FCC PART 15.247

TEST REPORT

For

Guangzhou Si Bao Jian Electronics Co., Ltd.

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

FCC ID: 2ACQS162RX

Report Type:	Product Type:
Original Report	Digital Baby Phone

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Report Number:	RDG160622003-00A
Report Date:	2016-08-25
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Guangzhou Si Bao Jian Electronics Co., Ltd.*'s product, model number: *BM-162 (FCC ID: 2ACQS162RX)* (the "EUT") in this report was *a* prent unit of *Digital Baby Phone,* which was measured approximately: 11.43cm (L) x 5.38 cm (W) x 4.28 cm (H), rated input voltage: DC4.5V from (3×1.5V AAA rechargeable batteries) or DC5.0V from adapter.

Adapter Information:
Switching Adapter
Model: PS06C050K1000UU
Input: 100-240V~, 50/60Hz, 0.25A
Output: DC 5.0V, 1000mA

Note: The series product, models BM-162, BM-164 are electrically identical, the difference between them are model name, colour 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: 160622003 (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 Baby Part of a system with FCC ID: 2ACQS162TX

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.

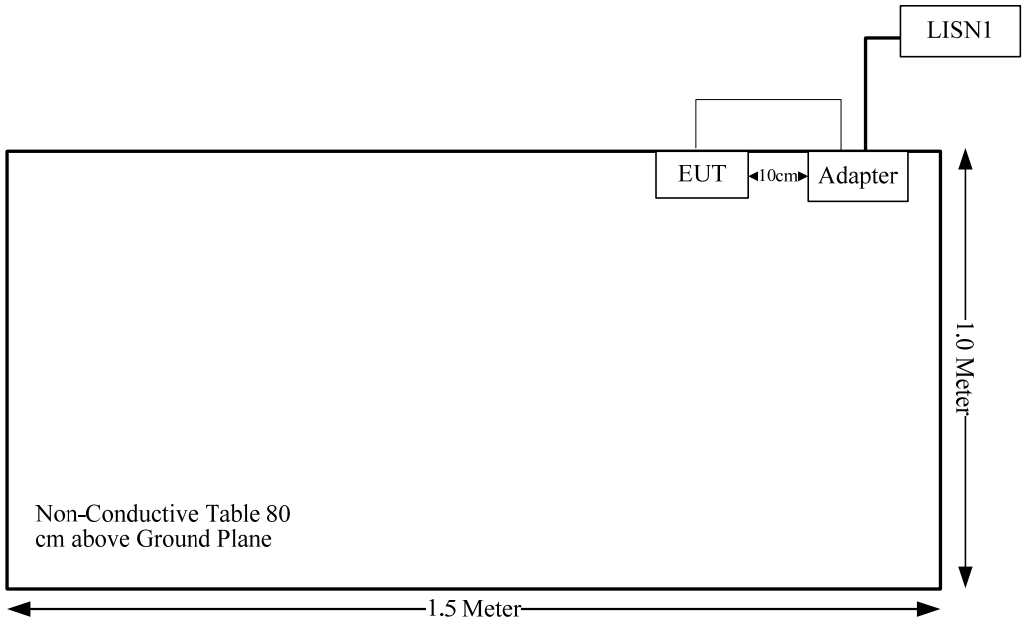
EUT Exercise Software

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

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)	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 ≤ 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.

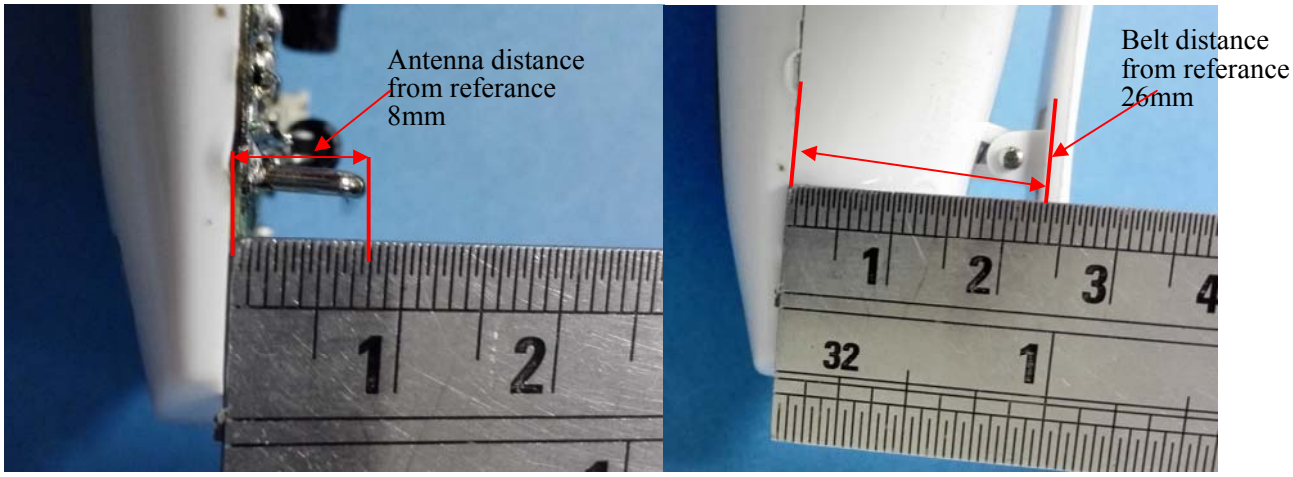
Measurement Result

The maximum peak tune-up power including tolerance is 18.3 dBm (67.61mW).
The device employed 360 hopping pulse per second,

When PTT key is pressed (Hand hold), each pulse is 1.252 ms, so
Duty cycle= 1.252ms*360/1s=45.07%
Time-base average power= 67.61 mW * duty cycle = 30.47 mW

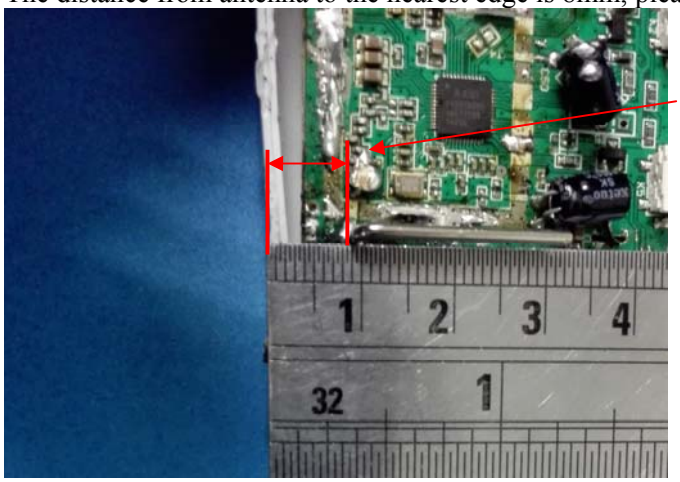
When PTT Key is released (Body-Worn), each pulse is 0.23 ms,
Duty cycle = 0.23ms*360/1s =8.28%
Time-base average power = 67.61mW * duty cycle= 5.598 mW

The distance from antenna to belt: 23.5mm-8mm =15.5mm, please refer the below photos



For Body-worn condition:
[(max. power of channel, mW)/(min. test separation distance, mm)][√f(GHz)]
= 5.598/15.5*(√2.477569) = 0.6 ≤ 3.0
So the SAR evaluation for body-worn is not necessary.

The distance from antenna to the nearest edge is 8mm, please refer to the below photo



For Hand hold use condition:
[(max. power of channel, mW)/(min. test separation distance, mm)][√f(GHz)]
= 30.47/8*(√2.477569) = 6.0 < 7.5
So the SAR evaluation for Hand hold is not necessary.

Result: Compliance.

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 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：

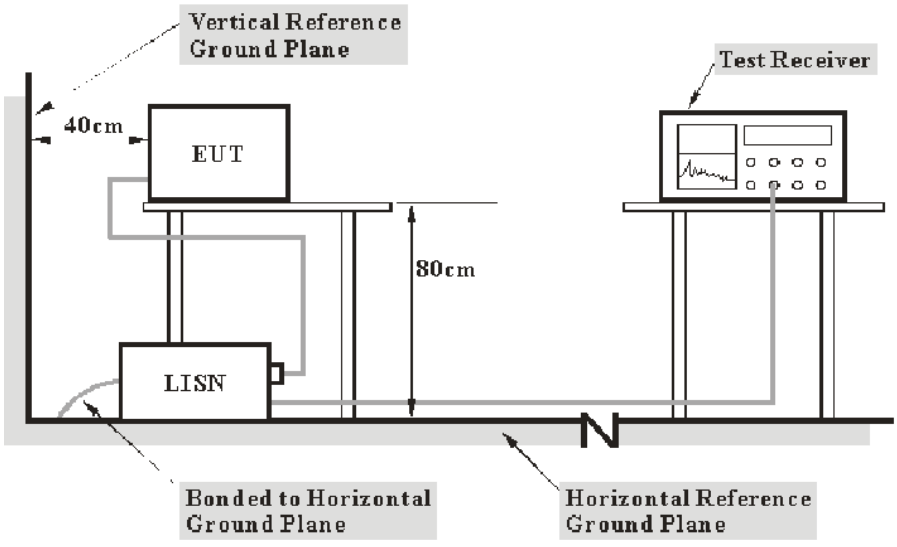
If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
– non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.
If U_{lab} is greater than U_{cispr} of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

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:

Margin = Limit – 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 Data

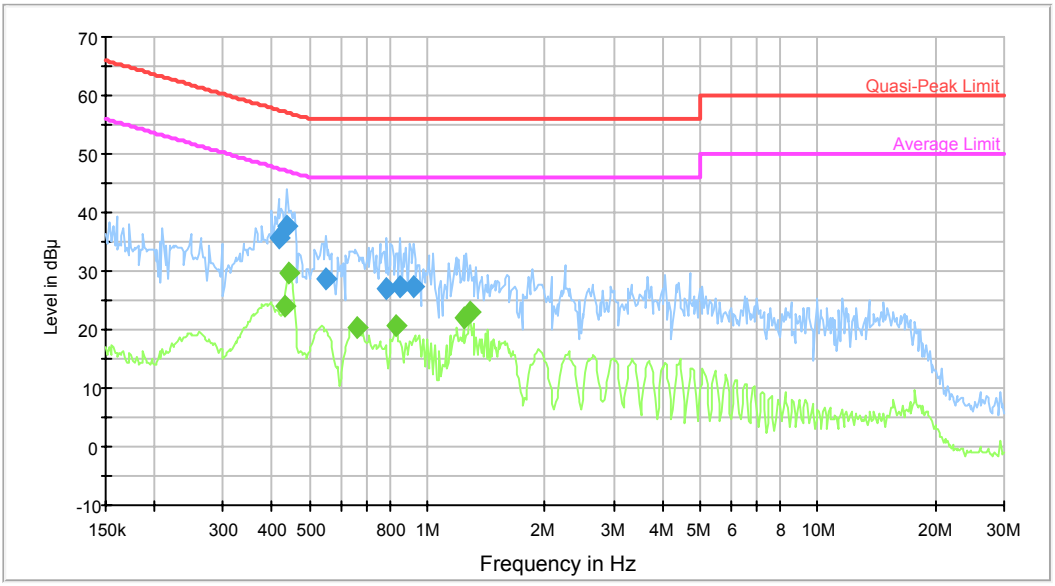
Environmental Conditions

Temperature:	29.8°C
Relative Humidity:	63 %
ATM Pressure:	100.4 kPa

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

Test Mode: Transmitting

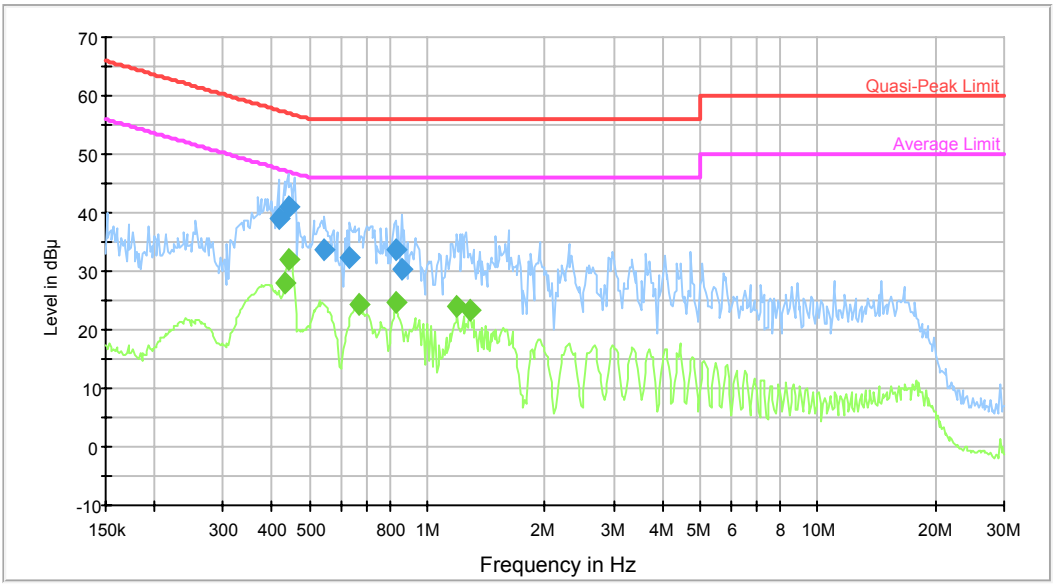
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.415949	35.5	9.000	L1	10.2	22.0	57.5	Compliance
0.436318	37.7	9.000	L1	10.2	19.4	57.1	Compliance
0.549741	28.6	9.000	L1	10.1	27.4	56.0	Compliance
0.786832	26.8	9.000	L1	10.4	29.2	56.0	Compliance
0.852094	27.3	9.000	L1	10.4	28.7	56.0	Compliance
0.922769	27.3	9.000	L1	10.4	28.7	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.429420	24.1	9.000	L1	10.2	23.2	47.3	Compliance
0.443327	29.5	9.000	L1	10.2	17.5	47.0	Compliance
0.660314	20.4	9.000	L1	10.4	25.6	46.0	Compliance
0.831967	20.6	9.000	L1	10.4	25.4	46.0	Compliance
1.239175	22.1	9.000	L1	10.4	23.9	46.0	Compliance
1.289541	22.9	9.000	L1	10.4	23.1	46.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.415949	39.0	9.000	N	10.2	18.5	57.5	Compliance
0.439808	41.1	9.000	N	10.1	16.0	57.1	Compliance
0.545378	33.8	9.000	N	10.1	22.2	56.0	Compliance
0.634524	32.5	9.000	N	10.3	23.5	56.0	Compliance
0.831967	33.8	9.000	N	10.3	22.2	56.0	Compliance
0.858911	30.3	9.000	N	10.3	25.7	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.429420	27.9	9.000	N	10.2	19.4	47.3	Compliance
0.439808	32.2	9.000	N	10.1	14.9	47.1	Compliance
0.665597	24.5	9.000	N	10.4	21.5	46.0	Compliance
0.831967	24.6	9.000	N	10.3	21.4	46.0	Compliance
1.190776	23.9	9.000	N	10.4	22.1	46.0	Compliance
1.289541	23.5	9.000	N	10.4	22.5	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.

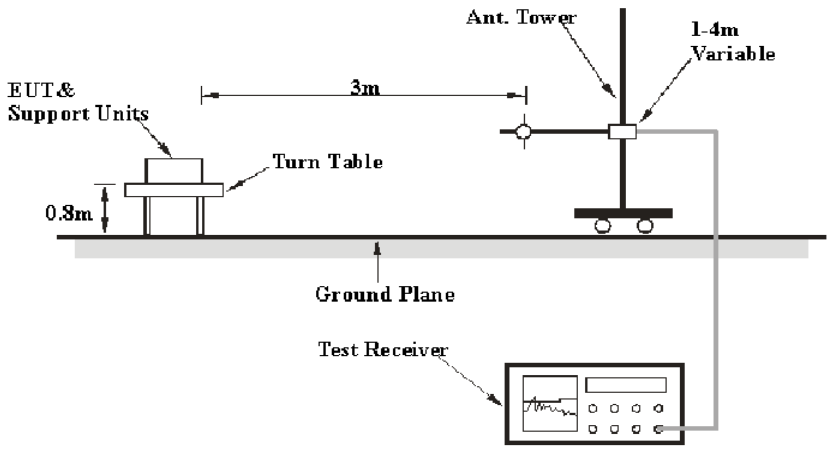
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is: 30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical; 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical; 1G~6GHz: 4.45 dB, 6G~18GHz: 5.23 dB.

Table 1 – Values of U_{cispr}

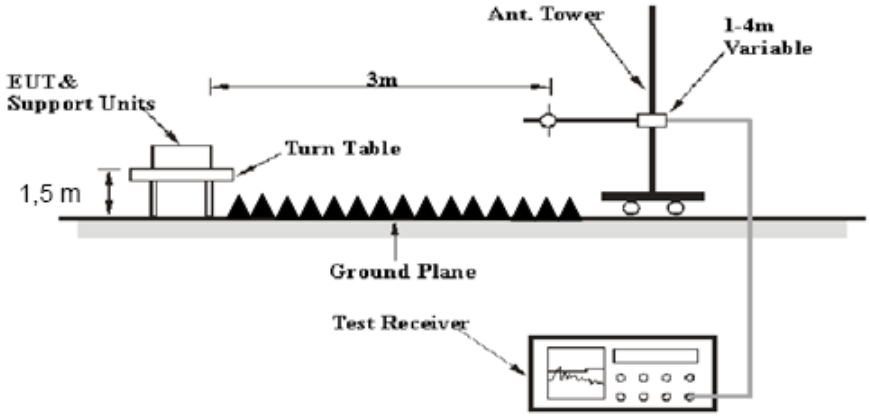
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

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	100224	2016-08-03	2017-08-02
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	2016-02-19	2017-02-19
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
Ducommun Technolagies	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

*** 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:

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 Data

Environmental Conditions

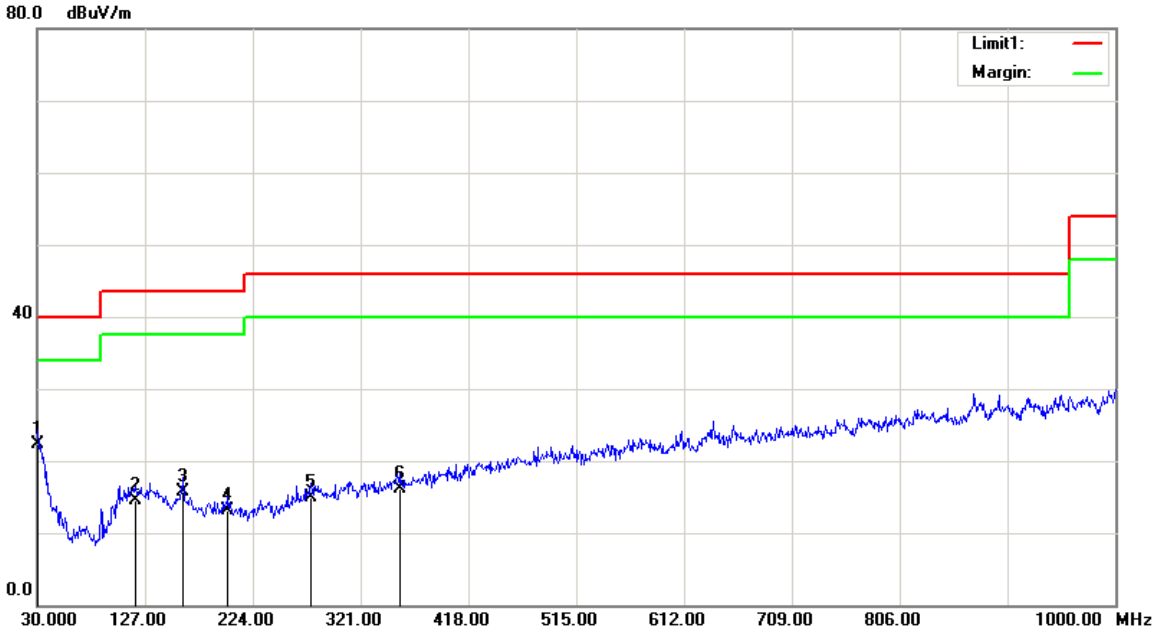
Temperature:	27.9°C
Relative Humidity:	67 %
ATM Pressure:	99.7 kPa

** The testing was performed by Lion Xiao on 2016-08-09*

Test Mode: Transmitting

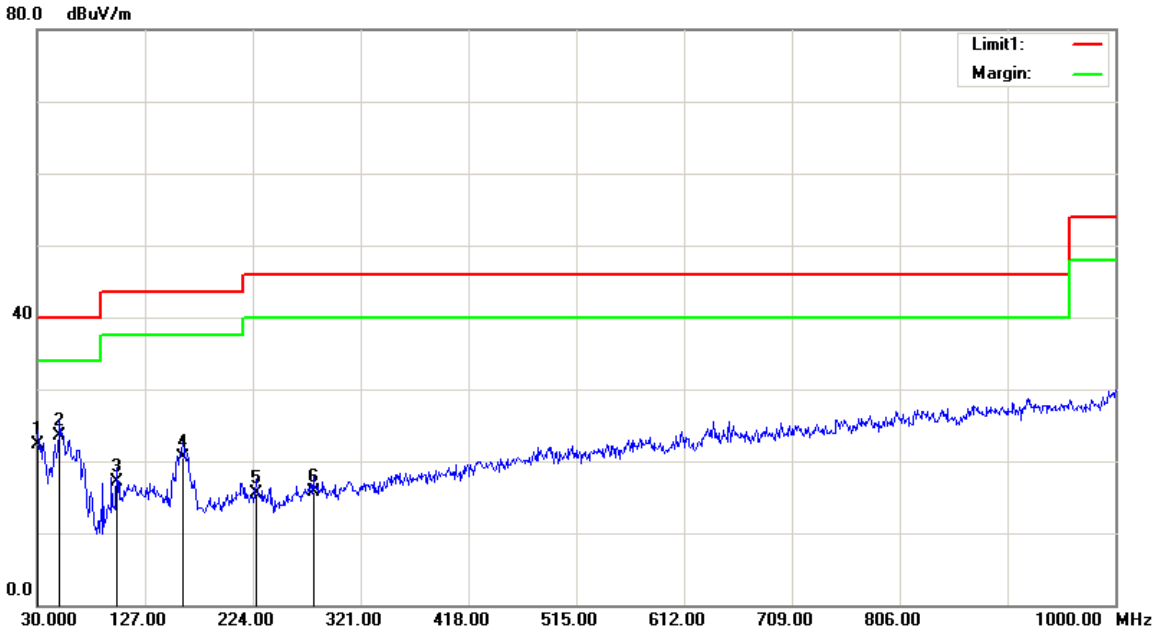
1) Below 1GHz:

Horizontal



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.9700	20.79	QP	1.51	22.30	40.00	17.70
118.2700	19.64	QP	-5.14	14.50	43.50	29.00
160.9500	22.13	QP	-6.33	15.80	43.50	27.70
201.6900	20.28	QP	-7.18	13.10	43.50	30.40
276.3800	20.22	QP	-5.32	14.90	46.00	31.10
355.9200	20.21	QP	-4.01	16.20	46.00	29.80

Vertical



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.9700	20.79	QP	1.51	22.30	40.00	17.70
50.3700	34.36	QP	-10.86	23.50	40.00	16.50
101.7800	26.03	QP	-8.93	17.10	43.50	26.40
160.9500	26.83	QP	-6.33	20.50	43.50	23.00
226.9100	23.31	QP	-7.71	15.60	46.00	30.40
278.3200	20.90	QP	-5.10	15.80	46.00	30.20

2) 1-25GHz:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB)					
Low Channel: 2405.377MHz									
2405.377	78.65	PK	H	24.83	5.05	0.00	108.53	N/A	N/A
2405.377	71.35	AV	H	24.83	5.05	0.00	101.23	N/A	N/A
2405.377	78.69	PK	V	24.83	5.05	0.00	108.57	N/A	N/A
2405.377	71.62	AV	V	24.83	5.05	0.00	101.50	N/A	N/A
2390	32.6	PK	H	24.80	5.04	0.00	62.44	74.00	11.56
2390	21.24	AV	H	24.80	5.04	0.00	51.08	54.00	2.92
4810.754	53.32	PK	H	29.72	7.22	27.05	57.87	74.00	16.13
4810.754	47.74	AV	H	29.72	7.22	27.05	52.29	54.00	1.71
7216.131	41.34	PK	H	33.95	8.93	25.20	41.52	74.00	32.48
7216.131	35.78	AV	H	33.95	8.93	25.20	35.96	54.00	18.04
9621.508	29.31	PK	H	36.37	10.65	27.52	31.11	74.00	42.89
9621.508	23.32	AV	H	36.37	10.65	27.52	25.12	54.00	28.88
3133	28.35	PK	H	26.10	5.82	26.50	34.57	75.00	40.43
3133	22.45	AV	H	26.10	5.82	26.50	28.67	54.00	25.33
Middle Channel: 2440.705 MHz									
2440.705	78.24	PK	H	24.89	5.09	0.00	108.22	N/A	N/A
2440.705	69.54	AV	H	24.89	5.09	0.00	99.52	N/A	N/A
2440.705	78.37	PK	V	24.89	5.09	0.00	108.35	N/A	N/A
2440.705	69.17	AV	V	24.89	5.09	0.00	99.15	N/A	N/A
4881.41	53.57	PK	V	29.86	7.30	26.88	57.89	75.00	17.11
4881.41	46.56	AV	V	29.86	7.30	26.88	50.88	54.00	3.12
7322.115	53.73	PK	V	34.12	9.00	25.42	54.03	74.00	19.97
7322.115	47.59	AV	V	34.12	9.00	25.42	47.89	54.00	6.11
9762.82	41.45	PK	V	36.46	10.87	27.20	43.06	74.00	30.94
9762.82	35.31	AV	V	36.46	10.87	27.20	36.92	54.00	17.08
3625	34.32	PK	V	27.45	6.12	27.25	40.24	74.00	33.76
3625	22.34	AV	V	27.45	6.12	27.25	28.26	54.00	25.74
3462	34.17	PK	V	27.09	6.03	27.15	40.26	74.00	33.74
3462	22.78	AV	V	27.09	6.03	27.15	28.87	54.00	25.13
High Channel: 2477.569 MHz									
2477.569	78.27	PK	H	24.96	5.18	0.00	108.41	N/A	N/A
2477.569	69.45	AV	H	24.96	5.18	0.00	99.59	N/A	N/A
2477.569	78.28	PK	V	24.96	5.18	0.00	108.42	N/A	N/A
2477.569	69.38	AV	V	24.96	5.18	0.00	99.52	N/A	N/A
2483.5	31.21	PK	V	24.97	5.19	0.00	61.37	74.00	12.63
2483.5	21.35	AV	V	24.97	5.19	0.00	51.51	54.00	2.49
4955.138	52.37	PK	V	30.01	7.40	26.71	56.47	74.00	17.53
4955.138	46.7	AV	V	30.01	7.40	26.71	50.80	54.00	3.20
7432.707	41.03	PK	V	34.29	9.08	25.35	41.17	74.00	32.83
7432.707	35.36	AV	V	34.29	9.08	25.35	35.50	54.00	18.50
9910.276	29.69	PK	V	36.55	11.10	26.70	30.94	74.00	43.06
9910.276	24.02	AV	V	36.55	11.10	26.70	25.27	54.00	28.73
3317	29.68	PK	V	26.65	5.95	26.89	35.87	74.00	38.13
3317	24.14	AV	V	26.65	5.95	26.89	30.33	54.00	23.67

FCC §15.247(a) (1) - CHANNEL SEPARATION TEST

Applicable Standard

Frequency hopping systems shall have hoping 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
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

*** 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 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:	27.2°C
Relative Humidity:	51 %
ATM Pressure:	99.2 kPa

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

Test Result: Compliance.

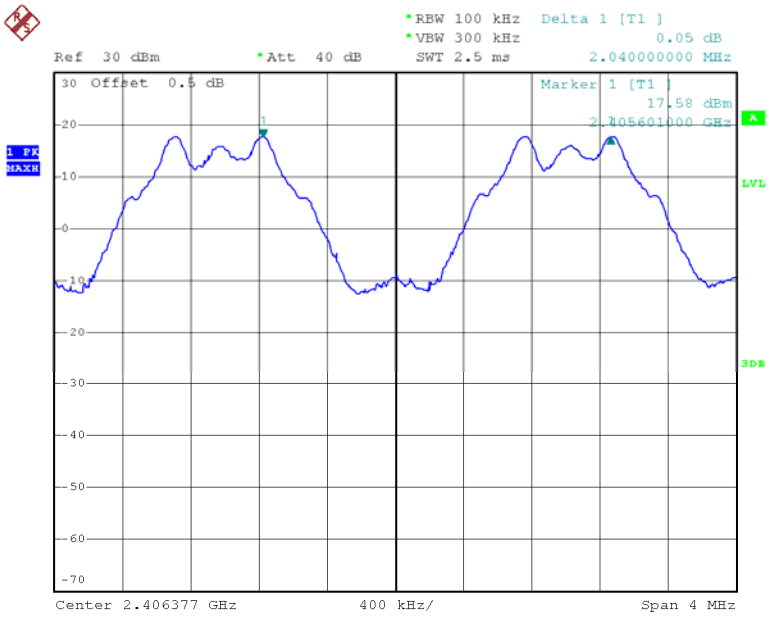
Please refer to following tables and plots

Test Mode: Transmitting

Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
2405.377	2.04	0.792	Compliant
2440.705	2.056	0.844	
2477.569	2.064	0.804	

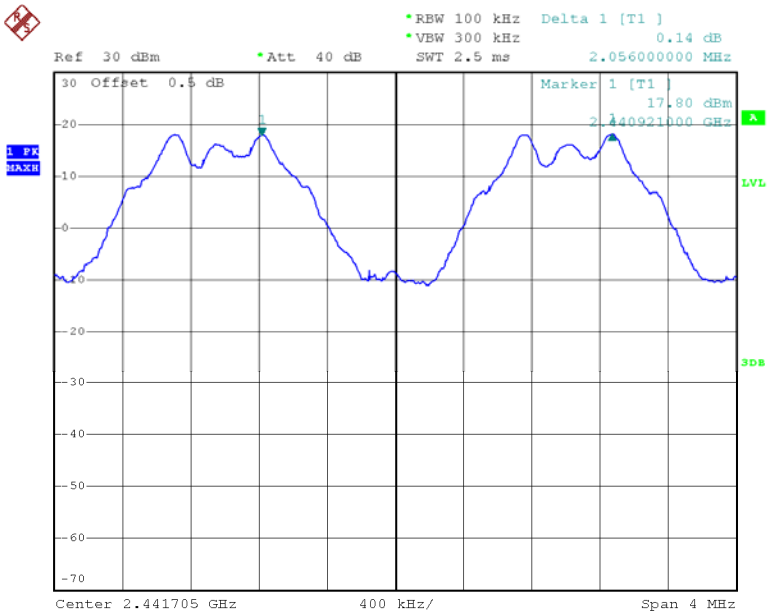
**Note: Limit= (2/3)× 20 dB bandwidth*

Low Channel



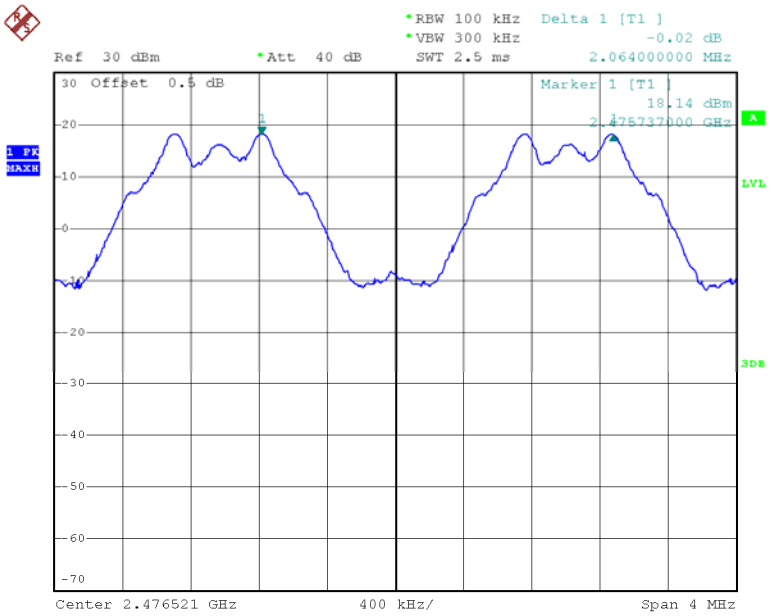
Date: 17.AUG.2016 16:26:54

Middle Channel



Date: 17.AUG.2016 16:30:08

High Channel



Date: 17.AUG.2016 16:31:36

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
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

*** 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 Data

Environmental Conditions

Temperature:	27.2°C
Relative Humidity:	51 %
ATM Pressure:	99.2 kPa

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

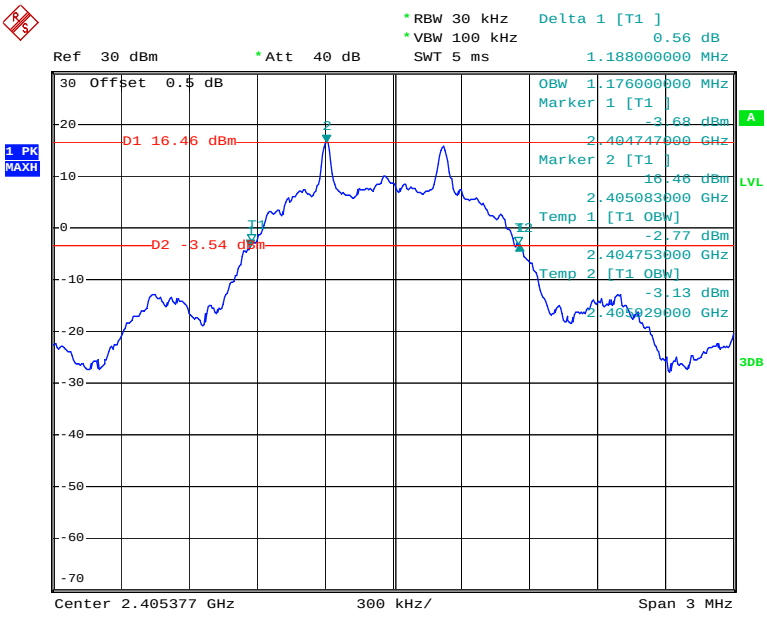
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

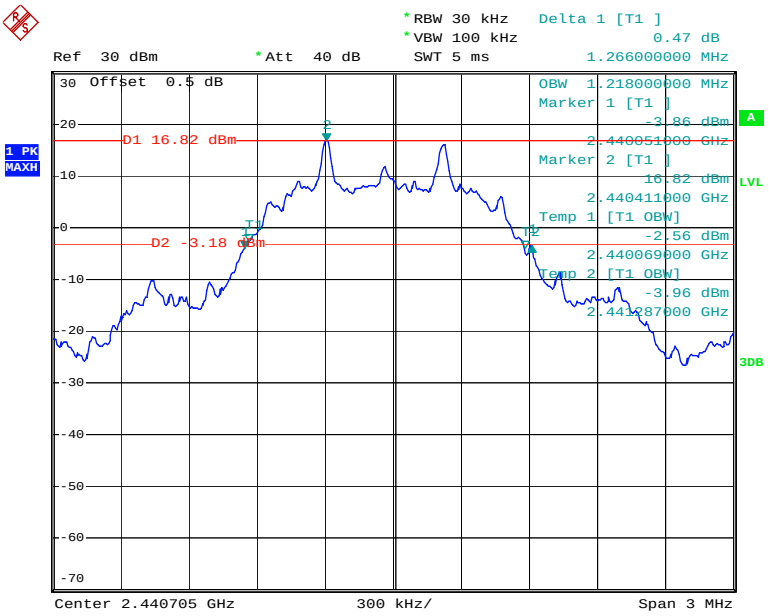
Frequency (MHz)	20 dB Bandwidth (MHz)
2405.377	1.188
2440.705	1.266
2477.569	1.206

Low Channel



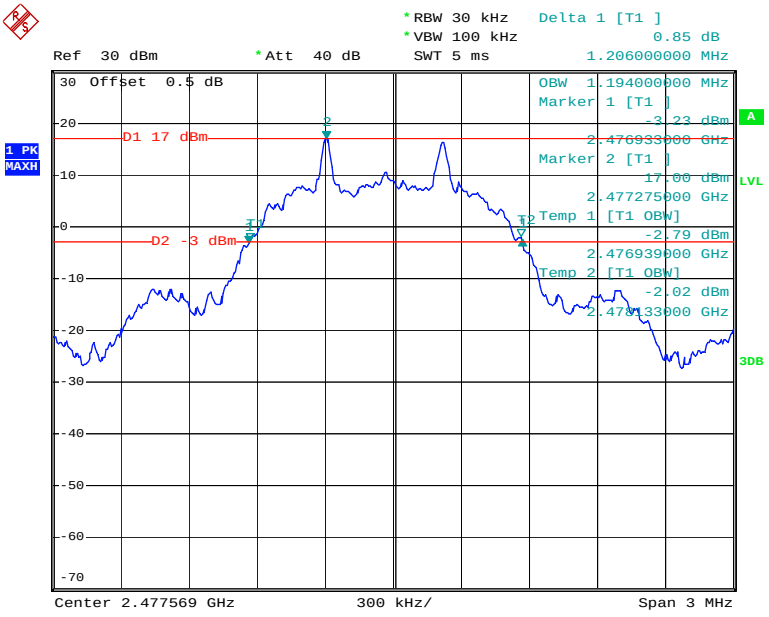
Date: 17.AUG.2016 16:44:14

Middle Channel



Date: 17.AUG.2016 16:46:28

High Channel



Date: 17.AUG.2016 16:41:48

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
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

*** 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 Data

Environmental Conditions

Temperature:	27.2°C
Relative Humidity:	51 %
ATM Pressure:	99.2 kPa

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

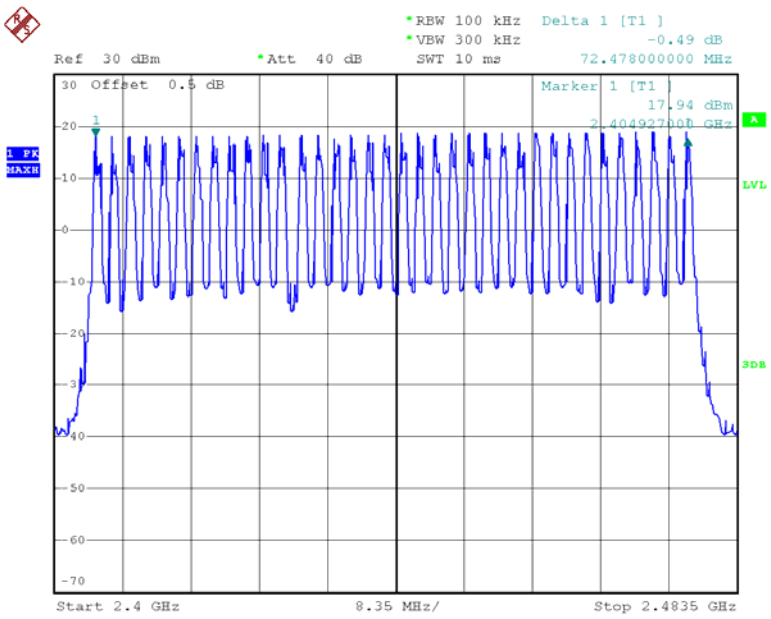
Test Result: Compliance.

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 16:12:34

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
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

*** 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 Data

Environmental Conditions

Temperature:	27.2°C
Relative Humidity:	51 %
ATM Pressure:	99.2 kPa

** The testing was performed by Lion Xiao on 2016-08-25.*

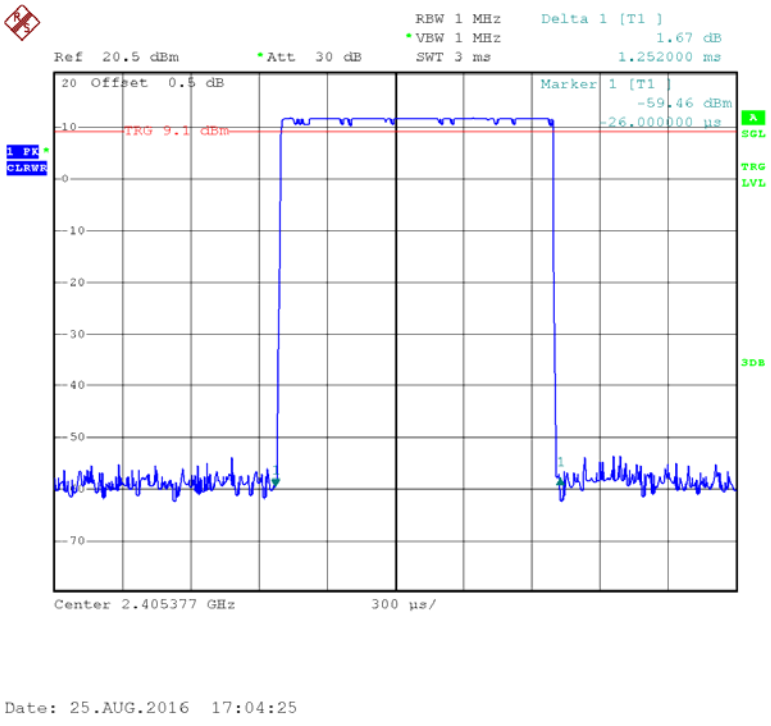
Test Result: Compliance.

Please refer to following tables and plots

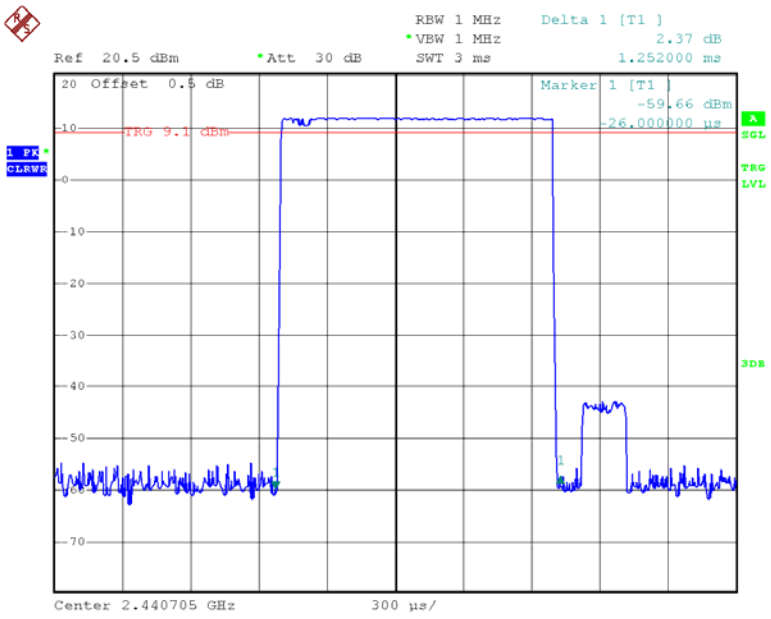
Test Mode: Transmitting(Press PTT key)

Channel	Pulse Width (ms)	Hopping Rate (pulse/s)	Dwell Time (s)	Limit (s)	Result
Low	1.252	360	0.180	0.4	Pass
Middle	1.252	360	0.180	0.4	Pass
High	1.246	360	0.179	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

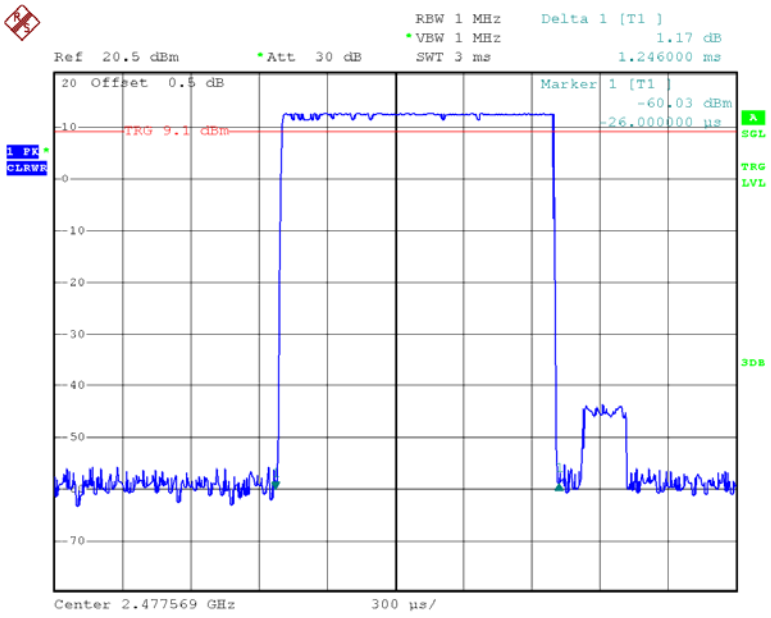


Pulse Width Middle Channel



Date: 25.AUG.2016 17:05:01

Pulse Width High Channel

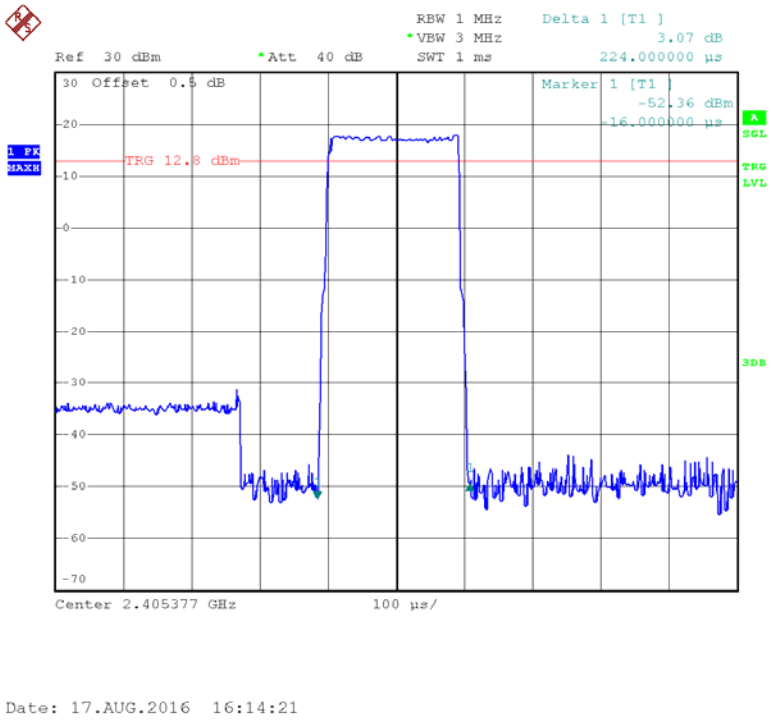


Date: 25.AUG.2016 17:05:30

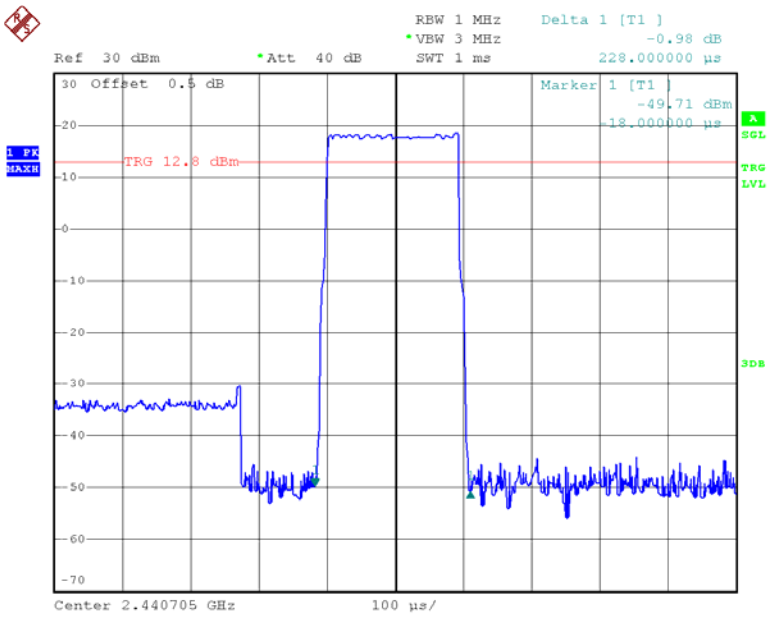
Test Mode: Transmitting(Don`t Press PTT key)

Channel	Pulse Width (ms)	Hopping Rate (pulse/s)	Dwell Time (s)	Limit (s)	Result
Low	0.224	360	0.032	0.4	Pass
Middle	0.228	360	0.032	0.4	Pass
High	0.230	360	0.033	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

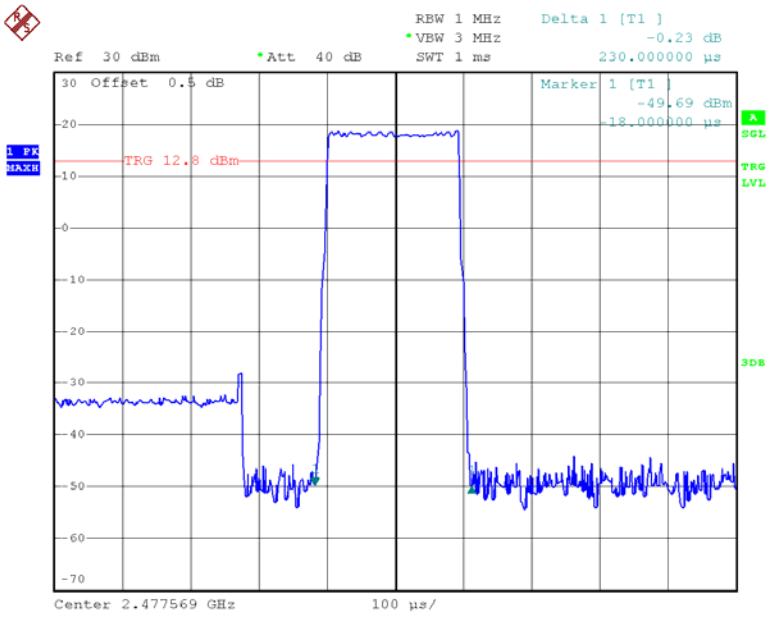


Pulse Width Middle Channel



Date: 17.AUG.2016 16:14:54

Pulse Width High Channel



Date: 17.AUG.2016 16:16:00

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
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

*** 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 Data

Environmental Conditions

Temperature:	27.2°C
Relative Humidity:	51 %
ATM Pressure:	99.2 kPa

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

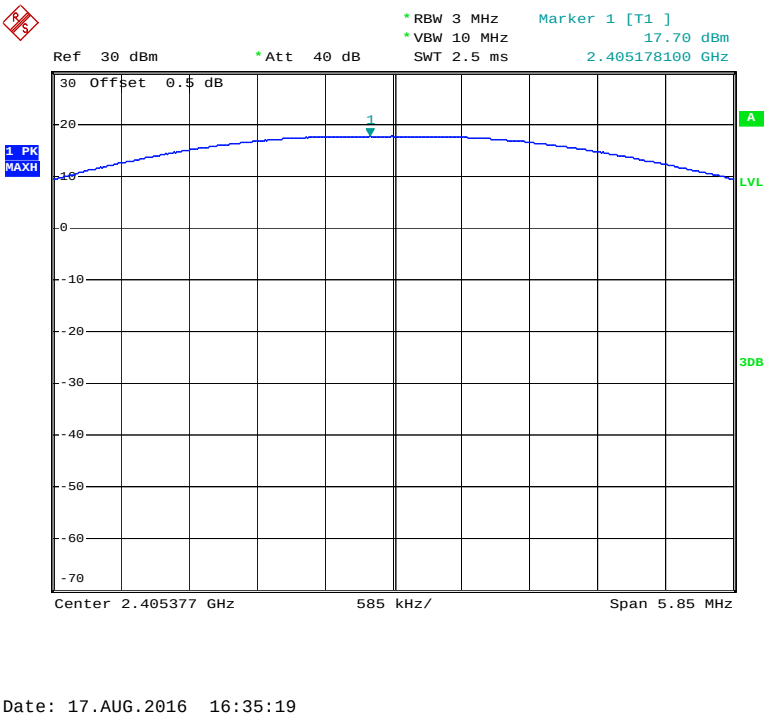
Test Result: Compliance.

Test Mode: Transmitting

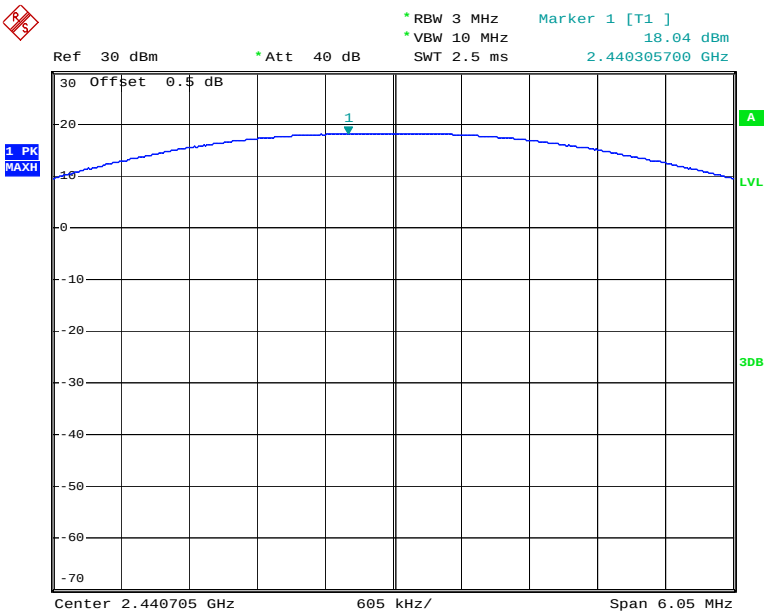
Channel	Frequency (MHz)	Output power (dBm)	Limit (dBm)
Low	2405.377	17.7	21
Middle	2440.705	18.04	21
High	2477.569	18.28	21

Note: The data above was tested in conducted mode.

Output Power, Low Channel

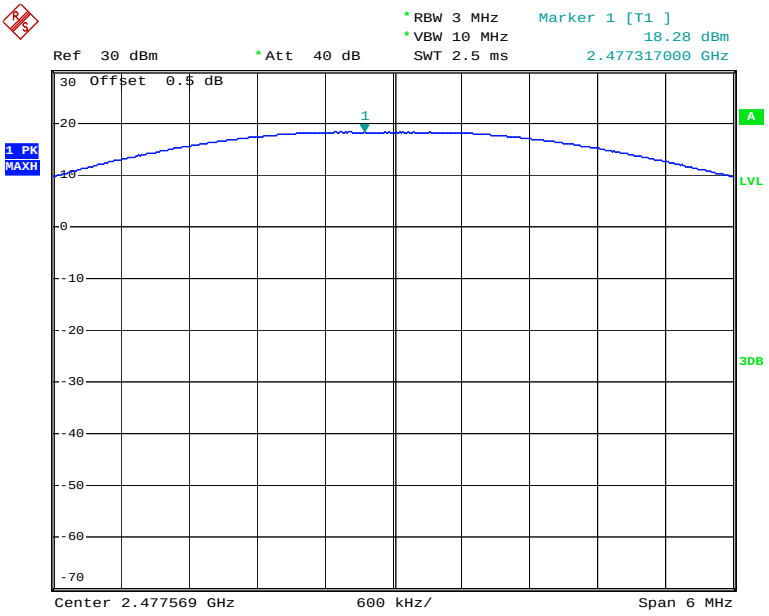


Output Power, Middle Channel



Date: 17.AUG.2016 16:36:57

Output Power, High Channel



Date: 17.AUG.2016 16:38:03

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
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

*** 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 Data

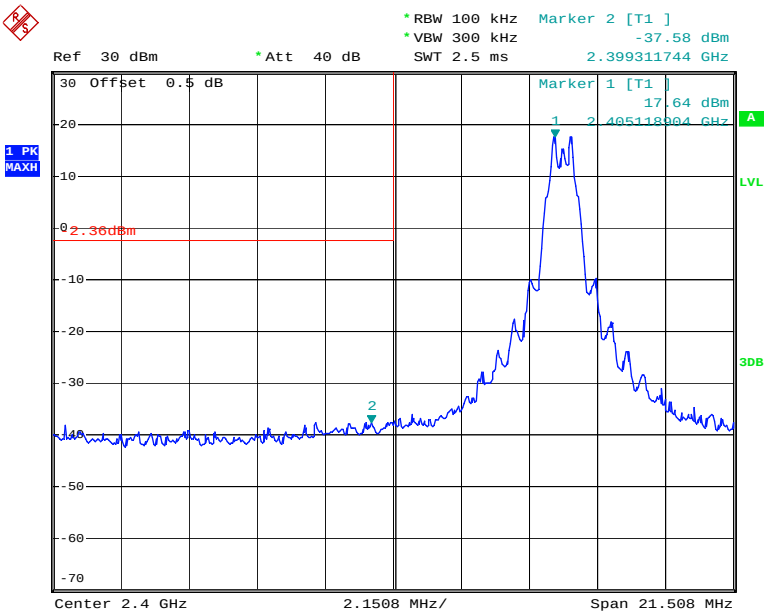
Environmental Conditions

Temperature:	27.2°C
Relative Humidity:	51 %
ATM Pressure:	99.2 kPa

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

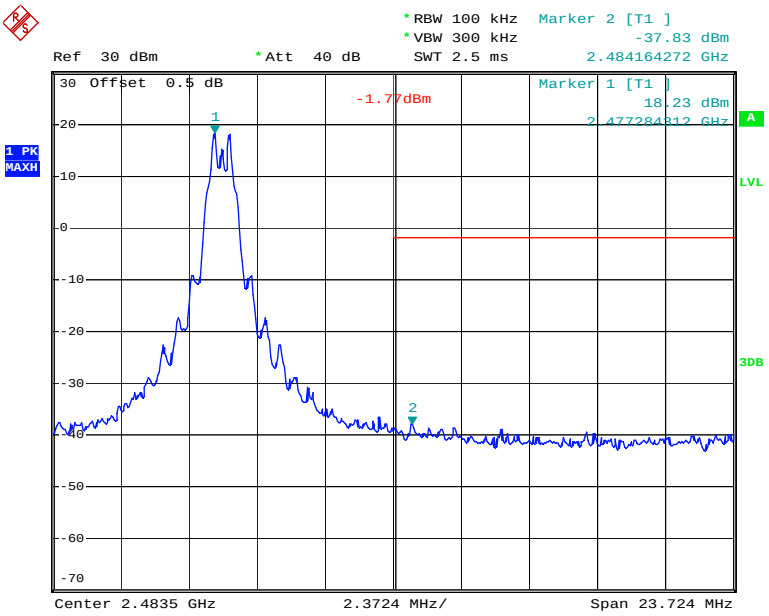
Test Result: Compliance

Band Edge, Left Side



Date: 17.AUG.2016 16:35:42

Band Edge, Right Side



Date: 17.AUG.2016 16:38:20

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