



FCC PART 15.247

TEST REPORT

For

Roam Data Inc.

280 Summer St Boston, Massachusetts

FCC ID: 2ABY6-RP750X

Report Type: Original Report	Product Type: mPOS
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TABLE OF CONTENTS

GENERAL INFORMATION.....	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	4
OBJECTIVE	4
RELATED SUBMITTAL(S)/GRANT(S).....	4
TEST METHODOLOGY	4
TEST FACILITY.....	5
SYSTEM TEST CONFIGURATION.....	6
DESCRIPTION OF TEST CONFIGURATION	6
EUT EXERCISE SOFTWARE	6
EQUIPMENT MODIFICATIONS	6
SUPPORT EQUIPMENT LIST AND DETAILS	6
EXTERNAL CABLE.....	6
BLOCK DIAGRAM OF TEST SETUP	7
SUMMARY OF TEST RESULTS.....	8
FCC §15.247 (i) & §1.1310 & §2.1093- RF EXPOSURE	9
APPLICABLE STANDARD	9
FCC §15.203 - ANTENNA REQUIREMENT.....	10
APPLICABLE STANDARD	10
ANTENNA CONNECTOR CONSTRUCTION	10
FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS	11
APPLICABLE STANDARD	11
MEASUREMENT UNCERTAINTY	11
EUT SETUP	11
EMI TEST RECEIVER SETUP	12
TEST PROCEDURE	12
TEST EQUIPMENT LIST AND DETAILS.....	12
CORRECTED AMPLITUDE & MARGIN CALCULATION	12
TEST RESULTS SUMMARY	13
TEST RESULTS SUMMARY	13
TEST DATA	13
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS.....	16
APPLICABLE STANDARD	16
MEASUREMENT UNCERTAINTY	16
EUT SETUP	16
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	17
TEST PROCEDURE	17
CORRECTED AMPLITUDE & MARGIN CALCULATION	18
TEST EQUIPMENT LIST AND DETAILS.....	18
TEST RESULTS SUMMARY	18
TEST DATA	18
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH.....	22
APPLICABLE STANDARD	22
TEST PROCEDURE	22
TEST EQUIPMENT LIST AND DETAILS.....	22

TEST DATA	22
FCC §15.247(b) (3) - MAXIMUM PEAK OUTPUT POWER	25
APPLICABLE STANDARD	25
TEST PROCEDURE	25
TEST EQUIPMENT LIST AND DETAILS.....	25
TEST DATA	25
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE.....	28
APPLICABLE STANDARD	28
TEST PROCEDURE	28
TEST EQUIPMENT LIST AND DETAILS.....	28
TEST DATA	28
FCC §15.247(e) - POWER SPECTRAL DENSITY	30
APPLICABLE STANDARD	30
TEST PROCEDURE	30
TEST EQUIPMENT LIST AND DETAILS.....	30
TEST DATA	30

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Roam Data Inc.*'s product, model number: *RP750x (FCC ID: 2ABY6-RP750X) or ("EUT")* in this report is a *mPOS*, which was measured approximately: 5.6 cm (L) x 10.1 cm (W) x 2.2 cm (H), rated input voltage: DC 3.7 V from lithium battery.

All measurement and test data in this report was gathered from production sample serial number: 140224050 (Assigned by BACL, Dongguan). The EUT was received on 2014-02-26.

Objective

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

The tests were performed in order to determine the compliance of the EUT with FCC Part 15-Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15C DXX submissions with FCC ID: *2ABY6-RP750X* for RF ID mode.
FCC Part15C DSS submissions with FCC ID: *2ABY6-RP750X* for *Bluetooth BDR mode*.

Test Methodology

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

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communications Commission (FCC). 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 02, 2012. The

facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Dongguan) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 500069-0).



The current scope of accreditations can be found at <http://ts.nist.gov/standards/scopes/5000690.htm>

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode, which was provided by manufacturer. The engineering mode was configured the system transmitting with maximum power.

EUT Exercise Software

Test Software Version	EDR_RF_test_Customer_080812.exe		
Test Frequency (MHz)	2402	2440	2480
Power Level	3	3	3

Equipment Modifications

No modification was made to the EUT.

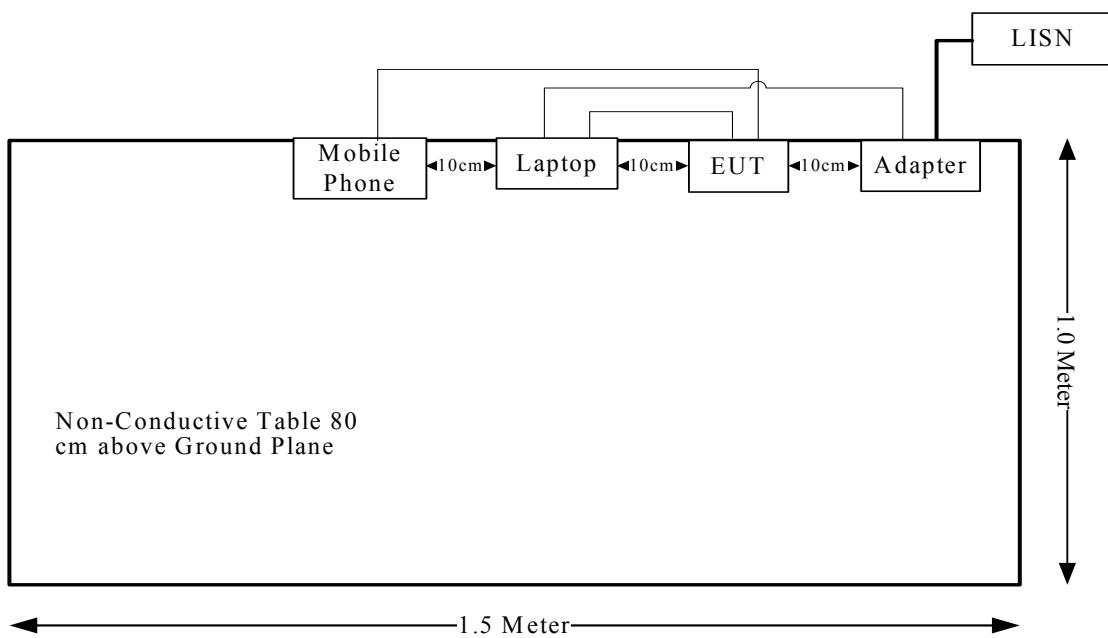
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1017
Nokia	Mobile phone	Lumia 520	N/A

External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB line	No	No	0.5	EUT	Laptop
Audio line	No	No	0.8	EUT	Mobile phone

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1093	RF EXPOSURE	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.247(d)	Spurious Emissions at Antenna Port	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Peak Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

FCC §15.247 (i) & §1.1310 & §2.1093- RF EXPOSURE

Applicable Standard

According to §15.247(i) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB447498 D01 General RF Exposure Guidance v05r02:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

Measurement Result

The maximum conducted output power= -0.71 dBm=0.8mW at 2440MHz
 $[(\text{max. power of channel, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}]$
 $= 0.8 / 5 * (\sqrt{2.44}) = 0.06 < 3.0$

So the stand-alone SAR evaluation is not necessary.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Antenna Connector Construction

The EUT has an internal antenna for Bluetooth, which the maximum gain is 0dBi, please, refer to the internal photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to $U_{\text{cisp}}_{\text{r}}$ of Table 1, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than $U_{\text{cisp}}_{\text{r}}$ of Table 1, then:

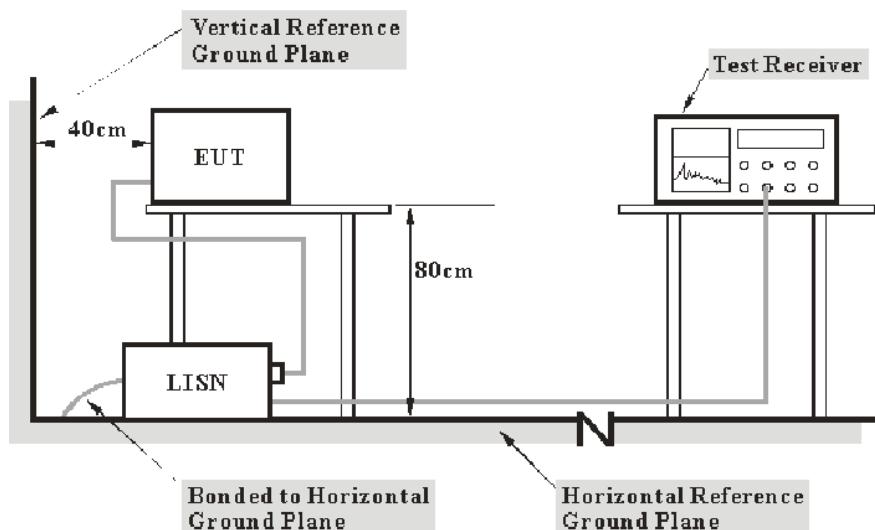
- compliance is deemed to occur if no measured disturbance level, increased by $(U_{\text{lab}} - U_{\text{cisp}}_{\text{r}})$, exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level, increased by $(U_{\text{lab}} - U_{\text{cisp}}_{\text{r}})$, exceeds the disturbance limit.

Based on CISPR 16-4-2: 2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Dongguan) is 3.46 dB (150 kHz to 30 MHz).

Table 1 – Values of $U_{\text{cisp}}_{\text{r}}$

Measurement	$U_{\text{cisp}}_{\text{r}}$
Conducted disturbance at mains port using AMN (150 kHz to 30 MHz)	3.4 dB

EUT Setup



Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

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

All data was recorded in the Quasi-peak and average detection mode.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2013-11-20	2014-11-19
R&S	Two-line V-network	ENV216	3560.6550.12	2014-01-22	2015-01-21
R&S	L.I.S.N	ESH3-Z5	100113	N/A	N/A
BACL	Test Software	BACL-EMC	V1.0-2010	N/A	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

$$C_f = A_C + VDF$$

Herein,

V_C (cord. Reading): corrected voltage amplitude

V_R : reading voltage amplitude

A_c : attenuation caused by cable loss

VDF: voltage division factor of AMN

C_f : Correction Factor

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

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the recorded data in following table, the EUT complied with the [FCC Part 15.207](#), with the worst margin reading of:

Test Results Summary

According to the recorded data in following table, the EUT complied with the [FCC Part 15.207](#), with the worst margin reading of:

10.18 dB at 0.180 MHz in the **Neutral** conducted mode.

Test Data

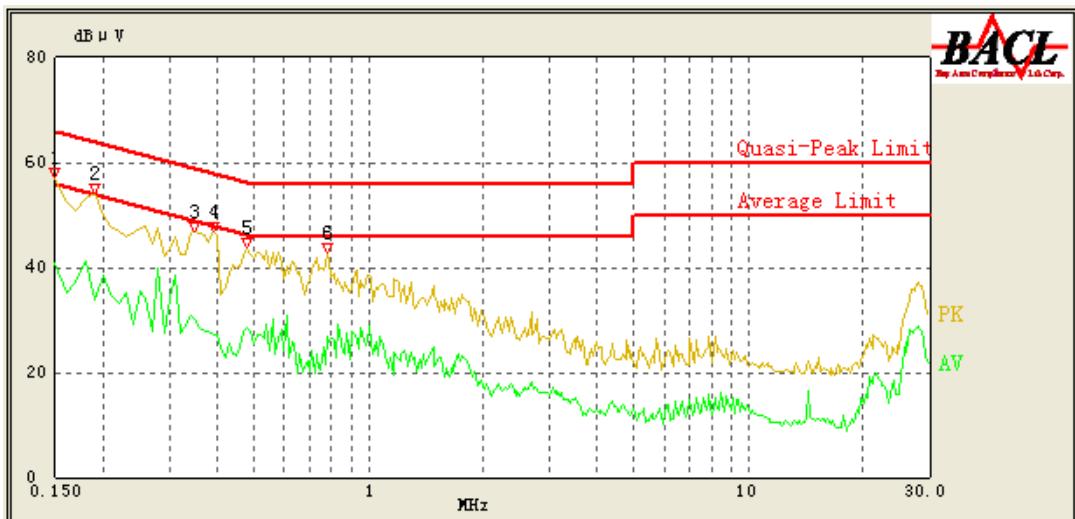
Environmental Conditions

Temperature:	20.9 °C
Relative Humidity:	56 %
ATM Pressure:	101.2 kPa

The testing was performed by Leon Chen on 2014-03-07.

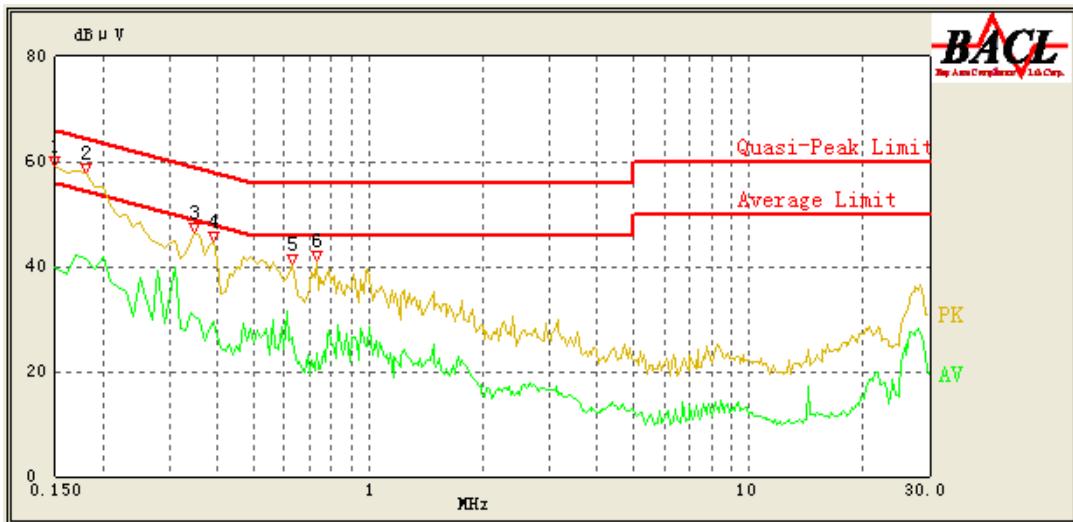
Test Mode: Transmitting

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dB μ V)	Correction Factor (dB)	Limit (dB μ V)	Margin (dB)	Detector (PK/ QP/Ave.)
0.150	52.93	9.51	66.00	13.07	QP
0.150	40.98	9.51	56.00	15.02	AV
0.190	47.34	10.06	64.04	16.70	QP
0.190	33.70	10.06	54.04	20.34	AV
0.350	40.00	10.07	58.96	18.96	QP
0.350	30.16	10.07	48.96	18.80	AV
0.390	42.49	10.04	58.06	15.57	QP
0.390	27.11	10.04	48.06	20.95	AV
0.480	40.97	9.97	56.34	15.37	QP
0.480	28.36	9.97	46.34	17.98	AV
0.780	35.47	9.79	56.00	20.53	QP
0.780	26.97	9.79	46.00	19.03	AV

AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dB μ V)	Correction Factor (dB)	Limit (dB μ V)	Margin (dB)	Detector (QP/AV)
0.150	54.91	9.71	66.00	11.09	QP
0.150	39.78	9.71	56.00	16.22	AV
0.180	54.31	10.36	64.49	10.18	QP
0.180	41.59	10.36	54.49	12.90	AV
0.350	39.26	10.38	58.96	19.70	QP
0.350	30.48	10.38	48.96	18.48	AV
0.390	41.42	10.26	58.06	16.64	QP
0.390	29.34	10.26	48.06	18.72	AV
0.630	37.45	9.87	56.00	18.55	QP
0.630	26.47	9.87	46.00	19.53	AV
0.730	35.74	9.82	56.00	20.26	QP
0.730	23.49	9.82	46.00	22.51	AV

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cispr} of Table 2, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level, increased by $(U_{\text{lab}} - U_{\text{cispr}})$, exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level, increased by $(U_{\text{lab}} - U_{\text{cispr}})$, exceeds the disturbance limit.

Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:

30M~200MHz: 5.0 dB

200M~1GHz: 6.2 dB

1G~6GHz: 4.45 dB

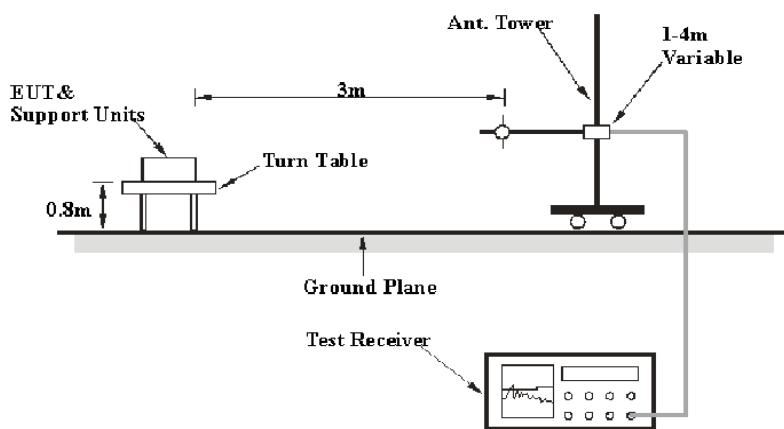
6G~18GHz: 5.23 dB

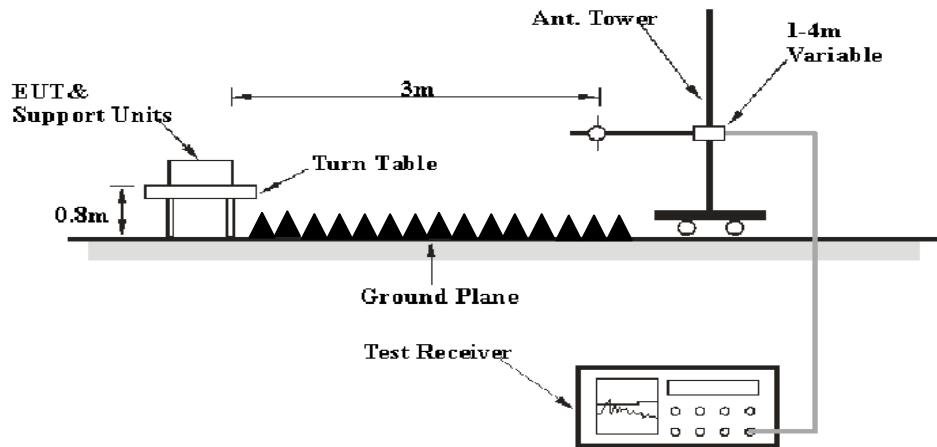
Table 2 – Values of U_{cispr}

Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1GHz:



Above 1GHz:

The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209, and FCC 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz – 1000 MHz	120 kHz	300 kHz	120kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

During the radiated emissions, the adapter 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.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2013-05-06	2014-05-05
Sunol Sciences	Antenna	JB3	A060611-1	2011-09-06	2014-09-05
HP	Amplifier	8447E	2434A02181	2013-09-06	2014-09-05
ETS LINDGREN	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-05
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2014-02-19	2015-02-18
R&S	Spectrum Analyzer	FSP 38	100478	2013-06-16	2014-06-15
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2013-06-16	2014-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2013-09-06	2014-09-05

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Section 15.205, 15.209 and 15.247, with the worst margin reading of:

16.99 dB at 9920 MHz in the Vertical polarization

Test Data

Environmental Conditions

Temperature:	22.6 °C
Relative Humidity:	70 %
ATM Pressure:	100.8 kPa

* The testing was performed by Leon Chen on 2014-03-19.

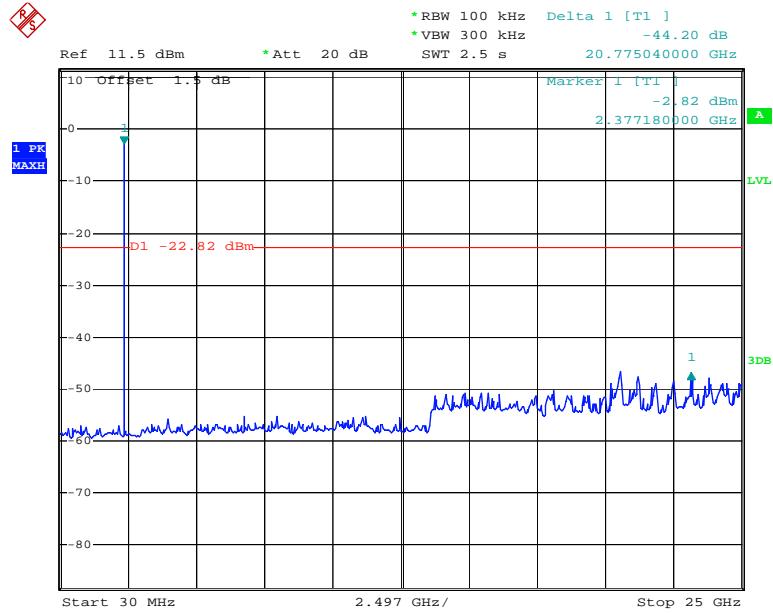
Mode: Transmitting

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dB μ V/m)	FCC 15.247	
	Reading (dB μ V)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dB μ V/m)	Margin (dB)
Low Channel: 2402(MHz)									
2402	86.54	PK	H	25.65	4.42	27.32	89.29	N/A	N/A
2402	67.68	AV	H	25.65	4.42	27.32	70.43	N/A	N/A
2402	86.93	PK	V	25.65	4.42	27.32	89.68	N/A	N/A
2402	67.84	AV	V	25.65	4.42	27.32	70.59	N/A	N/A
2390	31.84	PK	V	25.61	4.39	27.32	34.52	74.00	39.48
2390	18.65	AV	V	25.61	4.39	27.32	21.33	54.00	32.67
4804	36.86	PK	V	30.59	5.98	27.41	46.02	74.00	27.98
4804	18.74	AV	V	30.59	5.98	27.41	27.90	54.00	26.10
7206	30.45	PK	V	34.09	7.45	25.91	46.08	74.00	27.92
7206	18.08	AV	V	34.09	7.45	25.91	33.71	54.00	20.29
9608	30.69	PK	V	35.96	8.80	27.55	47.90	74.00	26.10
9608	18.22	AV	V	35.96	8.80	27.55	35.43	54.00	18.57
3338.24	30.43	PK	V	28.28	5.47	27.25	36.93	74.00	37.07
3338.24	18.17	AV	V	28.28	5.47	27.25	24.67	54.00	29.33
406.32	27.69	QP	V	16.38	2.45	21.79	24.73	46.00	21.27
Middle Channel: 2440(MHz)									
2440	86.38	PK	H	25.75	4.40	27.34	89.19	N/A	N/A
2440	66.92	AV	H	25.75	4.40	27.34	69.73	N/A	N/A
2440	87.12	PK	V	25.75	4.40	27.34	89.93	N/A	N/A
2440	68.37	AV	V	25.75	4.40	27.34	71.18	N/A	N/A
4880	38.58	PK	V	30.79	6.08	27.42	48.03	74.00	25.97
4880	19.46	AV	V	30.79	6.08	27.42	28.91	54.00	25.09
7320	30.65	PK	V	34.38	7.51	25.88	46.66	74.00	27.34
7320	18.43	AV	V	34.38	7.51	25.88	34.44	54.00	19.56
9760	30.22	PK	V	36.33	8.83	27.20	48.18	74.00	25.82
9760	18.18	AV	V	36.33	8.83	27.20	36.14	54.00	17.86
1720.58	30.08	PK	V	24.04	3.51	27.64	29.99	74.00	44.01
1720.58	18.06	AV	V	24.04	3.51	27.64	17.97	54.00	36.03
3338.24	30.84	PK	V	28.28	5.47	27.25	37.34	74.00	36.66
3338.24	18.22	AV	V	28.28	5.47	27.25	24.72	54.00	29.28
406.32	27.81	QP	V	16.38	2.45	21.79	24.85	46.00	21.15
High Channel: 2480(MHz)									
2480	85.72	PK	H	25.85	4.48	27.36	88.69	N/A	N/A
2480	66.53	AV	H	25.85	4.48	27.36	69.50	N/A	N/A
2480	86.94	PK	V	25.85	4.48	27.36	89.91	N/A	N/A
2480	67.82	AV	V	25.85	4.48	27.36	70.79	N/A	N/A
2483.5	38.24	PK	V	25.86	4.49	27.36	41.23	74.00	32.77
2483.5	20.36	AV	V	25.86	4.49	27.36	23.35	54.00	30.65
4960	37.95	PK	V	31.00	5.90	27.43	47.42	74.00	26.58
4960	18.33	AV	V	31.00	5.90	27.43	27.80	54.00	26.20
7440	30.15	PK	V	34.66	7.58	25.97	46.42	74.00	27.58
7440	18.21	AV	V	34.66	7.58	25.97	34.48	54.00	19.52
9920	30.46	PK	V	36.71	8.87	26.66	49.38	74.00	24.62
9920	18.09	AV	V	36.71	8.87	26.66	37.01	54.00	16.99
3338.24	30.49	PK	V	28.28	5.47	27.25	36.99	74.00	37.01
3338.24	18.11	AV	V	28.28	5.47	27.25	24.61	54.00	29.39
406.32	27.94	QP	V	16.38	2.45	21.79	24.98	46.00	21.02

*Within measurement uncertainty!

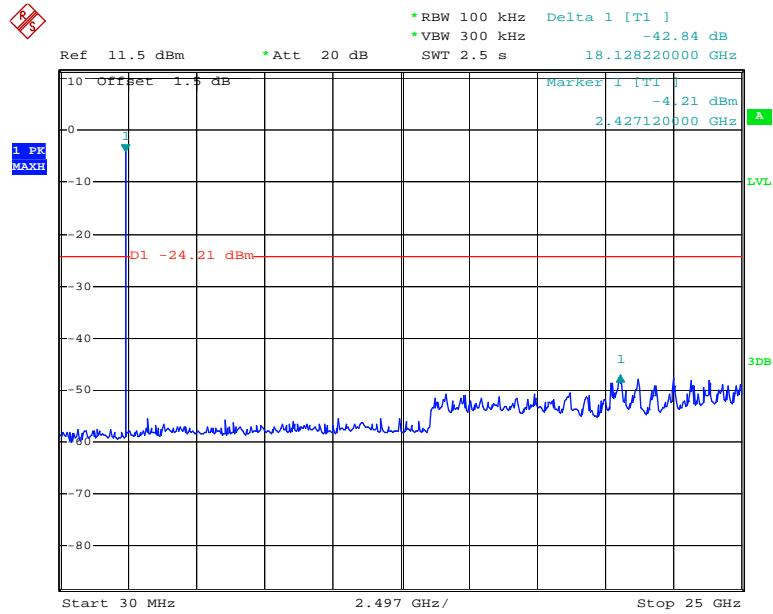
Conducted Spurious Emissions at Antenna Port

Low Channel

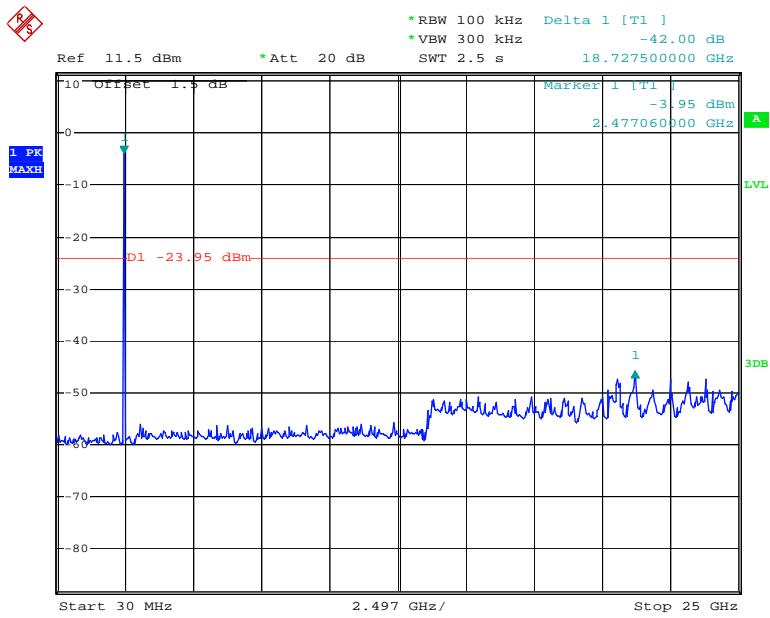


Date: 19.MAR.2014 18:04:21

Middle Channel



Date: 19.MAR.2014 18:05:00

High Channel

Date: 19.MAR.2014 18:06:04

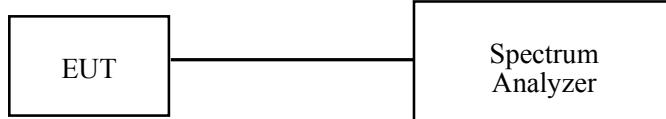
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

Applicable Standard

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.

Test 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 connect it to measurement instrument. Then 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 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2013-06-16	2014-06-15

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	23.7 °C
Relative Humidity:	68 %
ATM Pressure:	100.8 kPa

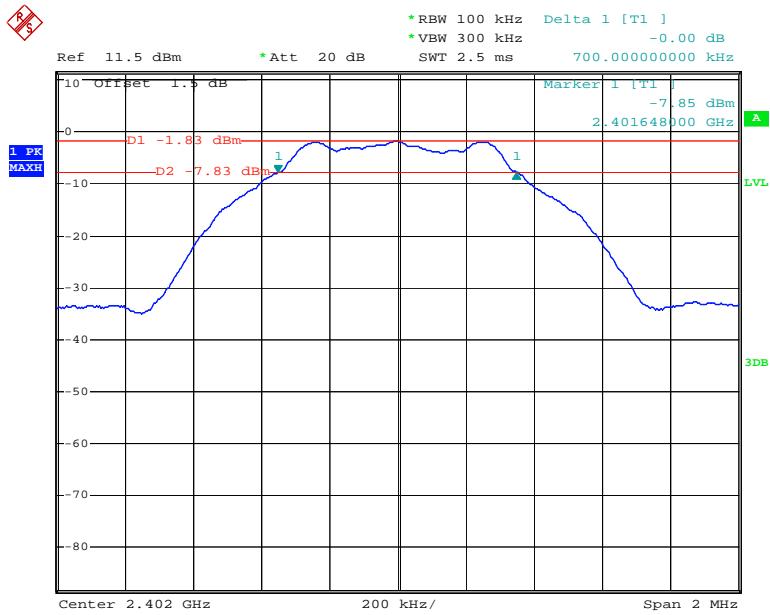
* The testing was performed by Leon Chen on 2014-03-19.

Test Result: Pass.

Please refer to the following tables and plots.

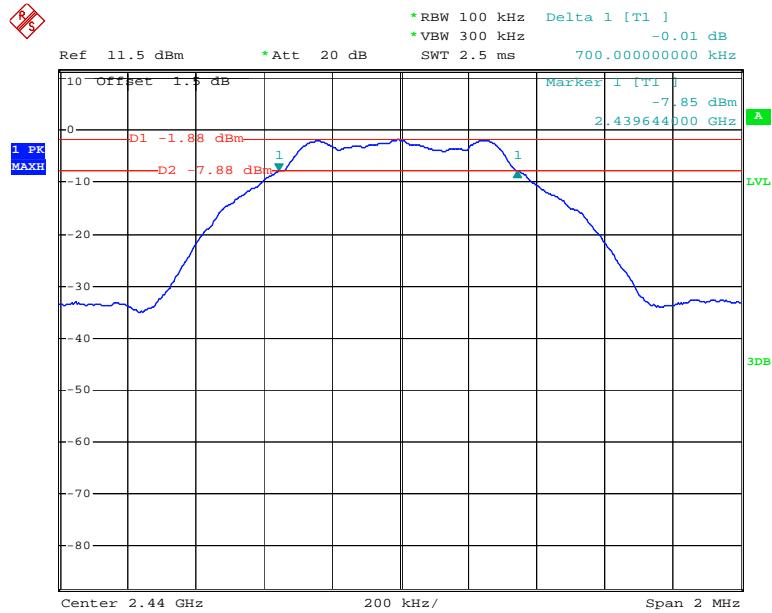
Channel	Frequency	6 dB Bandwidth	Limit
	(MHz)	(MHz)	(kHz)
Low	2402	0.700	>500
Middle	2440	0.700	>500
High	2480	0.700	>500

Low Channel



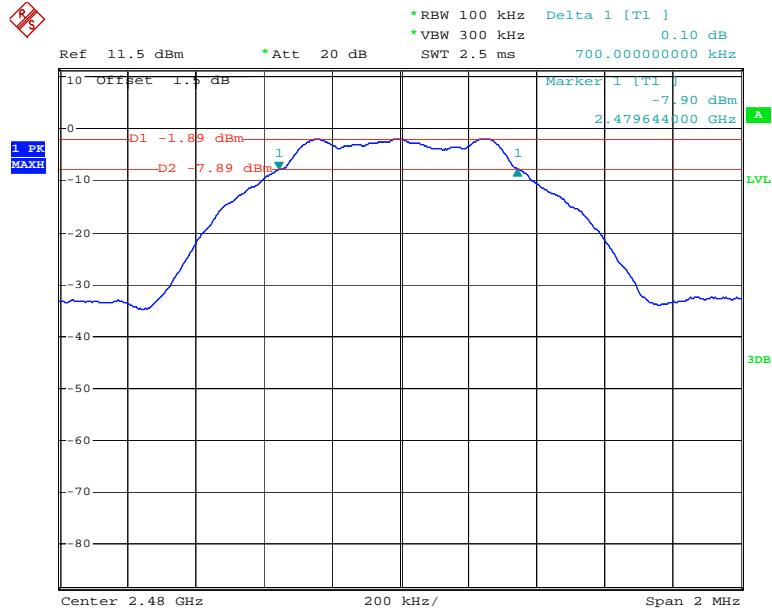
Date: 19.MAR.2014 15:07:06

Middle Channel



Date: 19.MAR.2014 15:10:12

High Channel



Date: 19.MAR.2014 15:12:36

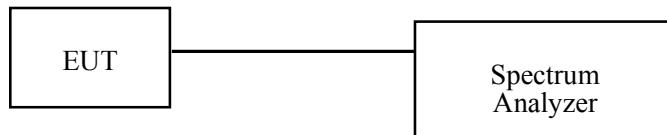
FCC §15.247(b) (3) - MAXIMUM PEAK OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

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



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2013-06-16	2014-06-15

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

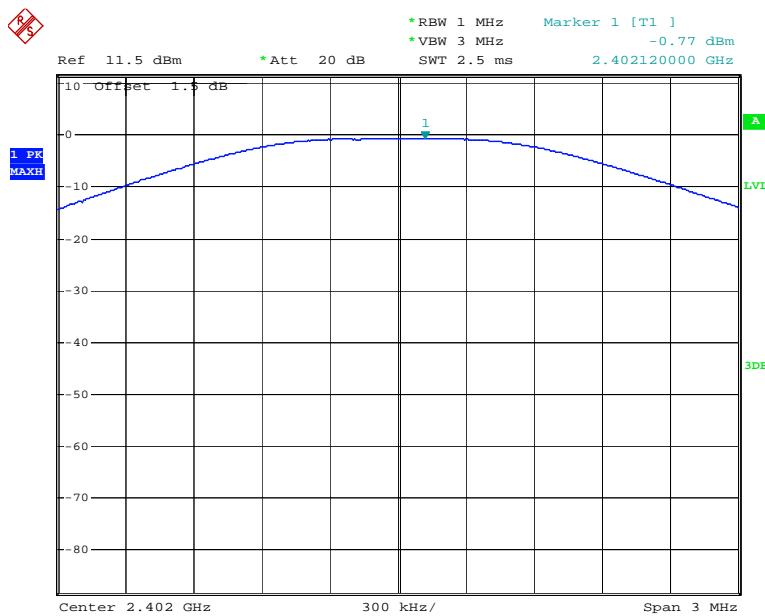
Temperature:	23.7 °C
Relative Humidity:	68 %
ATM Pressure:	100.8 kPa

* The testing was performed by Leon Chen on 2014-03-19.

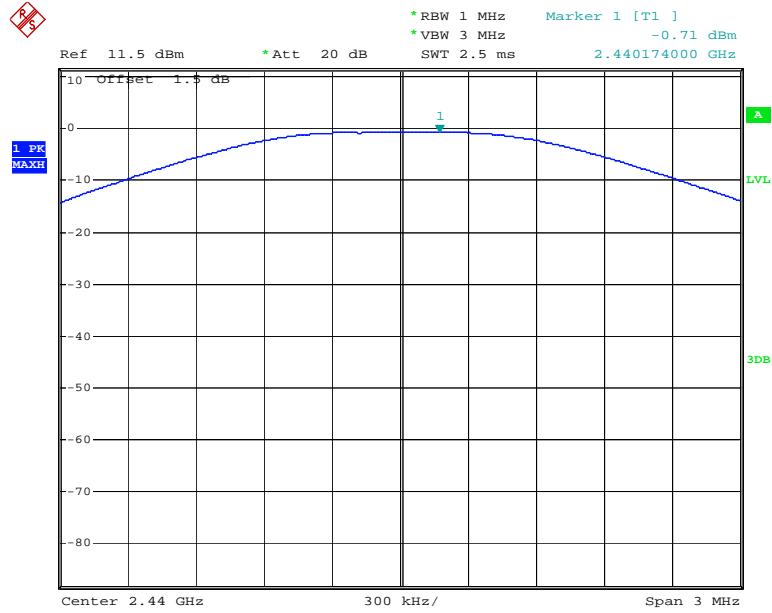
Test Mode: Transmitting

Channel	Frequency	Conducted Output Power	Limit	Result
	(MHz)	(dBm)	(dBm)	
Low	2402	-0.77	30	PASS
Middle	2440	-0.71	30	PASS
High	2480	-0.76	30	PASS

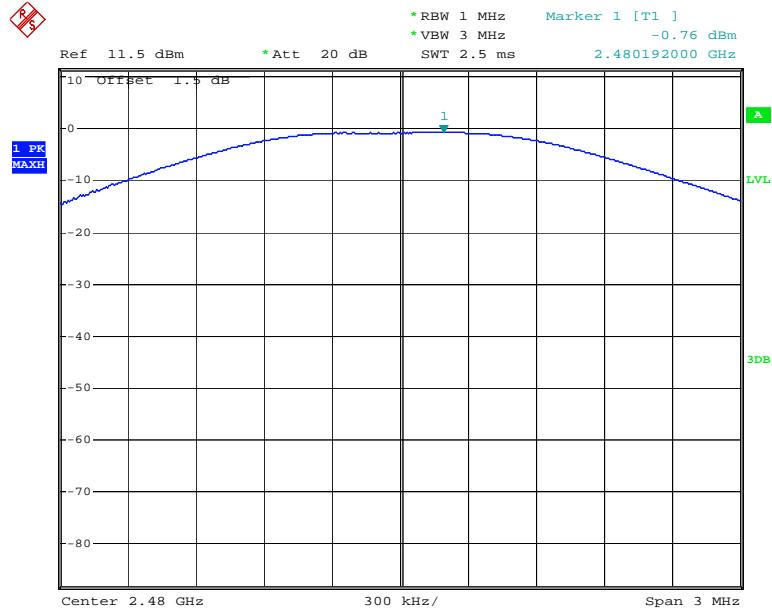
Low Channel



Date: 19.MAR.2014 15:02:30

Middle Channel

Date: 19.MAR.2014 15:03:12

High Channel

Date: 19.MAR.2014 15:03:27

FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

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)).

Test 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 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. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2013-06-16	2014-06-15

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

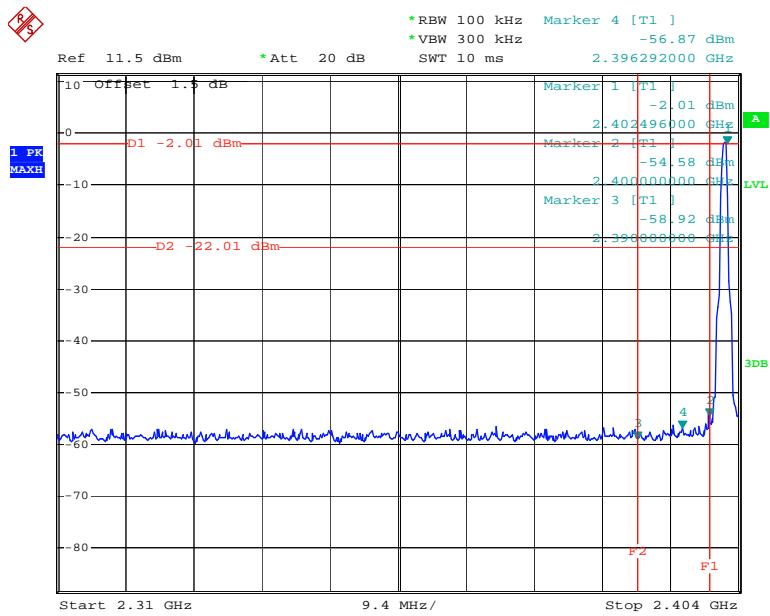
Temperature:	23.7 °C
Relative Humidity:	68 %
ATM Pressure:	100.8 kPa

* The testing was performed by Leon Chen on 2014-03-19.

Test Result: Compliance

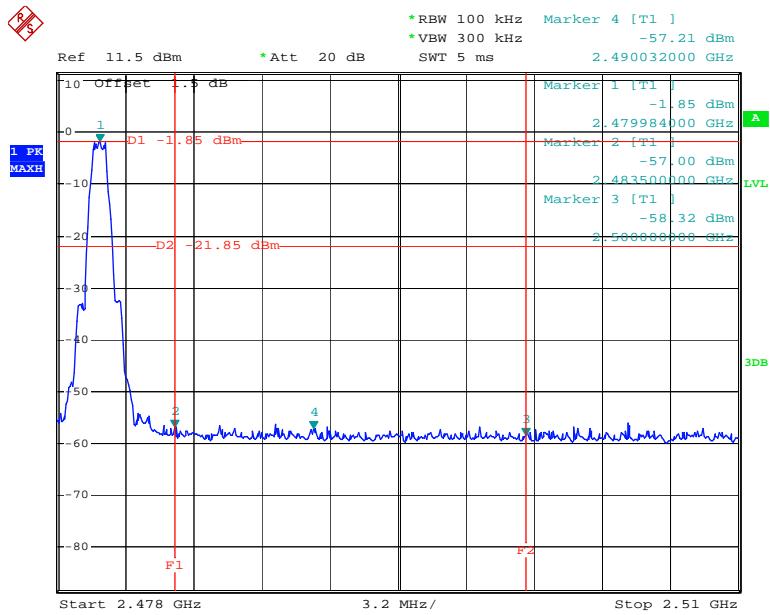
Please refer to following plots.

Band Edge, Left Side



Date: 19.MAR.2014 15:05:52

Band Edge, Right Side



Date: 19.MAR.2014 15:04:26

FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

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. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test 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. According to KDB 558074 D01 DTS Meas Guidance v03r01, set the RBW = 3 kHz, VBW = 10 kHz, Set the span to 1.5 times the DTS channel bandwidth.
4. Use the peak marker function to determine the maximum power level in any 3 kHz band.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2013-06-16	2014-06-15

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	23.7 °C
Relative Humidity:	68 %
ATM Pressure:	100.8 kPa

* The testing was performed by Leon Chen on 2014-03-19.

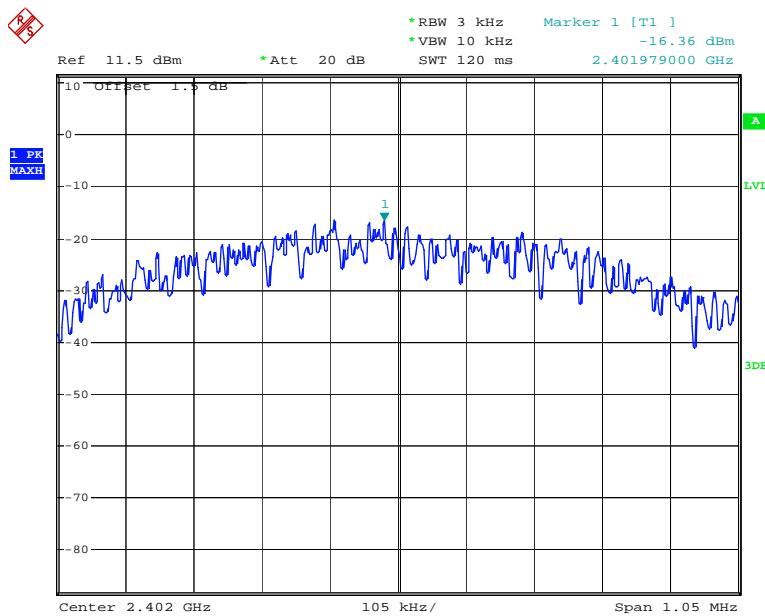
Test Mode: Transmitting

Test Result: Pass

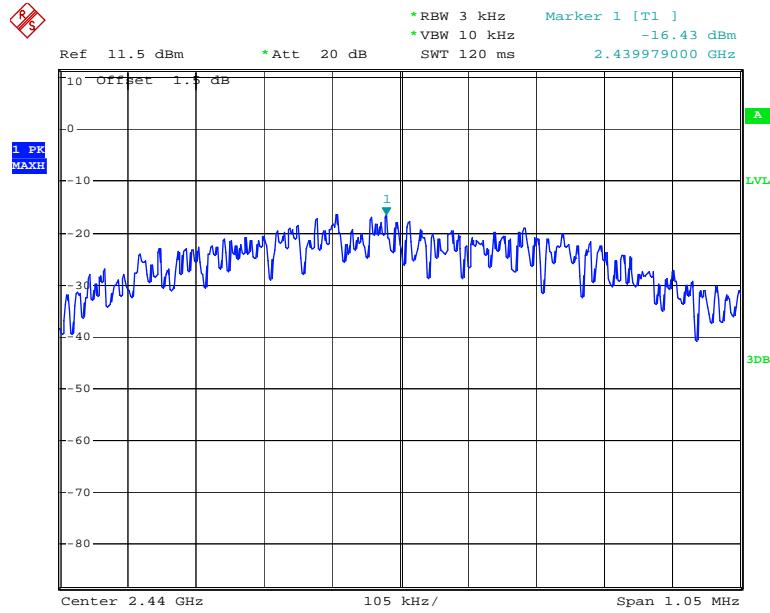
Channel	Frequency	PSD	Limit	Result
	MHz	(dBm/3kHz)	(dBm/3kHz)	
Low	2402	-16.36	8	PASS
Middle	2440	-16.43	8	PASS
High	2480	-16.47	8	PASS

Please refer to the following plots

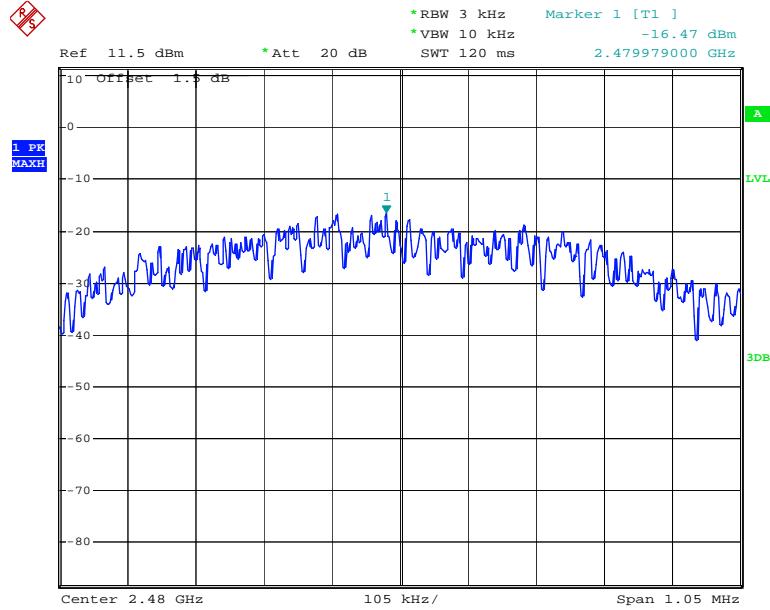
Power Spectral Density, Low Channel



Date: 19.MAR.2014 15:11:17

Power Spectral Density, Middle Channel

Date: 19.MAR.2014 15:10:51

Power Spectral Density, High Channel

Date: 19.MAR.2014 15:12:50

******* END OF REPORT *******