FCC PART 15.247

TEST REPORT

For

Dongguan Robstep Robot Co.,Ltd

#6 South Industrial Road, High-tech industrial park, Songshan Lake, Dongguan, China

FCC ID: ZO4-M1IOS

Report Type:	Product Type:
Original Report	Robstep

Test Engineer:	Dean Liu
Report Number:	RDG140826005-00A
Report Date:	2014-10-15
Reviewed By:	Sula Huang RF Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Dongguan Robstep Robot Co.,Ltd*'s product, model number: *M1 (FCC ID: ZO4-M1IOS)* (the "EUT") in this report was a *Robstep,* which was measured approximately: 46.7cm (L) x 46.4 cm (W) x 100 cm (H), rated input voltage: DC 48 V from rechargeable Li-ion battery or DC48V charging from adapter.

** All measurement and test data in this report was gathered from production sample serial number: 140826005. (Assigned by BACL.Dongguan). The EUT was received on 2014-08-27.*

Objective

This report is prepared on behalf of *Dongguan Robstep Robot Co.,Ltd* 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 Part15C DXX submissions with FCC ID: *ZO4-M1IOS*

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.

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.

For Bluetooth LE mode, 40 channels are provided for testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	…	…
…	…	…	…
…	…	…	…
..	…	38	2478
19	2440	39	2480

EUT was tested with channel 0, 19 and 39.

EUT Exercise Software

HMSOFT-10-2541-V528

Equipment Modifications

No modification was made to the EUT.

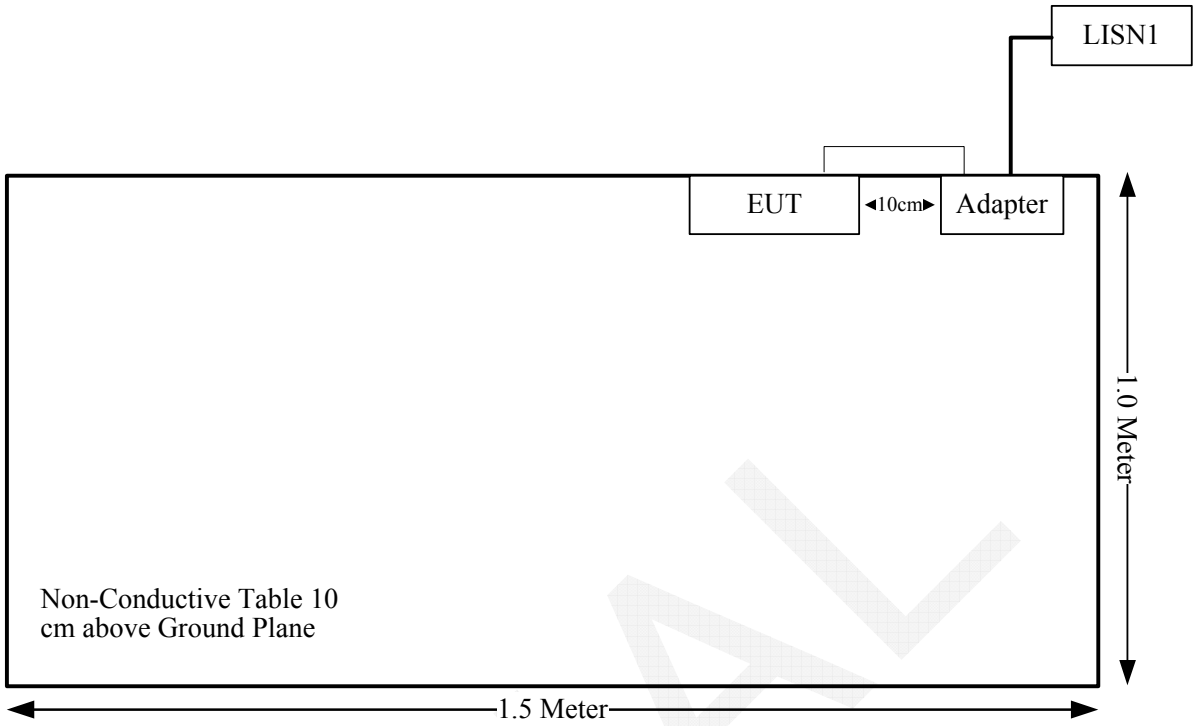
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
/	/	/	/	/	/

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:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- f(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= 1.58 dBm(1.44 mW) at 2480MHz
[(max. power of channel, mW)/(min. test separation distance, mm)] · [√f(GHz)]
= 1.44/5*(√2.480) = 0.45 < 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 two PCB antenna arrangement, both two antenna gain is 0 dBi, fulfill the requirement of this section. Please refer to the EUT 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：

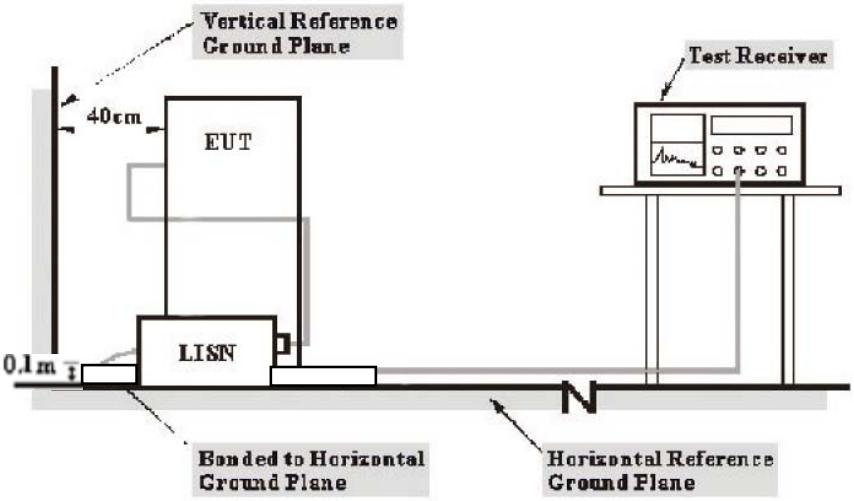
If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
– non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.
If U_{lab} is greater than U_{cispr} of Table 1, then:
– compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
– non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), 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_{cispr}

Measurement	U_{cispr}
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 first LISN and the other support equipments were connected to the outlet of the second 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	2014-11-20
R&S	L.I.S.N	ESH3-Z5	843331/015	2013-09-25	2014-09-25
R&S	Two-line V-network	ENV 216	3560.6550.12	2014-01-22	2015-01-22
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, 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:

Margin = Limit – 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:

14.1 dB at **0.196675 MHz** in the **Neutral** conducted mode.

Test Data

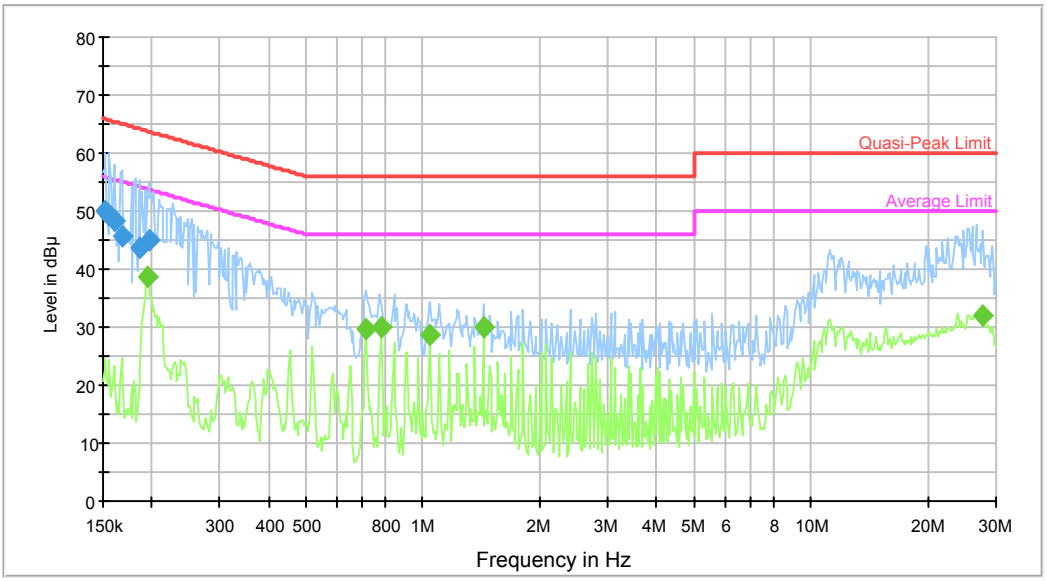
Environmental Conditions

Temperature:	28 °C
Relative Humidity:	58 %
ATM Pressure:	100.3 kPa

The testing was performed by Dean Liu on 2014-09-03.

Test Mode: Charging&Transmitting

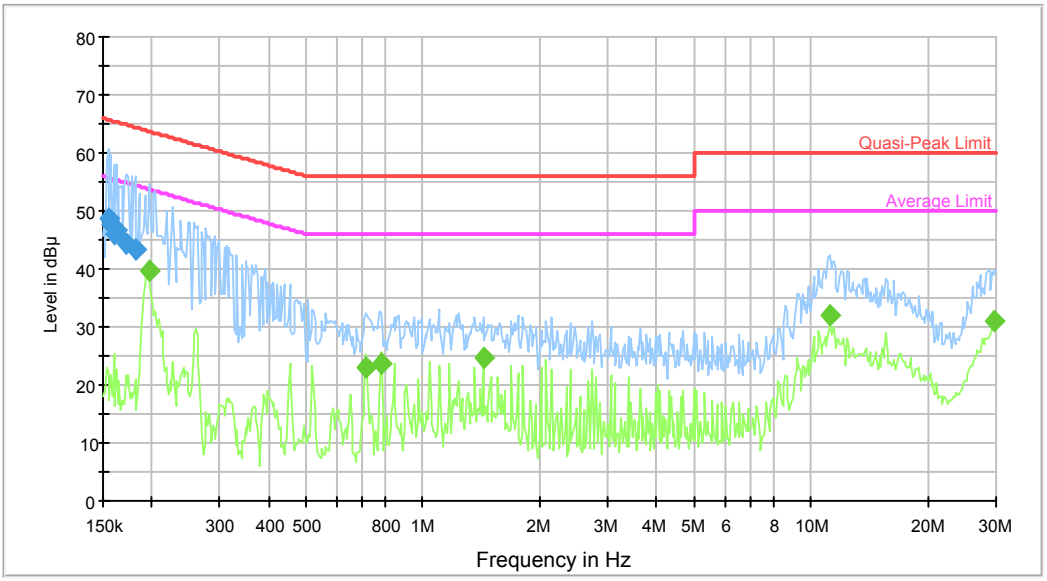
AC 120V/60 Hz, Line



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.152410	50.1	9.000	L1	10.1	15.8	65.9	Compliance
0.156097	49.5	9.000	L1	10.1	16.2	65.7	Compliance
0.159873	48.5	9.000	L1	10.2	17.0	65.5	Compliance
0.167702	45.7	9.000	L1	10.3	19.4	65.1	Compliance
0.186006	43.7	9.000	L1	10.5	20.5	64.2	Compliance
0.196675	45.1	9.000	L1	10.7	18.7	63.7	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.195114	38.8	9.000	L1	10.7	15.1	53.8	Compliance
0.715082	29.6	9.000	L1	10.6	16.4	46.0	Compliance
0.780588	30.1	9.000	L1	10.5	15.9	46.0	Compliance
1.039922	28.8	9.000	L1	10.4	17.2	46.0	Compliance
1.430284	29.9	9.000	L1	10.4	16.1	46.0	Compliance
27.716608	32.1	9.000	L1	11.0	17.9	50.0	Compliance

AC 120V/60 Hz, Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.154858	48.7	9.000	N	10.3	17.0	65.7	Compliance
0.157346	47.5	9.000	N	10.4	18.1	65.6	Compliance
0.159873	46.1	9.000	N	10.4	19.4	65.5	Compliance
0.162441	46.6	9.000	N	10.5	18.7	65.3	Compliance
0.171759	44.2	9.000	N	10.7	20.7	64.9	Compliance
0.181612	43.5	9.000	N	10.9	20.9	64.4	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.196675	39.6	9.000	N	11.3	14.1	53.7	Compliance
0.715082	23.1	9.000	N	10.6	22.9	46.0	Compliance
0.780588	23.7	9.000	N	10.5	22.3	46.0	Compliance
1.430284	24.6	9.000	N	10.5	21.4	46.0	Compliance
11.174791	31.9	9.000	N	10.6	18.1	50.0	Compliance
29.777269	31.0	9.000	N	11.1	19.0	50.0	Compliance

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 ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

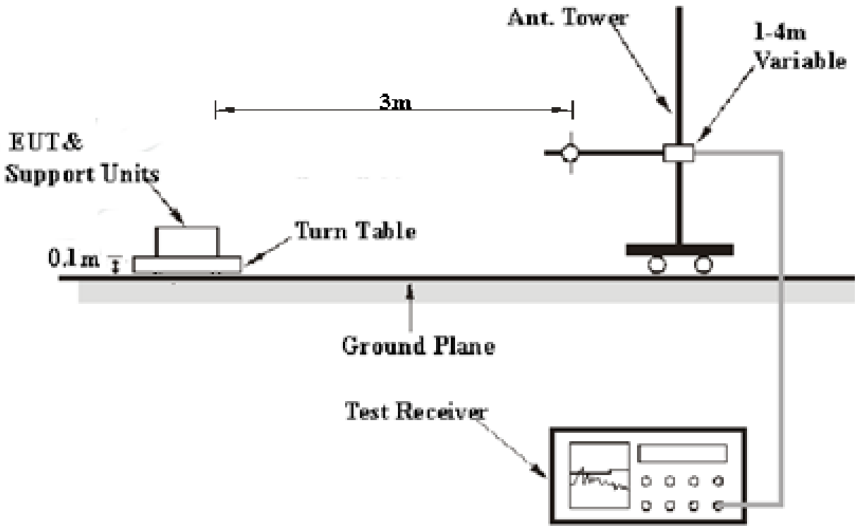
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:
30M~200MHz: 5.0 dB
200M~1GHz: 6.2 dB
1G~6GHz: 4.45 dB
6G~18GHz: 5.23 dB

Table 2 – Values of U_{cispr}

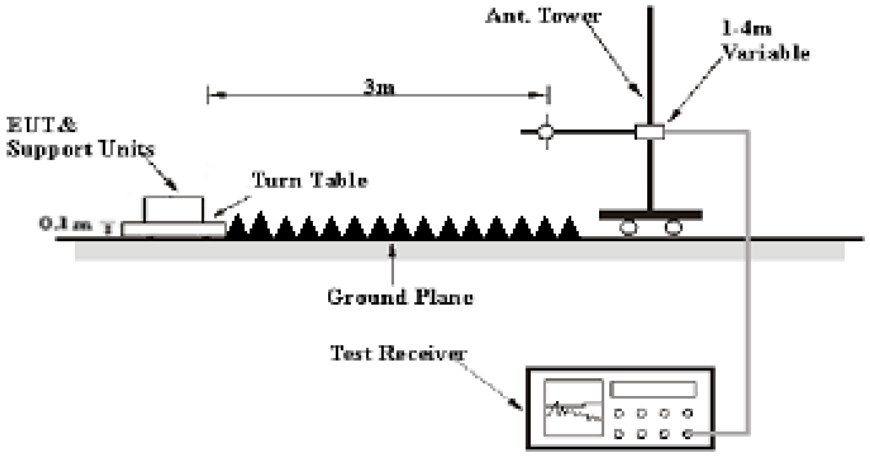
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

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.

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
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

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:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - 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:

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2014-05-09	2015-05-09
Sunol Sciences	Antenna	JB3	A060611-3	2014-07-28	2017-07-27
HP	Amplifier	8447E	2434A02181	2014-09-01	2015-09-01
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09
ETS-Lindgren	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2014-02-19	2015-02-19
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2014-09-06	2015-09-06

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, 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:

14.88 dB at **9608 MHz** in the **Vertical** polarization

Test Data

Environmental Conditions

Temperature:	26.8 °C
Relative Humidity:	54 %
ATM Pressure:	100.5 kPa

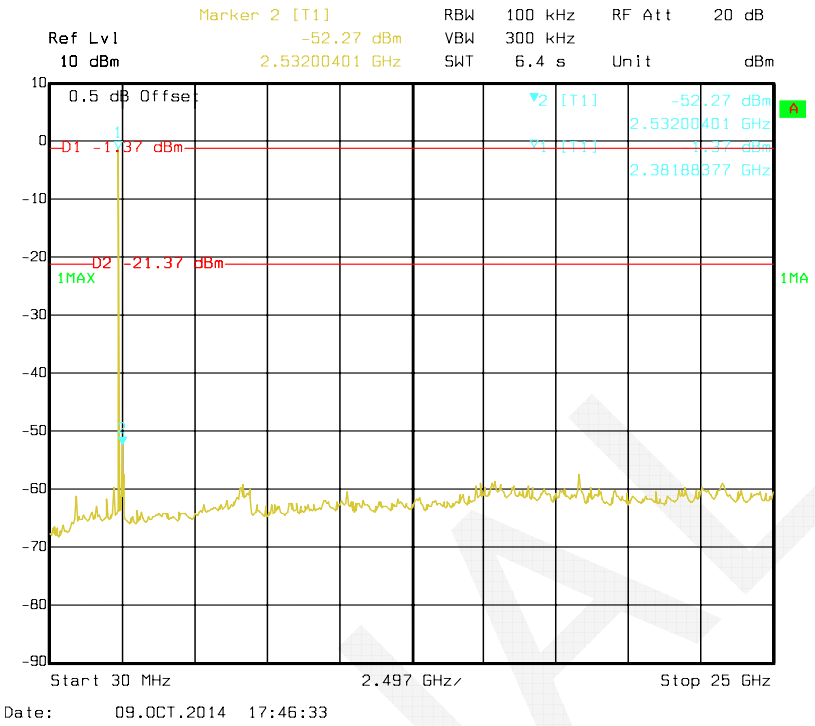
** The testing was performed by Dean Liu on 2014-10-09.*

Test Mode: Transmitting

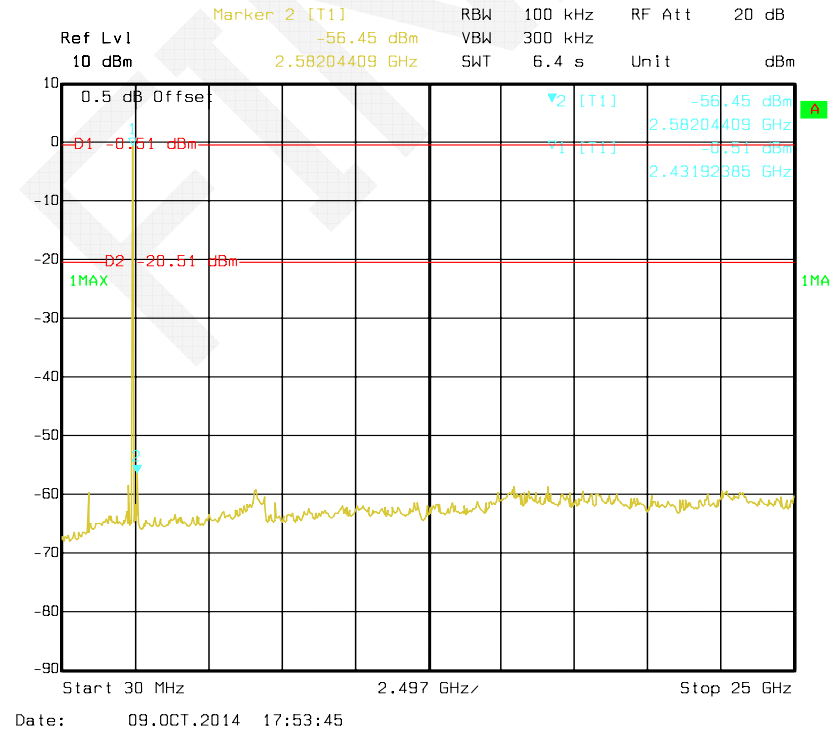
Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	FCC 15.247	
(MHz)	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dBµV/m)	Margin (dB)
Low Channel: 2402 MHz									
2402	91.64	PK	H	25.65	4.42	27.32	94.39	N/A	N/A
2402	86.61	AV	H	25.65	4.42	27.32	89.36	N/A	N/A
2402	92.80	PK	V	25.65	4.42	27.32	95.55	N/A	N/A
2402	87.74	AV	V	25.65	4.42	27.32	90.49	N/A	N/A
2390	36.59	PK	V	25.61	4.39	27.32	39.27	74.00	34.73
2390	25.2	AV	V	25.61	4.39	27.32	27.88	54.00	26.12
4804	41.48	PK	V	30.59	5.98	27.41	50.64	74.00	23.36
4804	24.28	AV	V	30.59	5.98	27.41	33.44	54.00	20.56
7206	35.66	PK	V	34.09	7.45	25.91	51.29	74.00	22.71
7206	20.21	AV	V	34.09	7.45	25.91	35.84	54.00	18.16
9608	35.24	PK	V	35.96	8.80	27.55	52.45	74.00	21.55
9608	21.91	AV	V	35.96	8.80	27.55	39.12	54.00	14.88
5520	34.62	PK	V	32.10	5.92	26.86	45.78	74.00	28.22
5520	21.11	AV	V	32.10	5.92	26.86	32.27	54.00	21.73
105.20	35.17	QP	H	11.89	1.26	21.40	26.92	43.50	16.58
Middle Channel: 2440 MHz									
2440	92.96	PK	H	25.74	4.40	27.34	95.76	N/A	N/A
2440	87.28	AV	H	25.74	4.40	27.34	90.08	N/A	N/A
2440	93.02	PK	V	25.74	4.40	27.34	95.82	N/A	N/A
2440	87.54	AV	V	25.74	4.40	27.34	90.34	N/A	N/A
4880	41.26	PK	V	30.79	6.08	27.42	50.71	74.00	23.29
4880	25.23	AV	V	30.79	6.08	27.42	34.68	54.00	19.32
7320	33.64	PK	V	34.37	7.51	25.88	49.64	74.00	24.36
7320	20.14	AV	V	34.37	7.51	25.88	36.14	54.00	17.86
9760	29.14	PK	V	36.32	8.83	27.21	47.08	74.00	26.92
9760	18.67	AV	V	36.32	8.83	27.21	36.61	54.00	17.39
5520	34.21	PK	V	32.10	5.92	26.86	45.37	74.00	28.63
5520	21.02	AV	V	32.10	5.92	26.86	32.18	54.00	21.82
105.20	34.22	QP	H	11.89	1.26	21.40	25.97	43.50	17.53
High Channel: 2480 MHz									
2480	92.87	PK	H	25.85	4.48	27.36	95.84	N/A	N/A
2480	88.34	AV	H	25.85	4.48	27.36	91.31	N/A	N/A
2480	93.6	PK	V	25.85	4.48	27.36	96.57	N/A	N/A
2480	88.9	AV	V	25.85	4.48	27.36	91.87	N/A	N/A
2483.5	44.05	PK	V	25.86	4.49	27.36	47.04	74.00	26.96
2483.5	31.42	AV	V	25.86	4.49	27.36	34.41	54.00	19.59
4960	40.95	PK	V	31.00	5.90	27.43	50.42	74.00	23.58
4960	24.84	AV	V	31.00	5.90	27.43	34.31	54.00	19.69
7440	34.96	PK	V	34.66	7.58	25.97	51.23	74.00	22.77
7440	21.24	AV	V	34.66	7.58	25.97	37.51	54.00	16.49
9920	29.49	PK	V	36.71	8.87	26.66	48.41	74.00	25.59
9920	18.74	AV	V	36.71	8.87	26.66	37.66	54.00	16.34
5520	33.68	PK	V	32.10	5.92	26.86	44.84	74.00	29.16
5520	20.27	AV	V	32.10	5.92	26.86	31.43	54.00	22.57
105.20	34.22	QP	H	11.89	1.26	21.40	25.97	43.50	17.53

Conducted Spurious Emissions at Antenna Port

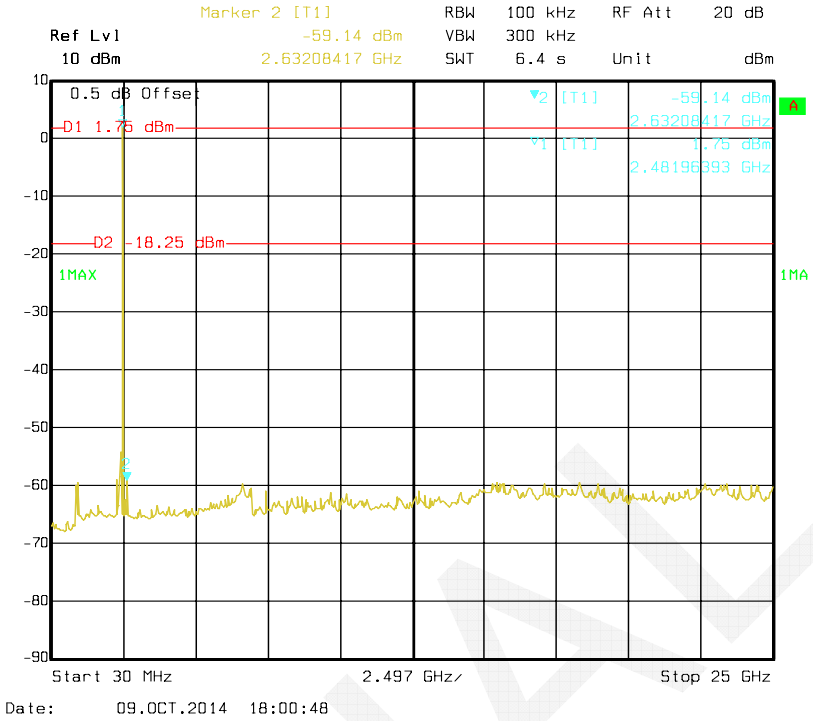
Low Channel



Middle Channel



High Channel



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

According to KDB 558074 D01 DTS Meas Guidance v03r02
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3×RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09

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

Test Data

Environmental Conditions

Temperature:	27.1 °C
Relative Humidity:	50 %
ATM Pressure:	100.5 kPa

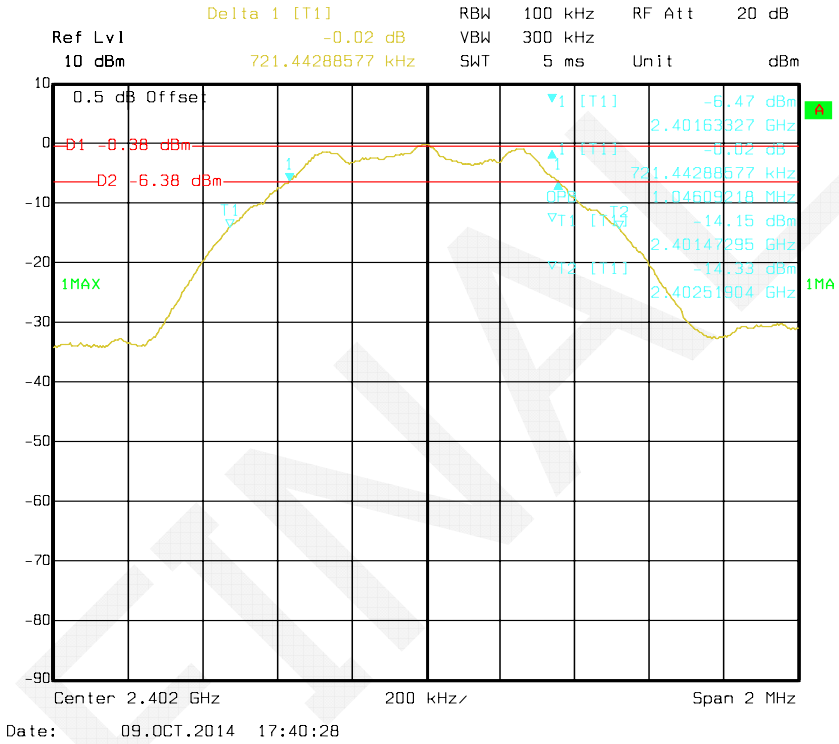
** The testing was performed by Dean Liu on 2014-10-09.*

Test Result: Compliant.

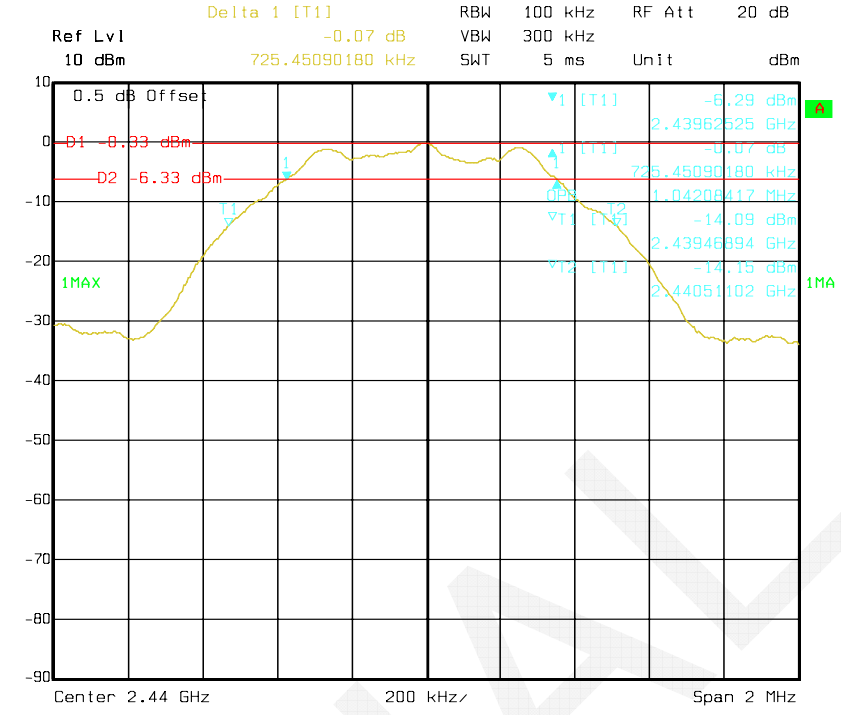
Please refer to the following tables and plots.

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (kHz)
Low	2402	0.721	≥500
Middle	2440	0.725	≥500
High	2480	0.725	≥500

Low Channel

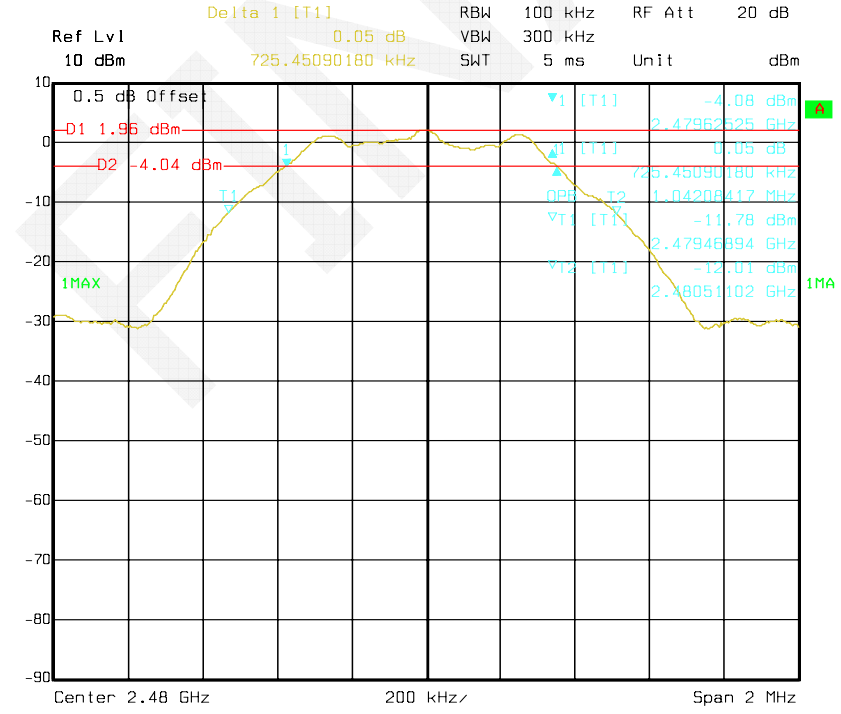


Middle Channel



Date: 09.OCT.2014 17:52:15

High Channel



Date: 09.OCT.2014 17:57:13

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

According to KDB 558074 D01 DTS Meas Guidance v03r02

a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ 3×RBW.
c) Set span ≥ 3×RBW
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09

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

Test Data

Environmental Conditions

Temperature:	27.1 °C
Relative Humidity:	50 %
ATM Pressure:	100.5 kPa

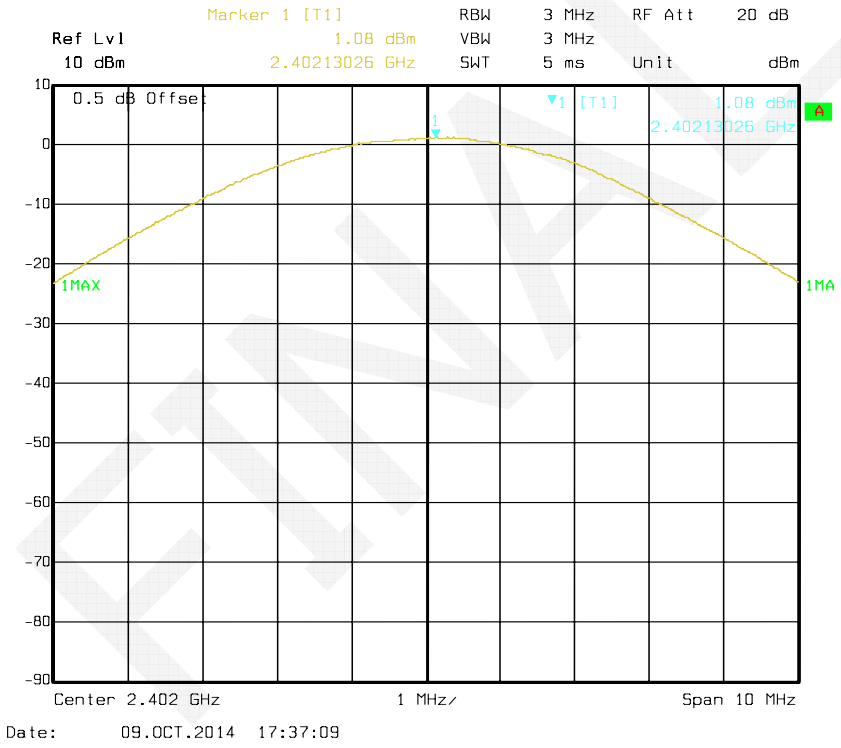
** The testing was performed by Dean Liu on 2014-10-09.*

Test Mode: Transmitting

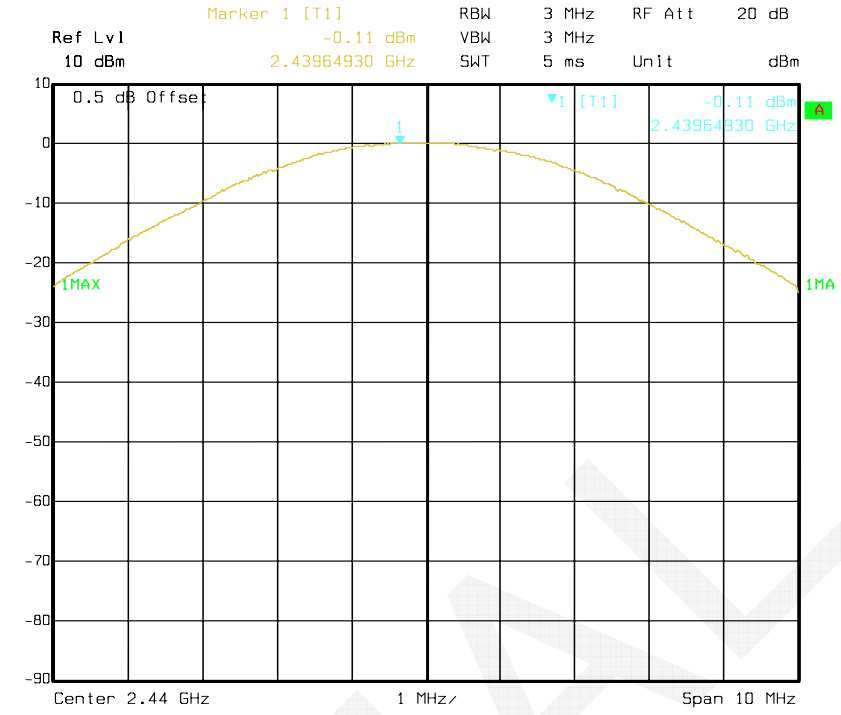
Channel	Frequency	Max Peak Conducted Output Power	Limit	Result
	(MHz)	(dBm)	(dBm)	
Low	2402	1.08	30	PASS
Middle	2440	-0.11	30	PASS
High	2480	1.58	30	PASS

Please refer to the following plots

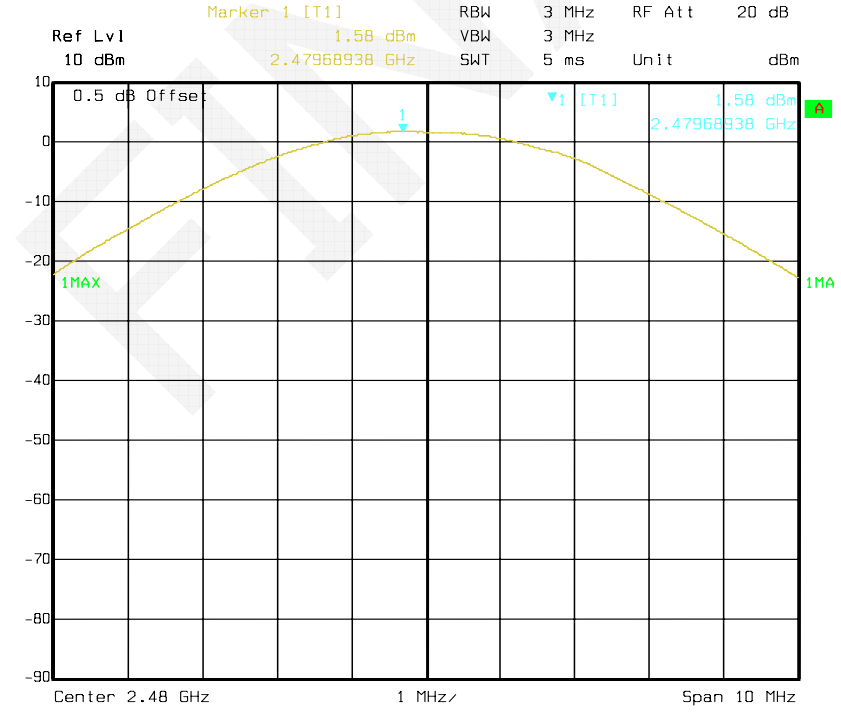
RF Output Power, Low Channel



RF Output Power, Middle Channel



RF Output Power, High Channel



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	FSEM	DE31388	2014-05-09	2015-05-09

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

Test Data

Environmental Conditions

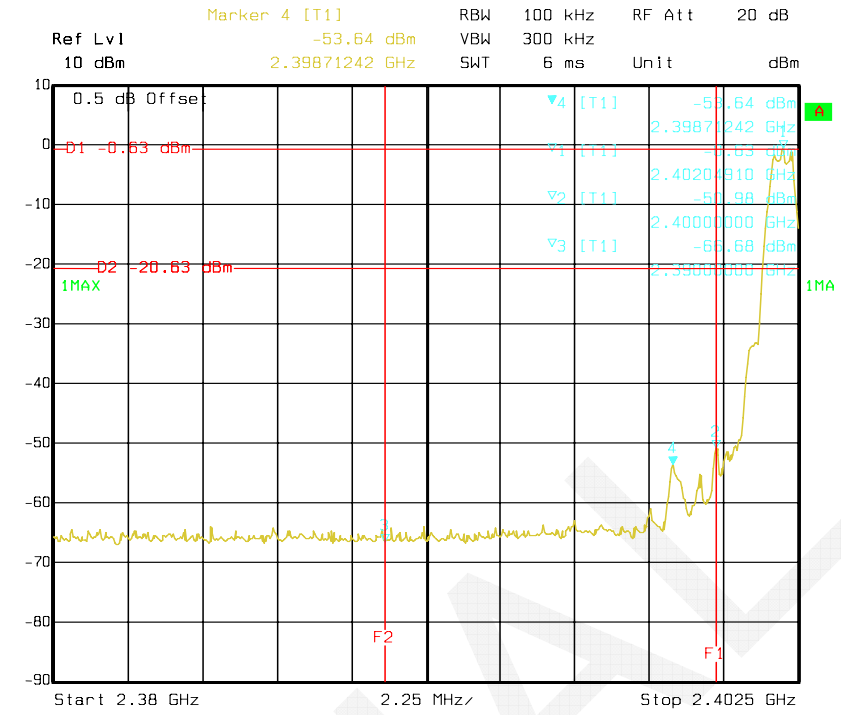
Temperature:	27.1 °C
Relative Humidity:	50 %
ATM Pressure:	100.5 kPa

** The testing was performed by Dean Liu on 2014-10-09.*

Test Result: *Compliant.*

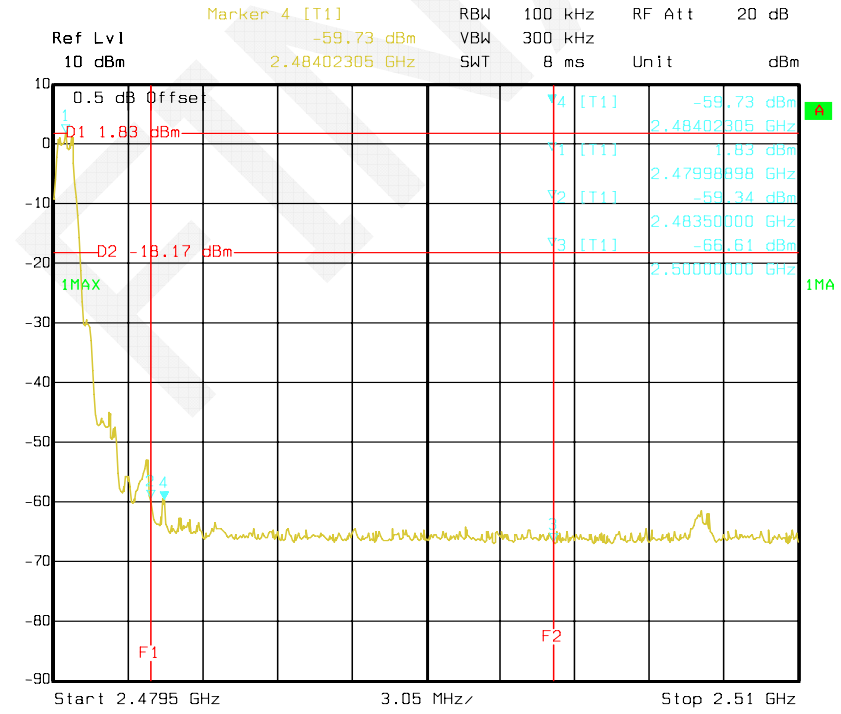
Please refer to following plots.

Band Edge, Left Side



Date: 09.OCT.2014 17:42:56

Band Edge, Right Side



Date: 09.OCT.2014 17:59:09

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

According to KDB 558074 D01 DTS Meas Guidance v03r02

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3×RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09

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

Test Data

Environmental Conditions

Temperature:	27.1 °C
Relative Humidity:	50 %
ATM Pressure:	100.5 kPa

** The testing was performed by Dean Liu on 2014-10-09.*

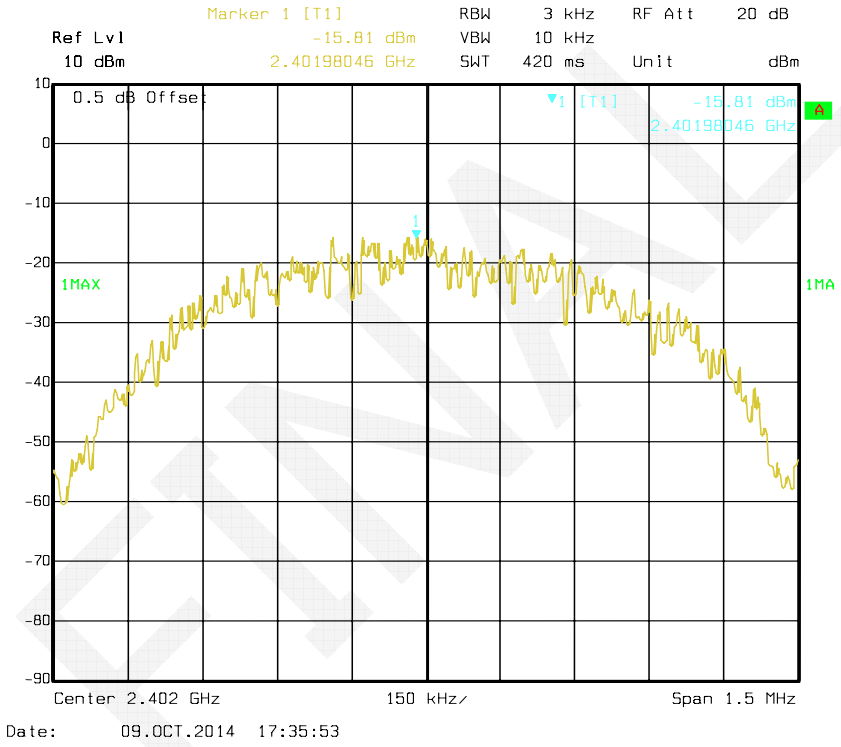
Test Mode: Transmitting

Test Result: Pass

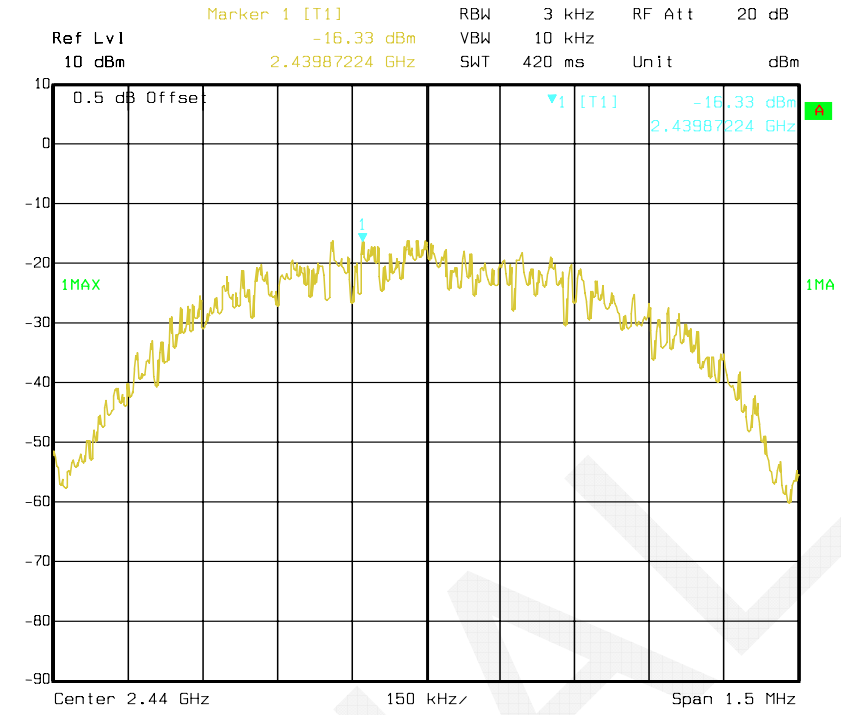
Channel	Frequency	PSD	Limit	Result
	MHz	(dBm/3kHz)	(dBm/3kHz)	
Low	2402	-15.81	≤8	PASS
Middle	2440	-16.33	≤8	PASS
High	2480	-14.16	≤8	PASS

Please refer to the following plots

Power Spectral Density, Low Channel

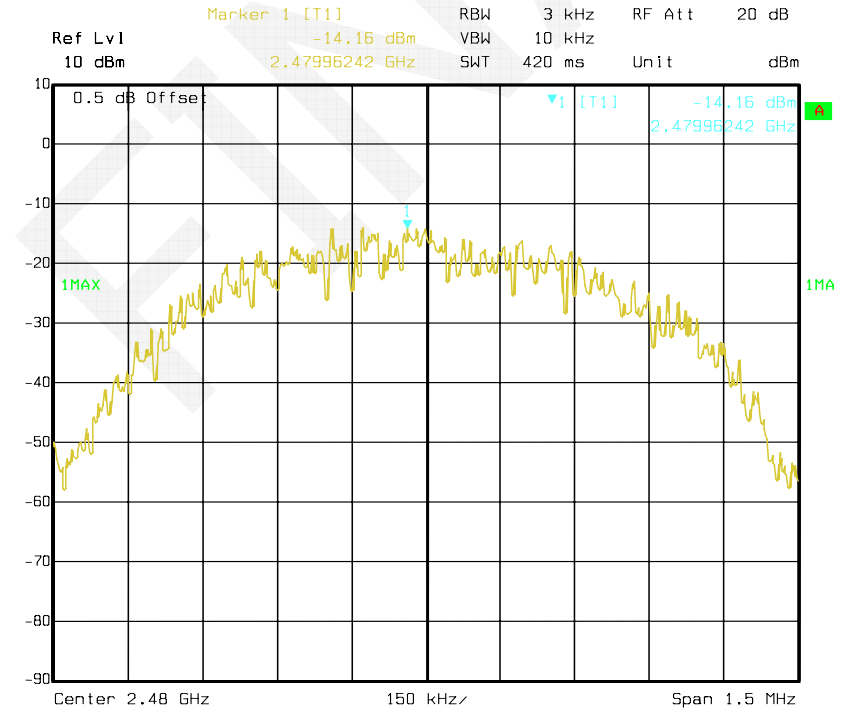


Power Spectral Density, Middle Channel



Date: 09.OCT.2014 17:50:17

Power Spectral Density, High Channel



Date: 09.OCT.2014 17:55:01

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