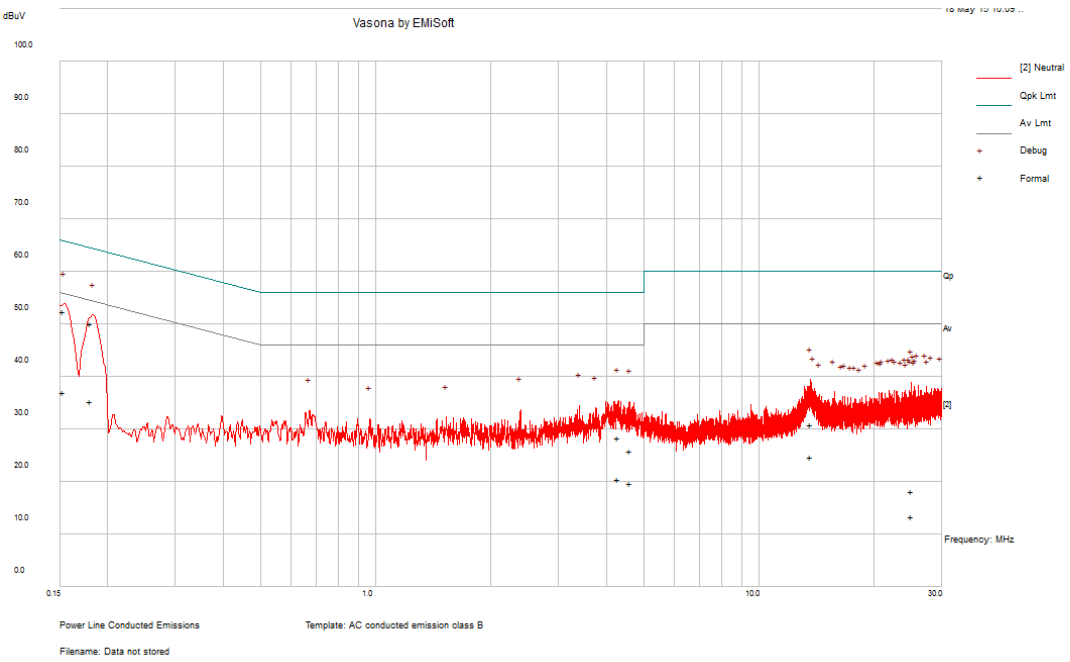
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.210068	46.41	Line	63.2	-16.79	QP
0.220297	38.07	Line	62.81	-24.73	QP
0.272169	39.04	Line	61.05	-22.01	QP
3.898742	26.63	Line	56	-29.37	QP
3.587032	25.69	Line	56	-30.31	QP
13.53377	31.1	Line	60	-28.9	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.210068	31.28	Line	53.2	-21.93	Ave
0.220297	17.6	Line	52.81	-35.2	Ave
0.272169	24.65	Line	51.05	-26.4	Ave
3.898742	18.84	Line	46	-27.16	Ave
3.587032	19.03	Line	46	-26.97	Ave
13.53377	24.84	Line	50	-25.16	Ave

120 V, 60 Hz – Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.152687	52.34	Neutral	65.85	-13.51	QP
0.180375	50.06	Neutral	64.47	-14.41	QP
4.29479	28.34	Neutral	56	-27.66	QP
13.62667	30.88	Neutral	60	-29.12	QP
4.603394	25.92	Neutral	56	-30.08	QP
24.9537	18.23	Neutral	60	-41.77	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.152687	36.96	Neutral	55.85	-18.89	Ave
0.180375	35.33	Neutral	54.47	-19.13	Ave
4.29479	20.57	Neutral	46	-25.43	Ave
13.62667	24.7	Neutral	50	-25.3	Ave
4.603394	19.66	Neutral	46	-26.34	Ave
24.9537	13.45	Neutral	50	-36.55	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 C63.10-2009. The specification used was the FCC 15 Subpart C limits.

The spacing between the peripherals was 10 centimeters.

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

7.3 Test Procedure

The measurements are based on FCC KDB 558074 D01 DTS Measured Guidance v03r01: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 11: Emissions in non-restricted frequency bands and section 12: Emissions in restricted frequency bands. As well as ANSI C63.10: 2009 as described below:

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
Agilent	Analyzer, Spectrum	E4446A	US44300386	2014-10-24	1 year
Sunol Sciences	Controller, System	SC104V	122303-1	Cal. Not required	N/A
Sunol Sciences	Antenna, Biconi-Log	JB3	A020106-3	2014-07-24	1 year
Agilent	Pre-amplifier	8447D	2944A10187	2015-03-20	1 year
HP/ Agilant	Pre-amplifier	8449B OPT HO2	3008A0113	2015-03-11	1 year
Sunol Sciences	Antenna, Horn	DRH-118	A052704	2015-03-09	2 year
Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100044	2014-07-17	1 year
-	SMA cable	-	C0005	Each Time[1]	-
IW Microwave	High Frequency Cable	DC-1438	SPS-2303-3840-SPS	2014-09-23	1 year
Suirong	30 ft conductive emission cable	LMR 400	-	2015-03-05	1 year
Mini Circuit	Precision Fixed Attenuator, 20 dB	BW-S20W5	-	Each Time[1]	N/A

Note 1: cable and attenuator included in the test set-up will be calibrated each time before testing.

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

7.6 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	42 %
ATM Pressure:	101.44 kPa

The testing was performed by Todd Moy on 2015-05-11 to 2015-05-15 at chamber 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)**	**Range (MHz)**
-7.48	36.0385	Vertical	30-1000

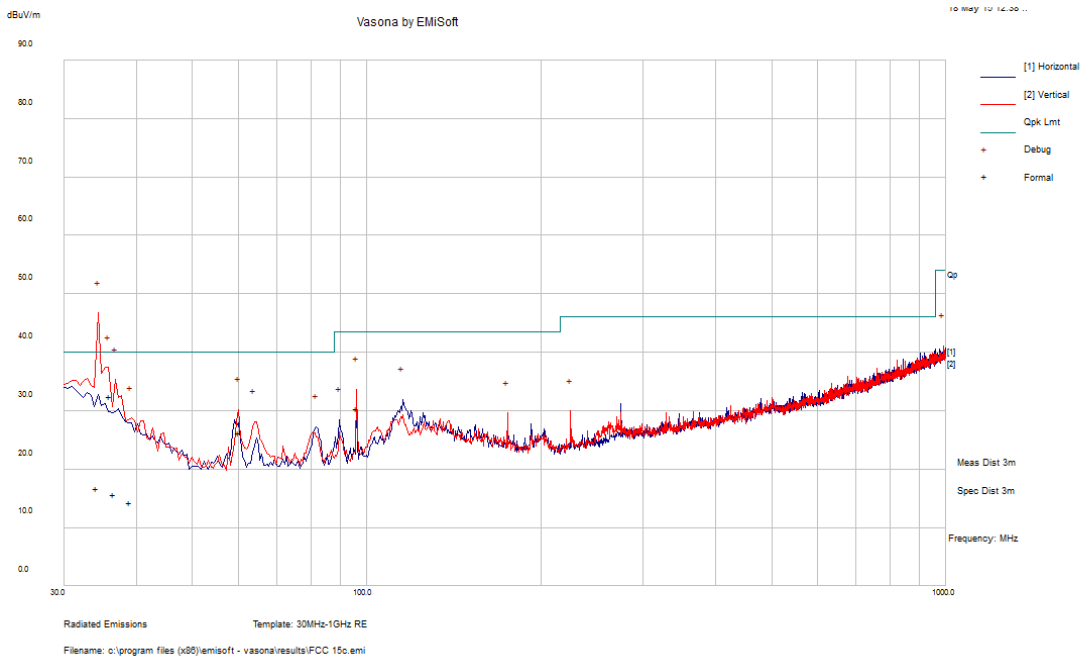
1 – 10 GHz, co-located:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range (GHz)**
-9.26	2483.5	Horizontal	1-10

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

7.8 Radiated Emissions Test Data and Plots

1) 30 MHz – 1 GHz, Measured at 3 meters



Frequency (MHz)	Cord. Reading (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (PK/QP/Ave.)
34.1855	16.81	170	V	294	40	-23.19	QP
36.0385	32.52	101	V	179	40	-7.48	QP
36.6135	15.76	276	V	49	40	-24.24	QP
60.036	26.29	134	V	15	40	-13.71	QP
96.0775	30.47	100	V	228	43.5	-13.03	QP
39.00725	14.26	284	V	350	40	-25.74	QP

2) 900MHz–10 GHz, Measured at 3 meters

Co-location with 902.6 MHz and 2480 MHz

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
902.6	103.16	0	100	V	23.100	1.770	0	128.030	-	-	Peak
902.6	92.42	33	100	H	23.100	1.770	0	117.290	-	-	Peak
902.6	99.07	0	100	V	23.100	1.770	0	123.940	-	-	Ave
902.6	91.82	188	141	H	23.100	1.770	0	116.690	-	-	Ave
1805.2	52.65	252	100	V	26.779	2.663	33.920	48.172	108.030	-59.858	Peak
1805.2	51.6	23	128	H	26.861	2.663	33.920	47.204	97.290	-50.086	Peak
1805.2	44.53	160	100	V	26.779	2.663	33.920	40.052	103.940	-63.888	Ave
1805.2	39.88	160	100	H	26.861	2.663	33.920	35.484	96.690	-61.206	Ave
2707.8	47.23	0	100	V	28.951	3.154	33.510	45.825	74.000	-28.175	Peak
2707.8	47.24	0	100	H	28.930	3.154	33.510	45.814	74.000	-28.186	Peak
2707.8	33.74	0	100	V	28.951	3.154	33.510	32.335	54.000	-21.665	Ave
2707.8	33.72	0	100	H	28.930	3.154	33.510	32.294	54.000	-21.706	Ave
3610.4	46.14	0	100	V	31.273	3.610	33.720	47.303	74.000	-26.697	Peak
3610.4	46.27	0	100	H	31.369	3.610	33.720	47.529	74.000	-26.471	Peak
3610.4	32.16	0	100	V	31.273	3.610	33.720	33.323	54.000	-20.677	Ave
3610.4	32.2	0	100	H	31.369	3.610	33.720	33.459	54.000	-20.541	Ave

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
2480	55.57	332	146	V	29.009	2.950	0	87.529	-	-	Peak
2480	56.85	40	246	H	28.999	2.950	0	88.799	-	-	Peak
2480	55.13	330	144	V	28.009	2.950	0	86.089	-	-	Ave
2480	55.78	43	247	H	28.999	2.950	0	87.729	-	-	Ave
2483.5	27.48	332	146	V	28.009	2.950	0	58.439	74	-15.561	Peak
2483.5	26.76	40	246	H	28.990	2.950	0	58.700	74	-15.300	Peak
2483.5	12.93	330	144	V	28.009	2.950	0	43.889	54	-10.111	Ave
2483.5	12.8	43	247	H	28.990	2.950	0	44.740	54	-9.260	Ave
4960	46.34	0	100	V	33.531	4.485	35.909	48.447	74	-25.553	Peak
4960	46.13	0	100	H	33.556	4.485	35.909	48.262	74	-25.738	Peak
4960	32.51	0	100	V	33.531	4.485	35.909	34.617	54	-19.383	Ave
4960	32.5	0	100	H	33.556	4.485	35.909	34.632	54	-19.368	Ave
7440	47.59	0	100	V	37.242	5.869	35.963	54.738	74	-19.262	Peak
7440	47.34	0	100	H	37.238	5.869	35.963	54.484	74	-19.516	Peak
7440	32.89	0	100	V	37.242	5.869	35.963	40.038	54	-13.962	Ave
7440	32.91	0	100	H	37.238	5.869	35.963	40.054	54	-13.946	Ave
9920	47.3	0	100	V	39.036	7.444	35.976	57.804	67.529	-9.725	Peak
9920	46.98	0	100	H	39.052	7.444	35.976	57.500	68.799	-11.299	Peak
9920	33.19	0	100	V	39.036	7.444	35.976	43.694	66.089	-22.395	Ave
9920	33.16	0	100	H	39.052	7.444	35.976	43.680	67.729	-24.049	Ave

2) 900 MHz–10 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		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 902.6 MHz, measured at 3 meters											
902.6	-	-	-	V	23.100	1.770	20.51	4.360	-	-	Peak
902.6	-	-	-	H	23.100	1.770	20.51	4.360	-	-	Peak
902.6	-	-	-	V	23.100	1.770	20.51	4.360	-	-	Ave
902.6	-	-	-	H	23.100	1.770	20.51	4.360	-	-	Ave
1805.2	50.14	0	100	V	26.779	2.663	33.920	45.662	-15.640	61.302	Peak
1805.2	49.51	0	100	H	26.861	2.663	33.920	45.114	-15.640	60.754	Peak
1805.2	35.38	0	100	V	26.779	2.663	33.920	30.902	-15.640	46.542	Ave
1805.2	35.35	0	100	H	26.861	2.663	33.920	30.954	-15.640	46.594	Ave
2707.8	49.28	0	100	V	28.951	3.154	33.510	47.875	74.000	-26.125	Peak
2707.8	48.98	0	100	H	28.930	3.154	33.510	47.554	74.000	-26.446	Peak
2707.8	34.64	0	100	V	28.951	3.154	33.510	33.235	54.000	-20.765	Ave
2707.8	34.64	0	100	H	28.930	3.154	33.510	33.214	54.000	-20.786	Ave
Middle Channel 915.4 MHz, measured at 3 meters											
915.4	-	-	-	V	23.200	1.790	20.46	4.530	-	-	Peak
915.4	-	-	-	H	23.200	1.790	20.46	4.530	-	-	Peak
915.4	-	-	-	V	23.200	1.790	20.46	4.530	-	-	Ave
915.4	-	-	-	H	23.200	1.790	20.46	4.530	-	-	Ave
1830.8	50.04	0	100	V	26.779	2.663	33.920	45.562	-15.470	61.032	Peak
1830.8	49.86	0	100	H	26.861	2.663	33.920	45.464	-15.470	60.934	Peak
1830.8	35.46	0	100	V	26.779	2.663	33.920	30.982	-15.470	46.452	Ave
1830.8	35.47	0	100	H	26.861	2.663	33.920	31.074	-15.470	46.544	Ave
2746.2	48.3	0	100	V	28.951	3.154	33.510	46.895	74.000	-27.105	Peak
2746.2	48.78	0	100	H	28.930	3.154	33.510	47.354	74.000	-26.646	Peak
2746.2	34.62	0	100	V	28.951	3.154	33.510	33.215	54.000	-20.785	Ave
2746.2	34.71	0	100	H	28.930	3.154	33.510	33.284	54.000	-20.716	Ave
High Channel 927.6 MHz, measured at 3 meters											
927.6	-	-	-	V	23.200	1.810	20.44	4.570	-	-	Peak
927.6	-	-	-	H	23.200	1.810	20.44	4.570	-	-	Peak
927.6	-	-	-	V	23.200	1.810	20.44	4.570	-	-	Ave
927.6	-	-	-	H	23.200	1.810	20.44	4.570	-	-	Ave
1855.2	49.27	0	100	V	27.403	2.743	33.770	45.646	-15.430	61.076	Peak
1855.2	48.91	0	100	H	27.383	2.743	33.770	45.266	-15.430	60.696	Peak
1855.2	34.25	0	100	V	27.403	2.743	33.770	30.626	-15.430	46.056	Ave
1855.2	34.24	0	100	H	27.383	2.743	33.770	30.596	-15.430	46.026	Ave
2782.8	50.86	0	100	V	29.208	3.232	33.520	49.780	74.000	-24.220	Peak
2782.8	52.31	0	100	H	27.383	3.232	33.520	49.405	74.000	-24.595	Peak
2782.8	40.67	0	100	V	29.208	3.232	33.520	39.590	54.000	-14.410	Ave
2782.8	44.03	0	100	H	27.383	3.232	33.520	41.125	54.000	-12.875	Ave

Note: To show compliance, cabinet-emissions tests were performed on the low, middle, and high channels.

8 FCC §15.247(a) – Hopping Channel Bandwidth

8.1 Applicable Standard

According to FCC§15.247(a) (l), the maximum 20 dB bandwidth of the hopping channel shall be presented.

8.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emissions bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

8.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2014-11-13	1 year
Rohde & Schwarz	Signal Analyzer	FSQ26	200749	2015-03-09	1 year
-	SMA cable	-	C0001	Each Time[1]	N/A
Mini Circuit	Precision Fixed Attenuator, 20 dB	BW-S20W5	-	Each Time[1]	N/A

Note[1]: These items shall be calibrated before every test.

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:	23° C
Relative Humidity:	33 %
ATM Pressure:	101.2 kPa

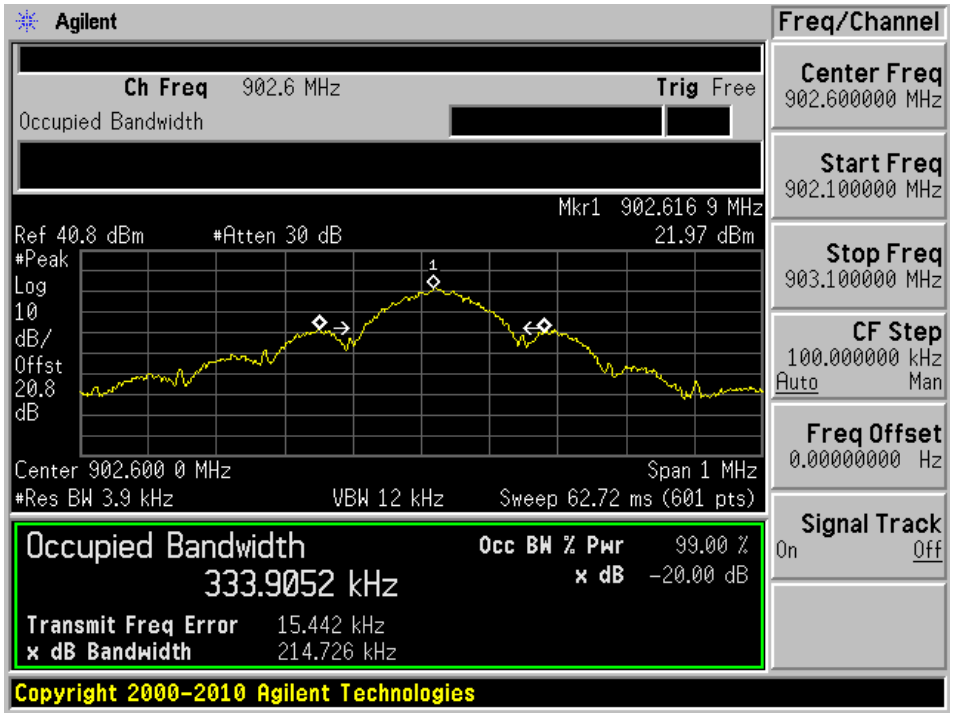
The testing was performed by Todd Moy on 2015-05-08 at the RF site.

8.5 Test Results

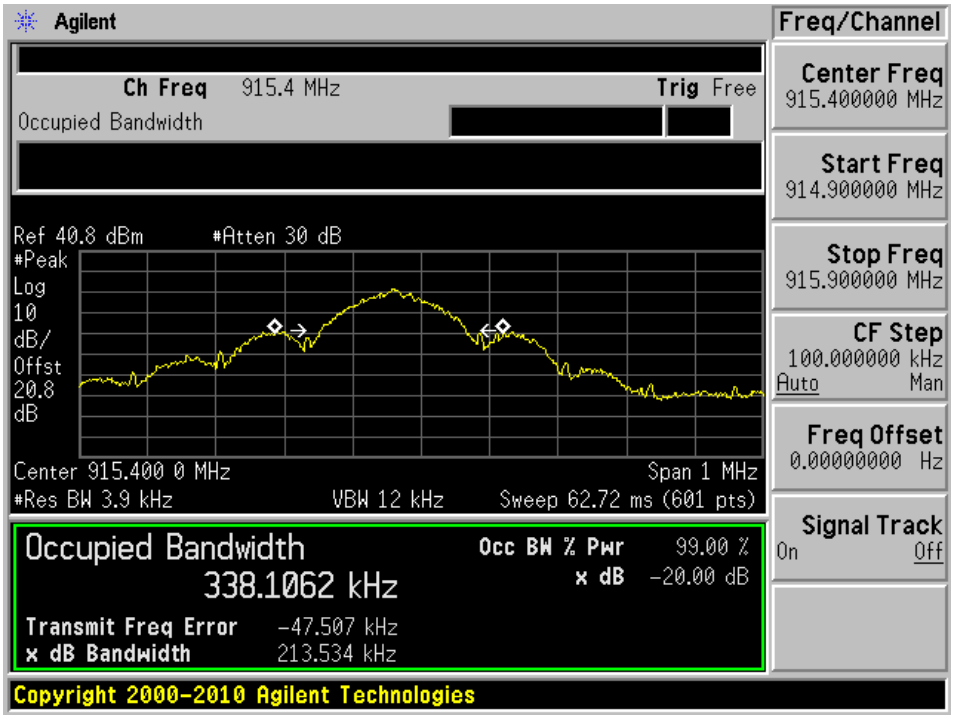
Channel	Frequency (MHz)	20 dB Emission Bandwidth (kHz)	99% Emission Bandwidth (kHz)	Results
Low	902.6	215.726	333.9052	Compliant
Middle 1	915.4	213.534	33.81062	Compliant
Middle 2	921.5	213.881	333.9181	Compliant
High	927.6	217.9488	326.5385	Compliant

Please refer to the following plots for detailed test results.

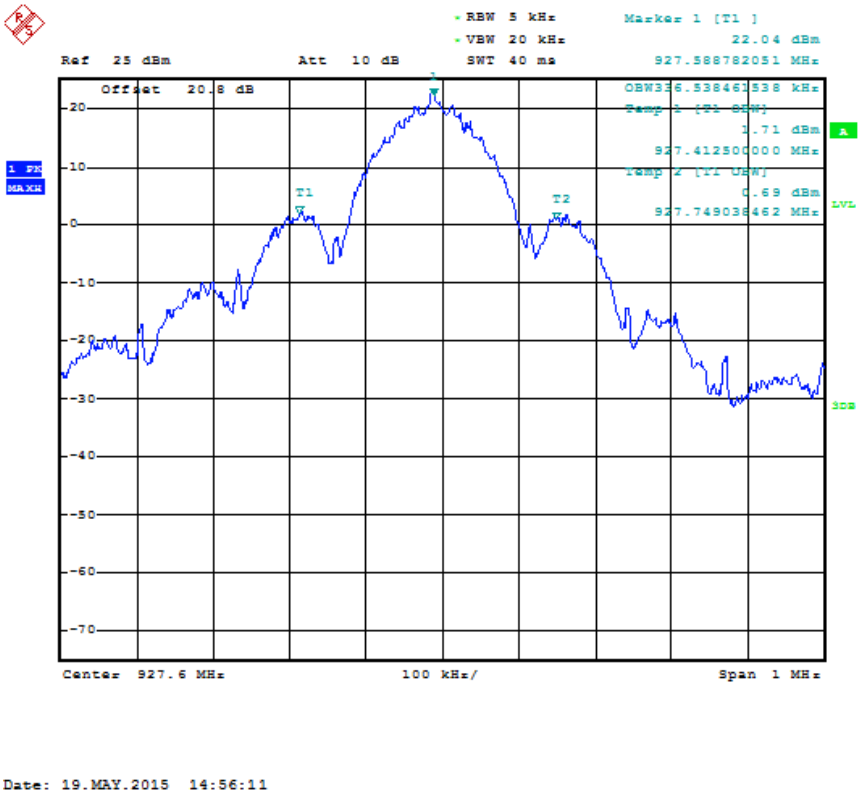
Low channel



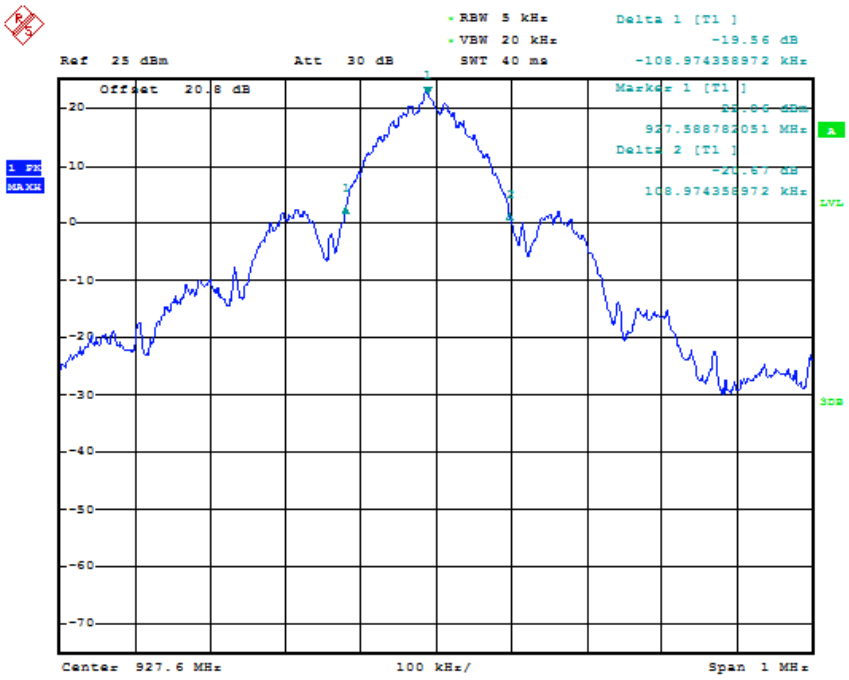
Middle channel



High channel, 99% Bandwidth



High Channel 20 dB Bandwidth



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9 FCC §15.247(a) – Hopping Channel Separation

9.1 Applicable Standard

According to FCC §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.

9.2 Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on a bench without connection to measurement instrument Turn on the EUT and set it to any one convenient frequency within its operating range.
3. By using the Max-Hold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function, and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2014-11-13	1 year
-	SMA cable	-	C0001	Each Time[1]	N/A
Mini Circuit	Precision Fixed Attenuator, 20 dB	BW-S20W5	-	Each Time[1]	N/A

Note[1]: These items shall be calibrated before every test.

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

9.4 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	33 %
ATM Pressure:	101.2 kPa

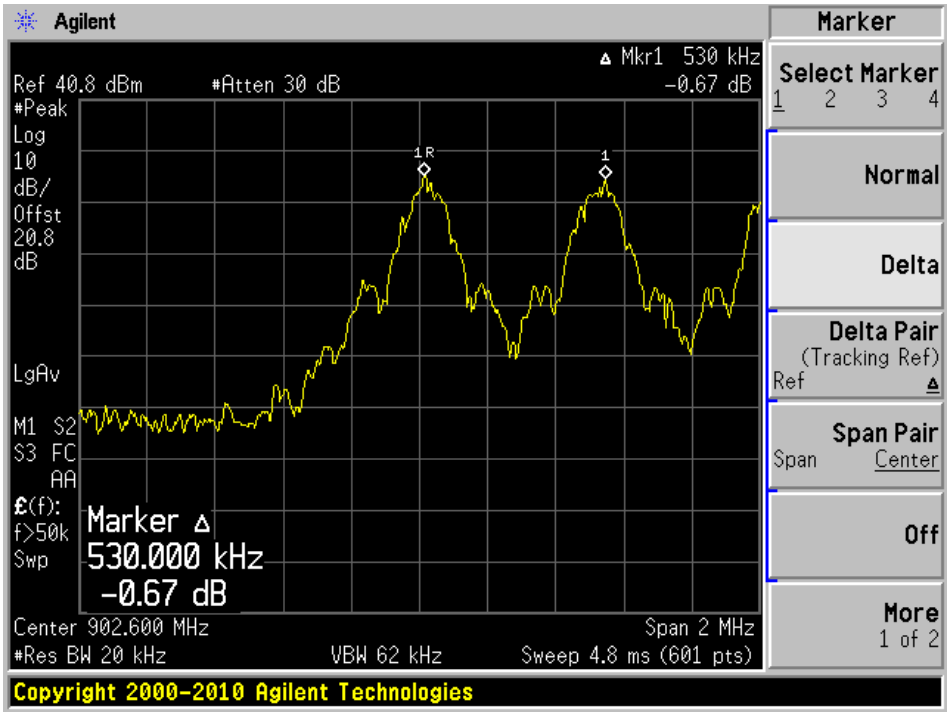
The testing was performed by Todd Moy on 2015-05-08 at the RF site.

9.5 Test Results

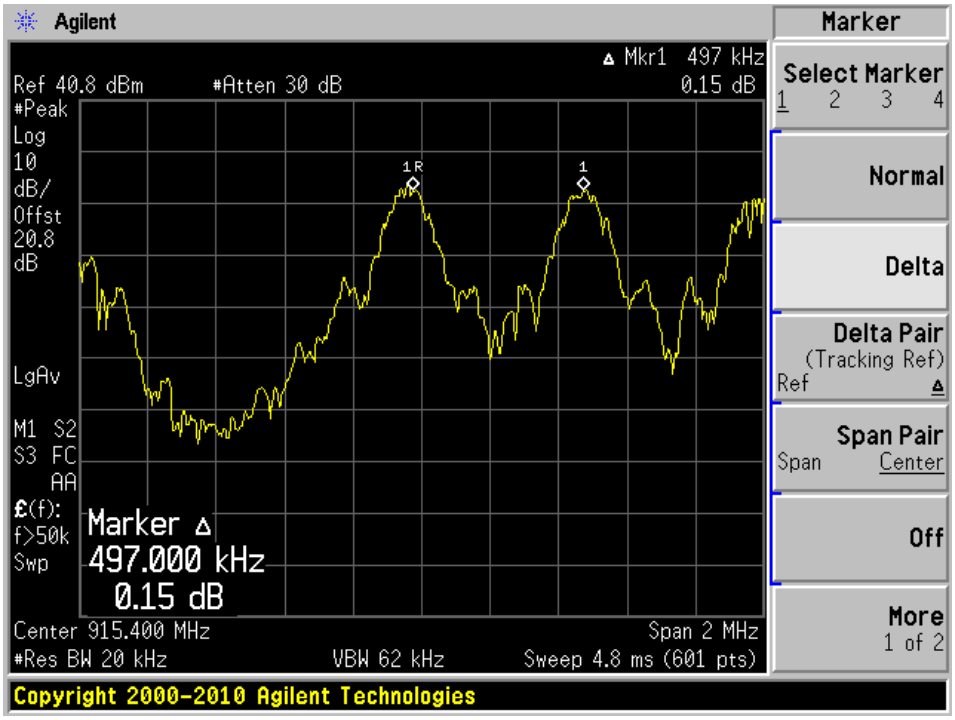
Channel	Frequency (MHz)	Channel Separation (kHz)	Limit > 20 dB OBW (kHz)	Result
Low	902.6	530	215.726	Pass
Middle	915.4	497	213.534	Pass
High	927.6	526.667	284.783	Pass

Please refer to the following plots.

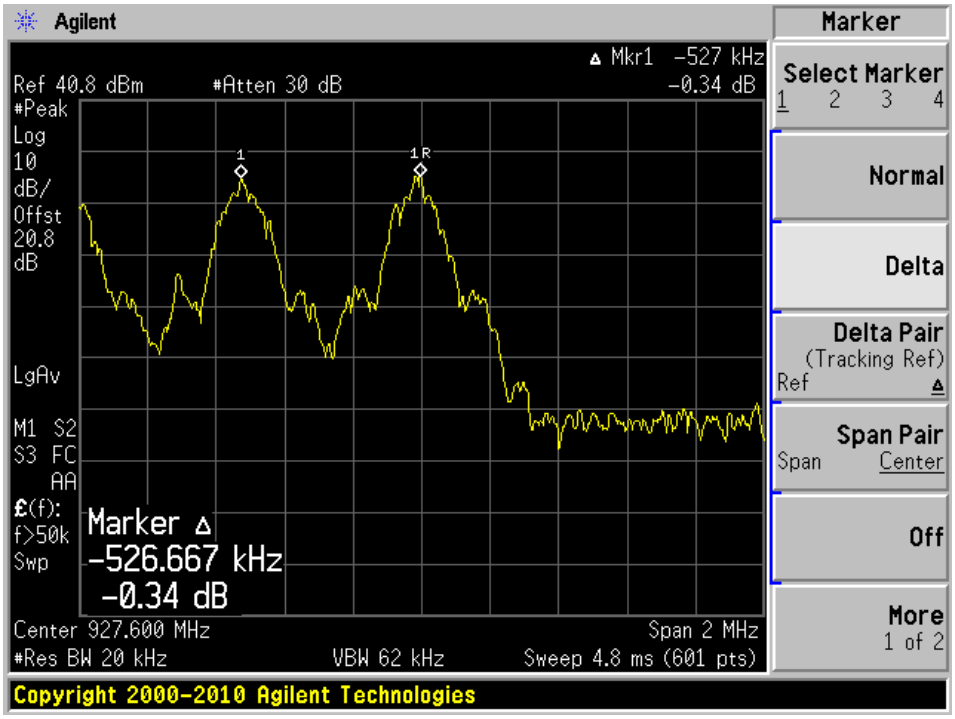
Low channel



Middle Channel



High Channel



10 FCC §15.247(a) - Number of Hopping Channels

10.1 Applicable Standard

According to FCC §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

10.2 Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the bench without connection to measurement instrument. Turn on the EUT and set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

10.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2014-11-13	1 year
-	SMA cable	-	C0001	Each Time[1]	N/A
Mini Circuit	Precision Fixed Attenuator, 20 dB	BW-S20W5	-	Each Time[1]	N/A

Note[1]: These items shall be calibrated before every test.

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

10.4 Test Environmental Conditions

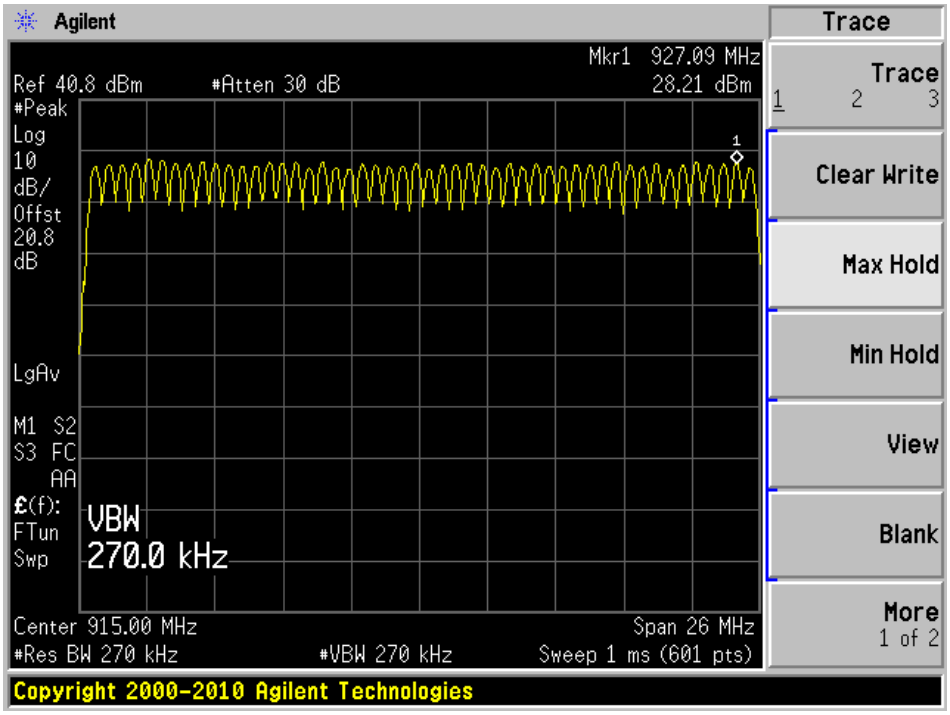
Temperature:	23° C
Relative Humidity:	33 %
ATM Pressure:	101.2 kPa

The testing was performed by Todd Moy on 2015-05-08 at the RF site.

10.5 Test Results

Total 50 channels; please refer to the plots hereinafter.

Hopping Channel Number: Total 50 Channels



11 FCC §15.247(a) - Dwell Time

11.1 Applicable Standard

According to FCC §15.247 (a)(1)(i), the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 20 second period.

11.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

11.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2014-11-13	1 year
-	SMA cable	-	C0001	Each Time[1]	N/A
Mini Circuit	Precision Fixed Attenuator, 20 dB	BW-S20W5	-	Each Time[1]	N/A

Note[1]: These items shall be calibrated before every test.

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

11.4 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	33 %
ATM Pressure:	101.2 kPa

The testing was performed by Todd Moy on 2015-05-08 at the RF site.

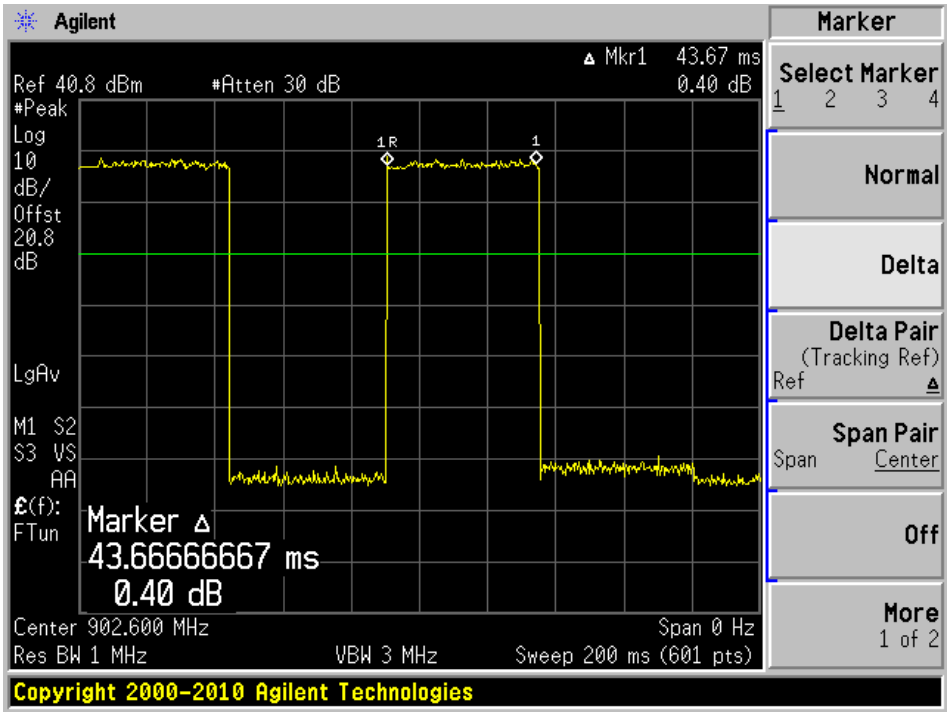
11.5 Test Results

Channel	Pulse Width (ms)	Dwell time (sec)	Limit (sec)	Results
Low	43.6667	0.1310	0.4	Compliant
Middle	44.3333	0.1330	0.4	Compliant
High	44.3333	0.1330	0.4	Compliant

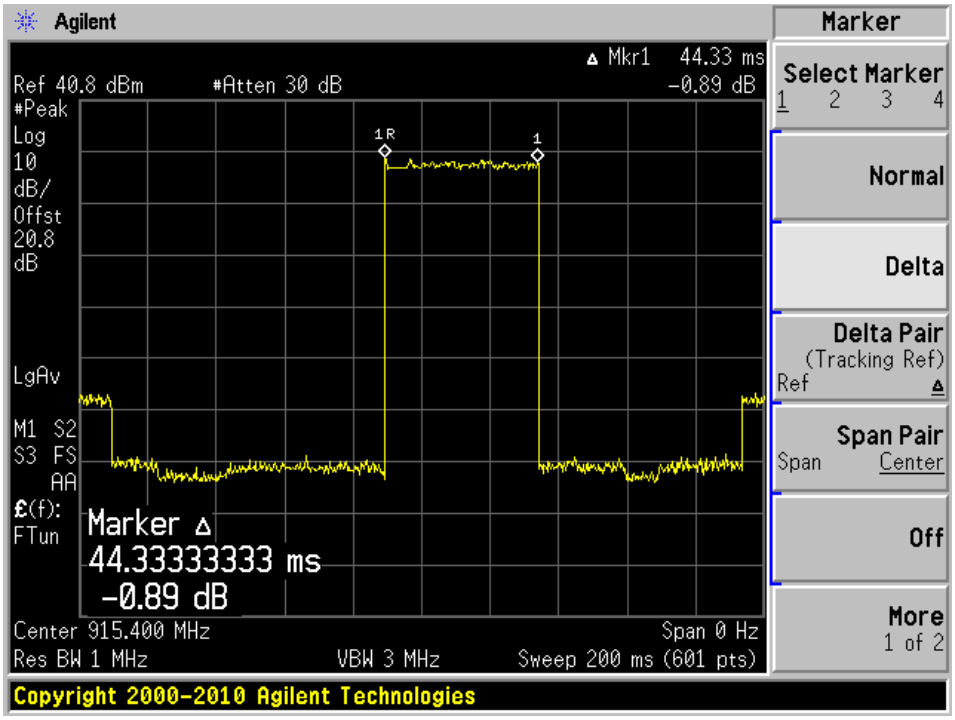
Note: There are 3 pulses during each 20 seconds.

Please refer to following plots:

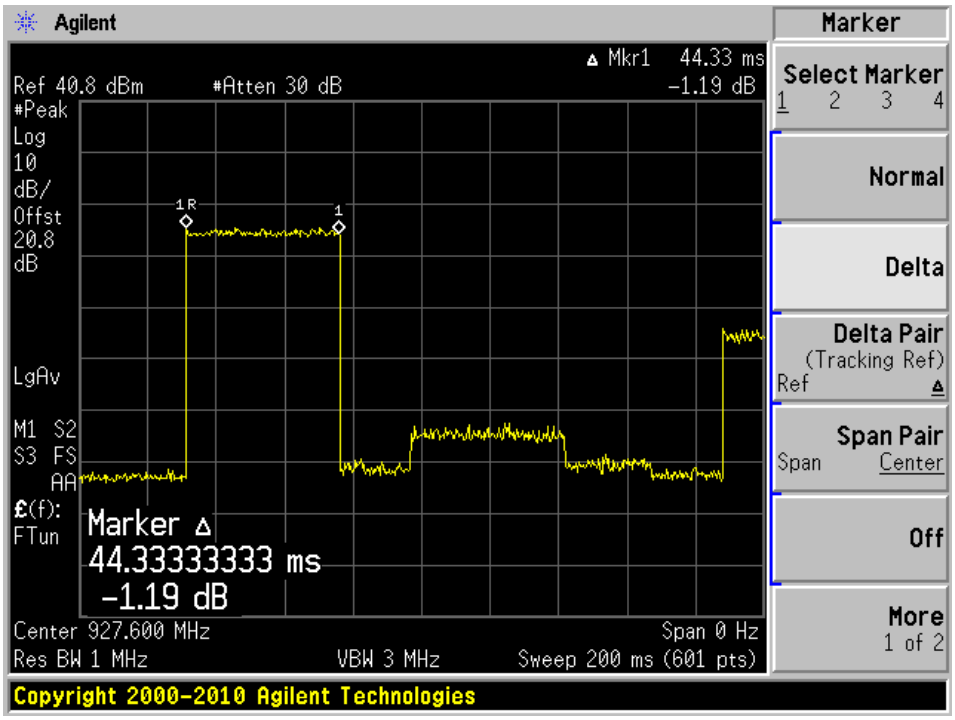
Low channel



Middle channel



High channel



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

12.1 Applicable Standard

According to FCC §15.247(b) for systems using digital modulation in the 902~928 MHz, 2400~2483.5 MHz, and 5725~5850 MHz bands: 1 Watt.

12.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Measured Guidance v03r01: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 9: Fundamental emission output power

12.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2014-11-13	1 year
-	SMA cable	-	C0001	Each Time[1]	N/A
Mini Circuit	Precision Fixed Attenuator, 20 dB	BW-S20W5	-	Each Time[1]	N/A

Note[1]: These items shall be calibrated before every test.

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

12.4 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	33 %
ATM Pressure:	101.2 kPa

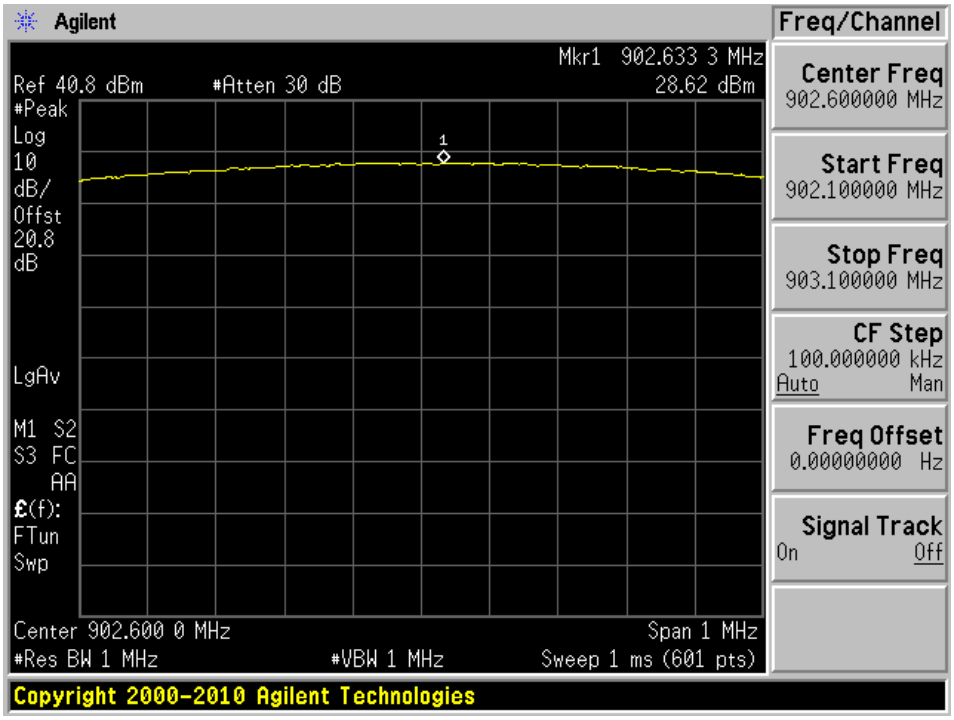
The testing was performed by Todd Moy on 2015-05-08 at the RF site.

12.5 Test Results

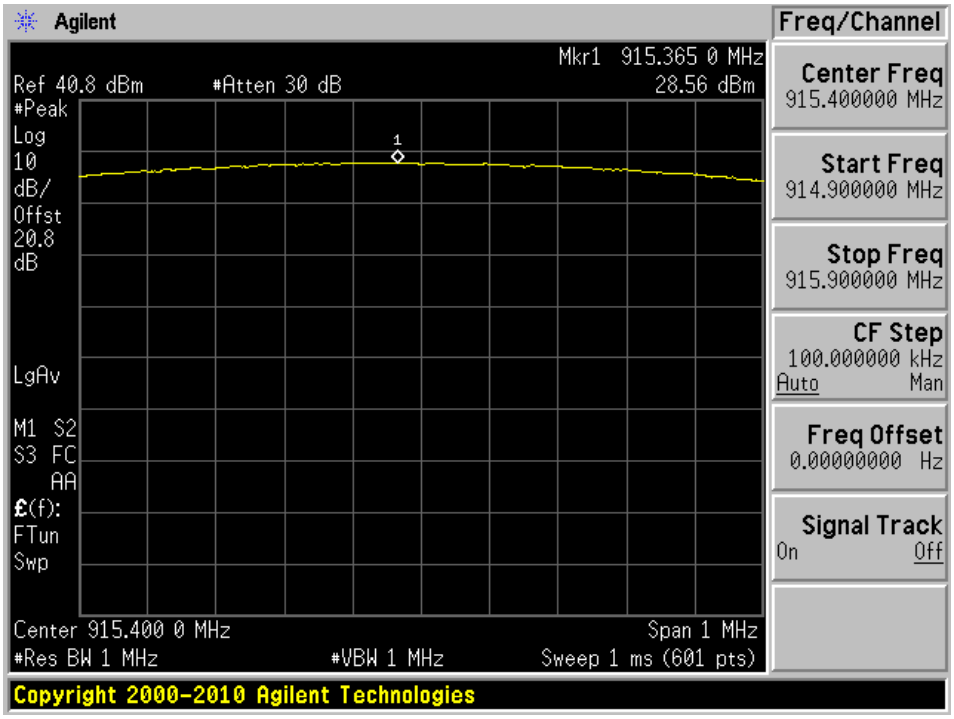
Channel	Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	902.6	28.62	30	-1.38
Middle	915.4	28.56	30	-1.44
High	927.6	28.42	30	-1.58

Please refer to the following plots for detailed test results.

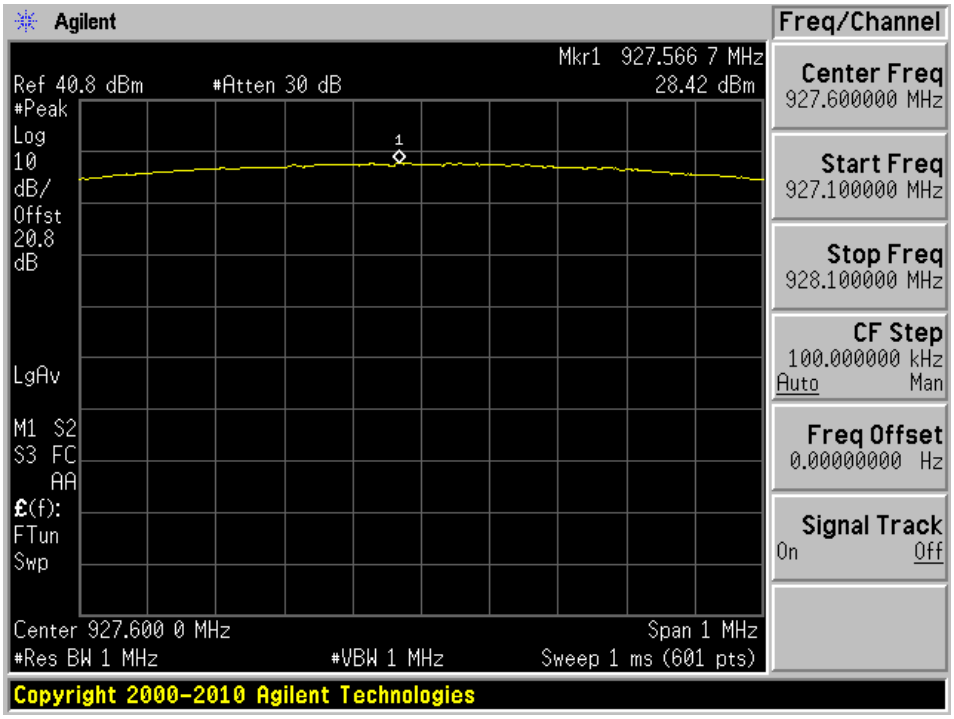
Low channel



Middle channel



High channel



13 FCC §15.247(d) – 100 kHz Bandwidth of Band Edges

13.1 Applicable Standard

According to FCC §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emissions limits specified in §15.209(a) see §15.205(c).

13.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Measure Guidance v03r01: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 13: Band-edge measurements

13.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	Signal Analyzer	FSQ26	200749	2015-03-09	1year
-	SMA cable	-	C0001	Each Time[1]	N/A
Mini Circuit	Precision Fixed Attenuator, 20 dB	BW-S20W5	-	Each Time[1]	N/A

Note[1]: These items shall be calibrated before every test.

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

13.4 Test Environmental Conditions

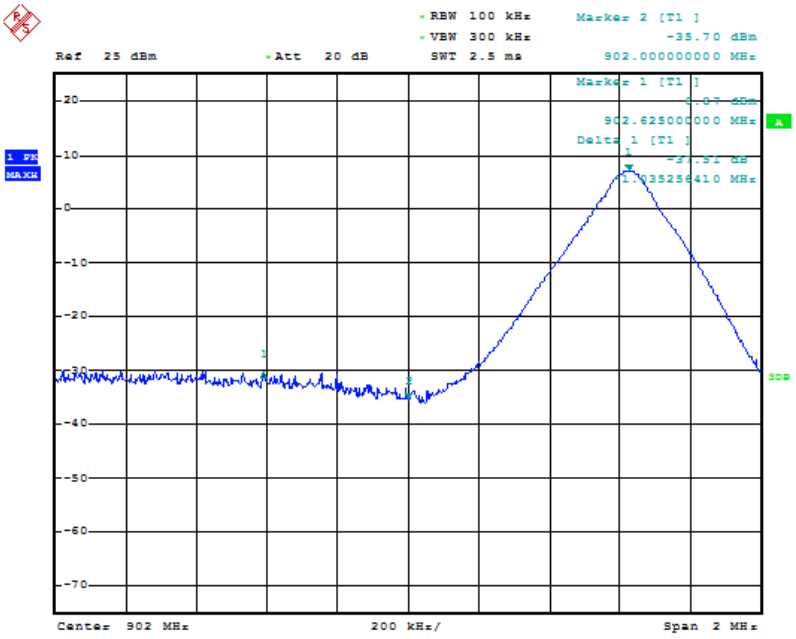
Temperature:	23° C
Relative Humidity:	33 %
ATM Pressure:	101.2 kPa

The testing was performed by Todd Moy on 2015-05-08 at the RF site.

13.5 Test Results

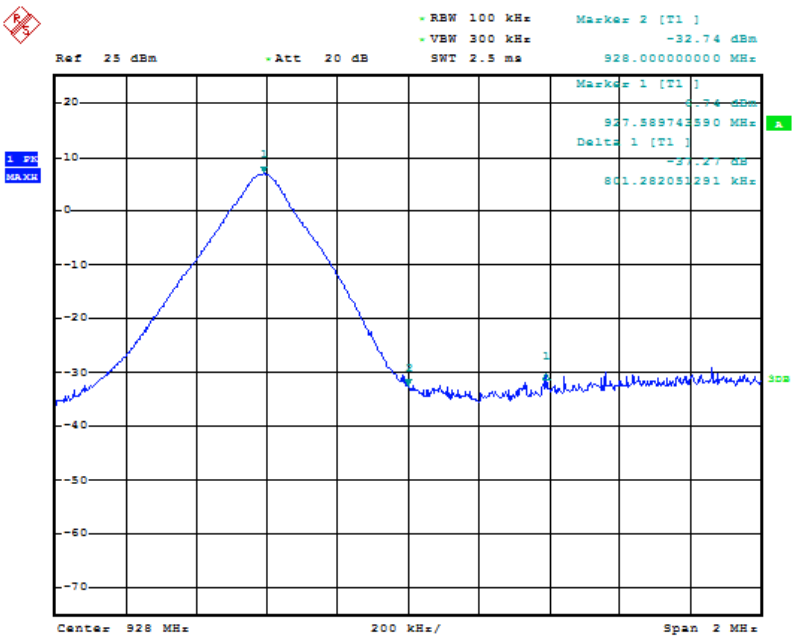
Please refer to following pages for plots of band edge.

Low CH @ Band Edge



Date: 6.JUN.2015 18:22:41

High CH @ Band Edge



Date: 6.JUN.2015 18:33:54

14 FCC §15.247(d) - Spurious Emissions at Antenna Terminals

14.1 Applicable Standard

For 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.

14.2 Measurement Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

14.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2014-11-13	1 year
-	SMA cable	-	C0001	Each Time[1]	N/A
Mini Circuit	Precision Fixed Attenuator, 20 dB	BW-S20W5	-	Each Time[1]	N/A

Note[1]: These items shall be calibrated before every test.

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

14.4 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	33 %
ATM Pressure:	101.2 kPa

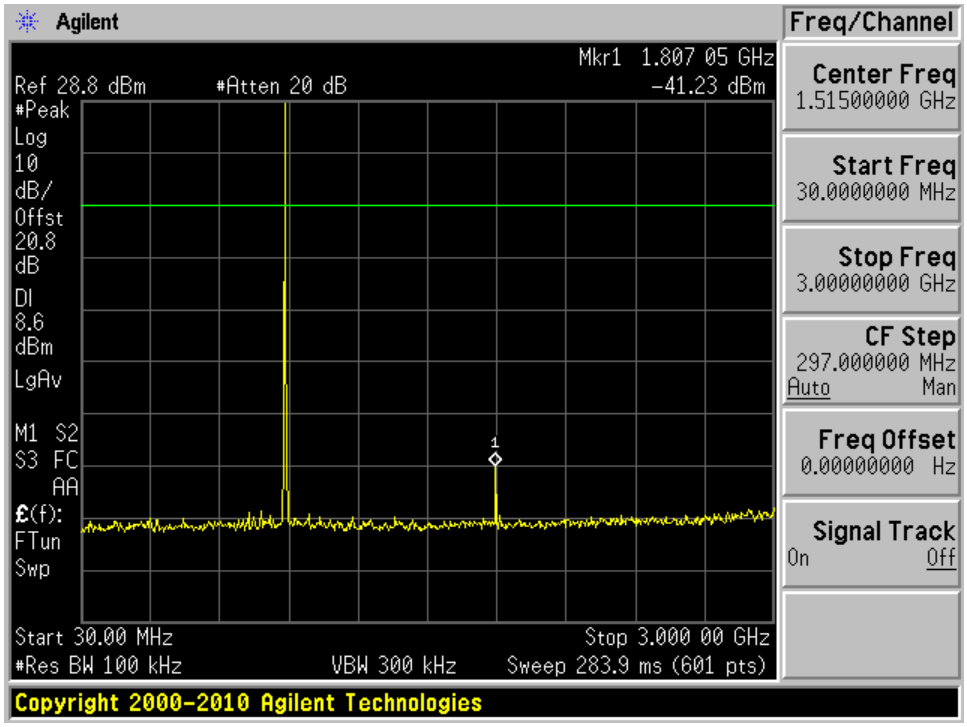
The testing was performed by Todd Moy on 2015-05-08 at the RF site.

14.5 Test Results

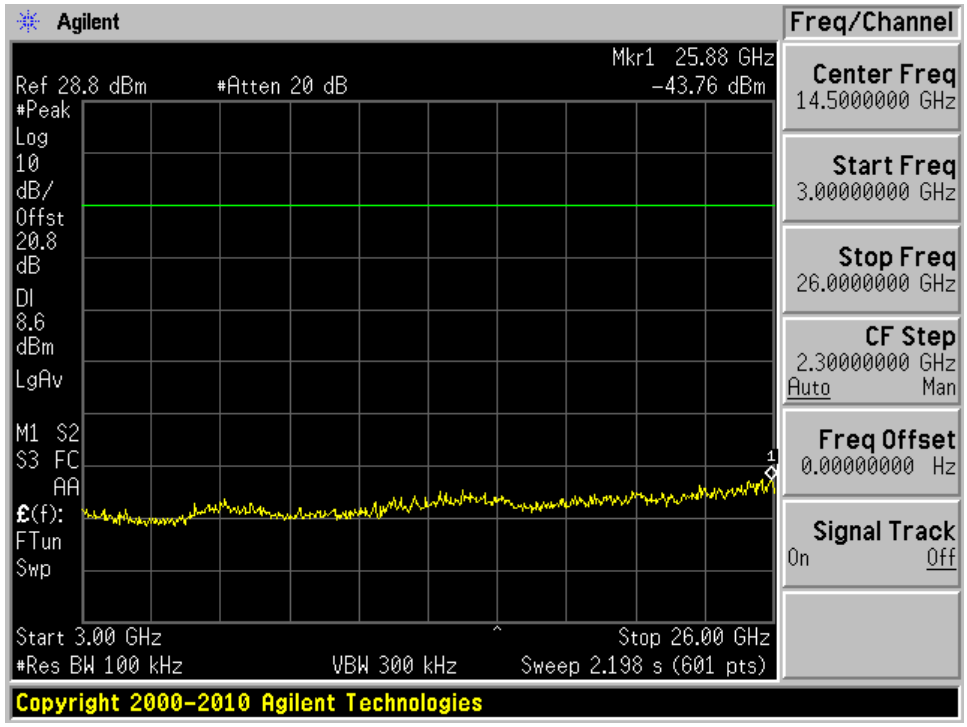
Please refer to following plots.

Low Channel

30 MHz to 3 GHz

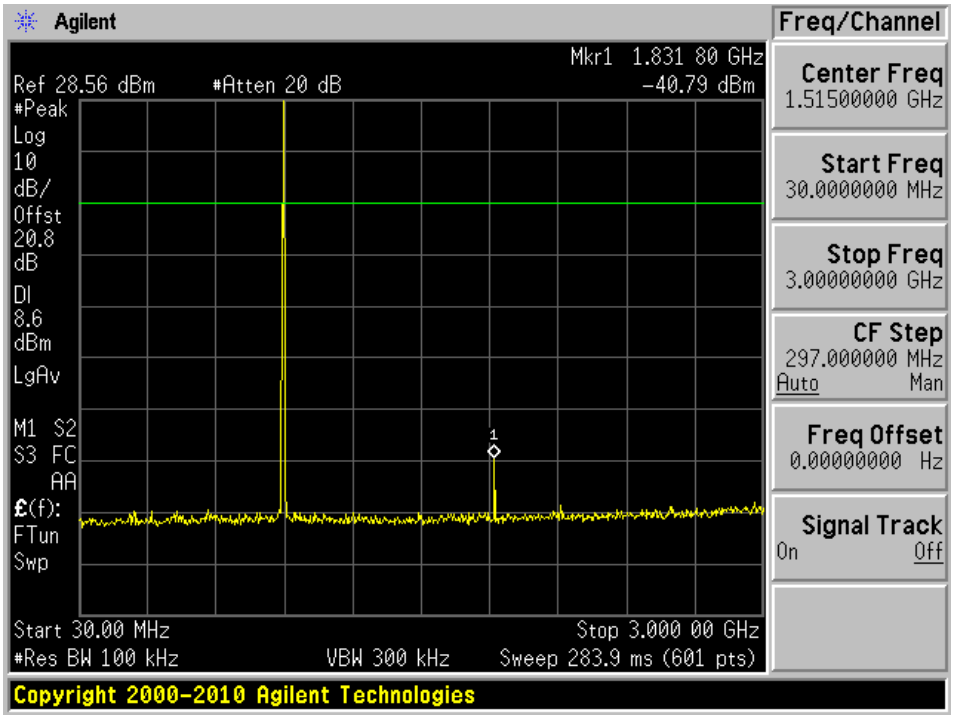


3 GHz to 26 GHz

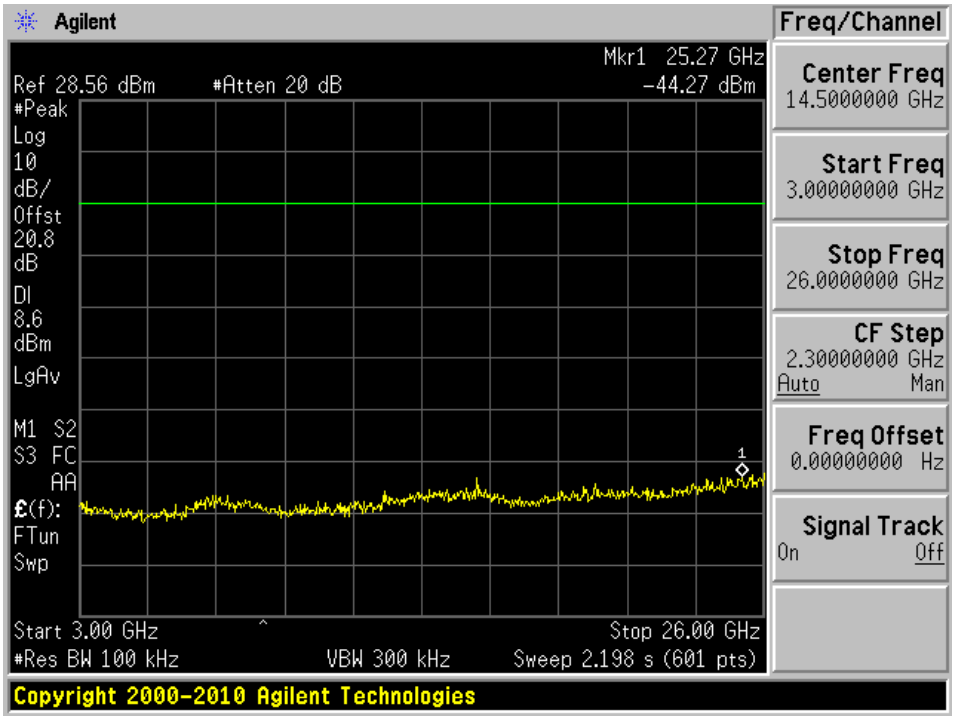


Middle Channel

30 MHz to 3 GHz

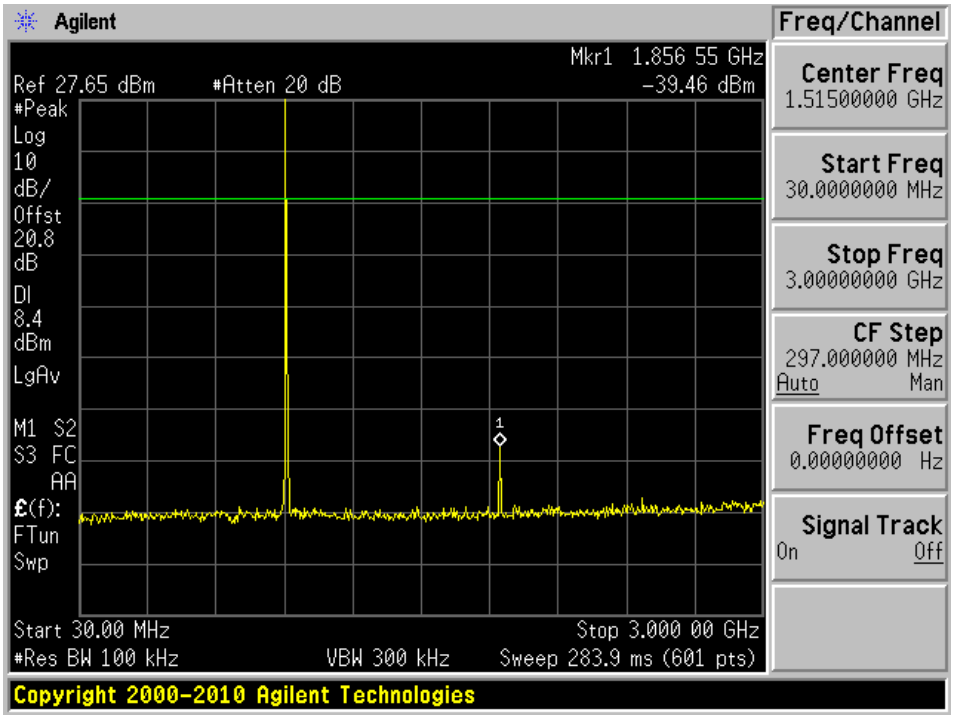


3 GHz to 26 GHz



High Channel: 927.6 MHz

30 MHz to 3 GHz



3 GHz to 26 GHz