

## 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: 2ACQS162TX**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Digital Baby Phone
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<b>Report Number:</b> RDG160622002-00A	
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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).

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The *Guangzhou Si Bao Jian Electronics Co., Ltd.*'s product, model number: *BM-162(FCC ID: 2ACQS162TX)* (the "EUT") in this report was a *baby unit of Digital Baby Phone*, which was measured approximately: 11.43 cm (L) x 5.38 cm (W) x 4.28 cm (H), rated input voltage: DC4.5V from (3×1.5V AAA battery) or DC5V from adapter.

#### Adapter Information:

MODEL: PS06C050K1000UU

INPUT: AC100-240V, 50/60 Hz, 0.25A;

OUTPUT: DC 5.0V, 1000mA

*Note: The series product, model BM-162, BM-164 are electrically identical, the difference them is the model name, color and appearance shape, we selected BM-162 for fully testing, the details was explained in the declaration letter.*

*All measurement and test data in this report was gathered from production sample serial number: 160622002 (Assigned by BACL, Dongguan). The EUT was received on 2016-06-23.*

### 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)

Submitted with the Parent Part of a system with FCC ID: 2ACQS156RX.

### 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.

36 channels are provided for testing:

Ch No.	Frequency	Ch No.	Frequency
1	2405.377	19	2442.753
2	2407.425	20	2444.801
3	2409.473	21	2446.849
4	2411.521	22	2448.897
5	2413.569	23	2450.945
6	2415.617	24	2452.993
7	2417.665	25	2455.041
8	2419.713	26	2457.089
9	2421.761	27	2459.137
10	2423.809	28	2461.185
11	2425.857	29	2463.233
12	2427.905	30	2465.281
13	2430.465	31	2467.329
14	2432.513	32	2469.377
15	2434.561	33	2471.425
16	2436.609	34	2473.473
17	2438.657	35	2475.521
18	2440.705	36	2477.569

EUT was tested with Channel 2405.377 MHz, 2440.705 MHz and 2477.569 MHz.

### Equipment Modifications

No modification was made to the EUT.

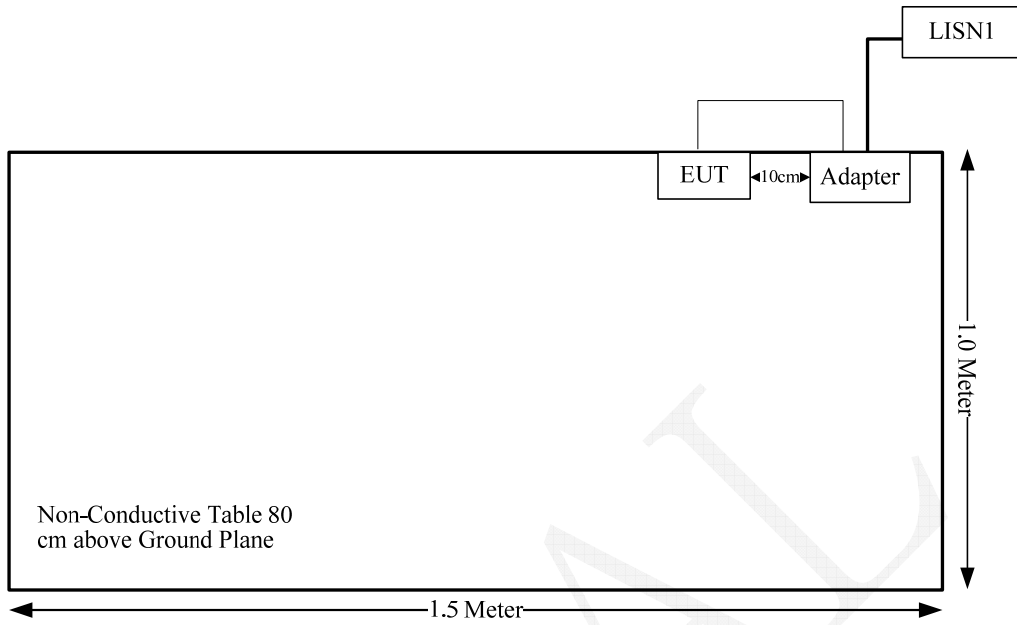
### EUT Exercise Software

No software was used in test.

### External I/O Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From	To
DC Cable	Yes	No	0.95	Adapter	EUT

**Block Diagram of Test Setup**



**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
FCC §15.247 (i) & §1.1310 & §2.1093	RF 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 & §2.1093- 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 v06

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  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  $\leq 7.5$  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  $\leq 50$  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**

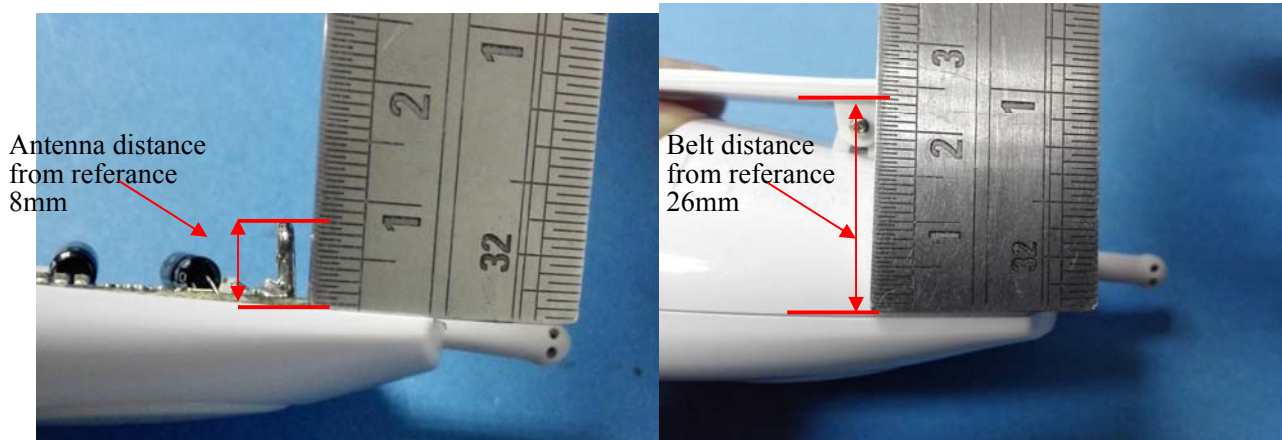
The maximum peak tune-up power including tolerance is 18 dBm(63.10mW).

The device employed 360 hopping pulse per second, each pulse is 1.266ms(the pulse test result please refer to dwell time test section), so

Duty cycle=  $1.266\text{ms} \cdot 360 / 1\text{s} = 45.576\%$

Time-base average power=  $63.10\text{mW} \cdot \text{duty cycle} = 28.76\text{mW}$

The distance from antenna to belt:  $23.5\text{mm} - 8\text{mm} = 15.5\text{mm}$ , please refer the below photos



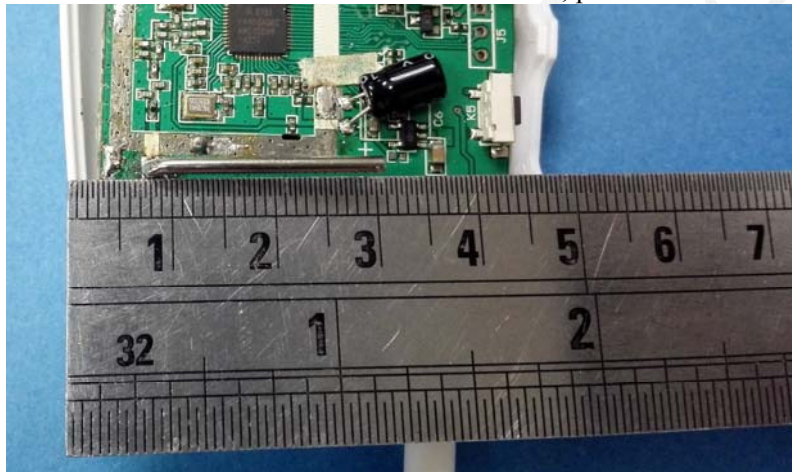
For Body-worn condition:

$$\left[ \frac{\text{(max. power of channel, mW)}}{\text{(min. test separation distance, mm)}} \right] \left[ \sqrt{f(\text{GHz})} \right]$$

$$= 28.76 / 15.5 * (\sqrt{2.477569}) = 2.9 < 3.0$$

**So the SAR evaluation for body-worn is not necessary.**

The distance from antenna to the nearest is 7mm, please refer to the below photo



For Hand hold use condition:

$$\left[ \frac{\text{(max. power of channel, mW)}}{\text{(min. test separation distance, mm)}} \right] \left[ \sqrt{f(\text{GHz})} \right]$$

$$= 28.76 / 7 * (\sqrt{2.477569}) = 6.5 < 7.5$$

**So the SAR evaluation for Hand hold is not necessary.**

Result: Compliance.

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## **FCC §15.203 - ANTENNA REQUIREMENT**

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### **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 internal 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:

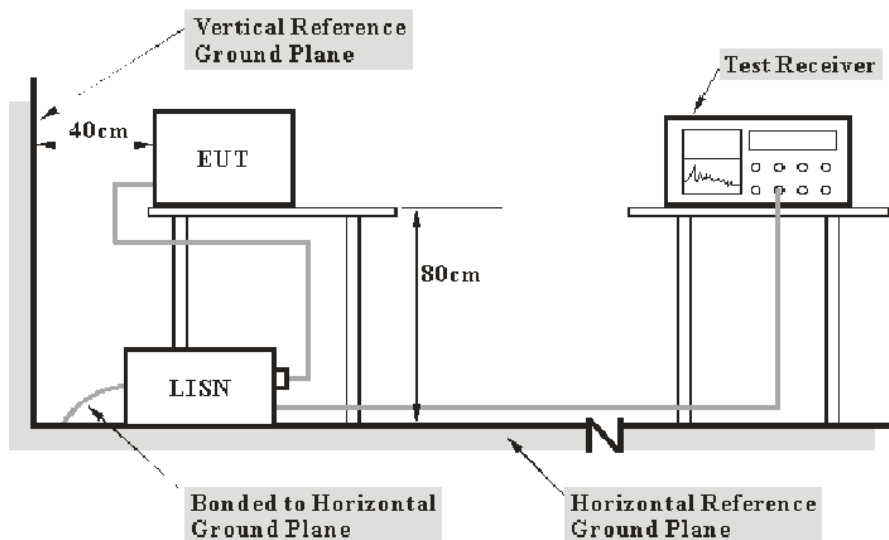
- compliance is deemed to occur if no measured disturbance level, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit.

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
N/A	Coaxial Cable	1.8m	N/A	2016-05-06	2017-05-06
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 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:

**5.9 dB at 0.426011 MHz** in the **Neutral** conducted mode

### Test Data

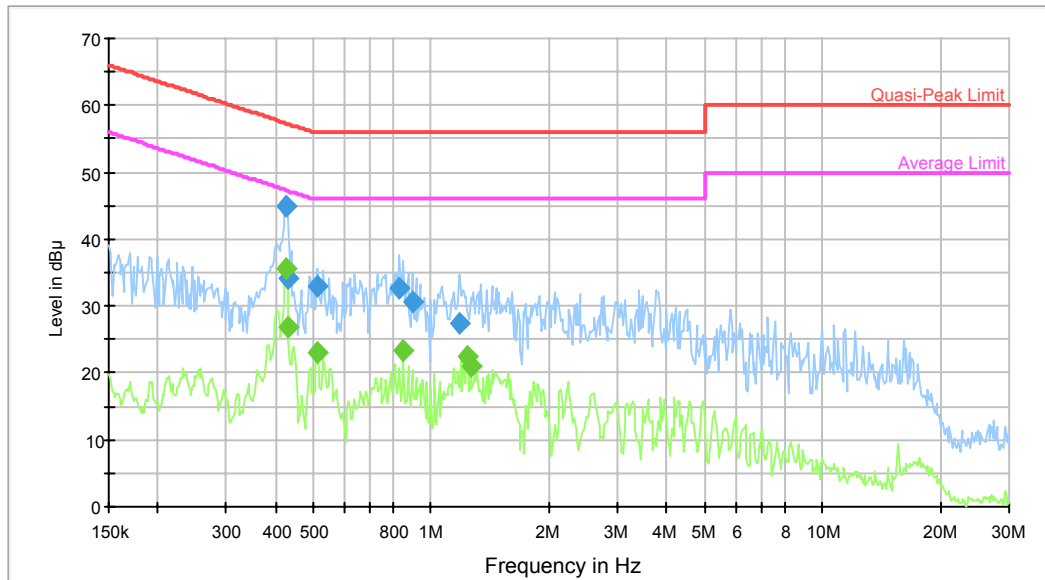
#### Environmental Conditions

<b>Temperature:</b>	29.8 °C
<b>Relative Humidity:</b>	63 %
<b>ATM Pressure:</b>	100.4 kPa

*The testing was performed by Lion Xiao on 2016-06-30.*

Test Mode: Transmitting

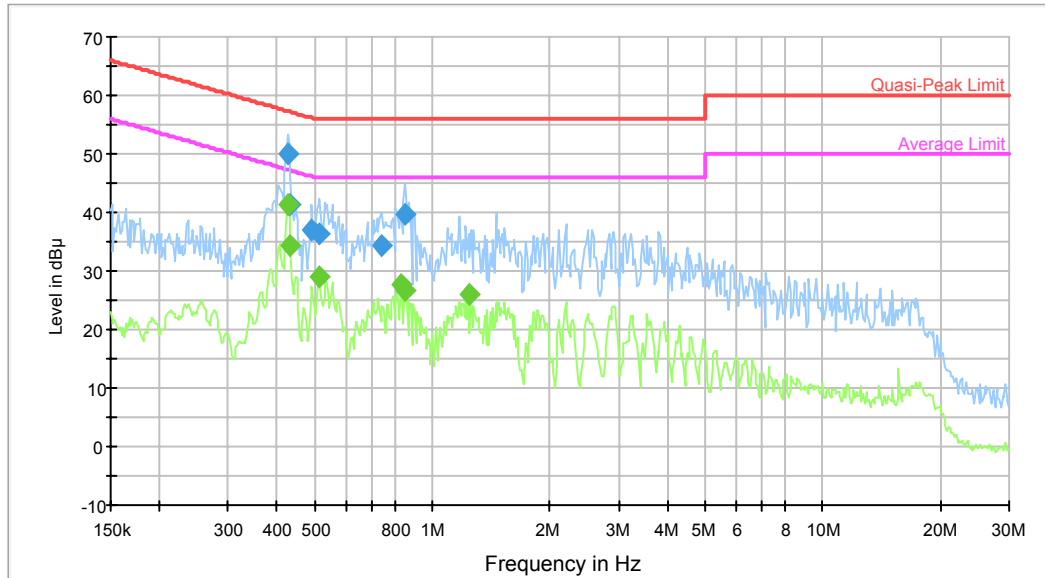
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.426011	44.9	9.000	L1	10.2	12.4	57.3	Compliance
0.432855	34.2	9.000	L1	10.2	23.0	57.2	Compliance
0.511698	32.9	9.000	L1	10.1	23.1	56.0	Compliance
0.831967	32.8	9.000	L1	10.4	23.2	56.0	Compliance
0.893821	30.6	9.000	L1	10.4	25.4	56.0	Compliance
1.181325	27.4	9.000	L1	10.4	28.6	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.426011	35.5	9.000	L1	10.2	11.8	47.3	Compliance
0.432855	26.7	9.000	L1	10.2	20.5	47.2	Compliance
0.511698	22.9	9.000	L1	10.1	23.1	46.0	Compliance
0.852094	23.2	9.000	L1	10.4	22.8	46.0	Compliance
1.239175	22.3	9.000	L1	10.4	23.7	46.0	Compliance
1.259081	21.0	9.000	L1	10.4	25.0	46.0	Compliance

**AC120 V, 60 Hz, Neutral:**



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.426011	49.9	9.000	N	10.2	7.4	57.3	Compliance
0.432855	41.4	9.000	N	10.1	15.8	57.2	Compliance
0.491712	37.1	9.000	N	10.1	19.0	56.1	Compliance
0.515791	36.3	9.000	N	10.1	19.7	56.0	Compliance
0.744147	34.2	9.000	N	10.4	21.8	56.0	Compliance
0.852094	39.7	9.000	N	10.3	16.3	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.426011	41.4	9.000	N	10.2	5.9	47.3	Compliance
0.432855	34.3	9.000	N	10.1	12.9	47.2	Compliance
0.511698	28.9	9.000	N	10.1	17.1	46.0	Compliance
0.831967	27.6	9.000	N	10.3	18.4	46.0	Compliance
0.852094	26.8	9.000	N	10.3	19.2	46.0	Compliance
1.239175	26.2	9.000	N	10.4	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  $U_{cispr}$  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.

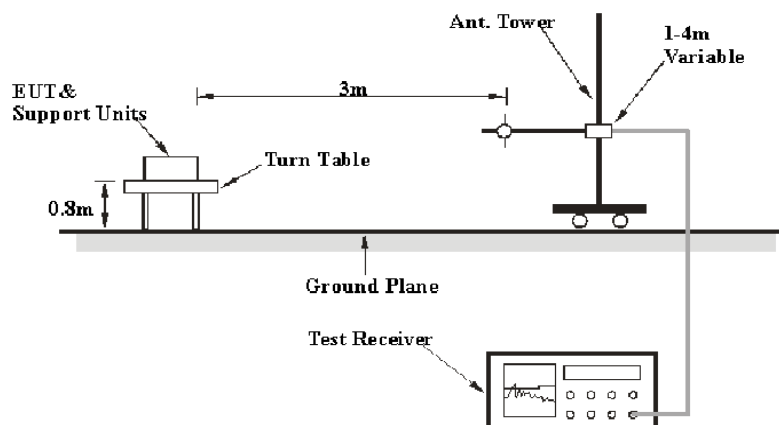
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 10m at Bay Area Compliance Laboratories Corp. (Dongguan) is: 30M~200MHz: 4.55 dB for Horizontal, 4.57 dB for Vertical; 200M~1GHz: 4.66 dB for Horizontal, 4.56 dB for Vertical; measurement uncertainty of radiated 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  $U_{cispr}$

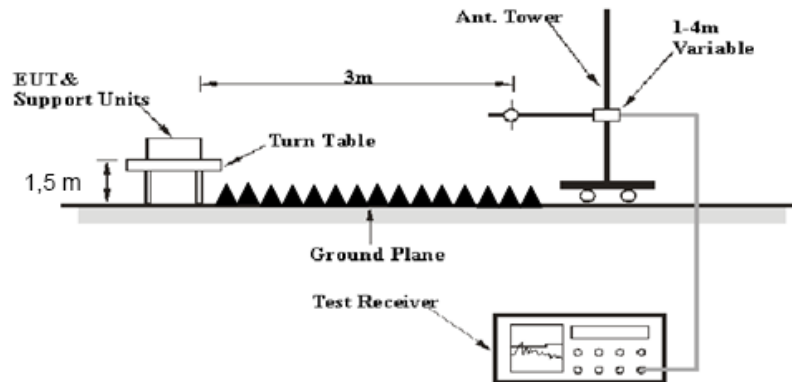
Measurement	$U_{cispr}$
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

### 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 C63.10-2013. 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	100035	2016-07-28	2017-07-27
Sunol Sciences	Antenna	JB3	A060611-2	2014-08-27	2017-08-26
HP	Amplifier	8447D	2727A05902	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	2016-02-19	2017-02-19
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
N/A	Coaxial Cable	14m	N/A	2016-05-06	2017-05-06
N/A	Coaxial Cable	8m	N/A	2016-05-06	2017-05-06
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
Farad	Test Software	EZ-EMC	V1.1.4.2	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 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

**Test Data**

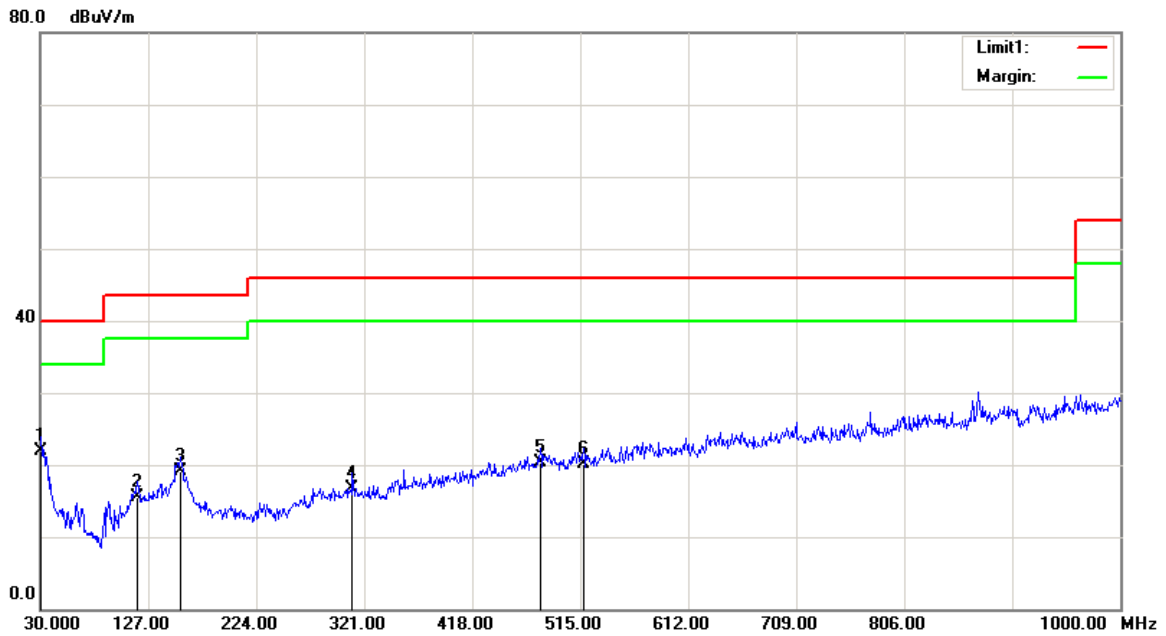
**Environmental Conditions**

<b>Temperature:</b>	27.9 °C
<b>Relative Humidity:</b>	62 %
<b>ATM Pressure:</b>	98.9 kPa

\* The testing was performed by Lion Xiao on 2016-08-17.

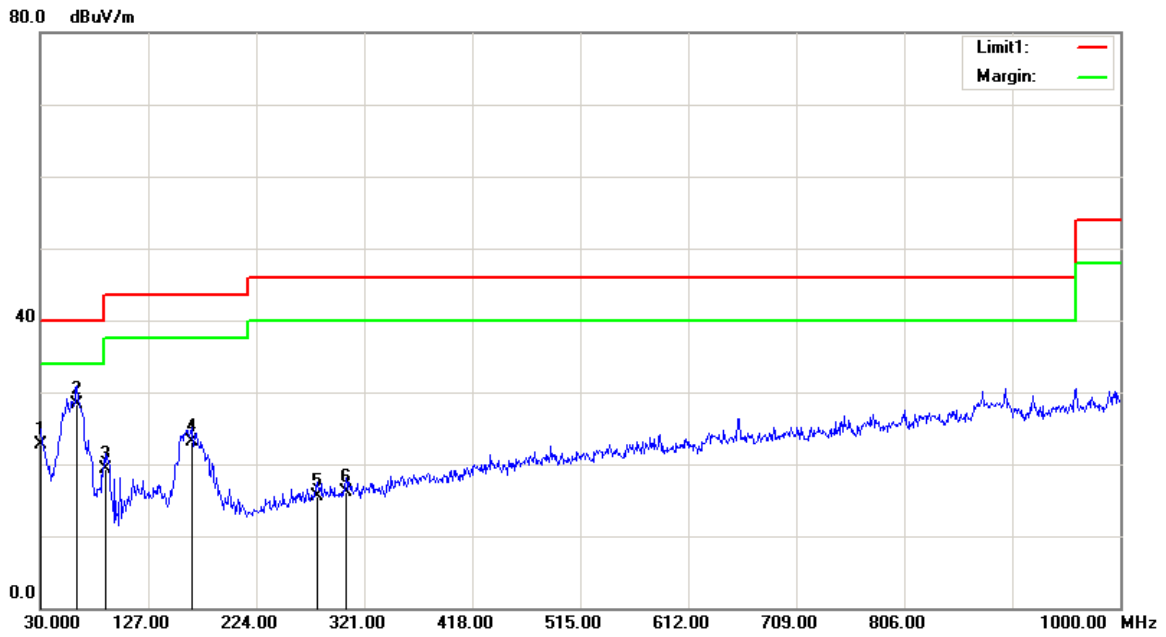
Below 1GHz(middle channel was the worst):

**Horizontal**



Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.9700	20.39	QP	1.51	21.90	40.00	18.10
117.3000	20.63	QP	-5.03	15.60	43.50	27.90
156.1000	25.61	QP	-6.51	19.10	43.50	24.40
310.3300	21.55	QP	-4.75	16.80	46.00	29.20
479.1100	21.23	QP	-0.93	20.30	46.00	25.70
517.9100	21.08	QP	-0.88	20.20	46.00	25.80

**Vertical**



Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.9700	21.29	QP	1.51	22.80	40.00	17.20
62.9800	40.75	QP	-12.45	28.30	40.00	11.70
89.1700	30.71	QP	-11.31	19.40	43.50	24.10
165.8000	30.11	QP	-6.91	23.20	43.50	20.30
278.3200	20.60	QP	-5.10	15.50	46.00	30.50
304.5100	20.81	QP	-4.71	16.10	46.00	29.90

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: 2405.377MHz									
2405.377	77.46	PK	H	24.83	5.05	0.00	107.34	N/A	N/A
2405.377	70.23	AV	H	24.83	5.05	0.00	100.11	N/A	N/A
2405.377	77.52	PK	V	24.83	5.05	0.00	107.40	N/A	N/A
2405.377	70.48	AV	V	24.83	5.05	0.00	100.36	N/A	N/A
2390	32.43	PK	H	24.80	5.04	0.00	62.27	74.00	11.73
2390	21.05	AV	H	24.80	5.04	0.00	50.89	54.00	3.11
4810.754	51.26	PK	H	29.72	7.22	27.05	55.81	74.00	18.19
4810.754	46.85	AV	H	29.72	7.22	27.05	51.40	54.00	2.60
7216.131	40.42	PK	H	33.95	8.93	25.20	40.60	74.00	33.40
7216.131	34.89	AV	H	33.95	8.93	25.20	35.07	54.00	18.93
9621.508	29.88	PK	H	36.37	10.65	27.52	31.68	74.00	42.32
9621.508	23.24	AV	H	36.37	10.65	27.52	25.04	54.00	28.96
3133	29.69	PK	H	26.10	5.82	26.50	35.91	75.00	39.09
3133	22.51	AV	H	26.10	5.82	26.50	28.73	54.00	25.27
Middle Channel: 2440.705 MHz									
2440.705	77.12	PK	H	24.89	5.09	0.00	107.10	N/A	N/A
2440.705	68.42	AV	H	24.89	5.09	0.00	98.40	N/A	N/A
2440.705	77.29	PK	V	24.89	5.09	0.00	107.27	N/A	N/A
2440.705	68.06	AV	V	24.89	5.09	0.00	98.04	N/A	N/A
4881.41	52.43	PK	V	29.86	7.30	26.88	56.75	75.00	18.25
4881.41	45.49	AV	V	29.86	7.30	26.88	49.81	54.00	4.19
7322.115	52.49	PK	V	34.12	9.00	25.42	52.79	74.00	21.21
7322.115	46.37	AV	V	34.12	9.00	25.42	46.67	54.00	7.33
9762.82	40.38	PK	V	36.46	10.87	27.20	41.99	74.00	32.01
9762.82	34.42	AV	V	36.46	10.87	27.20	36.03	54.00	17.97
3625	35.11	PK	V	27.45	6.12	27.25	41.03	74.00	32.97
3625	23.02	AV	V	27.45	6.12	27.25	28.94	54.00	25.06
3462	34.36	PK	V	27.09	6.03	27.15	40.45	74.00	33.55
3462	22.89	AV	V	27.09	6.03	27.15	28.98	54.00	25.02
High Channel: 2477.569 MHz									
2477.569	77.08	PK	H	24.96	5.18	0.00	107.22	N/A	N/A
2477.569	68.33	AV	H	24.96	5.18	0.00	98.47	N/A	N/A
2477.569	77.15	PK	V	24.96	5.18	0.00	107.29	N/A	N/A
2477.569	68.02	AV	V	24.96	5.18	0.00	98.16	N/A	N/A
2483.5	30.89	PK	V	24.97	5.19	0.00	61.05	74.00	12.95
2483.5	20.24	AV	V	24.97	5.19	0.00	50.40	54.00	3.60
4955.138	51.28	PK	V	30.01	7.40	26.71	55.38	74.00	18.62
4955.138	45.52	AV	V	30.01	7.40	26.71	49.62	54.00	4.38
7432.707	39.96	PK	V	34.29	9.08	25.35	40.10	74.00	33.90
7432.707	34.25	AV	V	34.29	9.08	25.35	34.39	54.00	19.61
9910.276	29.81	PK	V	36.55	11.10	26.70	31.06	74.00	42.94
9910.276	23.87	AV	V	36.55	11.10	26.70	25.12	54.00	28.88
3317	30.12	PK	V	26.65	5.95	26.89	36.31	74.00	37.69
3317	24.26	AV	V	26.65	5.95	26.89	30.45	54.00	23.55

## **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**

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
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**

<b>Temperature:</b>	27.3 °C
<b>Relative Humidity:</b>	41 %
<b>ATM Pressure:</b>	98.9 kPa

\* *The testing was performed by Lion Xiao on 2016-08-17.*

**Test Result:** Compliance.

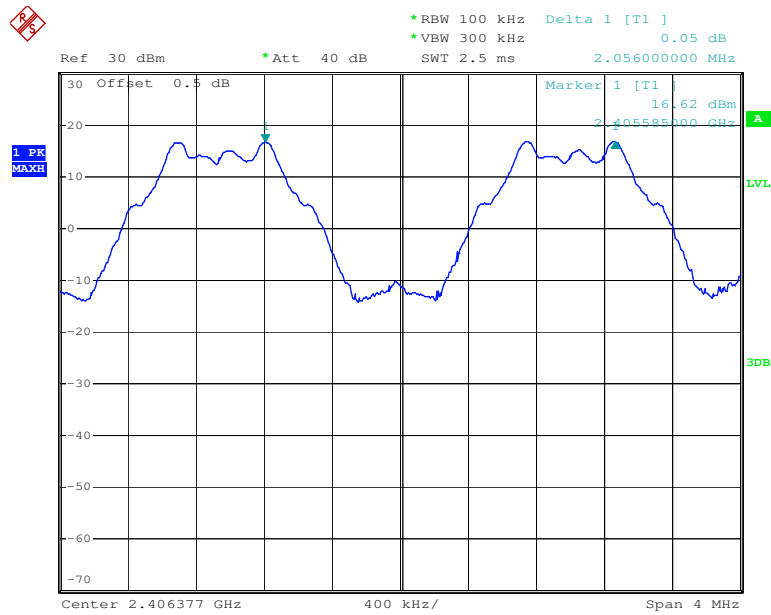
Please refer to following tables and plots

Test Mode: Transmitting

Channel	Frequency	Channel Separation	Limit
	MHz	MHz	MHz
Low	2405.377	2.056	0.788
Middle	2440.705	2.056	0.800
High	2477.569	2.056	0.796

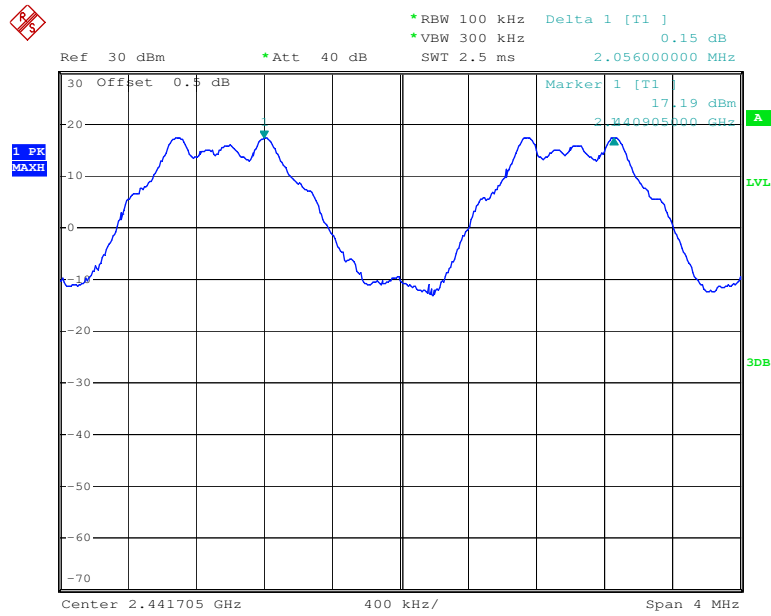
Note:  $Limit = (2/3) \times 20dB \text{ bandwidth}$

Low Channel



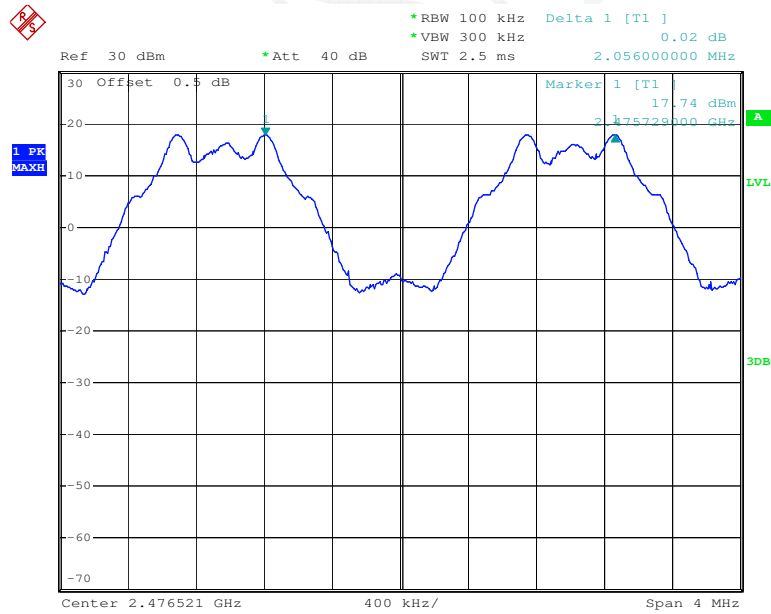
Date: 17.AUG.2016 15:44:06

### Middle Channel



Date: 17.AUG.2016 15:52:12

### High Channel



Date: 17.AUG.2016 15:39:54

## 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

<b>Temperature:</b>	27.3 °C
<b>Relative Humidity:</b>	41 %
<b>ATM Pressure:</b>	98.9 kPa

\* *The testing was performed by Lion Xiao on 2016-08-17.*

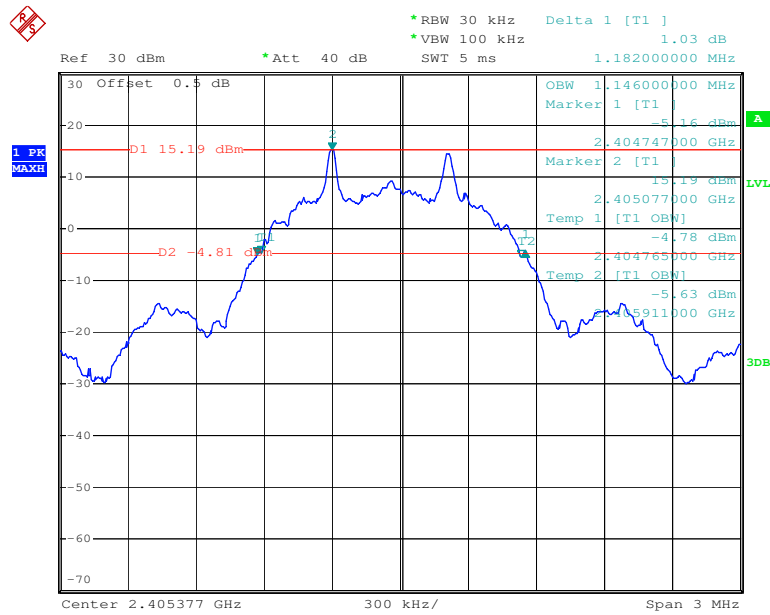
**Test Result:** Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

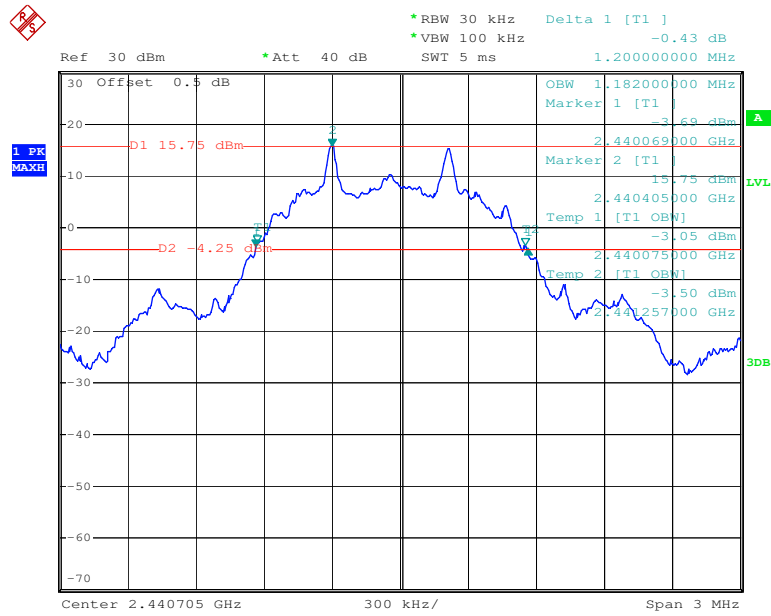
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2405.377	1.182
Middle	2440.705	1.200
High	2477.569	1.194

Low Channel



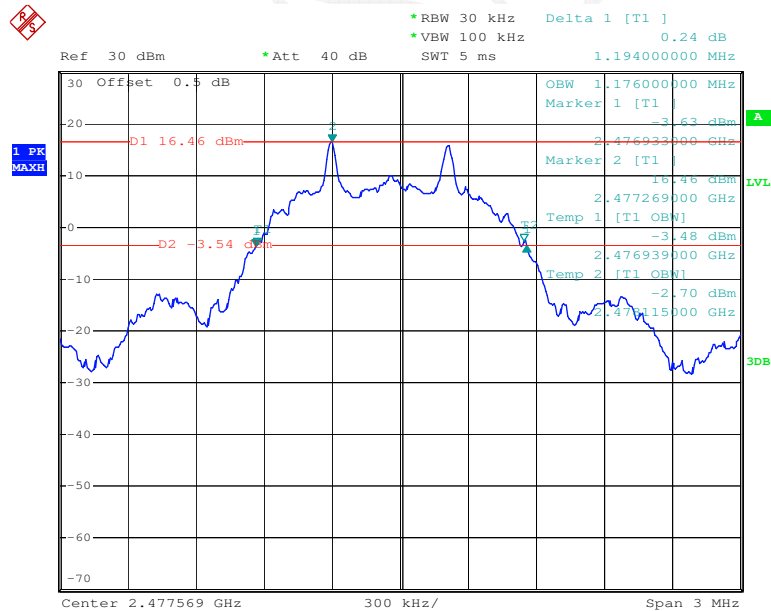
Date: 17.AUG.2016 15:14:56

Middle Channel



Date: 17.AUG.2016 15:16:52

High Channel



Date: 17.AUG.2016 15:12:18

## **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**

<b>Temperature:</b>	27.3 °C
<b>Relative Humidity:</b>	41 %
<b>ATM Pressure:</b>	98.9 kPa

\* *The testing was performed by Lion Xiao on 2016-08-17.*

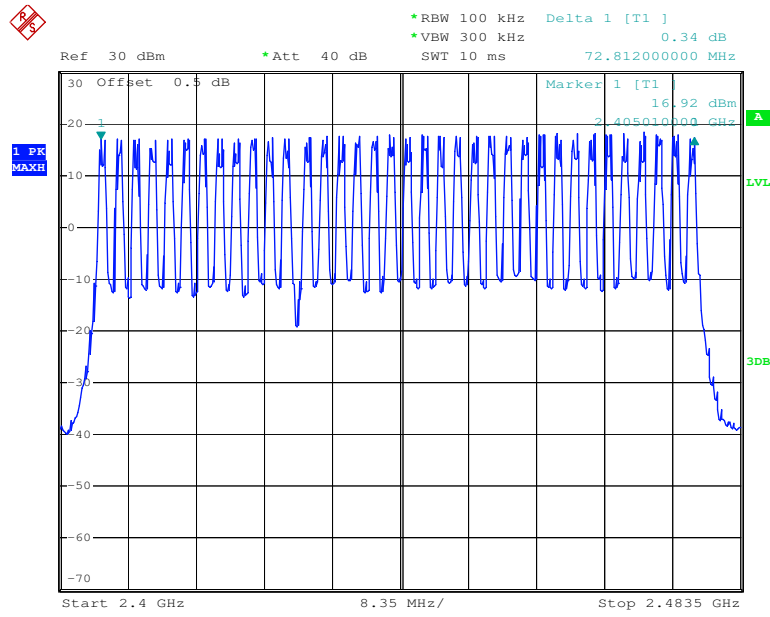
**Test Result:** Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	36	≥15

### Number of Hopping Channels



Date: 17.AUG.2016 15:28:17

## **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 \* channel no. (s), the quantity of pulse was get from single sweep. In addition, the time of single pulses was tested.

### **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**

<b>Temperature:</b>	27.3 °C
<b>Relative Humidity:</b>	41 %
<b>ATM Pressure:</b>	98.9 kPa

\* *The testing was performed by Lion Xiao on 2016-08-17.*

**Test Result:** Compliance.

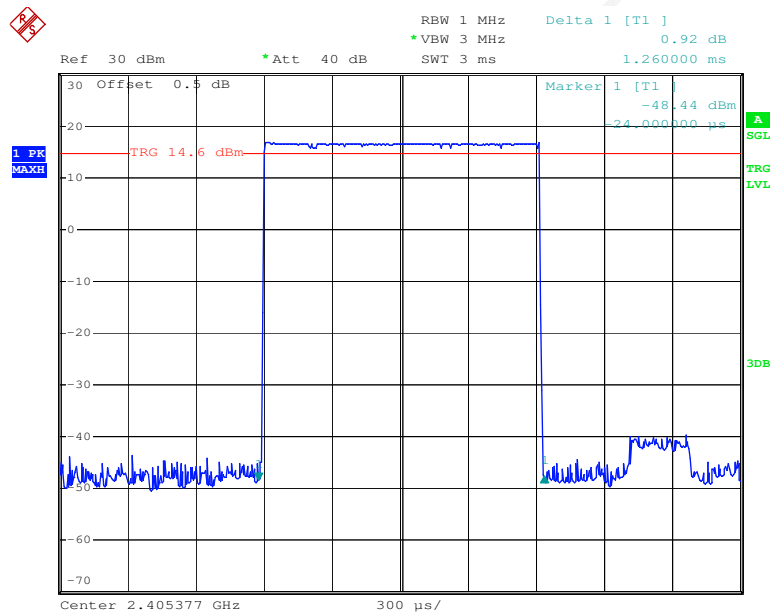
Please refer to following tables and plots

Test Mode: Transmitting

Channel	Pulse Width (ms)	Hopping Rate (pulse/s)	Dwell Time (s)	Limit (s)	Result
Low	1.26	360	0.181	0.4	Pass
Middle	1.266	360	0.182	0.4	Pass
High	1.266	360	0.182	0.4	Pass

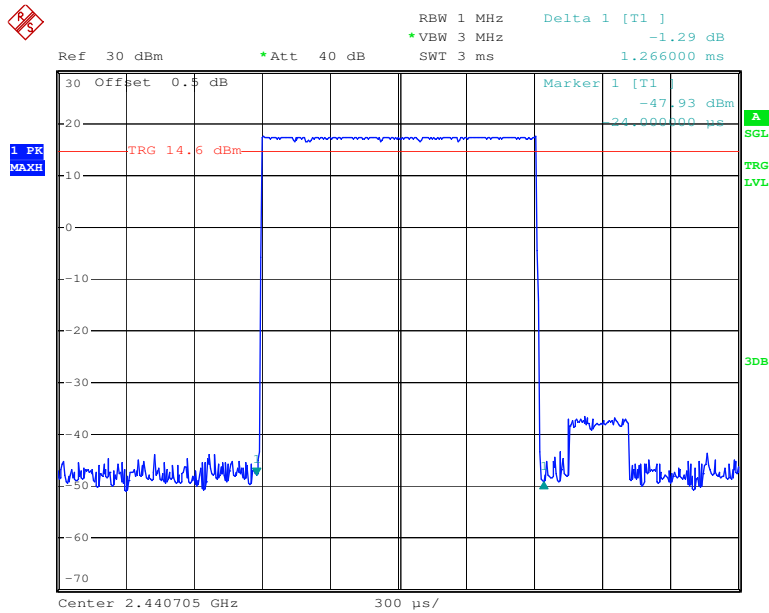
Dwell Time= time slot length \* hope rate/ number of hopping channels \*hopping NO. \* 0.4s  
 Hopping Rate is 360 pulse per second, which was declared by manufacturer

Pulse Width,Low Channel



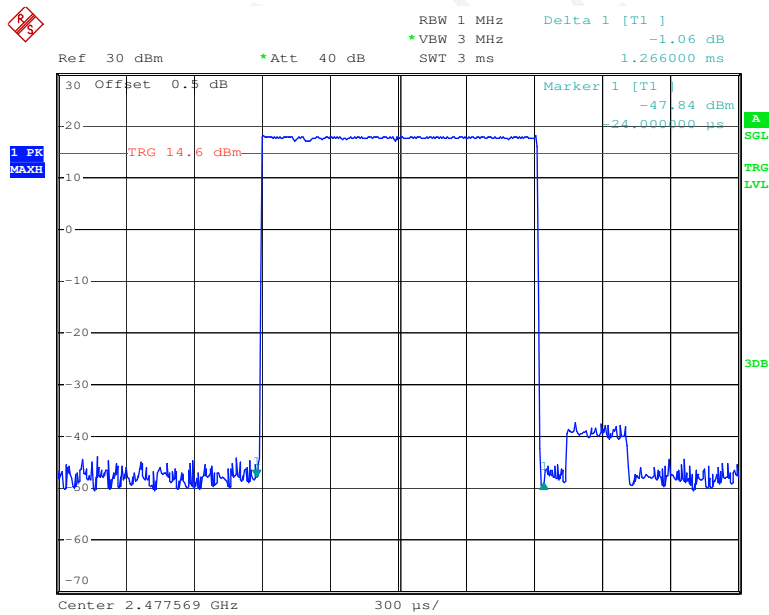
Date: 17.AUG.2016 15:30:38

### Pulse Width, Mid Channel



Date: 17.AUG.2016 15:31:20

### Pulse Width, High Channel



Date: 17.AUG.2016 15:32:32

## 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

<b>Temperature:</b>	27.3 °C
<b>Relative Humidity:</b>	41 %
<b>ATM Pressure:</b>	98.9 kPa

\* *The testing was performed by Lion Xiao on 2016-08-17.*

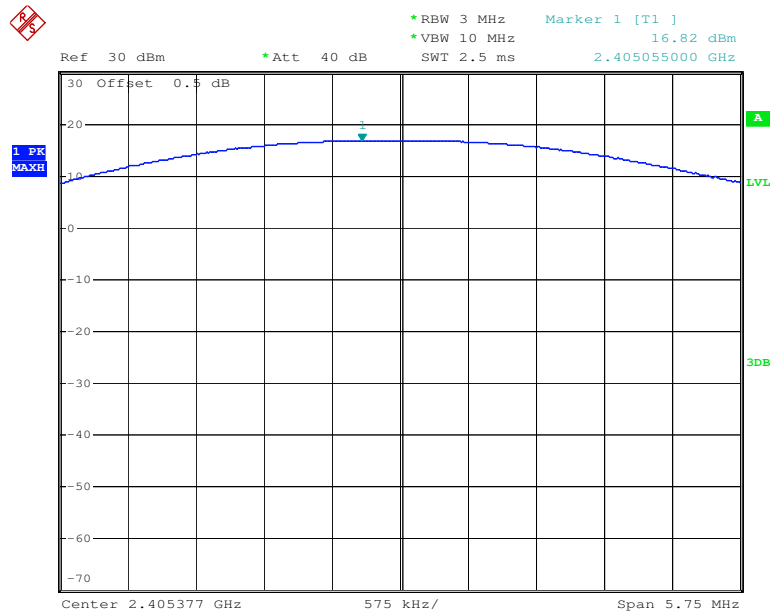
**Test Result:** Compliance.

Test Mode: Transmitting

Frequency (MHz)	Peak Output power (dBm)	Limit (dBm)
2405.377	16.82	21
2440.705	17.49	21
2477.569	17.94	21

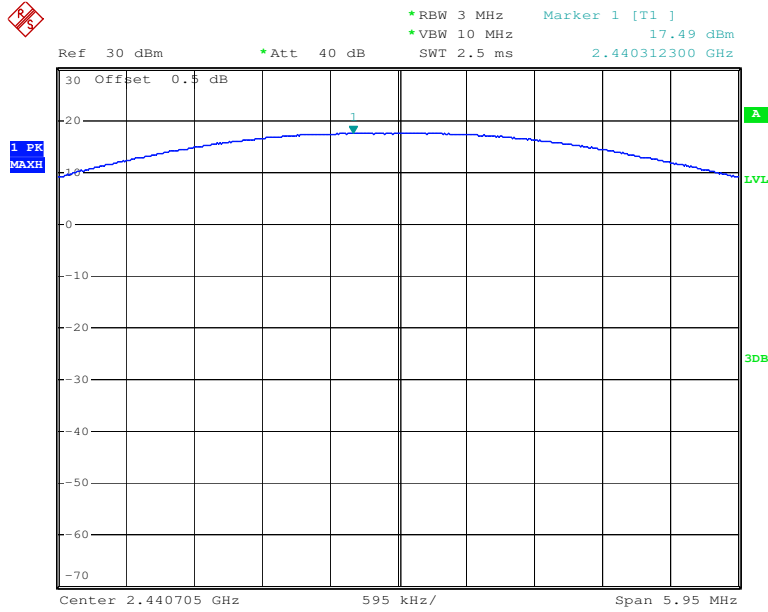
Note: The data above was tested in conducted mode.

**Output Power, 2405.377MHz**



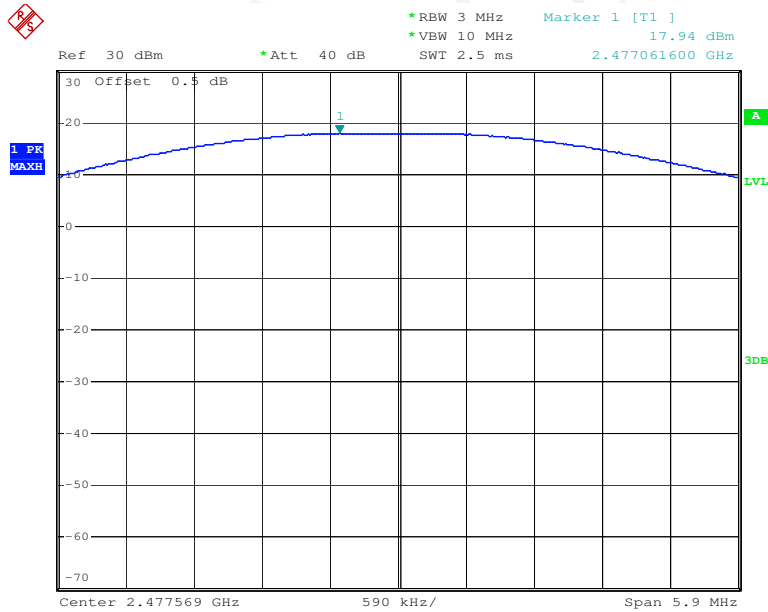
Date: 17.AUG.2016 15:06:39

### Output Power, 2440.705MHz



Date: 17.AUG.2016 15:08:34

### Output Power, 2477.569MHz



Date: 17.AUG.2016 15:09:44

## 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

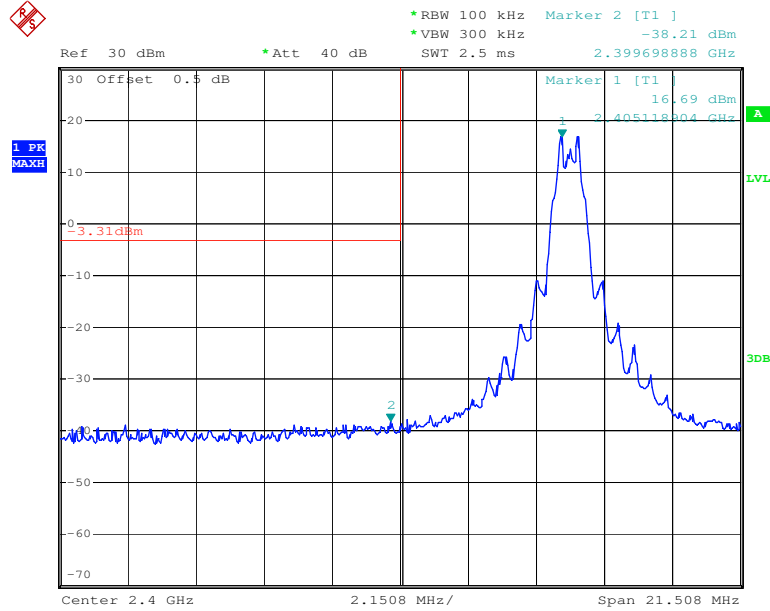
#### Environmental Conditions

Temperature:	27.3 °C
Relative Humidity:	41 %
ATM Pressure:	98.9 kPa

\* The testing was performed by Lion Xiao on 2016-08-17.

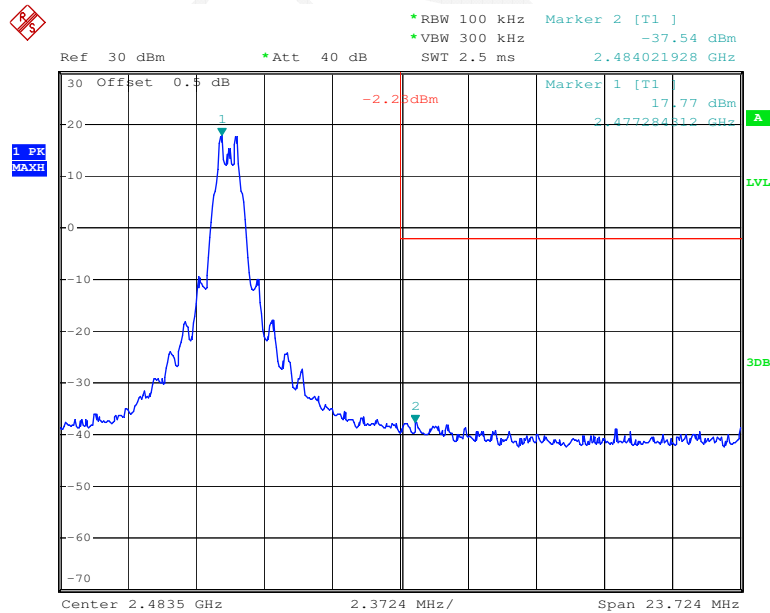
**Test Result: Compliance**

**Band Edge, Left Side**



Date: 17.AUG.2016 15:06:57

**Band Edge, Right Side**



Date: 17.AUG.2016 15:10:07

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