FCC PART 15.247

TEST REPORT

For

Guangzhou Si Bao Jian Electronics Co., Ltd.

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

FCC ID: 2ACQSBM148TX

Report Type:	**Product Name:**
Original Report	Baby Phone

Report Number:	RDG170911010-00
Report Date:	2017-10-28
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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

Product Description for Equipment under Test (EUT)

The ***Guangzhou Si Bao Jian Electronics Co., Ltd.***'s product, model number: ***BM-148 (FCC ID: 2ACQSBM148TX)*** (the "EUT") in this report was a ***Baby Phone,*** which was measured approximately: 11 cm (L) x 6 cm (W) x 5 cm (H), rated input voltage: DC 5V from adapter or DC 3.6V from battery.

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

**All measurement and test data in this report was gathered from production sample serial number: 170911010 (Assigned by BACL,Dongguan). The EUT was received on 2017-09-11.*

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 and C of the Federal Communications Commission's rules.

Related Submittal(s)/Grant(s)

Part of system submissions with FCC ID: 2ACQSBM148RX

Test Methodology

All measurements detailed in this Test Report were performed in accordance 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).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
Unwanted Emissions, radiated	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~26.5GHz: 5.23 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

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 Industry Area, Tangxia, Dongguan, Guangdong, China

Bay Area Compliance Laboratories Corp. (Dongguan) has been accredited to ISO 17025 by CNAS(Lab code: L5662). And accredited to ISO 17025 by NVLAP(Test Laboratory Accreditation Certificate Number 500069-0), the FCC Designation No. CN5002 under the KDB 974614 D01.

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.

Bay Area Compliance Laboratories Corp. (Dongguan) was registered with ISED Canada under ISED Canada Registration Number 3062D.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode. 36 channels are provided:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2405.377	10	2423.809	19	2442.753	28	2461.185
2	2407.425	11	2425.857	20	2444.801	29	2463.233
3	2409.473	12	2427.905	21	2446.849	30	2465.281
4	2411.521	13	2430.465	22	2448.897	31	2467.329
5	2413.569	14	2432.513	23	2450.945	32	2469.377
6	2415.617	15	2434.561	24	2452.993	33	2471.425
7	2417.665	16	2436.609	25	2455.041	34	2473.473
8	2419.713	17	2438.657	26	2457.089	35	2475.521
9	2421.761	18	2440.705	27	2459.137	36	2477.569

Channel 1, 18, 36 were selected to test.

EUT Exercise Software

The engineering mode configured the maximum power as default setting, the channels were switched by keys.

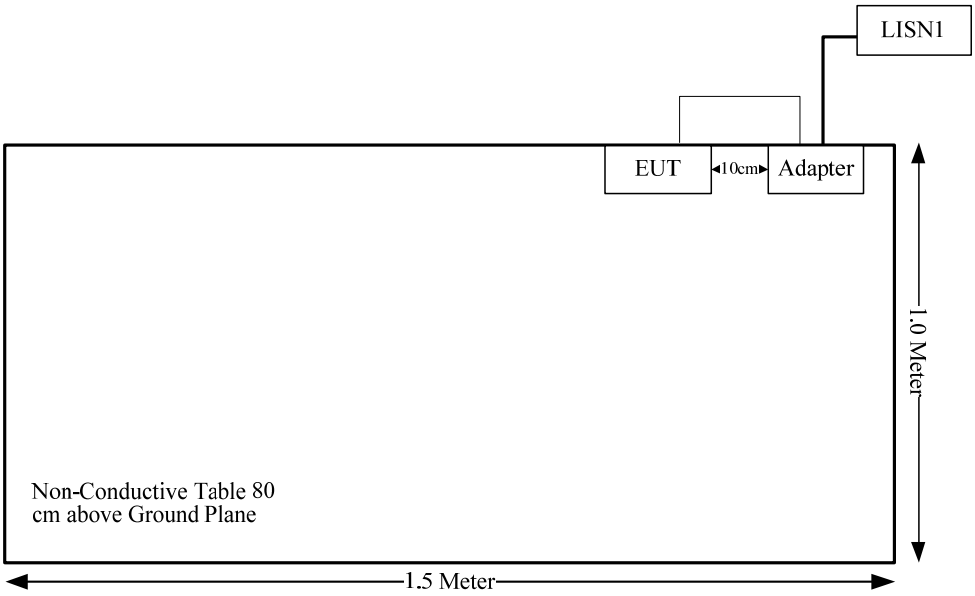
Equipment Modifications

No modification was made to the EUT.

External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From	To
USB Cable	no	no	1.1	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

For Body worn operation:
The distance form the antenna to the back edge is 3.0 cm
The max conducted power including tune-up tolerance is 11 dBm (12.59 mW).
[(max. power of channel, mW)/(min. test separation distance, mm)][√f(GHz)]
= 12.59/30*(√2.477569) = 0.7< 3.0

For Hand-held operation:
[(max. power of channel, mW)/(min. test separation distance, mm)][√f(GHz)]
= 12.59/5*(√2.477569) = 3.96< 7.5

So the stand-alone SAR evaluation is not necessary.

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, fulfill the requirement of this section. Please refer to the EUT photos.

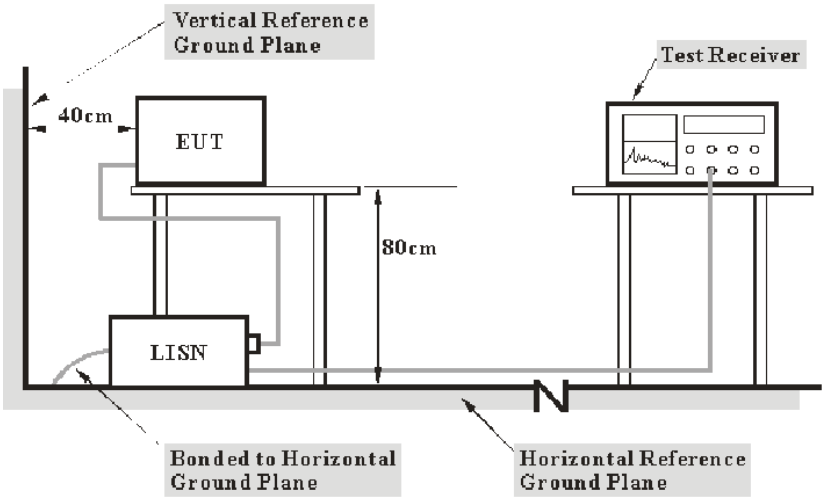
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207(a)

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 the main lisn with a 120 V/60 Hz AC 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 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	2016-12-08	2017-12-08
R&S	L.I.S.N	ESH2-Z5	892107/021	2017-09-25	2018-09-25
R&S	Two-line V-network	ENV 216	3560.6550.12	2016-12-08	2017-12-08
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
Unknown	Coaxial Cable	2m	Con-1	2017-09-05	2018-09-05

*** 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

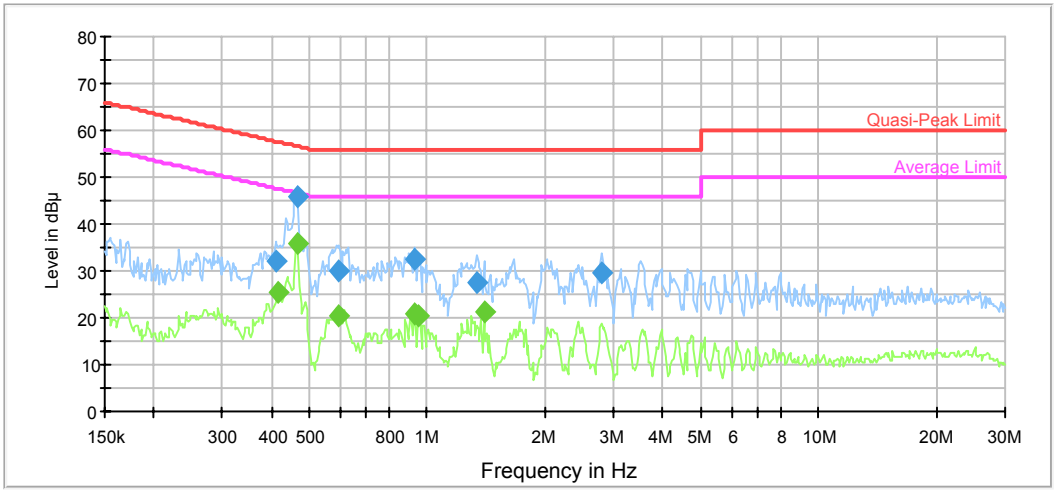
Environmental Conditions

Temperature:	27.3 °C
Relative Humidity:	41 %
ATM Pressure:	100.4 kPa

The testing was performed by Gaochao Gong on 2017-09-20.

Test Mode: Transmitting

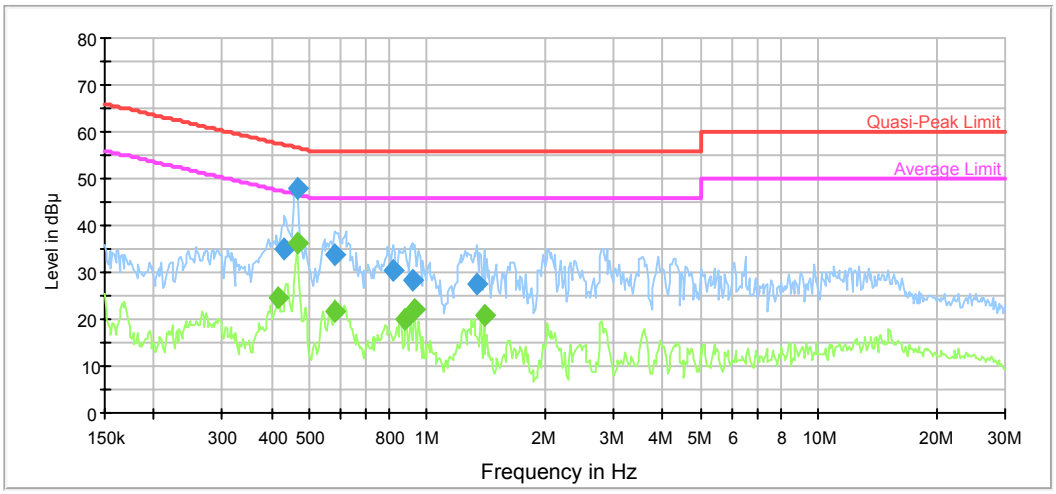
AC120V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.409372	32.2	9.000	L1	10.0	25.5	57.7	Compliance
0.465037	46.0	9.000	L1	9.9	10.6	56.6	Compliance
0.595338	29.9	9.000	L1	9.8	26.1	56.0	Compliance
0.930151	32.5	9.000	L1	9.8	23.5	56.0	Compliance
1.341955	27.4	9.000	L1	9.7	28.6	56.0	Compliance
2.793231	29.8	9.000	L1	9.8	26.2	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.415949	25.3	9.000	L1	10.0	22.2	47.5	Compliance
0.465037	35.8	9.000	L1	9.9	10.8	46.6	Compliance
0.590613	20.5	9.000	L1	9.8	25.5	46.0	Compliance
0.930151	21.0	9.000	L1	9.8	25.0	46.0	Compliance
0.952654	20.4	9.000	L1	9.8	25.6	46.0	Compliance
1.396499	21.4	9.000	L1	9.7	24.6	46.0	Compliance

AC120V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.429420	34.9	9.000	N	9.9	22.4	57.3	Compliance
0.465037	47.8	9.000	N	9.9	8.8	56.6	Compliance
0.581275	33.7	9.000	N	9.8	22.3	56.0	Compliance
0.818813	30.3	9.000	N	9.8	25.7	56.0	Compliance
0.915445	28.4	9.000	N	9.8	27.6	56.0	Compliance
1.341955	27.6	9.000	N	9.7	28.4	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.415949	24.7	9.000	N	10.0	22.8	47.5	Compliance
0.465037	36.1	9.000	N	9.9	10.5	46.6	Compliance
0.581275	21.8	9.000	N	9.8	24.2	46.0	Compliance
0.879690	20.1	9.000	N	9.8	25.9	46.0	Compliance
0.930151	22.1	9.000	N	9.8	23.9	46.0	Compliance
1.396499	20.6	9.000	N	9.7	25.4	46.0	Compliance

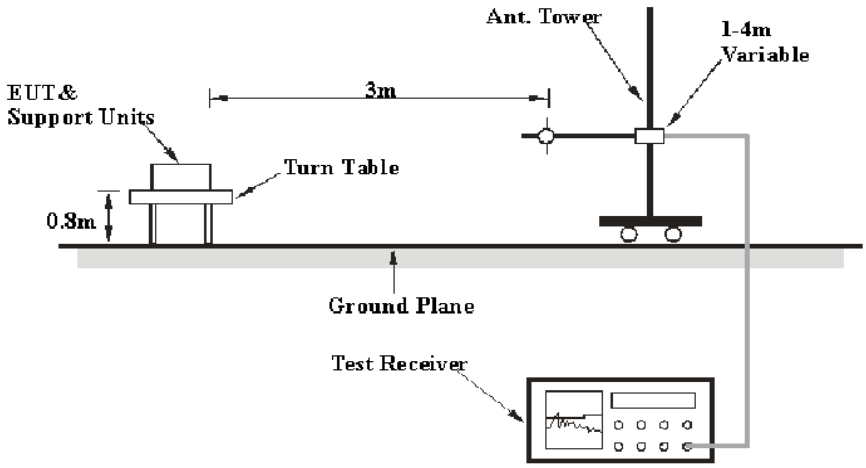
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

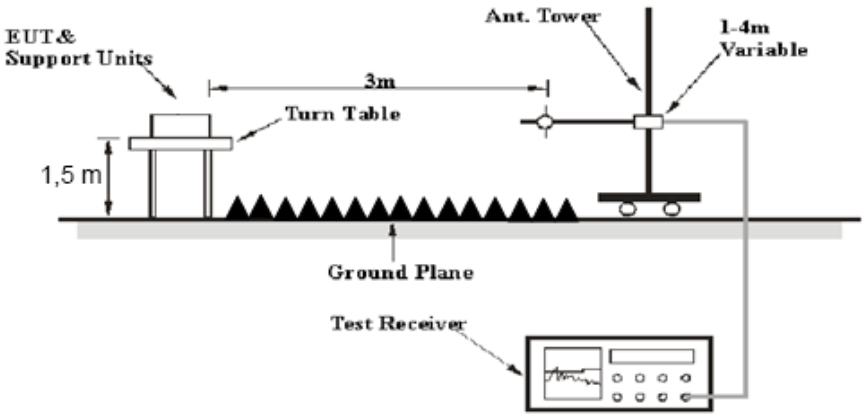
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber 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	Measurement
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	AV

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	2017-09-01	2018-09-01
Sunol Sciences	Antenna	JB3	A060611-1	2014-11-06	2017-11-06
HP	Amplifier	8447D	2727A05902	2017-09-05	2018-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2016-12-08	2017-12-08
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-02 1304	2017-06-16	2020-06-15
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2017-09-05	2018-09-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2017-06-27	2018-06-27
Unknown	Coaxial Cable	Chamber A-1	4m	2017-09-05	2018-09-05
Unknown	Coaxial Cable	Chamber B-1	0.75m	2017-09-05	2018-09-05
Unknown	Coaxial Cable	Chamber A-2	10m	2017-09-05	2018-09-05
Unknown	Coaxial Cable	Chamber B-2	8m	2017-09-05	2018-09-05
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:

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

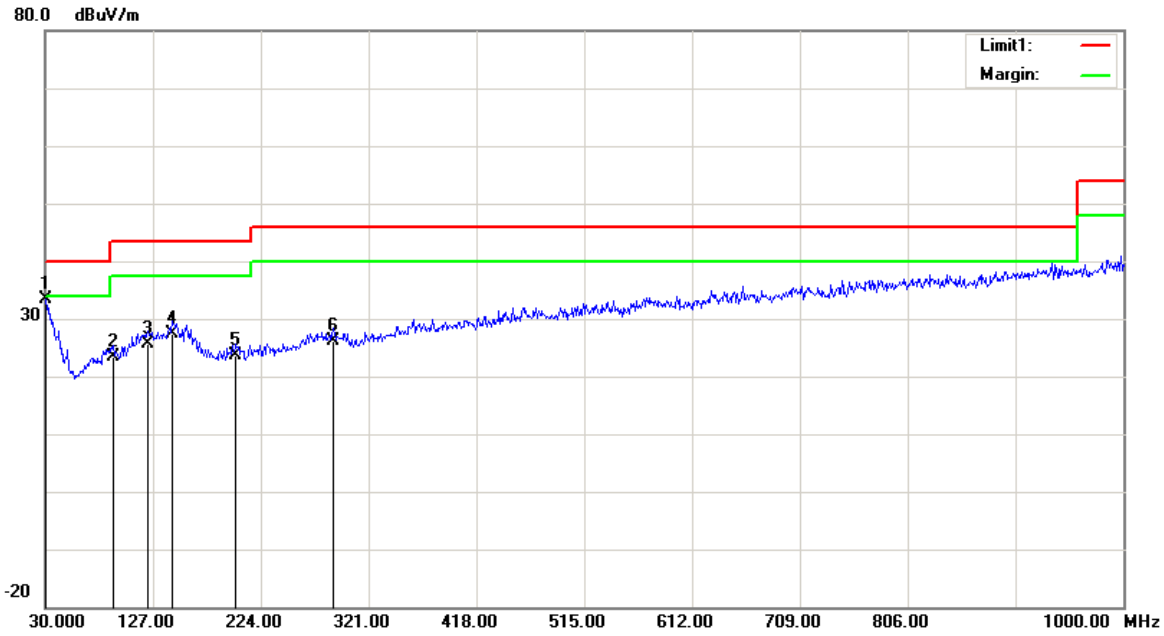
Temperature:	27.5~28.4 °C
Relative Humidity:	30~36 %
ATM Pressure:	100.3~100.4 kPa

** The testing was performed by Sunny Cen & Blake Yang on 2017-09-20 & 2017-09-23.*

Test Mode: Transmitting

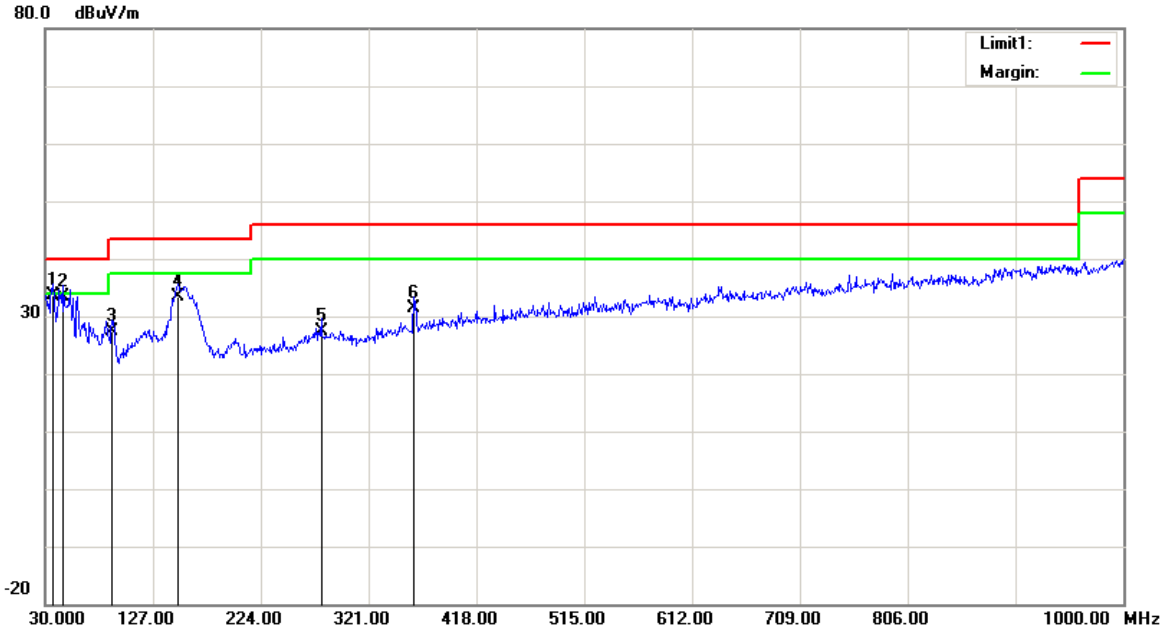
1) 30MHz-1GHz(Middle channel was the worst)

Horizontal:



Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.9700	32.94	QP	0.35	33.29	40.00	6.71
91.1100	34.13	QP	-10.73	23.40	43.50	20.10
122.1500	30.49	QP	-4.79	25.70	43.50	17.80
144.4600	33.90	QP	-6.40	27.50	43.50	16.00
201.6900	29.76	QP	-6.16	23.60	43.50	19.90
288.9900	30.11	QP	-3.91	26.20	46.00	19.80

Vertical:



Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
36.7900	37.43	QP	-3.83	33.60	40.00	6.40
46.4900	43.61	QP	-10.21	33.40	40.00	6.60
90.1400	38.36	QP	-10.86	27.50	43.50	16.00
149.3100	39.96	QP	-6.46	33.50	43.50	10.00
278.3200	30.98	QP	-3.68	27.30	46.00	18.70
361.7400	34.20	QP	-2.90	31.30	46.00	14.70

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: 2405.377 MHz									
2405.377	72.7	PK	H	24.83	5.68	0.00	103.21	N/A	N/A
2405.377	60.9	AV	H	24.83	5.68	0.00	91.41	N/A	N/A
2405.377	69.8	PK	V	24.83	5.68	0.00	100.31	N/A	N/A
2405.377	58.4	AV	V	24.83	5.68	0.00	88.91	N/A	N/A
2390	30.2	PK	H	24.80	5.67	0.00	60.67	74.00	13.33
2390	18.1	AV	H	24.80	5.67	0.00	48.57	54.00	5.43
4810.754	44.6	PK	H	29.72	7.98	27.38	54.92	74.00	19.08
4810.754	32.7	AV	H	29.72	7.98	27.38	43.02	54.00	10.98
7216.131	43.5	PK	H	33.95	9.78	27.20	60.03	74.00	13.97
7216.131	31.6	AV	H	33.95	9.78	27.20	48.13	54.00	5.87
4958	37.6	PK	H	30.02	8.10	27.37	48.35	74.00	25.65
4958	25.9	AV	H	30.02	8.10	27.37	36.65	54.00	17.35
Middle Channel: 2440.705 MHz									
2440.705	72.7	PK	H	24.89	5.68	0.00	103.27	N/A	N/A
2440.705	60.8	AV	H	24.89	5.68	0.00	91.37	N/A	N/A
2440.705	70.3	PK	V	24.89	5.68	0.00	100.87	N/A	N/A
2440.705	58.4	AV	V	24.89	5.68	0.00	88.97	N/A	N/A
4881.41	45.1	PK	H	29.86	8.03	27.55	55.44	74.00	18.56
4881.41	33.2	AV	H	29.86	8.03	27.55	43.54	54.00	10.46
7322.115	43.6	PK	H	34.12	9.86	27.26	60.32	74.00	13.68
7322.115	31.5	AV	H	34.12	9.86	27.26	48.22	54.00	5.78
1897	38.4	PK	H	24.10	5.36	27.84	40.02	74.00	33.98
1897	26.5	AV	H	24.10	5.36	27.84	28.12	54.00	25.88
3541	37.9	PK	H	27.28	7.02	26.70	45.50	74.00	28.50
3541	29.8	AV	H	27.28	7.02	26.70	37.40	54.00	16.60
High Channel: 2477.569 MHz									
2477.569	72.4	PK	H	24.96	5.69	0.00	103.05	N/A	N/A
2477.569	60.8	AV	H	24.96	5.69	0.00	91.45	N/A	N/A
2477.569	68.9	PK	V	24.96	5.69	0.00	99.55	N/A	N/A
2477.569	57.4	AV	V	24.96	5.69	0.00	88.05	N/A	N/A
2483.5	29.4	PK	H	24.97	5.69	0.00	60.06	74.00	13.94
2483.5	17.3	AV	H	24.97	5.69	0.00	47.96	54.00	6.04
4955.138	44.3	PK	H	30.01	8.09	27.38	55.02	74.00	18.98
4955.138	31.8	AV	H	30.01	8.09	27.38	42.52	54.00	11.48
7432.707	43.2	PK	H	34.29	9.95	27.21	60.23	74.00	13.77
7432.707	31.2	AV	H	34.29	9.95	27.21	48.23	54.00	5.77
4075	40.6	PK	H	28.34	7.52	27.20	49.26	74.00	24.74
4075	28.9	AV	H	28.34	7.52	27.20	37.56	54.00	16.44

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	EMI Test Receiver	ESCI	101121	2017-03-02	2018-03-02
Unknown	RF Cable	0.1m	C-1	Each Time	/

*** 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 100 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:	25.6~28.7 °C
Relative Humidity:	49~55 %
ATM Pressure:	100.1~100.6 kPa

** The testing was performed by George Peng on 2017-09-30 & 2017-10-27.*

Test Result: Compliance.

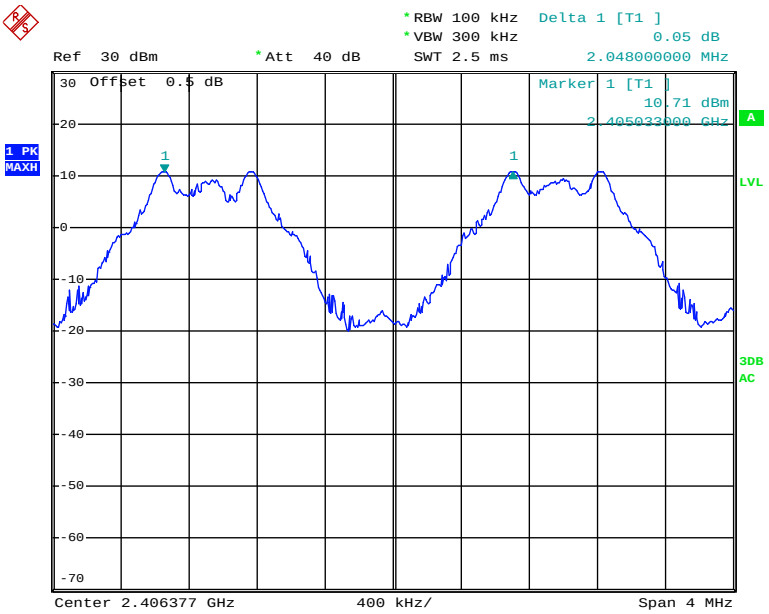
Please refer to following tables and plots

Test Mode: Transmitting

Channel	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)
Low	2405.377	2.048	0.808
Middle	2440.705	2.056	0.804
High	2477.569	2.056	0.816

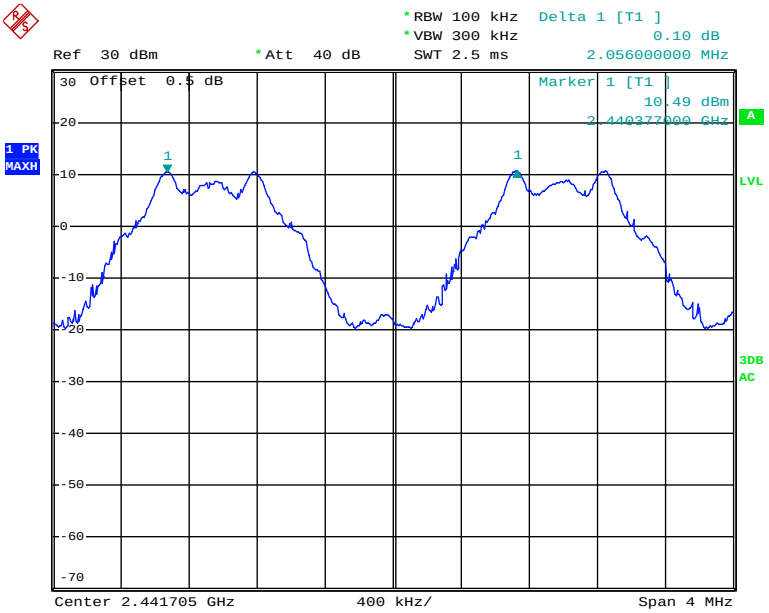
Note: Limit= (2/3) × 20dB bandwidth

Low Channel



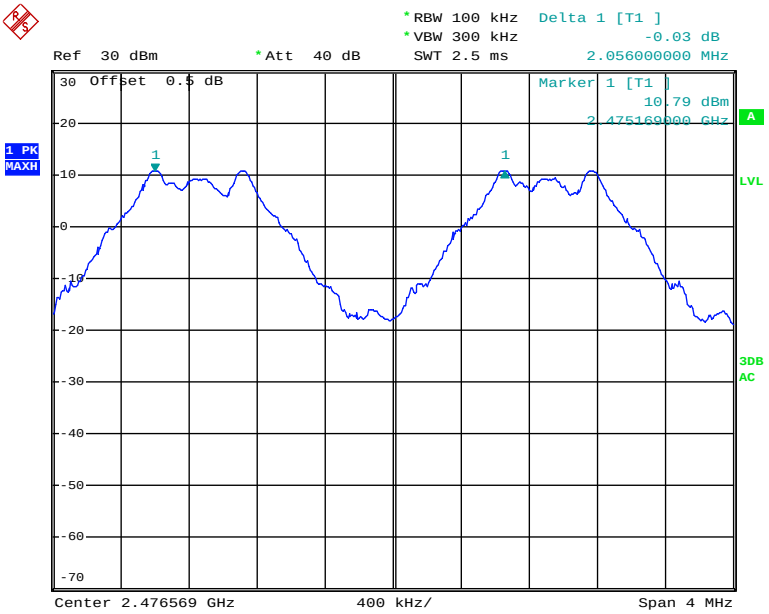
Date: 30.SEP.2017 11:15:58

Middle Channel



Date: 27.OCT.2017 19:25:30

High Channel



Date: 30.SEP.2017 11:21:04

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	EMI Test Receiver	ESCI	101121	2017-03-02	2018-03-02
Unknown	RF Cable	0.1m	C-1	Each Time	/

*** 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:	28.6 °C
Relative Humidity:	53 %
ATM Pressure:	100.6 kPa

** The testing was performed by George Peng on 2017-09-26.*

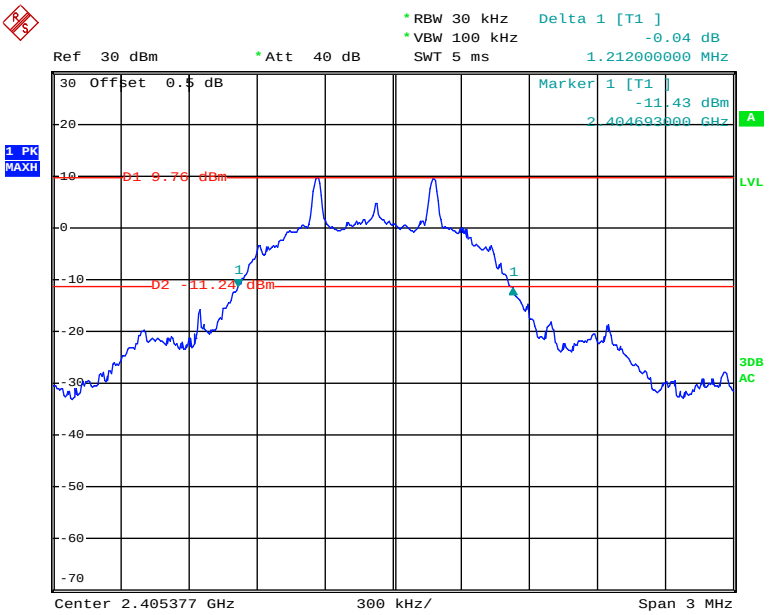
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

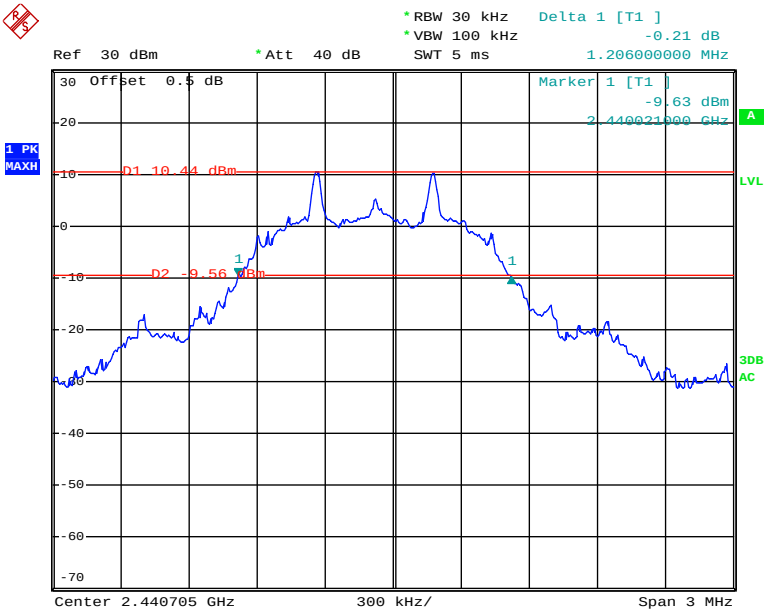
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2405.377	1.212
Middle	2440.705	1.206
High	2477.569	1.224

Low Channel



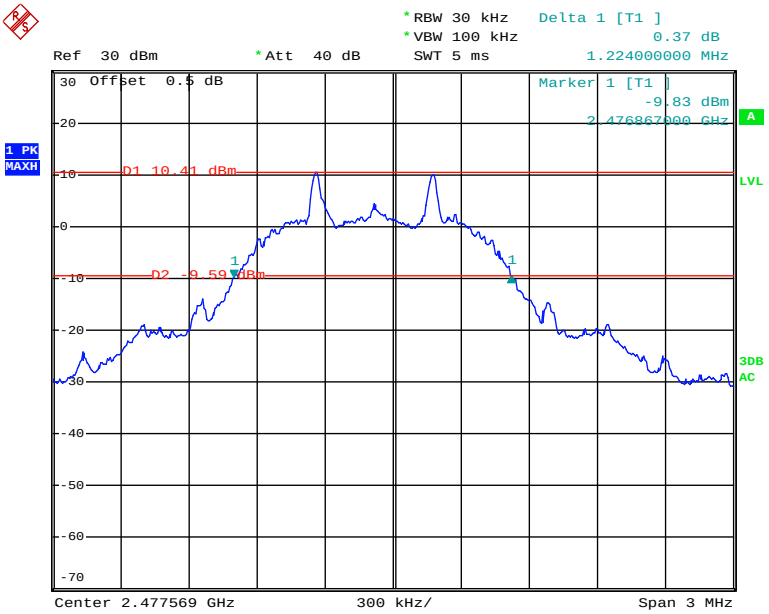
Date: 26.SEP.2017 19:43:47

Middle Channel



Date: 26.SEP.2017 19:41:39

High Channel



Date: 26.SEP.2017 19:39:32

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	EMI Test Receiver	ESCI	101121	2017-03-02	2018-03-02
Unknown	RF Cable	0.1m	C-1	Each Time	/

*** 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:	28.6 °C
Relative Humidity:	53 %
ATM Pressure:	100.6 kPa

** The testing was performed by George Peng on 2017-09-26.*

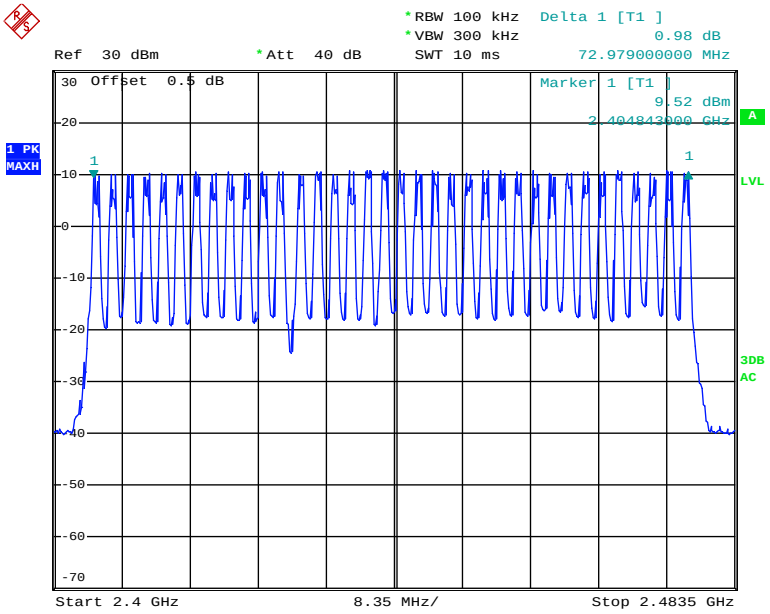
Test Result: Compliance.

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: 26.SEP.2017 19:27:48

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; the time of single pulses was tested.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	101121	2017-03-02	2018-03-02
Unknown	RF Cable	0.1m	C-1	Each Time	/

*** 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:	28.6~28.7 °C
Relative Humidity:	53~55 %
ATM Pressure:	100.6 kPa

** The testing was performed by George Peng on 2017-09-26&2017-09-30.*

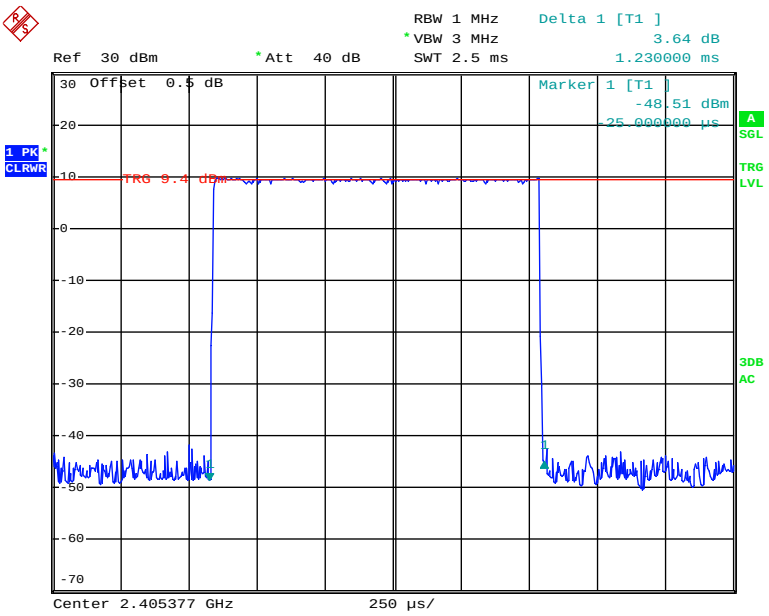
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

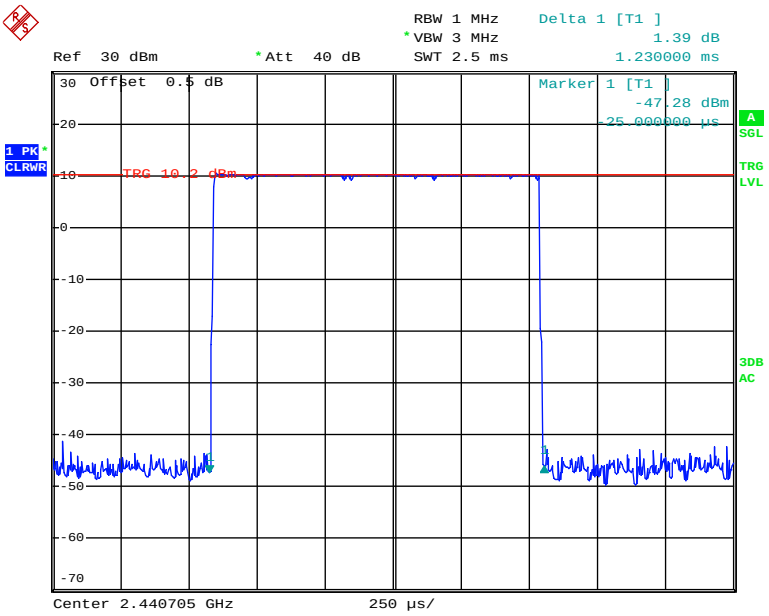
Channel	Occupancy Time For Single Hop (ms)	Hops in 1s	Hops in Observed Period	Dwell time (s)	Limit (s)	Result
Low	1.230	11	158	0.194	0.4	Compliance
Middle	1.230	11	158	0.194	0.4	Compliance
High	1.235	11	158	0.195	0.4	Compliance
Dwell time=Pulse time (ms) × hopping number per channel in Observed Period Observed Period=0.4 ×hopping numbers=0.4*36=14.4 Hops in Observed Period= Hops in 1s ×Observed Period						

Low Channel



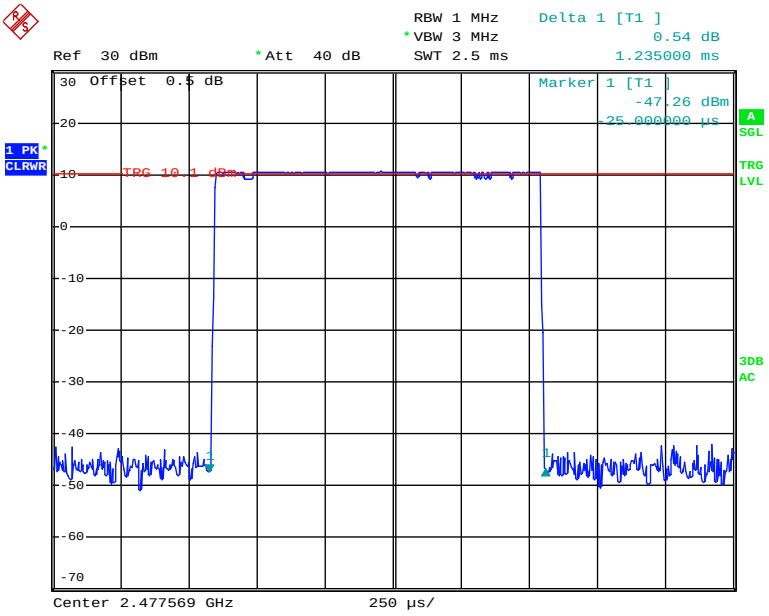
Date: 26.SEP.2017 20:14:05

Middle Channel



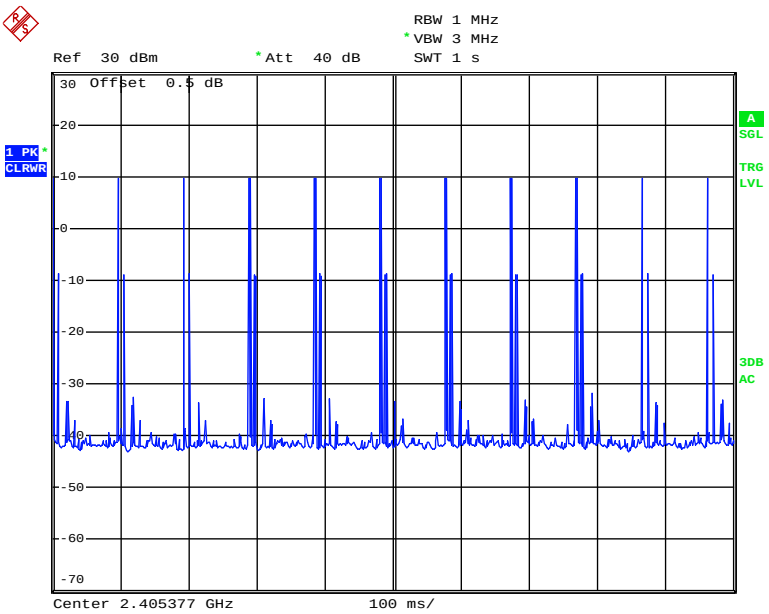
Date: 26.SEP.2017 20:11:32

High Channel



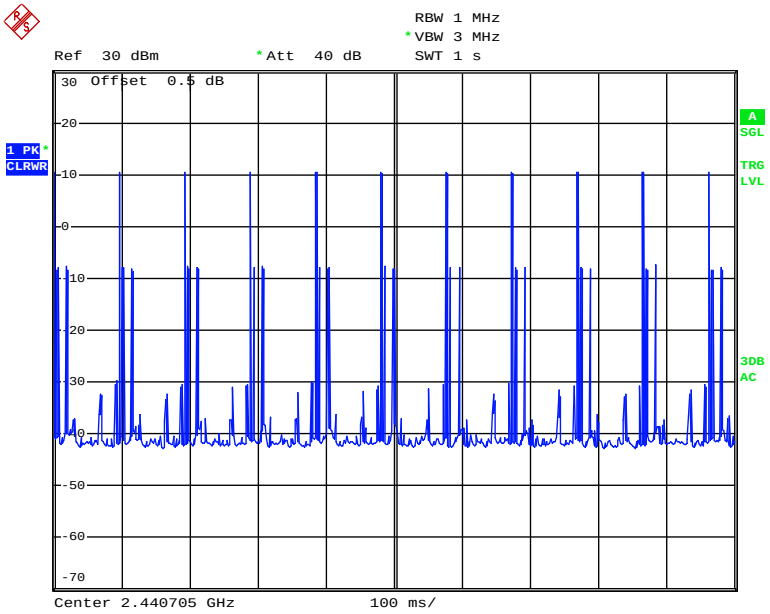
Date: 30.SEP.2017 13:32:50

1S: Low Channel



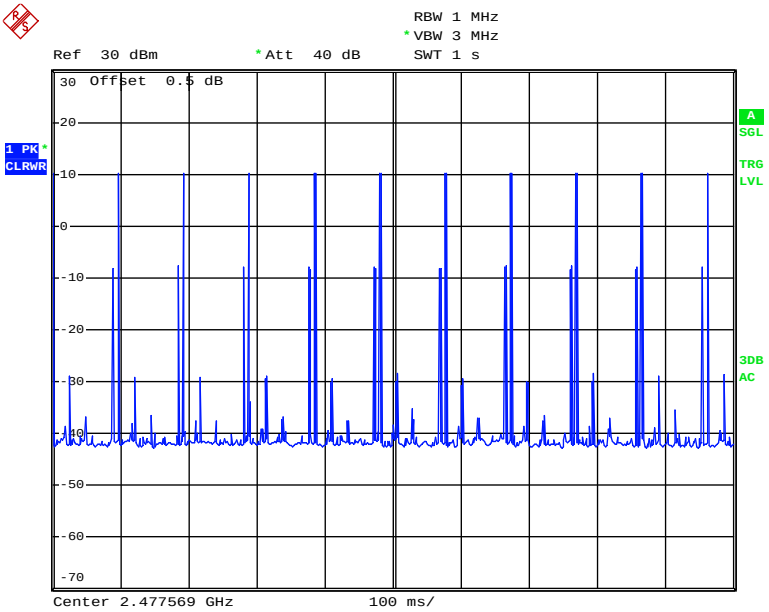
Date: 26.SEP.2017 20:16:18

1S: Middle Channel



Date: 26.SEP.2017 20:19:00

1S: High Channel



Date: 26.SEP.2017 20:19:36

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	EMI Test Receiver	ESCI	101121	2017-03-02	2018-03-02
Unknown	RF Cable	0.1m	C-1	Each Time	/

*** 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:	28.6 °C
Relative Humidity:	53 %
ATM Pressure:	100.6 kPa

** The testing was performed by George Peng on 2017-09-26.*

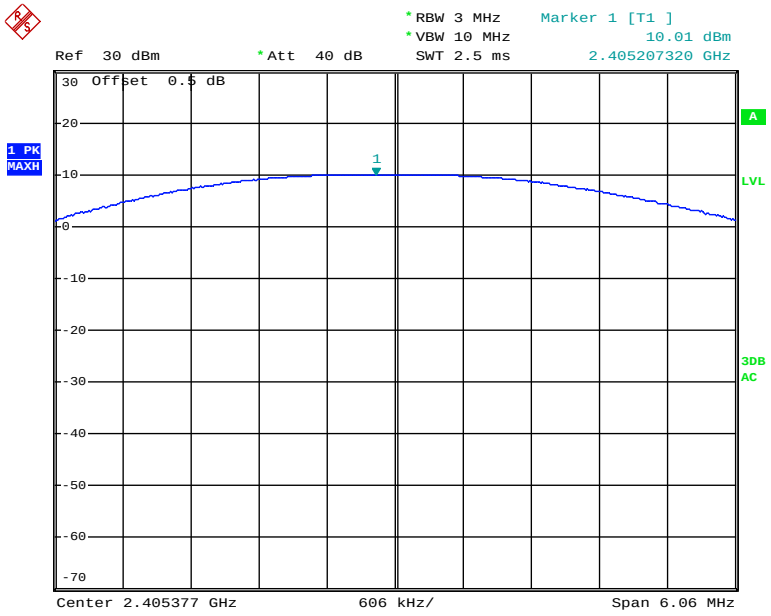
Test Result: Compliance.

Test Mode: Transmitting

Frequency (MHz)	Peak Conducted Output power (dBm)	Limit (dBm)
2405.377	10.01	21
2440.705	10.68	21
2477.569	10.71	21

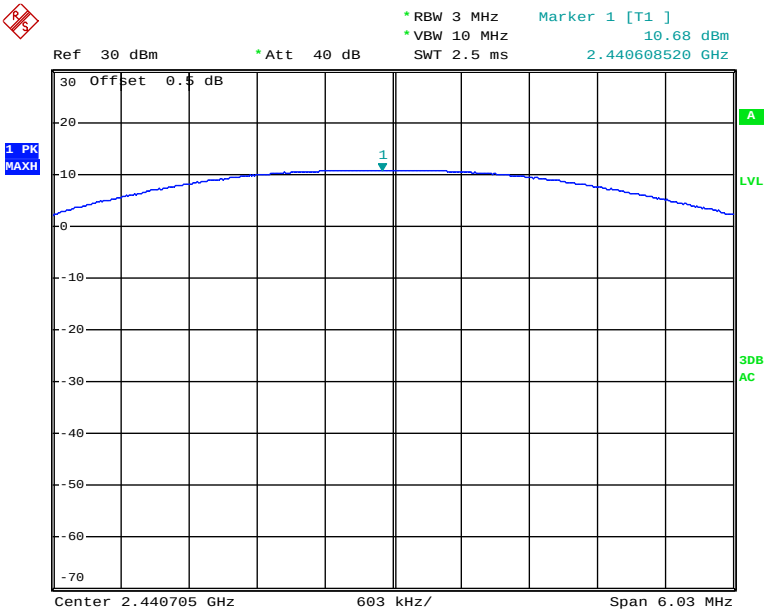
Note: The data above was tested in conducted mode.

Low Channel



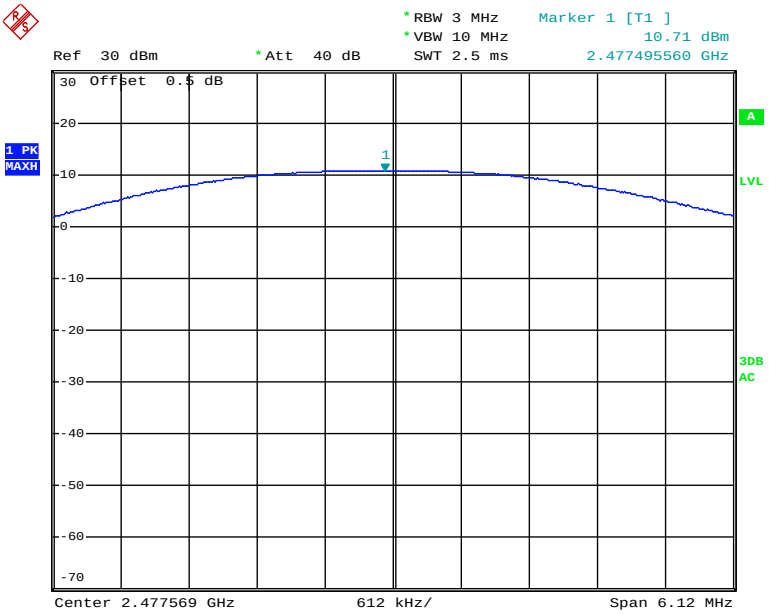
Date: 26.SEP.2017 19:54:56

Middle Channel



Date: 26.SEP.2017 19:53:35

High Channel



Date: 26.SEP.2017 19:51:55

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	101121	2017-03-02	2018-03-02
Unknown	RF Cable	0.1m	C-1	Each Time	/

*** 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

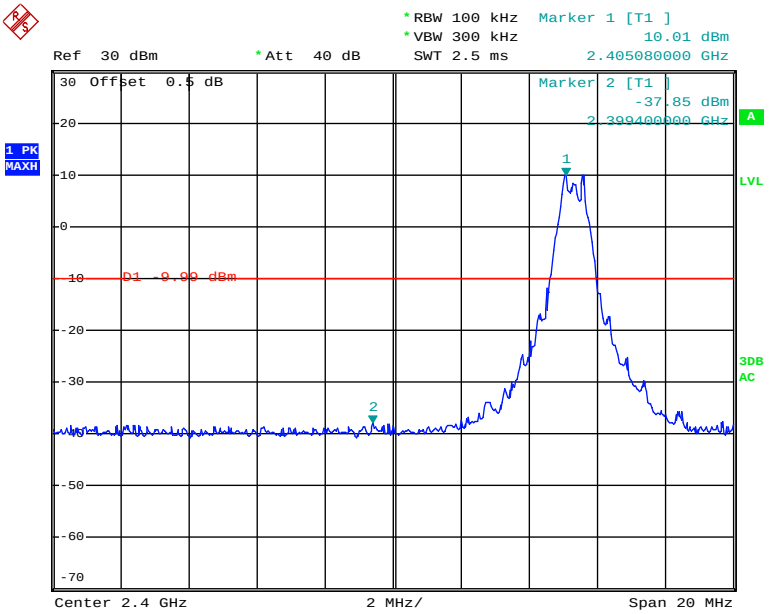
Environmental Conditions

Temperature:	28.6 °C
Relative Humidity:	53 %
ATM Pressure:	100.6 kPa

** The testing was performed by George Peng on 2017-09-26.*

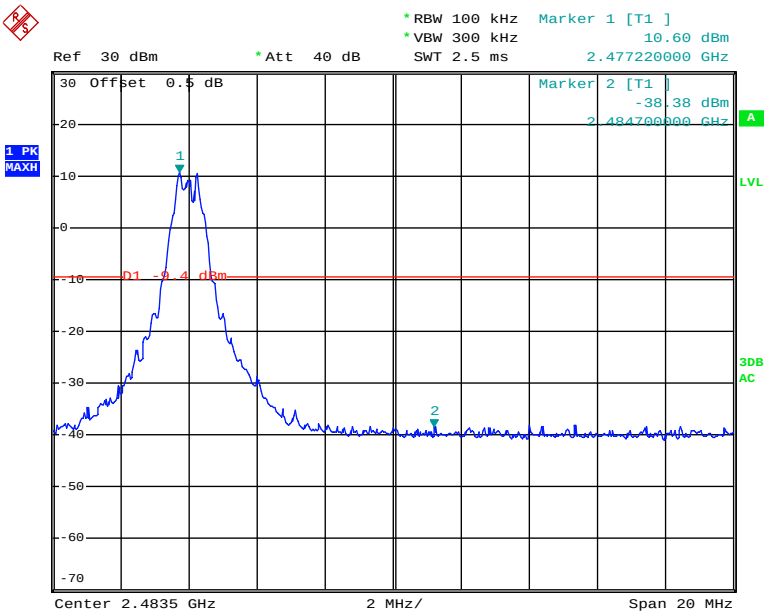
Test Result: Compliance

Band Edge, Left Side



Date: 26.SEP.2017 20:00:28

Band Edge, Right Side



Date: 26.SEP.2017 20:03:10

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