# FCC RF Test Report

## For

## Ring LLC

| | |
|---|---|
| **Test Standards:** | Part 15C Subpart C §15.247 |
| **Product Description:** | Floodlight Wired |
| **Tested Model:** | 5W21S8 |
| **Additional Model No.:** | N/A |
| **Brand Name:** | Ring |
| **FCC ID:** | 2AEUPBHAFM001 |
| **ISED:** | 20271-BHAFM001 |
| **Classification** | (DTS) Digital Transmission System |
| **Report No.:** | EC1811006F02 |
| **Tested Date:** | 2018-11-12 to 2018-12-25 |
| **Issued Date:** | 2018-12-25 |
| **Prepared By:** | Tiny Yang/ Engineer |
| **Approved By:** | Bacon Wu / RF Manager |


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# Report Revise Record

| Report Version | Revise Time | Issued Date | Valid Version | Notes |
|---|---|---|---|---|
| V1.0 | / | 2018.12.25 | Valid | Original Report |

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# Summary of Test RESULT

| FCC Rule | IC Rule | Description | Limit | Result | Remark |
|---|---|---|---|---|---|
| 15.247(a)(2) | RSS-247 5.2(1) | 6dB Bandwidth | ≥ 0.5MHz | Pass | - |
| - | RSS-Gen 6.6 | 99% Bandwidth | - | Pass | - |
| 15.247(b)(1) | RSS-247 A5.4(4) | Peak Output Power | ≤ 30dBm | Pass | - |
| 15.247(e) | RSS-247 5.2(2) | Power Spectral Density | ≤ 8dBm/3kHz | Pass | - |
| 15.247(d) | RSS-247 5.5 | Conducted Band Edges and Spurious Emission | ≤ 20dBc | Pass | - |
| 15.247(d) | RSS-247 5.5 | Radiated Spurious Emission | 15.209(a) & 15.247(d) | Pass | Under limit -1.17 dB at 3654.8 MHz |
| 15.207 | RSS-Gen 8.8 | AC Conducted Emission | 15.207(a) | Pass | Under limit -3.01 dB at 2.794 MHz |
| 15.203 & 15.247(b) | N/A | Antenna Requirement | N/A | Pass | - |

# 1. Test Laboratory

## 1.1 Test facility

### CNAS ( accreditation number: L11138 )

Hunan Ecloud Testing Technology Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

### FCC (Designation number: CN1244 , Test Firm Registration Number: 793308 )

Hunan Ecloud Testing Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

### ISED(CAB identifier: CN0012)

Hunan Ecloud Testing Technology Co., Ltd. has been listed on the Wireless Device Testing Laboratories list of innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements.

### A2LA (Certificate Code: 4895.01 )

Hunan Ecloud Testing Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

# 2. General Description

## 2.1 Applicant

**Ring LLC**
1523 26th St, Santa Monica, CA 90404

## 2.2 Manufacturer

**Guangdong Bestek Technology Co., Ltd**
No.1, B Road, Longling industrial Zone, YuanCheng District, HeYuan City. China

## 2.3 General Description Of EUT

| | |
|---|---|
| **Product** | Floodlight Wired |
| **Model No.** | 5W21S8 |
| **Additional No.** | N/A |
| **Difference Description** | N/A |
| **FCC ID** | 2AEUPBHAFM001 |
| **IC ID** | 20271-BHAFM001 |
| **Power Supply** | 120Vac |
| **Modulation Technology** | BLE / LoRa |
| **Modulation Type** | GFSK/ LoRa 500KHz DTS |
| **Operating Frequency** | 2402MHz ~ 2480MHz - BLE<br>902.5MHz ~ 927.0MHz – DTS |
| **Max. Output Power** | 15.236 dBm (33.39 mW) |
| **Antenna Type** | BLE: PCB Antenna type with -1.8dBi gain<br>Lora: PCB Antenna type with -4.17dBi gain |
| **I/O Ports** | Refer to user's manual |

**NOTE:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

## 2.4 Modification of EUT

No modifications are made to the EUT during all test items.

## 2.5 ApplicaLora Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- ANSI C63.10-2013
- IC RSS-247 Issue 2
- IC RSS-Gen Issue 5
- FCC KDB Publication No. 558074 D01 15.247 Meas Guidance v05

**Remark:**

1. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, ICES-005 recorded in a separate test report.

# 3. Test Configuration of Equipment Under Test

## 3.1 Descriptions of Test Mode

The transmitter has a maximum peak conducted output power as follows:

| Channel | Frequency | Lora RF Output Power |
|---|---|---|
| Low | 902.5MHz | **15.225** |
| Middle | 913.7MHz | **15.236** |
| High | 927.0MHz | **14.712** |

a. Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

## 3.2 Test Mode

### 3.2.1 Antenna Port Conducted Measurement

| Summary taLora of Test Cases | |
|---|---|
| **Test Item** | **Data Rate / Modulation** |
| | **Lora 500KHz DTS** |
| **Conducted Test Cases** | Mode 1: 902.5 MHz<br>Mode 2: 913.7 MHz<br>Mode 3: 927.0 MHz |

### 3.2.2 Radiated Emission Test (Below 1GHz)

| | **Lora 500KHz DTS** | |
|---|---|---|
| **Radiated Test Cases** | Transmitting | Mode 1: 902.5 MHz<br>Mode 2: 913.7 MHz<br>Mode 3: 927.0 MHz |

Note : 1. Pre-Scan has been conducted to determine the worst-case mode from all possiLora combinations between availaLora modulations, antenna ports (if EUT with antenna diversity architecture) and packet type.

2. All above modes were tested, but only the worst case test mode 1 was reported .

### 3.2.3 Radiated Emission Test (Above 1GHz)

| | **Lora 500KHz DTS** | |
|---|---|---|
| **Radiated Test Cases** | Transmitting | Mode 1: 902.5 MHz<br>Mode 2: 913.7 MHz<br>Mode 3: 927.0 MHz |

Note : 1. Pre-Scan has been conducted to determine the worst-case mode from all possiLora combinations between availaLora modulations, antenna ports (if EUT with antenna diversity architecture) and packet type.

2. Following channel(s) was (were) selected for the final test as listed above

### 3.2.4 Power Line Conducted Emission Test:

| | |
|---|---|
| **AC Conducted Emission** | Mode 1 : Lora Mode |

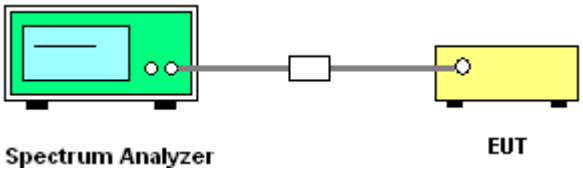
## 3.3 Support Equipment

| Item | Equipment | Trade Name | Model Name | FCC ID | Data CaLora | Power Cord |
|---|---|---|---|---|---|---|
| 1. | Notebook | Lenovo | E470C | FCC DoC | N/A | shielded caLora DC O/P 1.8 m unshielded AC I/P caLora1.2 m |

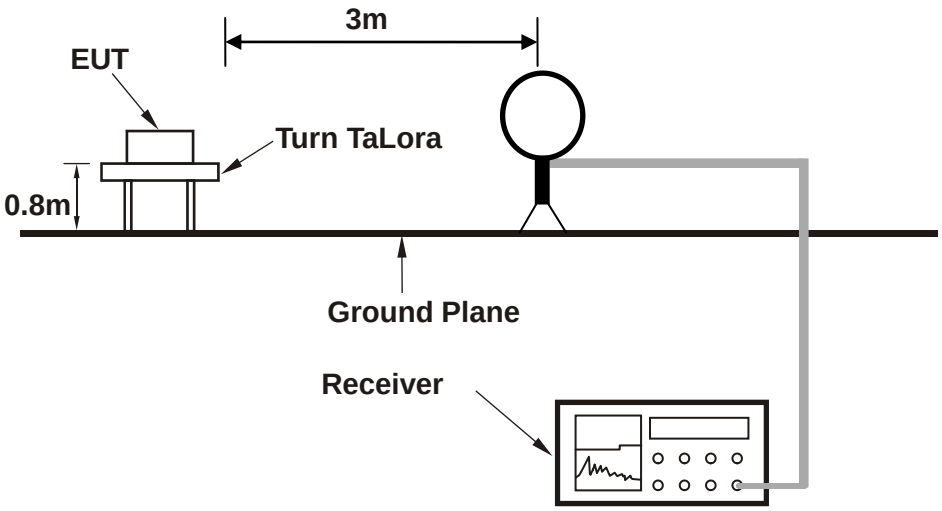
## 3.4 Test Setup

The software provided by client to enaLora the EUT under transmission condition continuously at specific channel frequencies individually.

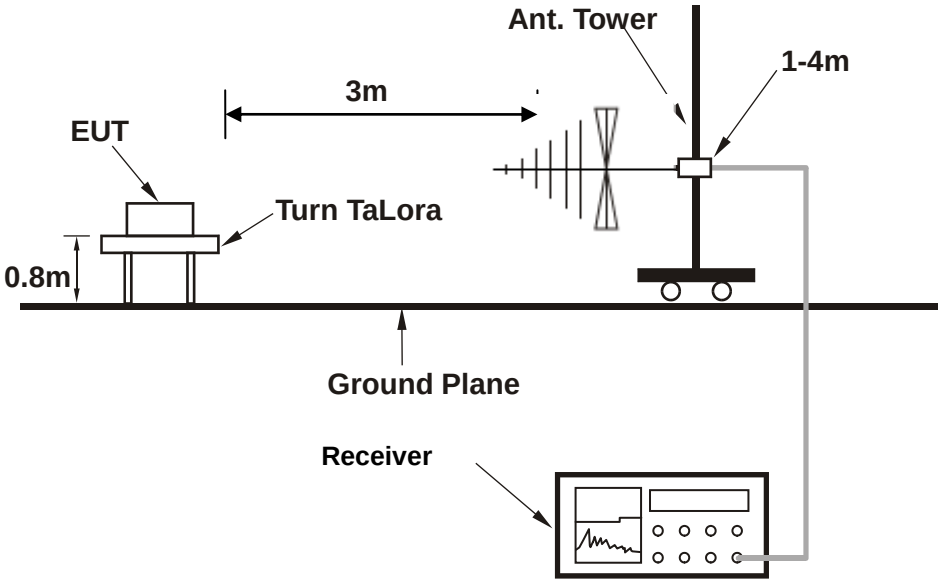
**Setup diagram for Conducted Test**



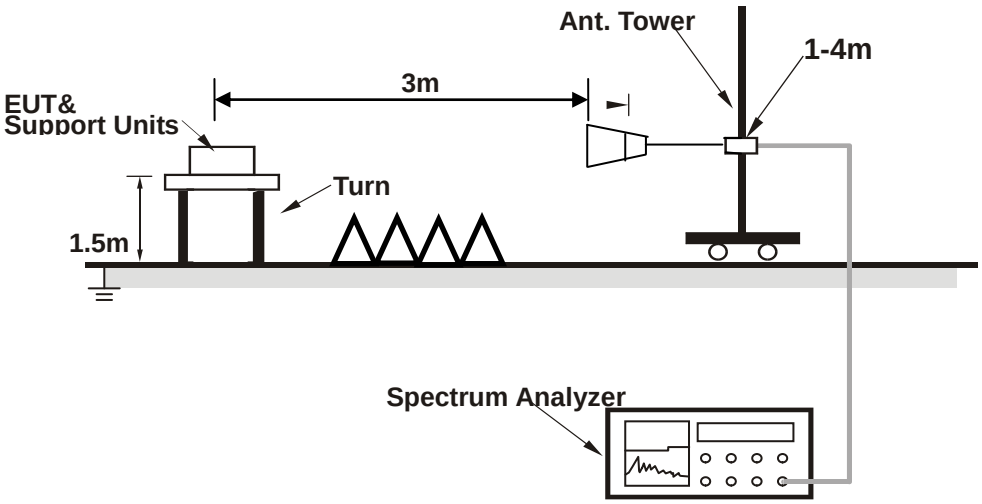

**Setup diagram for Raidation(9KHz~30MHz) Test**



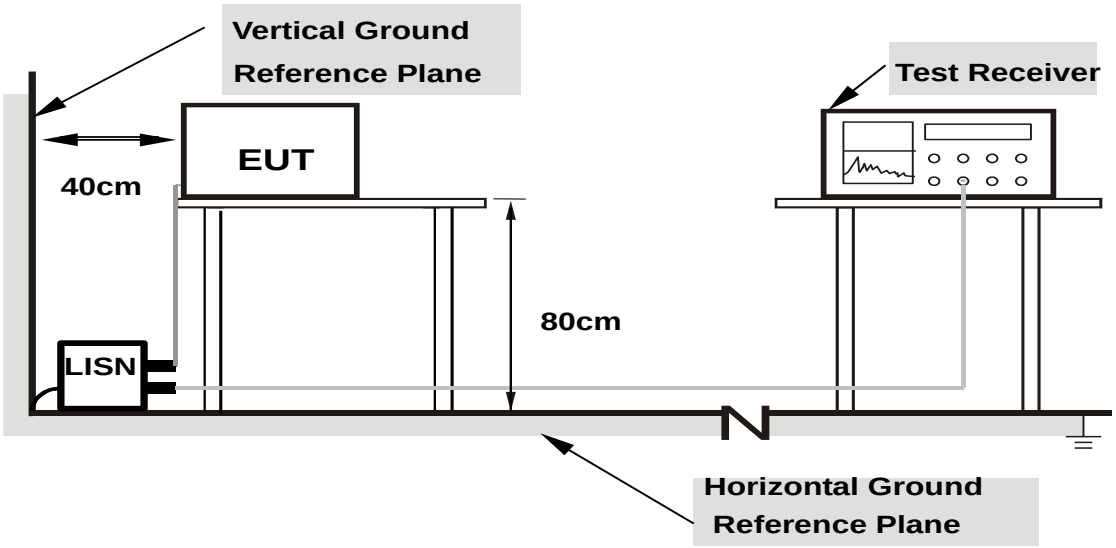
**Setup diagram for Raidation(Below 1G) Test**




**Setup diagram for Raidation(Above1G) Test**



**Setup diagram for AC Conducted Emission Test**




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

## 3.5 Measurement Results Explanation Example

**For all conducted test items:**

The offset level is set in the spectrum analyzer to compensate the RF caLora loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF caLora loss and attenuator factor.

*Offset = RF caLora loss + attenuator factor.*

Following shows an offset computation example with caLora loss 5 dB and 10dB attenuator.

*Offset(dB) = RF caLora loss(dB) + attenuator factor(dB).*

= 5 + 10 = 15 (dB)

# 4. Test Result

## 4.1 6dB and 99% Bandwidth Measurement

### 4.1.1 Limit of 6dB and 99% Bandwidth

FCC §15.247 (a) (2)

IC RSS-247 5.2(1)

The minimum 6 dB bandwidth shall be at least 500 kHz.

### 4.1.2 Test Procedures

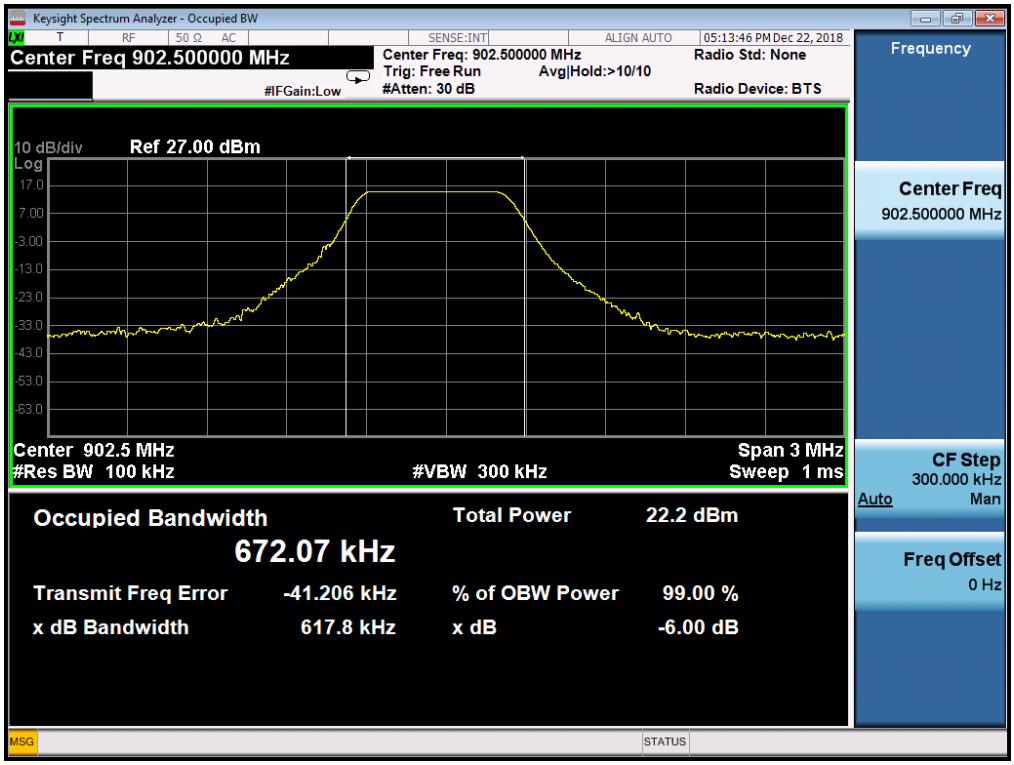
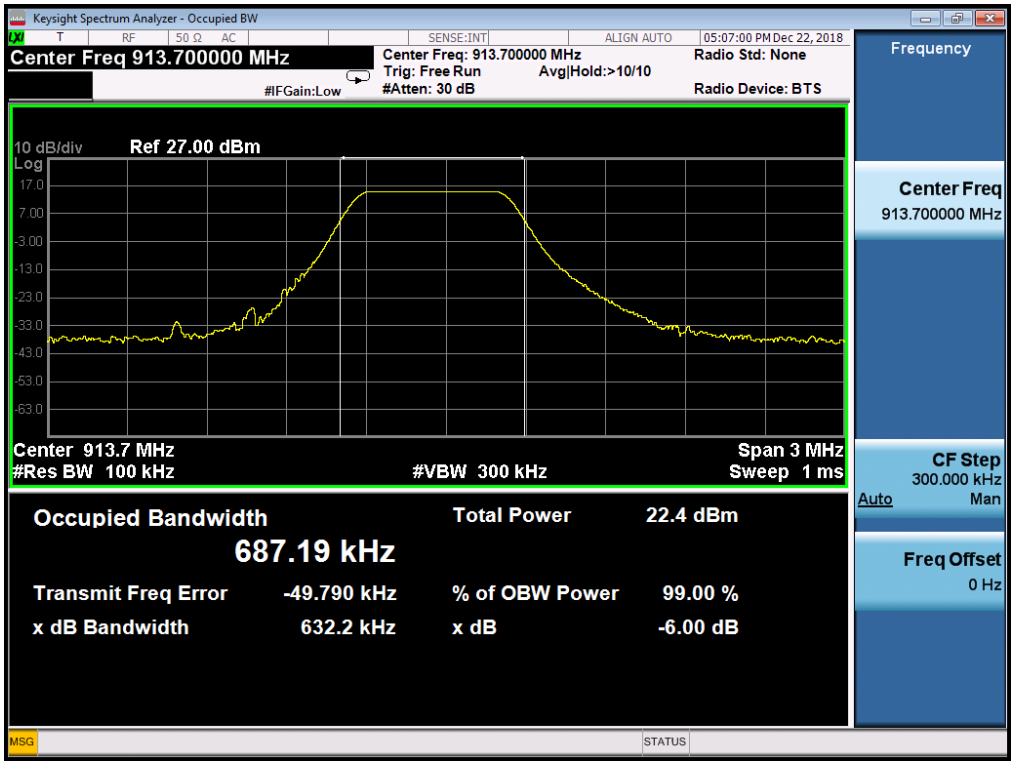
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument.
3. Set to the maximum power setting and enaLora the EUT transmit continuously
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 30kHz and set the Video bandwidth (VBW) = 100kHz.

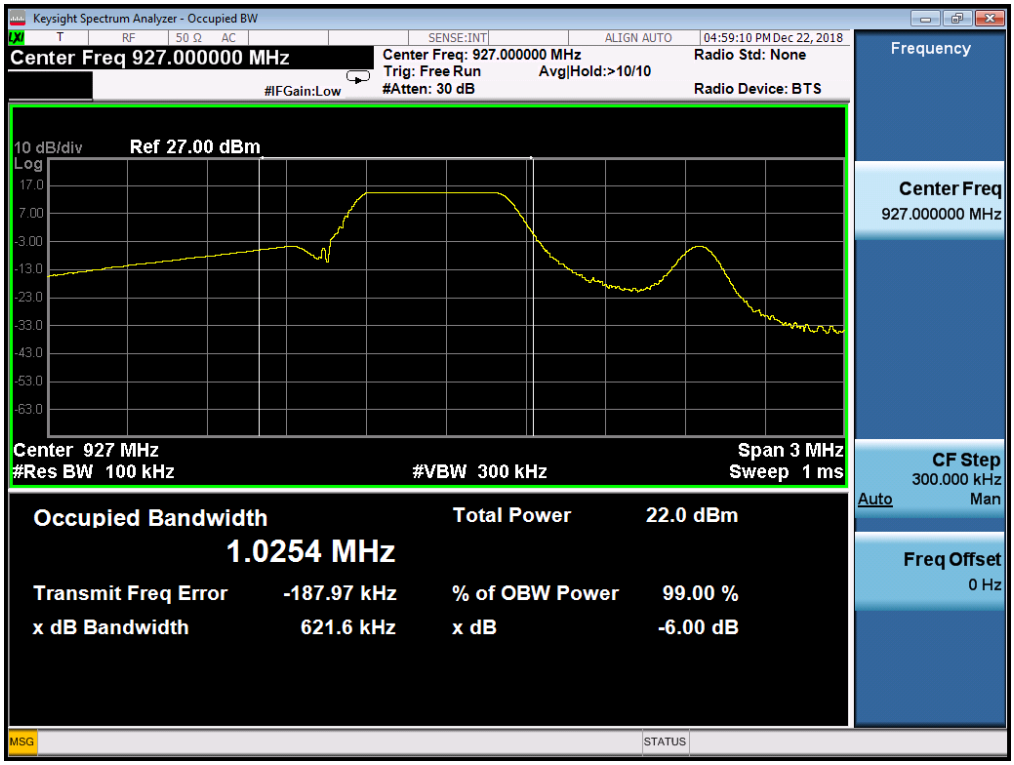
### 4.1.3 Test Result of 6dB and 99% Bandwidth

| **Test Mode :** | Transmitting | **Temperature :** | 24~26℃ |
|---|---|---|---|
| **Test Engineer :** | Damon Zhang | **Relative Humidity :** | 50~53% |

| **Channel** | **Frequency [MHz]** | **6dB Bandwidth [MHz]** | **99% OBW[MHz]** | **Limit 6dB OBW** | **Verdict** |
|---|---|---|---|---|---|
| LCH | 902.5 | 0.6178 | 0.67207 | ≥500KHz | PASS |
| MCH | 913.7 | 0.6322 | 0.68719 | ≥500KHz | PASS |
| HCH | 927.0 | 0.6216 | 1.0254 | ≥500KHz | PASS |

**6dB and 99% Bandwidth Plot**

| Graphs | |
|---|---|
| LCH |  |
| MCH |  |

| | |
|---|---|
| HCH |  |

Keysight Spectrum Analyzer - Occupied BW
Center Freq 927.000000 MHz
#IFGain:Low
Center Freq: 927.000000 MHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
04:59:10 PM Dec 22, 2018
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Log
Ref 27.00 dBm
17.0
7.00
-3.00
-13.0
-23.0
-33.0
-43.0
-53.0
-63.0
Center Freq
927.000000 MHz
Center 927 MHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 1 ms
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz
Occupied Bandwidth
1.0254 MHz
Total Power
22.0 dBm
Transmit Freq Error
-187.97 kHz
% of OBW Power
99.00 %
x dB Bandwidth
621.6 kHz
x dB
-6.00 dB
MSG
STATUS

## 4.2 Peak Output Power Measurement

### 4.2.1 Limit of Peak Output Power

FCC §15.247 (b)(3)

IC RSS-247 A5.4(4)

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

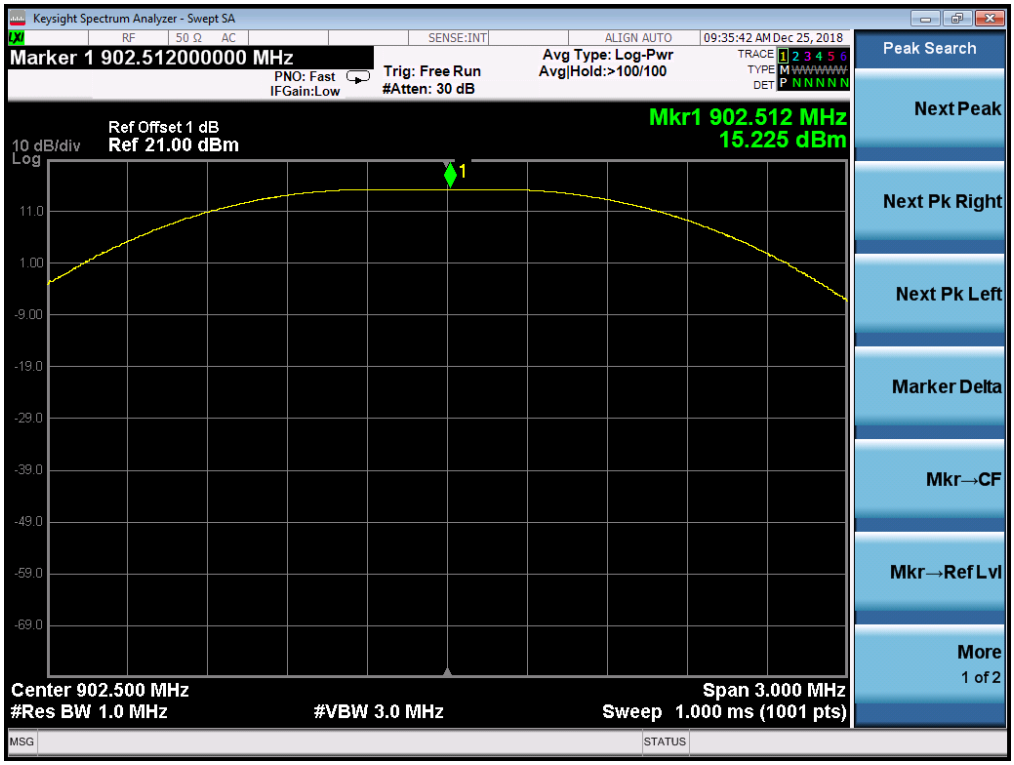
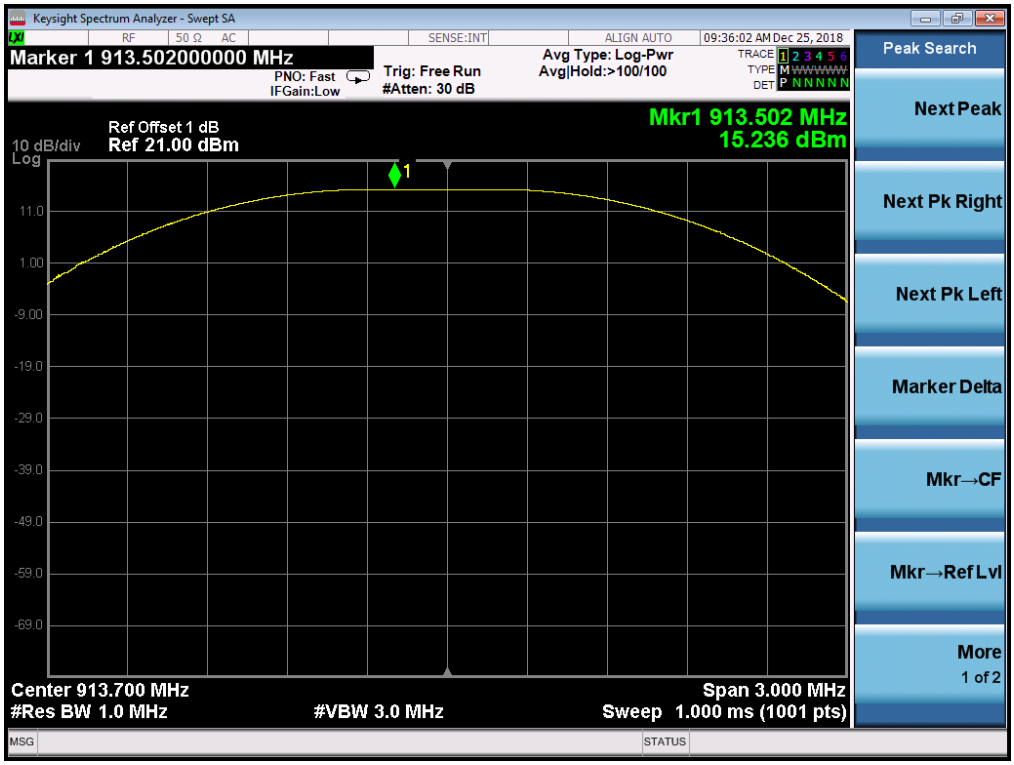
### 4.2.2 Test Procedures

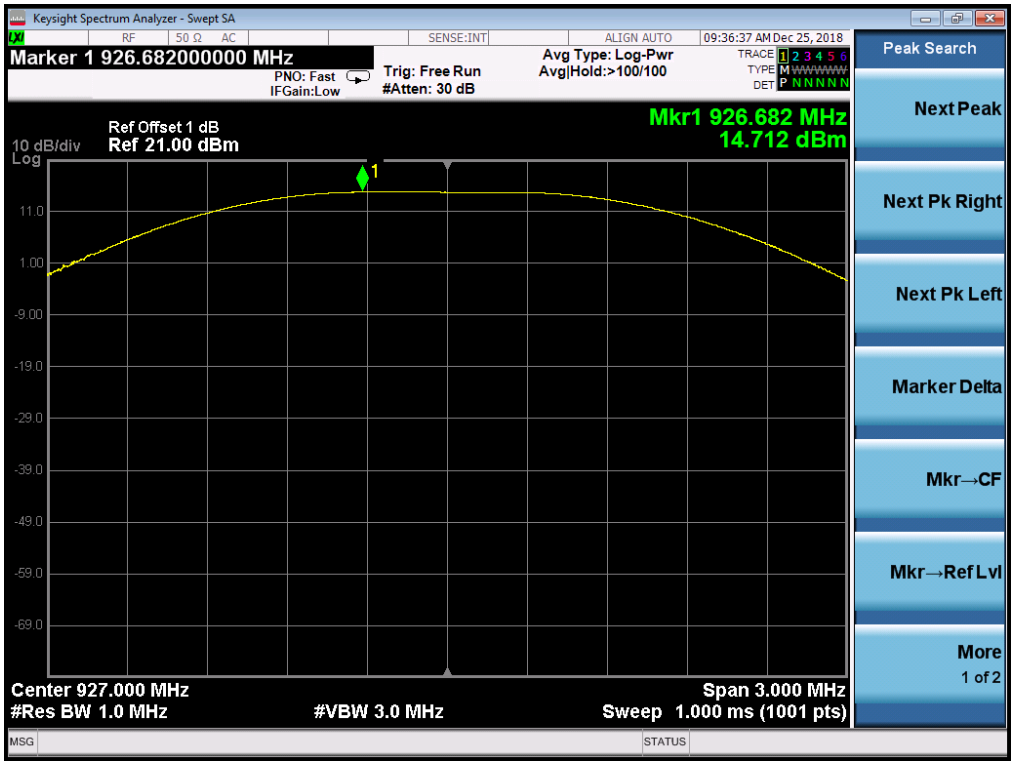
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to spectrum analyzer.
3. Set to the maximum power setting and enaLora the EUT transmit continuously
4. Set the RBW≥DTS Bandwidth,VBW≥3*RBW,Span≥3*RBW,Detector=Peak,Sweep time=auto couple,Trace mode=max hold.
5. Allow trace to fully stabilize, Use peak marker function to determine the peak amplitude level.
6. Measure the conducted output power

### 4.2.3 Test Result of Peak Output Power

| **Test Mode :** | Transmitting | **Temperature :** | 24~26℃ |
|---|---|---|---|
| **Test Engineer :** | Damon Zhang | **Relative Humidity :** | 50~53% |
| **Channel** | **Frequency** | **Conduct Peak Power[dBm]** | Verdict |
| **LCH** | 902.5 | **15.225** | PASS |
| **MCH** | 913.7 | **15.236** | PASS |
| **HCH** | 927.0 | **14.712** | PASS |

**Peak Output Power Plot**

| Graphs | |
|---|---|
| LCH |  |
| MCH |  |

| | |
|---|---|
| HCH |  |

Keysight Spectrum Analyzer - Swept SA
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
09:36:37 AM Dec 25, 2018
Marker 1 926.682000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Ref Offset 1 dB
10 dB/div
Log
Ref 21.00 dBm
Mkr1 926.682 MHz
14.712 dBm
11.0
1.00
-9.00
-19.0
-29.0
-39.0
-49.0
-59.0
-69.0
Center 927.000 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
MSG
STATUS
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

## 4.3 Power Spectral Density Measurement

### 4.3.1 Limits of Power Spectral Density

FCC § 15.247(e)

IC RSS-247 5.2(2)

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

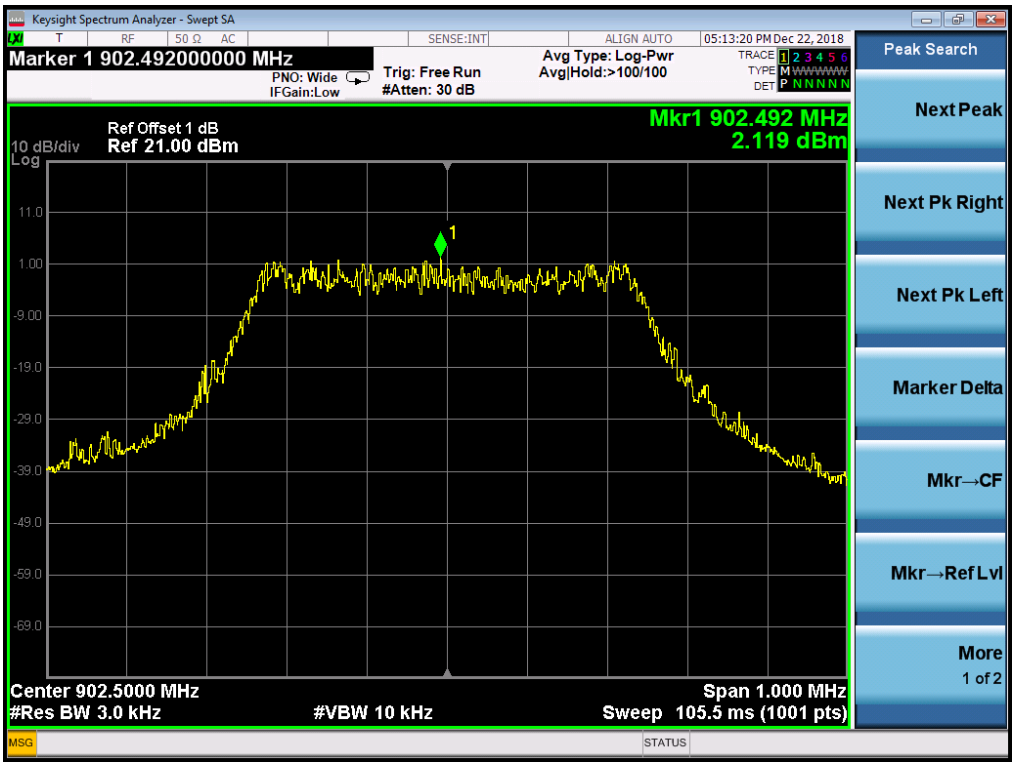
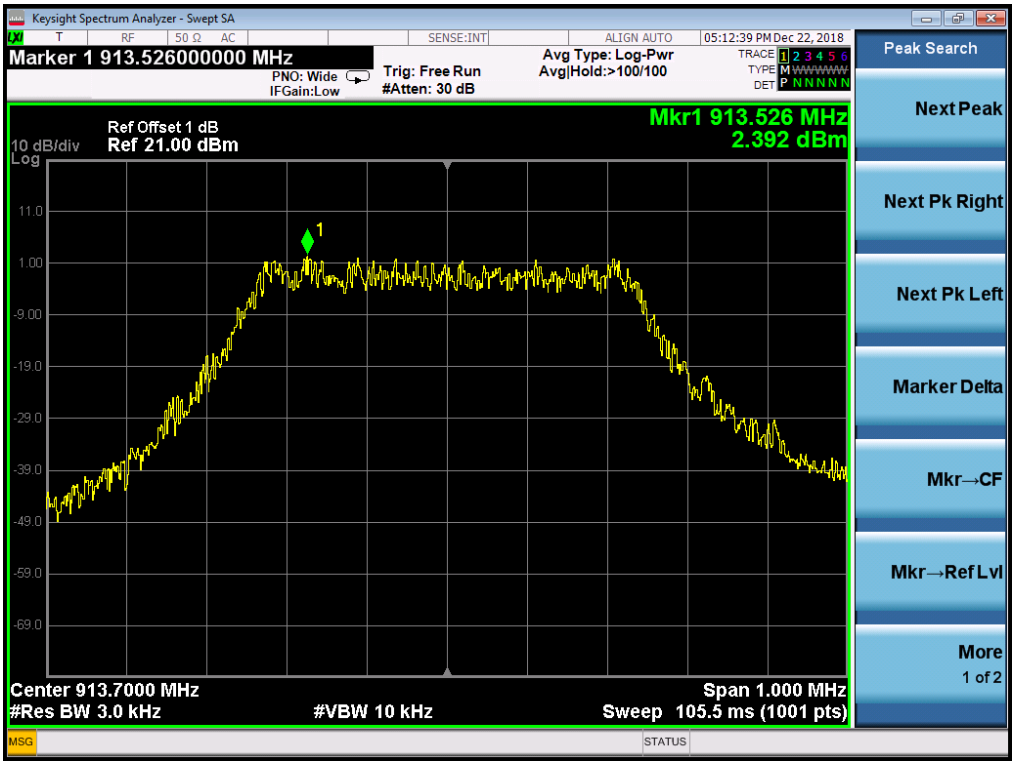
### 4.3.2 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument.
3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
4. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
5. Measure and record the results in the test report.
6. The Measured power density (dBm)/ 100kHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

### 4.3.3 Test Result of Power Spectral Density

| **Test Mode :** | Transmitting | **Temperature :** | 24~26℃ |
|---|---|---|---|
| **Test Engineer :** | Damon Zhang | **Relative Humidity :** | 50~53% |
| Channel | **Frequency** | **PSD [dBm]** | Verdict |
| LCH | 902.5 | **2.119** | PASS |
| MCH | 913.7 | **2.392** | PASS |
| HCH | 927.0 | **2.244** | PASS |

**Power Spectral Density Plot**

| Graphs | |
|---|---|
| LCH |  |
| MCH |  |

| | |
|---|---|
| HCH |  |

Keysight Spectrum Analyzer - Swept SA
Marker 1 926.826000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
05:06:24 PM Dec 22, 2018
Ref Offset 1 dB
10 dB/div
Log
Ref 21.00 dBm
Mkr1 926.826 MHz
2.244 dBm
Center 927.0000 MHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 1.000 MHz
Sweep 105.5 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

# 4.4 Conducted Band Edges and Spurious Emission Measurement

## 4.4.1 Limit of Conducted Band Edges and Spurious Emission

FCC §15.247 (d)

IC RSS-247 5.5

All harmonics/spurious must be at least 20 dB down from the highest emission level within the authorized band.

## 4.4.2 Test Procedures

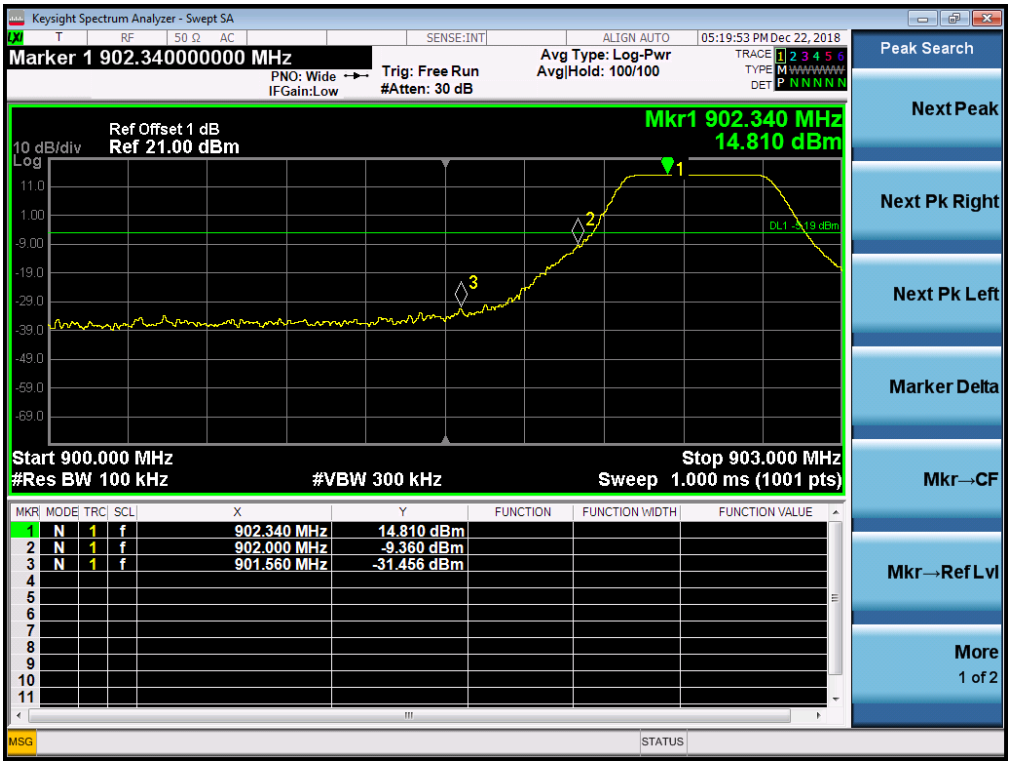
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument.
3. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
4. Measure and record the results in the test report.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

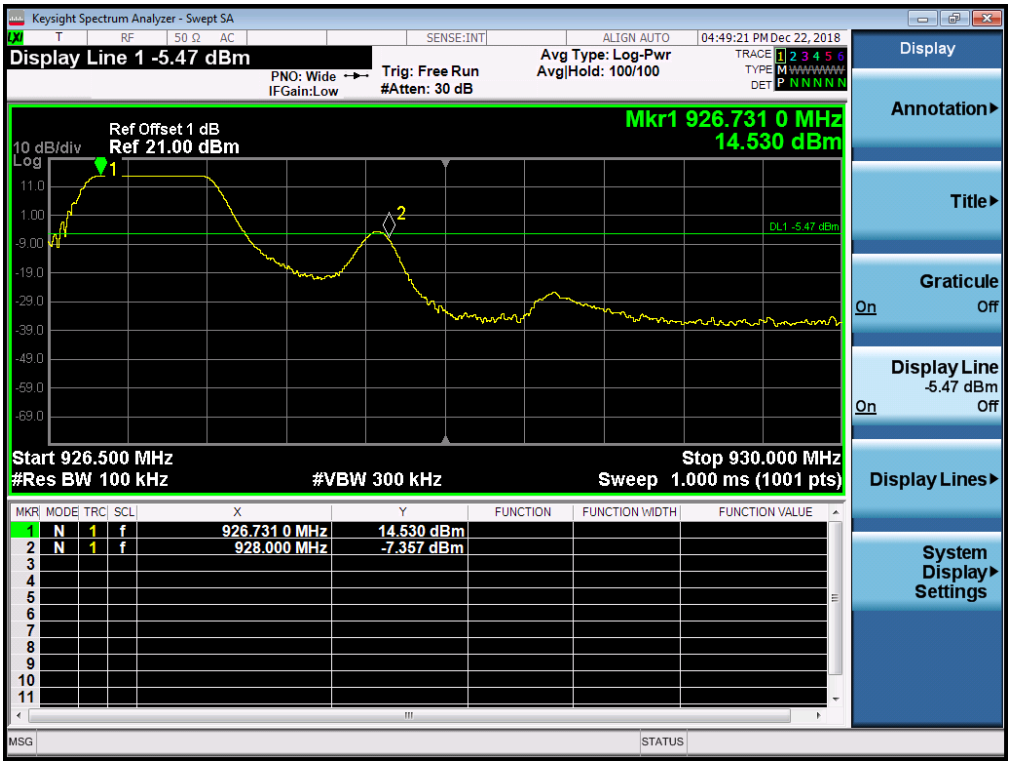
### 4.4.3 Test Result of Conducted Band Edges

| Test Mode : | Transmitting | Temperature : | 24~26℃ |
|---|---|---|---|
| Test Engineer : | Damon Zhang | Relative Humidity : | 50~53% |

| Channel | Frequency | Carrier Power[dBm] | Max.Spurious Level [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|
| LCH | 902.5 | 14.810 | -9.360 | -5.19 | PASS |
| HCH | 927.0 | 14.530 | -7.357 | -5.47 | PASS |

**Conducted Band Edges Plot**

| Graphs | |
|---|---|
| LCH |  |

| | |
|---|---|
| HCH |  |

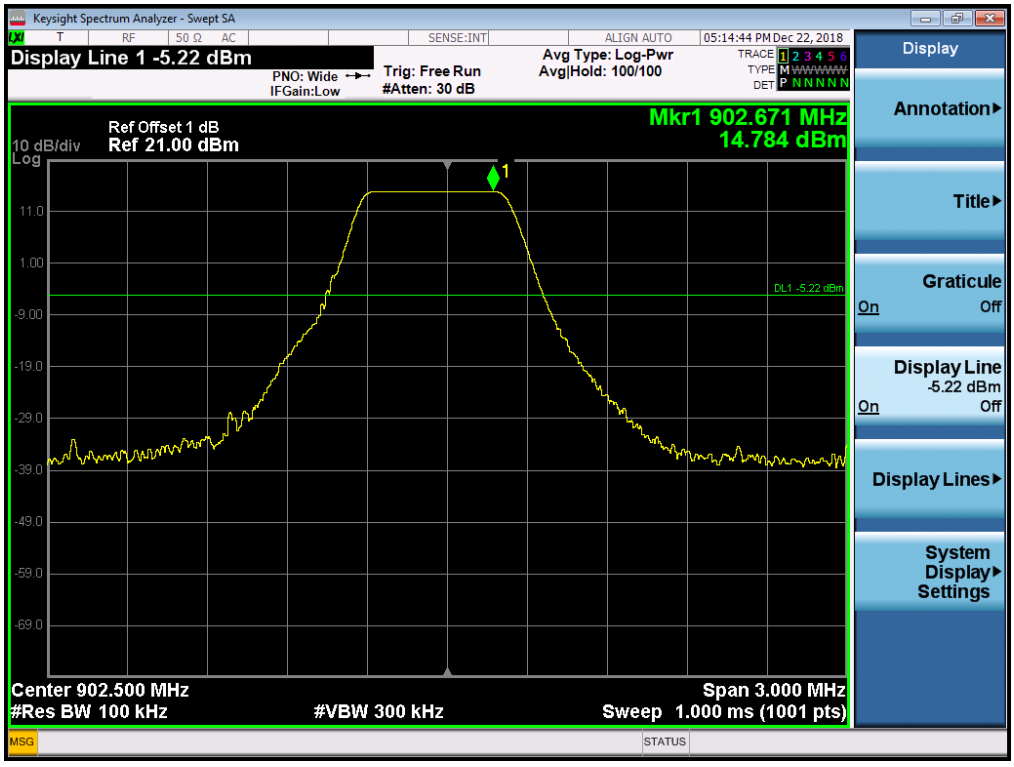
Keysight Spectrum Analyzer - Swept SA
Display Line 1 -5.47 dBm
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 100/100
04:49:21 PM Dec 22, 2018
Ref Offset 1 dB
10 dB/div
Log
Ref 21.00 dBm
Mkr1 926.731 0 MHz
14.530 dBm
DL1 -5.47 dBm
Start 926.500 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 930.000 MHz
Sweep 1.000 ms (1001 pts)
1 N 1 f 926.731 0 MHz 14.530 dBm
2 N 1 f 928.000 MHz -7.357 dBm
Display
Annotation
Title
Graticule
On Off
Display Line
-5.47 dBm
On Off
Display Lines
System
Display
Settings
MSG
STATUS

### 4.4.4 Test Result of Conducted Spurious Emission

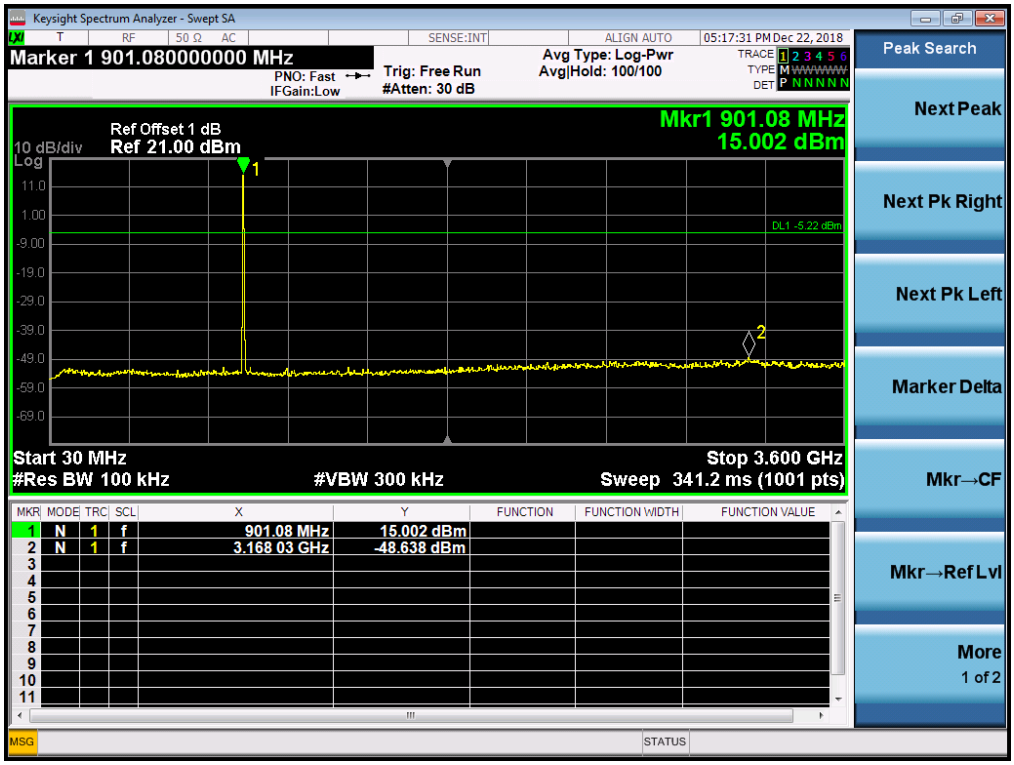
| Test Mode : | Transmitting | Temperature : | 24~26℃ |
|---|---|---|---|
| Test Engineer : | Damon Zhang | Relative Humidity : | 50~53% |

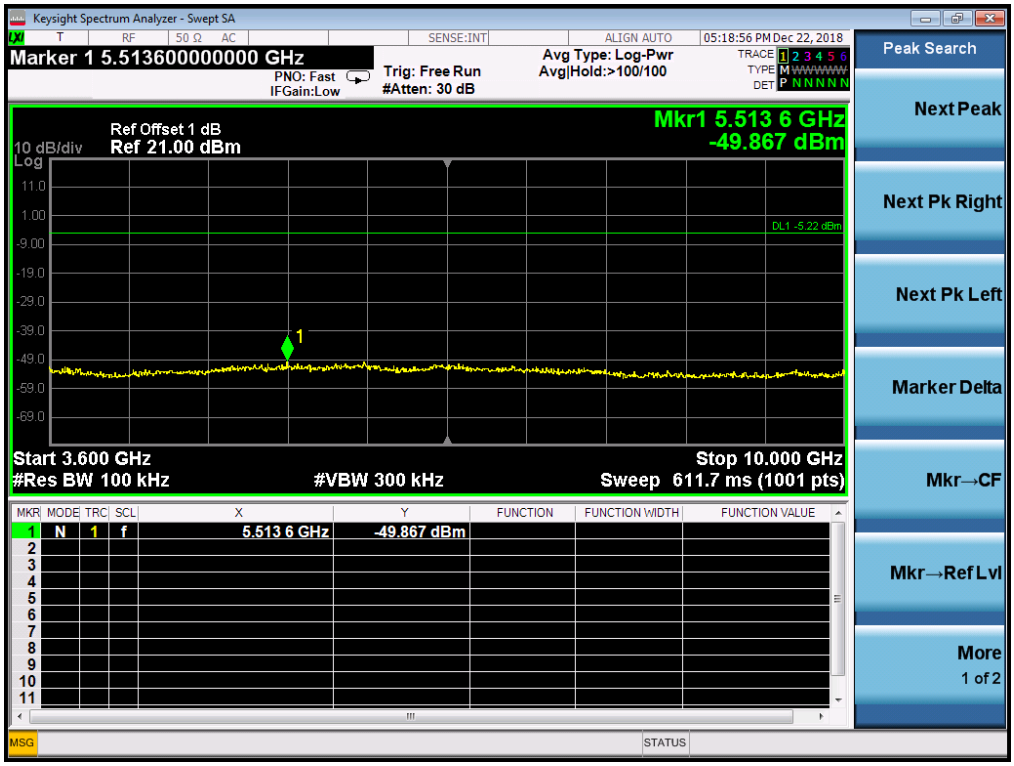
| Channel | Frequency | Pref [dBm] | Puw[dBm] | Verdict |
|---|---|---|---|---|
| LCH | 902.5 | -5.22 | <Limit | PASS |
| MCH | 913.7 | -5.12 | <Limit | PASS |
| HCH | 927.0 | -5.50 | <Limit | PASS |

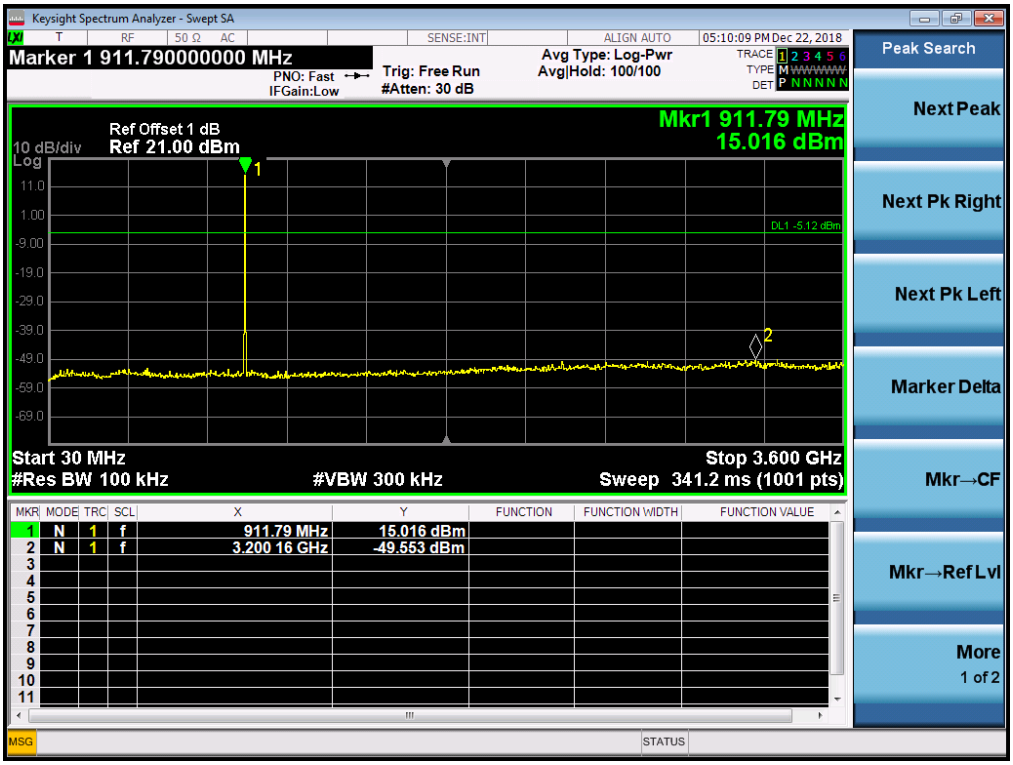
**Conducted Band Edges and Spurious Emission Plot**

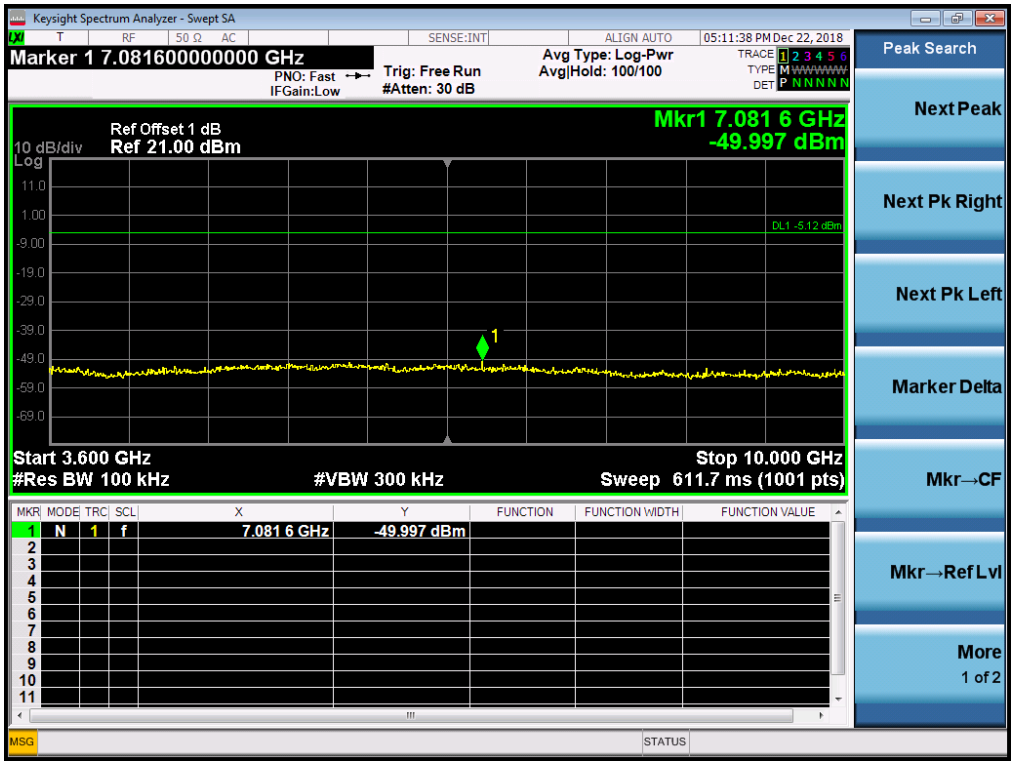
| Lora_LCH_Graphs | |
|---|---|
| Pref/Lora/LCH |  |

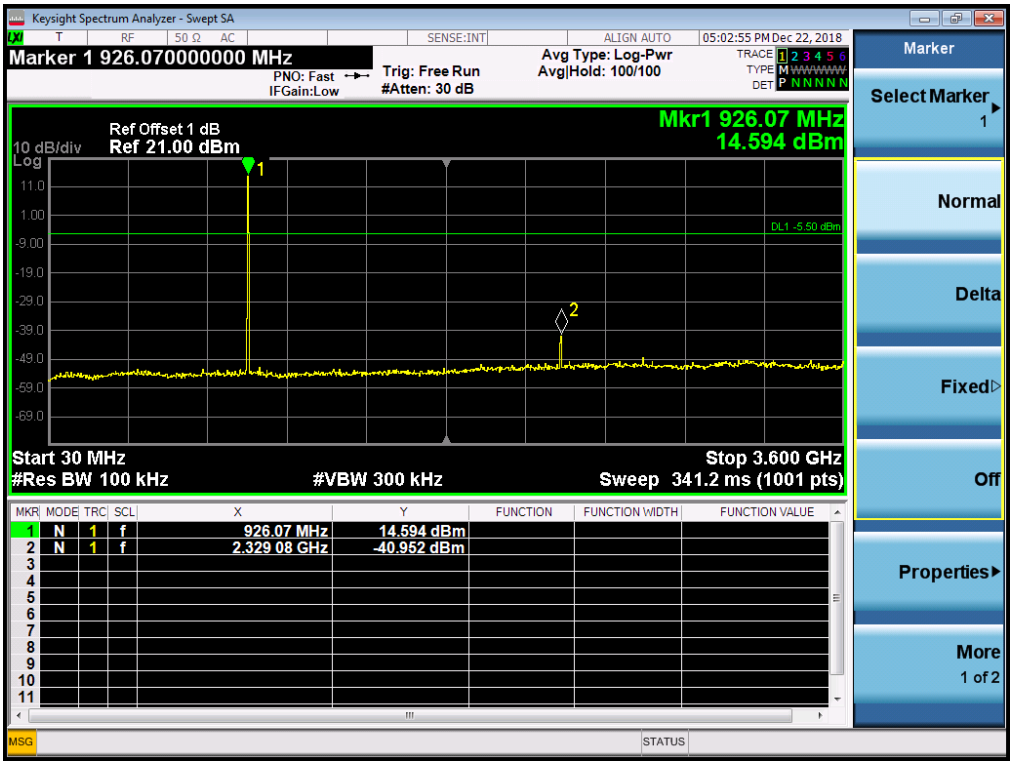
Puw/Lora/LCH

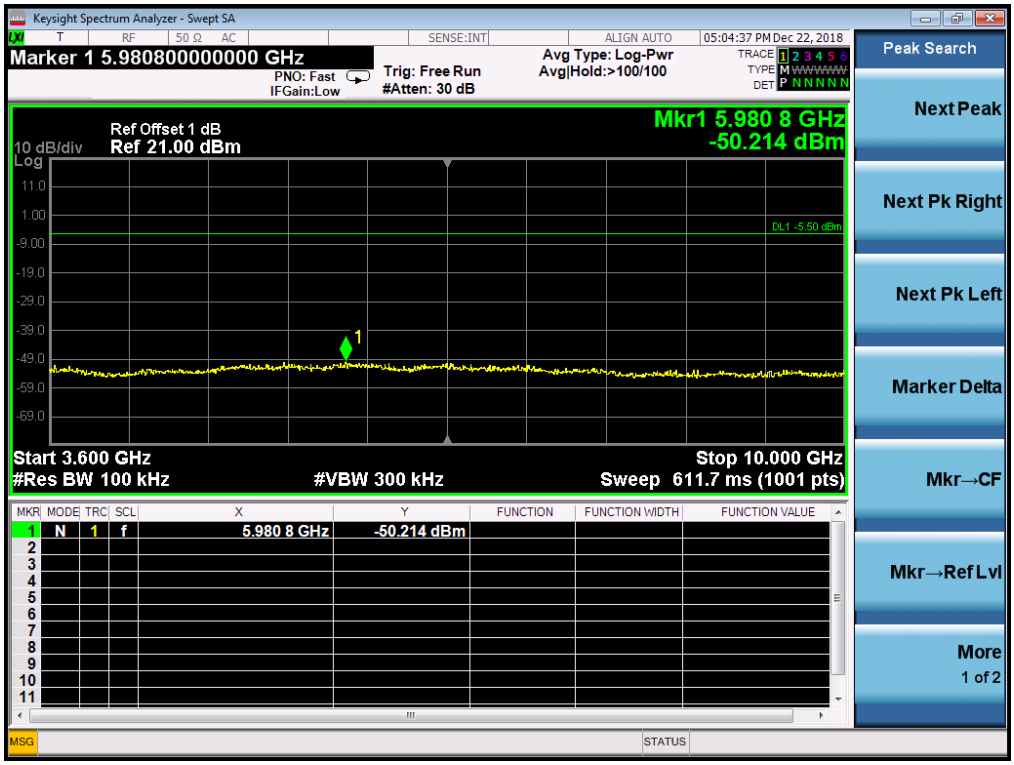

Keysight Spectrum Analyzer - Swept SA
Marker 1 901.080000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 100/100
05:17:31 PM Dec 22, 2018
Ref Offset 1 dB
10 dB/div
Log
Ref 21.00 dBm
Mkr1 901.08 MHz
15.002 dBm
DL1 -5.22 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 3.600 GHz
Sweep 341.2 ms (1001 pts)
1 N 1 f 901.08 MHz 15.002 dBm
2 N 1 f 3.168 03 GHz -48.638 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
MSG
STATUS


Keysight Spectrum Analyzer - Swept SA
Marker 1 5.513600000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
05:18:56 PM Dec 22, 2018
Ref Offset 1 dB
10 dB/div
Log
Ref 21.00 dBm
Mkr1 5.513 6 GHz
-49.867 dBm
DL1 -5.22 dBm
Start 3.600 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 10.000 GHz
Sweep 611.7 ms (1001 pts)
1 N 1 f 5.513 6 GHz -49.867 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
MSG
STATUS

| LORA_MCH_Graphs | |
|---|---|
| Pref/LORA/MCH |  |
| Puw/LORA/MCH |  |


Keysight Spectrum Analyzer - Swept SA
Marker 1 7.081600000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 100/100
05:11:38 PM Dec 22, 2018
Ref Offset 1 dB
10 dB/div
Log
Ref 21.00 dBm
Mkr1 7.081 6 GHz
-49.997 dBm
DL1 -5.12 dBm
Start 3.600 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 10.000 GHz
Sweep 611.7 ms (1001 pts)
1 N 1 f 7.081 6 GHz -49.997 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

| LORA_HCH_Graphs | |
|---|---|
| Pref/LORA/HCH |  |
| Puw/LORA/HCH |  |


Keysight Spectrum Analyzer - Swept SA
Marker 1 5.980800000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
05:04:37 PM Dec 22, 2018
Ref Offset 1 dB
10 dB/div
Log
Ref 21.00 dBm
Mkr1 5.980 8 GHz
-50.214 dBm
DL1 -5.50 dBm
Start 3.600 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 10.000 GHz
Sweep 611.7 ms (1001 pts)
1 N 1 f 5.980 8 GHz -50.214 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

# 4.5 Radiated Spurious Emission Measurement

## 4.5.1 Limit of Radiated Spurious Emission

FCC §15.247 (d)

IC RSS-247 5.5

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

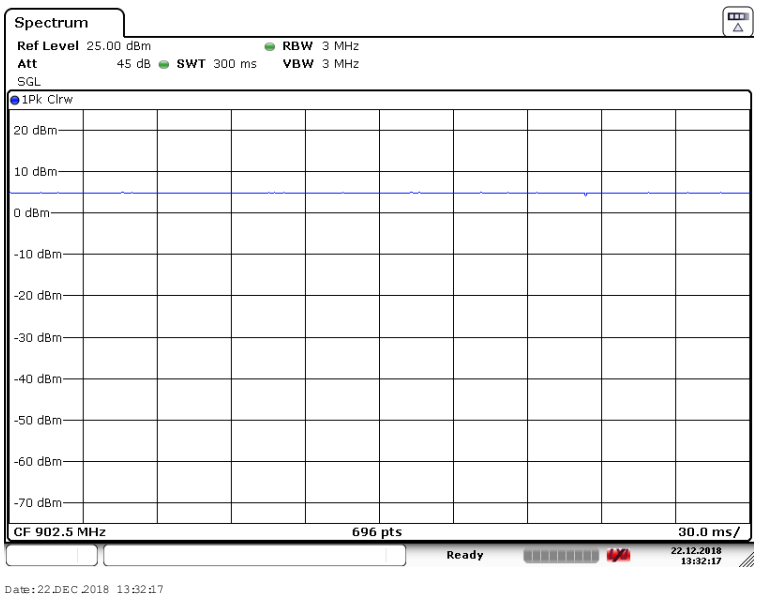
| Frequency (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009 – 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30.0 | 30 | 30 |
| 30 – 88 | 100 | 3 |
| 88 – 216 | 150 | 3 |
| 216 - 960 | 200 | 3 |
| Above 960 | 500 | 3 |

Note: The frequency range from 9KHz to 10th harmonic (25GHz) are checked, and no any emissions were found from 18GHz to 25GHz, So the radiated emissions from 18GHz to 25GHz were not record.

### 4.5.2 Test Procedures

1. The EUT was placed on a turntaLora with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The measurement distance is 3 meter.
3. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntaLora (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
4. Set to the maximum power setting and enaLora the EUT transmit continuously.
5. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
   (3) For average measurement:
   VBW = 10 Hz, when duty cycle is no less than 98 percent.
   VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

| Band | Duty Cycle(%) | T(ms) | 1/T(kHz) | VBW Setting |
|---|---|---|---|---|
| Lora 500KHz DTS | 1 | / | / | 10Hz |




6. Corrected Reading: Antenna Factor + CaLora Loss + Read Level - Preamp Factor = Level

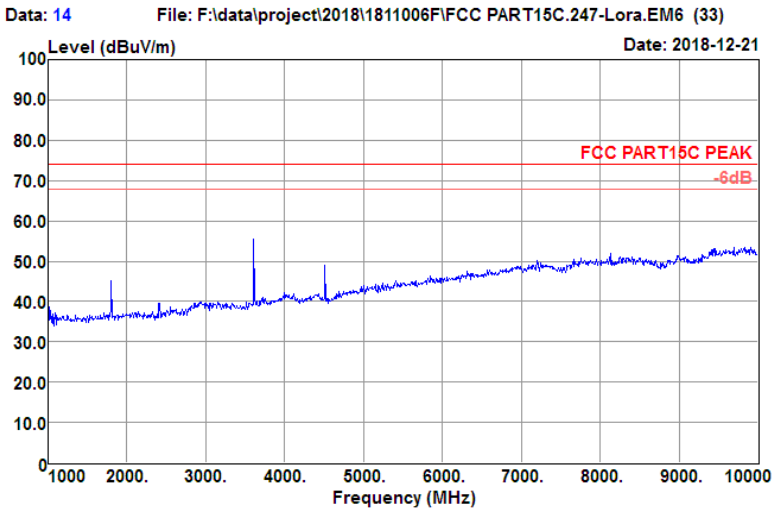
### 4.5.3 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

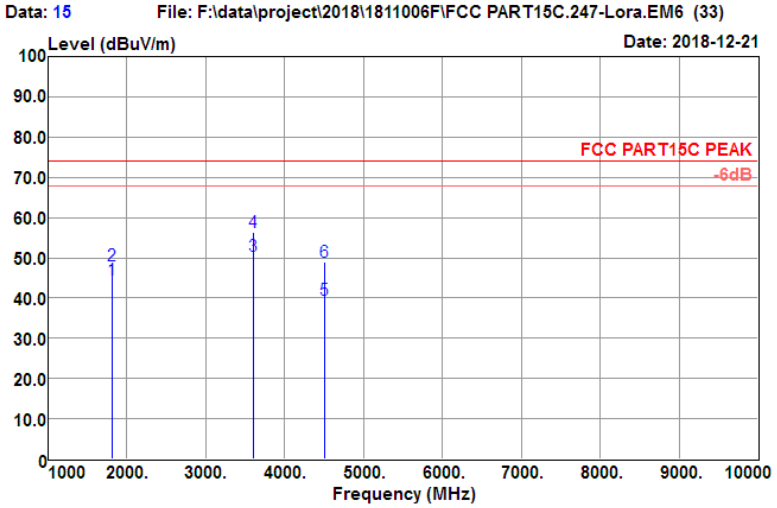
### 4.5.4 Test Result of Radiated Spurious Emission (1GHz ~ 10th Harmonic)

Low Channel Horizontal:

| | | | |
|---|---|---|---|
| Test Site | : 3m Chamber | Temp/Humi | : 19℃/60% |
| Tested by | : Damon | Power rating | : AC 120V |
| EUT | : Floodlight Wired | Pol/Phase | : HORIZONTAL |
| Model No. | : 5W21S8 | | |
| Test Mode | : Lora 500KHz DTS 902.5MHz | | |



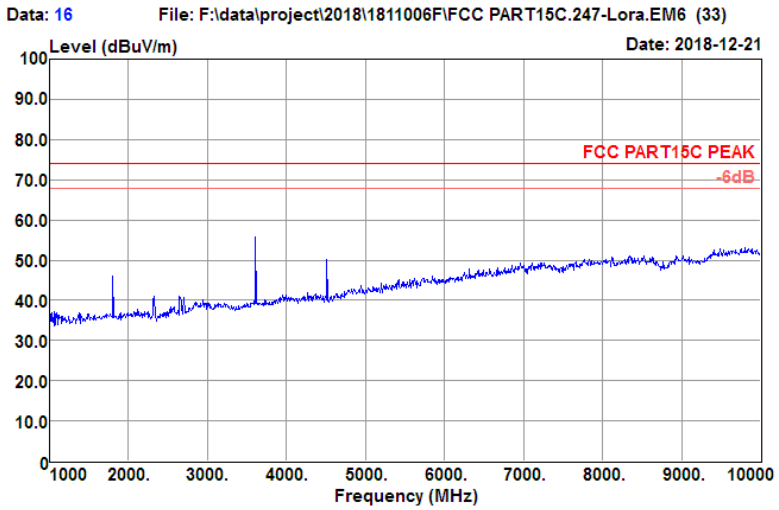
| | | | |
|---|---|---|---|
| Test Site | : 3m Chamber | Temp/Humi | : 19℃/60% |
| Tested by | : Damon | Power rating | : AC 120V |
| EUT | : Floodlight Wired | Pol/Phase | : HORIZONTAL |
| Model No. | : 5W21S8 | | |
| Test Mode | : Lora 500KHz DTS 902.5MHz | | |



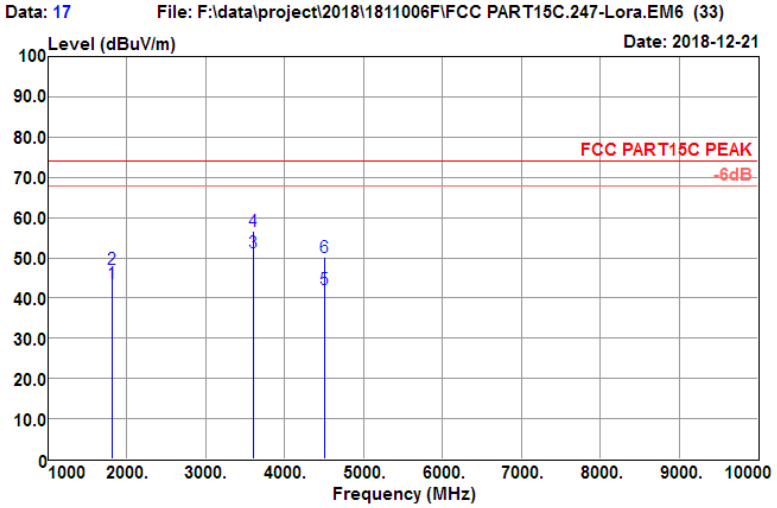

| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 1805.000 | 50.98 | 25.79 | 2.87 | 35.09 | 44.55 | 54.00 | -9.45 | Average |
| 1805.000 | 54.50 | 25.79 | 2.87 | 35.09 | 48.07 | 74.00 | -25.93 | Peak |
| 3610.000 | 53.70 | 29.07 | 4.79 | 36.99 | 50.57 | 54.00 | -3.43 | Average |
| 3610.000 | 59.42 | 29.07 | 4.79 | 36.99 | 56.29 | 74.00 | -17.71 | Peak |
| 4512.500 | 40.20 | 30.53 | 5.22 | 36.37 | 39.58 | 54.00 | -14.42 | Average |
| 4512.500 | 49.70 | 30.53 | 5.22 | 36.37 | 49.08 | 74.00 | -24.92 | Peak |

Low Channel Vertical:

| | | | |
|---|---|---|---|
| Test Site | : 3m Chamber | Temp/Humi | : 19℃/60% |
| Tested by | : Damon | Power rating | : AC 120V |
| EUT | : Floodlight Wired | Pol/Phase | : VERTICAL |
| Model No. | : 5W21S8 | | |
| Test Mode | : Lora 500KHz DTS 902.5MHz | | |



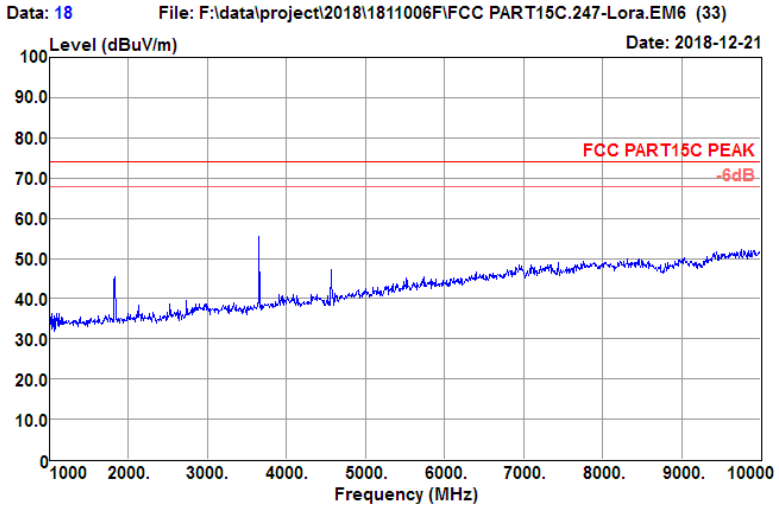
| | | | |
|---|---|---|---|
| Test Site | : 3m Chamber | Temp/Humi | : 19℃/60% |
| Tested by | : Damon | Power rating | : AC 120V |
| EUT | : Floodlight Wired | Pol/Phase | : VERTICAL |
| Model No. | : 5W21S8 | | |
| Test Mode | : Lora 500KHz DTS 902.5MHz | | |



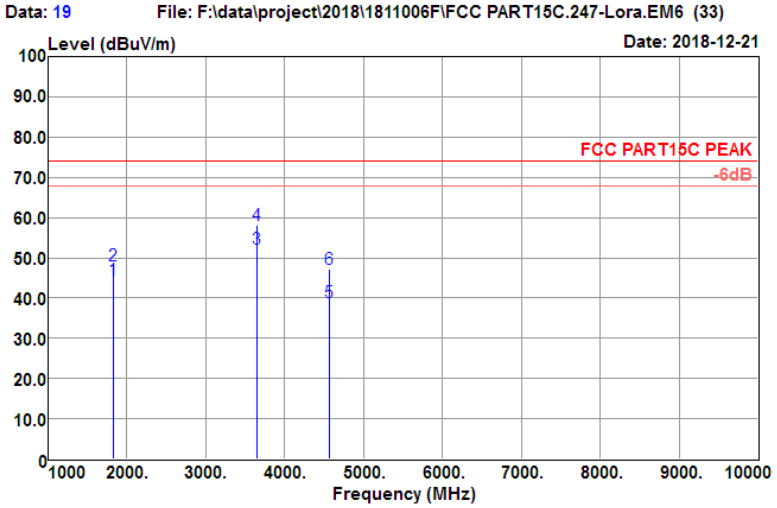

| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 1805.000 | 50.00 | 25.79 | 2.87 | 35.09 | 43.57 | 54.00 | -10.43 | Average |
| 1805.000 | 53.74 | 25.79 | 2.87 | 35.09 | 47.31 | 74.00 | -26.69 | Peak |
| 3610.000 | 54.46 | 29.07 | 4.79 | 36.99 | 51.33 | 54.00 | -2.67 | Average |
| 3610.000 | 59.91 | 29.07 | 4.79 | 36.99 | 56.78 | 74.00 | -17.22 | Peak |
| 4512.500 | 42.80 | 30.53 | 5.22 | 36.37 | 42.18 | 54.00 | -11.82 | Average |
| 4512.500 | 50.75 | 30.53 | 5.22 | 36.37 | 50.13 | 74.00 | -23.87 | Peak |

Middle Channel Horizontal:

| | | | |
|---|---|---|---|
| Test Site | : 3m Chamber | Temp/Humi | : 19℃/60% |
| Tested by | : Damon | Power rating | : AC 120V |
| EUT | : Floodlight Wired | Pol/Phase | : HORIZONTAL |
| Model No. | : 5W21S8 | | |
| Test Mode | : Lora 500KHz DTS 913.7MHz | | |



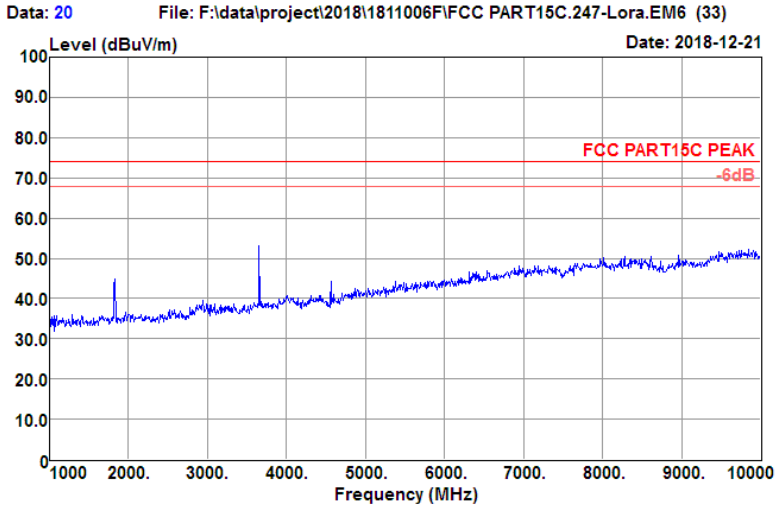
| | | | |
|---|---|---|---|
| Test Site | : 3m Chamber | Temp/Humi | : 19℃/60% |
| Tested by | : Damon | Power rating | : AC 120V |
| EUT | : Floodlight Wired | Pol/Phase | : HORIZONTAL |
| Model No. | : 5W21S8 | | |
| Test Mode | : Lora 500KHz DTS 913.7MHz | | |



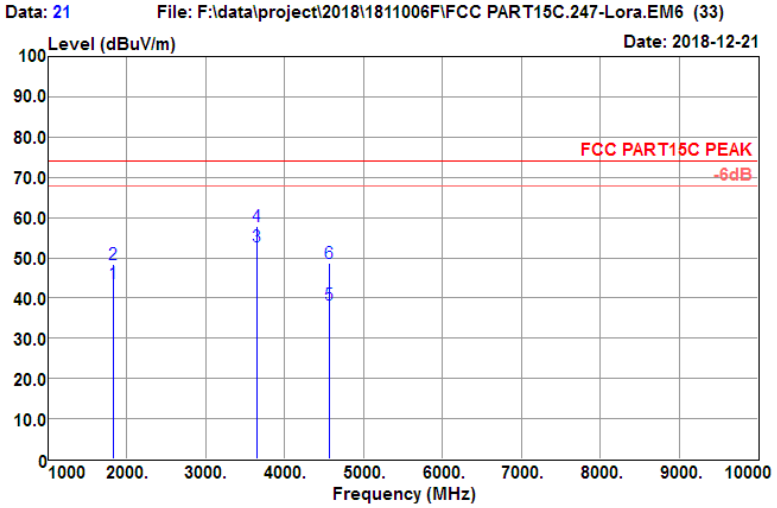

| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 1827.400 | 51.07 | 25.82 | 2.87 | 35.08 | 44.68 | 54.00 | -9.32 | Average |
| 1827.400 | 54.52 | 25.82 | 2.87 | 35.08 | 48.13 | 74.00 | -25.87 | Peak |
| 3654.800 | 55.30 | 29.09 | 4.88 | 36.94 | 52.33 | 54.00 | -1.67 | Average |
| 3654.800 | 61.15 | 29.09 | 4.88 | 36.94 | 58.18 | 74.00 | -15.82 | Peak |
| 4568.500 | 39.53 | 30.66 | 5.19 | 36.35 | 39.03 | 54.00 | -14.97 | Average |
| 4568.500 | 47.74 | 30.66 | 5.19 | 36.35 | 47.24 | 74.00 | -26.76 | Peak |

Middle Channel Vertical:

| | | | |
|---|---|---|---|
| Test Site | : 3m Chamber | Temp/Humi | : 19℃/60% |
| Tested by | : Damon | Power rating | : AC 120V |
| EUT | : Floodlight Wired | Pol/Phase | : VERTICAL |
| Model No. | : 5W21S8 | | |
| Test Mode | : Lora 500KHz DTS 913.7MHz | | |



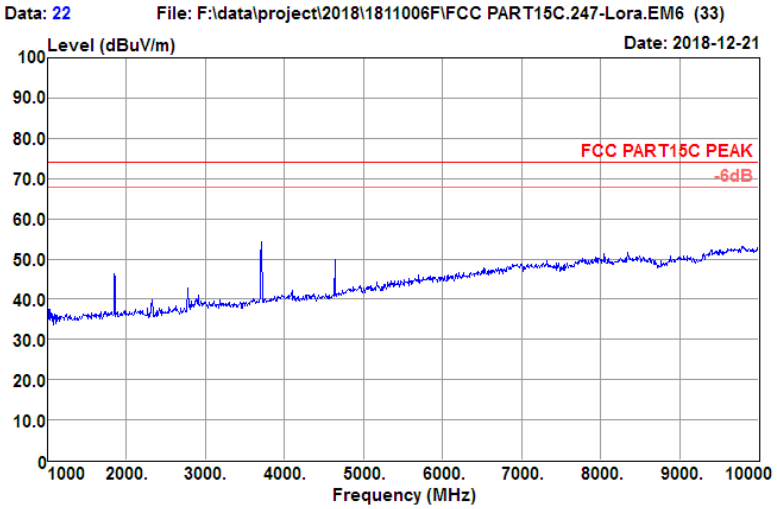
| | | | |
|---|---|---|---|
| Test Site | : 3m Chamber | Temp/Humi | : 19℃/60% |
| Tested by | : Damon | Power rating | : AC 120V |
| EUT | : Floodlight Wired | Pol/Phase | : VERTICAL |
| Model No. | : 5W21S8 | | |
| Test Mode | : Lora 500KHz DTS 913.7MHz | | |



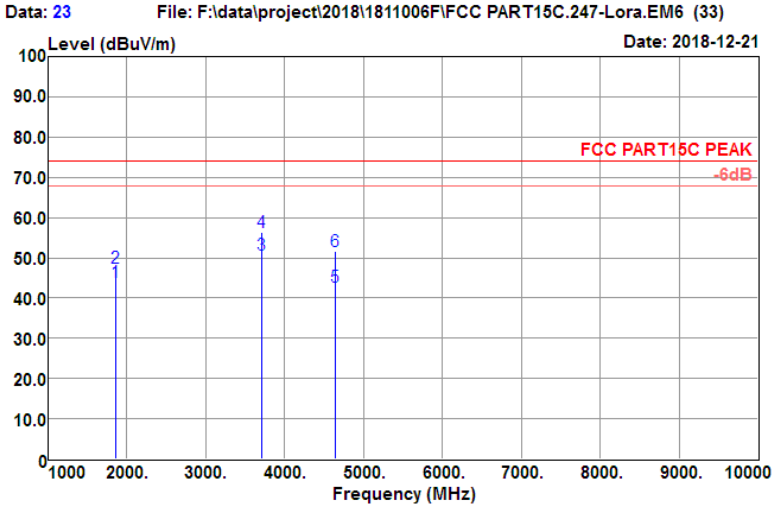

| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 1827.400 | 50.12 | 25.82 | 2.87 | 35.08 | 43.73 | 54.00 | -10.27 | Average |
| 1827.400 | 54.70 | 25.82 | 2.87 | 35.08 | 48.31 | 74.00 | -25.69 | Peak |
| 3654.800 | 55.80 | 29.09 | 4.88 | 36.94 | 52.83 | 54.00 | -1.17 | Average |
| 3654.800 | 60.88 | 29.09 | 4.88 | 36.94 | 57.91 | 74.00 | -16.09 | Peak |
| 4568.400 | 38.87 | 30.66 | 5.19 | 36.35 | 38.37 | 54.00 | -15.63 | Average |
| 4568.400 | 49.15 | 30.66 | 5.19 | 36.35 | 48.65 | 74.00 | -25.35 | Peak |

High Channel Horizontal:

| | | | |
|---|---|---|---|
| Test Site | : 3m Chamber | Temp/Humi | : 19℃/60% |
| Tested by | : Damon | Power rating | : AC 120V |
| EUT | : Floodlight Wired | Pol/Phase | : HORIZONTAL |
| Model No. | : 5W21S8 | | |
| Test Mode | : Lora 500KHz DTS 927MHz | | |



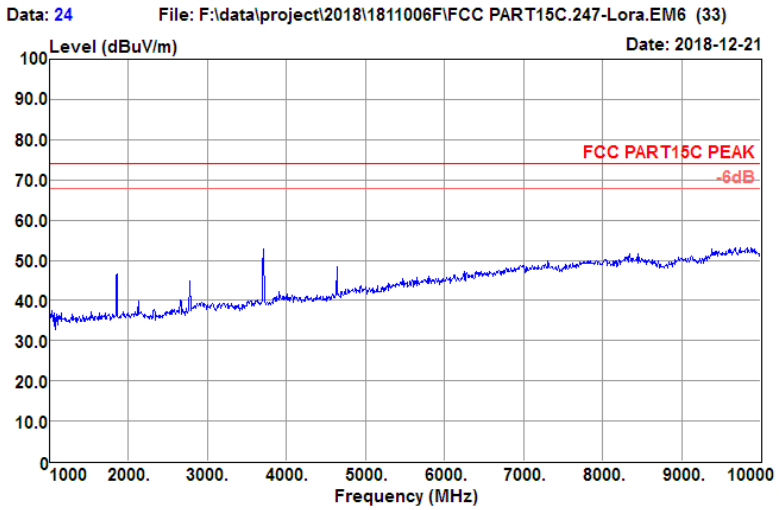
| | | | |
|---|---|---|---|
| Test Site | : 3m Chamber | Temp/Humi | : 19℃/60% |
| Tested by | : Damon | Power rating | : AC 120V |
| EUT | : Floodlight Wired | Pol/Phase | : HORIZONTAL |
| Model No. | : 5W21S8 | | |
| Test Mode | : Lora 500KHz DTS 927MHz | | |



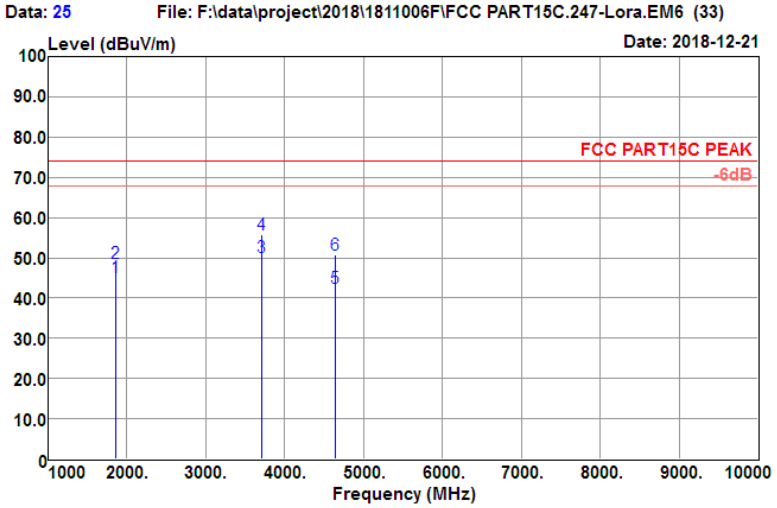

| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 1854.000 | 50.40 | 25.87 | 2.88 | 35.08 | 44.07 | 54.00 | -9.93 | Average |
| 1854.000 | 53.84 | 25.87 | 2.88 | 35.08 | 47.51 | 74.00 | -26.49 | Peak |
| 3708.000 | 53.48 | 29.12 | 4.99 | 36.88 | 50.71 | 74.00 | -23.29 | Average |
| 3708.000 | 59.15 | 29.12 | 4.99 | 36.88 | 56.38 | 74.00 | -17.62 | Peak |
| 4635.000 | 43.07 | 30.82 | 5.22 | 36.33 | 42.78 | 54.00 | -11.22 | Average |
| 4635.000 | 51.83 | 30.82 | 5.22 | 36.33 | 51.54 | 74.00 | -22.46 | Peak |

High Channel Vertical:

| | | | |
|---|---|---|---|
| Test Site | : 3m Chamber | Temp/Humi | : 19℃/60% |
| Tested by | : Damon | Power rating | : AC 120V |
| EUT | : Floodlight Wired | Pol/Phase | : VERTICAL |
| Model No. | : 5W21S8 | | |
| Test Mode | : Lora 500KHz DTS 927MHz | | |



| | | | |
|---|---|---|---|
| Test Site | : 3m Chamber | Temp/Humi | : 19℃/60% |
| Tested by | : Damon | Power rating | : AC 120V |
| EUT | : Floodlight Wired | Pol/Phase | : VERTICAL |
| Model No. | : 5W21S8 | | |
| Test Mode | : Lora 500KHz DTS 927MHz | | |

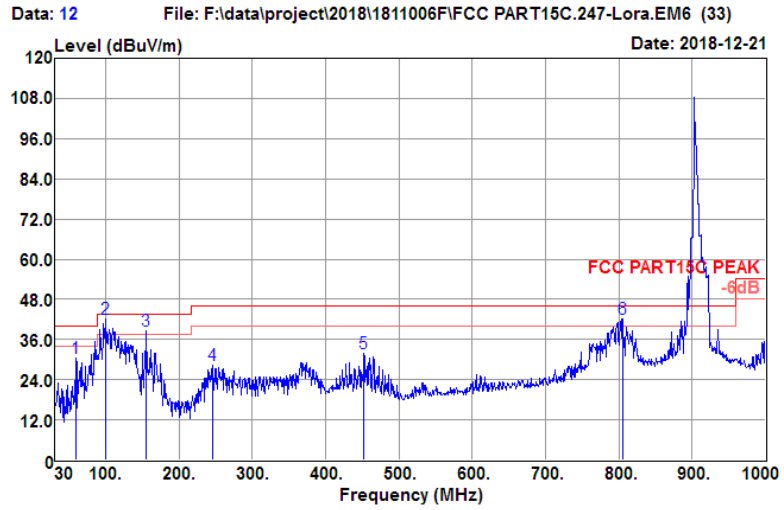



| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 1854.000 | 51.49 | 25.87 | 2.88 | 35.08 | 45.16 | 54.00 | -8.84 | Average |
| 1854.000 | 55.01 | 25.87 | 2.88 | 35.08 | 48.68 | 74.00 | -25.32 | Peak |
| 3708.000 | 52.79 | 29.12 | 4.99 | 36.88 | 50.02 | 54.00 | -3.98 | Average |
| 3708.000 | 58.43 | 29.12 | 4.99 | 36.88 | 55.66 | 74.00 | -18.34 | Peak |
| 4635.000 | 42.92 | 30.82 | 5.22 | 36.33 | 42.63 | 54.00 | -11.37 | Average |
| 4635.000 | 51.06 | 30.82 | 5.22 | 36.33 | 50.77 | 74.00 | -23.23 | Peak |

### 4.5.5 Test Result of Radiated Spurious Emission (30MHz ~ 1GHz)

Horizontal:

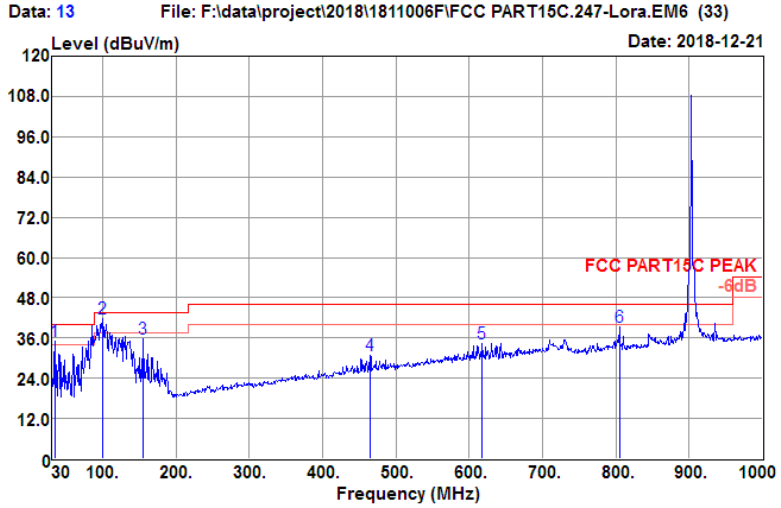
| | | | |
|---|---|---|---|
| Test Site | : 3m Chamber | Temp/Humi | : 19℃/60% |
| Tested by | : Damon | Power rating | : AC 120V |
| EUT | : Floodlight Wired | Pol/Phase | : HORIZONTAL |
| Model No. | : 5W21S8 | | |
| Test Mode | : Lora 500KHz DTS 902.5MHz | | |




| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 59.100 | 48.69 | 12.77 | 1.46 | 32.55 | 30.37 | 40.00 | -9.63 | QP |
| 99.840 | 62.49 | 10.19 | 1.95 | 32.44 | 42.19 | 43.50 | -1.31 | QP |
| 155.130 | 54.42 | 14.20 | 2.46 | 32.51 | 38.57 | 43.50 | -4.93 | QP |
| 246.310 | 46.43 | 11.29 | 3.16 | 32.53 | 28.35 | 46.00 | -17.65 | QP |
| 451.950 | 44.40 | 15.68 | 4.31 | 32.51 | 31.88 | 46.00 | -14.12 | QP |
| 805.030 | 47.90 | 20.85 | 6.11 | 32.62 | 42.24 | 46.00 | -3.76 | QP |

Vertical:

| | | | |
|---|---|---|---|
| Test Site | : 3m Chamber | Temp/Humi | : 19℃/60% |
| Tested by | : Damon | Power rating | : AC 120V |
| EUT | : Floodlight Wired | Pol/Phase | : VERTICAL |
| Model No. | : 5W21S8 | | |
| Test Mode | : Lora 500KHz DTS 902.5MHz | | |




| Freq | Reading level | Antenna factor | Cable loss | Preamp factor | level | Limit level | Over limit | Remark |
|---|---|---|---|---|---|---|---|---|
| MHz | dBuV | dB/m | dB | dB | dBuV | dBuV/m | dB | |
| 34.850 | 53.17 | 13.39 | 1.12 | 32.54 | 35.14 | 40.00 | -4.86 | QP |
| 99.840 | 62.02 | 10.19 | 1.95 | 32.44 | 41.72 | 43.50 | -1.78 | QP |
| 155.130 | 51.48 | 14.20 | 2.46 | 32.51 | 35.63 | 43.50 | -7.87 | QP |
| 464.560 | 42.95 | 15.90 | 4.41 | 32.52 | 30.74 | 46.00 | -15.26 | QP |
| 617.820 | 43.23 | 18.63 | 5.06 | 32.71 | 34.21 | 46.00 | -11.79 | QP |
| 805.030 | 44.82 | 20.85 | 6.11 | 32.62 | 39.16 | 46.00 | -6.84 | QP |

# 4.6 AC Conducted Emission Measurement

## 4.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

| Frequency of emission (MHz) | Conducted limit (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

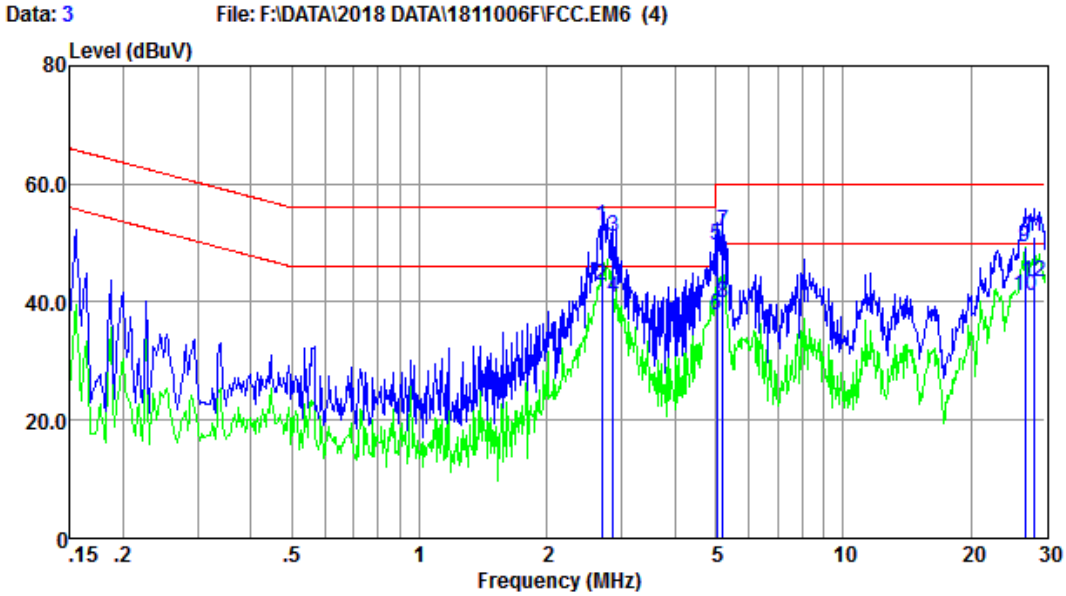
*Decreases with the logarithm of the frequency.

## 4.6.2 Test Procedures

7. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
8. Connect EUT to the power mains through a line impedance stabilization network (LISN).
9. All the support units are connecting to the other LISN.
10. The LISN provides 50 ohm coupling impedance for the measuring instrument.
11. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
12. Both sides of AC line were checked for maximum conducted interference.
13. The frequency range from 150 kHz to 30 MHz was searched.
14. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

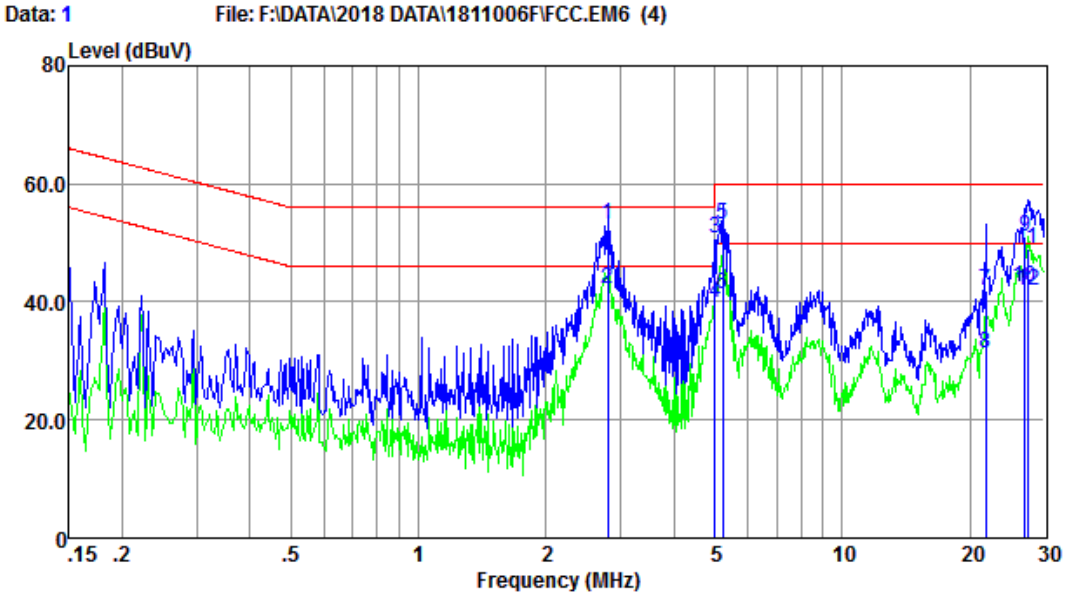
### 4.6.3 Test Result of AC Conducted Emission

| | | | |
|---|---|---|---|
| **Test Mode :** | Mode 1 | **Temperature :** | 21~23℃ |
| **Test Engineer :** | Damon Zhang | **Relative Humidity :** | 61~63% |
| **Test Voltage :** | 120Vac / 60Hz | **Phase :** | Line |
| **Function Type :** | Lora Mode | | |




| Freq | Reading level | LISN/ISN factor | Cable loss | | Limit level | Over limit | Remark |
|---|---|---|---|---|---|---|---|
| MHz | dBuV | dB | dB | dBuV | dBuV | dB | |
| 2.692 | 43.20 | 9.61 | 0.03 | 52.84 | 56.00 | -3.16 | QP |
| 2.692 | 33.20 | 9.61 | 0.03 | 42.84 | 46.00 | -3.16 | Average |
| 2.869 | 41.50 | 9.61 | 0.03 | 51.14 | 56.00 | -4.86 | QP |
| 2.869 | 31.20 | 9.61 | 0.03 | 40.84 | 46.00 | -5.16 | Average |
| 5.031 | 40.00 | 9.67 | 0.03 | 49.70 | 60.00 | -10.30 | QP |
| 5.031 | 28.20 | 9.67 | 0.03 | 37.90 | 50.00 | -12.10 | Average |
| 5.194 | 42.20 | 9.67 | 0.03 | 51.90 | 60.00 | -8.10 | QP |
| 5.194 | 30.10 | 9.67 | 0.03 | 39.80 | 50.00 | -10.20 | Average |
| 26.841 | 39.50 | 9.85 | 0.03 | 49.38 | 60.00 | -10.62 | QP |
| 26.841 | 31.20 | 9.85 | 0.03 | 41.08 | 50.00 | -8.92 | Average |
| 28.152 | 41.10 | 9.84 | 0.05 | 50.99 | 60.00 | -9.01 | QP |
| 28.152 | 33.50 | 9.84 | 0.05 | 43.39 | 50.00 | -6.61 | Average |

| Test Mode : | Mode 1 | Temperature : | 21~23℃ |
|---|---|---|---|
| Test Engineer : | Damon Zhang | Relative Humidity : | 61~63% |
| Test Voltage : | 120Vac / 60Hz | Phase : | Neutral |
| Function Type : | Lora Mode | | |




| Freq | Reading level | LISN/ISN factor | Cable loss | level | Limit level | Over limit | Remark |
|---|---|---|---|---|---|---|---|
| MHz | dBuV | dB | dB | dBuV | dBuV | dB | |
| 2.794 | 43.30 | 9.66 | 0.03 | 52.99 | 56.00 | -3.01 | QP |
| 2.794 | 32.50 | 9.66 | 0.03 | 42.19 | 46.00 | -3.81 | Average |
| 5.005 | 40.90 | 9.72 | 0.03 | 50.65 | 60.00 | -9.35 | QP |
| 5.005 | 30.10 | 9.72 | 0.03 | 39.85 | 50.00 | -10.15 | Average |
| 5.221 | 43.30 | 9.73 | 0.03 | 53.06 | 60.00 | -6.94 | QP |
| 5.221 | 31.60 | 9.73 | 0.03 | 41.36 | 50.00 | -8.64 | Average |
| 21.830 | 31.90 | 9.93 | 0.05 | 41.88 | 60.00 | -18.12 | QP |
| 21.830 | 21.40 | 9.93 | 0.05 | 31.38 | 50.00 | -18.62 | Average |
| 26.984 | 41.00 | 9.97 | 0.03 | 51.00 | 60.00 | -9.00 | QP |
| 26.984 | 32.50 | 9.97 | 0.03 | 42.50 | 50.00 | -7.50 | Average |
| 27.416 | 39.10 | 9.97 | 0.04 | 49.11 | 60.00 | -10.89 | QP |
| 27.416 | 31.90 | 9.97 | 0.04 | 41.91 | 50.00 | -8.09 | Average |

## 4.7 Antenna Requirements

### 4.7.1 Standard ApplicaLora

According to antenna requirement of §15.203.

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsiLora 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 re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsiLora for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

And according to §15.247(4)(1), system operating in the 2400-2483.5MHz bands that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

### 4.7.2 Antenna Connected Construction

An embedded-in antenna design is used.

### 4.7.3 Antenna Gain

The antenna peak gain of EUT is -1.8dBi for BLE and -4.17dBi for Lora less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

# 5. List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Calibration Date | Due Date | Remark |
|---|---|---|---|---|---|---|
| Spectrum Analyzer | Keysight | N9010A | MY56070788 | 2018-03-02 | 2019-03-01 | Conducted |
| Power Sensor | Keysight | U2021XA | MY56510025 | 2018-03-02 | 2019-03-01 | Conducted |
| Power Sensor | Keysight | U2021XA | MY57030005 | 2018-03-02 | 2019-03-01 | Conducted |
| Power Sensor | Keysight | U2021XA | MY56510018 | 2018-03-02 | 2019-03-01 | Conducted |
| Power Sensor | Keysight | U2021XA | MY56480002 | 2018-03-02 | 2019-03-01 | Conducted |
| Thermal Chamber | Sanmtest | SMC-408-CD | 2435 | 2018-07-05 | 2019-07-04 | Conducted |
| Base Station | R&S | CMW 270 | 101231 | 2018-03-17 | 2019-03-16 | Conducted |
| Signal Generator (Interferer) | Keysight | N5182B | MY56200384 | 2018-04-10 | 2019-04-09 | Conducted |
| Signal Generator (Blocker) | Keysight | N5171B | MY56200661 | 2018-03-15 | 2019-03-14 | Conducted |

| Instrument | Manufacturer | Model No. | Serial No. | Calibration Date | Due Date | Remark |
|---|---|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSV 40 | 101433 | 2018-03-14 | 2019-03-13 | Radiation |
| Amplifier | Sonoma | 310 | 363917 | 2018-03-06 | 2019-03-05 | Radiation |
| Amplifier | Schwarzbeck | BBV 9718 | 327 | 2018-03-14 | 2019-03-13 | Radiation |
| Amplifier | Narda | TTA1840-35-HG | 2034380 | 2018-07-18 | 2019-07-17 | Radiation |
| Broadband Antenna | Schwarzbeck | VULB 9168 | 9168-757 | 2017-03-03 | 2020-03-02 | Radiation |
| Horn Antenna | Schwarzbeck | BBHA 9120 D | 1677 | 2017-03-03 | 2020-03-02 | Radiation |
| Horn Antenna | COM-POWER | AH-1840 | 101117 | 2018-06-20 | 2021-06-19 | Radiation |
| Test Software | Auidx | E3 | 6.111221a | N/A | N/A | Radiation |
| Filter | Micro-Tronics | BRM 50702 | G266 | N/A | N/A | Radiation |

N/A: No Calibration Required

# 6. Uncertainty of Evaluation

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| MEASUREMENT | FREQUENCY | UNCERTAINTY |
|---|---|---|
| Conducted emissions | 9kHz~30MHz | 2.64dB |
| Radiated emission | 30MHz ~ 1GMHz | 5.05dB |
| | 1GHz ~ 18GHz | 5.06 dB |
| | 18GHz ~ 40GHz | 3.65dB |

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.