FCC PART 15.247

TEST REPORT

For

Skyrocket Toys LLC

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

FCC ID: O5301603RX24G

Report Type:	**Product Type:**
Original Report	Sky Viper Pro Series Video Drone (Drone)

Test Engineer:	Robin Zheng
Report Number:	RDG160721001-00B
Report Date:	2016-08-19
Reviewed By:	Ivan Cao Assistant Manager
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

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Skyrocket Toys LLC* 's product, model number:*01602 (FCC ID: O5301602RX24G)* (the "EUT") in this report was a *Sky Viper Pro Series Video Drone (Drone),* which was measured approximately: 38.0 cm (L) x 38.0 cm (W) x 7.8 cm (H), rated input voltage: DC7.4V from rechargeable Li-ion battery, the battery can be removed andcharged by 9V from adapter.

Adapter Information：
Model：YHY-09001000
P/N :WL090009US-W
Input：100-240V~50-60Hz,0.2A
Output :DC 9V,1.0A

Note: The series product, model 01602, 01650 and 01721are electrically identical, the difference them is the model name, we selected 01602 for fully testing, the details was explained in the attached declaration letter.

All measurement and test data in this report was gathered from production sample serial number: 160721001 (Assigned byBACL, Dongguan). The EUT was received on 2016-06-25.

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, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: O5301602RX24G.
Submitted with the Part of a system with FCC ID: O5301602TX24G.

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 with maximum power output, which was provided by the manufacturer, 15channels are provided to testing:

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.

EUT Exercise Software

The software nRFgo was used during the test

Equipment Modifications

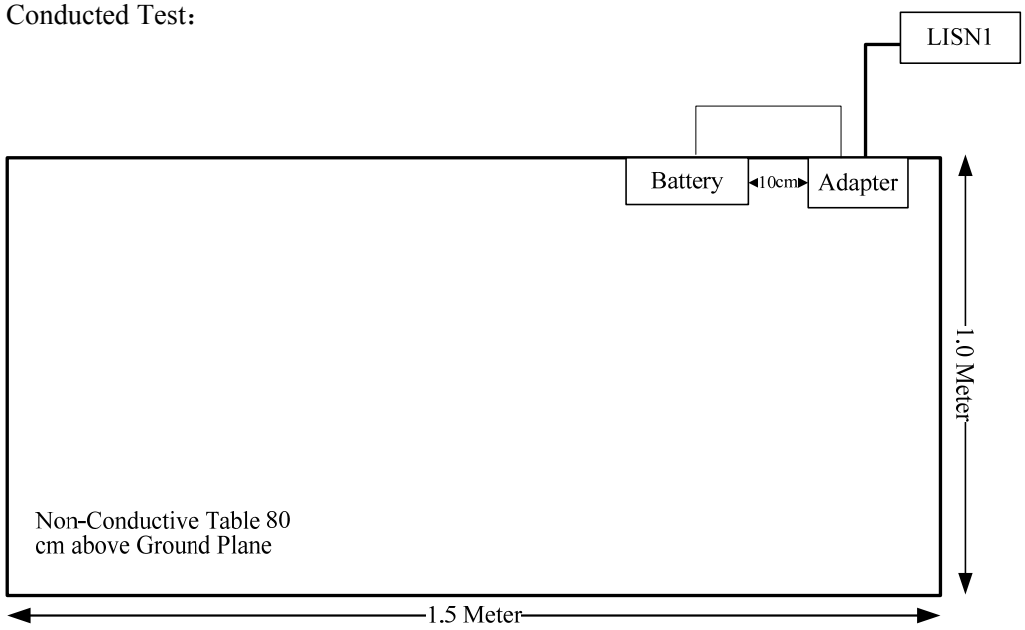
No modification was made to the EUT.

External I/O Cable

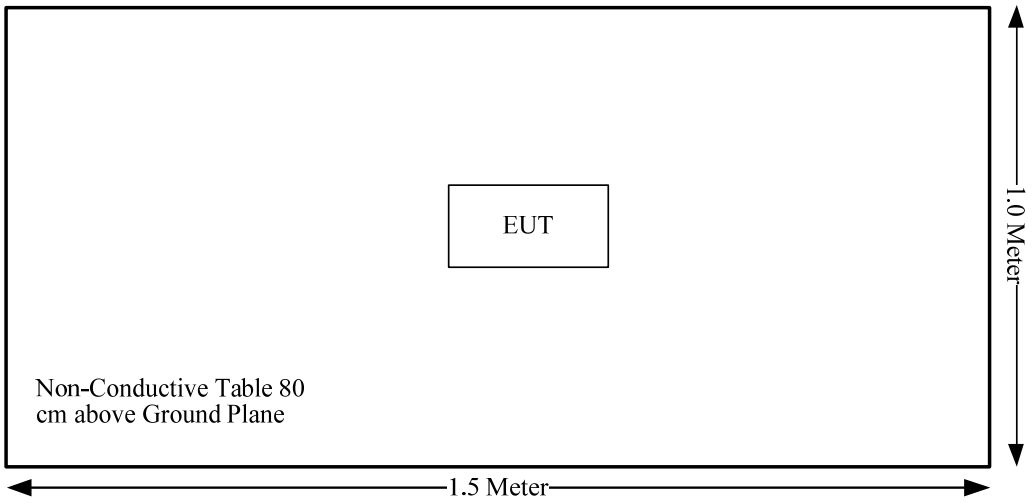
Cable Description	Shielding Type	Ferrite Core	Length (m)	From	To
DC Cable	No	No	1.14	Adapter	EUT

Block Diagram of Test Setup

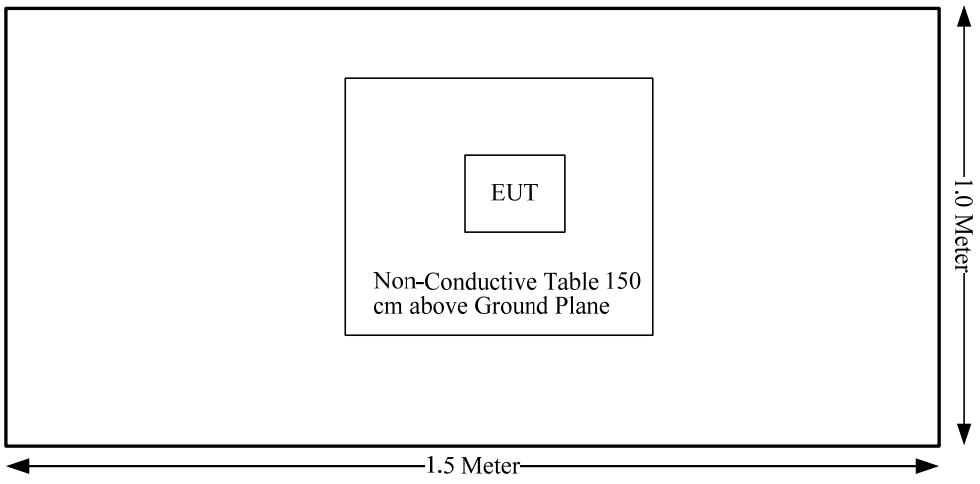
AC Line Conducted Test:



Radation test Below 1GHz:



Radiation test Above 1GHz:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1091	Maximum Permissible 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 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

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

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:

Frequency Range (MHz)	Antenna Gain		Tune-up Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
	(dBi)	(numeric)	(dBm)	(mW)			
2410-2472	2.00	1.58	17	50.12	20.00	0.0158	1.0
2412-2462	2.00	1.58	18	63.10	20.00	0.0199	1.0

Note: The tune-up power including tolerance for hopping frequency system is 17dBm. tune-up power including tolerance for WIFI is 18dBm. Which are declared by manufacturer.

FHs and wifi may transmit simultaneously,

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$=S_{FH}/S_{limit\text{-}FH} + S_{Wifi}/S_{limit\text{-}wifi}= 0.0158/1 + 0.0199/1 =0.0357 < 1$

Result: The device meet MPE at 20 cm distance

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 an internal antenna, the antenna gain is 2dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

Measurement Uncertainty

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

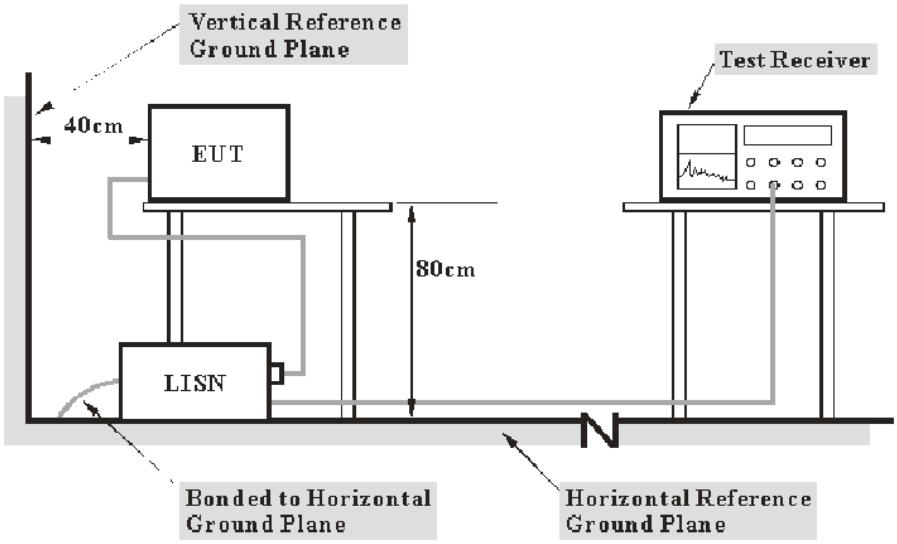
If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
– non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.
If U_{lab} is greater than U_{cispr} of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

Based on CISPR 16-4-2: 2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Dongguan) is 3.12 dB (150 kHz to 30 MHz).

Table 1 – Values of U_{cispr}

Measurement	U_{cispr}
Conducted disturbance at mains port using AMN (150 kHz to 30 MHz)	3.4 dB

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$

Herein,
V_C: corrected voltage amplitude
V_R: reading voltage amplitude
A_c: attenuation caused by cable loss
VDF: voltage division factor of AMN or ISN

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

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2015-12-10	2016-12-09
R&S	L.I.S.N	ESH2-Z5	892107/021	2016-07-16	2017-07-15
R&S	Two-line V-network	ENV 216	3560.6550.12	2015-11-26	2016-11-25
N/A	Coaxial Cable	1.8m	N/A	2016-05-06	2017-05-06
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

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

Test Data

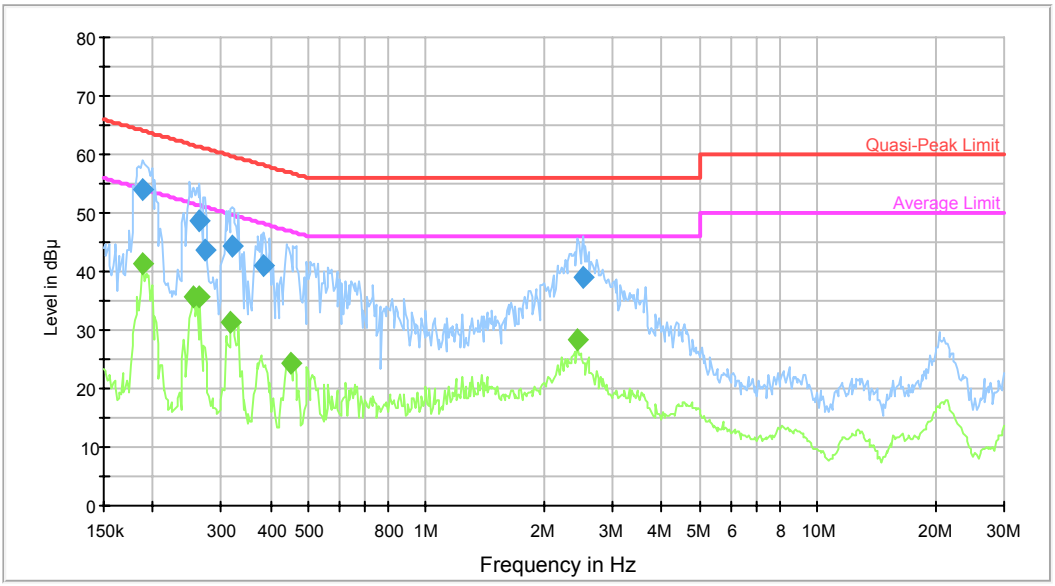
Environmental Conditions

Temperature:	29.3°C
Relative Humidity:	55 %
ATM Pressure:	100.3kPa

** The testing was performed by Robin Zheng on 2016-08-11.*

Test Mode: Charging

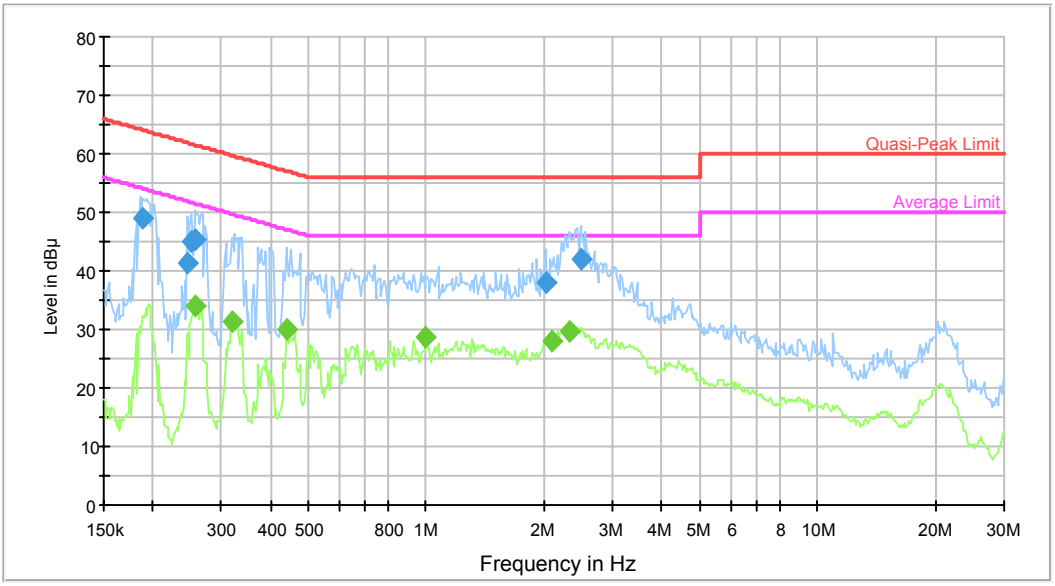
Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.188994	53.8	9.000	L1	10.2	10.3	64.1	Compliance
0.264113	48.5	9.000	L1	10.2	12.8	61.3	Compliance
0.272666	43.6	9.000	L1	10.2	17.4	61.0	Compliance
0.319773	44.5	9.000	L1	10.3	15.2	59.7	Compliance
0.384091	41.0	9.000	L1	10.2	17.2	58.2	Compliance
2.518372	38.9	9.000	L1	10.4	17.1	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.188994	41.2	9.000	L1	10.2	12.9	54.1	Compliance
0.253797	35.6	9.000	L1	10.2	16.0	51.6	Compliance
0.264113	35.7	9.000	L1	10.2	15.6	51.3	Compliance
0.317235	31.5	9.000	L1	10.3	18.3	49.8	Compliance
0.450448	24.2	9.000	L1	10.1	22.7	46.9	Compliance
2.439371	28.2	9.000	L1	10.4	17.8	46.0	Compliance

Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.188994	48.8	9.000	N	10.2	15.3	64.1	Compliance
0.245835	41.3	9.000	N	10.2	20.6	61.9	Compliance
0.251783	45.0	9.000	N	10.2	16.7	61.7	Compliance
0.255827	45.2	9.000	N	10.2	16.4	61.6	Compliance
2.014768	37.9	9.000	N	10.4	18.1	56.0	Compliance
2.478557	41.9	9.000	N	10.4	14.1	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.257874	33.9	9.000	N	10.2	17.6	51.5	Compliance
0.319773	31.2	9.000	N	10.3	18.5	49.7	Compliance
0.443327	30.0	9.000	N	10.1	17.0	47.0	Compliance
0.999305	28.6	9.000	N	10.4	17.4	46.0	Compliance
2.096658	27.9	9.000	N	10.4	18.1	46.0	Compliance
2.325491	29.6	9.000	N	10.4	16.4	46.0	Compliance

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

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

Measurement Uncertainty

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

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

If U_{lab} is greater than U_{cispr} of Table 1, then:
- compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

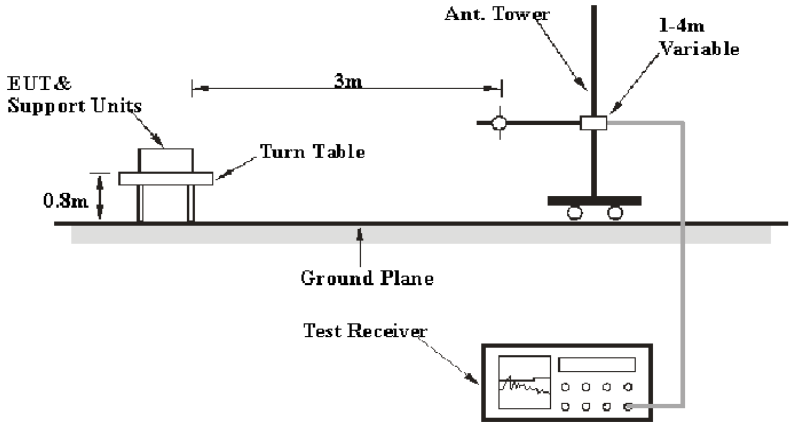
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:
30M~200MHz: 4.55 dB for Horizontal, 4.57 dB for Vertical; 200M~1GHz: 4.66 dB for Horizontal, 4.56 dB for Vertical; measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical; 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical; 1G~6GHz: 4.45 dB, 6G~18GHz: 5.23 dB.

Table 1 – Values of U_{cispr}

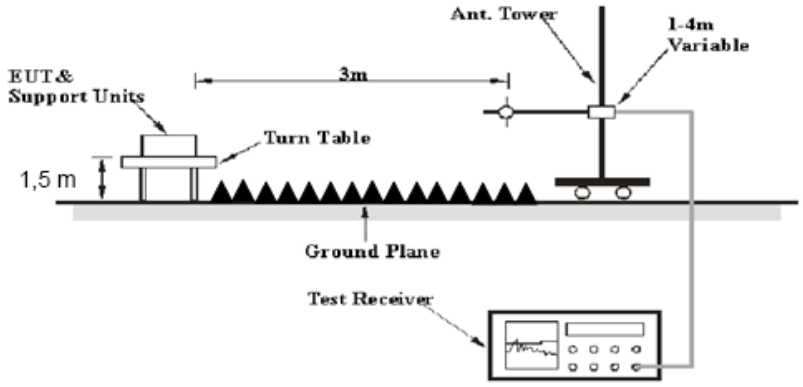
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1GHz:



Above 1GHz:



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

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	/	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	2016-08-03	2017-08-02
Sunol Sciences	Antenna	JB3	A060611-3	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2015-09-01	2016-09-01
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
ETS-Lindgren	Horn Antenna	3115	9808-5557	2015-09-06	2018-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2016-02-19	2017-02-19
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2015-09-06	2016-09-06
N/A	Coaxial Cable	14m	N/A	2016-05-06	2017-05-06
N/A	Coaxial Cable	8m	N/A	2016-05-06	2017-05-06

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

Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

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

Margin = Limit – Corrected Amplitude

Test Data

Environmental Conditions

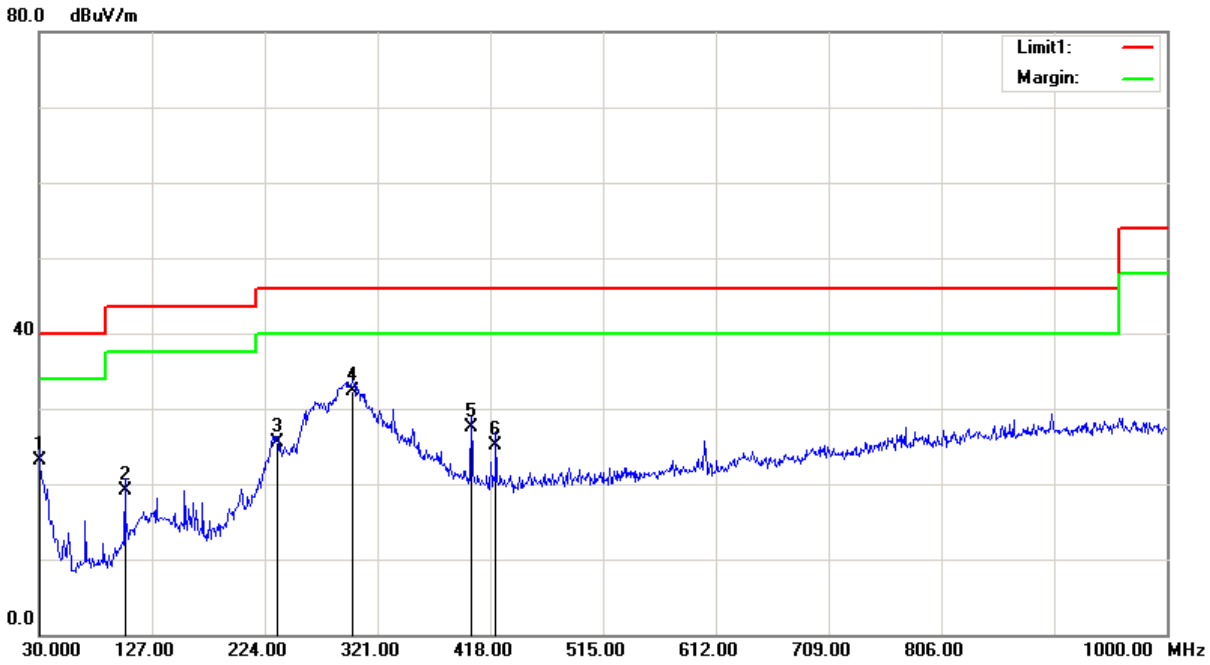
Temperature:	26.3 °C
Relative Humidity:	57 %
ATM Pressure:	99.7 kPa

** The testing was performed by Robin Zheng on 2016-08-11.*

Test Mode: Transmitting

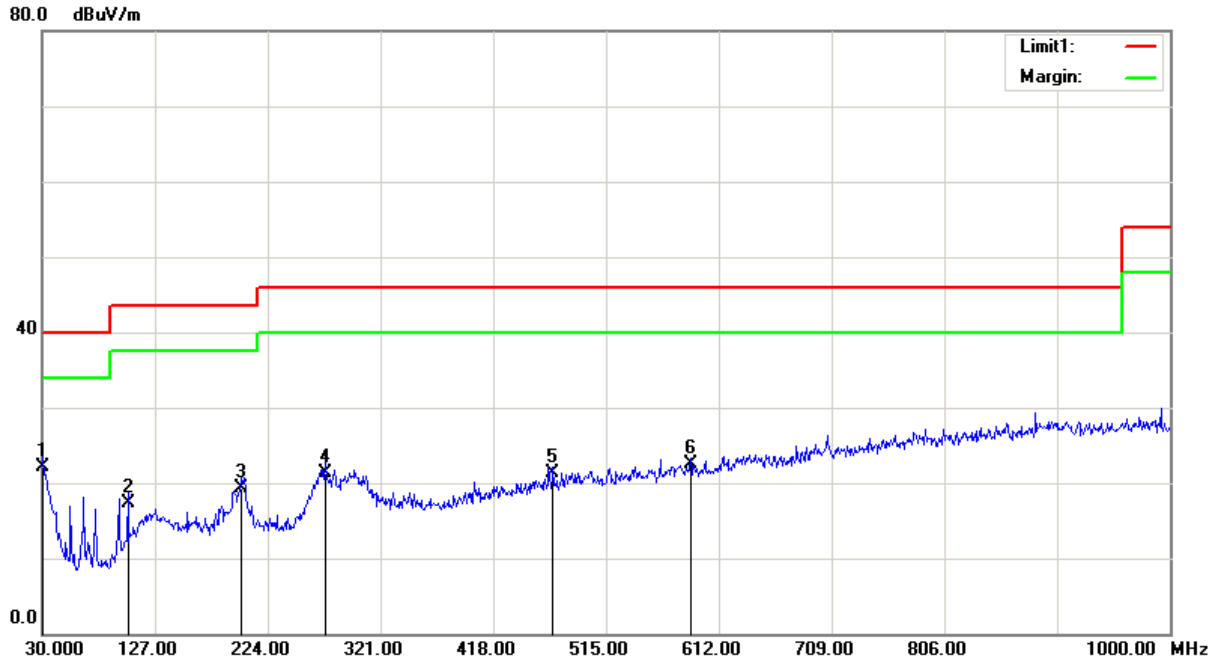
1) Below 1GHz

Horizontal



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.0000	22.15	QP	0.95	23.10	40.00	16.90
103.7200	27.80	QP	-8.60	19.20	43.50	24.30
234.6700	33.50	QP	-7.90	25.60	46.00	20.40
299.6600	38.20	QP	-5.80	32.40	46.00	13.60
401.5100	31.06	QP	-3.56	27.50	46.00	18.50
422.8500	28.27	QP	-3.17	25.10	46.00	20.90

Vertical



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.0000	21.15	QP	0.95	22.10	40.00	17.90
103.7200	25.90	QP	-8.60	17.30	43.50	26.20
200.7200	26.69	QP	-7.29	19.40	43.50	24.10
273.4700	27.31	QP	-6.01	21.30	46.00	24.70
469.4100	23.15	QP	-1.75	21.40	46.00	24.60
587.7500	23.20	QP	-0.70	22.50	46.00	23.50

2) 1-25GHz:

Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	FCC 15.247	
(MHz)	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB)				Limit (dBμV/m)	Margin (dB)
Low Channel: 2410 MHz									
2410	69	PK	H	25.67	3.68	0.00	98.35	N/A	N/A
2410	63.59	AV	H	25.67	3.68	0.00	92.94	N/A	N/A
2410	67.92	PK	V	25.67	3.68	0.00	97.27	N/A	N/A
2410	62.98	AV	V	25.67	3.68	0.00	92.33	N/A	N/A
2400	30.21	PK	H	25.64	3.65	0.00	59.50	74.00	14.50
2400	16.52	AV	H	25.64	3.65	0.00	45.81	54.00	8.19
4820	47.43	PK	H	30.63	5.03	27.41	55.68	74.00	18.32
4820	42.37	AV	H	30.63	5.03	27.41	50.62	54.00	3.38
7230	35.89	PK	H	34.15	6.64	25.90	50.78	74.00	23.22
7230	29.85	AV	H	34.15	6.64	25.90	44.74	54.00	9.26
9640	38.14	PK	H	36.76	8.55	27.48	55.97	74.00	18.03
9640	32.01	AV	H	36.76	8.55	27.48	49.84	54.00	4.16
3618	41.49	PK	H	29.06	4.59	27.28	47.86	74.00	26.14
3618	35	AV	H	29.06	4.59	27.28	41.37	54.00	12.63
Middle Channel: 2452 MHz									
2452	69.75	PK	H	25.78	3.78	0.00	99.31	N/A	N/A
2452	63.39	AV	H	25.78	3.78	0.00	92.95	N/A	N/A
2452	67.25	PK	V	25.78	3.78	0.00	96.81	N/A	N/A
2452	60.01	AV	V	25.78	3.78	0.00	89.57	N/A	N/A
4904	51.02	PK	H	30.85	5.31	27.43	59.75	74.00	14.25
4904	43.52	AV	H	30.85	5.31	27.43	52.25	54.00	1.75
7356	35.12	PK	H	34.45	6.79	25.87	50.49	74.00	23.51
7356	29.54	AV	H	34.45	6.79	25.87	44.91	54.00	9.09
9808	33.98	PK	H	36.82	8.64	27.09	52.35	74.00	21.65
9808	28.12	AV	H	36.82	8.64	27.09	46.49	54.00	7.51
3128	33.52	PK	H	27.61	6.92	27.43	40.62	74.00	33.38
3128	21.09	AV	H	27.61	6.92	27.43	28.19	54.00	25.81
3665	37.19	PK	H	29.16	4.56	27.31	43.60	74.00	30.40
3665	30.65	AV	H	29.16	4.56	27.31	37.06	54.00	16.94
High Channel: 2472 MHz									
2472	72.84	PK	H	25.83	3.71	0.00	102.38	N/A	N/A
2472	67.91	AV	H	25.83	3.71	0.00	97.45	N/A	N/A
2472	69.61	PK	V	25.83	3.71	0.00	99.15	N/A	N/A
2472	64.44	AV	V	25.83	3.71	0.00	93.98	N/A	N/A
2483.5	30.14	PK	H	25.86	3.67	0.00	59.67	74.00	14.33
2483.5	16.96	AV	H	25.86	3.67	0.00	46.49	54.00	7.51
4944	42.05	PK	H	30.95	5.36	27.43	50.93	74.00	23.07
4944	35.55	AV	H	30.95	5.36	27.43	44.43	54.00	9.57
7416	39.25	PK	H	34.60	6.86	25.90	54.81	74.00	19.19
7416	34.87	AV	H	34.60	6.86	25.90	50.43	54.00	3.57
9888	37.96	PK	H	36.86	8.69	26.79	56.72	74.00	17.28
9888	31.83	AV	H	36.86	8.69	26.79	50.59	54.00	3.41
3712	43.8	PK	H	29.27	4.62	27.33	50.36	74.00	23.64
3712	37.34	AV	H	29.27	4.62	27.33	43.90	54.00	10.10

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

Applicable Standard

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

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

Test Procedure

1. Set the EUT in transmitting mode, spectrum Bandwidth was set at 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:	27.3 °C
Relative Humidity:	41 %
ATM Pressure:	98.9 kPa

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

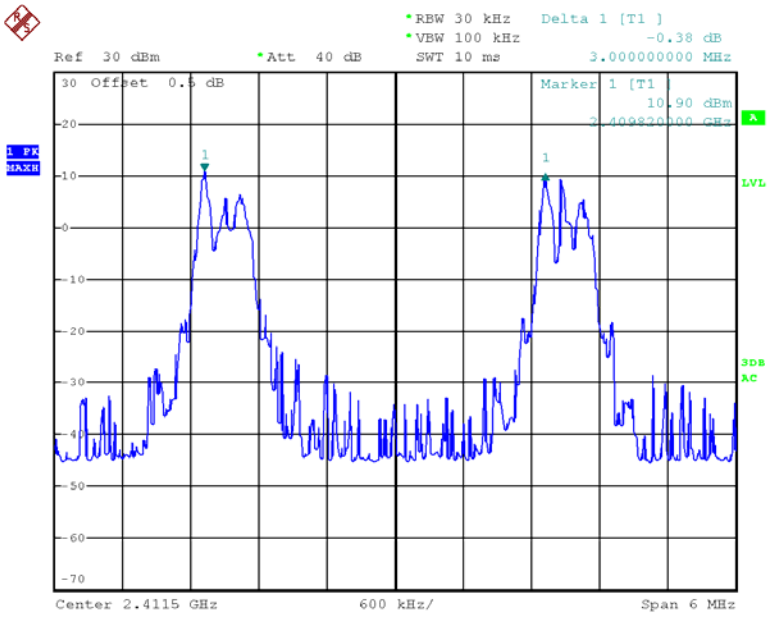
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

Frequency	Channel Separation	Limit
MHz	MHz	MHz
2410	3.000	0.472
2413		

Note: Limit= (2/3)× 20dB bandwidth



Date: 17.AUG.2016 19:40:30

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:	28.8 °C
Relative Humidity:	54 %
ATM Pressure:	100 kPa

** The testing was performed by Robin Zheng on 2016-08-12.*

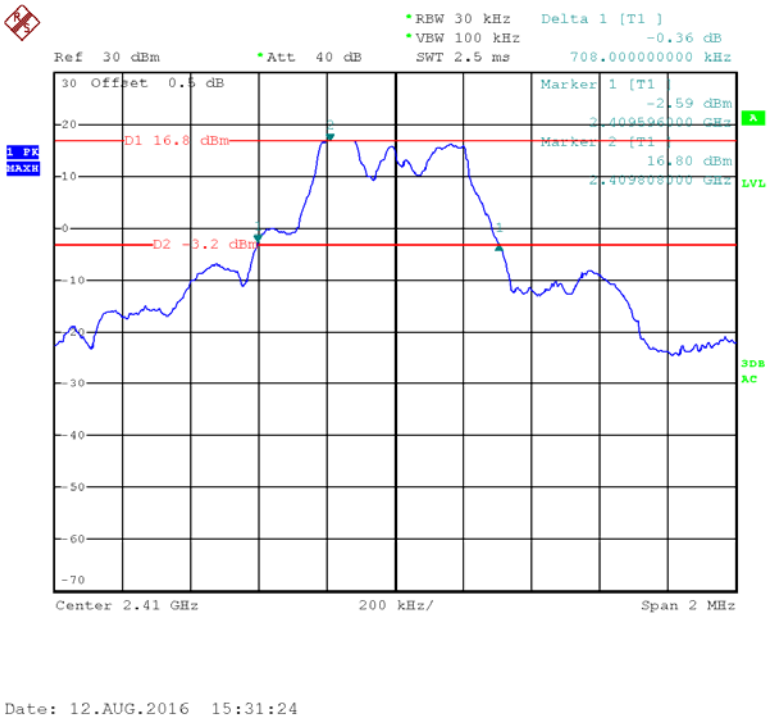
Test Result: Compliance.

Please refer to following tables and plots

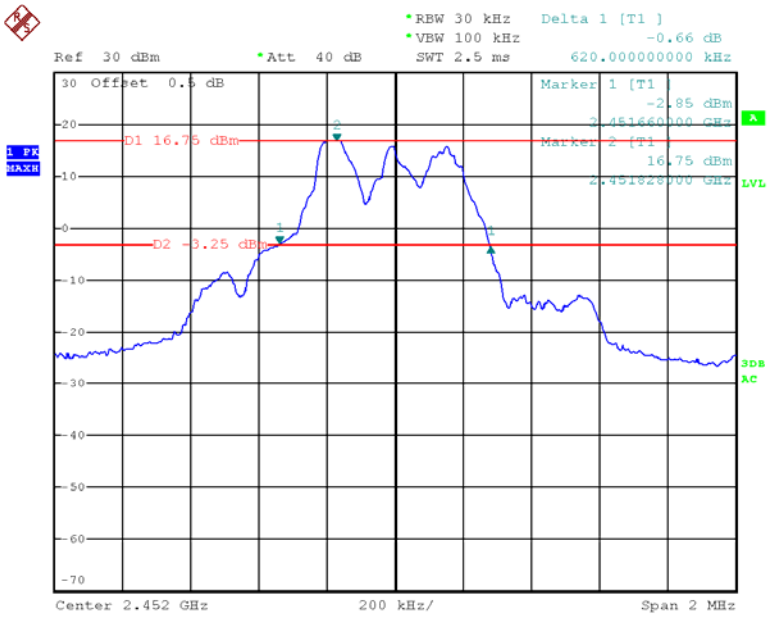
Test Mode: Transmitting

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2410	0.708
Middle	2452	0.62
High	2472	0.612

Low Channel

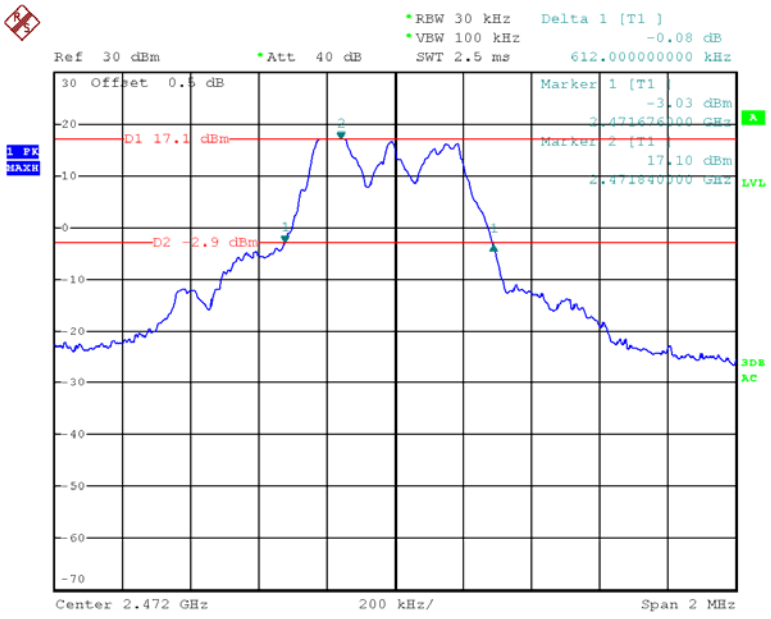


Middle Channel



Date: 12.AUG.2016 15:55:12

High Channel



Date: 12.AUG.2016 12:58:10

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

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

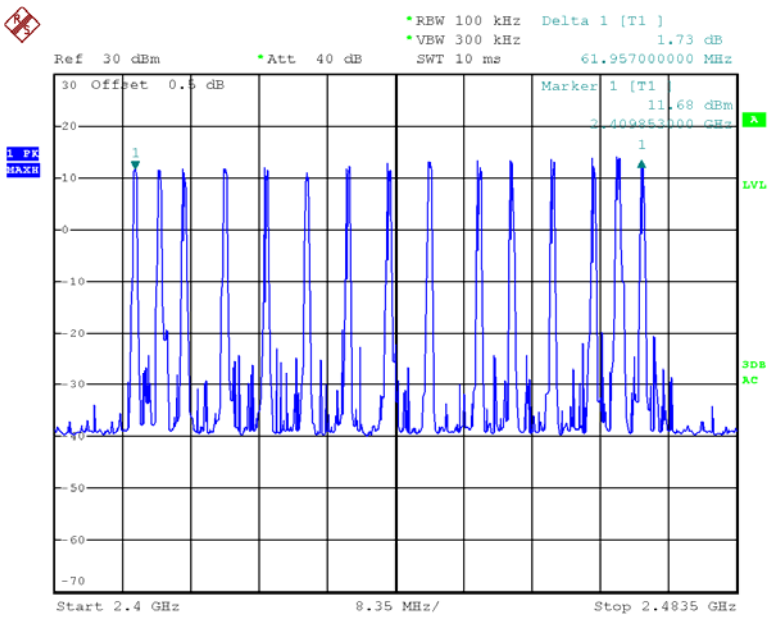
Test Result: Compliance.

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 19:10:47

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, the time of single pulses was tested.

Dwell Time= time slot length * hope rate/ number of hopping channels *hopping NO. * 0.4s

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:	27.3~28.8 °C
Relative Humidity:	41~54 %
ATM Pressure:	98.9~100kPa

** The testing was performed by Robin Zheng from2016-08-12 to 2016-08-17.*

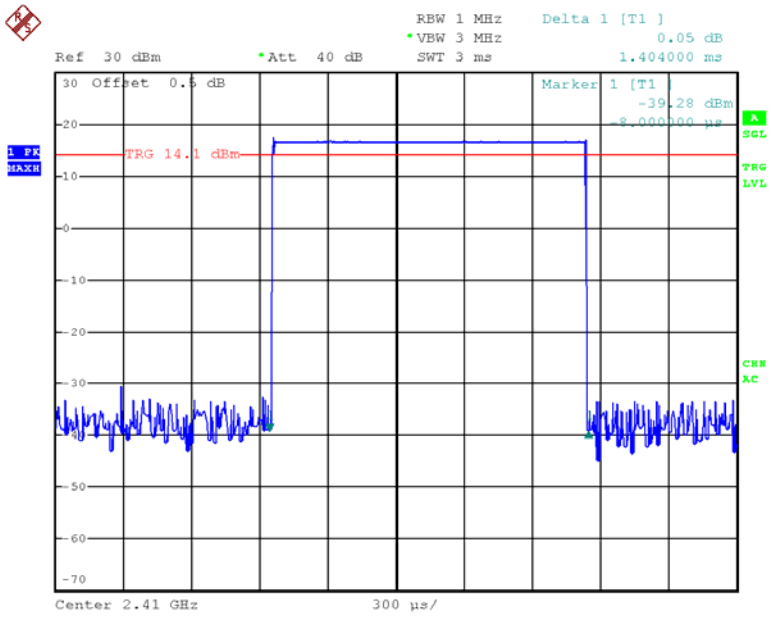
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

Channel	Pulse Width (ms)	Hopping Rate (pulse/s)	Dwell Time (s)	Limit (s)	Result
Low	1.4	200	0.112	0.4	Pass
Dwell Time= time slot length * hope Rate *Hopping channels/ number of hopping channels *hopping NO. * 0.4s Hopping rate is 200Hz (200 hoppings in a second), which was declared by manufacturer.					

Pulse Width



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:	28.8°C
Relative Humidity:	54 %
ATM Pressure:	100 kPa

** The testing was performed by Robin Zheng on 2016-08-12.*

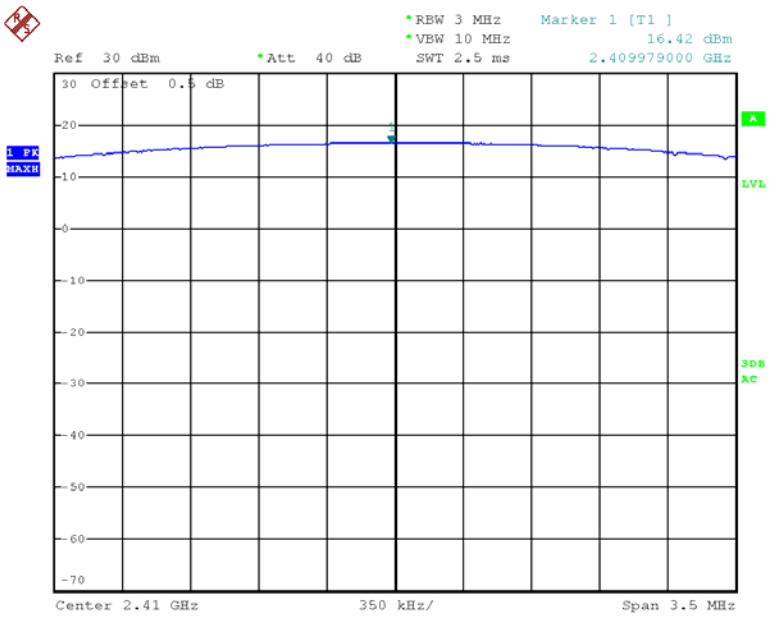
Test Result: Compliance.

Test Mode: Transmitting

Frequency (MHz)	Peak Output power (dBm)	Limit (dBm)
2410	16.42	21
2452	16.33	21
2472	16.82	21

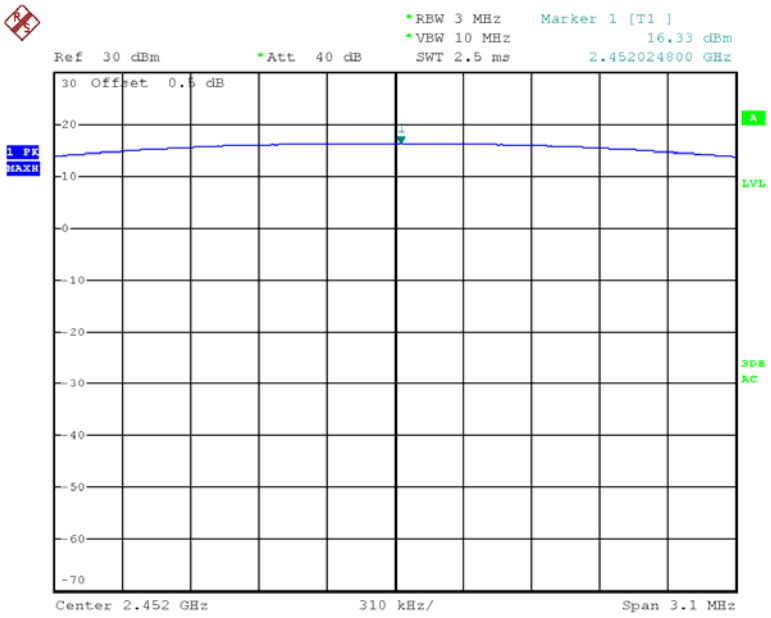
Note: The data above was tested in conducted mode.

Output Power, 2410MHz



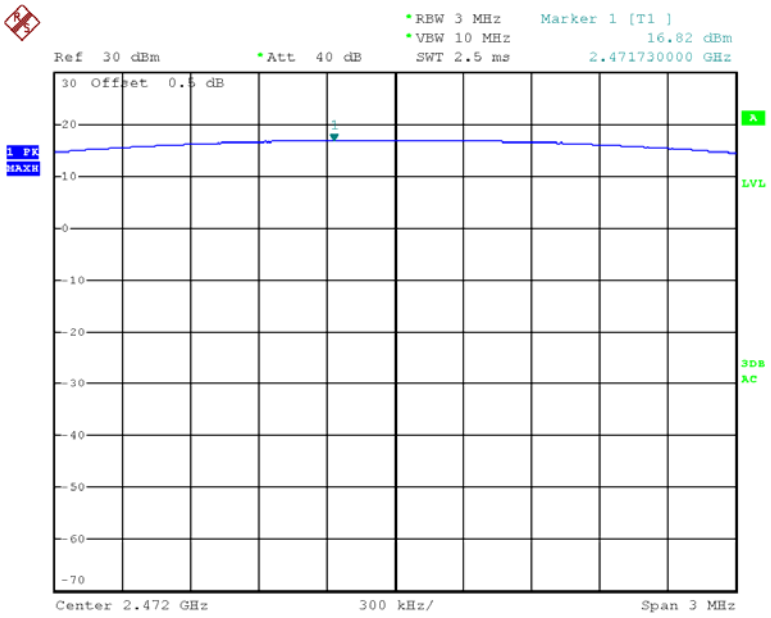
Date: 12.AUG.2016 15:33:39

Output Power, 2452MHz



Date: 12.AUG.2016 15:57:02

Output Power, 2472MHz



Date: 12.AUG.2016 14:39:35

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

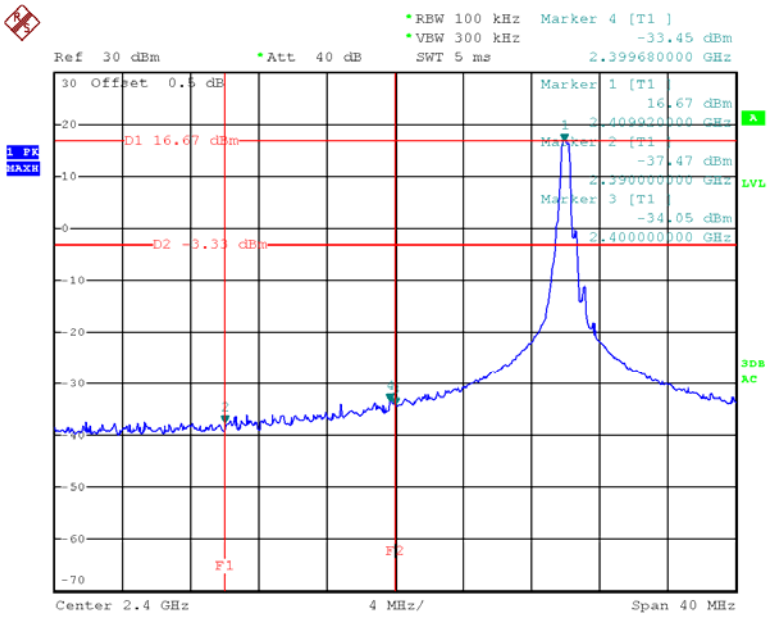
Environmental Conditions

Temperature:	31.4 °C
Relative Humidity:	52 %
ATM Pressure:	100.3 kPa

** The testing was performed by Robin Zheng on 2016-08-12.*

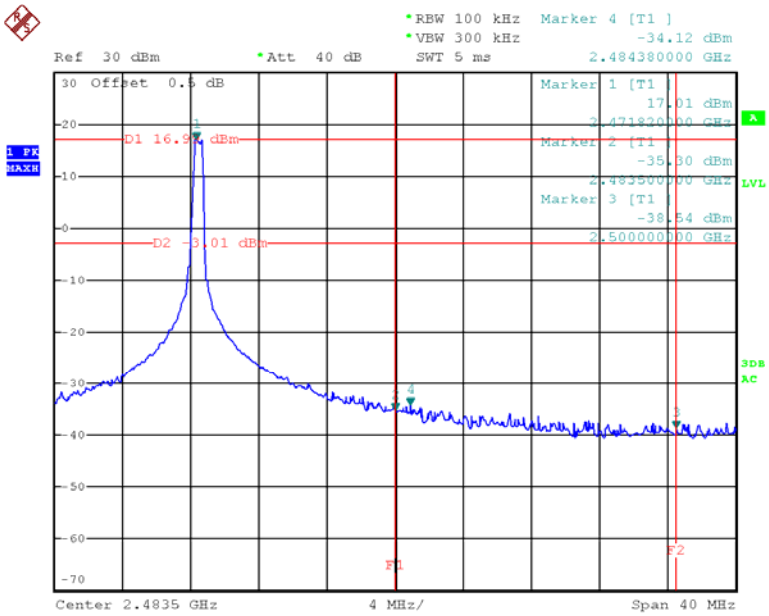
Test Result: Compliance

Band Edge, Left Side



Date: 12.AUG.2016 15:38:41

Band Edge, Right Side



Date: 12.AUG.2016 14:36:20

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