

FCC PART 15.247  
TEST REPORT

For

**Porta Phone Company Inc**

145 Dean Knauss Dr. Narragansett, RI 02882, USA.

**FCC ID: B4HGLD1000R**

<b>Report Type:</b> Original Report	<b>Product Type:</b> GOLD REMOTE (GLD1000R)
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<b>Report Number:</b> <u>RSZ160414830-00</u>	
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**Note:** This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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## GENERAL INFORMATION

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

The *Porta Phone Company Inc*'s product, model number: *GOLD SR (FCC ID: B4HGLD1000R)* (the "EUT") in this report was a *GOLD REMOTE (GLD1000R)*, which was measured approximately: 195 mm (L) x 190 mm (W) x 75 mm (H), rated with input voltage: DC 3.7V Li-ion battery.

Note: The series product, model GOLD SR-SW; GOLD DR, GOLD DR-SW and GOLD SR, they are electrically identical and the differences between them are the model number, appearance and function. Model GOLD SR was selected for fully testing, which was explained in the attached product similarity declaration letter.

*\* All measurement and test data for full testing model in this report was gathered from production sample serial number: 20160415. (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2016-04-14.*

### Objective

This report is prepared on behalf of *Porta Phone Company Inc* in accordance with Part 2-Subpart J, Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

### Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS submissions with FCC ID: B4HGLD1000M.

### 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. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with radiated emission is 5.81 dB for 30MHz-1GHz and 4.88 dB for above 1GHz, 1.95dB for conducted measurement.

## **Test Facility**

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication 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 October 31, 2013. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.10-2013.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

**SYSTEM TEST CONFIGURATION**

**Description of Test Configuration**

The system was configured for testing in an engineering mode which was selected by manufacturer.

Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2411	18	2445
2	2413	19	2447
3	2415	20	2449
4	2417	21	2451
5	2419	22	2453
6	2421	23	2455
7	2423	24	2457
8	2425	25	2459
9	2427	26	2461
10	2429	27	2463
11	2431	28	2465
12	2433	29	2467
13	2435	30	2469
14	2437	31	2471
15	2439	32	2473
16	2441	33	2475
17	2443		

EUT was tested with Channel 1, 16 and 33.

**EUT Exercise Software**

No exercise software was used.

**Equipment Modifications**

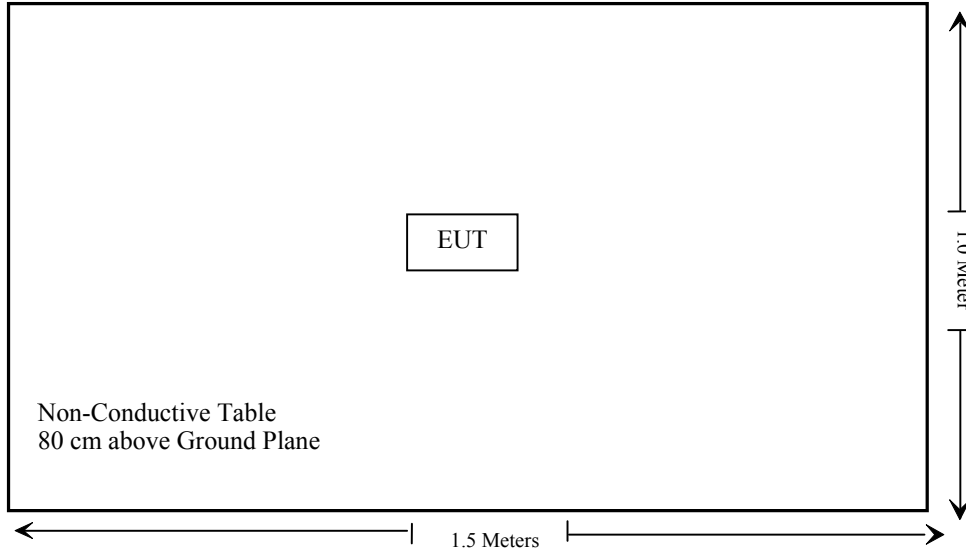
No modification was made to the EUT tested.

**External I/O Cable**

Cable Description	Length (m)	From/Port	To
/	/	/	

**Block Diagram of Test Setup**

For Radiated Emission: Below 1GHz



**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
§15.247 (i), §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Not applicable
§15.205, §15.209, §15.247(d)	Radiated Emissions	Compliance
§15.247 (a)(1)	20 dB Emission Bandwidth	Compliance
§15.247(a)(1)	Channel Separation	Compliance
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance
§15.247(a)(1)(iii)	Quantity of hopping channel	Compliance
§15.247(b)(1)	Peak Output Power Measurement	Compliance
§15.247(d)	Band Edges	Compliance

Note: EUT is powered by battery.



## **FCC §15.247 (i) & §2.1093 – RF EXPOSURE**

### **Applicable Standard**

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

According to KDB447498 D01 General RF Exposure Guidance v05r02:

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

### **Evaluation data:**

The maximum tune-up conducted peak output power is 19.60 dBm(91.20 mW) @2475 MHz

And

Duty Cycle =  $T_{on}/T_p \cdot 100\% = 3.06\%$

Which,  $T_{on} = 307 \mu\text{s}$ ,  $T_p = 10.03 \text{ ms}$ , please refer to below plots detail.

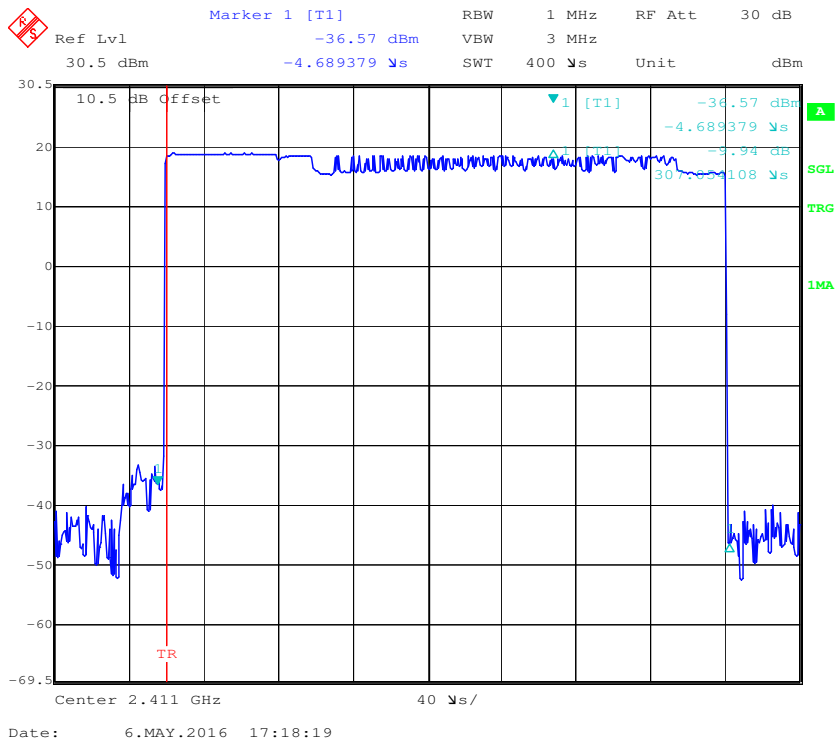
So, the maximum conducted source-based, time-averaged output power is:

$91.20 \cdot 3.06\% \text{ mW} = 2.79 \text{ mW} @ 2475 \text{ MHz}$

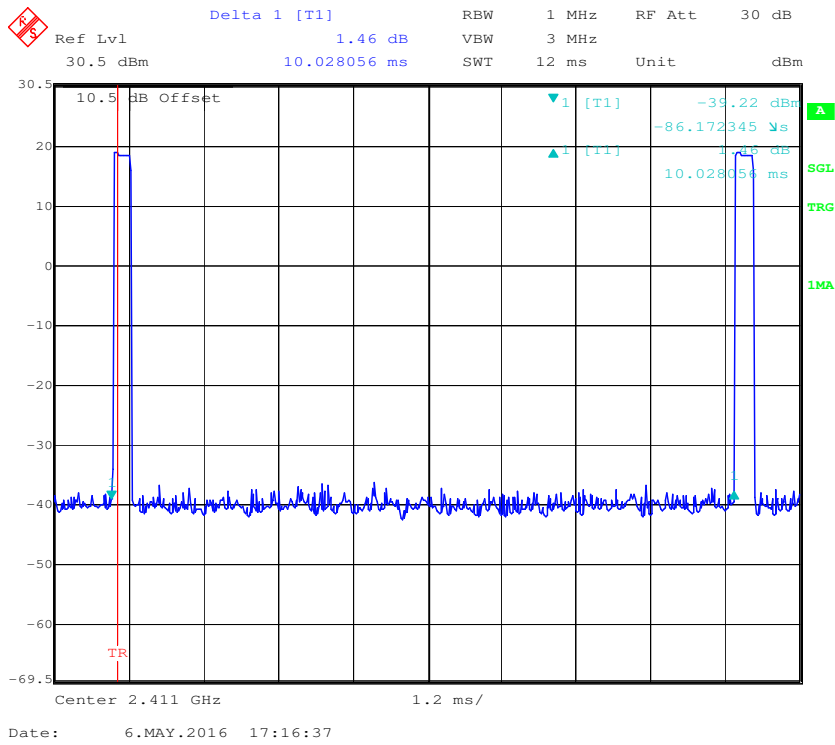
$(2.79/5) \cdot \sqrt{2.475} = 0.9 < 3.0$

**Result: No SAR test is required for Standalone SAR**

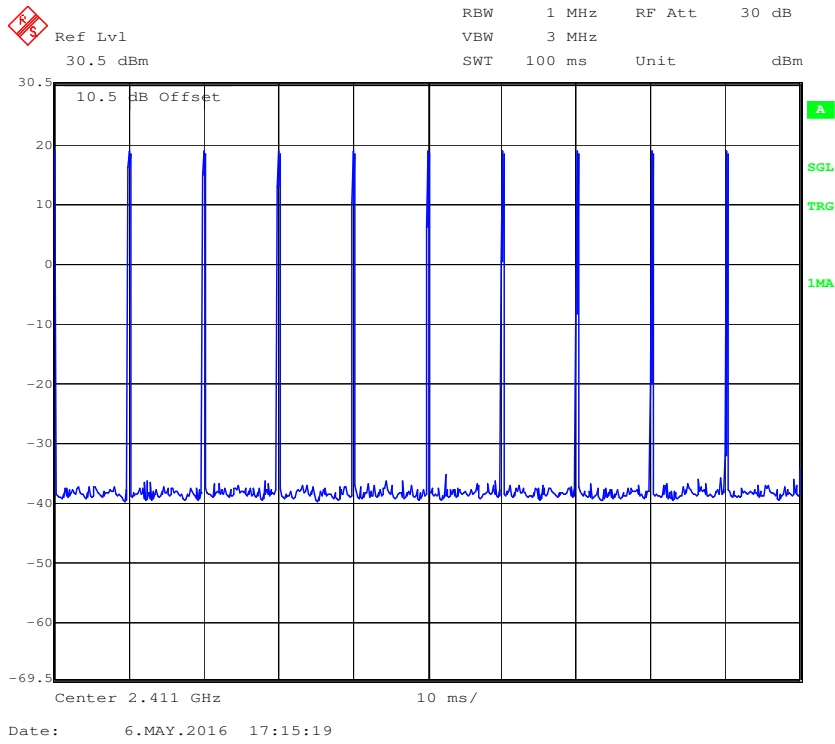
Ton



Tp



T<sub>100ms</sub>



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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 integrated antenna arrangement, which was permanently attached and the antenna gain is 0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

**Result:** Compliance.

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

**Applicable Standard**

FCC §15.247 (d); §15.209; §15.205;

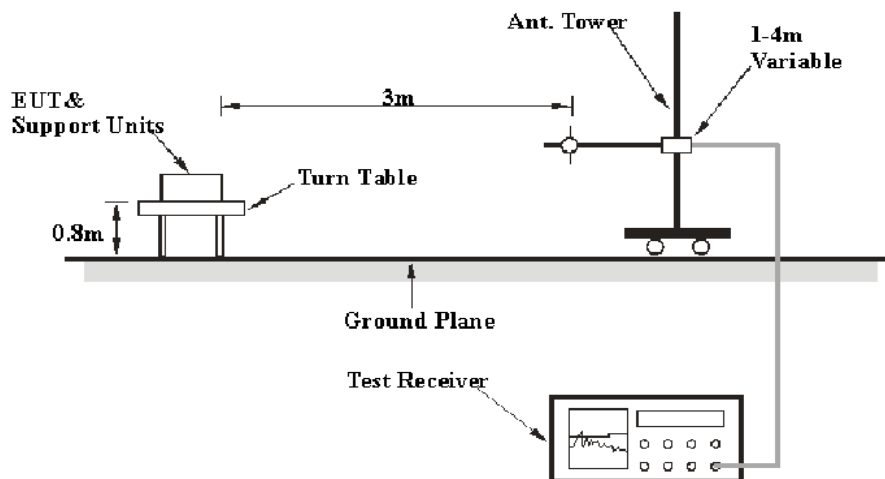
**Measurement Uncertainty**

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

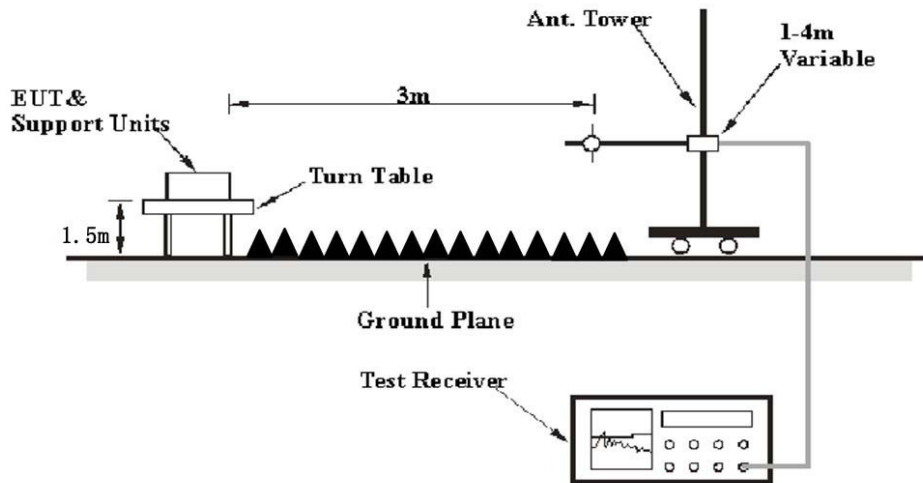
Based on CISPR 16-4-2:2011, the expanded combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) is 5.81 dB for 30MHz-1GHz and 4.88 dB for above 1GHz. And the uncertainty will not be taken into consideration for the test data recorded in the report

**EUT Setup**

**Below 1 GHz:**



**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	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK

**Test Procedure**

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in Quasi-peak detection mode for frequency range of 30 MHz to 1GHz and peak and Average detection modes for frequencies above 1GHz.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447E	1937A01046	2015-05-06	2016-05-06
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2015-12-15	2016-12-14
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2014-12-07	2017-12-06
Mini	Amplifier	ZVA-183-S+	5969001149	2016-04-23	2017-04-23
A.H. System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2015-12-11	2016-12-11
the electro-Mechanics Co.	Horn Antenna	3116	9510-2270	2013-10-14	2016-10-13
TDK	Chamber	Chamber A	2#	2013-10-15	2016-10-15
TDK	Chamber	Chamber B	1#	2015-07-23	2016-07-22
DUCOMMUN	Pre-amplifier	ALN-22093530-01	991373-01	2015-08-03	2016-08-03
R&S	Auto test Software	EMC32	V9.10	NCR	NCR
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369 223410-001	2015-06-15	2016-06-15
Ducommun technologies	RF Cable	104PEA	218124002	2015-06-15	2016-06-15
Ducommun technologies	RF Cable	RG-214	1	2015-06-15	2016-06-15
Ducommun technologies	RF Cable	RG-214	2	2015-06-15	2016-06-15

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that 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, section 15.205, 15.209 and 15.247, the worst margin reading as bellow:

**1.42 dB at 2483.96 MHz in the Horizontal polarization for High Channel with GOLD SR Model**

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level compliance with the limit if

$$L_m + U_{(L_m)} \leq L_{lim} + U_{cispr}$$

In BAACL.,  $U_{(L_m)}$  is less than  $+ U_{cispr}$ , if  $L_m$  is less than  $L_{lim}$ , it implies that the EUT complies with the limit.

## Test Data

### Environmental Conditions

Temperature:	25 °C
Relative Humidity:	49 %
ATM Pressure:	101.5 kPa

*The testing was performed by Xiangguang Kong on 2016-04-29.*

*Test Mode: Transmitting*



**30 MHz -25 GHz:**

**For GOLD SR Model:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/205/209	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBµV/m)	Margin (dB)
Low Channel (2411MHz)									
150.03	33.63	QP	81	2.0	H	-7.8	25.83	43.5	17.67
2411.00	114.93	PK	332	1.9	H	-6.46	108.47	/	/
2411.00	113.71	PK	146	1.9	V	-6.46	107.25	/	/
2386.63	66.52	PK	99	1.9	H	-6.46	60.06	74	13.94
2388.87	68.62	PK	248	2.5	H	-6.46	62.16	74	11.84
2483.79	56.66	PK	251	2.5	H	-4.74	51.92	74	22.08
4822.00	39.21	PK	323	2.5	H	3.79	43.00	74	31.00
7233.00	54.33	PK	340	1.2	H	9.79	64.12	74	9.88
9644.00	55.42	PK	138	1.1	H	11.85	67.27	74	6.73
Middle Channel (2441MHz)									
150.03	32.79	QP	179	1.4	H	-7.8	24.99	43.5	18.51
2441.00	114.11	PK	305	1.9	H	-6.46	107.65	/	/
2441.00	112.83	PK	317	2.0	V	-6.46	106.37	/	/
2329.23	62.01	PK	317	1.4	H	-6.65	55.36	74	18.64
2344.94	59.68	PK	70	2.0	H	-6.65	53.03	74	20.97
2484.35	58.78	PK	189	1.7	H	-4.74	54.04	74	19.96
4882.00	41.98	PK	34	1.7	H	3.56	45.54	74	28.46
7323.00	50.77	PK	124	2.0	H	10.11	60.88	74	13.12
9764.00	54.88	PK	155	1.8	H	13.21	68.09	74	5.91
High Channel (2475 MHz)									
150.03	33.39	QP	199	1.2	H	-7.8	25.59	43.5	17.91
2475.00	114.91	PK	28	1.4	H	-4.74	110.17	/	/
2475.00	112.71	PK	100	1.8	V	-4.74	107.97	/	/
2390.00	57.42	PK	185	1.9	H	4.97	62.39	74	11.61
2483.96	77.32	PK	274	1.9	H	-4.74	72.58	74	<b>1.42</b>
2483.51	74.13	PK	352	2.0	H	-4.74	69.39	74	4.61
4950.00	44.68	PK	39	1.5	H	3.19	47.87	74	26.13
7425.00	47.21	PK	263	2.0	H	8.17	55.38	74	18.62
9900.00	55.42	PK	208	2.0	H	13.21	68.63	74	5.37

**Note:**

Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor

Corrected Amplitude = Corrected Factor + Reading

Margin = Limit - Corrected. Amplitude

The other spurious emissions data which 20dB below the limit or on the system noise floor level was not recorded.

Field Strength of Radiated Emission Average						
Frequency (MHz)	Corrected Peak Amplitude (dB $\mu$ V/m)	Rx Antenna	Duty Cycle Factor (dB)	Corrected Average Amplitude (dB $\mu$ V/m)	FCC Part 15.247/205/209	
		Polar (H/V)			Limit (dB $\mu$ V/m)	Margin (dB)
Low Channel (2411MHz)						
2411.00	108.47	H	-30.28	78.19	/	/
2411.00	107.25	V	-30.28	76.97	/	/
2386.63	60.06	H	-30.28	29.78	54	24.22
2388.87	62.16	H	-30.28	31.88	54	22.12
2483.79	51.92	H	-30.28	21.64	54	32.36
4822.00	43.00	H	-30.28	12.72	54	41.28
7233.00	64.12	H	-30.28	33.84	54	20.16
9644.00	67.27	H	-30.28	36.99	54	17.01
Middle Channel (2441MHz)						
2441.00	107.65	H	-30.28	77.37	/	/
2441.00	106.37	V	-30.28	76.09	/	/
2329.23	55.36	H	-30.28	25.08	54	28.92
2344.94	53.03	H	-30.28	22.75	54	31.25
2484.35	54.04	H	-30.28	23.76	54	30.24
4882.00	45.54	H	-30.28	15.26	54	38.74
7323.00	60.88	H	-30.28	30.60	54	23.40
9764.00	68.09	H	-30.28	37.81	54	16.19
High Channel (2475 MHz)						
2475.00	110.17	H	-30.28	79.89	/	/
2475.00	107.97	V	-30.28	77.69	/	/
2390.00	62.39	H	-30.28	32.11	54	21.89
2483.96	72.58	H	-30.28	42.30	54	11.70
2483.51	69.39	H	-30.28	39.11	54	14.89
4950.00	47.87	H	-30.28	17.59	54	36.41
7425.00	55.38	H	-30.28	25.10	54	28.90
9900.00	68.63	H	-30.28	38.35	54	15.65

Note:

Corrected Average Amplitude = Corrected Peak Amplitude + Duty Cycle Factor

Margin = Limit - Corrected Average Amplitude

Duty Cycle = Ton/Tp\*100%, Ton = 307 $\mu$ s, Tp= 10.03ms, please refer to page 10&11 of report.

Duty Cycle Factor = 20lg (Duty Cycle) = -30.28

**For GOLD DR Model:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/205/209	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBµV/m)	Margin (dB)
Low Channel (2411MHz)									
150.03	33.22	QP	112	1.8	H	-7.8	25.42	43.5	18.08
2411.00	112.49	PK	96	1.4	H	-6.46	106.03	/	/
2411.00	111.91	PK	224	1.6	V	-6.46	105.45	/	/
2385.67	64.01	PK	125	2.2	H	-6.46	57.55	74	16.45
2388.87	65.15	PK	183	1.9	H	-6.46	58.69	74	15.31
2491.21	57.45	PK	145	1.2	H	-4.74	52.71	74	21.29
4822.00	41.82	PK	109	1.5	H	3.79	45.61	74	28.39
7233.00	46.75	PK	289	2.3	H	9.79	56.54	74	17.46
9644.00	50.97	PK	334	2.4	H	11.85	62.82	74	11.18
Middle Channel (2441MHz)									
150.03	32.86	QP	60	1.4	H	-7.8	25.06	43.5	18.44
2441.00	113.07	PK	210	2.4	H	-6.46	106.61	/	/
2441.00	112.09	PK	265	2.3	V	-6.46	105.63	/	/
2329.39	60.41	PK	138	1.5	H	-6.65	53.76	74	20.24
2344.62	58.51	PK	276	2.5	H	-6.65	51.86	74	22.14
2483.63	60.41	PK	62	1.5	H	-4.74	55.67	74	18.33
4882.00	44.89	PK	223	1.5	H	3.56	48.45	74	25.55
7323.00	44.41	PK	0	1.8	H	10.11	54.52	74	19.48
9764.00	51.65	PK	282	1.7	H	13.21	64.86	74	9.14
High Channel (2475 MHz)									
150.03	32.98	QP	62	1.3	H	-7.8	25.18	43.5	18.32
2475.00	114.53	PK	249	2.4	H	-4.74	109.79	/	/
2475.00	111.61	PK	189	1.2	V	-4.74	106.87	/	/
2390.00	58.13	PK	145	1.1	H	4.97	63.10	74	10.90
2483.96	75.91	PK	7	1.6	H	-4.74	71.17	74	2.83
2483.51	71.29	PK	223	2.0	H	-4.74	66.55	74	7.45
4950.00	47.26	PK	22	2.2	H	3.19	50.45	74	23.55
7425.00	45.03	PK	211	1.8	H	8.17	53.20	74	20.80
9900.00	56.45	PK	300	1.2	H	13.21	69.66	74	4.34

**Note:**

Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor

Corrected Amplitude = Corrected Factor + Reading

Margin = Limit - Corrected. Amplitude

The other spurious emissions data which 20dB below the limit or on the system noise floor level was not recorded.

Field Strength of Radiated Emission Average						
Frequency (MHz)	Corrected Peak Amplitude (dB $\mu$ V/m)	Rx Antenna	Duty Cycle Factor (dB)	Corrected Average Amplitude (dB $\mu$ V/m)	FCC Part 15.247/205/209	
		Polar (H/V)			Limit (dB $\mu$ V/m)	Margin (dB)
Low Channel (2411MHz)						
2411.00	106.03	H	-30.28	75.75	/	/
2411.00	105.45	V	-30.28	75.17	/	/
2385.67	57.55	H	-30.28	27.27	54	26.73
2388.87	58.69	H	-30.28	28.41	54	25.59
2491.21	52.71	H	-30.28	22.43	54	31.57
4822.00	45.61	H	-30.28	15.33	54	38.67
7233.00	56.54	H	-30.28	26.26	54	27.74
9644.00	62.82	H	-30.28	32.54	54	21.46
Middle Channel (2441MHz)						
2441.00	106.61	H	-30.28	76.33	/	/
2441.00	105.63	V	-30.28	75.35	/	/
2329.39	53.76	H	-30.28	23.48	54	30.52
2344.62	51.86	H	-30.28	21.58	54	32.42
2483.63	55.67	H	-30.28	25.39	54	28.61
4882.00	48.45	H	-30.28	18.17	54	35.83
7323.00	54.52	H	-30.28	24.24	54	29.76
9764.00	64.86	H	-30.28	34.58	54	19.42
High Channel (2475 MHz)						
2475.00	109.79	H	-30.28	79.51	/	/
2475.00	106.87	V	-30.28	76.59	/	/
2390.00	63.10	H	-30.28	32.82	54	21.18
2483.96	71.17	H	-30.28	40.89	54	13.11
2483.51	66.55	H	-30.28	36.27	54	17.73
4950.00	50.45	H	-30.28	20.17	54	33.83
7425.00	53.20	H	-30.28	22.92	54	31.08
9900.00	69.66	H	-30.28	39.38	54	14.62

## Note:

Corrected Average Amplitude = Corrected Peak Amplitude + Duty Cycle Factor

Margin = Limit - Corrected Average Amplitude

Duty Cycle = Ton/Tp\*100%, Ton = 307 $\mu$ s, Tp= 10.03ms, please refer to page 10&11 of report.

Duty Cycle Factor = 20lg (Duty Cycle) = -30.28

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

### 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 2400-2483.5 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 Procedure

1. Set the EUT in operating mode, RBW was set at 100 kHz, VBW  $\geq$  3RBW maxhold the channel.
2. Set the adjacent channel of the EUT maxhold another trace
3. Measure the channel separation.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2015-12-11	2016-12-11
Ducommun technologies	RF Cable	RG-214	3	2015-06-15	2016-06-15
WEINSCHL	10dB Attenuator	5324	AU0709	2015-06-18	2016-06-18

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

### Test Data

#### Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.5 kPa

*The testing was performed by Xiangguang Kong on 2015-04-29.*

**Test Result:** Compliance.

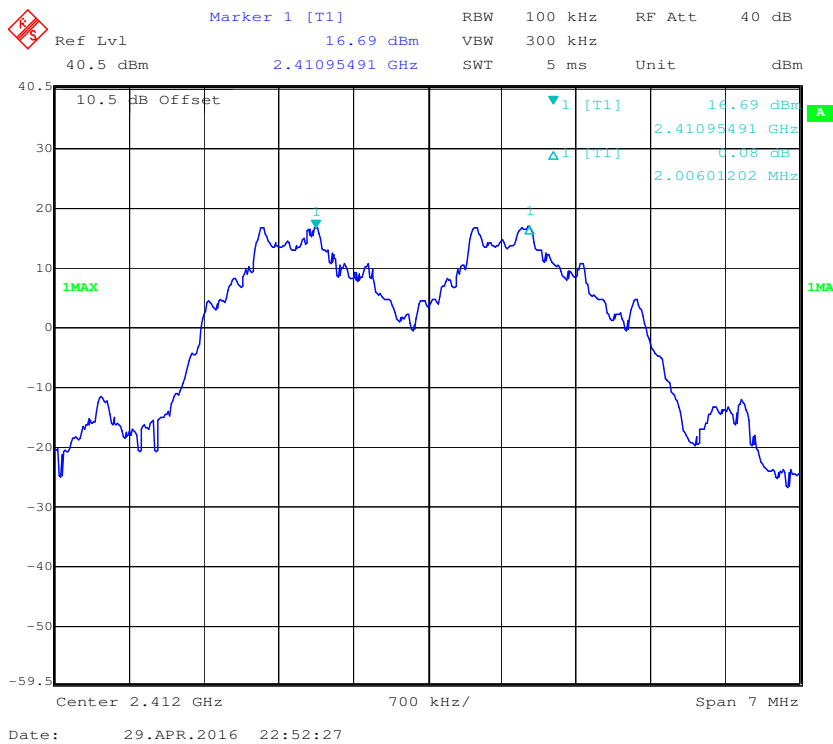
Please refer to following table and plots.

Test Mode: Transmitting

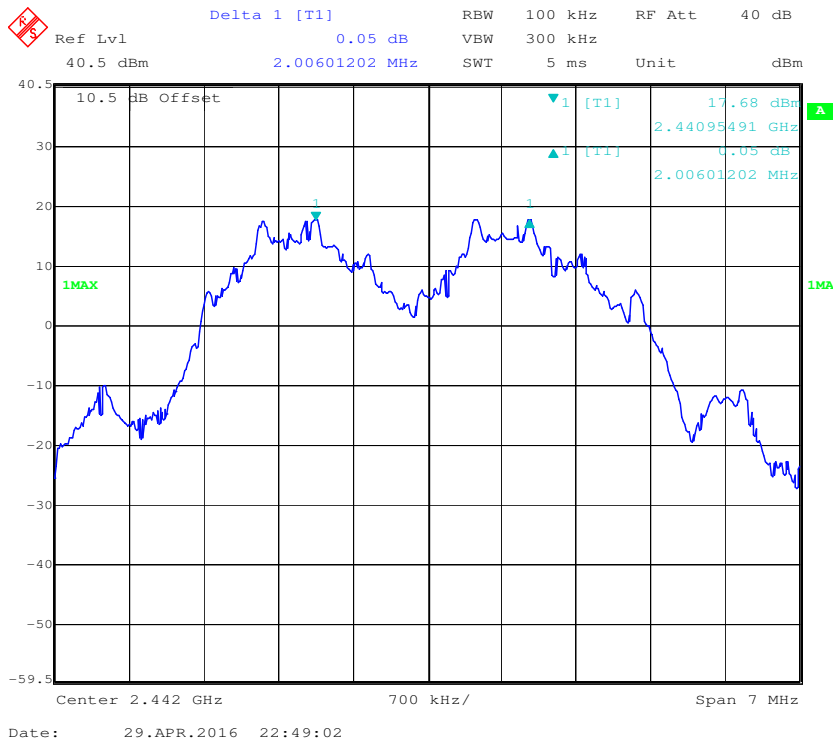
Channel	Channel Frequency (MHz)	Channel Separation (MHz)	≥ Limit (MHz)
Low	2411	2.006	1.403
Adjacent	2413		
Middle	2441	2.006	1.396
Adjacent	2443		
High	2475	2.006	1.403
Adjacent	2473		

Note: limit =2/3 of 20 dB bandwidth

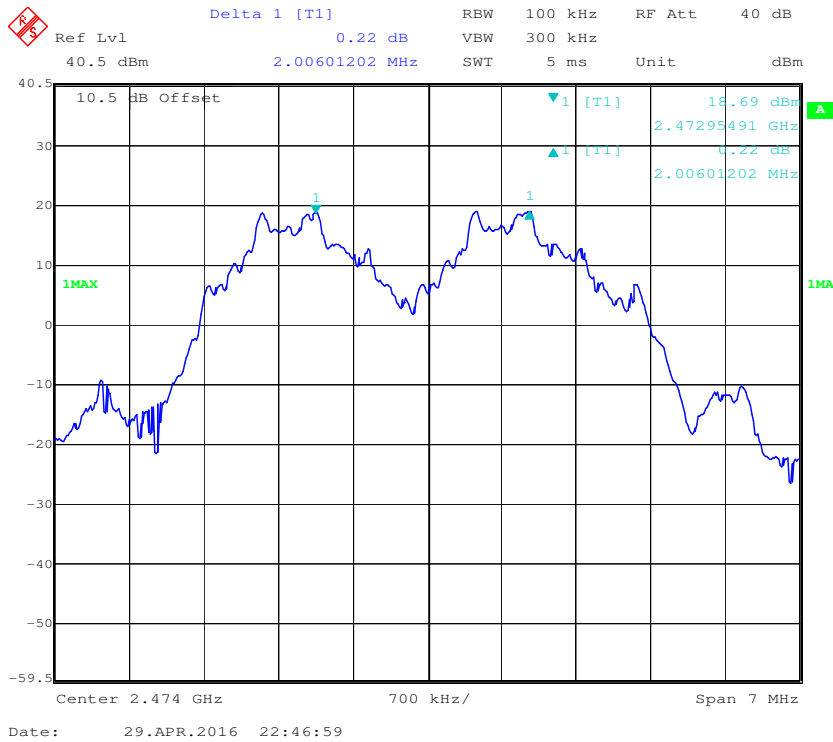
Low Channel



### Middle Channel



### High Channel



## FCC §15.247(a) (1) – 20 dB EMISSION BANDWIDTH

### 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 125mW.

### Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
3. Repeat above procedures until all frequencies measured were complete.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2015-12-11	2016-12-11
Ducommun technologies	RF Cable	RG-214	3	2015-06-15	2016-06-15
WEINSCHEL	10dB Attenuator	5324	AU0709	2015-06-18	2016-06-18

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

### Test Data

#### Environmental Conditions

<b>Temperature:</b>	22 °C
<b>Relative Humidity:</b>	51 %
<b>ATM Pressure:</b>	101.5 kPa

*The testing was performed by Xiangguang Kong on 2016-04-20.*

**Test Result:** Compliance.

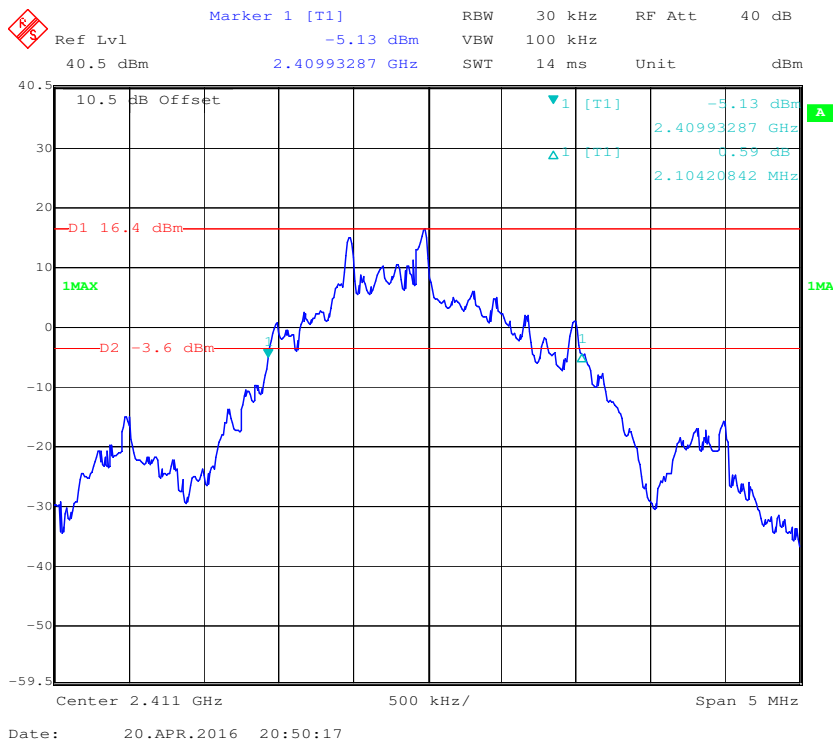
Please refer to following table and plots



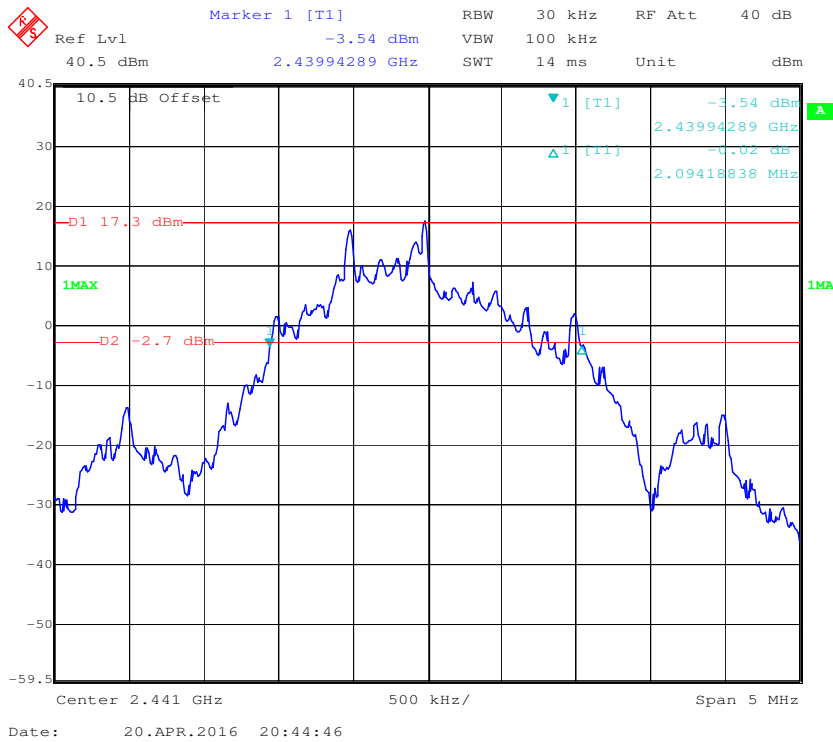
Test Mode: Transmitting

Channel	Frequency (MHz)	20 dB Emission Bandwidth (MHz)
Low	2411	2.104
Middle	2441	2.094
High	2475	2.104

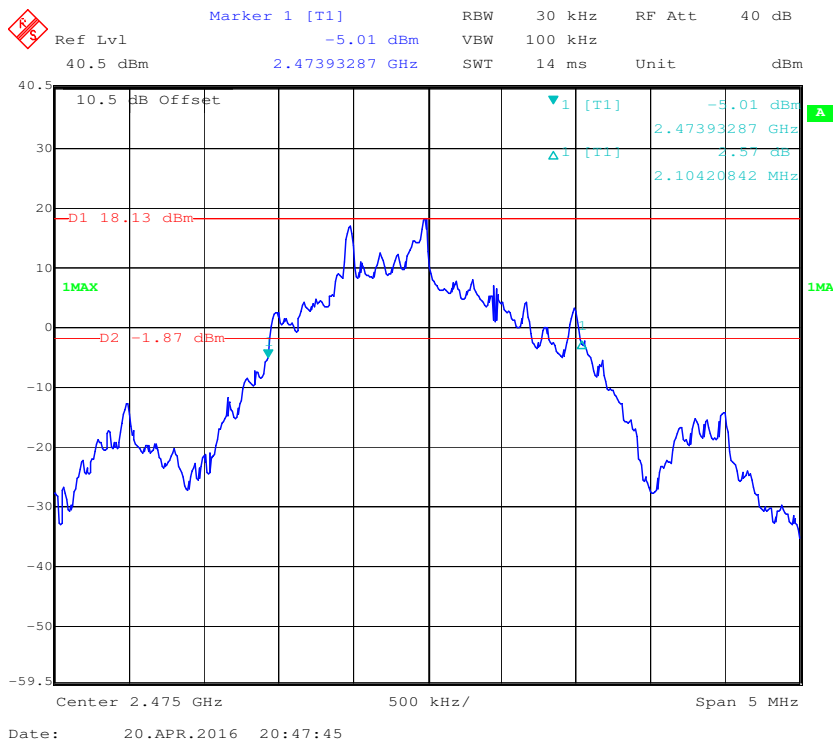
Low Channel



### Middle Channel



### High Channel



## **FCC §15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL**

### **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**

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2015-12-11	2016-12-11
Ducommun technologies	RF Cable	RG-214	3	2015-06-15	2016-06-15
WEINSCHEL	10dB Attenuator	5324	AU0709	2015-06-18	2016-06-18

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

### **Test Data**

#### **Environmental Conditions**

<b>Temperature:</b>	23 °C
<b>Relative Humidity:</b>	50 %
<b>ATM Pressure:</b>	101.5 kPa

*The testing was performed by Xiangguang Kong on 2016-04-22.*

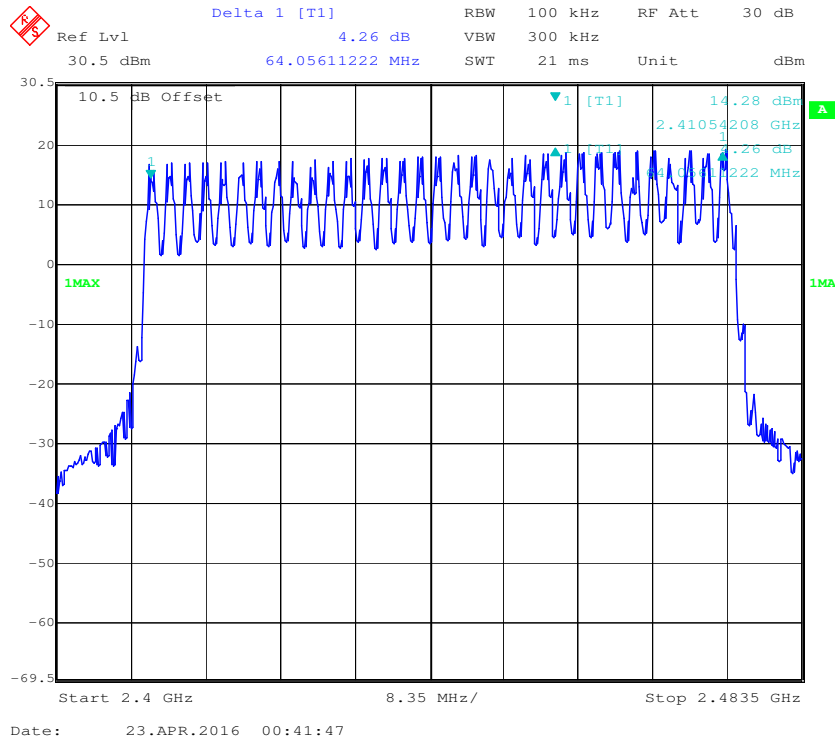
**Test Result:** Compliance.

Please refer to following table and plots

Test Mode: Transmitting

Frequency Range (MHz)	Number of Hopping Channel	Limit
2400 ~ 2483.50	33	≥ 15

### Number of Hopping Channels



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

Dwell Time= Pulse time (ms) \* hope rate/ number of hopping channels \* hopping No.\*0.4 s

### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2015-12-11	2016-12-11
Ducommun technologies	RF Cable	RG-214	3	2015-06-15	2016-06-15
WEINSCHL	10dB Attenuator	5324	AU0709	2015-06-18	2016-06-18

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

### **Test Data**

#### **Environmental Conditions**

<b>Temperature:</b>	24 °C
<b>Relative Humidity:</b>	50 %
<b>ATM Pressure:</b>	101.5 kPa

*The testing was performed by Xiangguang Kong on 2016-04-29.*

**Test Result:** Compliance.

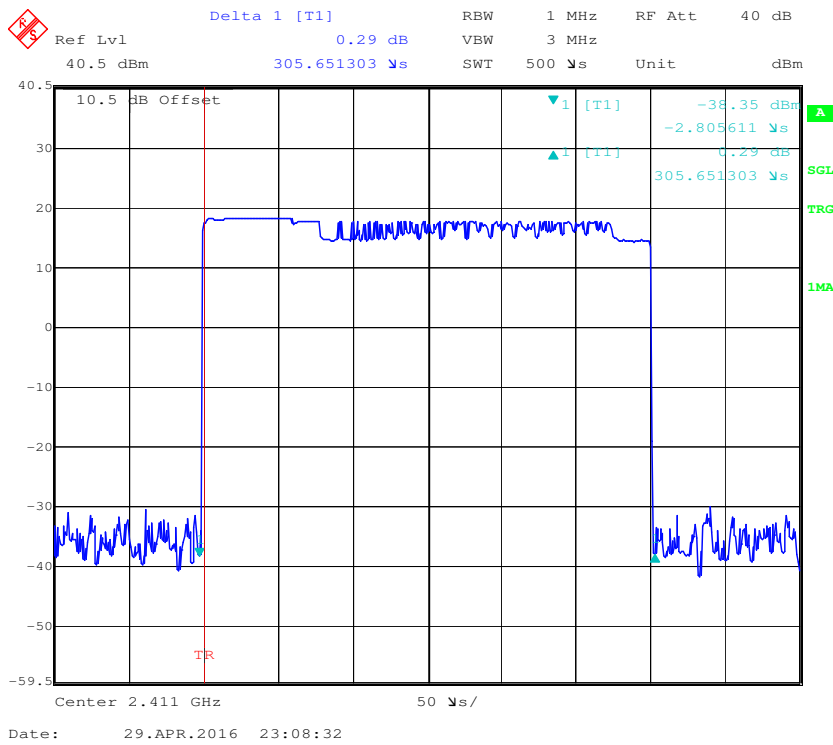
Please refer to following table and plots.

Test Mode: Transmitting

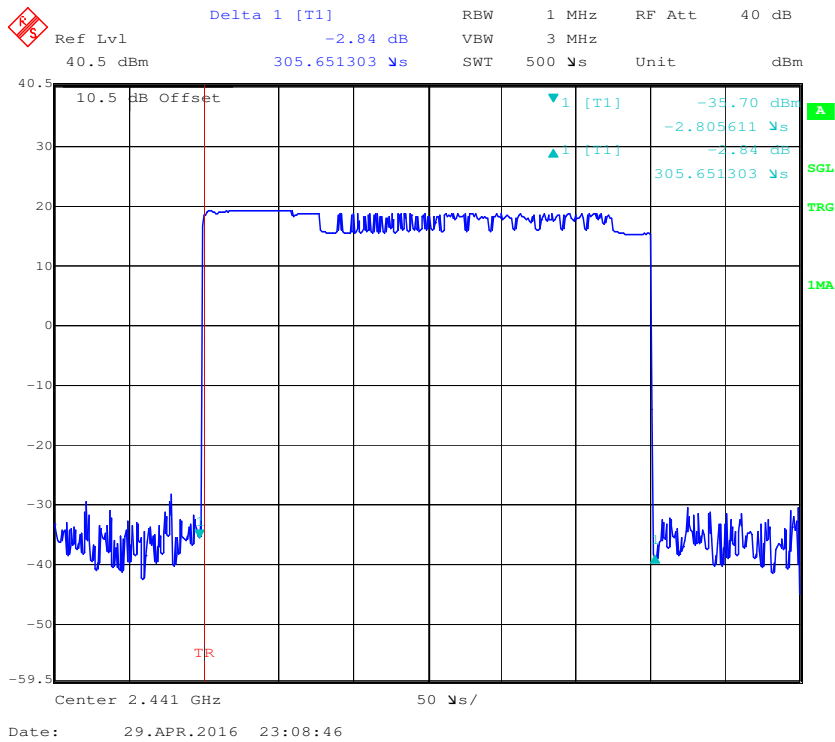
Channel	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Result
Low	0.306	0.012	0.4	Pass
Middle	0.306	0.012	0.4	Pass
High	0.306	0.012	0.4	Pass

Note: Dwell time = Pulse time\*(100/33)\*33\*0.4s  
Hopping rate =100 times per second

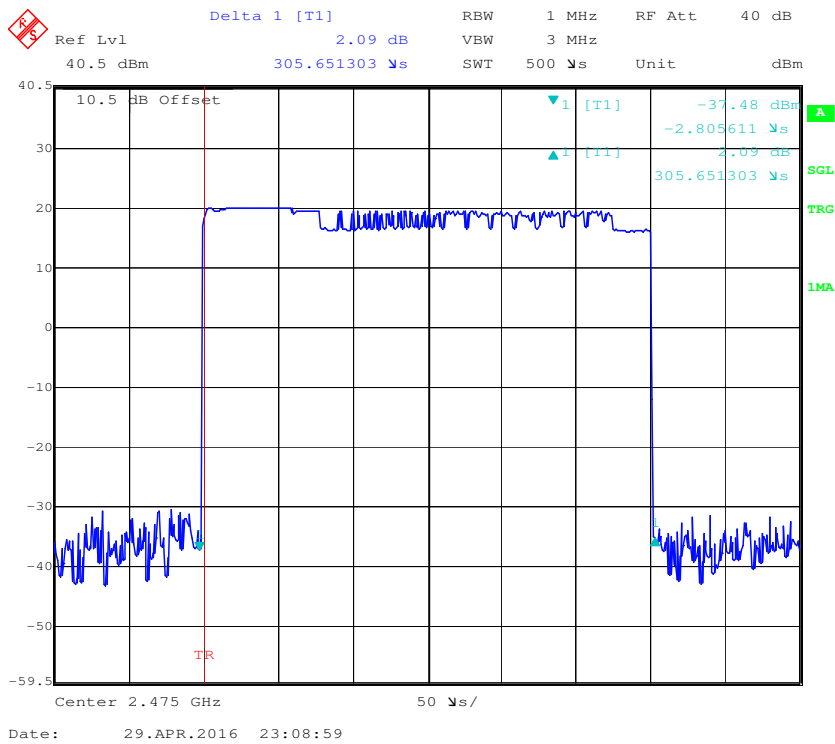
Low Channel



### Middle Channel



### High Channel



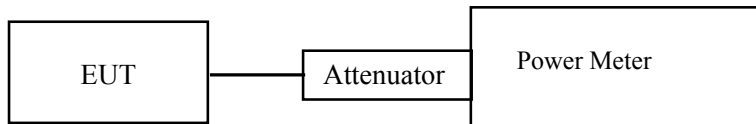
**FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT**

**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 it 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
HP	Power Meter	N1912A	MY5000448	2015-12-18	2016-12-17
HP	Power Sensor	N1921A	MY54210016	2015-12-18	2016-12-17
Ducommun technologies	RF Cable	RG-214	3	2015-06-15	2016-06-15
WEINSCHEL	10dB Attenuator	5324	AU0709	2015-06-18	2016-06-18

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



**Test Data****Environmental Conditions**

<b>Temperature:</b>	23 °C
<b>Relative Humidity:</b>	50 %
<b>ATM Pressure:</b>	101.5 kPa

*The testing was performed by Xiangguang Kong on 2016-04-20.*

**Test Result:** Compliance.

*Test Mode: Transmitting*

<b>Mode</b>	<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Reading power (dBm)</b>	<b>Power output (mw)</b>	<b>Limit (mw)</b>
GFSK	Low	2411	17.67	58.48	125
	Middle	2441	18.55	71.61	125
	High	2475	19.53	89.74	125

Note: The data above was tested in conducted mode.

## FCC §15.247(d) - BAND EDGES

### 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. 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.
3. Repeat above procedures until all measured frequencies were complete.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2015-12-11	2016-12-11
Ducommun technologies	RF Cable	RG-214	3	2015-06-15	2016-06-15
WEINSCHL	10dB Attenuator	5324	AU0709	2015-06-18	2016-06-18

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

**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	23 °C
<b>Relative Humidity:</b>	51 %
<b>ATM Pressure:</b>	101.5 kPa

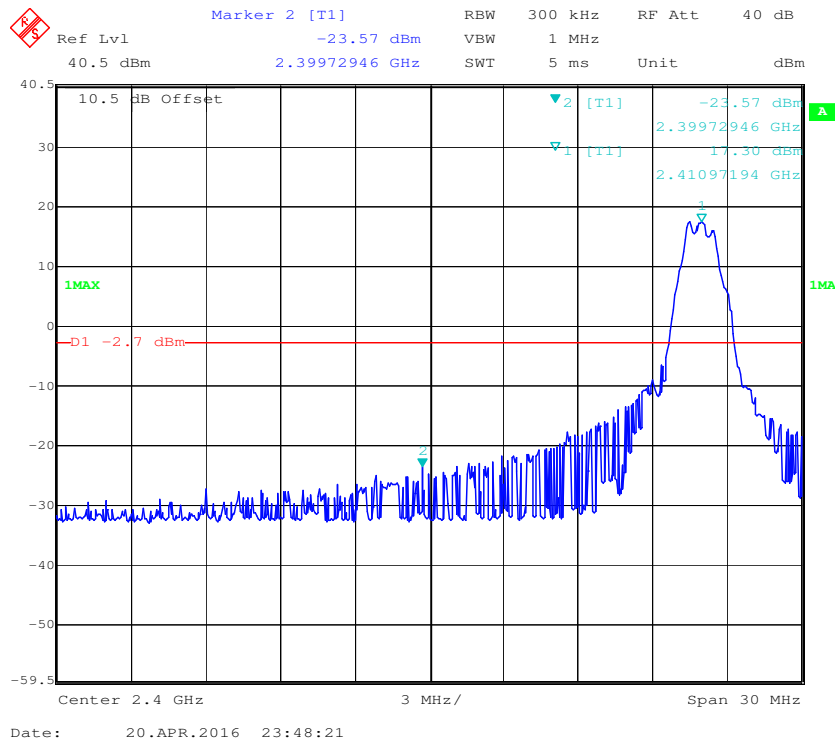
The testing was performed by Xiangguang Kong on 2016-04-20.

**Test Result:** Compliance.

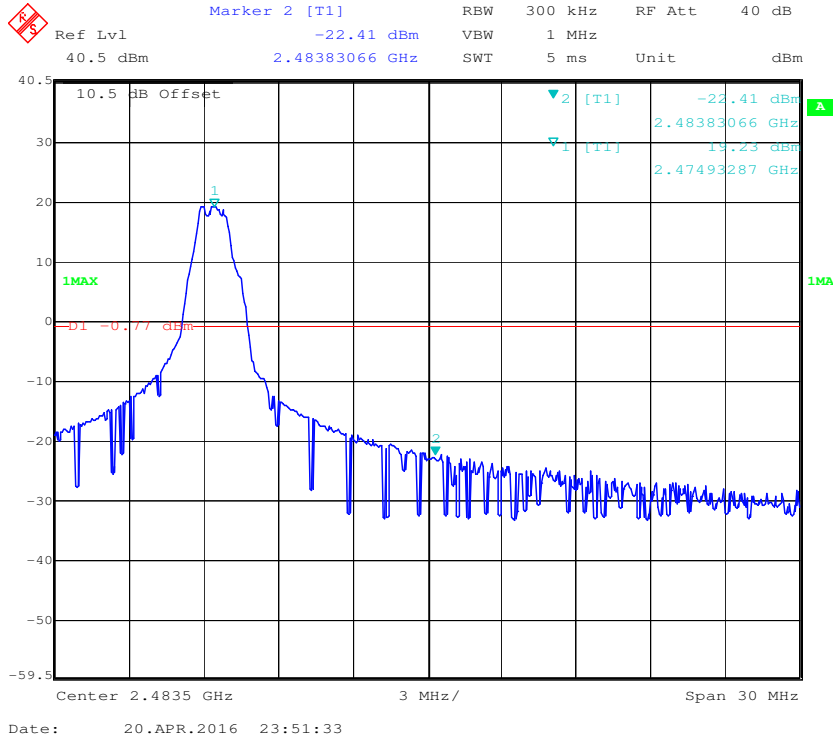
Test Mode: Transmitting

Please refer to follow plots:

**Band Edge: Left Side**



### Band Edge: Right Side



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