FCC PART 15, SUBPART C
IC RSS-247, ISSUE 1, MAY 2015

TEST AND MEASUREMENT REPORT

For

NVIDIA Corporation

2701 San Tomas Expressway,

Santa Clara, CA 95050, USA

FCC ID: VOB-P2450A
IC: 7361A-P2450A
Model: P2450

Report Type:	**Product Type:**
CIIPC Report	Portable Gaming Device

Prepared By	Jason Qian Associate Engineer
Report Number	R1512175-247
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TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1512175-247	Initial	2016-01-13

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report has been compiled on behalf of *NVIDIA Corporation,* and their product, FCC ID: VOB-P2450A, IC: 7361A-P2450A, model number: P2450, which henceforth is referred to as the EUT (Equipment Under Test.), The EUT is a portable gaming device operates in 2.4 GHz and 5 GHz bands.

1.2 Mechanical Description of EUT

The EUT measures approximately 160 mm (L) x 135 mm (W) x 55 mm (H) and weighs approximately 585 g.

The data gathered are from a typical production sample provided by the manufacturer with serial number: TRB2-0020

1.3 Objective

This report is prepared on behalf of *NVIDIA Corporation* in accordance with Part 2, Subpart J, and Part 15, Subparts B and C of the Federal Communication Commission's rules and IC RSS-247 Issue 1, May 2015.

This is a Class II Permissive Change of adding BLE. The objective is to determine compliance with FCC Part 15.247 and IC RSS-247 rules for Output Power, Antenna Requirements, AC Line Conducted Emissions, 6 dB Bandwidth, power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Spurious Emissions, Conducted and Radiated Spurious Emissions.

1.4 Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS, 15.407 NII with FCC IC: VOB-P2450A and IC: 7361A-P2450A.

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB 558074 D01 DTS Meas Guidance v03r03: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

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 CISPR16-4-2:2011, 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:
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 C63.10-2013, ANSI C63.4-2014, 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 C63.10-2013 and FCC KDB 558074 D01 DTS Meas Guidance v03r03.

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

2.2 EUT Exercise Software

The software is provided by customer. The EUT exercise program used during testing was designed to exercise the system components. The EUT had been tested with the following channels settings:

Radio Mode	Frequency Band	Frequency (MHz)		
		Low CH	Mid CH	High CH
BLE	2.4 GHz	2402	2440	2480

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 No.	Serial No.
Lenovo	Laptop	G560-0679	CB08585694
DELL	Laptop	PP18L	PF329 A03

2.6 EUT Internal Configuration Details

Manufacturer	Description	Type	Serial Number
NVIDIA Corporation	Joystick board	Gaming control stick	0511613700054
NVIDIA Corporation	Control panel	Button board	0511613600173
Sanyo	Battery	Battery	027-0012-000
NVIDIA Corporation	Mother board	Mother Board	0511613500407
Delta Electronics Inc.	Fan	Fan	-

2.7 Interface Ports and Cables

Cable Description	Length (m)	To	From
RF Cable	<1.0	PSA	EUT
USB Cable	<1.0	Laptop	EUT

2.8 Power Supply List and Details

Manufacturer	Description	Model	Part Number
NVIDIA Corporation	Power Adapter	P2551	-

3 Summary of Test Results

Results reported relate only to the product tested.

FCC & IC Rules	Description of Test	Results
FCC §15.203 IC RSS-Gen §8.3	Antenna Requirement	Compliant
FCC §15.207(a) IC RSS-Gen §8.8	AC Line Conducted Emissions	Compliant
FCC §15.247(i) IC RSS-102	RF Exposure	Compliant
FCC §15.247 (d) IC RSS-247 §5.5	Spurious Emissions at Antenna Port	Compliant
FCC §15.205 IC RSS-Gen §8.10	Restricted Bands	Compliant
FCC §15.209, §15.247 (d) IC RSS-247 §5.5 IC RSS-Gen §8.9	Radiated Spurious Emissions	Compliant
FCC §15.247(a)(2) IC RSS-247 §5.2 IC RSS-Gen §6.6	6 dB & 99% Emission Bandwidth	Compliant
FCC §15.247(b)(3) IC RSS-247 §5.4	Maximum Peak Output Power	Compliant
FCC §15.247(d) IC RSS-247 §5.5	100 kHz Bandwidth of Frequency Band Edge	Compliant
FCC §15.247(e) IC RSS-247 §5.2	Power Spectral Density	Compliant

4 FCC §15.203 & IC RSS-Gen §8.3 – Antenna Requirements

4.1 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.

According to IC RSS-Gen §8.3: Transmitter Antenna

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the license-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

License-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the license-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of license-exempt transmitter and antenna type, with the transmitter output power set at the maximum level. 9 When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

User manuals for transmitters equipped with detachable antennas shall also contain the following notice in a conspicuous location:

This radio transmitter (identify the device by certification number) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types approved for use with the transmitter, indicating the maximum permissible antenna gain (in dBi).

4.2 Antenna List

Antenna Location	Manufacturers	Models/Name	Antenna Gain (dBi) @ 2.4 GHz	Antenna Gain (dBi) @ 5 GHz
Top	Amphenol	NV4157-12-005-R-FC	2.46	5.04
Right	Amphenol	NV4158-12-005-R-FC	2.83	5.18

The antenna consists of non-standard (UFL) connectors with less 6 dBi gain; Antenna gain that exceeds 6 dBi was added to RF measurement therefore, it complies with the antenna requirement. Please refer to the internal photos.

5 FCC §15.247(i), §2.1093 & IC RSS §102 – RF Exposure

5.1 Applicable Standards

According to FCC KDB 447498 D01, Appendix A:

SAR Test Exclusion Thresholds for 100 MHz-6 GHz and ≤ 50 mm
Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distance are illustrated in the following Table:

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	*SAR Test Exclusion Threshold* (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	

Note: 10-g Extremity SAR Test Exclusion Power Thresholds are 2.5 times higher than the 1-g SAR Test Exclusion Thresholds indicated above. These thresholds do not apply, by extrapolation or other means, to occupational exposure limits.
According to IC RSS-102 Issue 5:

2.5.1 Exemption Limits for Routine Evaluation – SAR Evaluation
SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance[4,5]

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
≤300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in Table 1, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.

5.2 Evaluation Results

The highest output power is **6.78 dBm**, and the antenna gain is **2.83dBi**, so the maximum EIRP is **9.61 dBm**, which is **9.14 mW**.

For FCC Evaluation:

The SAR Test Exclusion Threshold is **10mW**, for 10-g Extremity SAR Test Exclusion Power Thresholds are **2.5** times higher than the 1-g SAR Test Exclusion Thresholds, therefore, the threshold for this device is **25mW**, which is greater than **9.14mW**, so SAR testing is not required.

For IC Evaluation:

The SAR Test Exclusion Threshold is **4mW**, for 10-g Extremity SAR Test Exclusion Power Thresholds are **2.5** times higher than the 1-g SAR Test Exclusion Thresholds, therefore, the threshold for this device is **10mW**, which is greater than **9.14mW**, so SAR testing is not required.

6 FCC §15.207 & IC RSS-Gen §8.8 – 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 Note1	56 to 46 Note2
0.5-5	56	46
5-30	60	50

Note1: Decreases with the logarithm of the frequency.

According to RSS GEN §8.8:

A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz-30 MHz, shall not exceed the limits in Table 3.
Unless the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 3 below.
The more stringent limit applies at the frequency range boundaries. The conducted emissions shall be measured in accordance with the reference publication mentioned in Section 3.

Table 3 – AC Power Line Conducted Emissions Limits

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

**: The level decreases linearly with the logarithm of the frequency.*
***: A linear average detector is required.*

6.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.4-2014 measurement procedure. The specification used was FCC §15.207 and IC RSS-Gen §8.8 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 cord of the EUT host system was connected to the mains outlet of the LISN-1 and the power cord of the support equipment was connected to 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".

6.4 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:

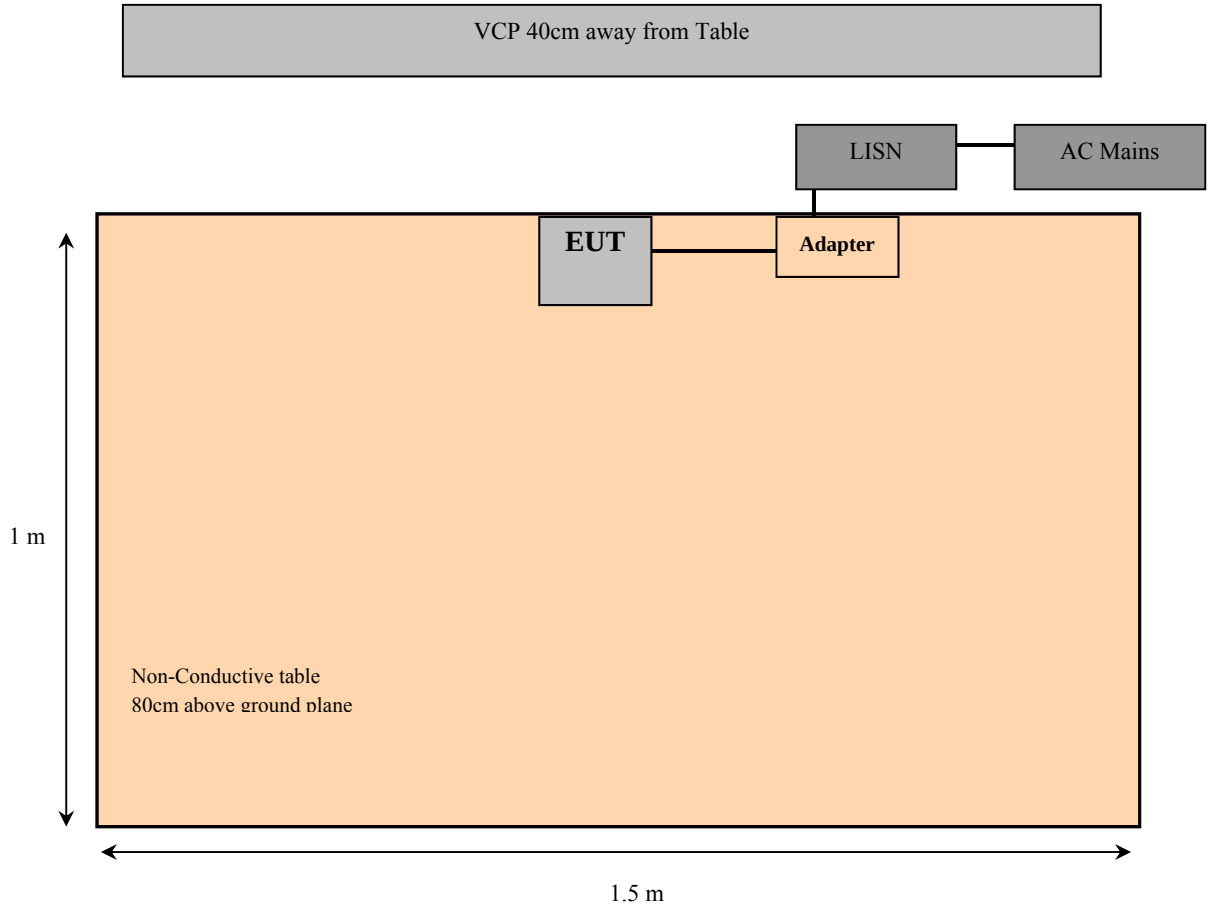
CA = Ai + CL + Atten

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

6.5 Test Setup Block Diagram



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	100337	2015-06-18	1 year
FCC	LISN	FCC-LISN-50-2-10-CISPR16 1PA ANSI 14	160130	2015-04-07	1 year
TTE INCORPORATED	High Pass Filter	H985-150k-50-720N	H 886	2015-01-09	1 year
Ericsson	Pulse Limiter	ESH 3-Z2	101964	N/A	N/A
Suirong	30 ft conductive emission cable	LMR 400	-	2015-03-05	1 year
Hewlett-Packard	5 ft N-type RF cable	-	1268	2015-05-15	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 º C
Relative Humidity:	42 %
ATM Pressure:	101.31 kPa

The testing was performed by Jason Qian on 2015-12-17 in 5 chamber3

6.8 Summary of Test Results

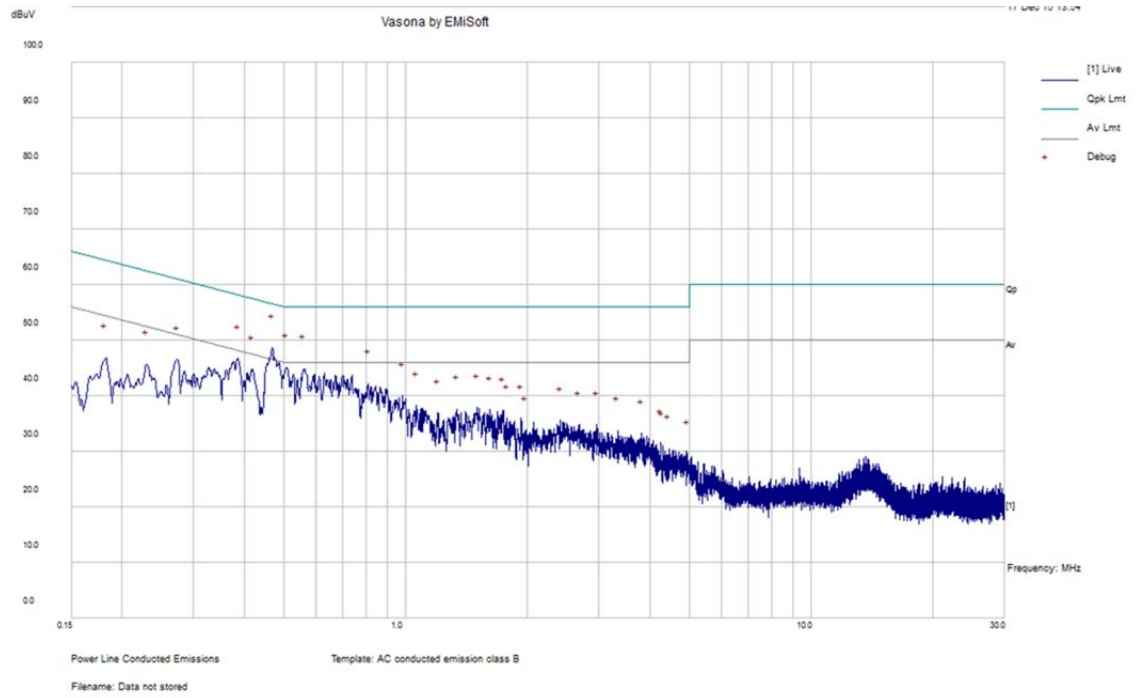
According to the recorded data in following table, the EUT complied with the FCC 15C and IC RSS-Gen standard's conducted emissions limits, with the margin reading of:

BLE mode:

Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Live/Neutral)**	**Range (MHz)**
-11.59	0.435624	Neutral	0.15-30

6.9 Conducted Emissions Test Plots and Data

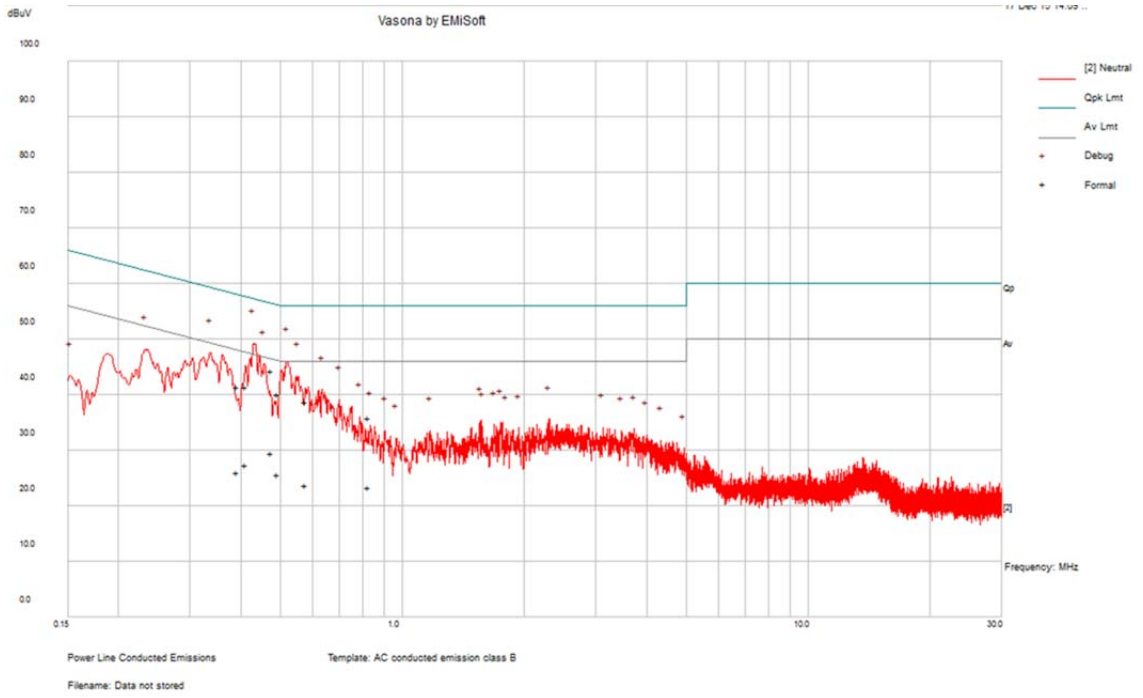
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (PK/QP/Ave.)
0.475836	44.26	Line	56.41	-12.15	QP
0.49398	40.04	Line	56.1	-16.06	QP
0.577782	38.76	Line	56	-17.24	QP
0.392241	41.39	Line	58.02	-16.63	QP
0.410406	41.52	Line	57.64	-16.12	QP
0.823965	35.88	Line	56	-20.12	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (PK/QP/Ave.)
0.475836	29.62	Line	46.41	-16.79	Ave.
0.49398	25.71	Line	46.1	-20.39	Ave.
0.577782	23.81	Line	46	-22.19	Ave.
0.392241	26.05	Line	48.02	-21.96	Ave.
0.410406	27.42	Line	47.64	-20.22	Ave.
0.823965	23.4	Line	46	-22.6	Ave.

120 V, 60 Hz – Neutral



Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (PK/QP/Ave.)
0.435624	45.55	Neutral	57.14	-11.59	QP
0.520779	41.09	Neutral	56	-14.91	QP
0.438957	44.51	Neutral	57.08	-12.57	QP
0.331326	43.16	Neutral	59.42	-16.26	QP
0.552639	38.91	Neutral	56	-17.09	QP
0.234945	44.5	Neutral	62.27	-17.78	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (PK/QP/Ave.)
0.435624	30.82	Neutral	47.14	-16.32	Ave.
0.520779	27.49	Neutral	46	-18.51	Ave.
0.438957	29.68	Neutral	47.08	-17.4	Ave.
0.331326	29.34	Neutral	49.42	-20.08	Ave.
0.552639	23.71	Neutral	46	-22.29	Ave.
0.234945	31.09	Neutral	52.27	-21.18	Ave.

7 FCC §15.209, §15.247(d) & IC RSS-247 §5.5, RSS-Gen §8.9, §8.10 - Spurious Radiated Emissions

7.1 Applicable Standards

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) and RSS-210: 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).

As per IC RSS-Gen 8.9,

> Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in Table 4 or Table 5 below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

Table 4 – General Field Strength Limits for Licence-Exempt Transmitters at Frequencies Above 30 MHz

Frequency (MHz)	Field Strength (µv/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960*	500

* Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

Note: Transmitting devices are not permitted in restricted frequency bands unless stated otherwise in the specific RSS.

As per IC RSS-247 5.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

As per IC RSS-Gen 8.10, Restricted bands, identified in Table 6, are designated primarily for safety-of-life services (distress calling and certain aeronautical bands), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following restrictions apply: (a) Fundamental components of modulation of licence-exempt radio apparatus shall not fall within the restricted bands of Table 6 except for apparatus complying under RSS-287; (b) Unwanted emissions that fall into restricted bands of Table 6 shall comply with the limits specified in RSS-Gen; and (c) Unwanted emissions that do not fall within the restricted frequency bands of Table 6 shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

Table 6 – Restricted Frequency Bands*

MHz
0.090-0.110
2.1735-2.1905
3.020-3.026
4.125-4.128
4.17725-4.17775
4.20725-4.20775
5.677-5.683
6.215-6.218
6.26775-6.26825
6.31175-6.31225
8.291-8.294
8.362-8.366
8.37625-8.38675
8.41425-8.41475
12.29-12.293
12.51975-12.52025
12.57675-12.57725
13.36-13.41
16.42-16.423
16.69475-16.69525
16.80425-16.80475
25.5-25.67
37.5-38.25
73-74.6
74.8-75.2
108-138
156.52475-156.52525
156.7-156.9

MHz
240-285
322-335.4
399.9-410
608-614
960-1427
1435-1626.5
1645.5-1646.5
1660-1710
1718.8-1722.2
2200-2300
2310-2390
2655-2900
3260-3267
3332-3339
3345.8-3358
3500-4400
4500-5150
5350-5460
7250-7750
8025-8500

GHz
9.0-9.2
9.3-9.5
10.6-12.7
13.25-13.4
14.47-14.5
15.35-16.2
17.7-21.4
22.01-23.12
23.6-24.0
31.2-31.8
36.43-36.5
Above 38.6

* Certain frequency bands listed in Table 6 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in the 200- and 300-series of RSSs, such as RSS-210 and RSS-310, which contain the requirements that apply to licence-exempt radio apparatus.

7.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.10-2013. The specification used was the FCC 15 Subpart C.

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

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
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2015-06-18	1 year
Agilent	Spectrum Analyzer	E4440A	MY44303352	2015-06-22	1 year
Sunol Science Corp	System Controller	SC99V	011003-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-3	2015-07-11	1 year
EMCO	Horn Antenna	3115	9511-4627	2015-01-15	1 year
Agilent	Pre-amplifier	8447D	2944A10187	2015-03-20	1 year
Suirong	30 ft conductive emission cable	LMR 400	-	2015-03-05	1 year
-	SMA cable	-	C0002	Each time[1]	N/A
IW Microwave	High Frequency Cable	DC-1438	SPS-2303-3840-SPS	2015-09-23	1 year
Hewlett-Packard	5 ft N-type RF cable	-	1268	2015-05-15	1 year
Hewlett	Pre-Amplifier	8449B	3008A01978	2015-03-11	1year
BK Precision	Source, DC	1740	26502000233	N/A	N/A
Fluke Corp	Multimeter, Digital	233	23790031	2015-07-06	1 year

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL *attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.*

7.6 Test Environmental Conditions

Temperature:	22º C
Relative Humidity:	42 %
ATM Pressure:	102.7 kPa

The testing was performed by Jason Qian on 2015-12-17 in 5m chamber 3.

7.7 Summary of Test Results

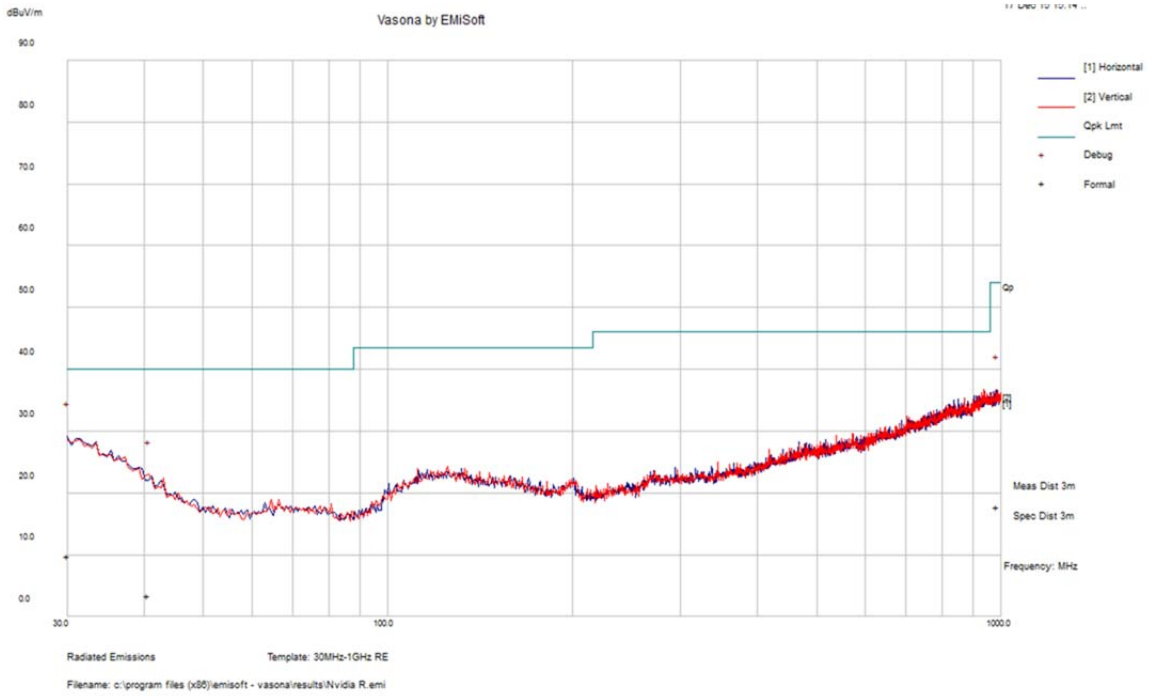
According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15C and IC RSS-210 standard's radiated emissions limits, and had the worst margin of:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode**
-8.7	9900	Vertical	BLE

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

7.8 Radiated Emissions Test Results

1) 30 MHz – 1 GHz Worst Case, Measured at 3 meter



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comments
549.9543	9.84	176	H	90	40	-30.16	QP
37.92825	3.45	225	V	163	40	-36.55	QP
50.00975	17.78	159	V	83	54	-36.22	QP

2) 1–25 GHz Measured at 3 meters

requency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2402 MHz, measured at 3 meters											
2402	62.65	330	240	V	28.174	4.44	N/A	94.254	N/A	N/A	Peak
2402	72.01	180	100	H	28.197	4.44	N/A	103.637	N/A	N/A	Peak
2402	64.16	180	220	V	28.174	4.44	N/A	95.764	N/A	N/A	Ave
2402	70.97	300	240	H	28.197	4.44	N/A	102.597	N/A	N/A	Ave
2390	26.62	0	100	V	28.174	4.44	N/A	59.23	74.00	-14.77	Peak
2390	25.93	0	100	H	28.197	4.44	N/A	58.57	74.00	-15.43	Peak
2390	11.97	0	100	V	28.174	4.44	N/A	44.58	54.00	-9.42	Ave
2390	11.95	0	100	H	28.197	4.44	N/A	44.59	54.00	-9.41	Ave
4804	42.33	0	100	V	33.12	5.357	34.62	46.19	74.00	-27.81	Peak
4804	42.3	0	100	H	33.18	5.357	34.62	46.22	74.00	-27.78	Peak
4804	30.16	0	100	V	33.12	5.357	34.62	34.02	54.00	-19.98	Ave
4804	30.66	0	100	H	33.18	5.357	34.62	34.58	54.00	-19.42	Ave
7206	43.16	0	100	V	37.44	6.925	34.44	53.09	74.00	-20.91	Peak
7206	43.12	0	100	H	37.44	6.925	34.44	53.05	74.00	-20.95	Peak
7206	30.48	0	100	V	37.44	6.925	34.44	40.41	54.00	-13.59	Ave
7206	30.24	0	100	H	37.44	6.925	34.44	40.17	54.00	-13.83	Ave
9608	42.05	0	100	V	38.83	10.204	32.66	58.42	74.00	-15.58	Peak
9608	42.72	0	100	H	38.83	10.204	32.66	59.10	74.00	-14.90	Peak
9608	28.54	0	100	V	38.83	10.204	32.66	44.91	54.00	-9.09	Ave
9608	28.67	0	100	H	38.83	10.204	32.66	45.05	54.00	-8.95	Ave
Middle Channel 2440 MHz, measured at 3 meters											
2440	62.96	330	166	V	28.174	4.44	N/A	94.564	N/A	N/A	Peak
2440	68.68	340	172	H	28.197	4.44	N/A	100.307	N/A	N/A	Peak
2440	62.45	330	166	V	28.174	4.44	N/A	94.054	N/A	N/A	Ave
2440	69.62	310	166	H	28.197	4.44	N/A	101.247	N/A	N/A	Ave
4880	43.16	249	240	V	33.32	5.375	34.61	47.25	74.00	-26.75	Peak
4880	44.43	133	112	H	33.35	5.375	34.61	48.55	74.00	-25.45	Peak
4880	30.86	249	240	V	33.32	5.375	34.61	34.95	54.00	-19.05	Ave
4880	30.87	133	112	H	33.35	5.375	34.61	34.99	54.00	-19.01	Ave
7320	43.41	320	255	V	37.324	6.925	34.52	53.14	74.00	-20.86	Peak
7320	43.16	9	103	H	37.356	6.925	34.52	52.92	74.00	-21.08	Peak
7320	29.88	320	255	V	37.324	6.925	34.52	39.61	54.00	-14.39	Ave
7320	30.24	9	103	H	37.356	6.925	34.52	40.00	54.00	-14.00	Ave
9760	42.23	0	100	V	38.908	10.650	33.14	58.65	74.00	-15.35	Peak
9760	42.17	0	100	H	38.953	10.650	33.14	58.63	74.00	-15.37	Peak
9760	28.5	0	100	V	38.908	10.650	33.14	44.92	54.00	-9.08	Ave
9760	28.77	0	100	H	38.953	10.650	33.14	45.23	54.00	-8.77	Ave

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2480 MHz, measured at 3 meters											
2480	60.99	160	150	V	29.009	4.47	N/A	93.429	N/A	N/A	Peak
2480	66.94	300	120	H	28.999	4.47	N/A	99.369	N/A	N/A	Peak
2480	60.97	160	240	V	29.009	4.47	N/A	93.409	N/A	N/A	Ave
2480	67.2	150	240	H	28.999	4.47	N/A	99.629	N/A	N/A	Ave
2483.5	26.4	0	100	V	29.01	4.47	N/A	59.88	74.00	-14.12	Peak
2483.5	26.68	0	100	H	29.00	4.47	N/A	60.15	74.00	-13.85	Peak
2483.5	12.23	0	100	V	29.01	4.47	N/A	45.71	54.00	-8.29	Ave
2483.5	12.276	0	100	H	29.00	4.47	N/A	45.75	54.00	-8.26	Ave
4960	43.66	0	100	V	33.32	6.340	34.61	48.71	74.00	-25.29	Peak
4960	43.77	0	100	H	33.35	6.340	34.61	48.85	74.00	-25.15	Peak
4960	30.46	0	100	V	33.32	6.340	34.61	35.51	54.00	-18.49	Ave
4960	30.5	0	100	H	33.35	6.340	34.61	35.58	54.00	-18.42	Ave
7440	43.22	0	100	V	37.24	7.310	34.62	53.15	74.00	-20.85	Peak
7440	42.73	0	100	H	37.24	7.310	34.62	52.66	74.00	-21.34	Peak
7440	29.57	0	100	V	37.24	7.310	34.62	39.50	54.00	-14.50	Ave
7440	29.56	0	100	H	37.24	7.310	34.62	39.49	54.00	-14.51	Ave
9920	42.69	0	100	V	38.92	10.650	33.46	58.80	74.00	-15.20	Peak
9920	42.77	0	100	H	38.91	10.650	33.46	58.87	74.00	-15.13	Peak
9920	29.19	0	100	V	38.92	10.650	33.46	45.30	54.00	-8.70	Ave
9920	29.05	0	100	H	38.91	10.650	33.46	45.15	54.00	-8.85	Ave

8 FCC §2.1051, §15.247(d) & IC RSS-247 §5.5 – Spurious Emissions at Antenna Terminals

8.1 Applicable Standards

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).

For IC RSS-247 §5.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

8.2 Test Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r03: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 13: Band-edge measurements

8.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2015-06-22	1 year
-	SMA cable	-	C0002	Each time[1]	N/A
-	10 dB attenuator	-	-	Each time[1]	N/A

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

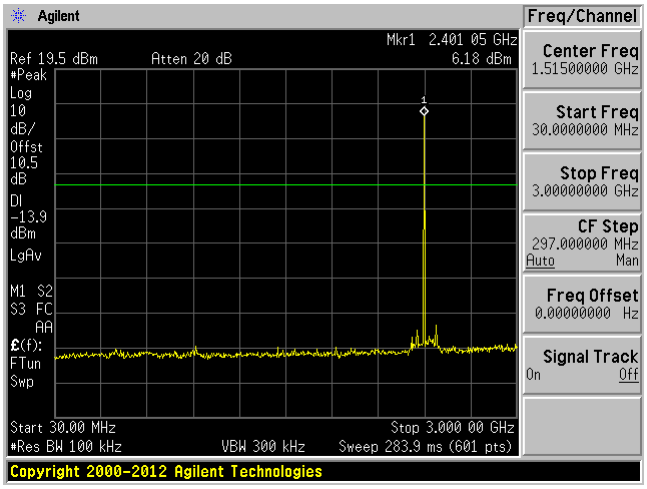
Temperature:	22º C
Relative Humidity:	42 %
ATM Pressure:	102.7 kPa

The testing was performed by Jason Qian on 2015-12-18 at RF site.

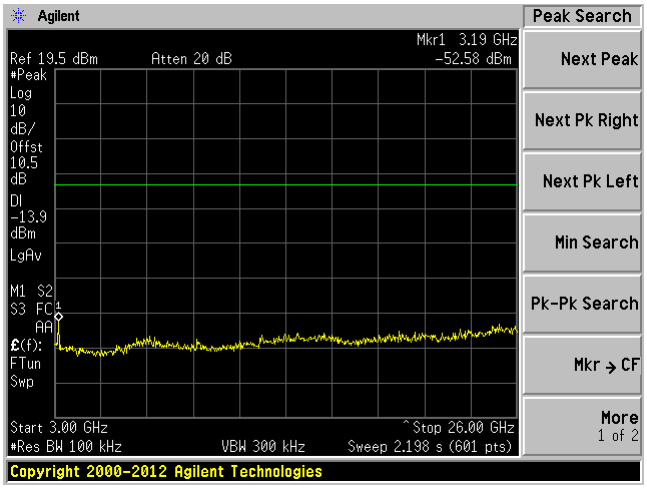
8.5 Test Results

Please refer to following plots.

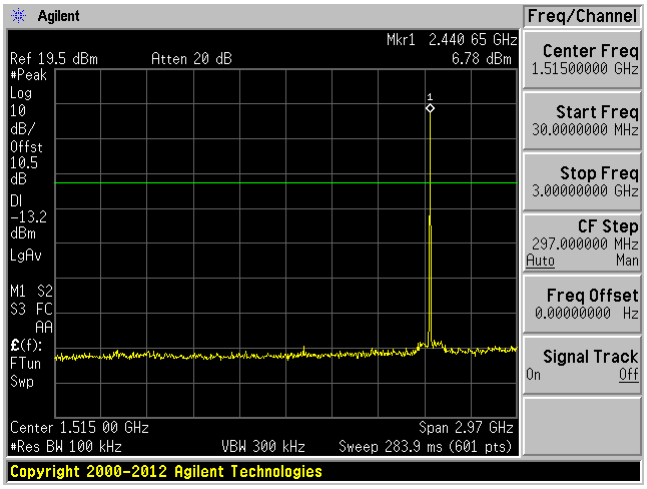
Low Channel 30 MHz – 3 GHz



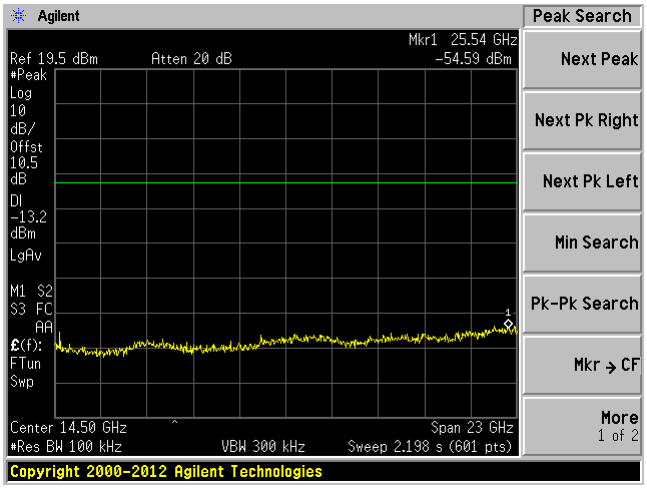
Low Channels 3 GHz – 26 GHz



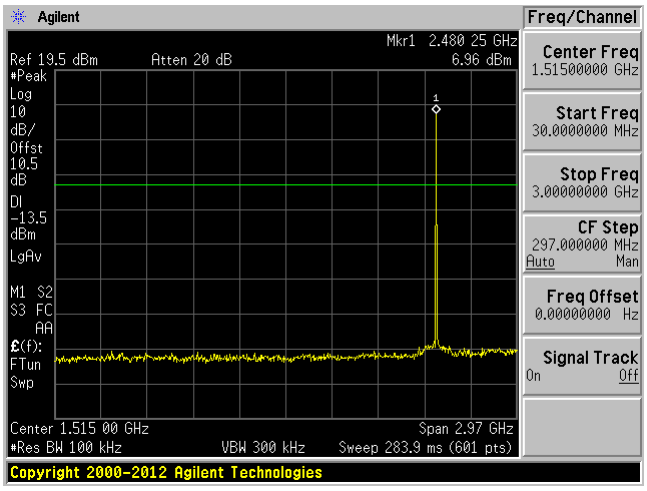
Middle Channel 30 MHz – 3 GHz



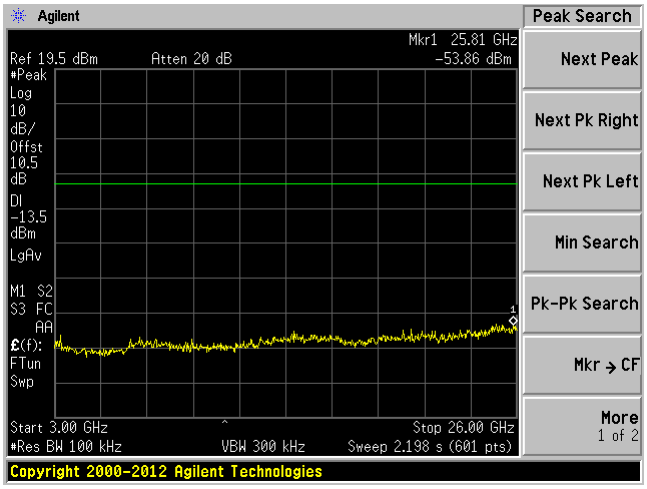
Middle Channels 3 GHz – 26 GHz



High Channel 30 MHz – 3 GHz



High Channels 3 GHz – 26 GHz



9 FCC §15.247(a)(2) & IC RSS-247 §5.2 – 6 dB & 99% Emission Bandwidth

9.1 Applicable Standards

According to FCC §15.247(a)(2), systems using digital modulation techniques may operate in the 902~928 MHz, 2400~2483.5 MHz, and 5725~5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz

According to IC RSS-247 5.2 (1), DTSs include systems that employ digital modulation techniques resulting in spectral characteristics similar to direct sequence systems. The minimum 6 dB bandwidth shall be 500 kHz for bands 902 -928 MHz and 2400 – 2483.5 MHz.

9.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r03: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 8: DTS bandwidth

9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2015-06-22	1 year
-	SMA cable	-	C0002	Each time[1]	N/A
-	10dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
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:	22º C
Relative Humidity:	42 %
ATM Pressure:	102.7 KPa

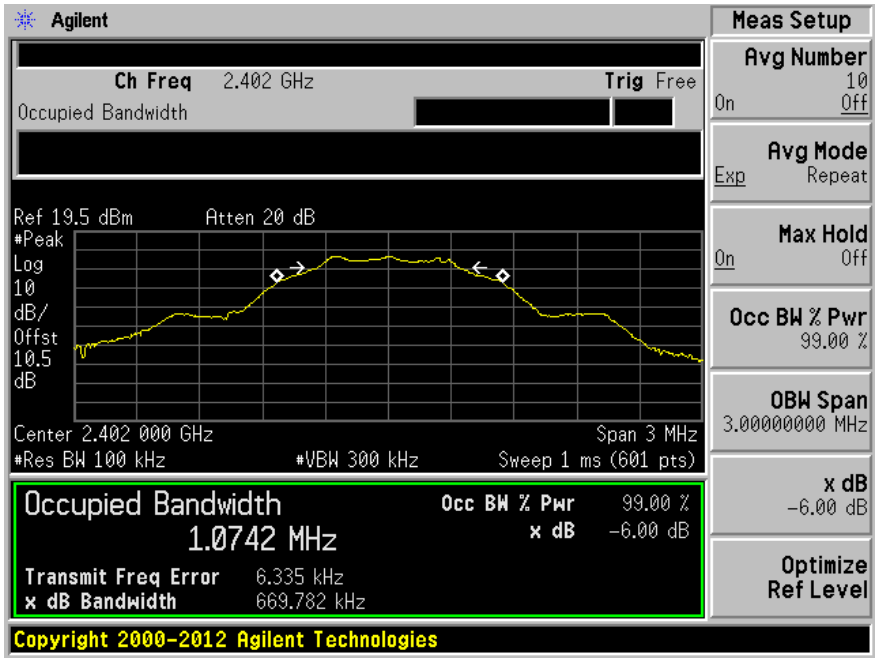
The testing was performed by Jason Qian on 2015-12-17 in RF site.

9.5 Test Results

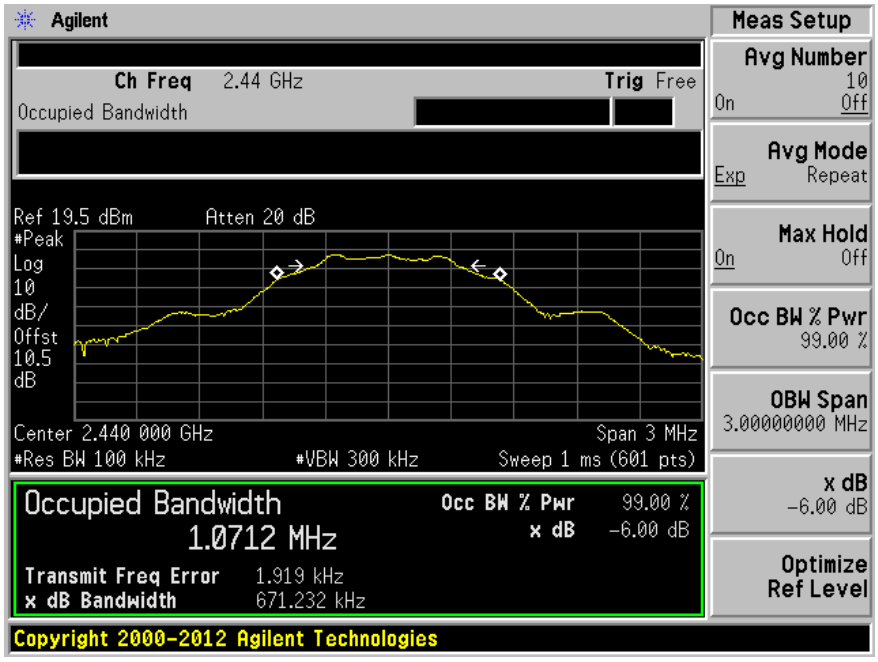
Channel	Frequency (MHz)	99% OBW (MHz)	6 dB OBW (kHz)	6 dB OBW Limit (kHz)	Result
Low	2402	1.0742	669.782	≥ 500	Pass
Middle	2440	1.0712	671.232	≥ 5 00	Pass
High	2480	1.0741	672.490	≥ 500	Pass

Please refer to the following plots for detailed test results

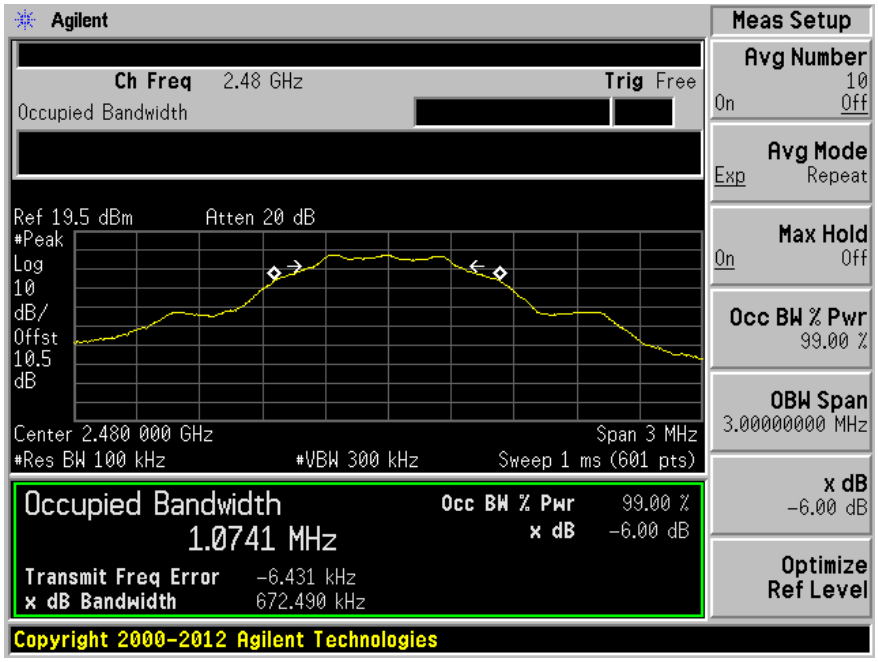
Low Channel 2402 MHz



Middle Channel 2440 MHz



High Channel 2480 MHz



10 FCC §15.247(b) & IC RSS-247 §5.4 – Output Power Measurement

10.1 Applicable Standards

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.

According to IC RSS-247 §5.4 (4), for DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. Except as provided in Section 5.4(5), the e.i.r.p. shall not exceed 4 W.

10.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r03: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 9: Fundamental emission output power

10.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2015-06-22	1 year
-	SMA cable	-	C0002	Each time[1]	N/A
-	10dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
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:	22º C
Relative Humidity:	42 %
ATM Pressure:	102.7 KPa

The testing was performed by Jason Qian on 2015-12-17 at RF site.

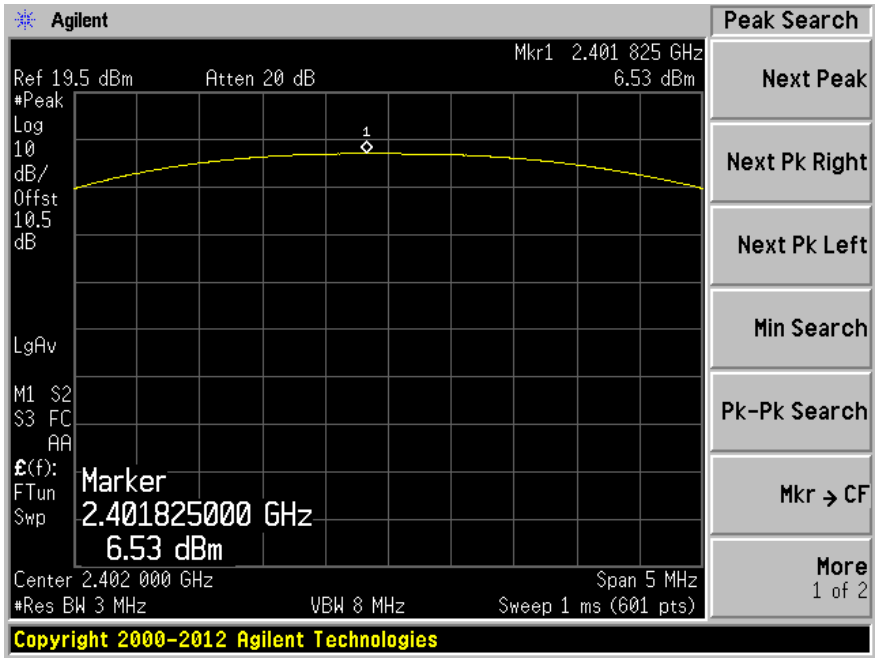
10.5 Test Results

Peak Output Power

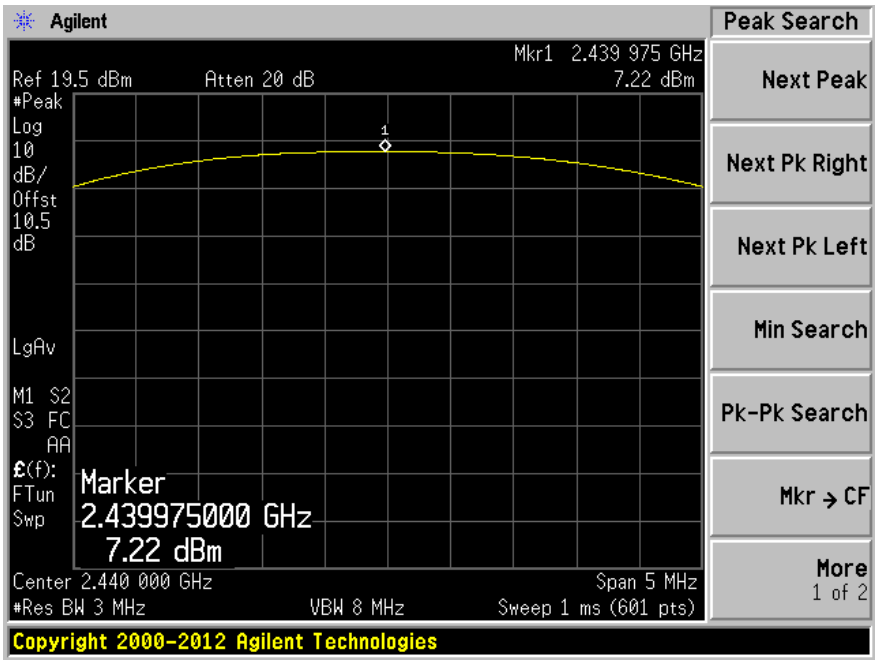
Frequency (MHz)	Peak Conducted Output Power (dBm)	Average Conducted Output Power (dBm)	Limit (dBm)	Result
2402	6.53	4.32	30	Pass
2440	7.22	6.08	30	Pass
2480	7.28	6.78	30	Pass

Please refer to the following plots for detailed test results

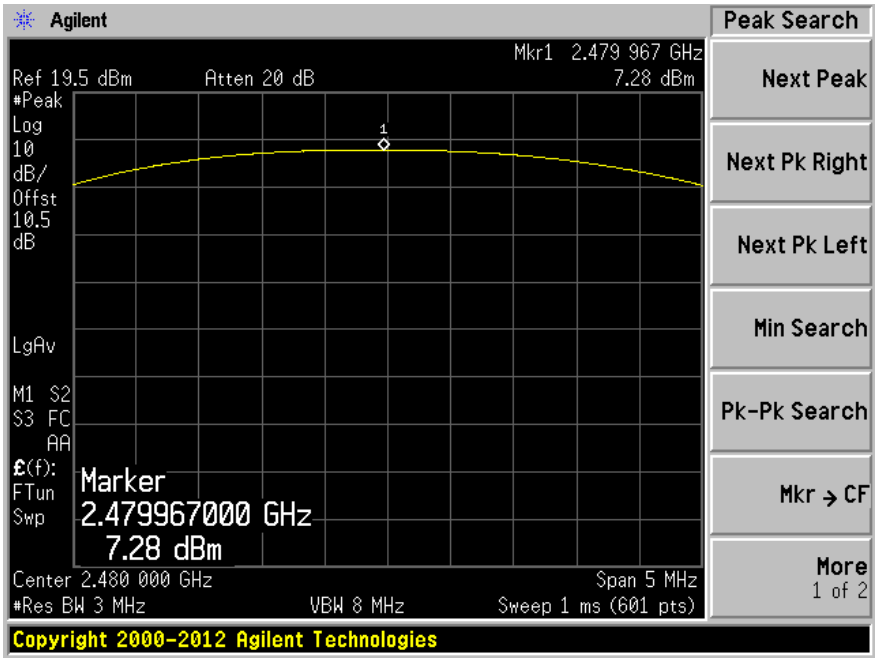
Low Channel 2402 MHz



Middle Channel 2440 MHz



High Channel 2480 MHz



11 FCC §15.247(d) & IC RSS-247 §5.5 – 100 kHz Bandwidth of Band Edges

11.1 Applicable Standards

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).

For IC RSS-247 §5.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

11.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r03: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 13: Band-edge measurements

11.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2015-06-22	1 year
-	SMA cable	-	C0002	Each time[1]	N/A
-	10 dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

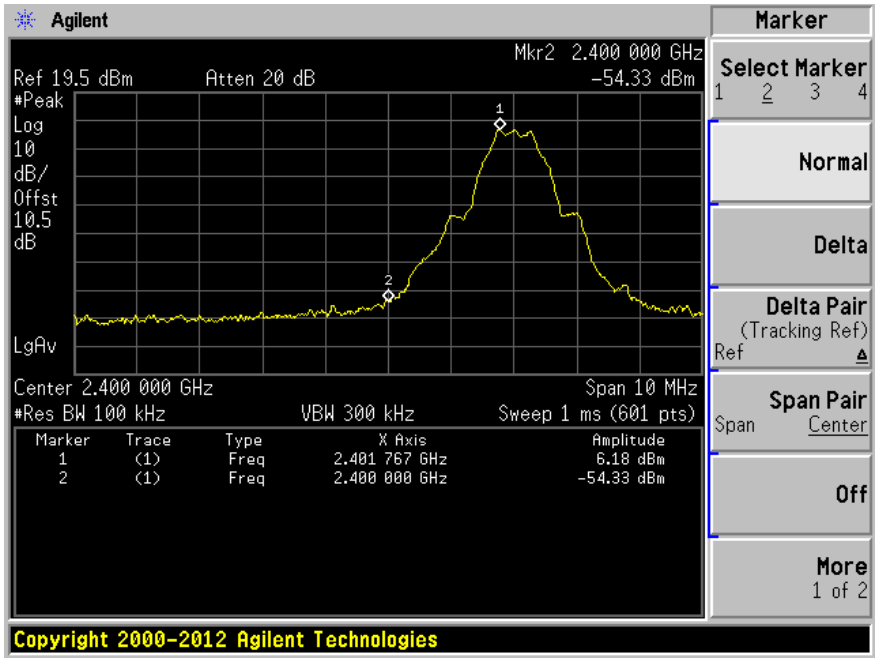
11.4 Test Environmental Conditions

Temperature:	22º C
Relative Humidity:	42 %
ATM Pressure:	102.7 KPa

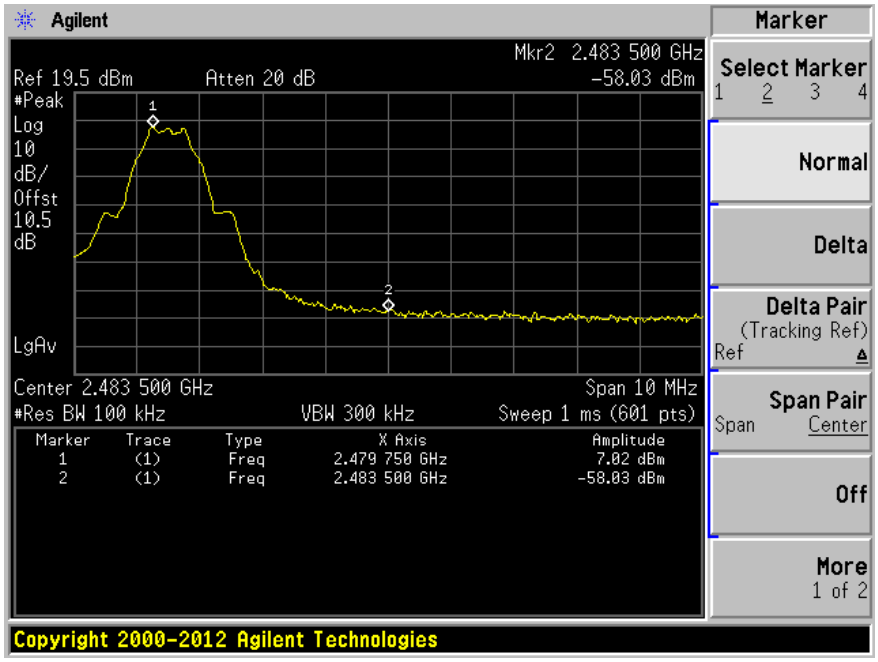
The testing was performed by Jason Qian on 2015-12-18 at RF site.

11.5 Test Results

Low Channel 2402 MHz



High Channel 2480 MHz



12 FCC §15.247(e) & ICC RSS-247 §5.2 – Power Spectral Density

12.1 Applicable Standards

According to FCC §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

According to RSS-247 §5.2(2) , DTSs include systems that employ digital modulation techniques resulting in spectral characteristics similar to direct sequence systems. The following applies to the bands 902-928 MHz and 2400- 2483.5 MHz1 : The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of Section 5.4(4), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).

12.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r03: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 10: Maximum power spectral density level in the fundamental emission

12.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2015-06-22	1 year
-	SMA cable	-	C0002	Each time[1]	N/A
-	10dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
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:	22º C
Relative Humidity:	42 %
ATM Pressure:	102.7 KPa

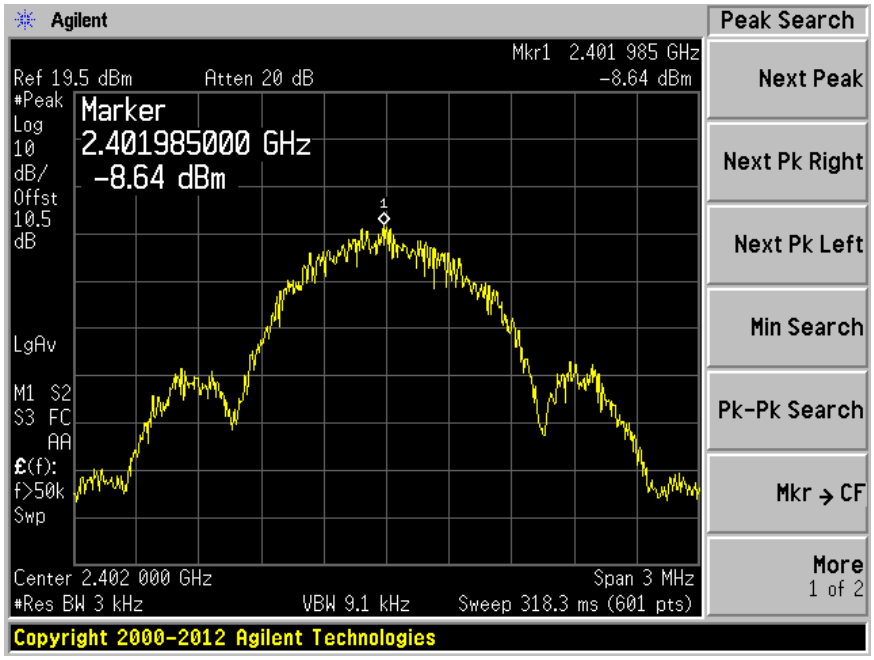
The testing was performed by Jason Qian on 2015-12-18 at RF site.

12.5 Test Results

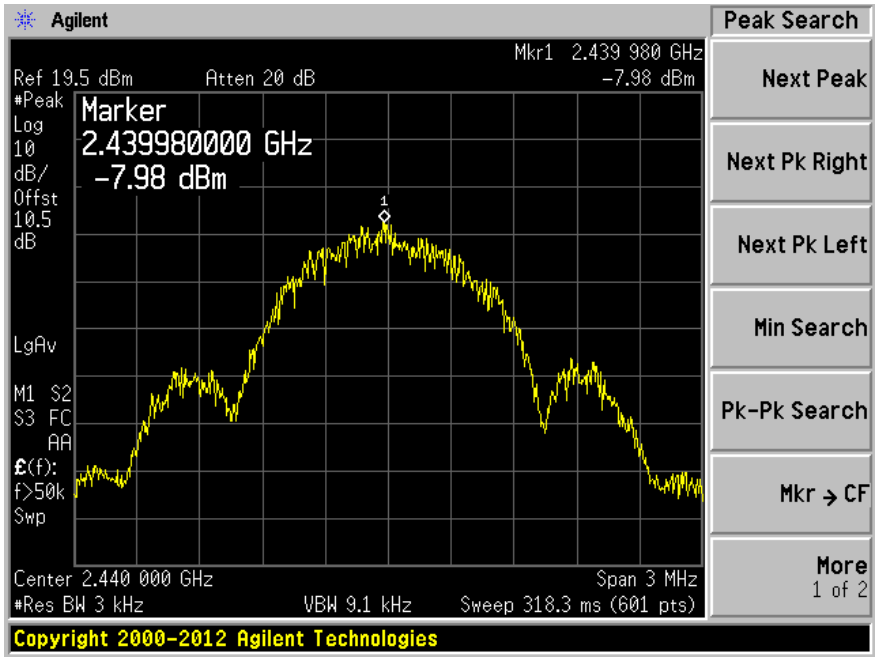
Frequency (MHz)	PSD (dBm)	Limit (dBm)	Result
2402	-8.64	8	Pass
2440	-7.98	8	Pass
2480	-7.92	8	Pass

Please refer to the following plots for detailed test results

Low Channel 2402 MHz



Middle Channel 2440 MHz



High Channel 2480 MHz