



FCC PART 15.247  
TEST REPORT

For

**Convoy Technologies Inc.**

6409 Highview Drive, Fort Wayne, Indiana United States 46818

**FCC ID: 2AA4QM7204RF**

<b>Report Type:</b> Original Report	<b>Product Type:</b> LCD Colour Monitor
<b>Report Number:</b>	<u>RDG190530003-00A</u>
<b>Report Date:</b>	<u>2019-08-14</u>
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## GENERAL INFORMATION

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

<b>EUT Name:</b>	LCD Colour Monitor
<b>EUT Model:</b>	M7204RF
<b>Multiple Models:</b>	M7104RF
<b>Operation Frequency:</b>	2403-2478MHz
<b>Maximum Output Power (Conducted):</b>	16.73dBm
<b>Rated Input Voltage:</b>	DC 12V from battery
<b>External Dimension:</b>	182mm(L)*123mm(W)*40mm(H)
<b>Serial Number:</b>	190530003
<b>EUT Received Date:</b>	2019.05.30

*Note: Model M7204RF was selected for fully testing, the detailed information about the difference among M7104RF and model M7204RF can be referred to the declaration letter which was stated and guaranteed by the manufacturer.*

### Objective

This report is prepared on behalf of *Convoy Technologies Inc.* in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communications Commission's rules

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

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

No related submittal.

### Test Methodology

All measurements detailed in this Test Report were performed in accordance with ANSI C63.10-2013 "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices".

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

### Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
Unwanted Emissions, radiated	30M~200MHz: 4.55 dB,200M~1GHz: 5.92 dB,1G~6GHz: 4.98 dB, 6G~18GHz: 5.89 dB,18G~26.5G:5.47 dB,26.5G~40G:5.63 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1 °C
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

### Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing in engineering mode.

The device employs total 26 channels as below table:

channel	frequency MHz	channel	frequency MHz
1	2403	14	2442
2	2406	15	2445
3	2409	16	2448
4	2412	17	2451
5	2415	18	2454
6	2418	19	2457
7	2421	20	2460
8	2424	21	2463
9	2427	22	2466
10	2430	23	2469
11	2433	24	2472
12	2436	25	2475
13	2439	26	2478

Channel 1,13, 26 were tested.

### EUT Exercise Software

The software: 'IDPLUSONE\_Ver.1.1.2.exe' was used during test, which was provided by manufacturer. The maximum power level was configured by the software as below table:

Test Frequency	Low	Middle	High
Power Level Setting	12	12	12

### Equipment Modifications

No modification was made to the EUT.

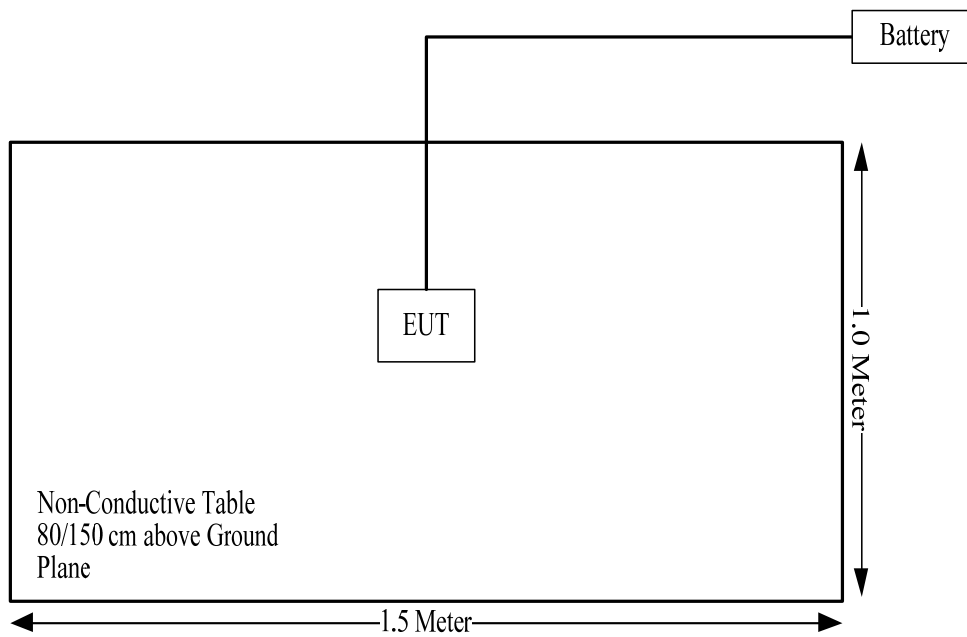
### Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Un-known	Battery	/	/

**Support Cable List and Details**

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
DC Cable	Yes	No	5	EUT	Battery

**Block Diagram of Test Setup**



**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
FCC§15.247 (i) & §1.1310 & §2.1091	Maximum Permissible Exposure (MPE)	Compliance
FCC §15.203	Antenna requirement	Compliance
FCC §15.207(a)	AC line conducted emissions	Not Applicable
FCC §15.205, §15.209, §15.247(d)	Spurious emissions	Compliance
FCC §15.247(a)(1)	Channel separation	Compliance
FCC §15.247(a)(1)	20 dB bandwidth	Compliance
FCC §15.247(a)(1)(iii)	Quantity of hopping channel test	Compliance
FCC §15.247(a)(1)(iii)	Time of occupancy (dwell time)	Compliance
FCC §15.247(b)(1)	Peak output power measurement	Compliance
FCC §15.247(d)	Band edges	Compliance

Not Applicable: the device was powered by battery.



**FCC §15.247 (i) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

**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 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>(B) Limits for General Population/Uncontrolled Exposure</b>				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f <sup>2</sup> )	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<sup>2</sup>);

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);

**Calculated Data:**

Frequency Range (MHz)	Antenna Gain		Max. Target Power including Tolerance		Evaluation Distance (cm)	Power Density (W/m <sup>2</sup> )	MPE Limit (W/m <sup>2</sup> )
	(dBi)	(numeric)	(dBm)	(mW)			
2403-2478	2	1.58	17	50	20.00	0.02	1.0

Note: the Max. Target Power including Tolerance was declared by manufacturer.

**Result: Compliance,** The device meets MPE requirement for Devices Used by the General Public (Uncontrolled Environment) at distance ≥20 cm.

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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 external antenna uses a unique coupling to the intentional radiator, and the antenna gain is 2.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

**Result:** Compliance.

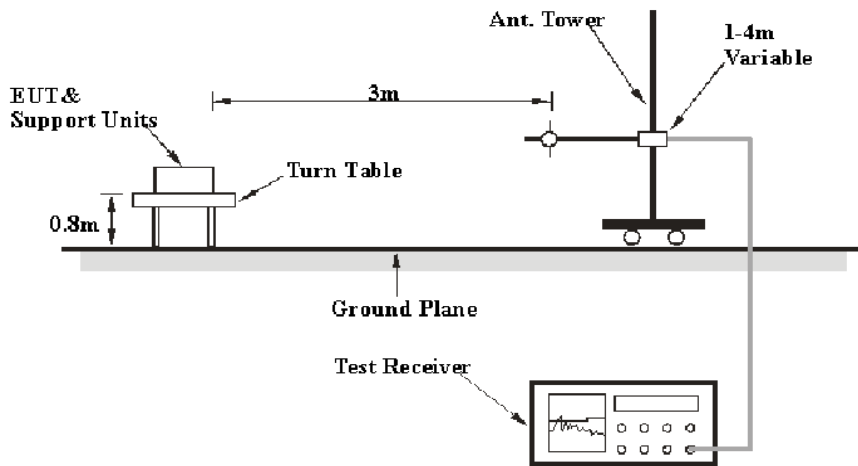
**FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS**

**Applicable Standard**

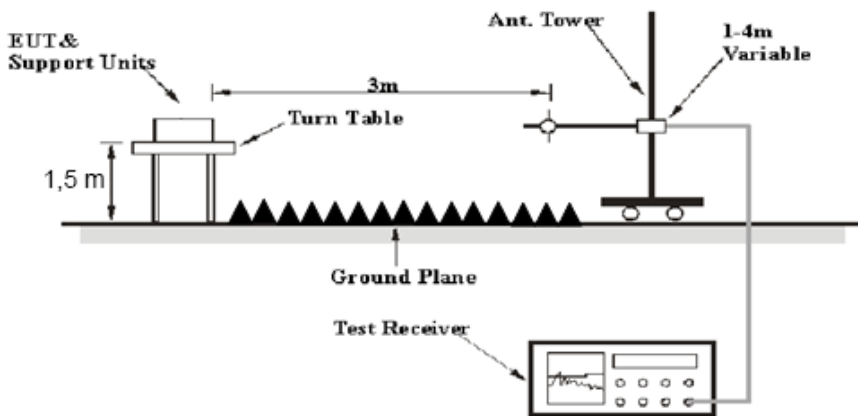
FCC §15.247 (d); §15.209; §15.205;

**EUT Setup**

**Below 1GHz:**



**Above 1GHz:**



The radiated emission Below 1GHz tests were performed in the 3 meters chamber A, above 1GHz tests were performed in the 3 meters chamber B, 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.

According to FCC public notice: DA-00-705, during the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

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

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

### 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	ESR3	102453	2019-06-26	2020-06-26
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2019-05-06	2020-05-06
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-05-09	2020-05-09
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
MITEQ	Amplifier	AFS42-00101800- 25-S-42	2001271	2018-09-05	2019-09-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2019-06-27	2020-06-27
E-Microwave	Band-stop Filters	OBSF-2400-2483.5- S	OE01601525	2019-06-16	2020-06-16
Micro-tronics	High Pass Filter	HPM50111	S/N-G217	2019-06-16	2020-06-16
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2019-06-27	2020-06-27

\* **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

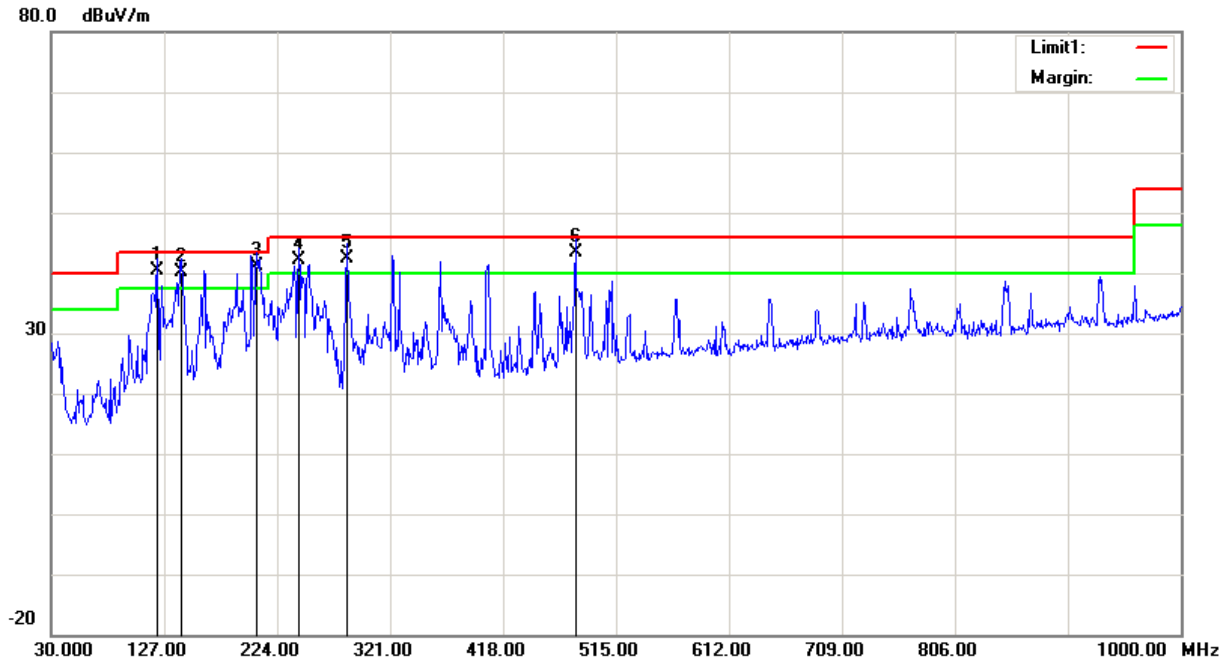
#### Environmental Conditions

Test Items	Radiation Below 1GHz	Radiation Above 1GHz
Temperature:	28.6 °C	28.8 °C
Relative Humidity:	59%	60%
ATM Pressure:	100.3 kPa	100.3 kPa
Tester:	Tyler Pan	Lucy Lu
Test Date:	2019-07-04	2019-07-01

*Test Mode: Transmitting*

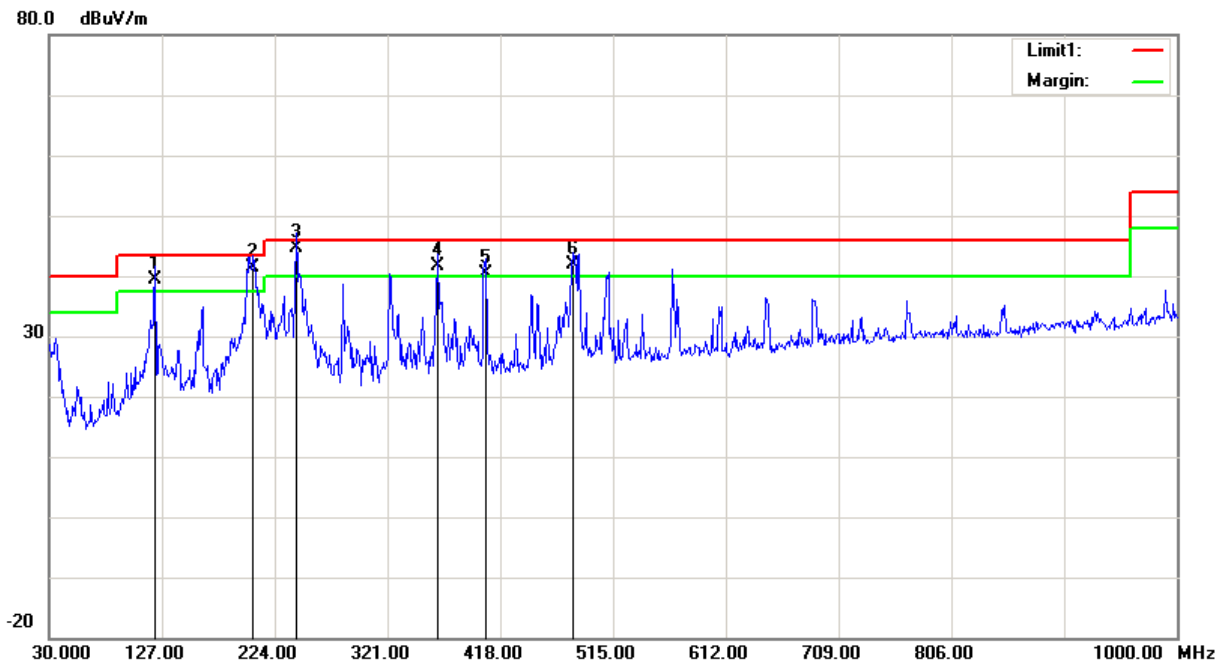
1) 30MHz-1GHz (High channel was the worst)

Horizontal:



Frequency (MHz)	Receiver Reading (dBµV)	Remark	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
121.1800	45.03	QP	-4.68	40.35	43.50	3.15
141.5500	45.96	QP	-5.85	40.11	43.50	3.39
206.5400	48.21	QP	-7.10	41.11	43.50	2.39
242.4300	48.06	QP	-5.97	42.09	46.00	3.91
284.1400	46.52	QP	-4.05	42.47	46.00	3.53
480.0800	43.63	QP	-0.27	43.36	46.00	2.64

**Vertical:**



Frequency (MHz)	Receiver Reading (dBµV)	Remark	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
121.1800	44.10	QP	-4.68	39.42	43.50	4.08
205.5700	48.21	QP	-6.88	41.33	43.50	2.17
242.4300	50.65	QP	-5.97	44.68	46.00	1.32
364.6500	44.36	QP	-2.82	41.54	46.00	4.46
405.3900	42.36	QP	-1.92	40.44	46.00	5.56
480.0800	42.06	QP	-0.27	41.79	46.00	4.21

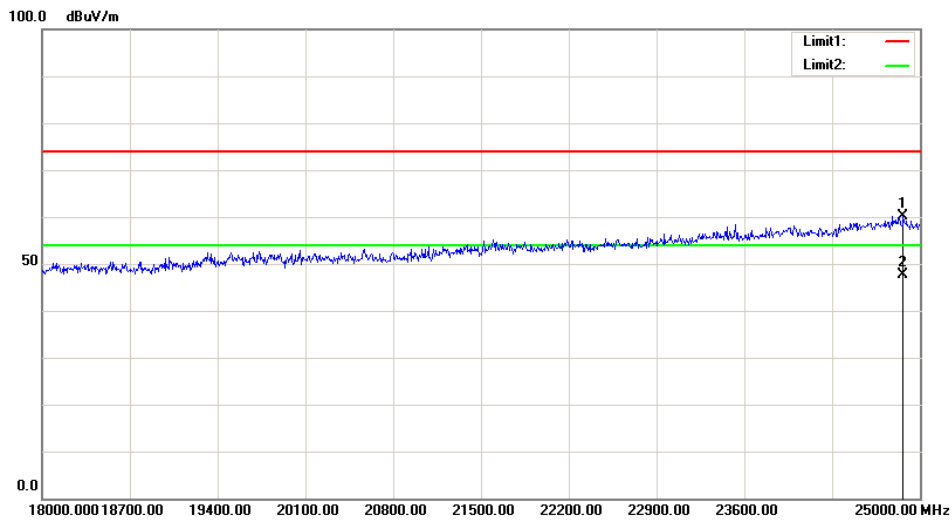
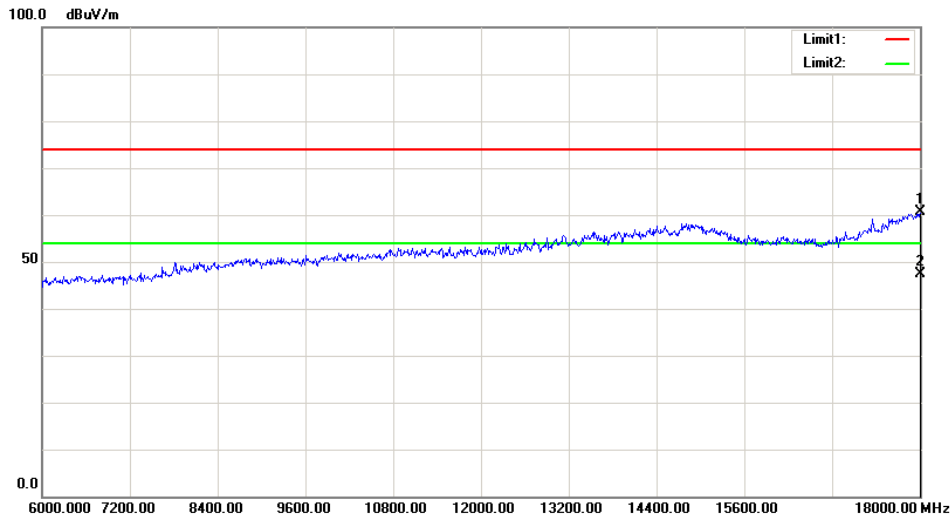
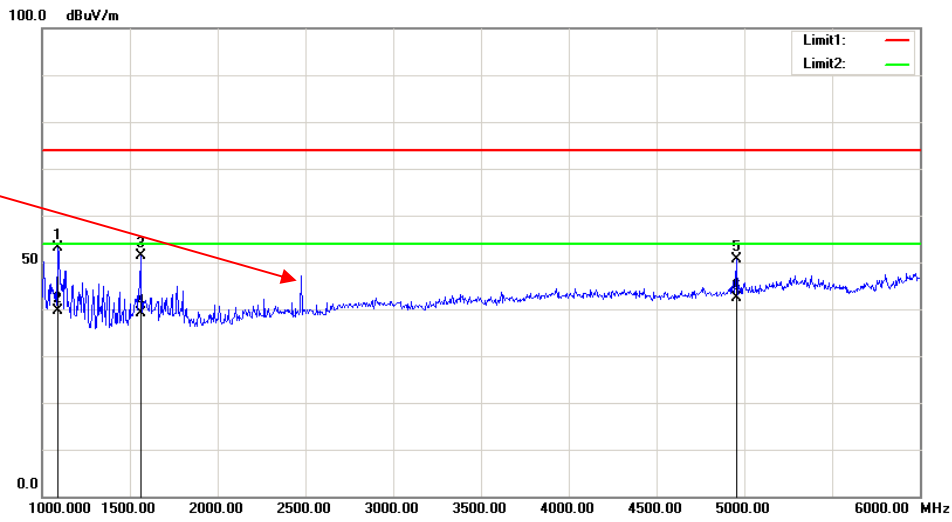
**2)1GHz-25GHz:**

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Remark	Polar (H/V)	Factor (dB/m)					
Low Channel: 2403 MHz									
2403.00	81.36	PK	H	28.11	1.80	0.00	111.27	N/A	N/A
2403.00	62.41	AV	H	28.11	1.80	0.00	92.32	N/A	N/A
2403.00	89.20	PK	V	28.11	1.80	0.00	119.11	N/A	N/A
2403.00	70.39	AV	V	28.11	1.80	0.00	100.30	N/A	N/A
2390.00	38.71	PK	V	28.08	1.80	0.00	68.59	74.00	5.41
2390.00	18.02	AV	V	28.08	1.80	0.00	47.90	54.00	6.10
4806.00	58.95	PK	V	32.91	3.17	37.20	57.83	74.00	16.17
4806.00	39.67	AV	V	32.91	3.17	37.20	38.55	54.00	15.45
7209.00	55.43	PK	V	35.74	4.82	37.23	58.76	74.00	15.24
7209.00	33.94	AV	V	35.74	4.82	37.23	37.27	54.00	16.73
Middle Channel: 2439 MHz									
2439.00	77.51	PK	H	28.18	1.82	0.00	107.51	N/A	N/A
2439.00	57.81	AV	H	28.18	1.82	0.00	87.81	N/A	N/A
2439.00	85.54	PK	V	28.18	1.82	0.00	115.54	N/A	N/A
2439.00	66.20	AV	V	28.18	1.82	0.00	96.20	N/A	N/A
4878.00	52.10	PK	V	33.06	3.27	37.21	51.22	74.00	22.78
4878.00	37.62	AV	V	33.06	3.27	37.21	36.74	54.00	17.26
7317.00	49.63	PK	V	36.02	4.63	37.37	52.91	74.00	21.09
7317.00	33.10	AV	V	36.02	4.63	37.37	36.38	54.00	17.62
High Channel: 2478 MHz									
2478.00	79.68	PK	H	28.26	1.84	0.00	109.78	N/A	N/A
2478.00	59.51	AV	H	28.26	1.84	0.00	89.61	N/A	N/A
2478.00	87.82	PK	V	28.26	1.84	0.00	117.92	N/A	N/A
2478.00	67.60	AV	V	28.26	1.84	0.00	97.70	N/A	N/A
2483.50	41.93	PK	V	28.27	1.84	0.00	72.04	74.00	1.96
2483.50	21.71	AV	V	28.27	1.84	0.00	51.82	54.00	2.18
4956.00	57.80	PK	V	33.21	3.23	37.24	57.00	74.00	17.00
4956.00	44.30	AV	V	33.21	3.23	37.24	43.50	54.00	10.50
7434.00	46.35	PK	V	36.33	4.42	37.52	49.58	74.00	24.42
7434.00	33.25	AV	V	36.33	4.42	37.52	36.48	54.00	17.52



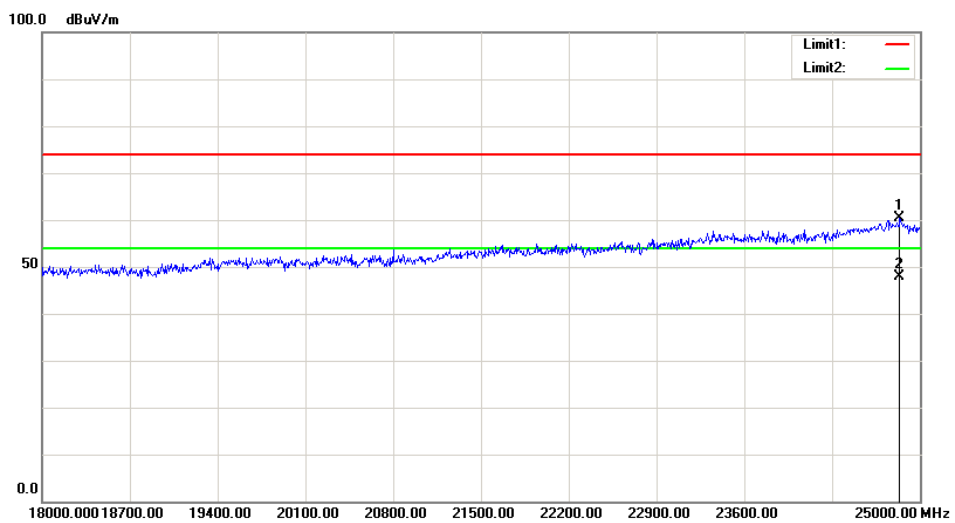
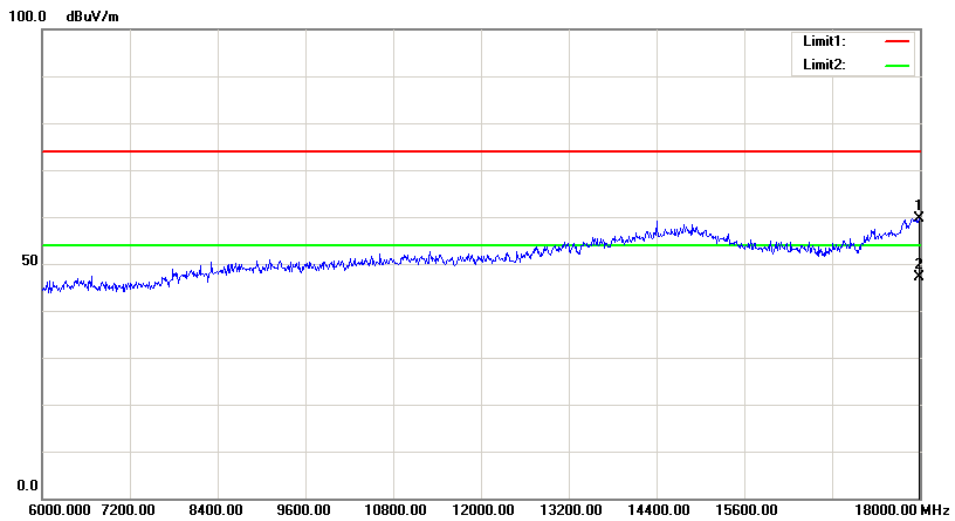
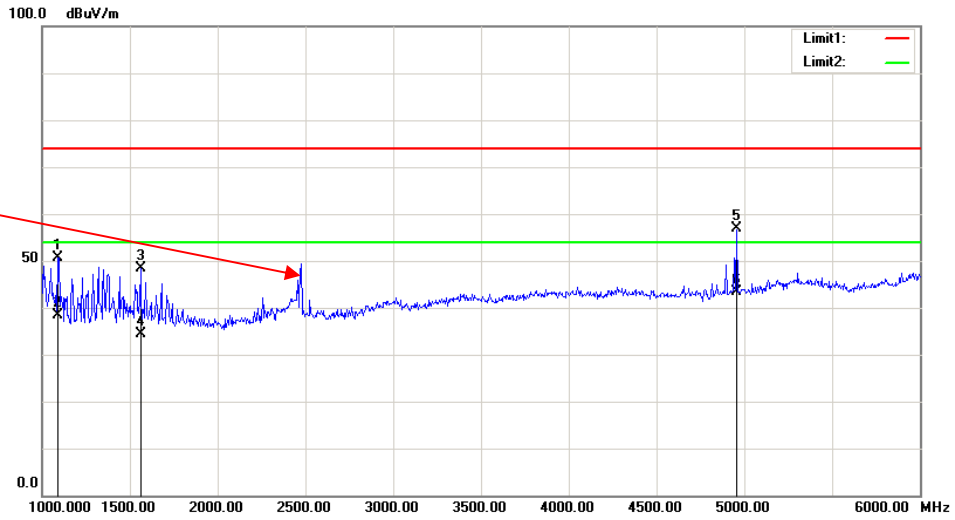
**Worst plots (High channel was the worst)**  
**Horizontal**

Fundamental Test with Band Rejection Filter



Vertical

Fundamental Test with Band Rejection Filter



## 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
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
Unknown	Coaxial Cable	C-SJ00-0010	C0011/02	Each time	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 Procedure

1. Set the EUT in transmitting mode, spectrum Bandwidth was set at 30 kHz, maxhold the channel.
2. Set the adjacent channel of the EUT maxhold another trace.
3. Measure the channel separation.

### Test Data

#### Environmental Conditions

<b>Temperature:</b>	55 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	100.5 kPa
<b>Test by:</b>	Andy Huang
<b>Test Date:</b>	2019-07-01

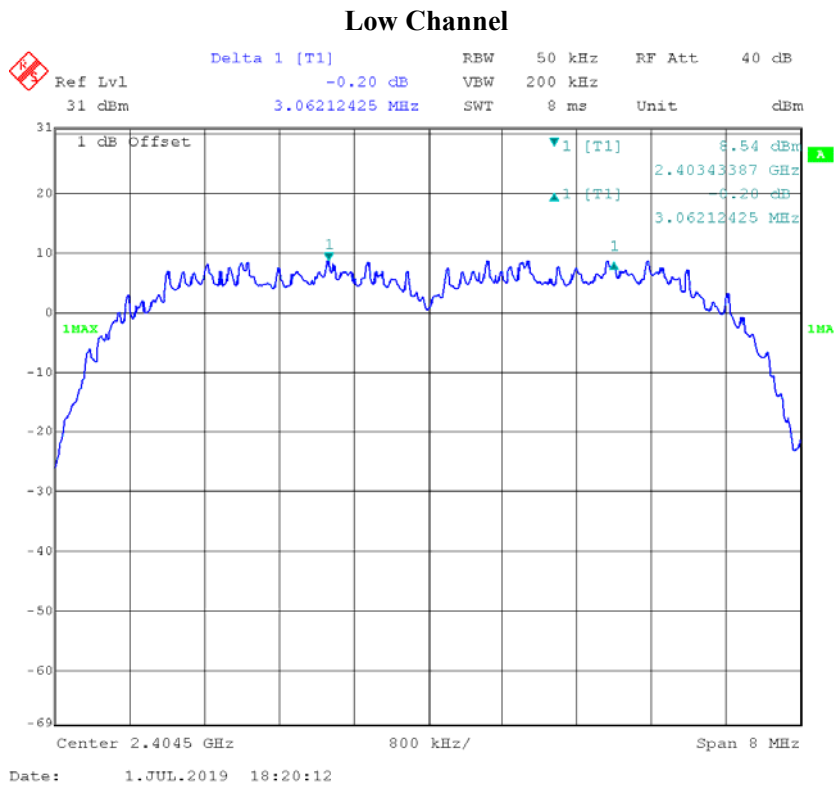
**Test Result:** Compliance.

Please refer to following tables and plots

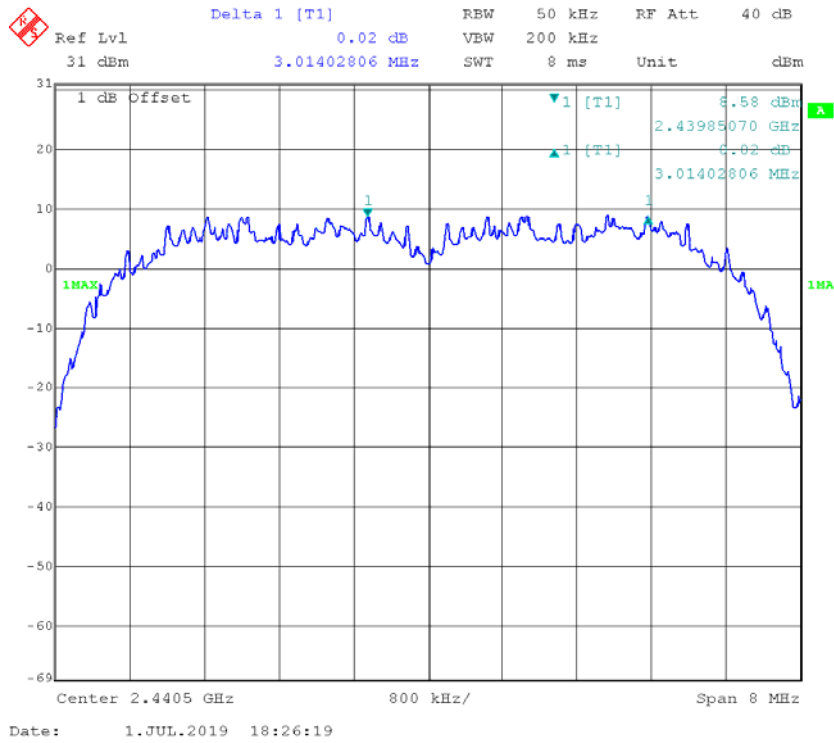
Test Mode: Transmitting

Channel	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)
Low	2403	3.062	2.98
Middle	2439	3.014	2.98
High	2478	3.014	2.98

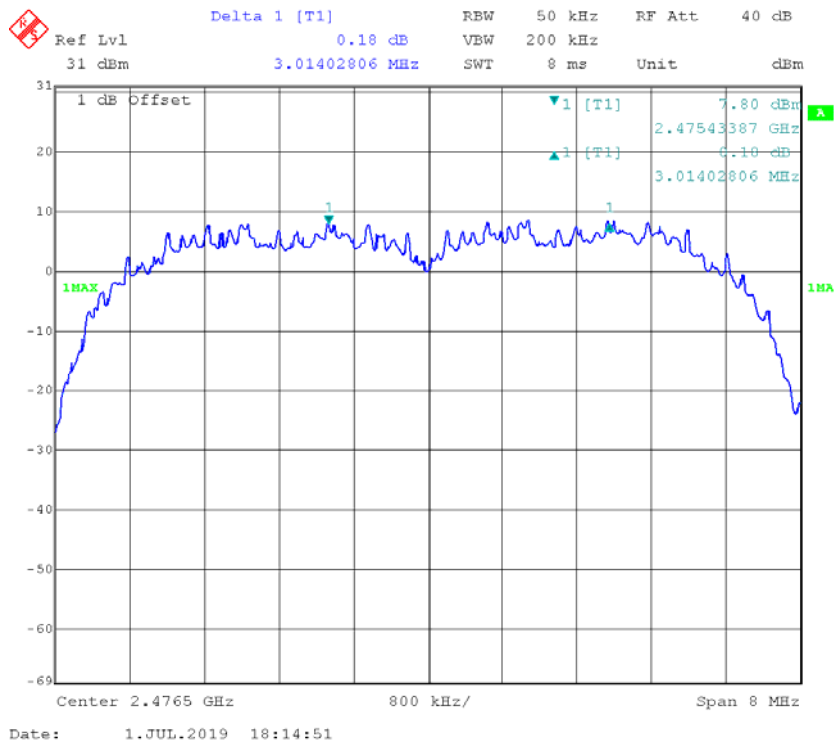
Note: Limit= (2/3) × 20dB bandwidth



### Middle Channel



### High Channel



## 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
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
Unknown	Coaxial Cable	C-SJ00-0010	C0011/02	Each time	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

<b>Temperature:</b>	55 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	100.5 kPa
<b>Test by:</b>	Andy Huang
<b>Test Date:</b>	2019-07-01

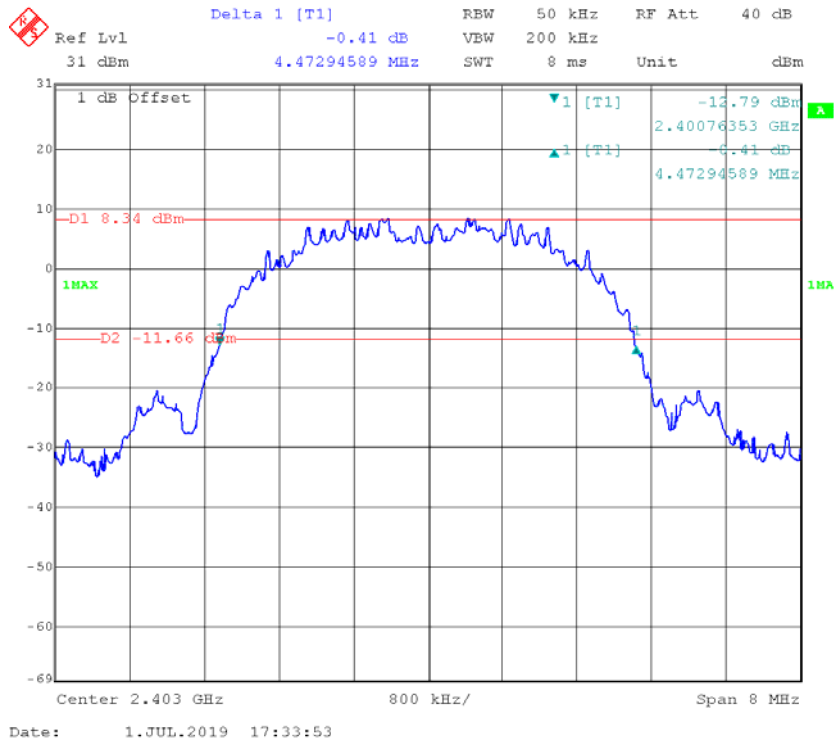
**Test Result:** Compliance.

Please refer to following tables and plots

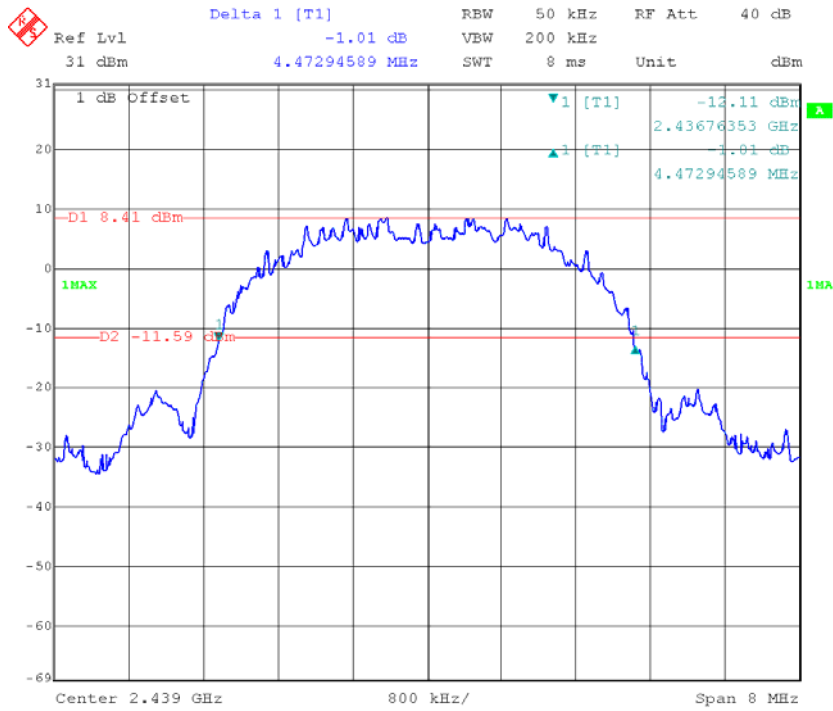
Test Mode: Transmitting

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2403	4.473
Middle	2439	4.473
High	2478	4.473

Low Channel

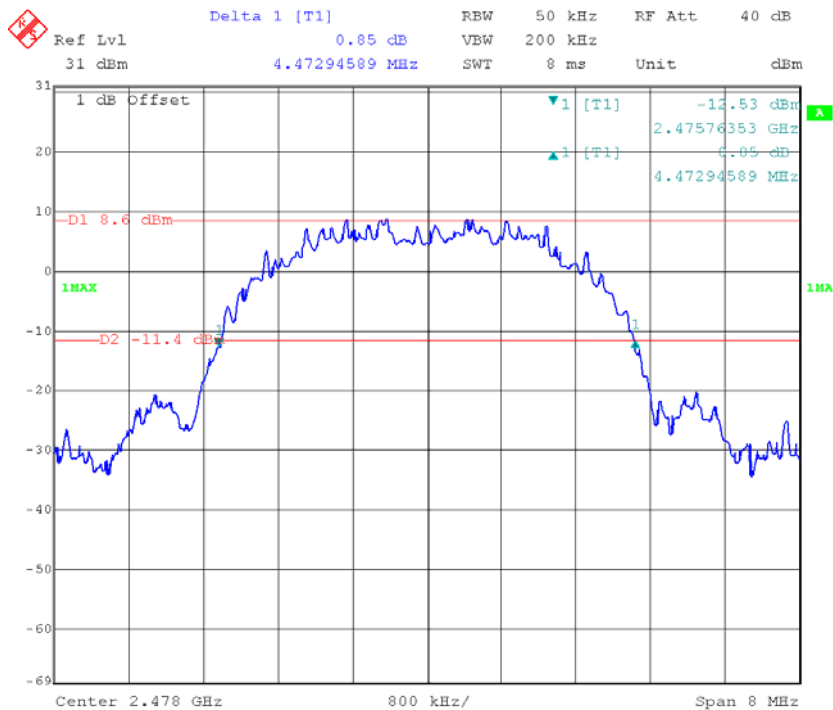


### Middle Channel



Date: 1.JUL.2019 17:37:50

### High Channel



Date: 1.JUL.2019 17:41:01



## **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**

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
R&S	Spectrum Analyzer	FSU 26	200256	2019-01-04	2020-01-04
Unknown	Coaxial Cable	C-SJ00-0010	C0011/02	Each time	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**

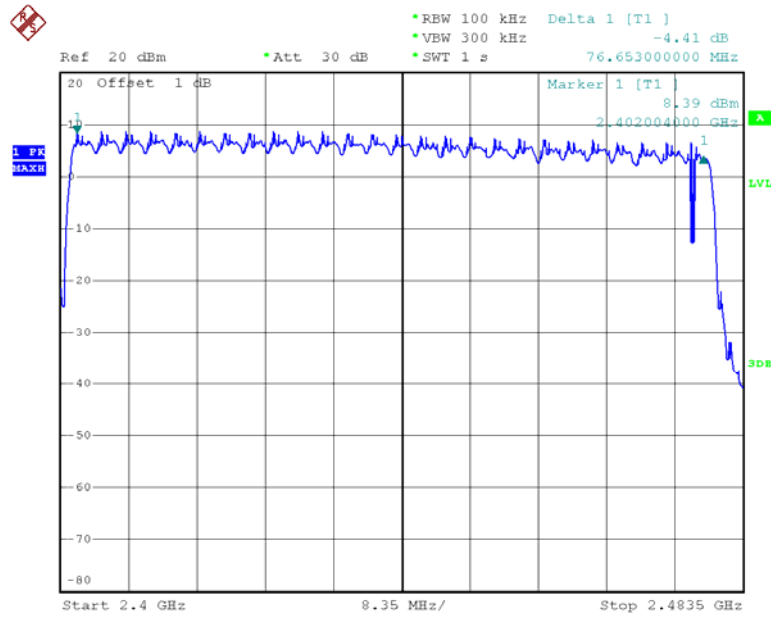
<b>Temperature:</b>	29.3 °C
<b>Relative Humidity:</b>	69 %
<b>ATM Pressure:</b>	100.5 kPa
<b>Test by:</b>	Andy Huang
<b>Test Date:</b>	2019-08-13

**Test Result:** Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	26	≥15



Date: 13.AUG.2019 15:14:43

## **FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)**

### **Applicable Standard**

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

### **Test Procedure**

The EUT was worked in channel hopping; the time of single pulses was tested.

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

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
Unknown	Coaxial Cable	C-SJ00-0010	C0011/02	Each time	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**

<b>Temperature:</b>	27.2°C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	100.2 kPa
<b>Test by:</b>	Andy Huang
<b>Test Date:</b>	2019-07-01

**Test Result:** Compliance.

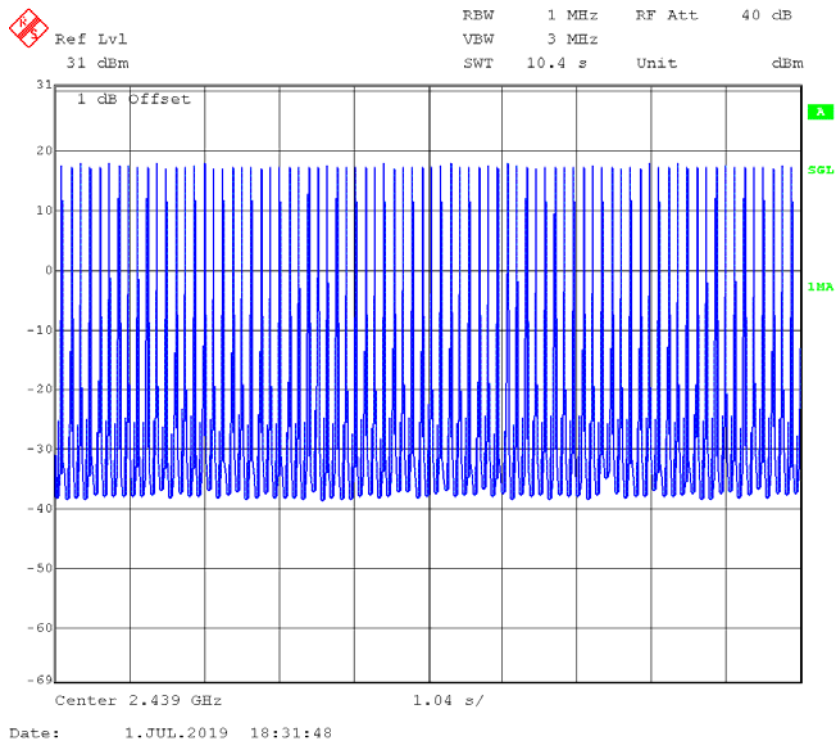
Please refer to following tables and plots

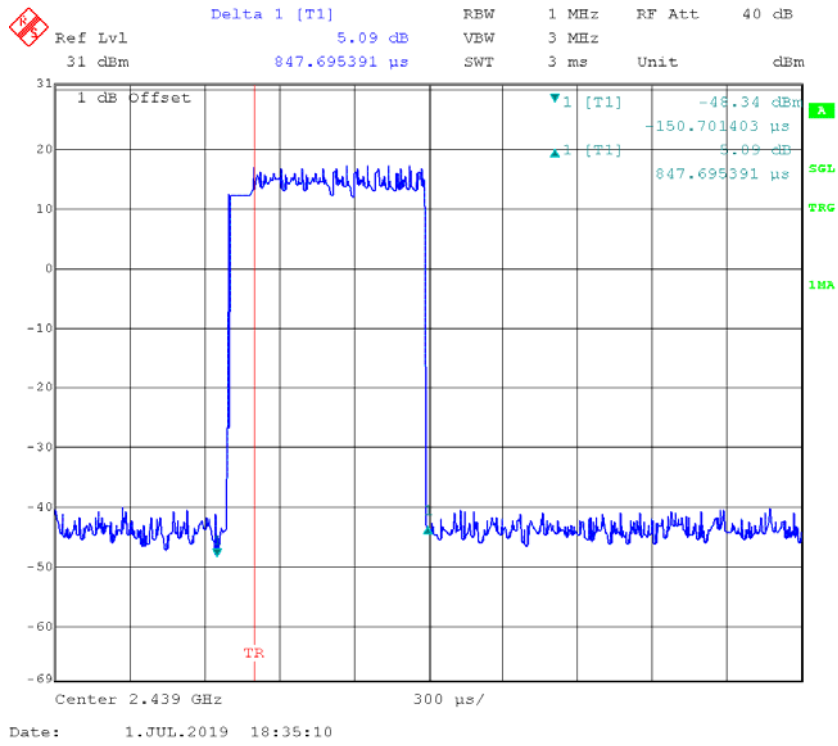
Test Mode: Transmitting

Channel	Frequency (MHz)	Pulse width (ms)	Hopping Numbers in period	Result (s)	Limit (s)
Middle	2439	0.848	78	0.066	0.4

Note:  
 Dwell time=Pulse time×Hopping numbers in period  
 Period=0.4\* Hopping numbers=0.4\*26=10.4(s)

### Hopping Number





## **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**

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
Agilent	USB Wideband Power Sensor	U2022XA	MY5417006	2018-12-10	2019-12-10
Unknown	Coaxial Cable	C-SJ00-0010	C0011/02	Each time	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**

<b>Temperature:</b>	55 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	100.5 kPa
<b>Test by:</b>	Andy Huang
<b>Test Date:</b>	2019-07-01

**Test Result:** Compliance.

*Test Mode: Transmitting*

<b>Frequency (MHz)</b>	<b>Peak Conducted Output power (dBm)</b>	<b>Limit (dBm)</b>
2403	16.73	21
2439	16.42	21
2478	16.72	21

Note: The data above was tested in conducted mode.

## FCC §15.247(d) - BAND EDGES TESTING

### Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW/ VBW of spectrum analyzer to 100/300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
Unknown	Coaxial Cable	C-SJ00-0010	C0011/02	Each time	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**

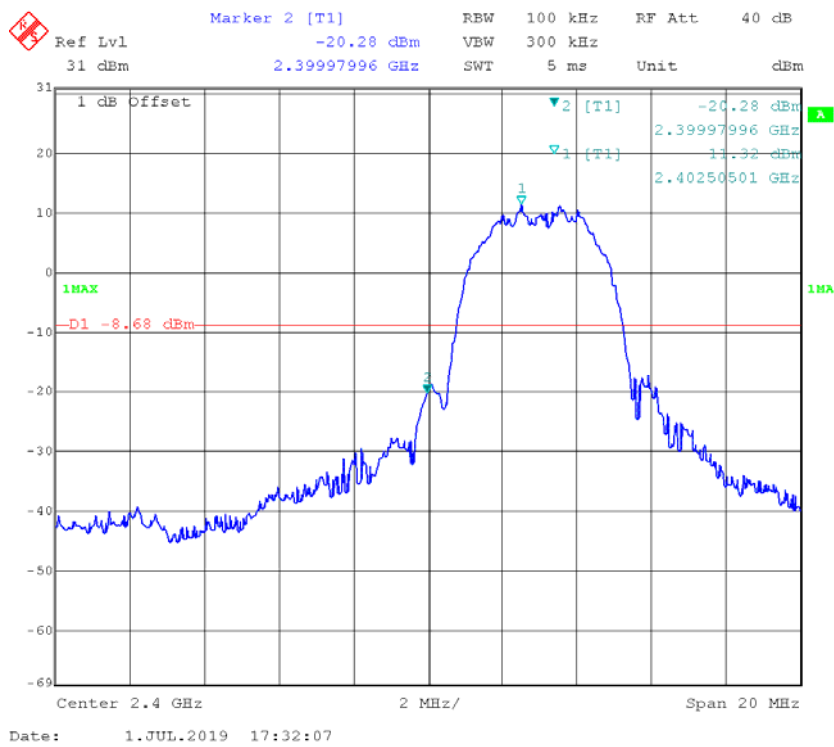
**Environmental Conditions**

<b>Temperature:</b>	55 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	100.5 kPa
<b>Test by:</b>	Andy Huang
<b>Test Date:</b>	2019-07-01

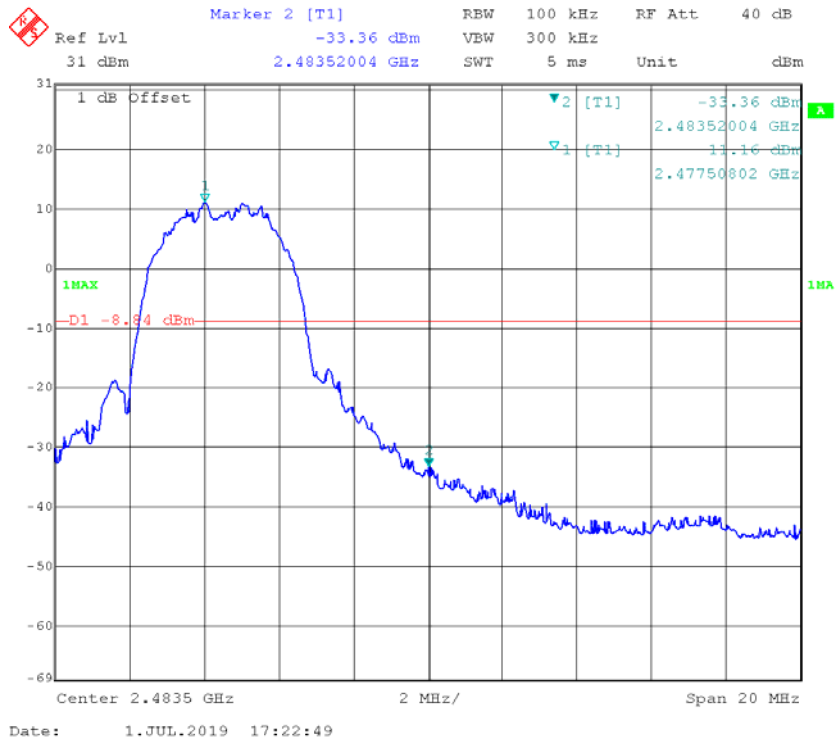
**Test Result:** Compliance

*Single Channel Mode,*

**Band Edge, Left Side**



### Band Edge, Right Side

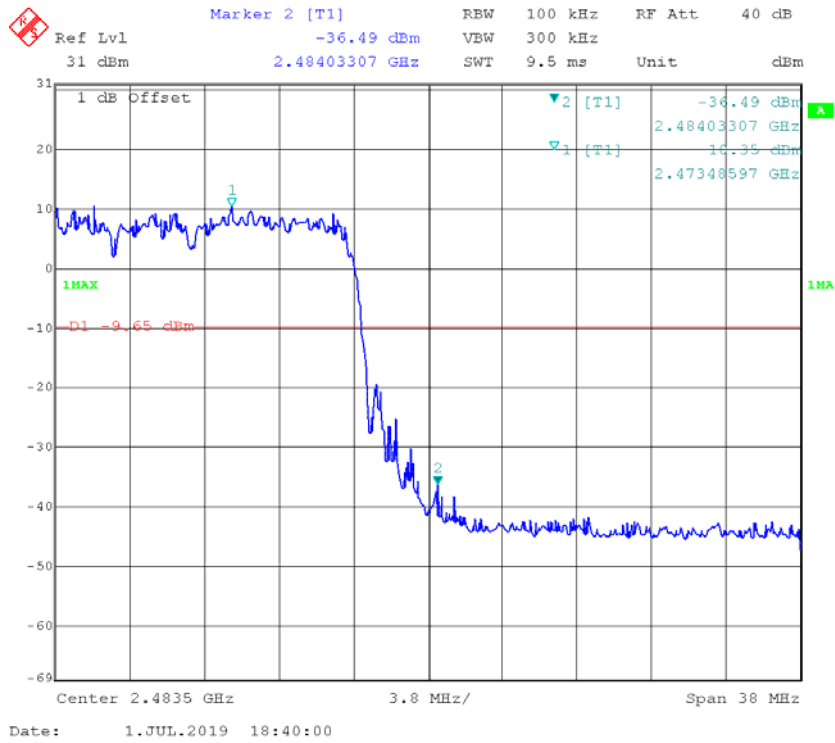


### Hopping Mode

### Band Edge, Left Side



**Band Edge, Right Side**



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