

FCC PART 15.247

TEST REPORT

For

Guangzhou Si Bao Jian Electronics Co., Ltd.

No.7 Nanbei Main Road, Shitan Town, Zengcheng, Guangzhou City, Guangdong Province

FCC ID: 2ACQS254TX

Report Type: Original Report	Product Type: Baby Monitor
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Report Number: RDG160106001-00A	
Report Date: 2016-02-17	
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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
EQUIPMENT MODIFICATIONS	6
EUT EXERCISE SOFTWARE	6
BLOCK DIAGRAM OF TEST SETUP	6
SUMMARY OF TEST RESULTS	7
FCC §15.247 (I) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)	8
APPLICABLE STANDARD	8
FCC §15.203 - ANTENNA REQUIREMENT.....	9
APPLICABLE STANDARD	9
ANTENNA CONNECTOR CONSTRUCTION	9
FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS	10
APPLICABLE STANDARD	10
MEASUREMENT UNCERTAINTY	10
EUT SETUP	10
EMI TEST RECEIVER SETUP.....	11
TEST PROCEDURE	11
CORRECTED AMPLITUDE & MARGIN CALCULATION	11
TEST EQUIPMENT LIST AND DETAILS.....	12
TEST DATA	12
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS.....	17
APPLICABLE STANDARD	17
MEASUREMENT UNCERTAINTY	17
EUT SETUP	17
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	18
TEST PROCEDURE	18
TEST EQUIPMENT LIST AND DETAILS.....	19
CORRECTED AMPLITUDE & MARGIN CALCULATION	19
TEST RESULTS SUMMARY	19
TEST DATA	19
FCC §15.247(a) (1) - CHANNEL SEPARATION TEST	23
APPLICABLE STANDARD	23
TEST EQUIPMENT LIST AND DETAILS.....	23
TEST PROCEDURE	23
TEST DATA	23
FCC §15.247(a) (1) – 20 dB BANDWIDTH TESTING	25
APPLICABLE STANDARD	25
TEST PROCEDURE	25

TEST EQUIPMENT LIST AND DETAILS.....	25
TEST DATA	25
FCC §15.247(a) (1) (iii) - QUANTITY OF HOPPING CHANNEL TEST	28
APPLICABLE STANDARD	28
TEST PROCEDURE	28
TEST EQUIPMENT LIST AND DETAILS.....	28
TEST DATA	28
FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME).....	30
APPLICABLE STANDARD	30
TEST PROCEDURE	30
TEST EQUIPMENT LIST AND DETAILS.....	30
TEST DATA	30
FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT	33
APPLICABLE STANDARD	33
TEST PROCEDURE	33
TEST EQUIPMENT LIST AND DETAILS.....	33
TEST DATA	33
FCC §15.247(d) - BAND EDGES TESTING	36
APPLICABLE STANDARD	36
TEST PROCEDURE	36
TEST EQUIPMENT LIST AND DETAILS.....	36
TEST DATA	36

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Guangzhou Si Bao Jian Electronics Co., Ltd.*'s product, model number: *BM-254 (FCC ID: 2ACQS254TX)* (the "EUT") in this report was a *Baby Monitor*, which was measured approximately: 11.8 cm (L) x 8.5cm (W) x 6.6 cm (H), rated input voltage: DC5.5V from adapter.

Adapter#1 information:

S01-005-0055-00800 SWP-26457-00L

Input: AC100-240V, 50/60 Hz, 0.15A max;

Output: DC 5.5V, 800mA

Adapter#2 information:

Model: S11-006-0055-00800UM

Input: AC100-240V, 50-60 Hz, 0.2A max;

Output: DC 5.5V, 800mA

All measurement and test data in this report was gathered from production sample serial number: 160106001 (Assigned byBACL, Dongguan). The EUT was received on 2016-01-07.

Objective

This report is prepared on behalf of *Guangzhou Si Bao Jian Electronics 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 compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

Operating with the Parent Part of a system, FCC ID: 2ACQS256RX, Granted at 2014-09-04.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

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 06, 2015.

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 engineering mode which was configured under maximum power output and switched the channels by keys.

16 hopping channels are provided by manufacturer, and EUT was tested with channel 1, 10 and 16.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	9	2442.25
2	2415	10	2445.75
3	2418	11	2449.5
4	2421	12	2452.25
5	2424.25	13	2458.75
6	2430.75	14	2462.25
7	2433.25	15	2465.25
8	2436.5	16	2469.4

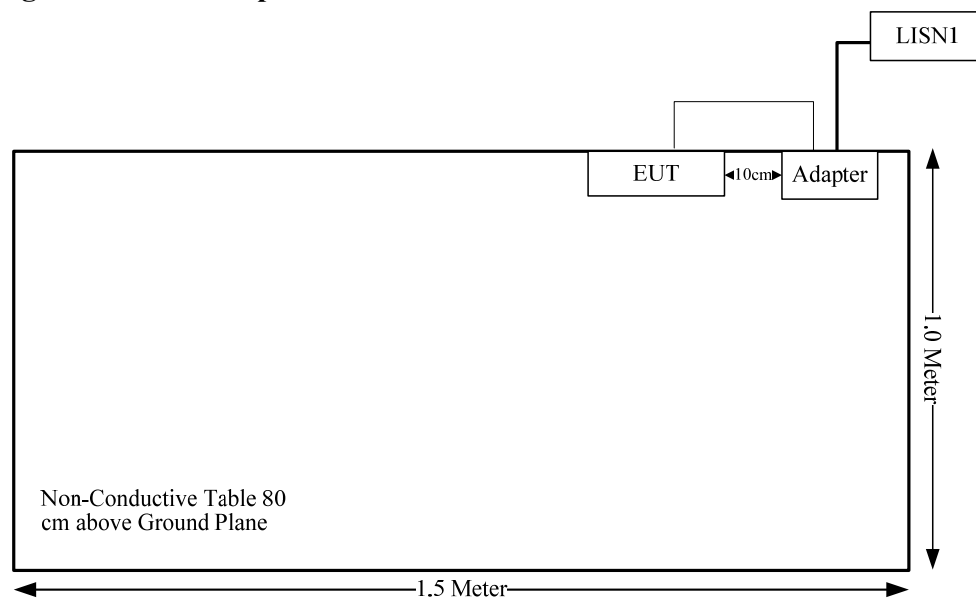
Equipment Modifications

No modification was made to the EUT.

EUT Exercise Software

No EUT exercise software was used.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1091	Maximum Permissible Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(1)	20 dB Bandwidth	Compliance
§15.247(a)(1)	Channel Separation Test	Compliance
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliance
§15.247(b)(1)	Peak Output Power Measurement	Compliance
§15.247(d)	Band Edges	Compliance

FCC §15.247 (I) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

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

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

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

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

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data:

Frequency Range (MHz)	Antenna Gain		Tune-up Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
	(dBi)	(numeric)	(dBm)	(mW)			
2412-2469.4	0	1.0	10.0	10.0	20	0.002	1.0

Note: The tune-up power is 8 ± 2 dBm.

Result: The device meet FCC MPE at 20 cm distance.

FCC §15.203 - ANTENNA REQUIREMENT

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.

Antenna Connector Construction

The EUT has one integral antenna arrangement and the antenna gain is 0 dBi, which 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:

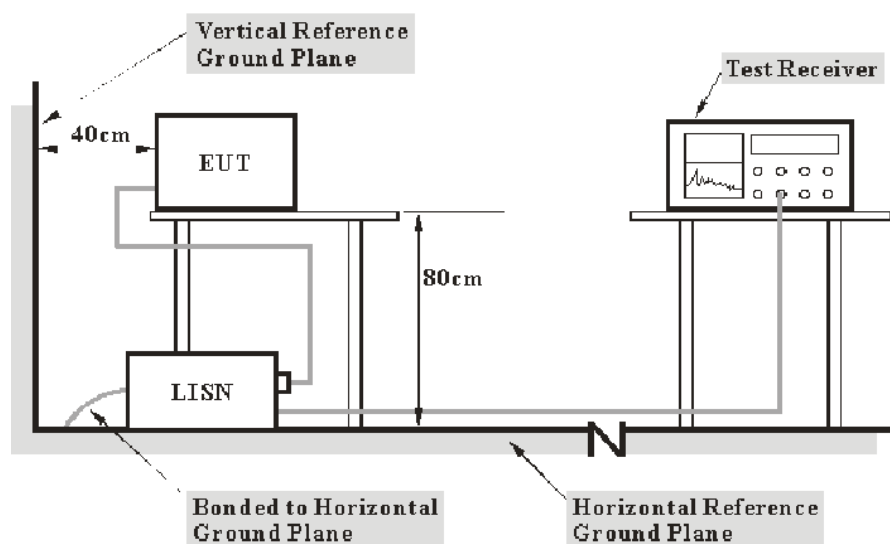
- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.

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 3.12 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 C63.10-2013 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.

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.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

Herein,

V_C : corrected voltage amplitude

V_R : reading voltage amplitude

A_C : attenuation caused by cable loss

VDF : voltage division factor of AMN or ISN

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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2015-12-10	2016-12-09
R&S	L.I.S.N	ESH2-Z5	892107/021	2015-07-16	2016-07-15
R&S	Two-line V-network	ENV 216	3560.6550.12	2015-11-26	2016-11-25
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).

Test Data**Environmental Conditions**

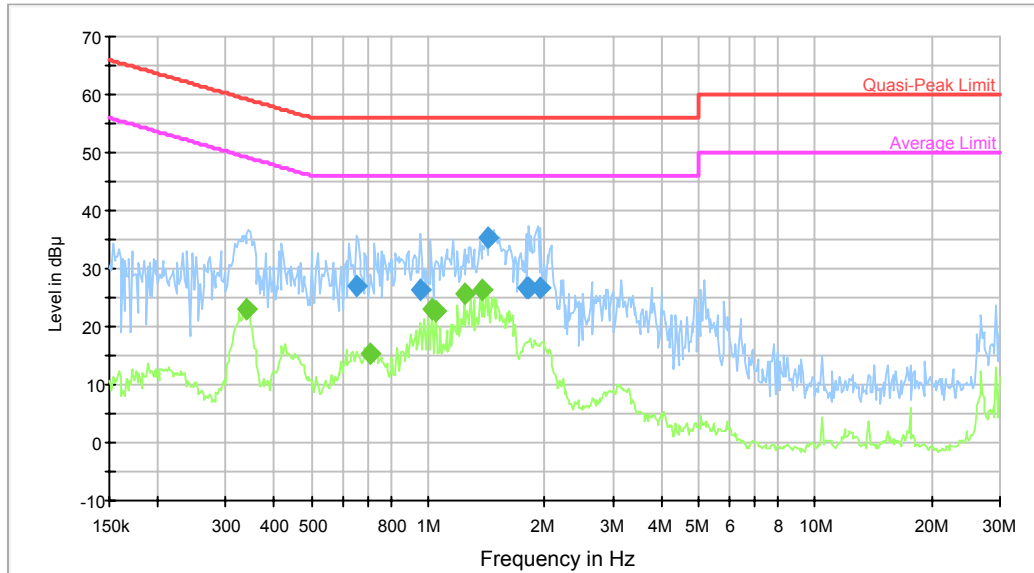
Temperature:	23.69°C
Relative Humidity:	54 %
ATM Pressure:	102 kPa

The testing was performed by Allen Qiao on 2016-01-08.

Test Mode: Transmitting

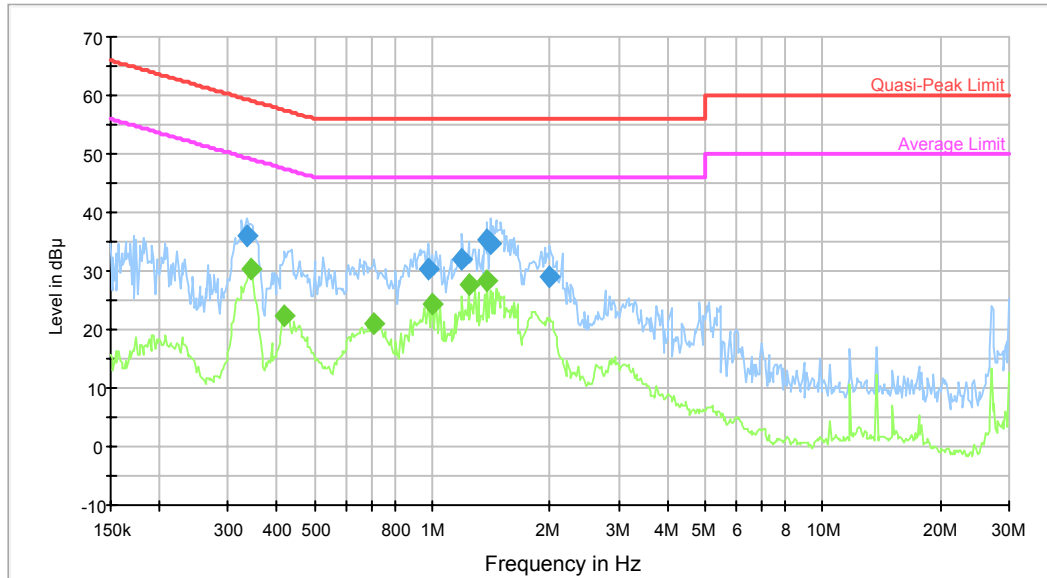
Adapter#1:

AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.655073	26.9	9.000	L1	9.8	29.1	56.0	Compliance
0.952654	26.4	9.000	L1	9.8	29.6	56.0	Compliance
1.430284	35.5	9.000	L1	9.8	20.5	56.0	Compliance
1.787792	26.6	9.000	L1	9.8	29.4	56.0	Compliance
1.816511	26.6	9.000	L1	9.8	29.4	56.0	Compliance
1.951564	26.6	9.000	L1	9.8	29.4	56.0	Compliance

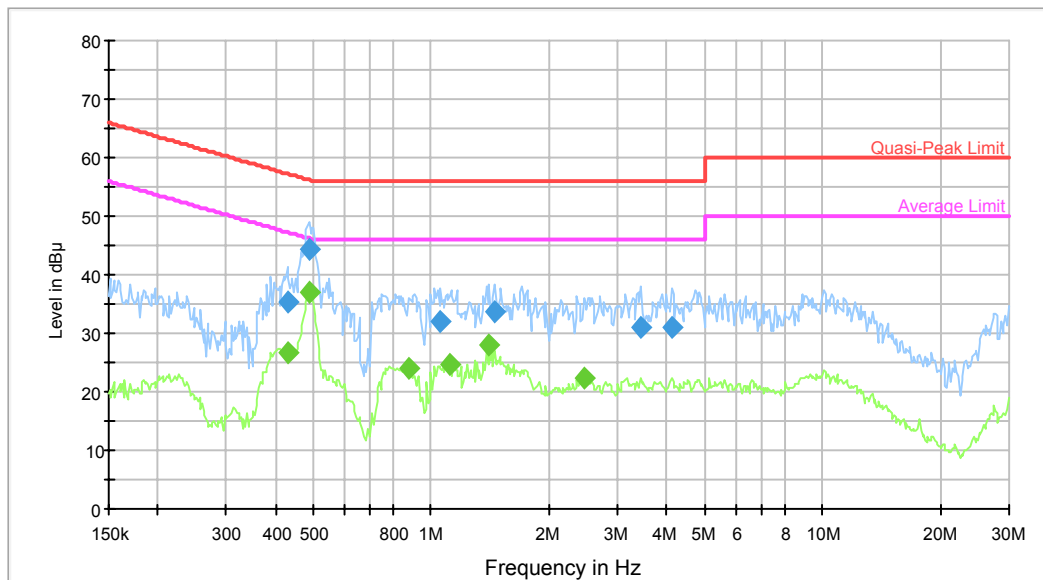
Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.340821	22.9	9.000	L1	9.7	26.3	49.2	Compliance
0.709407	15.4	9.000	L1	9.8	30.6	46.0	Compliance
1.023481	23.0	9.000	L1	9.8	23.0	46.0	Compliance
1.048242	22.7	9.000	L1	9.8	23.3	46.0	Compliance
1.239175	25.7	9.000	L1	9.8	20.3	46.0	Compliance
1.385415	26.3	9.000	L1	9.8	19.7	46.0	Compliance

AC120 V, 60 Hz, Neutral:

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.335433	36.1	9.000	N	9.7	23.2	59.3	Compliance
0.975701	30.5	9.000	N	9.8	25.5	56.0	Compliance
1.190776	31.9	9.000	N	9.8	24.1	56.0	Compliance
1.385415	35.3	9.000	N	9.8	20.7	56.0	Compliance
1.407671	34.6	9.000	N	9.8	21.4	56.0	Compliance
1.998778	29.0	9.000	N	9.8	27.0	56.0	Compliance

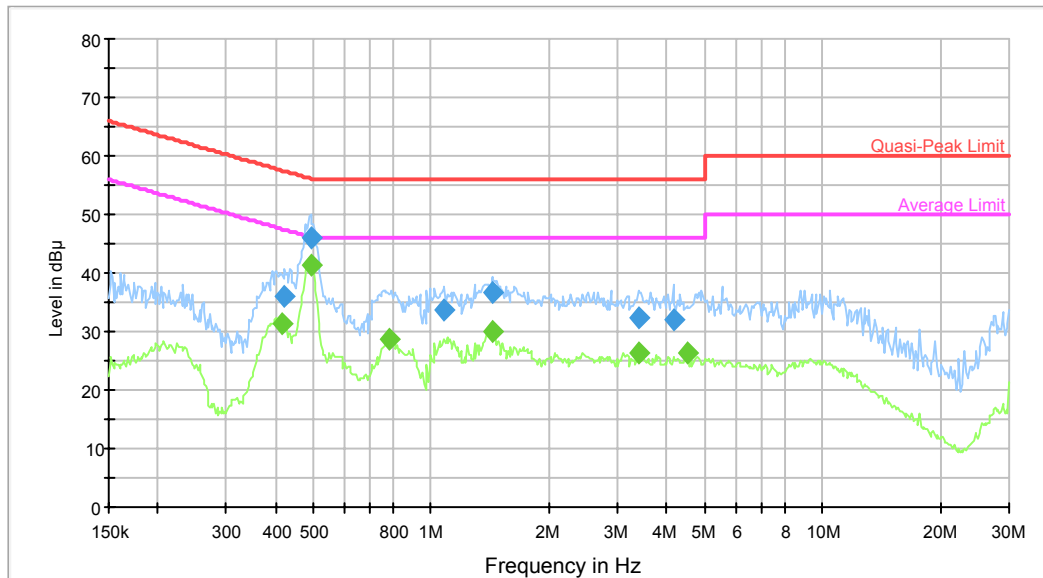
Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.343548	30.2	9.000	N	9.7	18.9	49.1	Compliance
0.419276	22.4	9.000	N	9.7	25.1	47.5	Compliance
0.709407	21.0	9.000	N	9.7	25.0	46.0	Compliance
0.999305	24.4	9.000	N	9.8	21.6	46.0	Compliance
1.239175	27.8	9.000	N	9.8	18.2	46.0	Compliance
1.385415	28.4	9.000	N	9.8	17.6	46.0	Compliance

Adapter#2:

AC120 V, 60 Hz, Line:

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.429420	35.5	9.000	L1	9.8	21.8	57.3	Compliance
0.487810	44.2	9.000	L1	9.8	12.0	56.2	Compliance
1.056628	32.1	9.000	L1	9.8	23.9	56.0	Compliance
1.453260	33.6	9.000	L1	9.8	22.4	56.0	Compliance
3.436218	30.9	9.000	L1	9.8	25.1	56.0	Compliance
4.127365	31.1	9.000	L1	9.9	24.9	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.429420	26.8	9.000	L1	9.8	20.5	47.3	Compliance
0.487810	37.0	9.000	L1	9.8	9.2	46.2	Compliance
0.879690	24.1	9.000	L1	9.8	21.9	46.0	Compliance
1.117238	24.5	9.000	L1	9.8	21.5	46.0	Compliance
1.407671	28.0	9.000	L1	9.8	18.0	46.0	Compliance
2.458886	22.3	9.000	L1	9.8	23.7	46.0	Compliance

AC120 V, 60 Hz, Neutral:

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.422630	35.9	9.000	N	9.7	21.5	57.4	Compliance
0.491712	46.0	9.000	N	9.7	10.1	56.1	Compliance
1.082190	33.5	9.000	N	9.8	22.5	56.0	Compliance
1.430284	36.7	9.000	N	9.8	19.3	56.0	Compliance
3.381891	32.3	9.000	N	9.8	23.7	56.0	Compliance
4.160384	32.1	9.000	N	9.9	23.9	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.415949	31.2	9.000	N	9.7	16.3	47.5	Compliance
0.491712	41.2	9.000	N	9.7	4.9	46.1	Compliance
0.780588	28.7	9.000	N	9.7	17.3	46.0	Compliance
1.430284	30.0	9.000	N	9.8	16.0	46.0	Compliance
3.381891	26.2	9.000	N	9.8	19.8	46.0	Compliance
4.541500	26.2	9.000	N	9.9	19.8	46.0	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_{cisp} 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_{cisp} of Table 1, then:

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

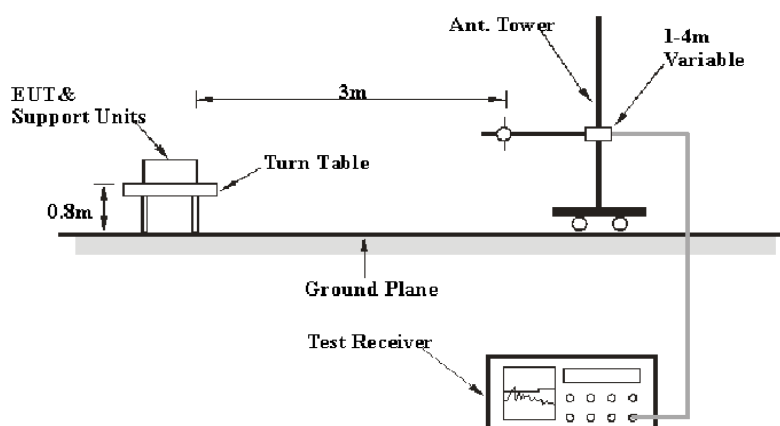
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is: 30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical; 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical; 1G~6GHz: 4.45 dB, 6G~18GHz: 5.23 dB

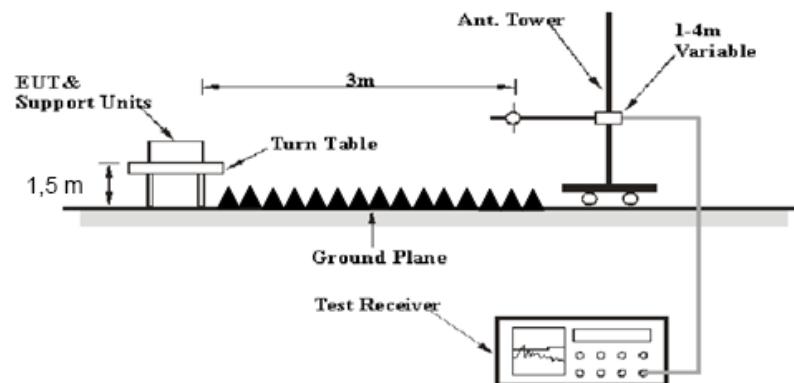
Table 1 – Values of U_{cisp}

Measurement	U_{cisp}
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 C63.10-2013. 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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2015-08-03	2016-08-02
Sunol Sciences	Antenna	JB3	A060611-3	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2015-09-01	2016-09-01
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
ETS-Lindgren	Horn Antenna	3115	9808-5557	2015-09-06	2018-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2015-02-19	2016-02-19
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2015-09-06	2016-09-06

* **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).

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 Results Summary

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

1.27 dB at 7408.2 MHz in the Horizontal polarization

Test Data

Environmental Conditions

Temperature:	23 °C
Relative Humidity:	52 %
ATM Pressure:	101.8 kPa

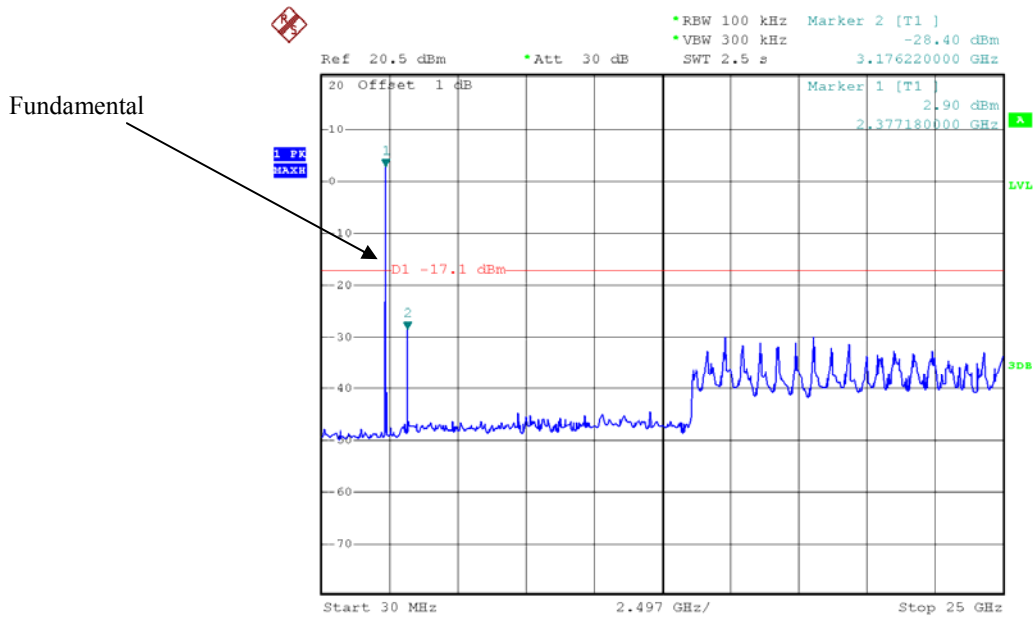
* The testing was performed by Allen Qiao on 2016-01-12.

Test Mode: Transmitting

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	FCC 15.247	
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dBμV/m)	Margin (dB)
Low Channel: 2412 MHz									
2412	76.14	PK	H	24.84	3.68	0.00	104.66	N/A	N/A
2412	68.28	AV	H	24.84	3.68	0.00	96.80	N/A	N/A
2412	75.33	PK	V	24.84	3.68	0.00	103.85	N/A	N/A
2412	67.68	AV	V	24.84	3.68	0.00	96.20	N/A	N/A
2390	31.92	PK	H	24.80	3.63	0.00	60.35	74.00	13.65
2390	14.93	AV	H	24.80	3.63	0.00	43.36	54.00	10.64
4824	63.96	PK	H	29.75	5.03	27.41	71.33	74.00	2.67 *
4824	39.46	AV	H	29.75	5.03	27.41	46.83	54.00	7.17
7236	49.13	PK	H	33.98	6.65	25.90	63.86	74.00	10.14
7236	36.39	AV	H	33.98	6.65	25.90	51.12	54.00	2.88 *
9648	45.32	PK	H	36.39	8.55	27.46	62.80	74.00	11.20
9648	34.58	AV	H	36.39	8.55	27.46	52.06	54.00	1.94 *
3215	42.83	PK	H	26.35	6.15	27.36	47.97	74.00	26.03
3215	36.56	AV	H	26.35	6.15	27.36	41.70	54.00	12.30
504.33	38.6	QP	V	18.11	2.75	22.03	37.43	46.00	8.57
Middle Channel: 2445.75 MHz									
2445.75	76.21	PK	H	24.90	3.78	0.00	104.89	N/A	N/A
2445.75	68.39	AV	H	24.90	3.78	0.00	97.07	N/A	N/A
2445.75	75.41	PK	V	24.90	3.78	0.00	104.09	N/A	N/A
2445.75	67.89	AV	V	24.90	3.78	0.00	96.57	N/A	N/A
4891.5	63.08	PK	V	29.88	5.25	27.42	70.79	74.00	3.21 *
4891.5	39.54	AV	V	29.88	5.25	27.42	47.25	54.00	6.75
7337.25	49.52	PK	V	34.14	6.77	25.88	64.55	74.00	9.45
7337.25	36.76	AV	V	34.14	6.77	25.88	51.79	54.00	2.21 *
9783	43.2	PK	V	36.47	8.63	27.16	61.14	74.00	12.86
9783	30.79	AV	V	36.47	8.63	27.16	48.73	54.00	5.27
3261	39.35	PK	V	26.48	6.05	27.32	44.56	74.00	29.44
3261	31.52	AV	V	26.48	6.05	27.32	36.73	54.00	17.27
2147	34.78	PK	V	24.36	3.17	27.34	34.97	74.00	39.03
2147	22.51	AV	V	24.36	3.17	27.34	22.70	54.00	31.30
504.33	38.7	QP	V	18.11	2.75	22.03	37.53	46.00	8.47
High Channel: 2469.4 MHz									
2469.4	76.56	PK	H	24.94	3.72	0.00	105.22	N/A	N/A
2469.4	68.74	AV	H	24.94	3.72	0.00	97.40	N/A	N/A
2469.4	75.74	PK	V	24.94	3.72	0.00	104.40	N/A	N/A
2469.4	68.19	AV	V	24.94	3.72	0.00	96.85	N/A	N/A
2483.5	35.51	PK	H	24.97	3.67	0.00	64.15	74.00	9.85
2483.5	18.14	AV	H	24.97	3.67	0.00	46.78	54.00	7.22
4938.8	63.98	PK	H	29.98	5.36	27.43	71.89	74.00	2.11 *
4938.8	40.44	AV	H	29.98	5.36	27.43	48.35	54.00	5.65
7408.2	50.37	PK	H	34.25	6.85	25.88	65.59	74.00	8.41
7408.2	37.51	AV	H	34.25	6.85	25.88	52.73	54.00	1.27 *
9877.6	41.61	PK	H	36.53	8.68	26.83	59.99	74.00	14.01
9877.6	29.04	AV	H	36.53	8.68	26.83	47.42	54.00	6.58
3293	38.82	PK	H	26.58	5.30	27.29	43.41	74.00	30.59
3293	32.37	AV	H	26.58	5.30	27.29	36.96	54.00	17.04
504.33	38.8	QP	V	18.11	2.75	22.03	37.63	46.00	8.37

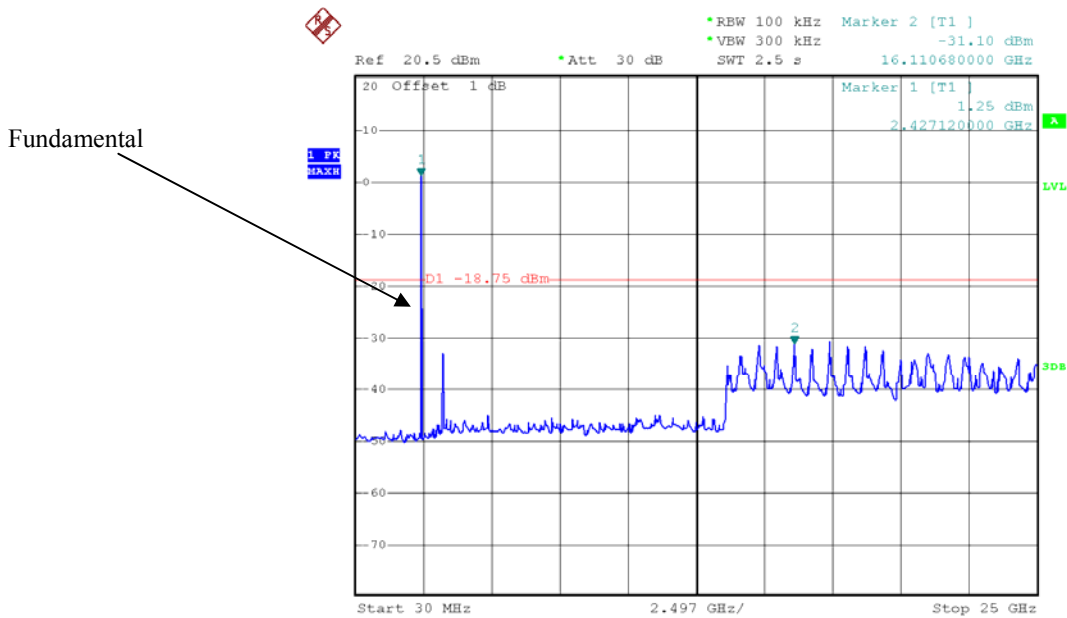
*Within measurement uncertainty!

Conducted Spurious Emissions at Antenna Port Low Channel



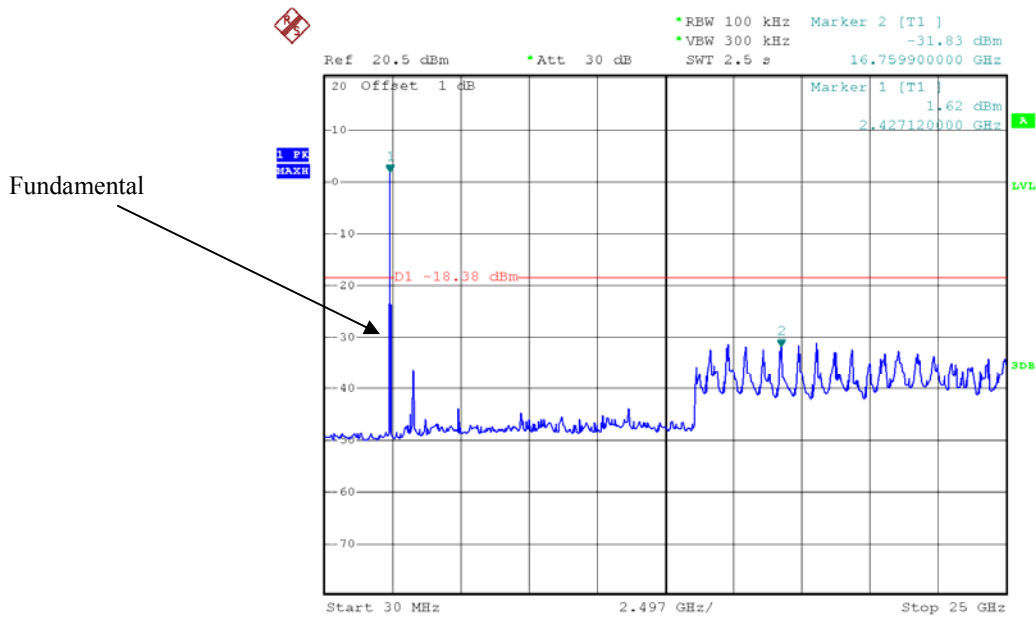
Date: 12.JAN.2016 13:47:38

Middle Channel



Date: 12.JAN.2016 13:57:54

High Channel



Date: 12.JAN.2016 14:06:59

FCC §15.247(a) (1) - CHANNEL SEPARATION TEST**Applicable Standard**

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.50 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22

* **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 Procedure

1. Set the EUT in transmitting mode, spectrum Bandwidth was set at 30 kHz, maxhold the channel.
2. Set the adjacent channel of the EUT maxhold another trace.
3. Measure the channel separation.

Test Data**Environmental Conditions**

Temperature:	23.9 °C
Relative Humidity:	53 %
ATM Pressure:	101.1 kPa

* The testing was performed by Allen Qiao on 2016-01-12.

Test Result: Compliance.

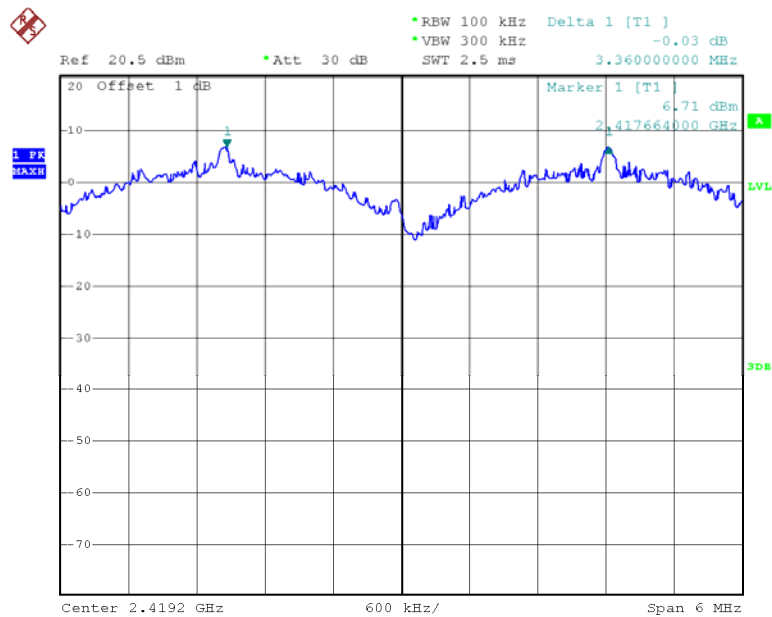
Please refer to following tables and plots

Test Mode: Transmitting

Channel	Frequency	Channel Separation	Limit
	MHz		
Low	2417.6	3.36	2.448
Adjacent	2421		

Note 1: The above table shows lowest channel separation, Please refer to the quantity of hopping channel test.

Note 2: Limit= (2/3)× 20dB bandwidth



Date: 12.JAN.2016 15:02:48

FCC §15.247(a) (1) – 20 dB BANDWIDTH TESTING**Applicable Standard**

Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

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 on the test table without connection to measurement instrument. Turn on the EUT. 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 20 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	2015-11-23	2016-11-22

* **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:	23.9 °C
Relative Humidity:	53 %
ATM Pressure:	101.1 kPa

* *The testing was performed by Allen Qiao on 2016-01-12.*

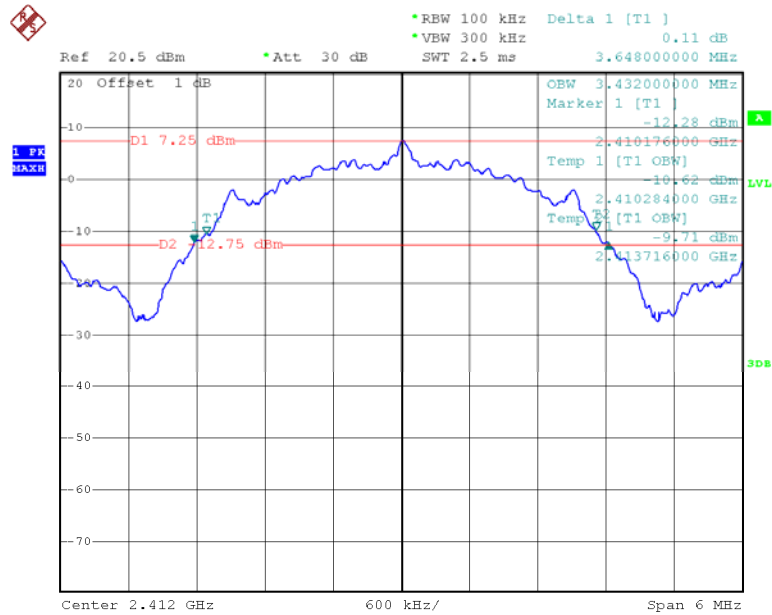
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

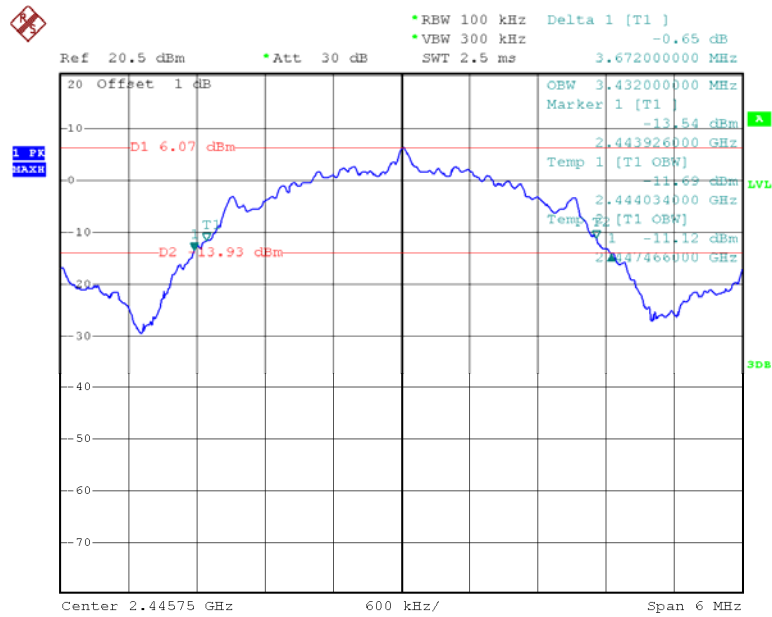
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2412	3.648
Middle	2445.75	3.672
High	2469.4	3.684

Low Channel



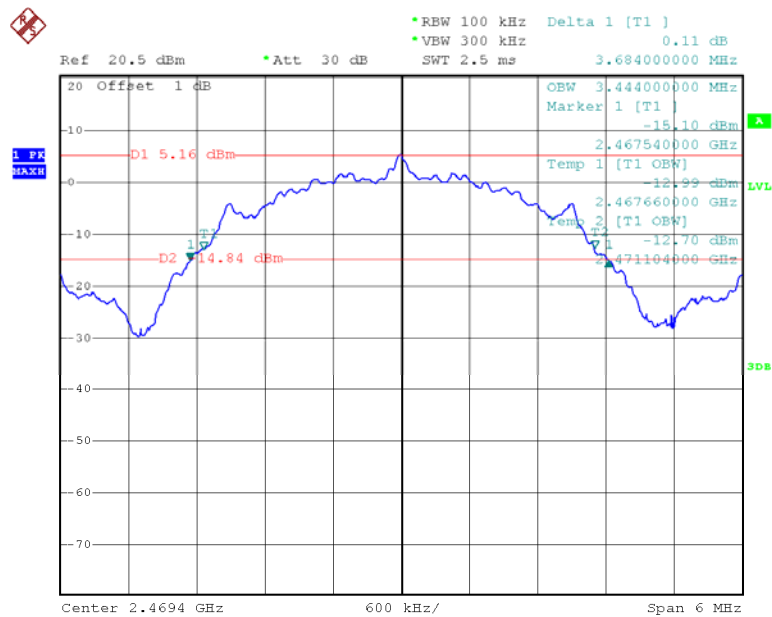
Date: 12.JAN.2016 13:50:28

Middle Channel



Date: 12.JAN.2016 13:54:53

High Channel



Date: 12.JAN.2016 14:02:57

FCC §15.247(a) (1) (iii) - QUANTITY OF HOPPING CHANNEL TEST**Applicable Standard**

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Set the EUT in hopping mode from first channel to last.
3. By using the Max-Hold function record the Quantity of the channel.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22

* **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:	23.9 °C
Relative Humidity:	53 %
ATM Pressure:	101.1 kPa

* The testing was performed by Allen Qiao on 2016-01-12.

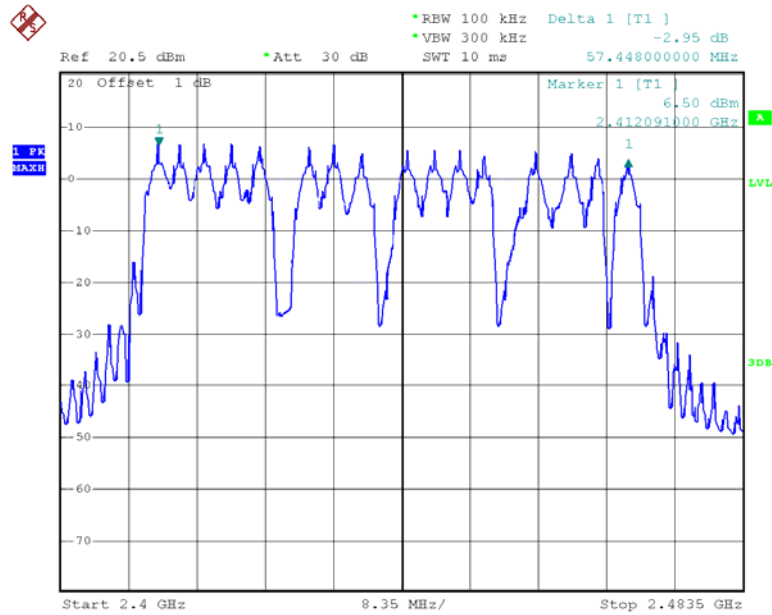
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	16	≥ 15

Number of Hopping Channels



Date: 12.JAN.2016 14:16:45

FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)**Applicable Standard**

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

The EUT was worked in channel hopping; Spectrum SPAN was set as 0. Sweep was set as $0.4 \times \text{channel no. (s)}$, the quantity of pulse was get from single sweep. In addition, the time of single pulses was tested.

Dwell Time = time slot length * hope rate / number of hopping channels * hopping NO. * 0.4s

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22

* **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:	22.9 °C
Relative Humidity:	55 %
ATM Pressure:	100.1 kPa

* The testing was performed by Allen Qiao on 2016-01-12.

Test Result: Compliance.

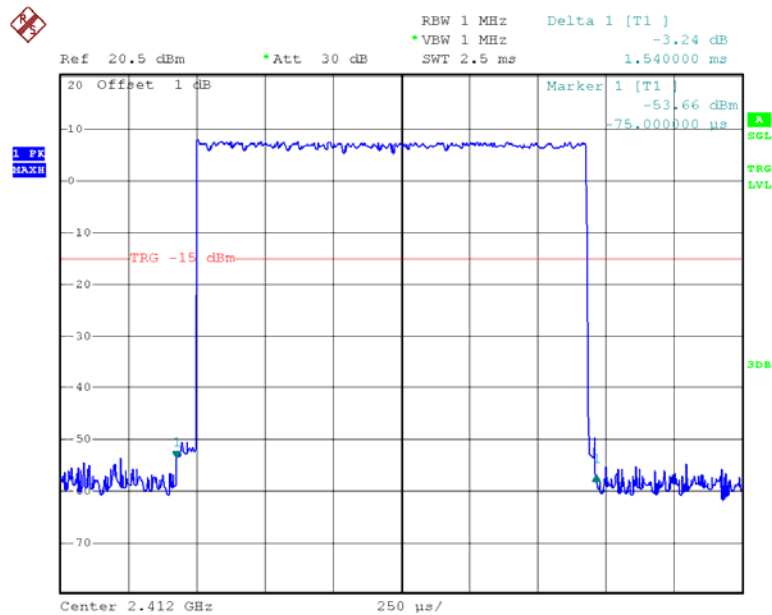
Please refer to following tables and plots

Test Mode: Transmitting

Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
Low	1.540	0.0308	0.4	Pass
Middle	1.465	0.0293	0.4	Pass
High	1.455	0.0291	0.4	Pass

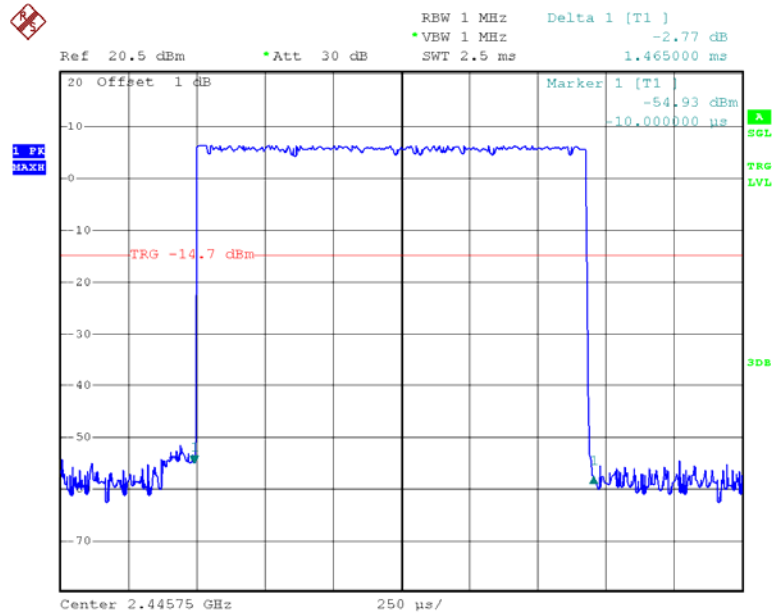
Note: the hopping period is 20ms per period, that declared by manufacturers. So the hopping rate is $1000/20=50$ pulse/s

Dwell time=Pulse width*50/16*16*0.4

Low Channel

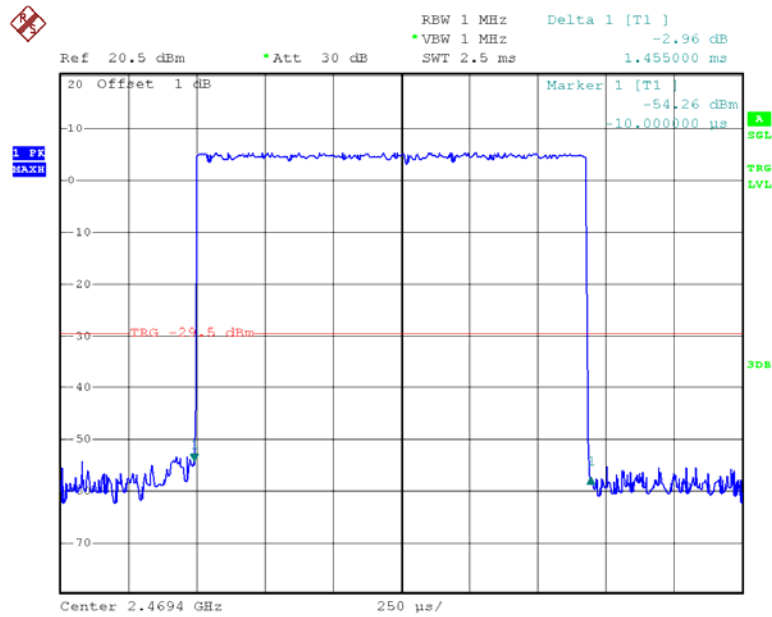
Date: 12.JAN.2016 14:39:04

Middle Channel



Date: 12.JAN.2016 14:38:09

High Channel



Date: 12.JAN.2016 14:34:47

FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT**Applicable Standard**

According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts

Test Procedure

1. Place the EUT on a bench and set in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
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	2015-11-23	2016-11-22

* **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:	23.9 °C
Relative Humidity:	53 %
ATM Pressure:	101.1 kPa

* The testing was performed by Allen Qiao on 2016-01-12.

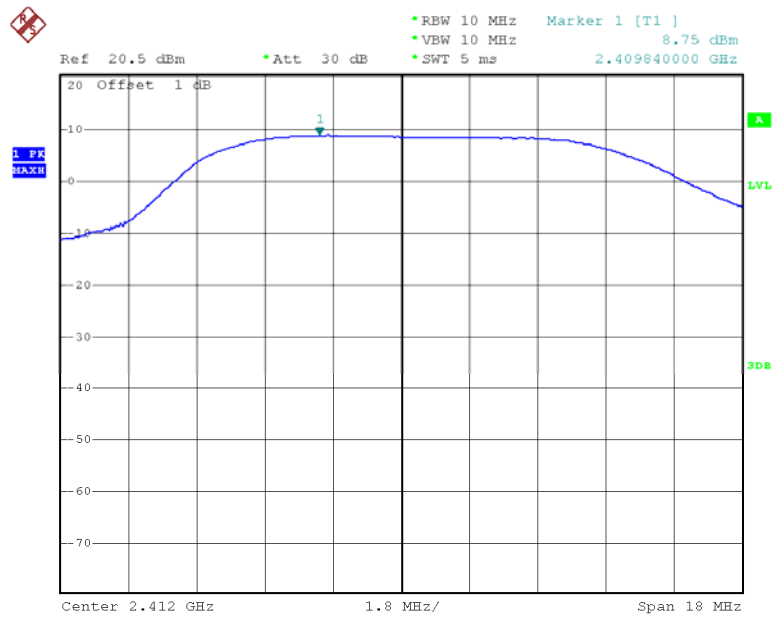
Test Result: Compliance.

Test Mode: Transmitting

Frequency (MHz)	Peak Output power (dBm)	Limit (dBm)
2412	8.75	21
2445.75	7.56	21
2469.4	6.55	21

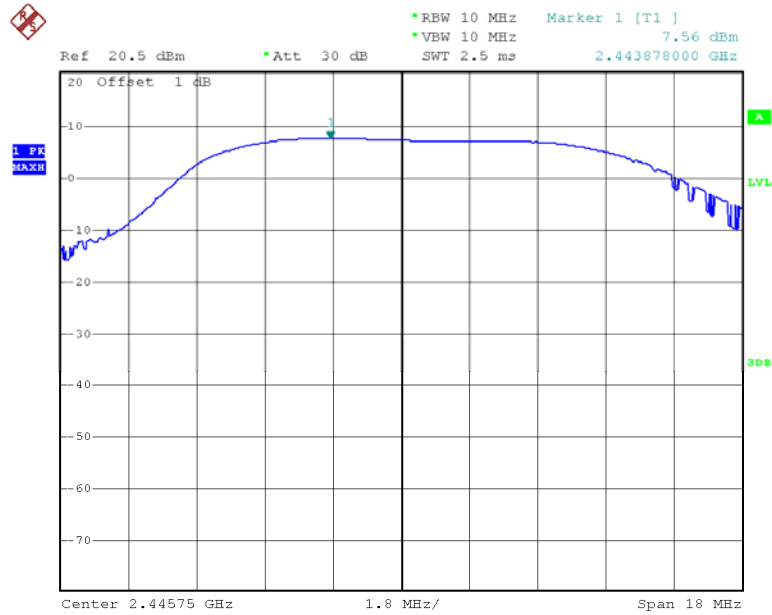
Note: The data above was tested in conducted mode.

Output Power, 2412MHz



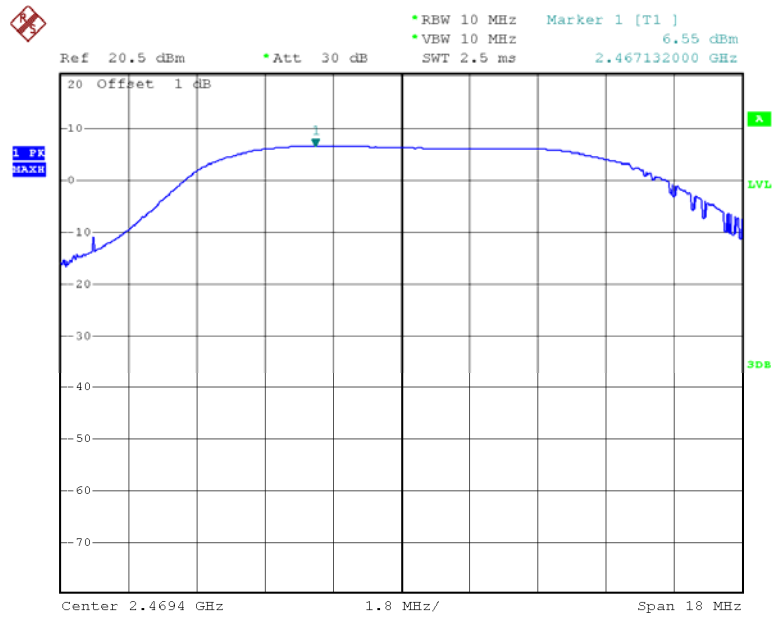
Date: 12.JAN.2016 13:38:27

Output Power, 2445.75MHz



Date: 12.JAN.2016 13:55:43

Output Power, 2469.4MHz



Date: 12.JAN.2016 14:01:26

FCC §15.247(d) - BAND EDGES TESTING

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. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 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	2015-11-23	2016-11-22

* **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

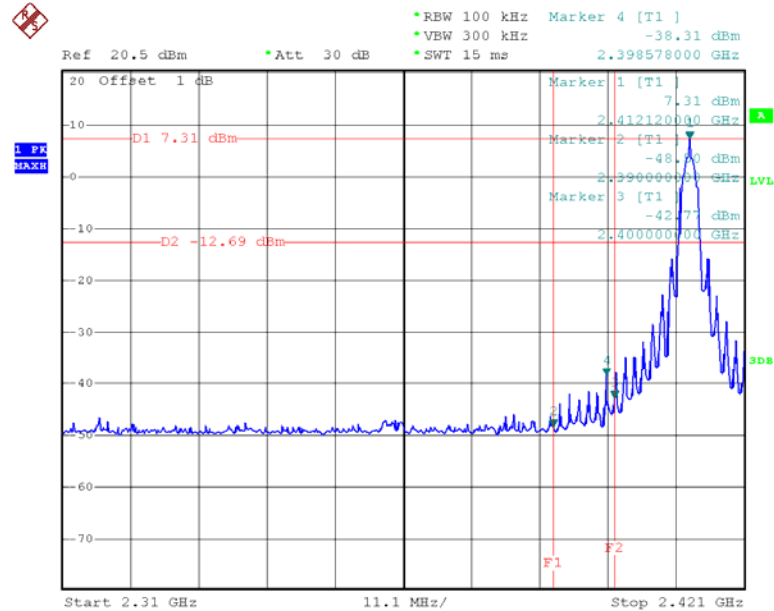
Environmental Conditions

Temperature:	23.9 °C
Relative Humidity:	53 %
ATM Pressure:	101.1 kPa

* The testing was performed by Allen Qiao on 2016-01-12.

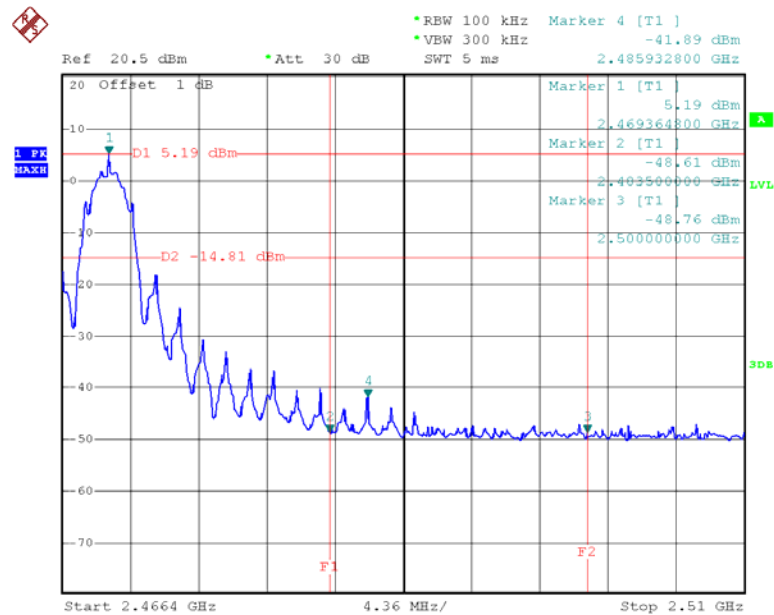
Test Result: Compliance

Band Edge, Left Side



Date: 12.JAN.2016 13:43:19

Band Edge, Right Side



Date: 12.JAN.2016 14:05:45

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