



TESTING LABORATORY  
CERTIFICATE # 4821.01



## FCC PART 15.249

## TEST REPORT

For

### Feit Electric Company

4901 Gregg Road Pico Rivera, California, United States

**FCC ID: SYW-A1902**

<b>Report Type:</b> Original Report	<b>Product Type:</b> LED Lamp
<b>Report Number:</b> <u>RSZ180525551-00</u>	
<b>Report Date:</b>	<u>2018-06-25</u>
	Rocky Kang
<b>Reviewed By:</b>	<u>RF Engineer</u>
<b>Prepared By:</b>	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 <a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a>

**Note:** This report must not be used by the customer to claim product certification, approval, or endorsement by A2LA\* or any agency of the Federal Government. \* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk \*\*

## **TABLE OF CONTENTS**

<b>GENERAL INFORMATION.....</b>	<b>3</b>
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	3
OBJECTIVE .....	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY .....	3
MEASUREMENT UNCERTAINTY .....	3
<b>SYSTEM TEST CONFIGURATION.....</b>	<b>5</b>
JUSTIFICATION .....	5
EUT EXERCISE SOFTWARE .....	5
EQUIPMENT MODIFICATIONS .....	5
SUPPORT EQUIPMENT LIST AND DETAILS .....	5
EXTERNAL I/O CABLE.....	5
BLOCK DIAGRAM OF TEST SETUP .....	6
<b>SUMMARY OF TEST RESULTS.....</b>	<b>7</b>
<b>TEST EQUIPMENT LIST .....</b>	<b>8</b>
<b>FCC§15.203 - ANTENNA REQUIREMENT.....</b>	<b>9</b>
APPLICABLE STANDARD .....	9
ANTENNA CONNECTOR CONSTRUCTION .....	9
<b>FCC §15.207 – AC LINE CONDUCTED EMISSIONS.....</b>	<b>10</b>
APPLICABLE STANDARD .....	10
EUT SETUP .....	10
EMI TEST RECEIVER SETUP.....	10
TEST PROCEDURE .....	10
CORRECTED FACTOR & MARGIN CALCULATION .....	11
TEST RESULTS SUMMARY.....	11
TEST DATA .....	11
<b>FCC§15.205, §15.209 &amp; §15.249(D) - RADIATED EMISSIONS.....</b>	<b>14</b>
APPLICABLE STANDARD .....	14
TEST EQUIPMENT SETUP .....	14
EUT SETUP .....	15
TEST PROCEDURE .....	16
CORRECTED AMPLITUDE & MARGIN CALCULATION .....	16
TEST RESULTS SUMMARY.....	16
TEST DATA .....	16
<b>FCC§15.215(C) - 20DB EMISSION BANDWIDTH .....</b>	<b>24</b>
APPLICABLE STANDARD .....	24
TEST PROCEDURE .....	24
TEST DATA .....	24

## GENERAL INFORMATION

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

The *Feit Electric Company*'s product, model number: *OM60/927CA/MM/LED1* (*FCC ID: SYW-A1902*) in this report is a *LED Lamp*, which was measured approximately: 6.0 cm (L) \* 6.0 cm (W) \* 10.9 cm (H), rated with input voltage: AC 120 V/60 Hz.

*\* All measurement and test data in this report was gathered from production sample serial number: 1805046 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2018-05-25.*

### Objective

This type approval report is prepared on behalf of *Feit Electric Company* in accordance with Part 2-Subpart J, and Part 15-Subparts A and C of the Federal Communication Commissions 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 15.249 rules.

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

No related submittal(s).

### 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 radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

### Measurement Uncertainty

Parameter	uncertainty
Occupied Channel Bandwidth	±5%
RF Output Power with Power meter	±0.5dB
RF conducted test with spectrum	±1.5dB
AC Power Lines Conducted Emissions	±1.95dB
All emissions, radiated	±4.88dB
Temperature	±3 °C
Humidity	±6%
Supply voltages	±0.4%

## Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

## SYSTEM TEST CONFIGURATION

### Justification

The system was configured for testing by manufacturer.

Operating frequency: 5727-5764MHz

### EUT Exercise Software

No software was used.

### Equipment Modifications

No modifications were made to the unit tested.

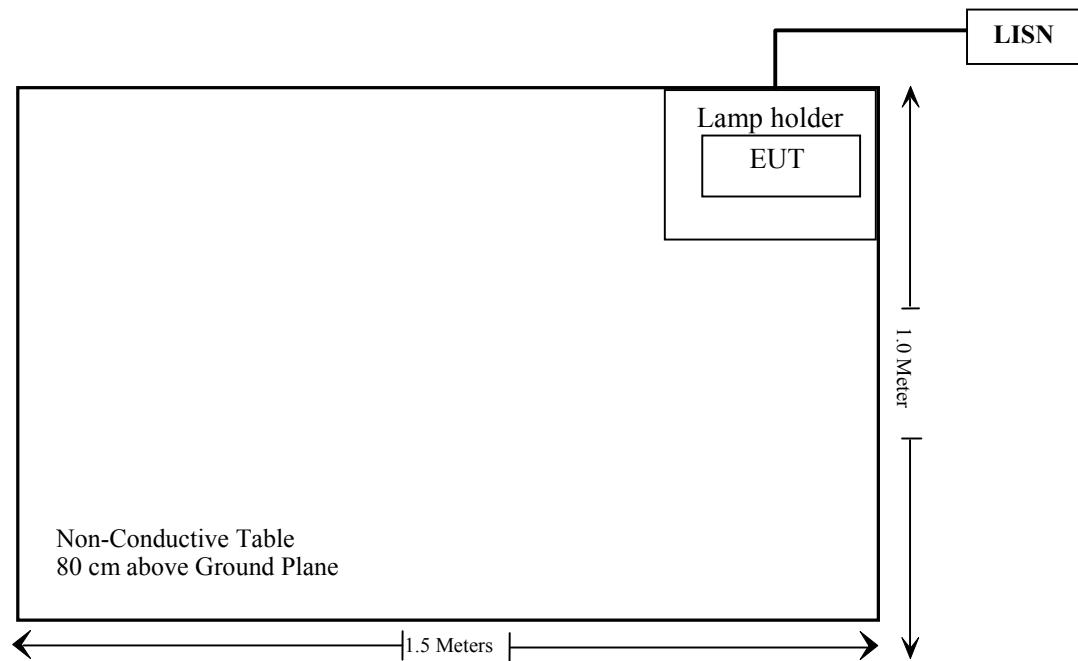
### Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
N/A	Lamp holder	N/A	N/A

### External I/O Cable

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

### Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conduction Emissions	Compliance
15.205, §15.209, §15.249(d)	Radiated Emissions& Outside of Band Emission	Compliance
§15.215 (c)	20 dB Bandwidth	Compliance

## TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>AC Line Conducted Emission Test</b>					
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2017-08-04	2018-08-04
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2017-12-21	2018-12-21
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2018-05-21	2018-11-19
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
<b>Radiated Emission Test</b>					
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017-12-28	2020-12-29
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2018-04-24	2019-04-24
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2017-12-17	2020-12-16
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2018-02-14	2019-02-14
HP	Amplifier	HP8447E	1937A01046	2018-05-21	2018-11-19
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2018-01-11	2019-01-11
Agilent	Spectrum Analyzer	8564E	3943A01781	2018-01-04	2019-01-04
Ducommun technologies	Horn Antenna	ARH-2823-02	1007726-04	NCR	NCR
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369 223410-001	2018-05-21	2018-11-19
Ducommun technologies	RF Cable	104PEA	218124002	2018-05-21	2018-11-19
Ducommun technologies	RF Cable	RG-214	1	2018-05-21	2018-11-19
Ducommun technologies	RF Cable	RG-214	2	2018-05-21	2018-11-19
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2017-12-29	2020-12-28
Ducommun Technologies	Pre-amplifier	ALN-22093530-01	991373-01	2017-08-03	2018-08-03

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

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

### **Applicable Standard**

According to FCC § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

### **Antenna Connector Construction**

The EUT has one Doppler antenna which was permanently attached and the antenna gain is 0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

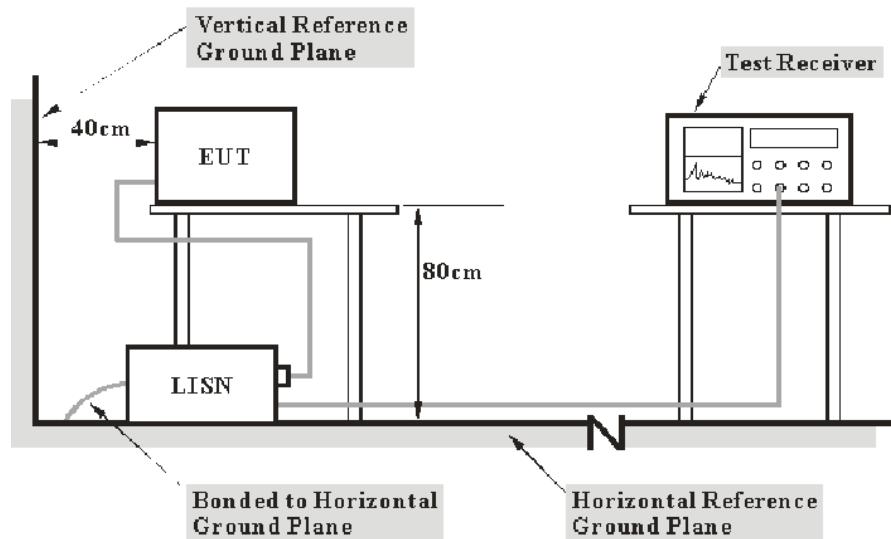
**Result:** Compliance.

## FCC §15.207 – AC LINE CONDUCTED EMISSIONS

### Applicable Standard

According to FCC §15.207

### 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 measurement procedure of EUT setup is according with per ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

### 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

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

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

## Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

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

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

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207,

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

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

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

## Test Data

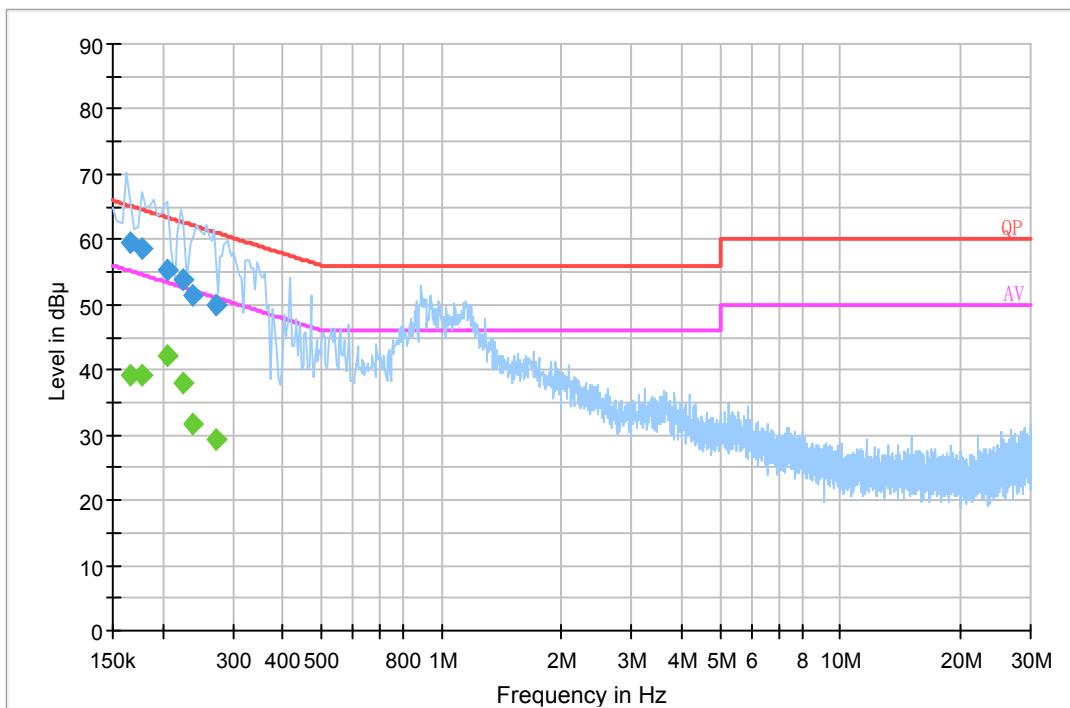
### Environmental Conditions

<b>Temperature:</b>	22 °C
<b>Relative Humidity:</b>	51 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Shawn Xiao on 2018-06-20.*

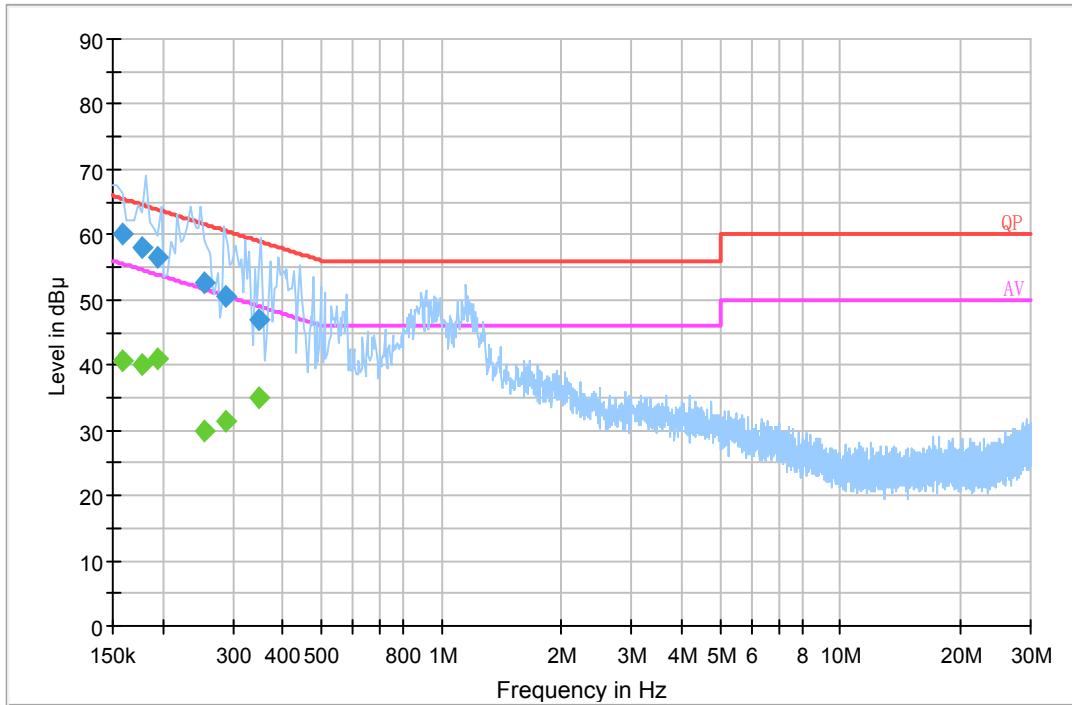
*EUT Operation Mode: Transmitting*

**AC 120V/60 Hz, Line**



Frequency (MHz)	Corrected Amplitude (dB $\mu$ V)	Corrected Factor (dB)	Limit (dB $\mu$ V)	Margin (dB)	Remark (PK/QP/Ave.)
0.166501	59.6	20.1	65.1	5.5	QP
0.177500	58.5	20.1	64.6	6.1	QP
0.205500	55.4	20.1	63.4	8.0	QP
0.225500	53.8	20.1	62.6	8.8	QP
0.237500	51.4	20.1	62.2	10.8	QP
0.273500	50.0	20.1	61.0	11.0	QP
0.166501	39.0	20.1	55.1	16.1	Ave.
0.177500	39.2	20.1	54.6	15.4	Ave.
0.205500	42.1	20.1	53.4	11.3	Ave.
0.225500	38.1	20.1	52.6	14.5	Ave.
0.237500	31.6	20.1	52.2	20.6	Ave.
0.273500	29.2	20.1	51.0	21.8	Ave.

## AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dB $\mu$ V)	Corrected Factor (dB)	Limit (dB $\mu$ V)	Margin (dB)	Remark (PK/QP/Ave.)
0.158000	60.2	20.1	65.6	5.4	QP
0.177500	58.1	20.1	64.6	6.5	QP
0.193500	56.7	20.1	63.9	7.2	QP
0.254500	52.5	20.1	61.6	9.1	QP
0.289500	50.5	20.1	60.5	10.0	QP
0.348690	46.9	20.1	59.0	12.1	QP
0.158000	40.7	20.1	55.6	14.9	Ave.
0.177500	40.2	20.1	54.6	14.4	Ave.
0.193500	41.1	20.1	53.9	12.8	Ave.
0.254500	30.0	20.1	51.6	21.6	Ave.
0.289500	31.5	20.1	50.5	19.0	Ave.
0.348690	35.0	20.1	49.0	14.0	Ave.

**Note:**

- 1) Correction Factor =LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation  
The corrected factor has been input into the transducer of the test software.
- 2) Corrected Amplitude = Reading + Correction Factor
- 3) Margin = Limit – Corrected Amplitude

**FCC§15.205, §15.209 & §15.249(d) - RADIATED EMISSIONS****Applicable Standard**

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

As per FCC§15.249 (d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

**Test Equipment Setup**

The spectrum analyzer or receiver is set as:

Below 1000MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

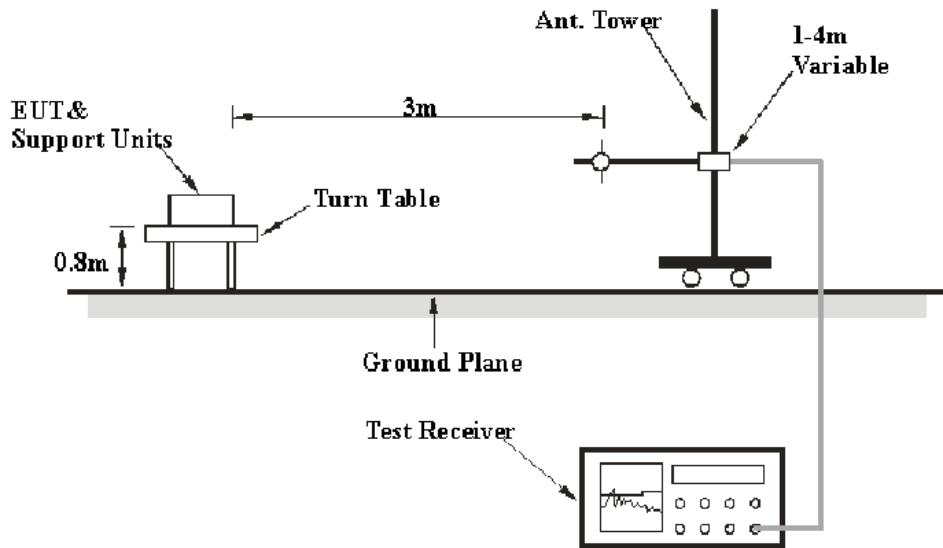
Above 1000MHz:

Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto

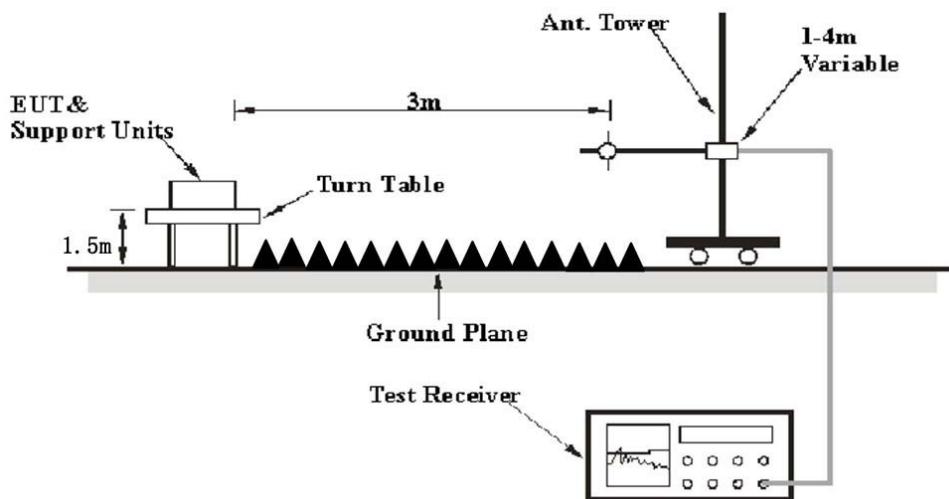
Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

## EUT Setup

Below 1G:



Above 1GHz:



The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209/15.205 and FCC 15.249 limits.

## Test Procedure

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

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane for below 1GHz or 1.5 meter for above 1GHz, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

## Corrected Amplitude & Margin Calculation

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

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

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

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

## Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.205, 15.209 & §15.249

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

$$L_m + U_{(Lm)} \leq L_{\text{lim}} + U_{\text{cisp}}$$

In BACL,  $U_{(Lm)}$  is less than  $U_{\text{cisp}}$ , if  $L_m$  is less than  $L_{\text{lim}}$ , it implies that the EUT complies with the limit.

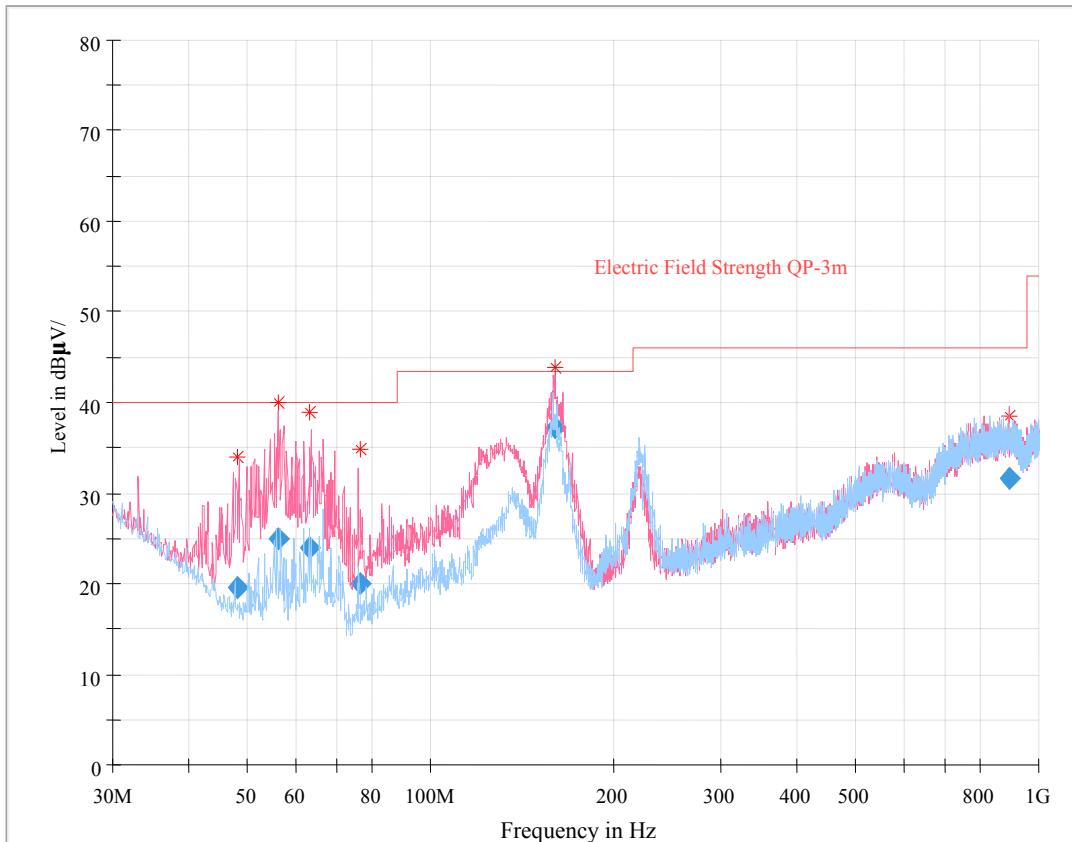
## Test Data

### Environmental Conditions

Temperature:	22 °C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

*The testing was performed by Shawn Xiao on 2018-06-21.*

*Test Mode: Transmitting*

**30MHz – 1 GHz:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBuV/m)	FCC Part 15.249&15.209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H / V)			Limit (dBuV/m)	Margin (dB)
48.020625	29.72	QP	0.0	100.0	V	-10.1	19.62	40.00	20.38
56.318875	36.26	QP	260.0	112.0	V	-11.3	24.96	40.00	15.04
63.100750	36.36	QP	345.0	105.0	V	-11.8	24.56	40.00	15.44
76.344500	32.30	QP	10.0	116.0	V	-11.8	20.05	40.00	19.95
160.378500	42.13	QP	240.0	100.0	V	-4.9	37.23	43.50	6.27
894.872750	21.55	QP	250.0	382.0	V	10.1	31.65	46.00	14.35

**1000 MHz~40 GHz:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dB $\mu$ V/m)	FCC Part 15.249&15.209	
	Reading (dB $\mu$ V)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dB $\mu$ V/m)	Margin (dB)
5762.00	74.87	PK	247	2.3	H	7.48	82.35	114	31.65
5762.00	74.41	Ave.	247	2.3	H	7.48	81.89	94	12.11
5762.00	80.43	PK	300	1.4	V	7.48	87.91	114	26.09
5762.00	79.69	Ave.	300	1.4	V	7.48	87.17	94	6.83
5725.00	46.50	PK	254	1.0	V	7.75	54.25	74	19.75
5725.00	44.93	Ave.	254	1.0	V	7.75	52.68	54	1.32
5875.00	41.66	PK	235	1.8	V	8.18	49.84	74	24.16
5875.00	28.58	Ave.	235	1.8	V	8.18	36.76	54	17.24
11569.00	40.41	PK	190	1.1	V	19.17	59.58	74	14.42
11569.00	24.07	Ave.	251	2.3	V	19.17	43.24	54	10.76

**Note:**

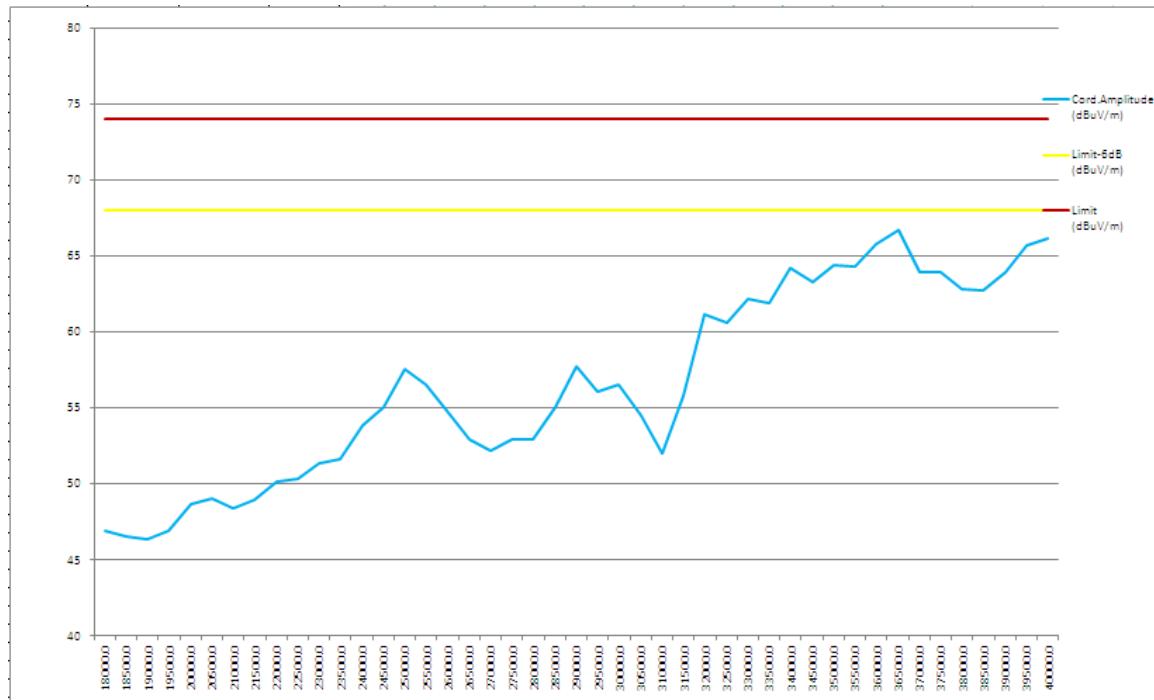
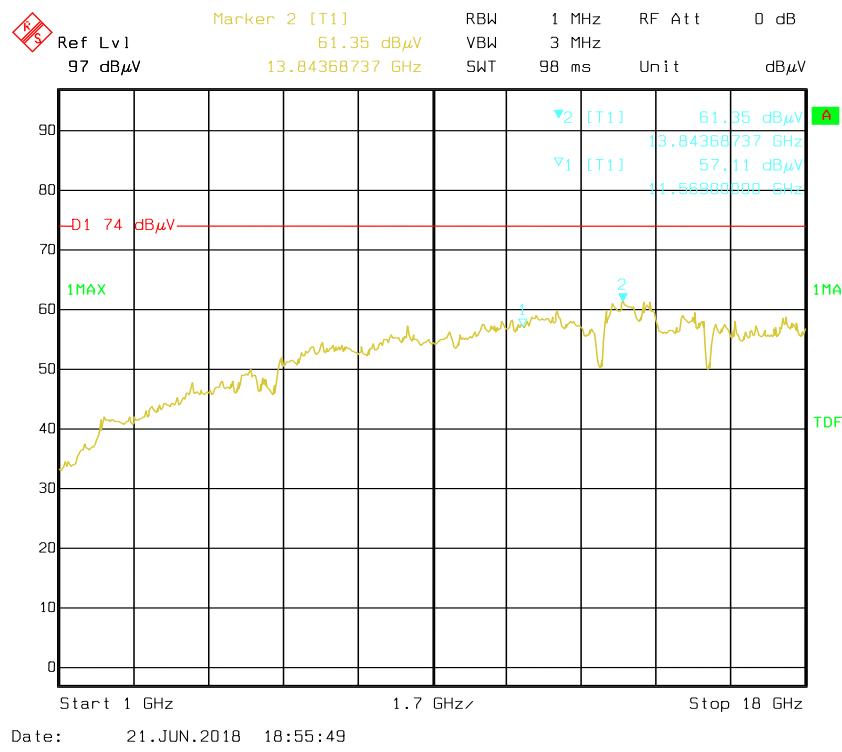
Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor (RX) +cable loss – amplifier factor

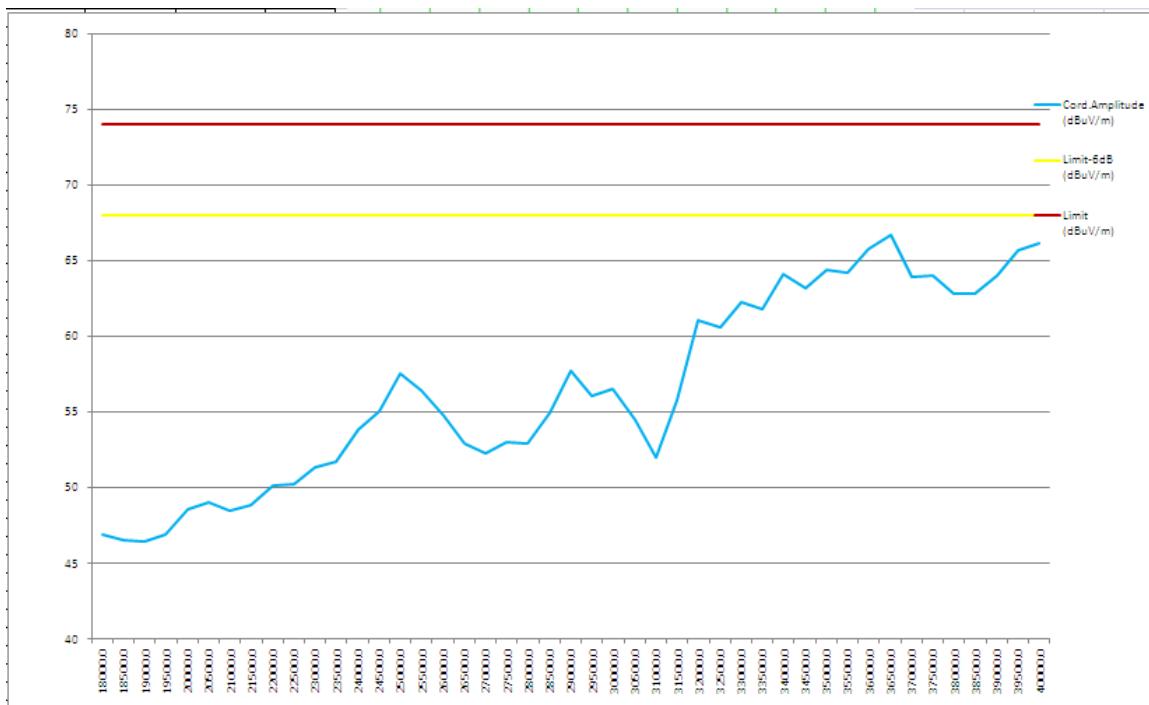
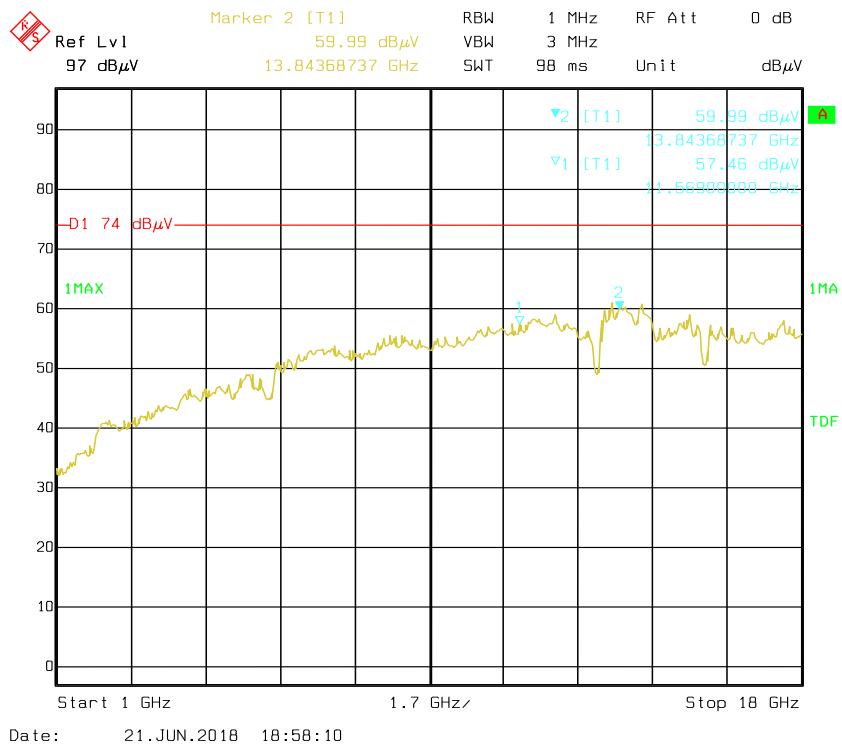
Margin = Limit- Corr. Amplitude

The emission more than 20dB below the limit was not required to be recorded.

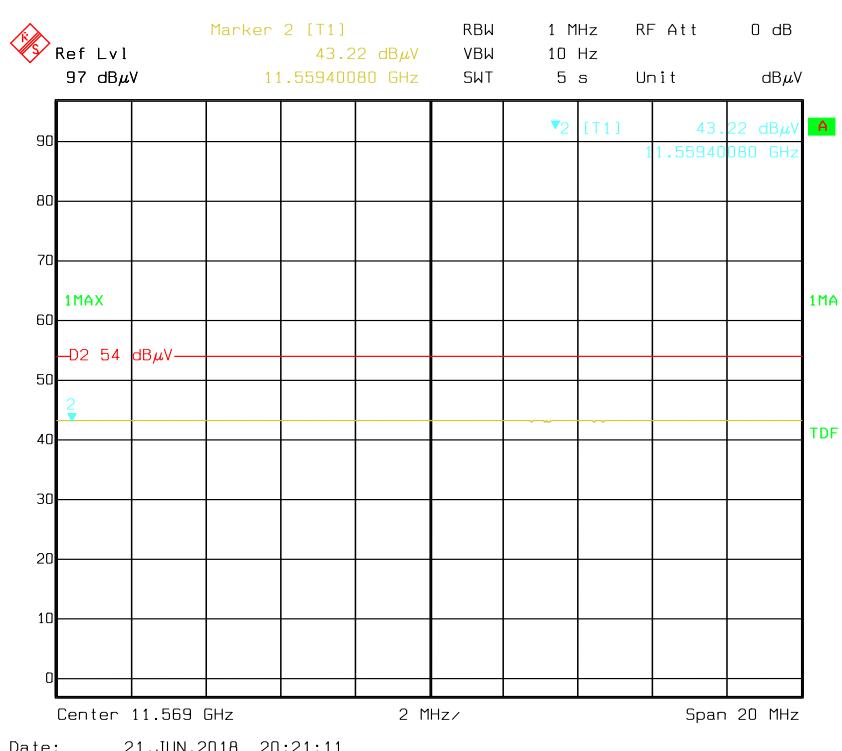
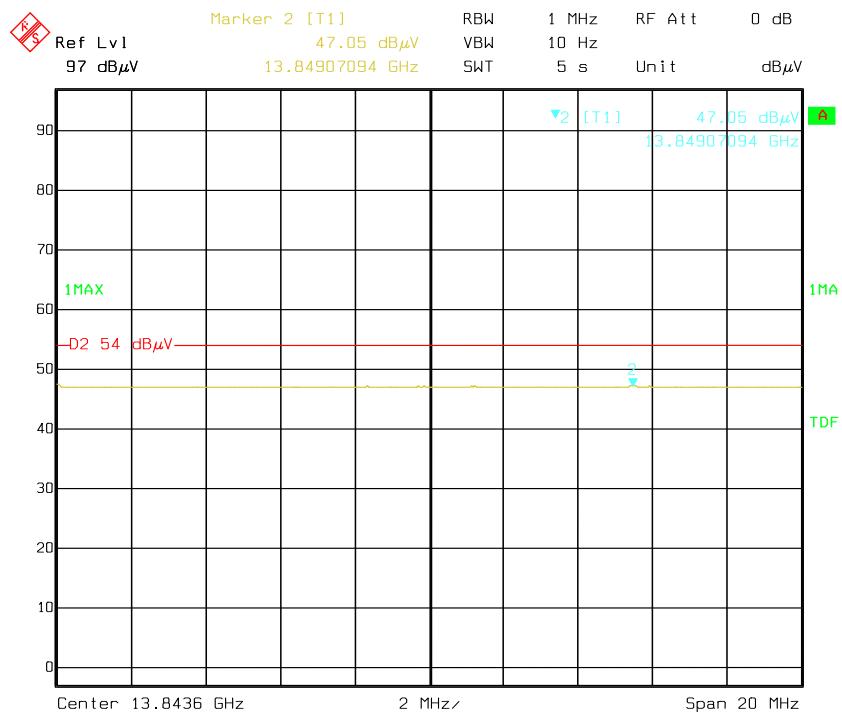
### Pre-scan with Peak Horizontal

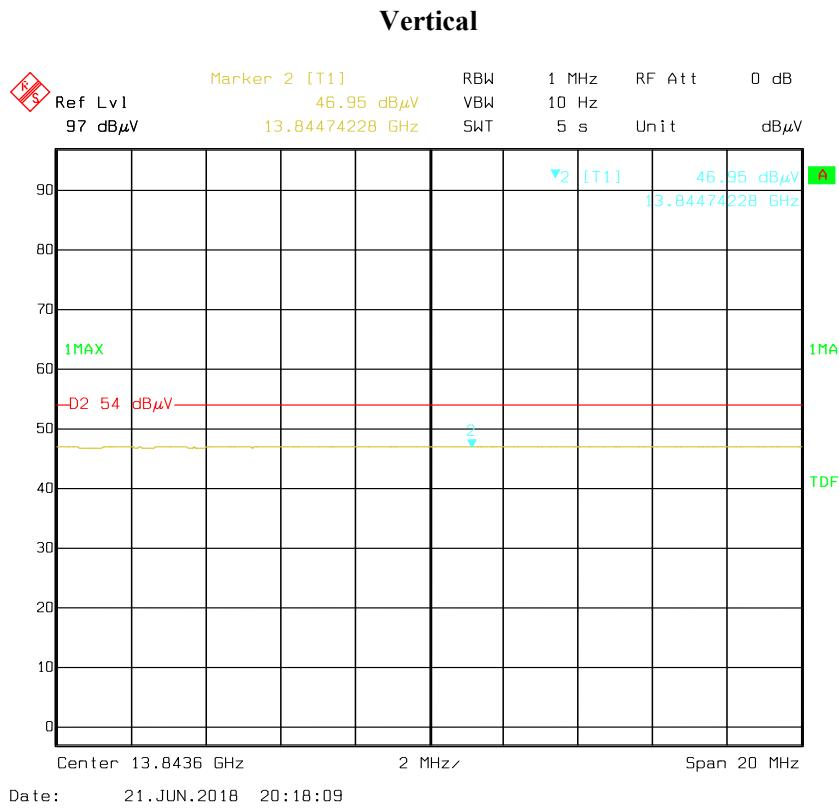
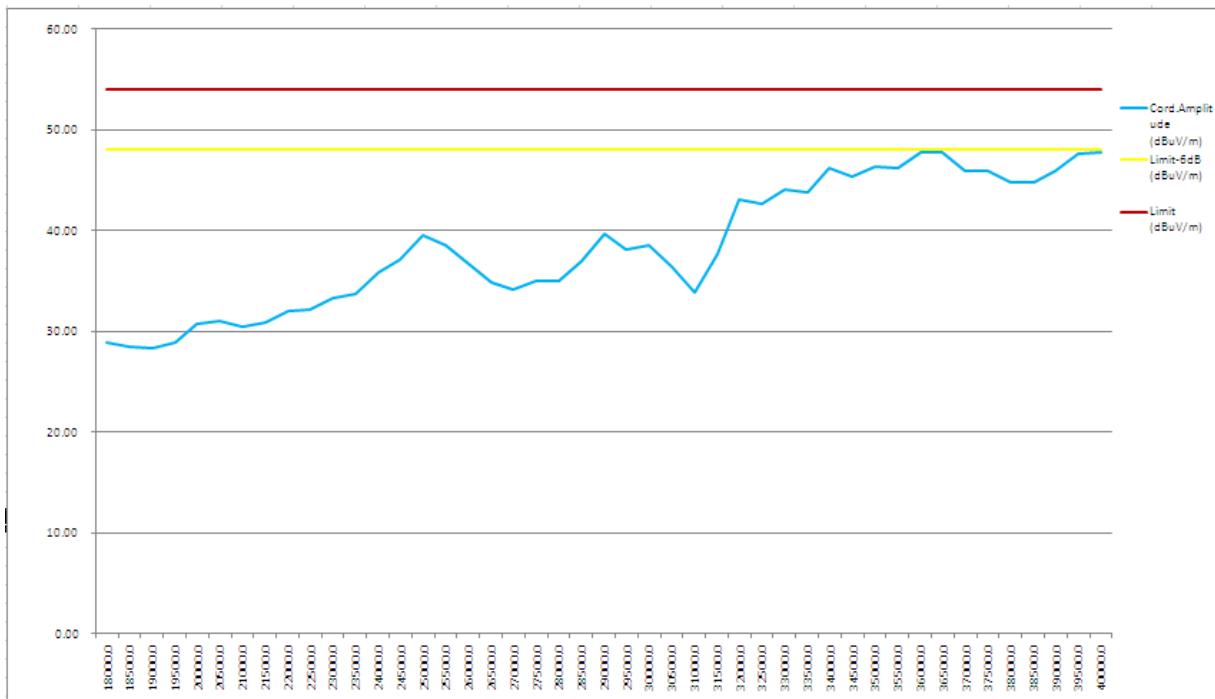


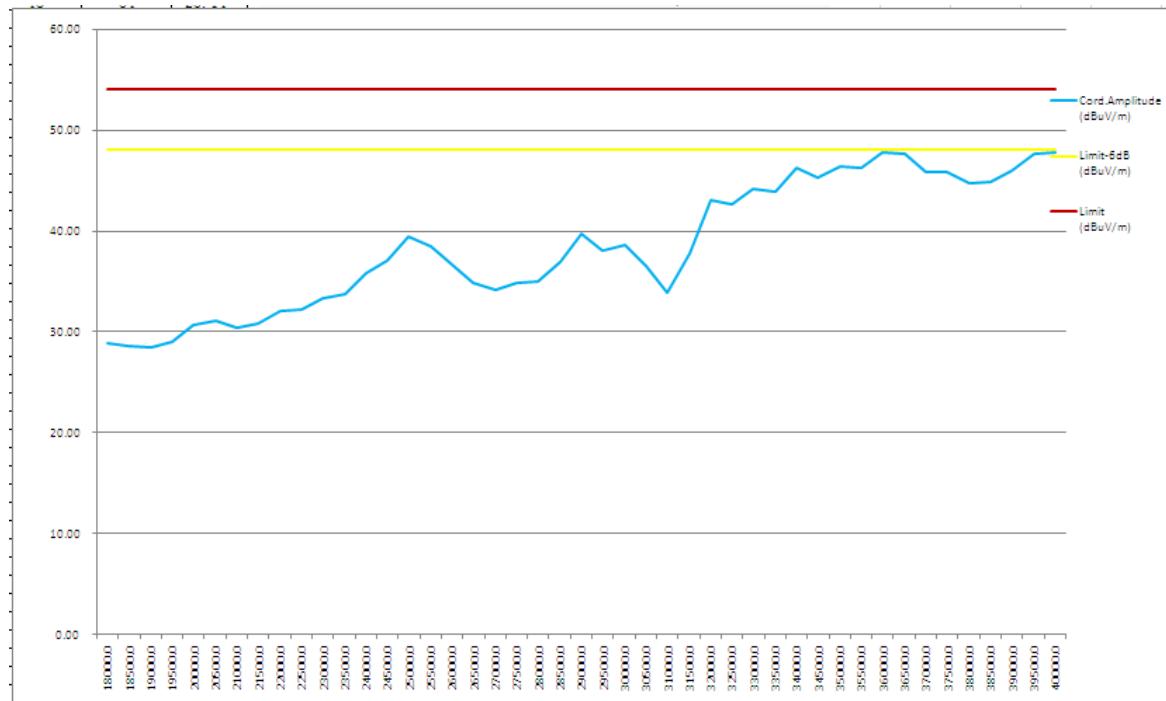
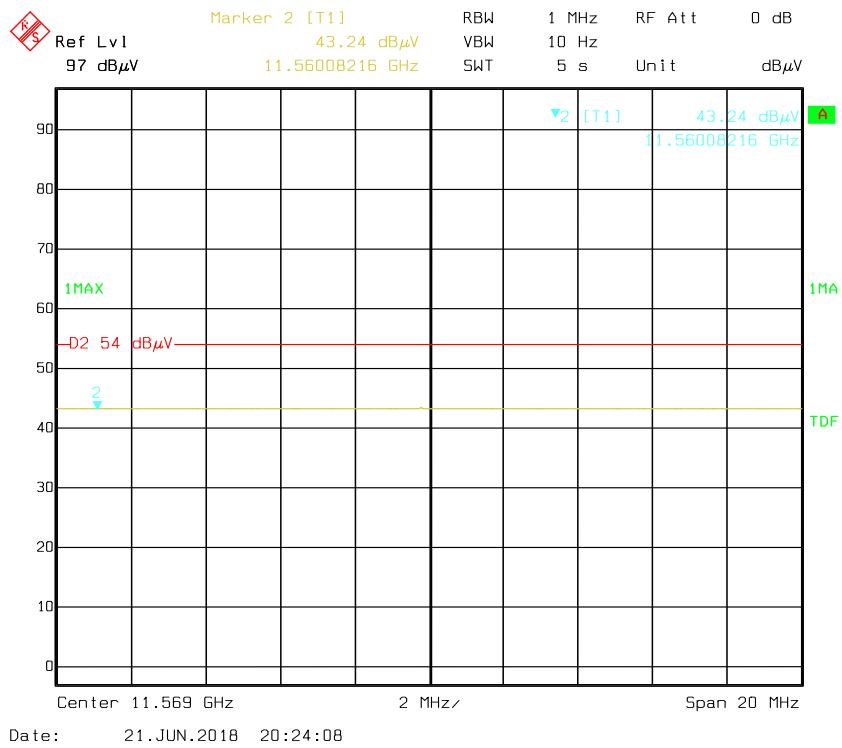
## Vertical



**Average value for the peak point at pre-scan  
Horizontal**







## FCC§15.215(c) - 20dB EMISSION BANDWIDTH

### Applicable Standard

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

### 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 without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. 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 indicated 20dB bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

### Test Data

#### Environmental Conditions

Temperature:	22 °C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

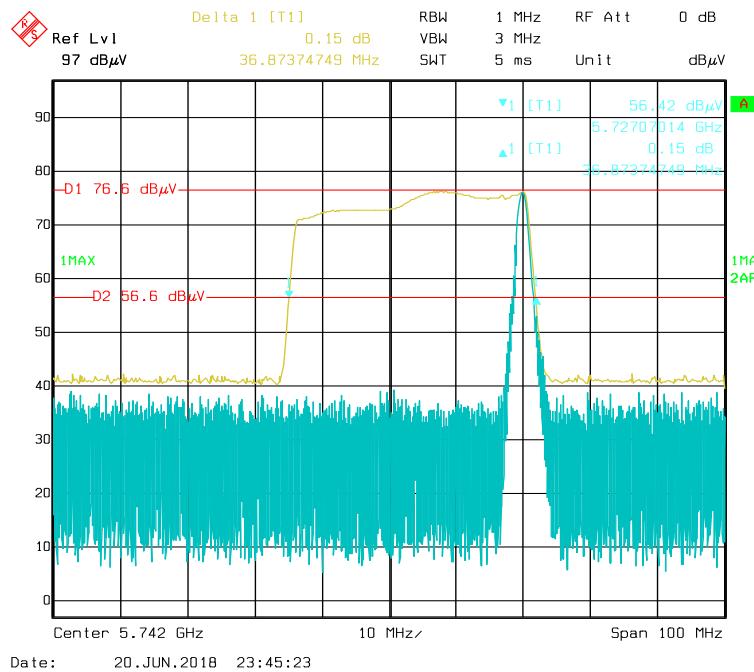
The testing was performed by Shawn Xiao on 2018-06-20.

Test Mode: Transmitting sweeping mode(the worst case)

Please refer to the following table and plots.

Frequency (MHz)	Limit (MHz)
5727.07014 – 5763.94389	5725-5875

## Sweeping Bandwidth



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