



FCC PART 15.247

TEST REPORT

For

Skyrocket Toys LLC

12910 Culver Blvd, Suite F, Los Angeles, CA 90066, U.S.A

FCC ID: O5301602TX24G

Report Type: Original Report	Product Type: Sky Viper Pro Series Video Drone (Remote Control)
Test Engineer: <u>Robin Zheng</u> <i>Robin Zheng</i>	
Report Number: <u>RDG160721002-00A</u>	
Report Date: <u>2016-08-19</u>	
Reviewed By: Ivan Cao EMC Vice Manager	<i>Ivan Cao</i>
Test Laboratory: Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn	

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

TABLE OF CONTENTS

GENERAL INFORMATION	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	4
OBJECTIVE	4
RELATED SUBMITTAL(S)/GRANT(S).....	4
TEST METHODOLOGY	4
TEST FACILITY	4
SYSTEM TEST CONFIGURATION	5
DESCRIPTION OF TEST CONFIGURATION	5
EQUIPMENT MODIFICATIONS	5
EUT EXERCISE SOFTWARE	5
BLOCK DIAGRAM OF TEST SETUP	6
SUMMARY OF TEST RESULTS	7
FCC §15.247 (i) & §1.1310 & §2.1093- RF EXPOSURE	8
APPLICABLE STANDARD	8
FCC §15.203 - ANTENNA REQUIREMENT	9
APPLICABLE STANDARD	9
ANTENNA CONNECTOR CONSTRUCTION	9
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS	10
APPLICABLE STANDARD	10
MEASUREMENT UNCERTAINTY	10
EUT SETUP	10
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	11
TEST PROCEDURE	11
TEST EQUIPMENT LIST AND DETAILS.....	12
CORRECTED AMPLITUDE & MARGIN CALCULATION	12
TEST DATA	12
FCC §15.247(a) (1) - CHANNEL SEPARATION TEST	16
APPLICABLE STANDARD	16
TEST EQUIPMENT LIST AND DETAILS.....	16
TEST PROCEDURE	16
TEST DATA	16
FCC §15.247(a) (1) – 20 dB BANDWIDTH TESTING	18
APPLICABLE STANDARD	18
TEST PROCEDURE	18
TEST EQUIPMENT LIST AND DETAILS.....	18
TEST DATA	18
FCC §15.247(a) (1) (iii) - QUANTITY OF HOPPING CHANNEL TEST	21
APPLICABLE STANDARD	21
TEST PROCEDURE	21
TEST EQUIPMENT LIST AND DETAILS.....	21
TEST DATA	21

FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME).....	23
APPLICABLE STANDARD	23
TEST PROCEDURE	23
TEST EQUIPMENT LIST AND DETAILS.....	23
TEST DATA	23
FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT.....	25
APPLICABLE STANDARD	25
TEST PROCEDURE	25
TEST EQUIPMENT LIST AND DETAILS.....	25
TEST DATA	25
FCC §15.247(d) - BAND EDGES TESTING	28
APPLICABLE STANDARD	28
TEST PROCEDURE	28
TEST EQUIPMENT LIST AND DETAILS.....	28
TEST DATA	28

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Skyrocket Toys LLC*'s product, model number: *01602 (FCC ID: O5301602TX24G)* (the "EUT") in this report was a parent unit of *Sky Viper Pro Series Video Drone (Remote Control)*, which was measured approximately: 17cm (L) x 16.5 cm (W) x 11.5 cm (H), rated input voltage: DC6V from (4×1.5V AA batteries) .

Note: The series product, model 01602, 01650, 01721 are electrically identical, the difference between them just is the model name for different marketing, we selected 01602 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: 160721002 (Assigned by BACL Dongguan). The EUT was received on 2016-07-22.

Objective

This report is prepared on behalf of *Skyrocket Toys LLC* 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, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

Submitted with the Part of a system with FCC ID: O5301602RX24G.

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.

15 channels are employed by the device:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2410	8	2446
1	2413	9	2452
2	2416	10	2456
3	2421	11	2461
4	2426	12	2466
5	2431	13	2469
6	2436	14	2472
7	2441	/	/

EUT was tested with channel 0, 9 and 14.

Equipment Modifications

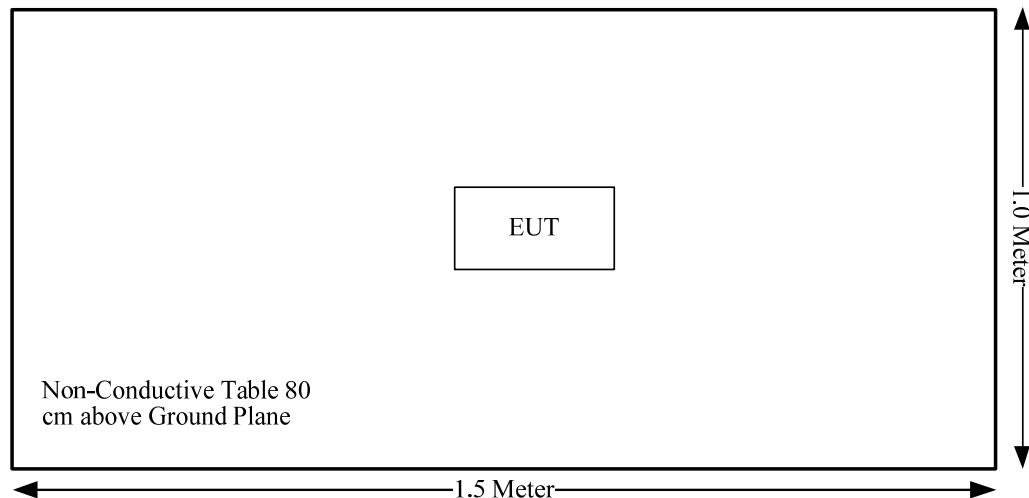
No modification was made to the EUT.

EUT Exercise Software

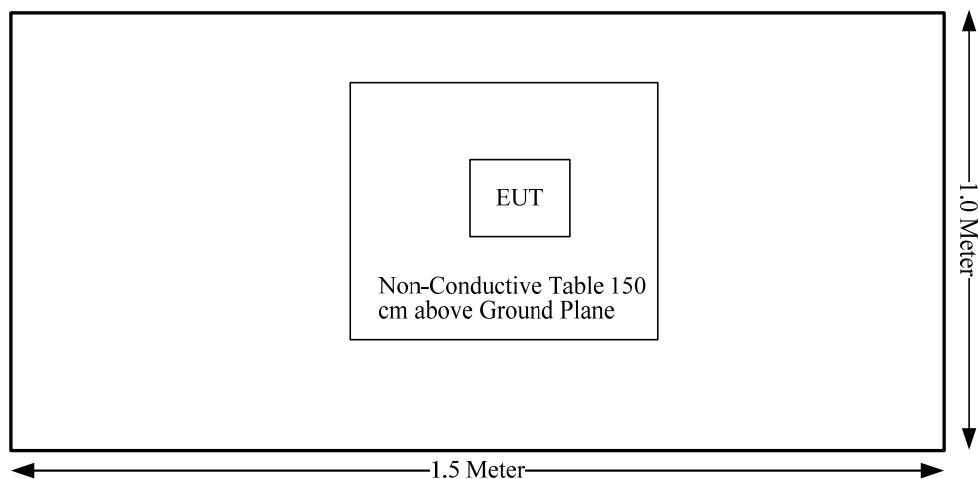
No software was used in test.

Block Diagram of Test Setup

Below 1GHz:



Above 1GHz:



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	Not Applicable
§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

Not Applicable: the device is powered by battery.

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:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR, where}$

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 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 1.0 dBm(1.26mW).

$[(\text{max. power of channel, mW}) / (\text{min. test separation distance, mm})] [\sqrt{f(\text{GHz})}] = 1.26/5 * (\sqrt{2.472}) = 0.4 < 3.0$

So the 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, which 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

Compliance or non- compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cisp} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cisp} of Table 1, then:

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

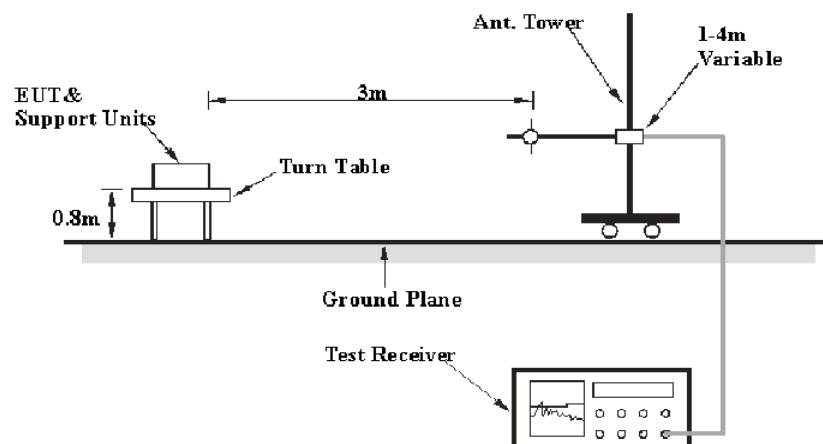
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is: 30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical; 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical; 1G~6GHz: 4.45 dB, 6G~18GHz: 5.23 dB.

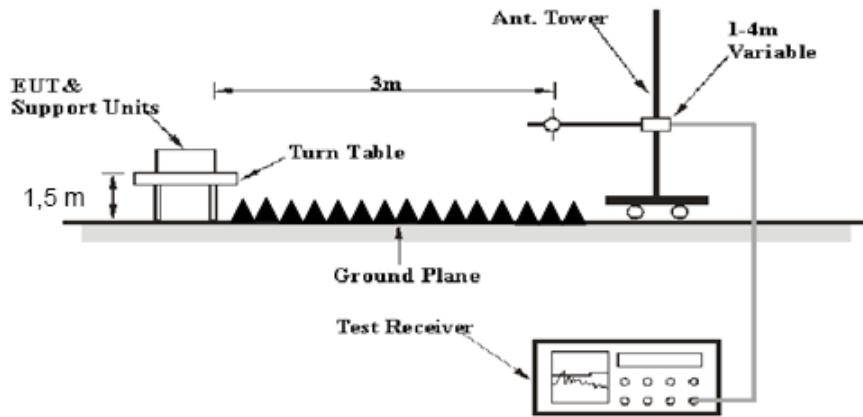
Table 1 – Values of U_{cisp}

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

EUT Setup

Below 1GHz:



Above 1GHz:

The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

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

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz - 1 GHz, peak and average detection modes for frequencies above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	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 Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2015-09-06	2016-09-06
N/A	Coaxial Cable	14m	N/A	2016-05-06	2017-05-06
N/A	Coaxial Cable	8m	N/A	2016-05-06	2017-05-06

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

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

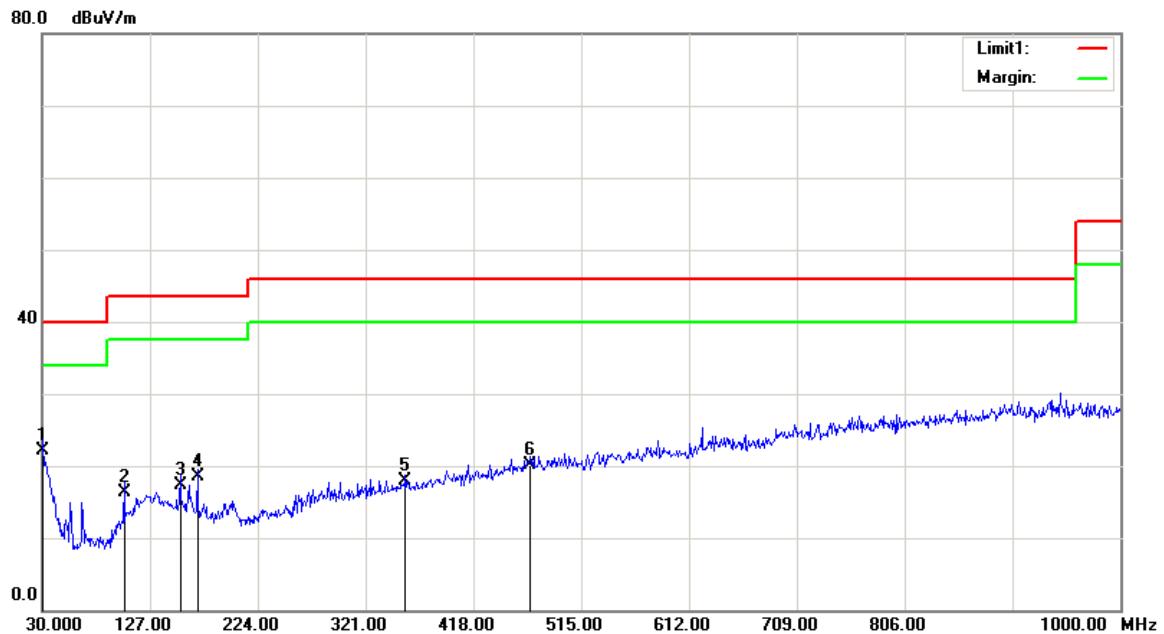
Test Data

Environmental Conditions

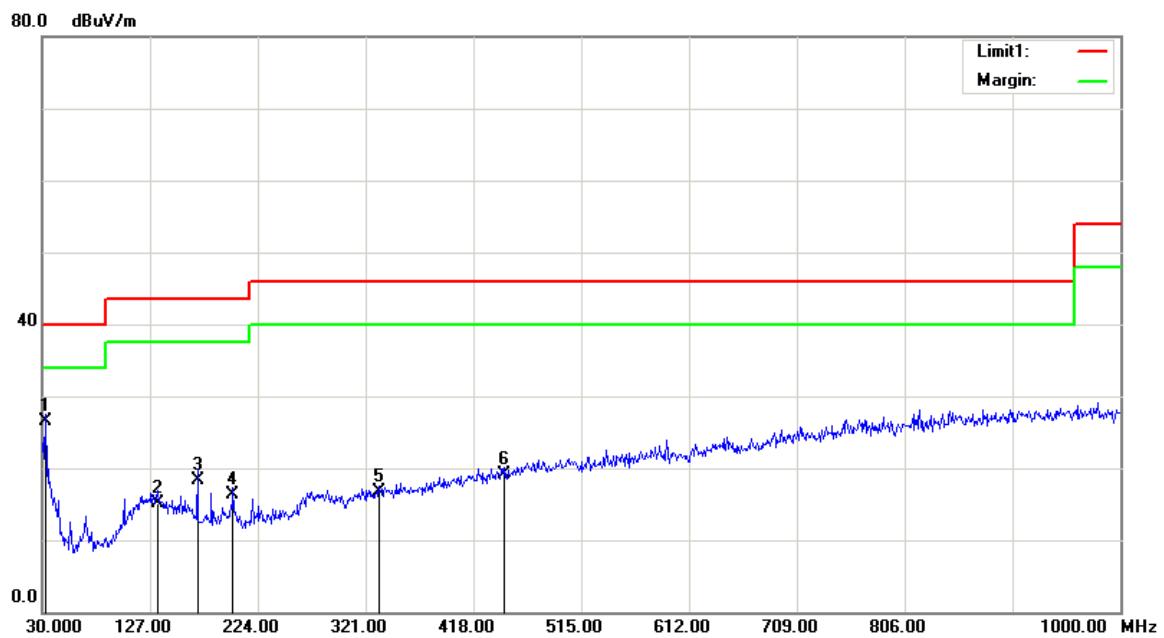
Temperature:	26.3°C
Relative Humidity:	65 %
ATM Pressure:	99.2 kPa

* The testing was performed by Robin Zheng on 2016-08-15.

Test Mode: Transmitting

1) Below 1GHz:**Horizontal**

Frequency (MHz)	Receiver Reading (dB μ V)	Detector	Correction Factor (dB/m)	Cord. Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
30.0000	21.15	QP	0.95	22.10	40.00	17.90
103.7200	25.00	QP	-8.60	16.40	43.50	27.10
154.1600	24.43	QP	-7.13	17.30	43.50	26.20
169.6800	26.39	QP	-7.89	18.50	43.50	25.00
356.8900	22.46	QP	-4.56	17.90	46.00	28.10
469.4100	21.85	QP	-1.75	20.10	46.00	25.90

Vertical

Frequency (MHz)	Receiver Reading (dB μ V)	Detector	Correction Factor (dB/m)	Cord. Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
32.9100	27.84	QP	-1.24	26.60	40.00	13.40
133.7900	21.15	QP	-5.95	15.20	43.50	28.30
169.6800	26.19	QP	-7.89	18.30	43.50	25.20
201.6900	23.70	QP	-7.30	16.40	43.50	27.10
332.6400	21.89	QP	-5.19	16.70	46.00	29.30
446.1300	21.83	QP	-2.63	19.20	46.00	26.80

2) 1-25GHz:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
	Reading (dB μ V)	Detector	Polar (H/V)	Factor (dB)					
Low Channel: 2410MHz									
2410	62.41	PK	H	25.67	3.68	0.00	91.76	N/A	N/A
2410	60.81	AV	H	25.67	3.68	0.00	90.16	N/A	N/A
2410	52.63	PK	V	25.67	3.68	0.00	81.98	N/A	N/A
2410	51.06	AV	V	25.67	3.68	0.00	80.41	N/A	N/A
2400	26.1	PK	H	25.64	3.65	0.00	55.39	74.00	18.61
2400	13.47	AV	H	25.64	3.65	0.00	42.76	54.00	11.24
4820	52.49	PK	H	30.63	5.03	27.41	60.74	74.00	13.26
4820	40.13	AV	H	30.63	5.03	27.41	48.38	54.00	5.62
7230	31.16	PK	H	34.15	6.64	25.90	46.05	74.00	27.95
7230	29.03	AV	H	34.15	6.64	25.90	43.92	54.00	10.08
3610	34.66	PK	H	29.04	4.61	27.28	41.03	74.00	32.97
3610	22.85	AV	H	29.04	4.61	27.28	29.22	54.00	24.78
Middle Channel: 2452 MHz									
2452	58.88	PK	H	25.78	3.78	0.00	88.44	N/A	N/A
2452	57.25	AV	H	25.78	3.78	0.00	86.81	N/A	N/A
2452	48.36	PK	V	25.78	3.78	0.00	77.92	N/A	N/A
2452	46.73	AV	V	25.78	3.78	0.00	76.29	N/A	N/A
4904	46.92	PK	H	30.85	5.31	27.43	55.65	74.00	18.35
4904	43.56	AV	H	30.85	5.31	27.43	52.29	54.00	1.71
7356	31.19	PK	H	34.45	6.79	25.87	46.56	74.00	27.44
7356	29.23	AV	H	34.45	6.79	25.87	44.60	54.00	9.40
3131	33.84	PK	H	27.62	6.93	27.43	40.96	74.00	33.04
3131	21.85	AV	H	27.62	6.93	27.43	28.97	54.00	25.03
3651	35.11	PK	H	29.13	4.53	27.30	41.47	74.00	32.53
3651	23.02	AV	H	29.13	4.53	27.30	29.38	54.00	24.62
High Channel: 2472MHz									
2472	59.64	PK	H	25.83	3.71	0.00	89.18	N/A	N/A
2472	57.88	AV	H	25.83	3.71	0.00	87.42	N/A	N/A
2472	48.12	PK	V	25.83	3.71	0.00	77.66	N/A	N/A
2472	46.53	AV	V	25.83	3.71	0.00	76.07	N/A	N/A
2483.5	25.46	PK	H	25.86	3.67	0.00	54.99	74.00	19.01
2483.5	14.15	AV	H	25.86	3.67	0.00	43.68	54.00	10.32
4944	47.06	PK	H	30.95	5.36	27.43	55.94	74.00	18.06
4944	43.74	AV	H	30.95	5.36	27.43	52.62	54.00	1.38
7416	31.36	PK	H	34.60	6.86	25.90	46.92	74.00	27.08
7416	29.35	AV	H	34.60	6.86	25.90	44.91	54.00	9.09
3715	34.02	PK	H	29.27	4.61	27.33	40.57	74.00	33.43
3715	21.98	AV	H	29.27	4.61	27.33	28.53	54.00	25.47

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

Applicable Standard

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
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, RBW 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:	27.2°C
Relative Humidity:	51 %
ATM Pressure:	99.2 kPa

* The testing was performed by Robin Zheng on 2016-08-17.

Test Result: Compliance.

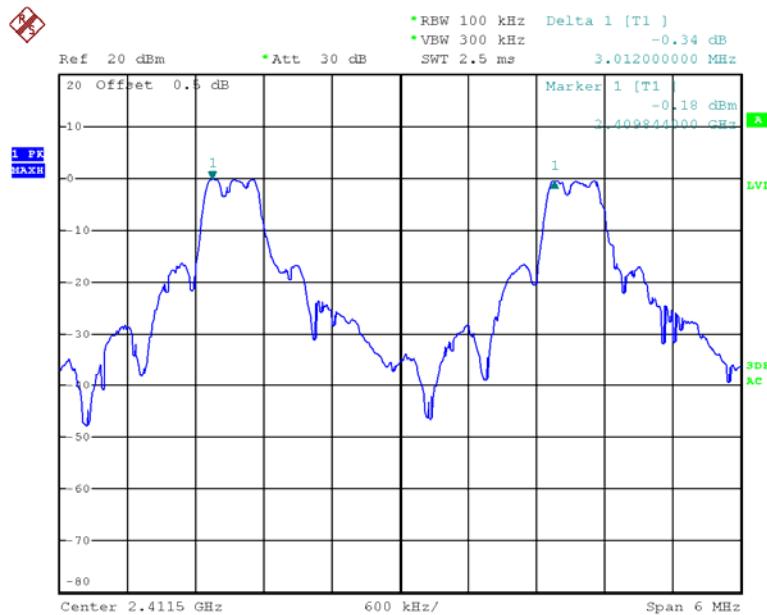
Please refer to following tables and plots

Test Mode: Transmitting

Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
		(MHz)	
2410	3.012	0.384	
2413			Compliant

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

Low Channel



Date: 17.AUG.2016 21:57:23

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 Robin Zheng on 2016-08-17.

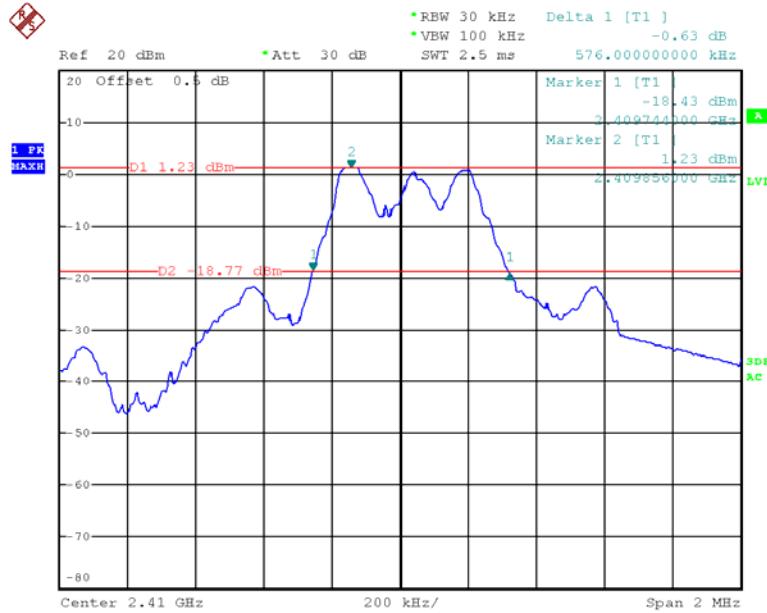
Test Result: Compliance.

Please refer to following tables and plots

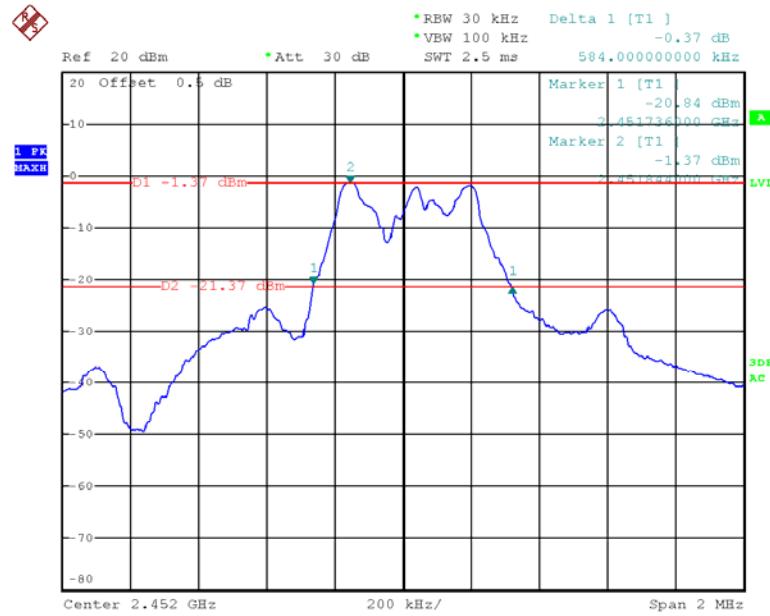
Test Mode: Transmitting

Frequency (MHz)	20 dB Bandwidth (MHz)
2410	0.576
2452	0.584
2472	0.576

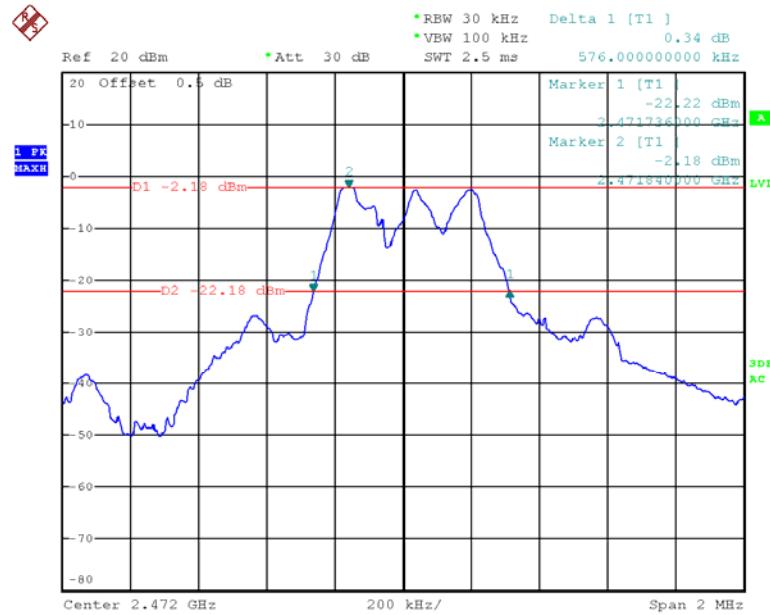
Low Channel



Date: 17.AUG.2016 19:49:22

Middle Channel

Date: 17.AUG.2016 19:52:58

High Channel

Date: 17.AUG.2016 19:54:08

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 Robin Zheng on 2016-08-17.

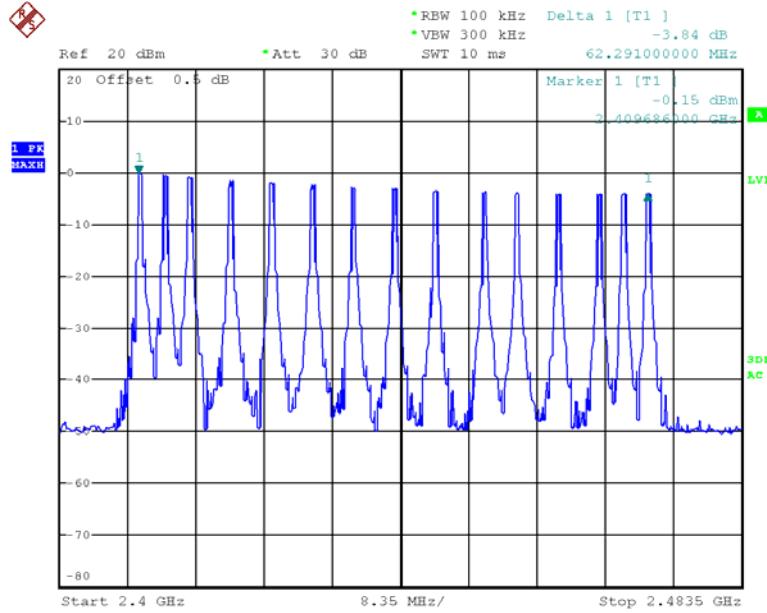
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

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

Number of Hopping Channels



Date: 17.AUG.2016 21:55:11

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

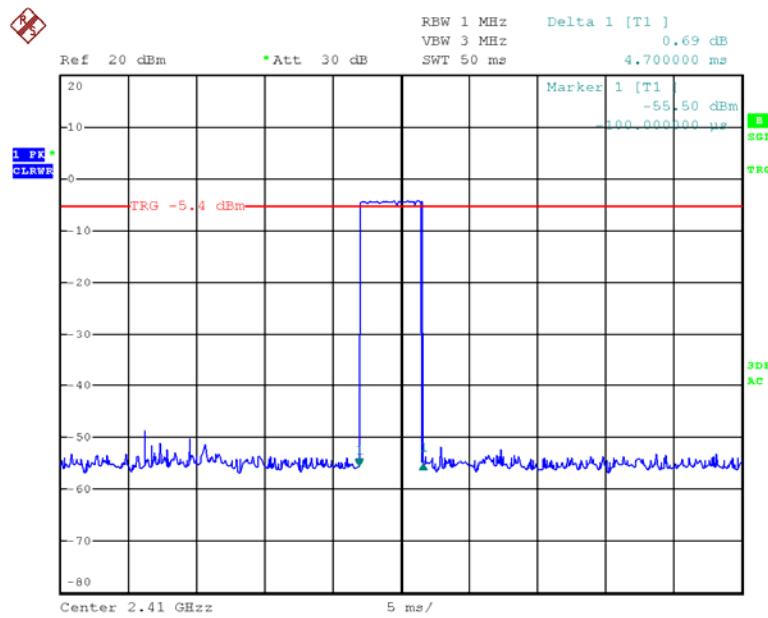
* The testing was performed by Robin Zheng on 2016-08-17.

Test Result: Compliance. Please refer to following tables and plots

Test Mode: Transmitting

Channel	Pulse Width (ms)	Hopping Rate (pulse/s)	Dwell Time (s)	Limit (s)	Result
Low	4.7	200	0.376	0.4	Pass

Dwell Time= time slot length * hope Rate*Hopping channels/ number of hopping channels* 0.4s
Hopping rate is 200Hz(200 hoppings per second), which was declared by manufacturer.

Pulse Width

Date: 17.AUG.2016 21:51:51

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 Robin Zheng on 2016-08-17.

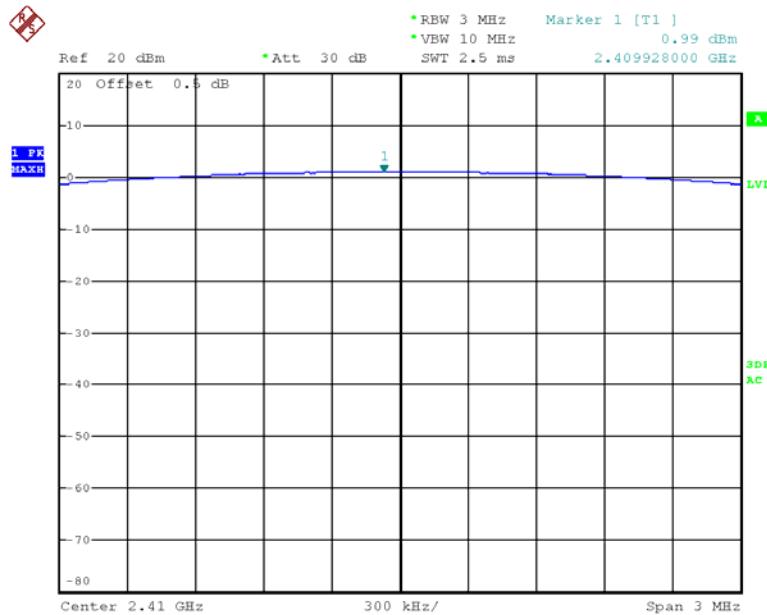
Test Result: Compliance.

Test Mode: Transmitting

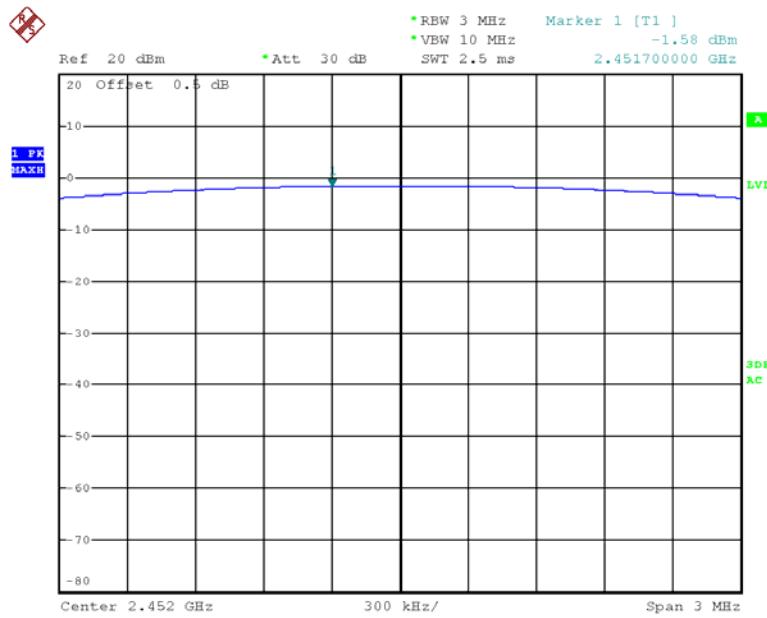
Channel	Frequency (MHz)	Output power (dBm)	Limit (dBm)
Low	2410	0.99	21
Middle	2452	-1.58	21
High	2472	-2.34	21

Note: The data above was tested in conducted mode.

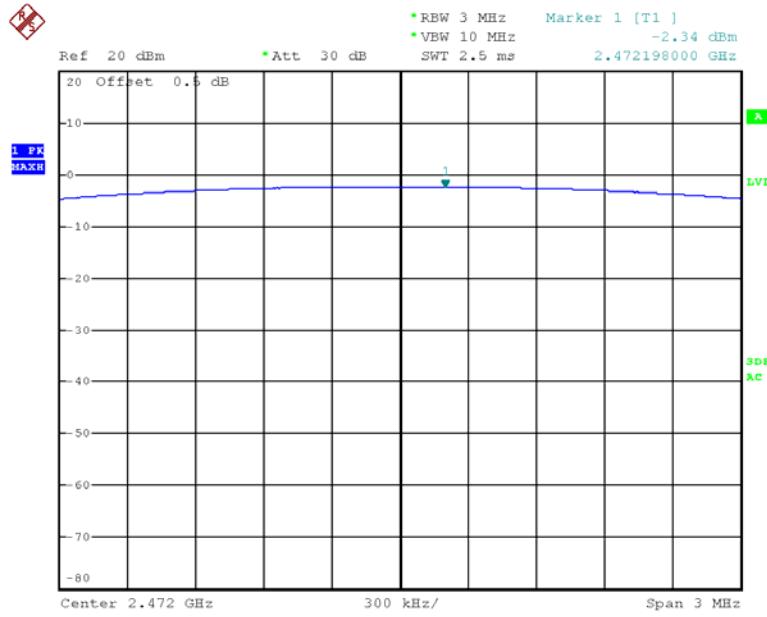
Output Power, Low Channel



Date: 17.AUG.2016 19:59:38

Output Power, Middle Channel

Date: 17.AUG.2016 20:00:01

Output Power, High Channel

Date: 17.AUG.2016 20:00:19

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

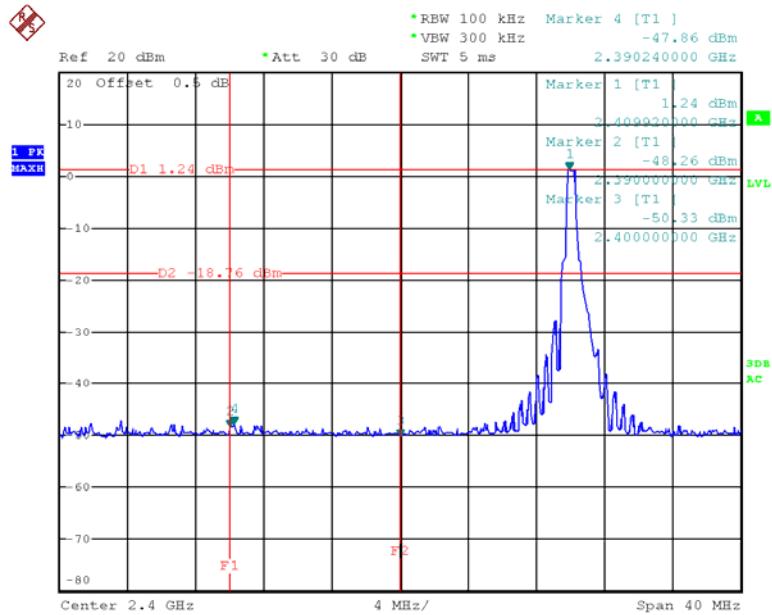
* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

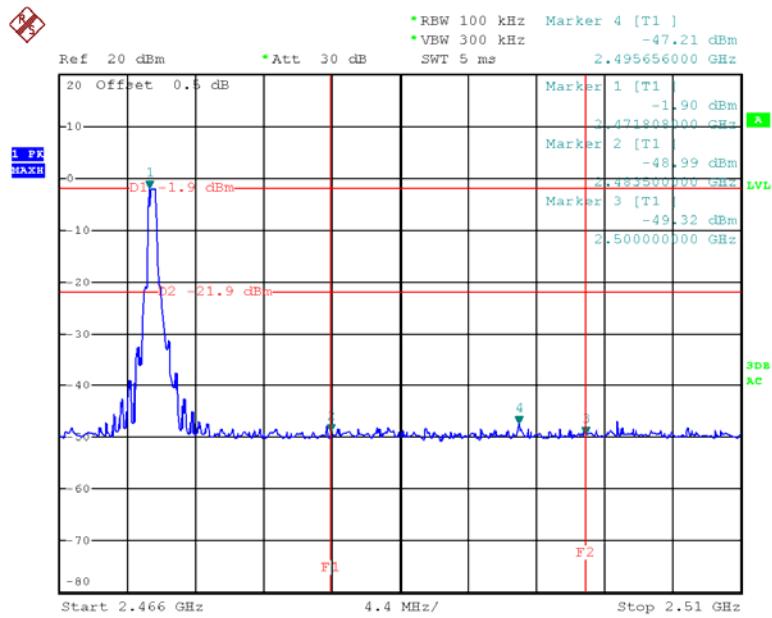
Environmental Conditions

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

* The testing was performed by Robin Zheng on 2016-08-17.

*Test Result: Compliance***Band Edge, Left Side**

Date: 17.AUG.2016 20:58:54

Band Edge, Right Side

Date: 17.AUG.2016 20:54:56

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