



# FCC PART 15.247 TEST REPORT

For

## Skyrocket Toys LLC

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

**FCC ID: O5301748TX24G**

<b>Report Type:</b> Original Report	<b>Product Name:</b> Spiderman Remote
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<b>Report Number:</b> RDG170301003	
<b>Report Date:</b> 2017-03-16	
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## **GENERAL INFORMATION**

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

The **Skyrocket Toys LLC**'s product, model number: **01749TX (FCC ID: O5301748TX24G)** (the "EUT") in this report was a **Spiderman Remote**, which was measured approximately: 15.5 cm (L) x 15.1 cm (W) x 5.5 cm (H), rated input voltage: DC4.5V from battery

*Note: The series product, model 01748, 01749TX are electrically identical with the same electromagnetic emissions and electromagnetic compatibility characteristics. The difference is 01749TX has a button more than 01748. we selected 01749TX for testing, and the details were explained in the attached declaration letter.*

*\*All measurement and test data in this report was gathered from final production sample, serial number: 170301003 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2017-03-01, and EUT conformed to test requirement.*

### **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 the EUT compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.247 rules.

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

Part of system submissions with FCC ID: O5301748RX24G.

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

## Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.62dB
Power Spectral Density, conducted	±0.62 dB
Unwanted Emissions, radiated	30M~200MHz: 4.7 dB for Horizontal, 4.7 dB for Vertical 200M~1GHz: 6.0 dB for Horizontal, 6.0 for Vertical 1G~6GHz: 5.13 dB, 6G~18GHz: 5.47 dB
Temperature	±1 °C
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.17 dB (150 kHz to 30 MHz)

## Test Facility

The test site used by BACL to collect test data is located in the 5040, HuiLongWan Plaza, No. 1, ShaWan Road, JinNiu District, ChengDu, China.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on April 24, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 560332. 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 a testing mode provided by manufacturer.

The device employed 15 channels as below list:

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)
2410	2431	2456
2413	2436	2461
2416	2441	2466
2421	2446	2469
2426	2452	2472

3channels were tested: 2410MHz, 2441MHz and 2472MHz

### Equipment Modifications

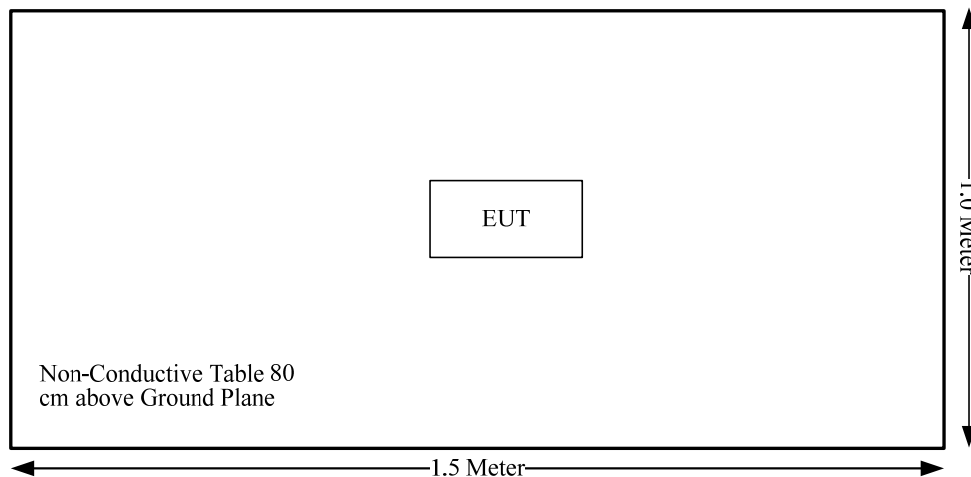
No modification was made to the EUT.

### EUT Exercise Software

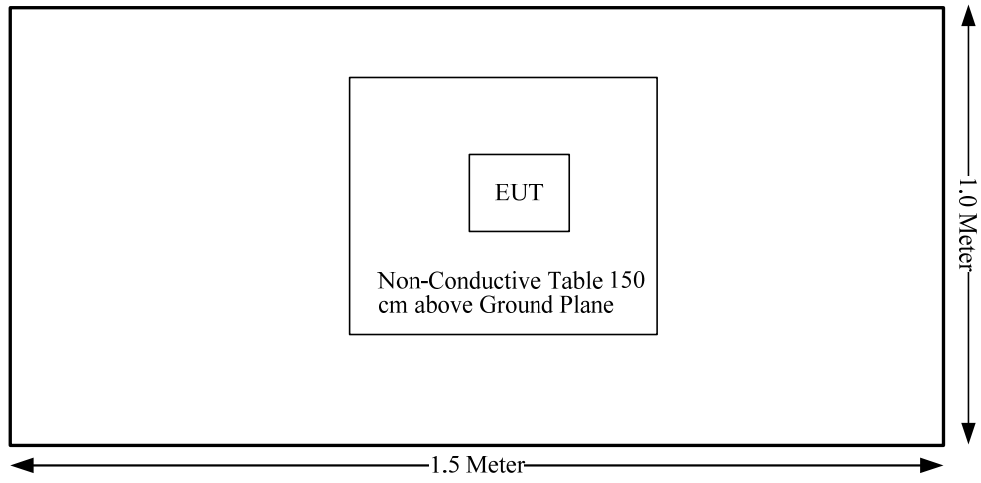
No software was used during testing. The maximum power was configured as default setting.

### Block Diagram of Test Setup

Radiation test below 1GHz:



Radiation test above 1GHz:



## **SUMMARY OF TEST RESULTS**

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<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
FCC §15.247 (i) & §1.1310 & §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Not Applicable
§15.205, §15.209, §15.247(d)	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

Note: Not Applicable: the device was powered by battery.



## **FCC §15.247 (i) & §1.1310 & §2.1093- RF EXPOSURE**

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### **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  $\leq 50$  mm are determined by:

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

- $f(\text{GHz})$  is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 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  $\leq 50$  mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is  $< 5$  mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

### **Measurement Result**

The maximum tune-up power including tolerance is 1 dBm (1.26mW).

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

**So the SAR evaluation is not necessary.**

## **FCC §15.203 - ANTENNA REQUIREMENT**

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### **Applicable Standard**

According to § 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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.
- c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

### **Antenna Connector Construction**

The EUT has 1 internal antenna, the antenna gain is 0 dBi, that fulfill the requirement of the item. Please refer to the internal 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  $U_{cispr}$  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. (Chengdu) is:

30M~200MHz: ±4.7 dB;

200M~1GHz: ±6.0 dB;

1G~6GHz: ±5.13dB;

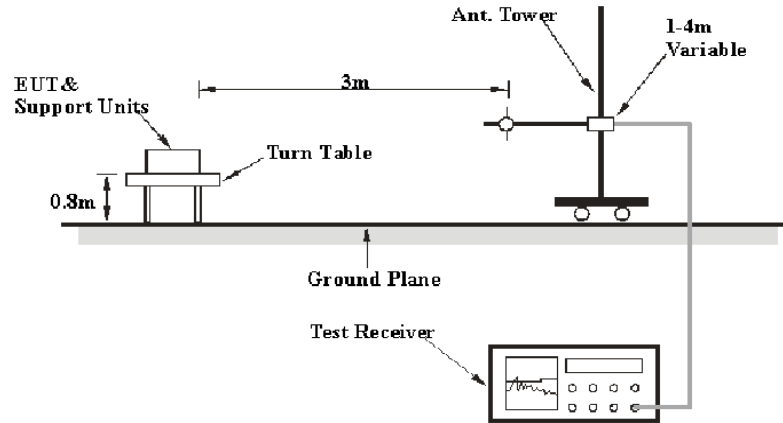
6G~25GHz: ±5.47 dB;

Table 1 – Values of  $U_{cispr}$

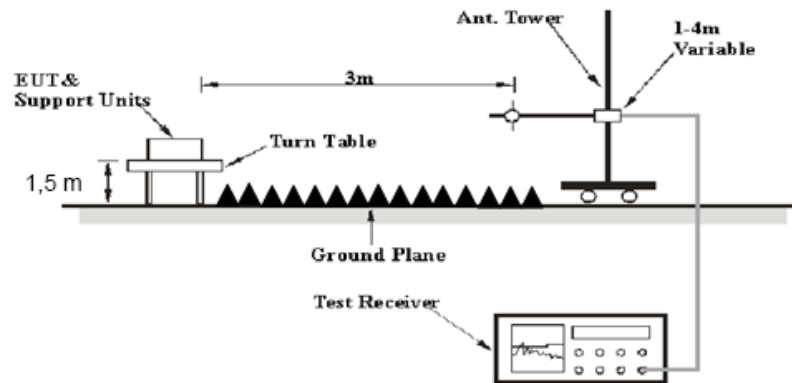
Measurement	$U_{cispr}$
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

## 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.

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	/	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
Agilent	Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A101808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-0113024	2014-06-16	2017-06-15
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2016-05-20	2017-05-19
HP	Amplifier	8449B	3008A00277	2016-12-02	2017-12-01
EMCT	Semi-Anechoic Chamber	966	N/A	2015-04-24	2018-04-23
N/A	RF Cable (below 1GHz)	NO.1	N/A	2016-11-10	2017-11-09
N/A	RF Cable (below 1GHz)	NO.4	N/A	2016-11-10	2017-11-09
N/A	RF Cable (above 1GHz)	NO.2	N/A	2016-11-10	2017-11-09

\* **Statement of Traceability:** BA CL (Chengdu) attested 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

<b>Temperature:</b>	23.8 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	99.8 kPa

*\* The testing was performed by Kevin Hu on 2017-03-12.*

*Test Mode: Transmitting*

**30MHz to 25 GHz(01749TX was the worst):**

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	FCC 15.247	
	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dBµV/m)	Margin (dB)
Low Channel: 2410 MHz									
2410	64.38	PK	H	23.51	3.00	0.00	90.89	N/A	N/A
2410	61.28	AV	H	23.51	3.00	0.00	87.79	N/A	N/A
2410	59.47	PK	V	23.51	3.00	0.00	85.98	N/A	N/A
2410	56.37	AV	V	23.51	3.00	0.00	82.88	N/A	N/A
2390	33.59	PK	H	23.57	3.00	0.00	60.16	74.00	13.84
2390	20.61	AV	H	23.57	3.00	0.00	47.18	54.00	6.82
4820	43.28	PK	H	30.82	5.12	26.87	52.35	74.00	21.65
4820	33.16	AV	H	30.82	5.12	26.87	42.23	54.00	11.77
7230	41.07	PK	H	34.76	6.18	26.36	55.65	74.00	18.35
7230	30.66	AV	H	34.76	6.18	26.36	45.24	54.00	8.76
9640	40.04	PK	H	37.08	7.80	26.20	58.72	74.00	15.28
9640	29.35	AV	H	37.08	7.80	26.20	48.03	54.00	5.97
2623	47.16	PK	H	23.45	3.10	26.77	46.94	74.00	27.06
2623	37.71	AV	H	23.45	3.10	26.77	37.49	54.00	16.51
49.4	39.6	QP	H	9.10	0.41	28.48	20.63	40.00	19.37
498.51	29.9	QP	H	18.11	1.61	28.81	20.81	46.00	25.19
Middle Channel: 2441 MHz									
2441	67.54	PK	H	23.40	3.00	0.00	93.94	N/A	N/A
2441	65.32	AV	H	23.40	3.00	0.00	91.72	N/A	N/A
2441	56.4	PK	V	23.40	3.00	0.00	82.80	N/A	N/A
2441	52.85	AV	V	23.40	3.00	0.00	79.25	N/A	N/A
4882	44.55	PK	H	31.02	5.09	26.87	53.79	74.00	20.21
4882	34.07	AV	H	31.02	5.09	26.87	43.31	54.00	10.69
7323	41.85	PK	H	34.95	6.22	26.40	56.62	74.00	17.38
7323	31.57	AV	H	34.95	6.22	26.40	46.34	54.00	7.66
9764	38.97	PK	H	37.16	7.71	26.27	57.57	74.00	16.43
9764	28.55	AV	H	37.16	7.71	26.27	47.15	54.00	6.85
2352	43.58	PK	H	23.70	3.01	26.87	43.42	74.00	30.58
2352	34.06	AV	H	23.70	3.01	26.87	33.90	54.00	20.10
1856	43.93	PK	H	24.67	2.94	26.68	44.86	74.00	29.14
1856	33.71	AV	H	24.67	2.94	26.68	34.64	54.00	19.36
49.4	39.7	QP	H	9.10	0.41	28.48	20.73	40.00	19.27
498.51	29.7	QP	H	18.11	1.61	28.81	20.61	46.00	25.39
High Channel: 2472 MHz									
2472	66.06	PK	H	23.30	2.99	0.00	92.35	N/A	N/A
2472	62.55	AV	H	23.30	2.99	0.00	88.84	N/A	N/A
2472	60.01	PK	V	23.30	2.99	0.00	86.30	N/A	N/A
2472	56.09	AV	V	23.30	2.99	0.00	82.38	N/A	N/A
2483.5	35.08	PK	H	23.26	2.99	0.00	61.33	74.00	12.67
2483.5	21.73	AV	H	23.26	2.99	0.00	47.98	54.00	6.02
4944	43.25	PK	H	31.22	5.06	26.88	52.65	74.00	21.35
4944	33.04	AV	H	31.22	5.06	26.88	42.44	54.00	11.56
7416	40.94	PK	H	35.13	6.26	26.44	55.89	74.00	18.11
7416	30.95	AV	H	35.13	6.26	26.44	45.90	54.00	8.10
9888	40.03	PK	H	37.23	7.62	26.35	58.53	74.00	15.47
9888	29.16	AV	H	37.23	7.62	26.35	47.66	54.00	6.34
2623	47.22	PK	H	23.45	3.10	26.77	47.00	74.00	27.00
2623	37.27	AV	H	23.45	3.10	26.77	37.05	54.00	16.95
49.4	39.5	QP	H	9.10	0.41	28.48	20.53	40.00	19.47
498.51	30.2	QP	H	18.11	1.61	28.81	21.11	46.00	24.89

## **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**

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
N/A	RF Cable	N/A	N/A	Each Time	/

\* **Statement of Traceability:** BACL (Chengdu) attested 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 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>	25.5 °C
<b>Relative Humidity:</b>	42 %
<b>ATM Pressure:</b>	96.8 kPa

\* *The testing was performed by Kevin Hu on 2017-03-09.*

**Test Result:** Compliance.

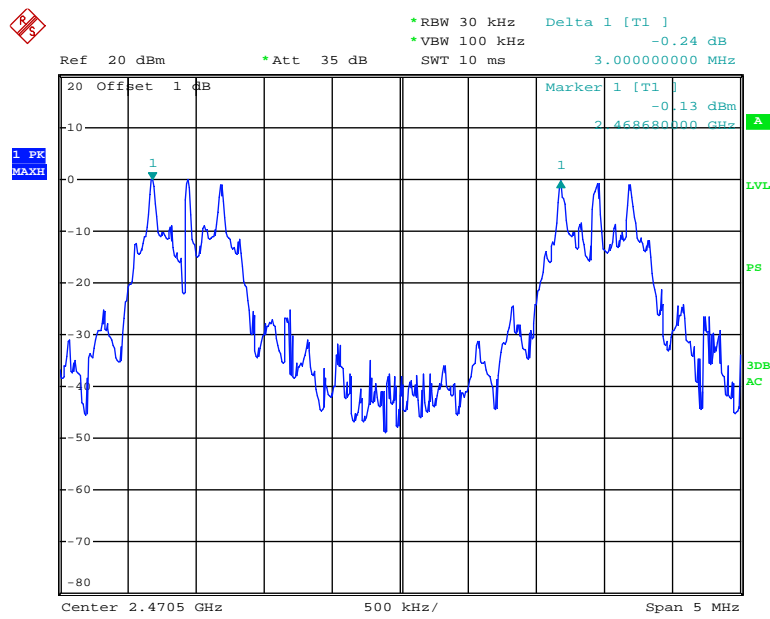
Please refer to following tables and plots



Test Mode: Transmitting

Channel	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)
High	2472	3	0.54
Adjacent	2469		

Note: Limit= (2/3)x 20dB bandwidth



Date: 9.MAR.2017 20:46:00

## 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	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
N/A	RF Cable	N/A	N/A	Each Time	/

\* **Statement of Traceability:** BAAC (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

### Test Data

#### Environmental Conditions

<b>Temperature:</b>	25.5 °C
<b>Relative Humidity:</b>	42 %
<b>ATM Pressure:</b>	96.8 kPa

\* The testing was performed by Kevin Hu on 2017-03-09.

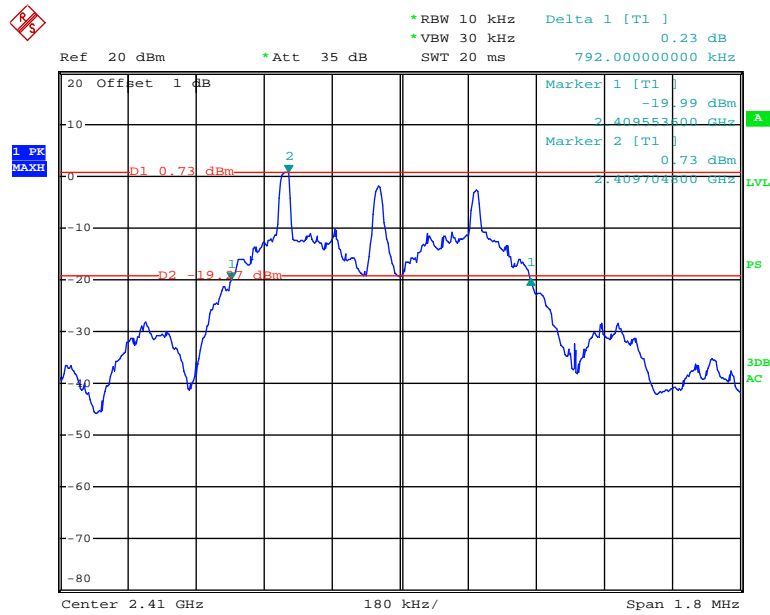
**Test Result:** Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

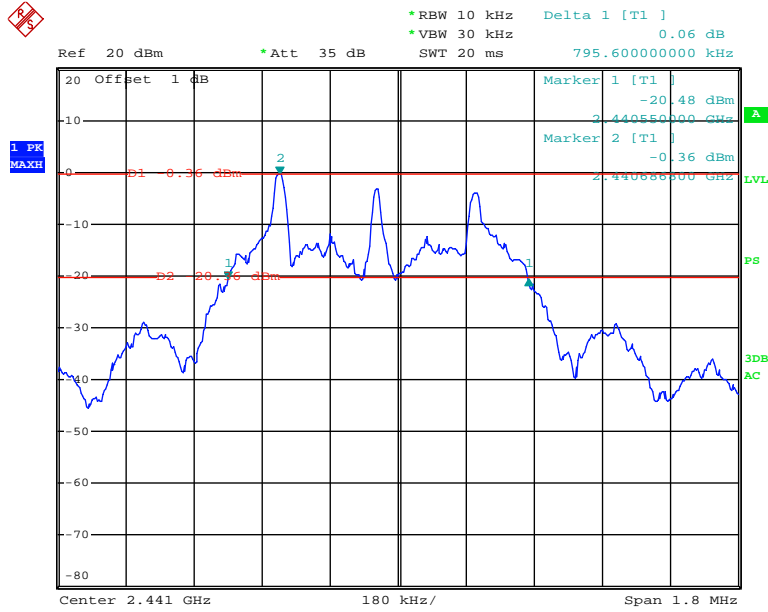
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2410	0.792
Middle	2441	0.796
High	2472	0.814

Low Channel



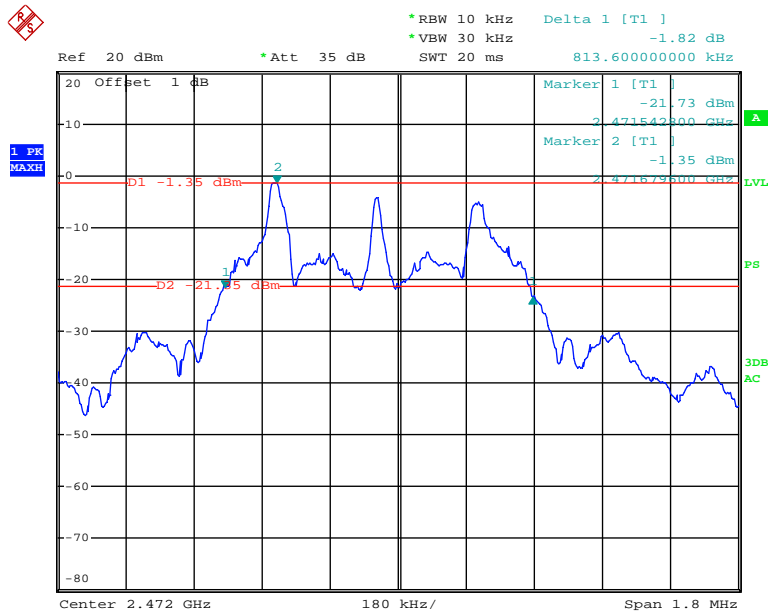
Date: 9.MAR.2017 22:35:23

### Middle Channel



Date: 9.MAR.2017 22:48:38

### High Channel



Date: 9.MAR.2017 22:55:19

## **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>
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
N/A	RF Cable	N/A	N/A	Each Time	/

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

### **Test Data**

#### **Environmental Conditions**

<b>Temperature:</b>	25.5 °C
<b>Relative Humidity:</b>	42 %
<b>ATM Pressure:</b>	96.8 kPa

\* *The testing was performed by Kevin Hu on 2017-03-09.*

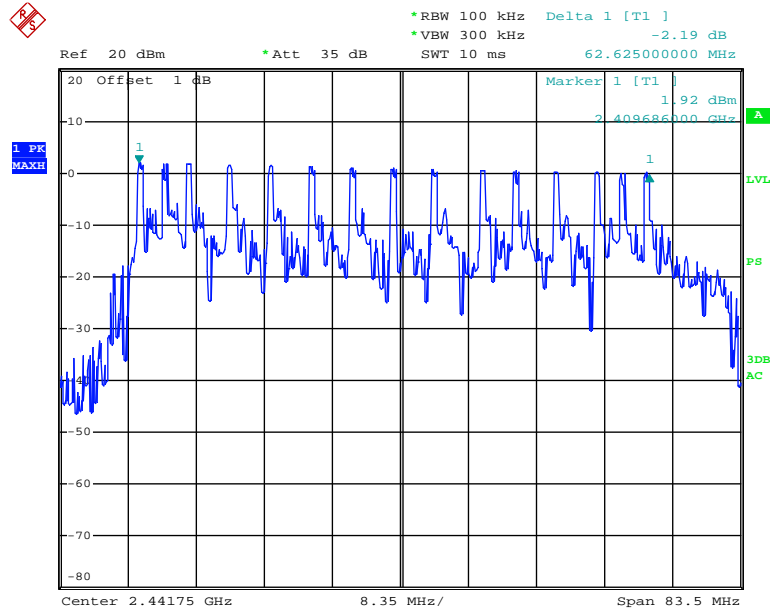
**Test Result:** Compliance.

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: 9.MAR.2017 20:37:34

## **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**

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
N/A	RF Cable	N/A	N/A	Each Time	/

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

### **Test Data**

#### **Environmental Conditions**

<b>Temperature:</b>	25.5 °C
<b>Relative Humidity:</b>	42 %
<b>ATM Pressure:</b>	96.8 kPa

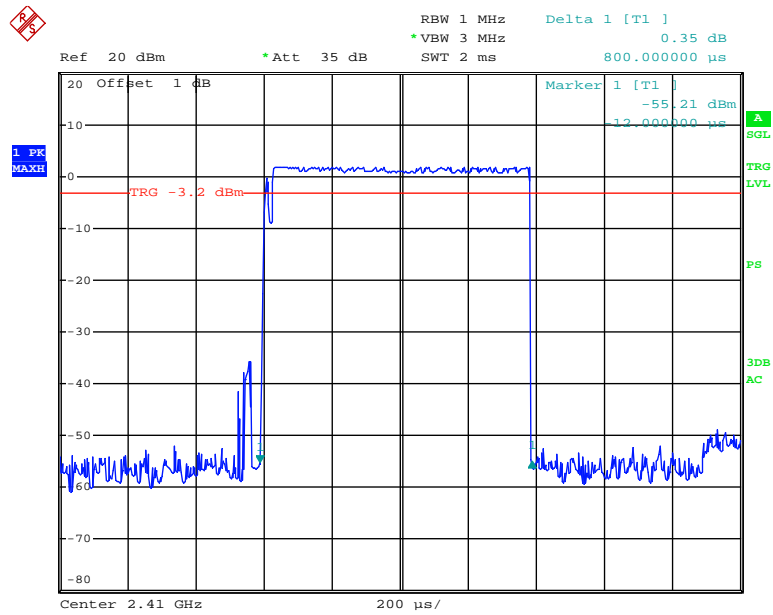
\* The testing was performed by Kevin Hu on 2017-03-09.

**Test Result:** Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
Low	0.800	0.064	0.4	Compliance
Note: Dwell time=Pulse width*200*15/15*0.4 The hopping rate is 200/s, that was declared by manufacturer				



Date: 9.MAR.2017 21:11:49



## 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
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
N/A	RF Cable	N/A	N/A	Each Time	/

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

### Test Data

#### Environmental Conditions

<b>Temperature:</b>	25.5 °C
<b>Relative Humidity:</b>	42 %
<b>ATM Pressure:</b>	96.8 kPa

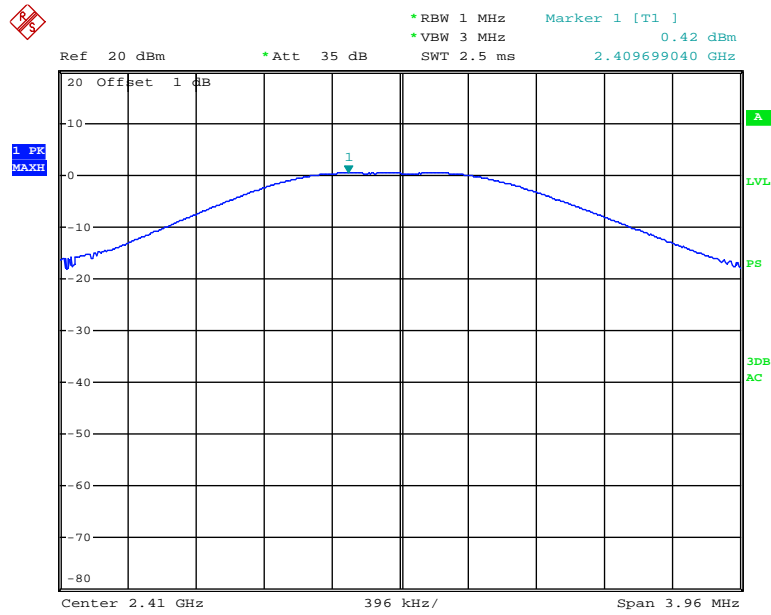
\* The testing was performed by Kevin Hu on 2017-03-09.

**Test Result:** Compliance.

Test Mode: Transmitting

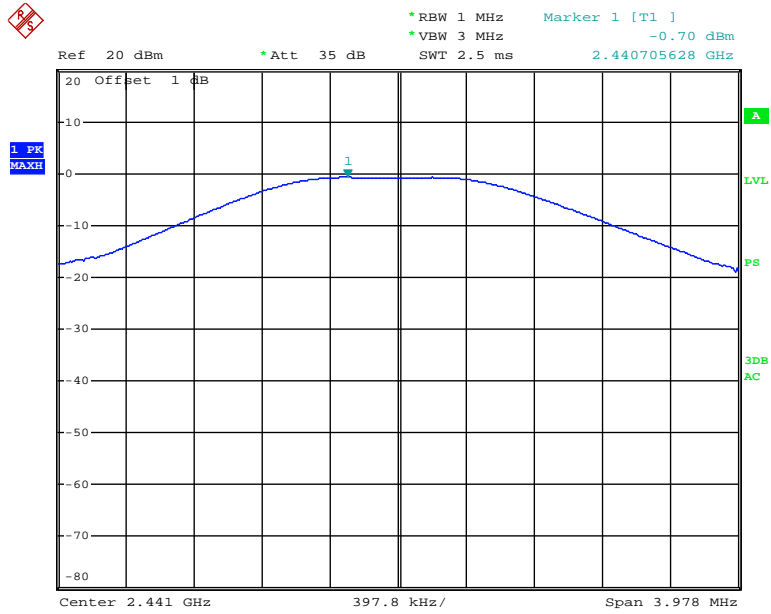
Channel	Frequency (MHz)	Output power (dBm)	Limit (dBm)
Low	2410	0.42	21
Middle	2441	-0.7	21
High	2472	-1.67	21

Output Power, Low Channel



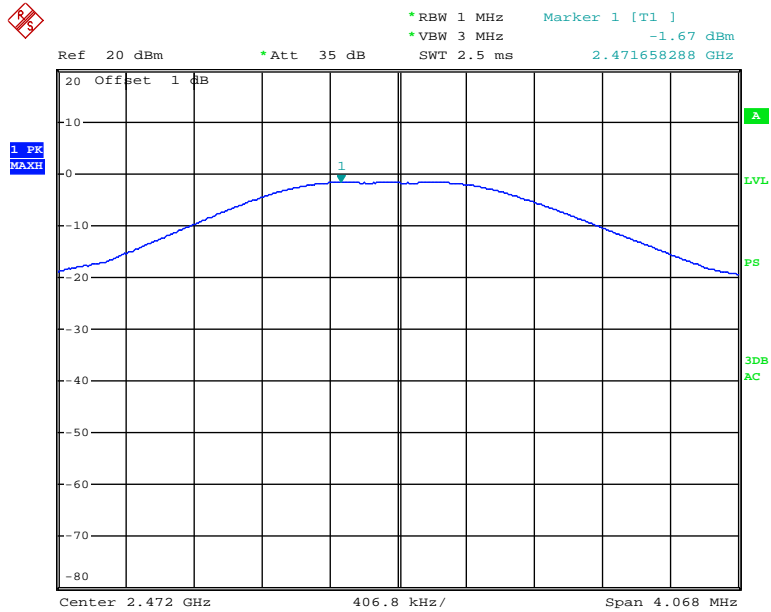
Date: 9.MAR.2017 22:43:35

### Output Power, Middle Channel



Date: 9.MAR.2017 22:49:51

### Output Power, High Channel



Date: 9.MAR.2017 22:57:16

## **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**

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
N/A	RF Cable	N/A	N/A	Each Time	/

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

### Test Data

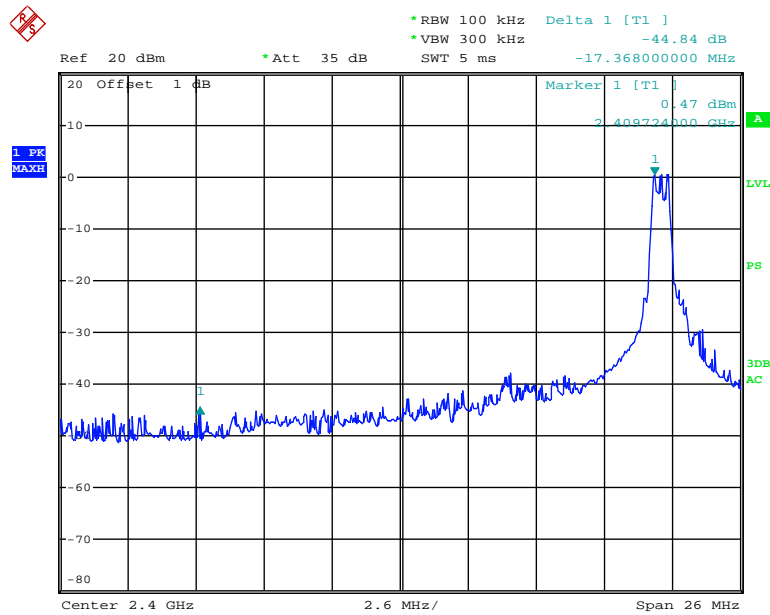
#### Environmental Conditions

Temperature:	25.5 °C
Relative Humidity:	42 %
ATM Pressure:	96.8 kPa

\* The testing was performed by Kevin Hu on 2017-03-09.

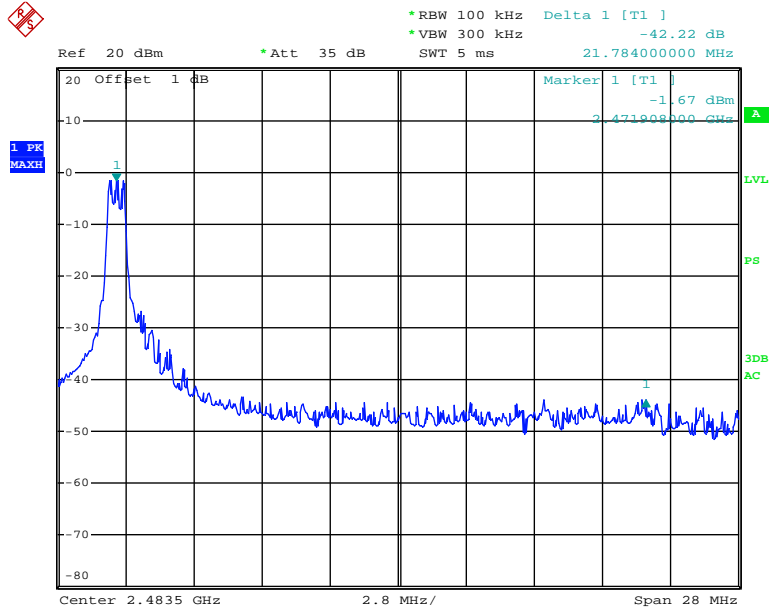
**Test Result:** Compliance

#### Band Edge, Left Side



Date: 9.MAR.2017 22:41:07

### Band Edge, Right Side



Date: 9.MAR.2017 22:59:12

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