



FCC ID: 2ARCQ-EM7565  
Report No.: T180821D09-RP3

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## FCC 47 CFR PART 22 SUBPART H AND PART 24 SUBPART E

### TEST REPORT

For

Nodegrid

Model No.: SR

Trade Name: ZPE

*Issued to*

**ZPE Systems, Inc.**  
**46757 Fremont Blvd., Fremont, CA 94538, USA**

*Issued by*

**Compliance Certification Services Inc.**  
**Wugu Laboratory**  
**No.11, Wugong 6th Rd., Wugu Dist.,**  
**New Taipei City 24891, Taiwan. (R.O.C.)**  
**Issued Date: November 29, 2018**

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.  
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### **Revision History**

| Rev. |  | Issue Date        |  | Revisions                                                                                         | Effect Page | Revised By   |
|------|--|-------------------|--|---------------------------------------------------------------------------------------------------|-------------|--------------|
| 00   |  | November 29, 2018 |  | Initial Issue                                                                                     | ALL         | Allison Chen |
| 01   |  | December 21, 2018 |  | 1. Revised description of test modes in section 4.3.<br>2. Revised test condition in section 4.4. | P.8-9       | Allison Chen |



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## 1. TEST RESULT CERTIFICATION

**Applicant:** ZPE Systems, Inc.  
46757 Fremont Blvd., Fremont, CA 94538, USA

**Manufacturer:** ZPE Systems, Inc.  
46757 Fremont Blvd., Fremont, CA 94538, USA

**Equipment Under Test:** Nodegrid

**Trade Name:** ZPE

**Model:** SR

**Date of Test:** September 28 ~ October 2, 2018

| APPLICABLE STANDARDS                                  |                         |
|-------------------------------------------------------|-------------------------|
| STANDARD                                              | TEST RESULT             |
| FCC 47 CFR PART 22 SUBPART H AND<br>PART 24 SUBPART E | No non-compliance noted |

### We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA-603-E and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rule FCC PART 22 Subpart H, PART 24 Subpart E.

The test results of this report relate only to the tested sample identified in this report.

*Approved by:*

*Tested by:*

Sam Chuang  
Manager  
Compliance Certification Services Inc.

Jerry Chuang  
Engineer  
Compliance Certification Services Inc.



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## 2. EUT DESCRIPTION

|                              |                                                              |                         |
|------------------------------|--------------------------------------------------------------|-------------------------|
| <b>Product</b>               | Nodegrid                                                     |                         |
| <b>Trade Name</b>            | ZPE                                                          |                         |
| <b>Model</b>                 | SR                                                           |                         |
| <b>Model Discrepancy</b>     | N/A                                                          |                         |
| <b>Received Date</b>         | August 21, 2018                                              |                         |
| <b>Power Supply</b>          | Power from AC adapter or internal Power Supply               |                         |
| <b>Frequency Range</b>       | LTE Band 2<br>Channel Bandwidth: 1.4MHz                      | 1850.7 MHz ~ 1909.2 MHz |
|                              | LTE Band 2<br>Channel Bandwidth: 3MHz                        | 1851.5 MHz ~ 1908.4 MHz |
|                              | LTE Band 2<br>Channel Bandwidth: 5MHz                        | 1852.5 MHz ~ 1907.5 MHz |
|                              | LTE Band 2<br>Channel Bandwidth: 10MHz                       | 1855.0 MHz ~1905.0 MHz  |
|                              | LTE Band 2<br>Channel Bandwidth: 15MHz                       | 1857.5 MHz ~ 1902.5 MHz |
|                              | LTE Band 2<br>Channel Bandwidth: 20MHz                       | 1860.0 MHz ~1900.0 MHz  |
|                              | LTE Band 5<br>Channel Bandwidth: 1.4MHz                      | 824.7 MHz ~ 848.2MHz    |
|                              | LTE Band 5<br>Channel Bandwidth: 3MHz                        | 825.5 MHz ~ 847.4 MHz   |
|                              | LTE Band 5<br>Channel Bandwidth: 5MHz                        | 826.5 MHz ~846.5 MHz    |
|                              | LTE Band 5<br>Channel Bandwidth: 10MHz                       | 829 MHz ~844 MHz        |
|                              |                                                              |                         |
| <b>Modulation Technique</b>  | LTE Band 2                                                   | QPSK, 16QAM             |
|                              | LTE Band 5                                                   | QPSK, 16QAM             |
| <b>Antenna Specification</b> | External Antenna<br>LTE Band 2: 3 dBi<br>LTE Band 5: 1.8 dBi |                         |

|                                                  |                                         |                                     |
|--------------------------------------------------|-----------------------------------------|-------------------------------------|
| <b>Transmit Power<br/>(ERP &amp; EIRP Power)</b> | LTE Band 2<br>Channel Bandwidth: 1.4MHz | QPSK: 31.66 dBm<br>16QAM: 32.39 dBm |
|                                                  | LTE Band 2<br>Channel Bandwidth: 3MHz   | QPSK: 31.59 dBm<br>16QAM: 32.13 dBm |
|                                                  | LTE Band 2<br>Channel Bandwidth: 5MHz   | QPSK: 31.59 dBm<br>16QAM: 32.18 dBm |
|                                                  | LTE Band 2<br>Channel Bandwidth: 10MHz  | QPSK: 31.67 dBm<br>16QAM: 32.59 dBm |
|                                                  | LTE Band 2<br>Channel Bandwidth: 15MHz  | QPSK: 31.85 dBm<br>16QAM: 32.59 dBm |
|                                                  | LTE Band 2<br>Channel Bandwidth: 20MHz  | QPSK: 31.68 dBm<br>16QAM: 32.42 dBm |
|                                                  | LTE Band 5<br>Channel Bandwidth: 1.4MHz | QPSK: 29.44 dBm<br>16QAM: 29.69 dBm |
|                                                  | LTE Band 5<br>Channel Bandwidth: 3MHz   | QPSK: 29.17 dBm<br>16QAM: 29.58 dBm |
|                                                  | LTE Band 5<br>Channel Bandwidth: 5MHz   | QPSK: 28.74 dBm<br>16QAM: 29.67 dBm |
|                                                  | LTE Band 5<br>Channel Bandwidth: 10MHz  | QPSK: 28.90 dBm<br>16QAM: 29.35 dBm |

**Remark:** The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.



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### 3. TEST SUMMARY

| FCC Standard Section         | Report Section | Test Item                                           | Result |
|------------------------------|----------------|-----------------------------------------------------|--------|
| -                            | 2              | Antenna Requirement                                 | Pass   |
| 2.1046                       | -              | Output Power measurement                            | N/A    |
| 22.913(a),<br>24.232(c)      | 8.1            | ERP Measurement                                     | Pass   |
| 2.1055,<br>22.355,<br>24.235 | -              | Frequency Stability v.s.<br>temperature measurement | N/A    |
| 2.1049                       | -              | Occupied Bandwidth<br>Measurement                   | N/A    |
| 22.917(a),<br>24.238(a)      | -              | Conducted Band Edge                                 | N/A    |
| 22.913(d),<br>24.232(d)      | -              | Peak to Average Ratio                               | N/A    |
| 22.917(a),<br>24.238(a)      | -              | Conducted Spurious Emission                         | N/A    |
| 22.917(a),<br>24.238(a)      | 8.2            | Spurious Radiation Measurement                      | Pass   |

## 4. TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures document on chapter 13 of TIA-603-E and FCC CFR 47, Part 2 and Part 22 Subpart H & Part 24 Subpart E, KDB 971168 D01 Power Meas License Digital Systems.

### 4.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

### 4.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

### 4.3 DESCRIPTION OF TEST MODES

The EUT had been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting mode was programmed.

#### LTE Band 2: 1850 MHz ~ 1915MHz

Three channels had been tested for each channel bandwidth.

| Channel Bandwidth  | 1.4MHz  |                 | 3MHz    |                 | 5MHz    |                 |
|--------------------|---------|-----------------|---------|-----------------|---------|-----------------|
|                    | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| Low channel (L)    | 18607   | 1850.7          | 18615   | 1851.5          | 18625   | 1852.5          |
| Middle channel (M) | 18900   | 1880            | 18900   | 1880.0          | 18900   | 1880            |
| High channel (H)   | 19192   | 1909.2          | 19184   | 1908.4          | 19175   | 1907.5          |
| Channel Bandwidth  | 10MHz   |                 | 15MHz   |                 | 20MHz   |                 |
|                    | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| Low channel (L)    | 18650   | 1855            | 18675   | 1857.5          | 18700   | 1860            |
| Middle channel (M) | 18900   | 1880            | 18900   | 1880.0          | 18900   | 1880            |
| High channel (H)   | 19150   | 1905            | 19125   | 1902.5          | 19100   | 1900            |

#### LTE Band 5: 824 MHz ~ 849

Three channels had been tested for each channel bandwidth.

| Channel Bandwidth  | 1.4MHz  |                 | 3MHz    |                 |
|--------------------|---------|-----------------|---------|-----------------|
|                    | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| Low channel (L)    | 20407   | 824.7           | 20415   | 825.5           |
| Middle channel (M) | 20525   | 836.5           | 20525   | 836.5           |
| High channel (H)   | 20642   | 848.2           | 20634   | 847.4           |
| Channel Bandwidth  | 5MHz    |                 | 10MHz   |                 |
|                    | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| Low channel (L)    | 20425   | 826.5           | 20450   | 829             |
| Middle channel (M) | 20525   | 836.5           | 20525   | 836.5           |
| High channel (H)   | 20625   | 846.5           | 20600   | 844             |

For test mode:

The conducted power be measured in 1, 50% and 100% RB allocation, offset to upper edge, centered and lower edge of the channel bandwidth of each required channel.

|       | QPSK | Worst Mode                       | 16QAM | Worst Mode                       |
|-------|------|----------------------------------|-------|----------------------------------|
| Band2 | 1.4M | 1 RB ALLOCATED AT THE LOWER EDGE | 1.4M  | 1 RB ALLOCATED AT THE LOWER EDGE |
|       | 3M   | 1 RB ALLOCATED AT THE LOWER EDGE | 3M    | 1 RB ALLOCATED AT THE LOWER EDGE |
|       | 5M   | 1 RB ALLOCATED AT THE LOWER EDGE | 5M    | 1 RB ALLOCATED AT THE LOWER EDGE |
|       | 10M  | 1 RB ALLOCATED AT THE LOWER EDGE | 10M   | 1 RB ALLOCATED AT THE LOWER EDGE |
|       | 15M  | 1 RB ALLOCATED AT THE LOWER EDGE | 15M   | 1 RB ALLOCATED AT THE LOWER EDGE |
|       | 20M  | 1 RB ALLOCATED AT THE LOWER EDGE | 20M   | 1 RB ALLOCATED AT THE LOWER EDGE |
| Band5 | 1.4M | 1 RB ALLOCATED AT THE LOWER EDGE | 1.4M  | 1 RB ALLOCATED AT THE LOWER EDGE |
|       | 3M   | 1 RB ALLOCATED AT THE LOWER EDGE | 3M    | 1 RB ALLOCATED AT THE LOWER EDGE |
|       | 5M   | 1 RB ALLOCATED AT THE LOWER EDGE | 5M    | 1 RB ALLOCATED AT THE LOWER EDGE |
|       | 10M  | 1 RB ALLOCATED AT THE LOWER EDGE | 10M   | 1 RB ALLOCATED AT THE LOWER EDGE |

## 4.4 THE WORST MODE OF MEASUREMENT

| Radiated Emission Measurement |                                                                                                                                                                                                                                                                                               |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Condition                | Emission for Unwanted and Fundamental                                                                                                                                                                                                                                                         |
| Power supply Mode             | Mode 1: EUT Power by adapter.                                                                                                                                                                                                                                                                 |
| Worst Mode                    | <input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4                                                                                                                                                    |
| Position                      | <input type="checkbox"/> Placed in fixed position.<br><input checked="" type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane)<br><input type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane)<br><input type="checkbox"/> Placed in fixed position at Z-Plane (H-Plane) |

Remark:

1. The worst mode was record in this test report.
2. The EUT pre-scanned in three axis ,X,Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case (X-Plane) were recorded in this report.

## 5. INSTRUMENT CALIBRATION

### 5.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

### 5.2 MEASUREMENT EQUIPMENT USED

#### Equipment Used for Emissions Measurement

| Wugu Fully Chamber                  |                    |                 |               |                  |                 |
|-------------------------------------|--------------------|-----------------|---------------|------------------|-----------------|
| Name of Equipment                   | Manufacturer       | Model           | Serial Number | Calibration Date | Calibration Due |
| Bilog Antenna                       | Sunol Sciences     | JB1             | A052609       | 03/14/2018       | 03/13/2019      |
| Cable                               | HUBER SUHNER       | SUCOFLEX 104PEA | 23452         | 06/29/2018       | 06/28/2019      |
| Cable                               | HUBER SUHNER       | SUCOFLEX 104PEA | 33960         | 06/29/2018       | 06/28/2019      |
| Digital Radio Communication Tester  | R&S                | CMU200          | 116604        | 07/19/2018       | 07/18/2019      |
| Digital Thermo-Hygro Meter          | WISEWIND           | 1110            | D06           | 02/08/2018       | 02/07/2019      |
| Horn Antenna                        | SCHWARZBECK        | BBHA 9120D      | 779           | 03/14/2018       | 03/13/2019      |
| Pre-Amplifier                       | Anritsu            | MH648A          | M89145        | 06/29/2018       | 06/28/2019      |
| Pre-Amplifier                       | EMEC               | EM01G26G        | 060570        | 06/29/2018       | 06/28/2019      |
| Signal Analyzer                     | Agilent            | N9010A          | MY52220817    | 03/22/2018       | 03/21/2019      |
| Wideband Radio Communication Tester | R&S                | CMW 500         | 116875        | 04/20/2018       | 04/19/2019      |
| Antenna Tower                       | CCS                | CC-A-1F         | N/A           | N.C.R            | N.C.R           |
| Controller                          | CCS                | CC-C-1F         | N/A           | N.C.R            | N.C.R           |
| Turn Table                          | CCS                | CC-T-1F         | N/A           | N.C.R            | N.C.R           |
| Software                            | EZ-EMC (CCS-3A1RE) |                 |               |                  |                 |



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### 5.3 MEASUREMENT UNCERTAINTY

| PARAMETER                             | UNCERTAINTY |
|---------------------------------------|-------------|
| Powerline Conducted Emission          | N/A         |
| 3M Semi Anechoic Chamber / 30M~200M   | +/- 4.0138  |
| 3M Semi Anechoic Chamber / 200M~1000M | +/- 3.9483  |
| 3M Semi Anechoic Chamber / 1G~8G      | +/- 2.5975  |
| 3M Semi Anechoic Chamber / 8G~18G     | +/- 2.6112  |
| 3M Semi Anechoic Chamber / 18G~26G    | +/- 2.7389  |
| 3M Semi Anechoic Chamber / 26G~40G    | +/- 2.9683  |

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

## 6. FACILITIES AND ACCREDITATIONS

### 6.1 FACILITIES

- ☐ No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.
- ☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan, R.O.C

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

### 6.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."



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## 7. SETUP OF EQUIPMENT UNDER TEST

### 7.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix A for the actual connections between EUT and support equipment.

### 7.2 SUPPORT EQUIPMENT

| No | Equipment | Brand | Model | Series No. | FCC ID | Data Cable |
|----|-----------|-------|-------|------------|--------|------------|
|    | N/A       |       |       |            |        |            |

**Remark:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

## 8. FCC PART 22 & 24 REQUIREMENTS

### 8.1 ERP & EIRP MEASUREMENT

#### LIMIT

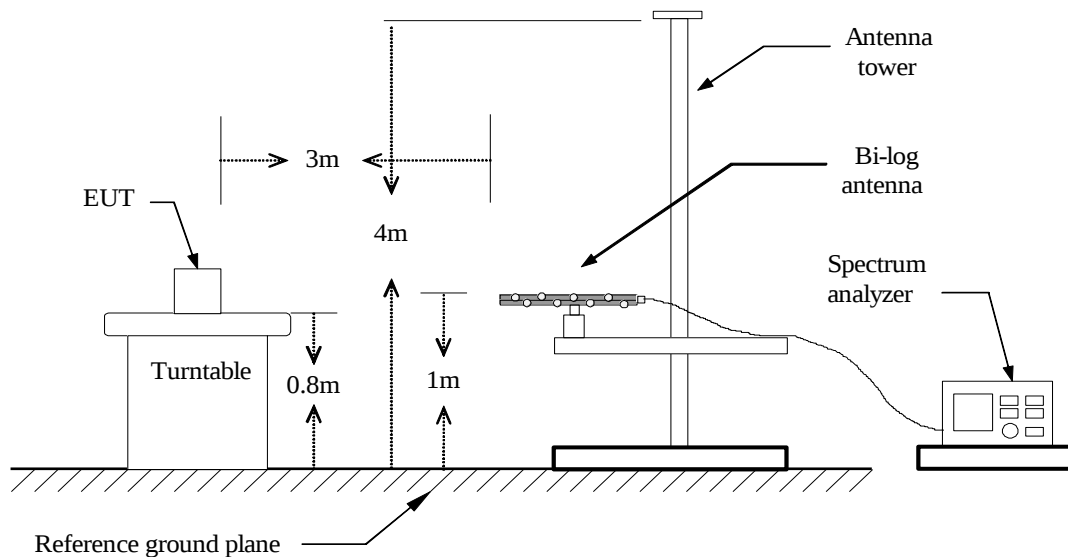
According to FCC §2.1046

FCC 22.913(a): The Effective Radiated Power (ERP) of mobile transmitters must not exceed 7 Watts.

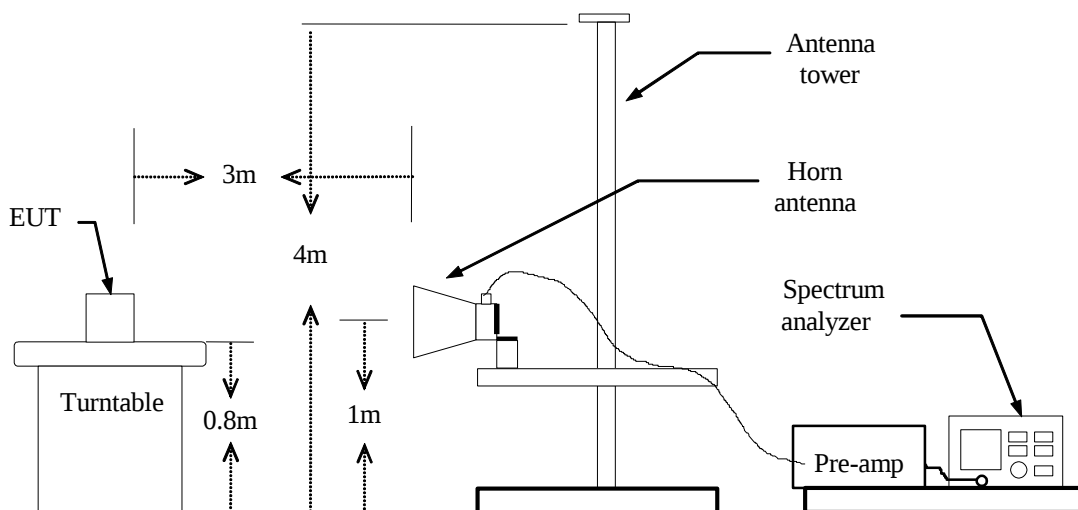
FCC 24.232(c): The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

#### TEST CONFIGURATION

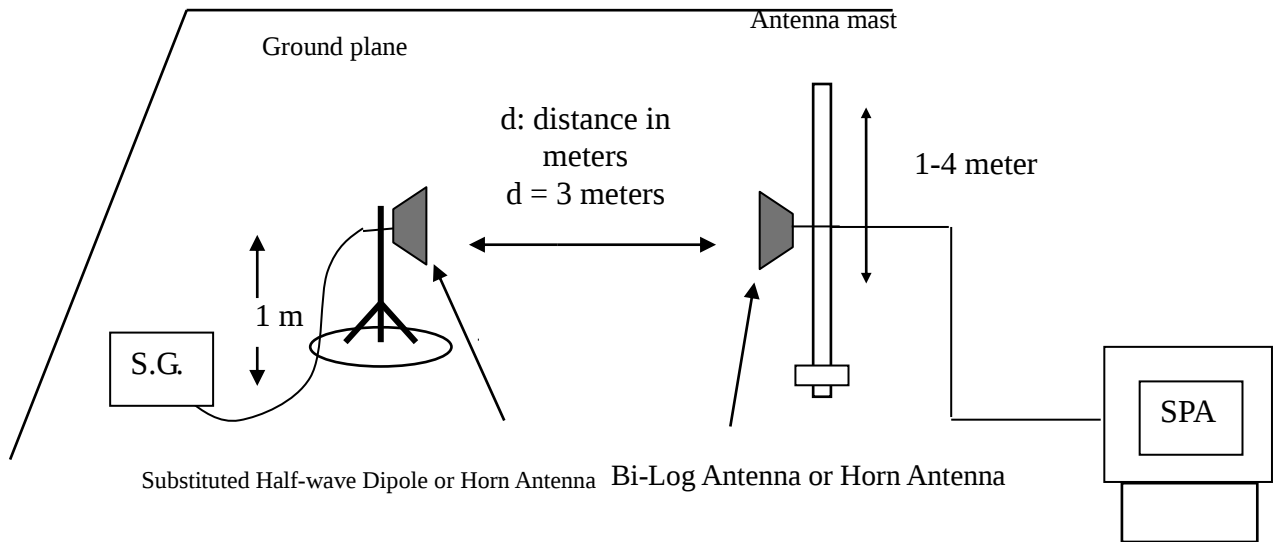
##### **Below 1 GHz**



##### **Above 1 GHz**



## For Substituted Method Test Set-UP



## TEST PROCEDURE

1. The EUT was placed on a non-conductive rotating platform (0.8m for below 1G and above 1G) in a semi-chamber. The radiated emission at the fundamental frequency was measured at 3m and SA with RMS detector per section 5, KDB 971168 D01 Power Meas License Digital Systems.
2. During the measurement, the call box parameters were set to get the maximum output power of the EUT. The maximum emission was recorded from spectrum analyzer power level (LVL) from 360 degrees rotation of turntable and the test antenna raised and lowered over a range from 1m to 4m in both horizontally and vertically polarized orientations.
3. EIRP was measured method according to TIA/EIA-603-E. The EUT was replaced by the substitution antenna at same location, and then record the maximum Analyzer reading through raised and lowered the test antenna.

$$\text{ERP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)} - 2.15$$

$$\text{EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)}$$

## TEST RESULTS

*No non-compliance noted.*

## LTE Band 2

**BW: 1.4MHz / RB=1, RB Offset=0**

| Band | BW (MHz) | Channel | Mode   | UL RB Allocation | UL RB offset | Vertical   |          | Horizontal |          |
|------|----------|---------|--------|------------------|--------------|------------|----------|------------|----------|
|      |          |         |        |                  |              | EIRP (dBm) | EIRP (W) | EIRP (dBm) | EIRP (W) |
| 2    | 1.4      | Lowest  | QPSK   | 1                | 0            | 13.52      | 0.0225   | 29.84      | 0.9638   |
|      |          | Middle  |        | 1                | 0            | 11.16      | 0.0131   | 30.98      | 1.2531   |
|      |          | Highest |        | 1                | 0            | 8.76       | 0.0075   | 31.66      | 1.4655   |
|      |          | Lowest  | 16 QAM | 1                | 0            | 14.10      | 0.0257   | 30.20      | 1.0471   |
|      |          | Middle  |        | 1                | 0            | 12.53      | 0.0179   | 32.39      | 1.7338   |
|      |          | Highest |        | 1                | 0            | 9.23       | 0.0084   | 32.09      | 1.6181   |

**BW: 3MHz / RB=1, RB Offset=0**

| Band | BW (MHz) | Channel | Mode   | UL RB Allocation | UL RB offset | Vertical   |          | Horizontal |          |
|------|----------|---------|--------|------------------|--------------|------------|----------|------------|----------|
|      |          |         |        |                  |              | EIRP (dBm) | EIRP (W) | EIRP (dBm) | EIRP (W) |
| 2    | 3        | Lowest  | QPSK   | 1                | 0            | 13.33      | 0.0215   | 29.51      | 0.8933   |
|      |          | Middle  |        | 1                | 0            | 11.56      | 0.0143   | 31.22      | 1.3243   |
|      |          | Highest |        | 1                | 0            | 8.79       | 0.0076   | 31.59      | 1.4421   |
|      |          | Lowest  | 16 QAM | 1                | 0            | 13.82      | 0.0241   | 30.25      | 1.0593   |
|      |          | Middle  |        | 1                | 0            | 12.32      | 0.0171   | 32.13      | 1.6331   |
|      |          | Highest |        | 1                | 0            | 9.26       | 0.0084   | 32.03      | 1.5959   |

**BW: 5MHz / RB=1, RB Offset=0**

| Band | BW (MHz) | Channel | Mode   | UL RB Allocation | UL RB offset | Vertical   |          | Horizontal |          |
|------|----------|---------|--------|------------------|--------------|------------|----------|------------|----------|
|      |          |         |        |                  |              | EIRP (dBm) | EIRP (W) | EIRP (dBm) | EIRP (W) |
| 2    | 5        | Lowest  | QPSK   | 1                | 0            | 13.25      | 0.0211   | 29.56      | 0.9036   |
|      |          | Middle  |        | 1                | 0            | 11.36      | 0.0137   | 31.14      | 1.3002   |
|      |          | Highest |        | 1                | 0            | 8.97       | 0.0079   | 31.59      | 1.4421   |
|      |          | Lowest  | 16 QAM | 1                | 0            | 13.93      | 0.0247   | 30.31      | 1.0740   |
|      |          | Middle  |        | 1                | 0            | 12.18      | 0.0165   | 32.18      | 1.6520   |
|      |          | Highest |        | 1                | 0            | 9.52       | 0.0090   | 32.13      | 1.6331   |

**BW: 10MHz / RB=1, RB Offset=0**

| Band | BW (MHz) | Channel | Mode   | UL RB Allocation | UL RB offset | Vertical   |          | Horizontal |          |
|------|----------|---------|--------|------------------|--------------|------------|----------|------------|----------|
|      |          |         |        |                  |              | EIRP (dBm) | EIRP (W) | EIRP (dBm) | EIRP (W) |
| 2    | 10       | Lowest  | QPSK   | 1                | 0            | 13.32      | 0.0215   | 29.69      | 0.9311   |
|      |          | Middle  |        | 1                | 0            | 11.34      | 0.0136   | 31.31      | 1.3521   |
|      |          | Highest |        | 1                | 0            | 9.25       | 0.0084   | 31.67      | 1.4689   |
|      |          | Lowest  | 16 QAM | 1                | 0            | 14.13      | 0.0259   | 30.45      | 1.1092   |
|      |          | Middle  |        | 1                | 0            | 12.27      | 0.0169   | 32.30      | 1.6982   |
|      |          | Highest |        | 1                | 0            | 10.10      | 0.0102   | 32.59      | 1.8155   |

**BW: 15MHz / RB=1, RB Offset=0**

| Band | BW (MHz) | Channel | Mode   | UL RB Allocation | UL RB offset | Vertical   |          | Horizontal |          |
|------|----------|---------|--------|------------------|--------------|------------|----------|------------|----------|
|      |          |         |        |                  |              | EIRP (dBm) | EIRP (W) | EIRP (dBm) | EIRP (W) |
| 2    | 15       | Lowest  | QPSK   | 1                | 0            | 13.25      | 0.0211   | 29.71      | 0.9354   |
|      |          | Middle  |        | 1                | 0            | 11.40      | 0.0138   | 31.05      | 1.2735   |
|      |          | Highest |        | 1                | 0            | 9.93       | 0.0098   | 31.85      | 1.5311   |
|      |          | Lowest  | 16 QAM | 1                | 0            | 13.97      | 0.0249   | 30.42      | 1.1015   |
|      |          | Middle  |        | 1                | 0            | 12.34      | 0.0171   | 32.01      | 1.5885   |
|      |          | Highest |        | 1                | 0            | 10.98      | 0.0125   | 32.59      | 1.8155   |

**BW: 20MHz / RB=1, RB Offset=0**

| Band | BW (MHz) | Channel | Mode   | UL RB Allocation | UL RB offset | Vertical   |          | Horizontal |          |
|------|----------|---------|--------|------------------|--------------|------------|----------|------------|----------|
|      |          |         |        |                  |              | EIRP (dBm) | EIRP (W) | EIRP (dBm) | EIRP (W) |
| 2    | 20       | Lowest  | QPSK   | 1                | 0            | 13.27      | 0.0212   | 29.82      | 0.9594   |
|      |          | Middle  |        | 1                | 0            | 11.77      | 0.0150   | 31.13      | 1.2972   |
|      |          | Highest |        | 1                | 0            | 10.46      | 0.0111   | 31.68      | 1.4723   |
|      |          | Lowest  | 16 QAM | 1                | 0            | 14.16      | 0.0261   | 30.62      | 1.1535   |
|      |          | Middle  |        | 1                | 0            | 12.69      | 0.0186   | 32.14      | 1.6368   |
|      |          | Highest |        | 1                | 0            | 11.41      | 0.0138   | 32.42      | 1.7458   |

## LTE Band 5

**BW: 1.4MHz / RB=1, RB Offset=0**

| Band | BW (MHz) | Channel | Mode   | UL RB Allocation | UL RB offset | Vertical  |         | Horizontal |         |
|------|----------|---------|--------|------------------|--------------|-----------|---------|------------|---------|
|      |          |         |        |                  |              | ERP (dBm) | ERP (W) | ERP (dBm)  | ERP (W) |
| 5    | 1.4      | Lowest  | QPSK   | 1                | 0            | 13.20     | 0.0209  | 28.94      | 0.7834  |
|      |          | Middle  |        | 1                | 0            | 14.27     | 0.0267  | 29.44      | 0.8790  |
|      |          | Highest |        | 1                | 0            | 14.82     | 0.0303  | 29.05      | 0.8035  |
|      |          | Lowest  | 16 QAM | 1                | 0            | 14.09     | 0.0256  | 29.69      | 0.9311  |
|      |          | Middle  |        | 1                | 0            | 15.09     | 0.0323  | 29.57      | 0.9057  |
|      |          | Highest |        | 1                | 0            | 15.45     | 0.0351  | 29.23      | 0.8375  |

**BW: 3MHz / RB=1, RB Offset=0**

| Band | BW (MHz) | Channel | Mode   | UL RB Allocation | UL RB offset | Vertical  |         | Horizontal |         |
|------|----------|---------|--------|------------------|--------------|-----------|---------|------------|---------|
|      |          |         |        |                  |              | ERP (dBm) | ERP (W) | ERP (dBm)  | ERP (W) |
| 5    | 3        | Lowest  | QPSK   | 1                | 0            | 13.59     | 0.0229  | 29.17      | 0.8260  |
|      |          | Middle  |        | 1                | 0            | 14.30     | 0.0269  | 28.89      | 0.7745  |
|      |          | Highest |        | 1                | 0            | 14.54     | 0.0284  | 28.27      | 0.6714  |
|      |          | Lowest  | 16 QAM | 1                | 0            | 14.32     | 0.0270  | 29.58      | 0.9078  |
|      |          | Middle  |        | 1                | 0            | 15.02     | 0.0318  | 29.45      | 0.8810  |
|      |          | Highest |        | 1                | 0            | 15.07     | 0.0321  | 28.33      | 0.6808  |

**BW: 5MHz / RB=1, RB Offset=0**

| Band | BW (MHz) | Channel | Mode   | UL RB Allocation | UL RB offset | Vertical  |         | Horizontal |         |
|------|----------|---------|--------|------------------|--------------|-----------|---------|------------|---------|
|      |          |         |        |                  |              | ERP (dBm) | ERP (W) | ERP (dBm)  | ERP (W) |
| 5    | 5        | Lowest  | QPSK   | 1                | 0            | 13.27     | 0.0212  | 28.74      | 0.7482  |
|      |          | Middle  |        | 1                | 0            | 14.23     | 0.0265  | 28.48      | 0.7047  |
|      |          | Highest |        | 1                | 0            | 14.68     | 0.0294  | 27.97      | 0.6266  |
|      |          | Lowest  | 16 QAM | 1                | 0            | 13.95     | 0.0248  | 29.67      | 0.9268  |
|      |          | Middle  |        | 1                | 0            | 14.67     | 0.0293  | 29.60      | 0.9120  |
|      |          | Highest |        | 1                | 0            | 15.07     | 0.0321  | 28.29      | 0.6745  |



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**BW: 10MHz / RB=1, RB Offset=0**

| Band | BW<br>(MHz) | Channel | Mode   | UL RB<br>Allocation | UL RB<br>offset | Vertical     |            | Horizontal   |            |
|------|-------------|---------|--------|---------------------|-----------------|--------------|------------|--------------|------------|
|      |             |         |        |                     |                 | ERP<br>(dBm) | ERP<br>(W) | ERP<br>(dBm) | ERP<br>(W) |
| 5    | 10          | Lowest  | QPSK   | 1                   | 0               | 13.53        | 0.0225     | 28.76        | 0.7516     |
|      |             | Middle  |        | 1                   | 0               | 14.17        | 0.0261     | 28.56        | 0.7178     |
|      |             | Highest |        | 1                   | 0               | 14.40        | 0.0275     | 28.90        | 0.7762     |
|      |             | Lowest  | 16 QAM | 1                   | 0               | 14.15        | 0.0260     | 29.35        | 0.8610     |
|      |             | Middle  |        | 1                   | 0               | 14.18        | 0.0262     | 29.26        | 0.8433     |
|      |             | Highest |        | 1                   | 0               | 16.25        | 0.0422     | 29.26        | 0.8433     |

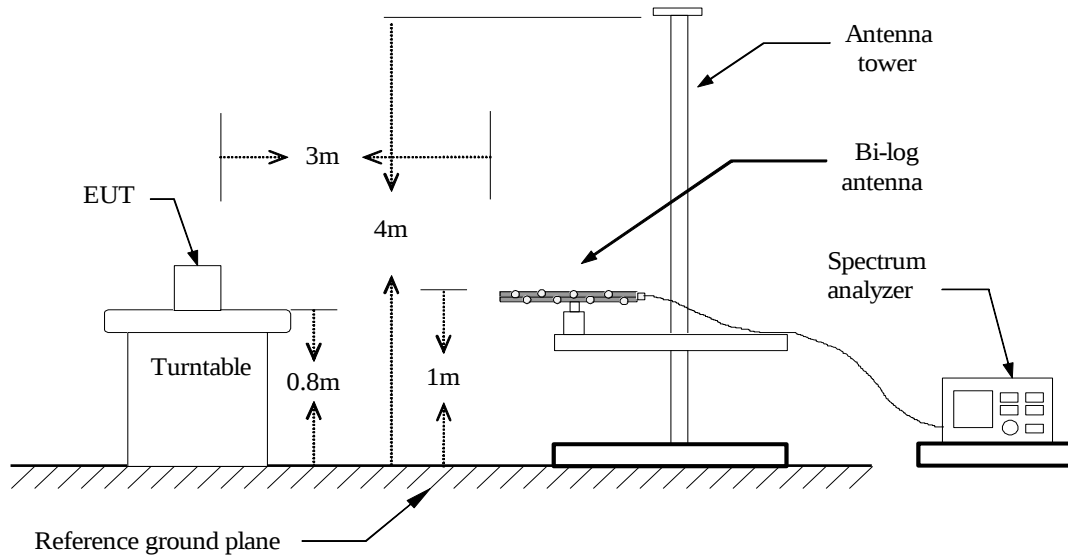
## 8.2 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

### LIMIT

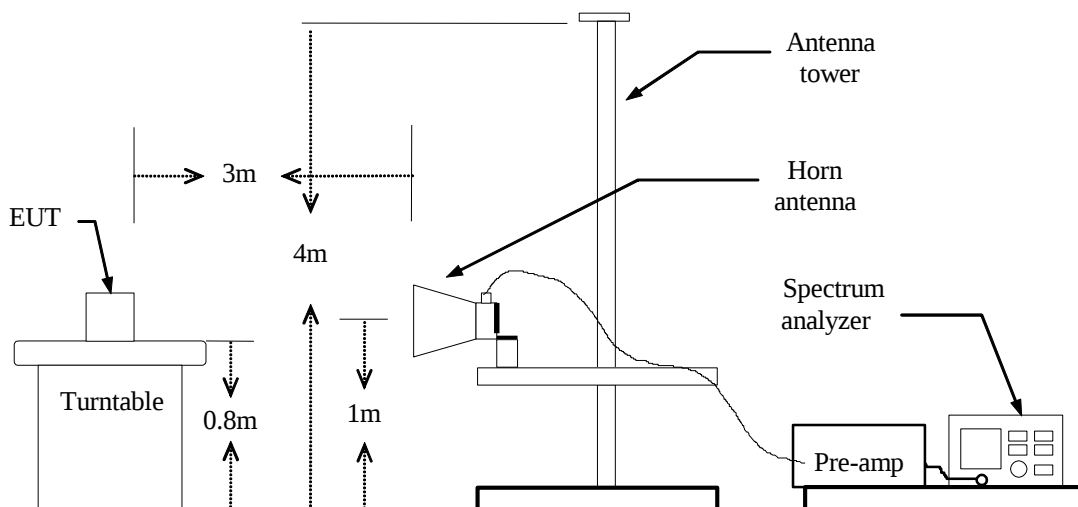
The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log_{10}(P)$  dB. The limit of emission equal to  $-13\text{dBm}$

### Test Configuration

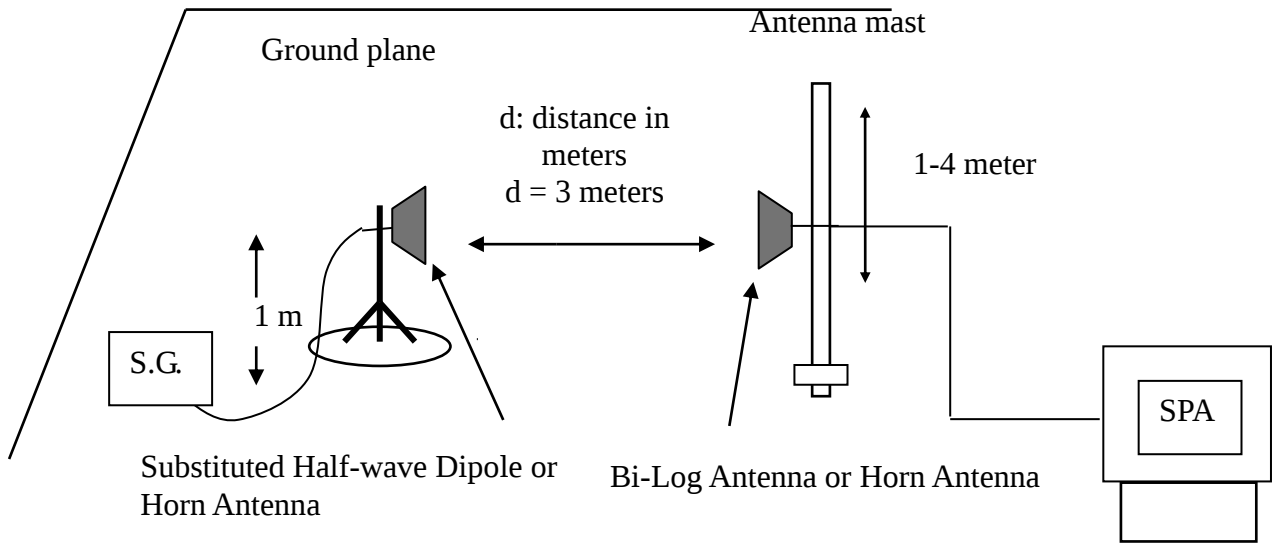
#### Below 1 GHz



#### Above 1 GHz



## Substituted Method Test Set-up



## TEST PROCEDURE

1. According to KDB 971168 D01 Power Meas License Digital Systems and TIA-603-E Section 2.2.12.
2. The EUT was placed on a turntable
  - (1) Below 1G : 0.8m
  - (2) Above 1G : 0.8m
  - (3) EUT set 3m from the receiving antenna
  - (4) The table was rotated 360 degrees of the highest spurious emission to determine the position.
3. Set the spectrum analyzer , RBW=1MHz, VBW=3MHz.
4. A horn antenna was driven by a signal generator.
5. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission

$$ERP = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)} - 2.15$$

$$EIRP = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)}$$

## TEST RESULTS

Refer to the attached tabular data sheets.



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## Test Results

### Below 1GHz

LTE Band 2 / BW: 20MHz / QPSK / RB =1, RB Offset = 0

Operation Mode: Tx / Mid CH

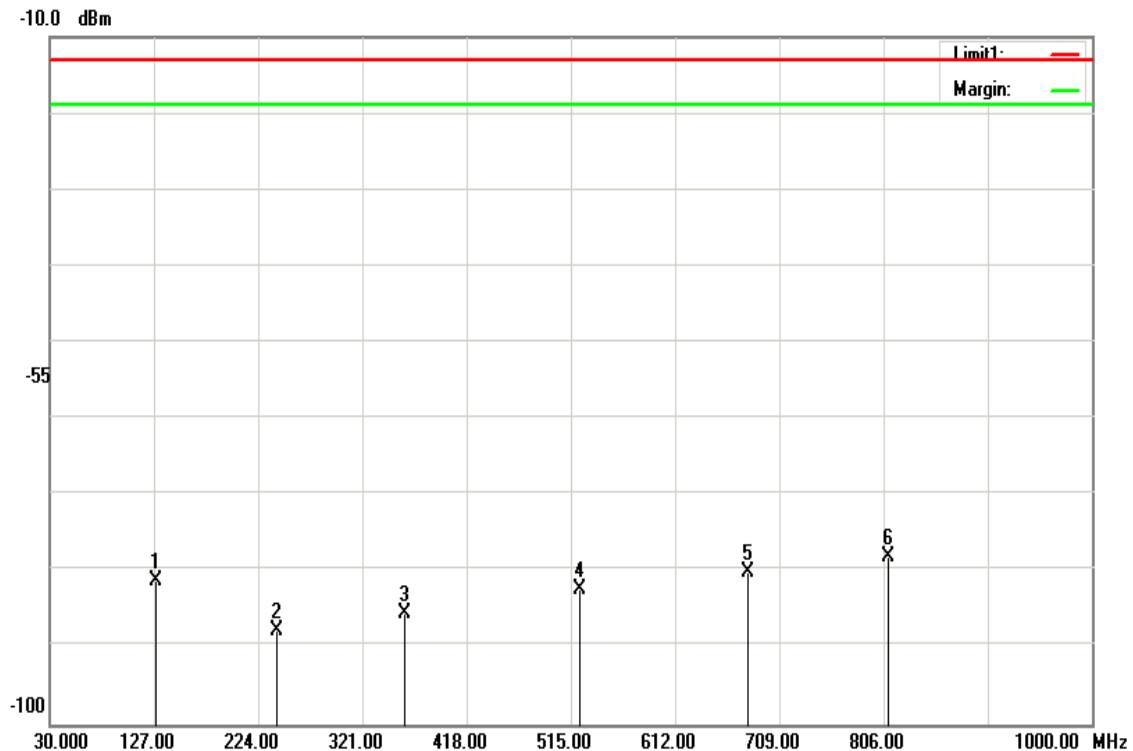
Test Date: October 2, 2018

Temperature: 22°C

Tested by: Jerry Chuang

Humidity: 40 %RH

Polarity: Ver.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 128.9400        | -80.03     | 1.13           | -81.16               | -13.00      | -68.16      | V                          |
| 241.9450        | -86.21     | 1.54           | -87.75               | -13.00      | -74.75      | V                          |
| 359.8000        | -83.52     | 1.9            | -85.42               | -13.00      | -72.42      | V                          |
| 523.7300        | -79.94     | 2.3            | -82.24               | -13.00      | -69.24      | V                          |
| 680.3850        | -77.54     | 2.64           | -80.18               | -13.00      | -67.18      | V                          |
| 810.3650        | -75.17     | 2.89           | -78.06               | -13.00      | -65.06      | V                          |

Note: We selected worst case to performed test, The results can be meet other mode.

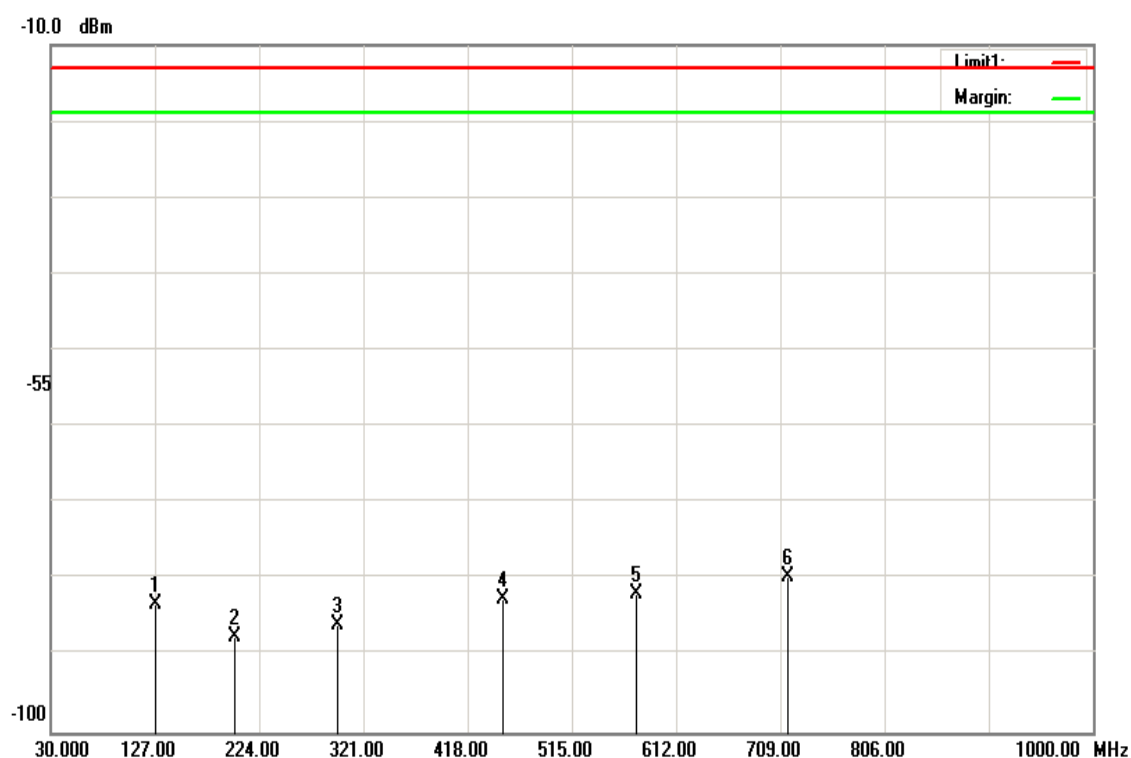
**Operation Mode:** Tx / Mid CH

**Test Date:** October 2, 2018

**Temperature:** 22°C

**Tested by:** Jerry Chuang

**Humidity:** 40 %RH

**Polarity:** Hor.


| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 127.9700        | -82.11     | 1.12           | -83.23               | -13.00      | -70.23      | H                          |
| 201.6900        | -85.99     | 1.41           | -87.40               | -13.00      | -74.40      | H                          |
| 296.7500        | -84.33     | 1.72           | -86.05               | -13.00      | -73.05      | H                          |
| 451.4650        | -80.43     | 2.13           | -82.56               | -13.00      | -69.56      | H                          |
| 575.6250        | -79.57     | 2.42           | -81.99               | -13.00      | -68.99      | H                          |
| 715.7900        | -76.85     | 2.71           | -79.56               | -13.00      | -66.56      | H                          |

Note: We selected worst case to performed test, The results can be meet other mode.

**LTE Band 2 / BW: 20MHz / 16QAM / RB =1, RB Offset = 0**

**Operation Mode:** Tx / Mid CH

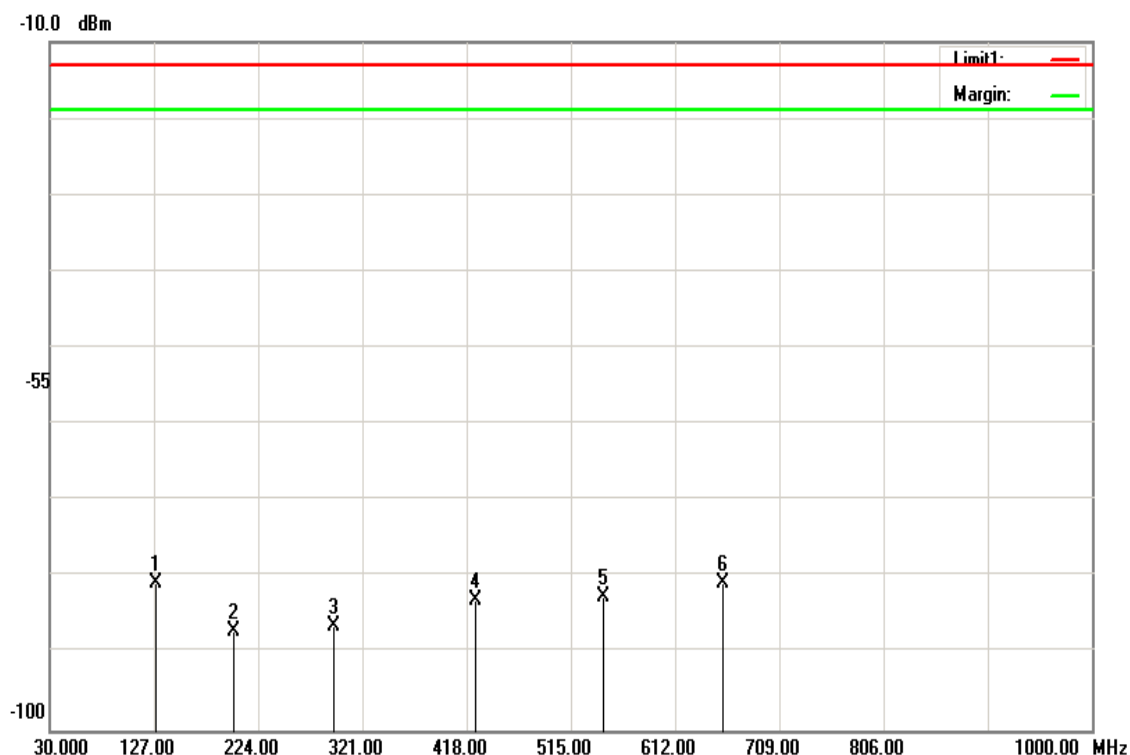
**Test Date:** October 2, 2018

**Temperature:** 22°C

**Tested by:** Jerry Chuang

**Humidity:** 40 %RH

**Polarity:** Ver.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 128.9400        | -79.62     | 1.13           | -80.75               | -13.00      | -67.75      | V                          |
| 201.2050        | -85.74     | 1.4            | -87.14               | -13.00      | -74.14      | V                          |
| 294.3250        | -84.77     | 1.71           | -86.48               | -13.00      | -73.48      | V                          |
| 425.7600        | -80.9      | 2.07           | -82.97               | -13.00      | -69.97      | V                          |
| 545.0700        | -80.18     | 2.35           | -82.53               | -13.00      | -69.53      | V                          |
| 656.6200        | -78.11     | 2.58           | -80.69               | -13.00      | -67.69      | V                          |

*Note: We selected worst case to performed test, The results can be meet other mode.*

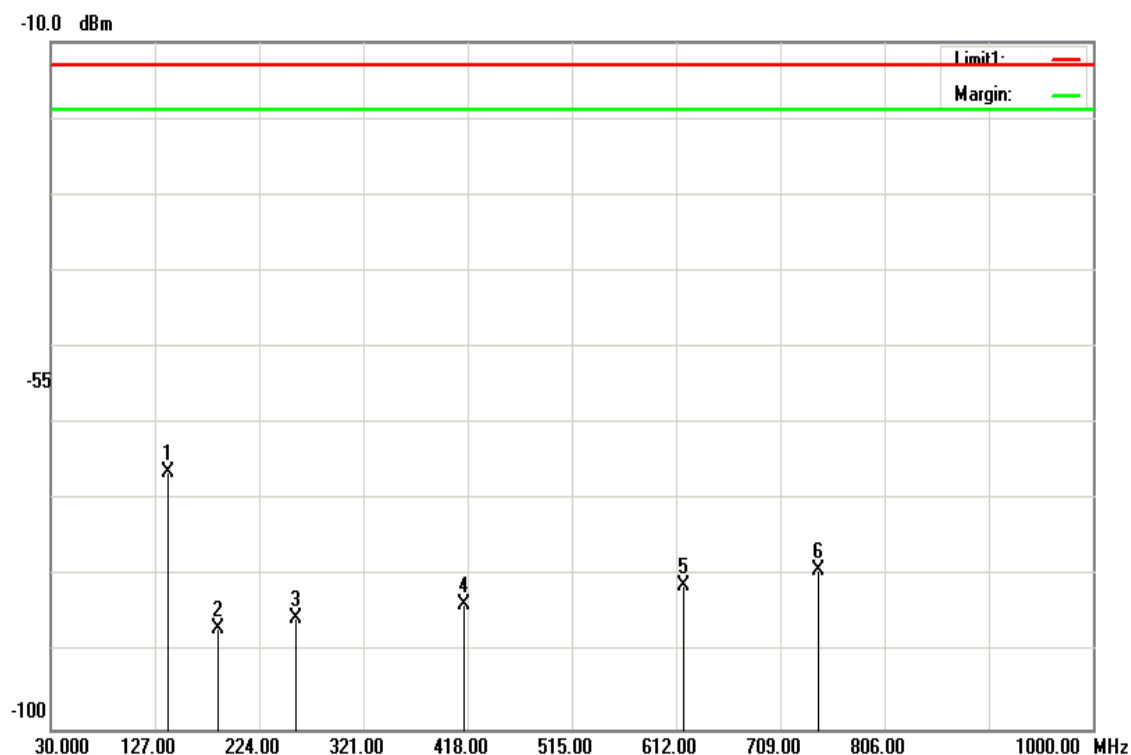
**Operation Mode:** Tx / Mid CH

**Test Date:** October 2, 2018

**Temperature:** 22°C

**Tested by:** Jerry Chuang

**Humidity:** 40 %RH

**Polarity:** Hor.


| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 139.6100        | -65.16     | 1.17           | -66.33               | -13.00      | -53.33      | H                          |
| 186.6550        | -85.48     | 1.35           | -86.83               | -13.00      | -73.83      | H                          |
| 258.4350        | -83.83     | 1.6            | -85.43               | -13.00      | -72.43      | H                          |
| 415.0900        | -81.65     | 2.05           | -83.70               | -13.00      | -70.70      | H                          |
| 619.2750        | -78.66     | 2.51           | -81.17               | -13.00      | -68.17      | H                          |
| 743.9200        | -76.48     | 2.77           | -79.25               | -13.00      | -66.25      | H                          |

Note: We selected worst case to performed test, The results can be meet other mode.



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### Above 1GHz

LTE Band 2 / BW: 20MHz / QPSK RB =1, RB Offset = 0

Operation Mode: Tx / Low CH

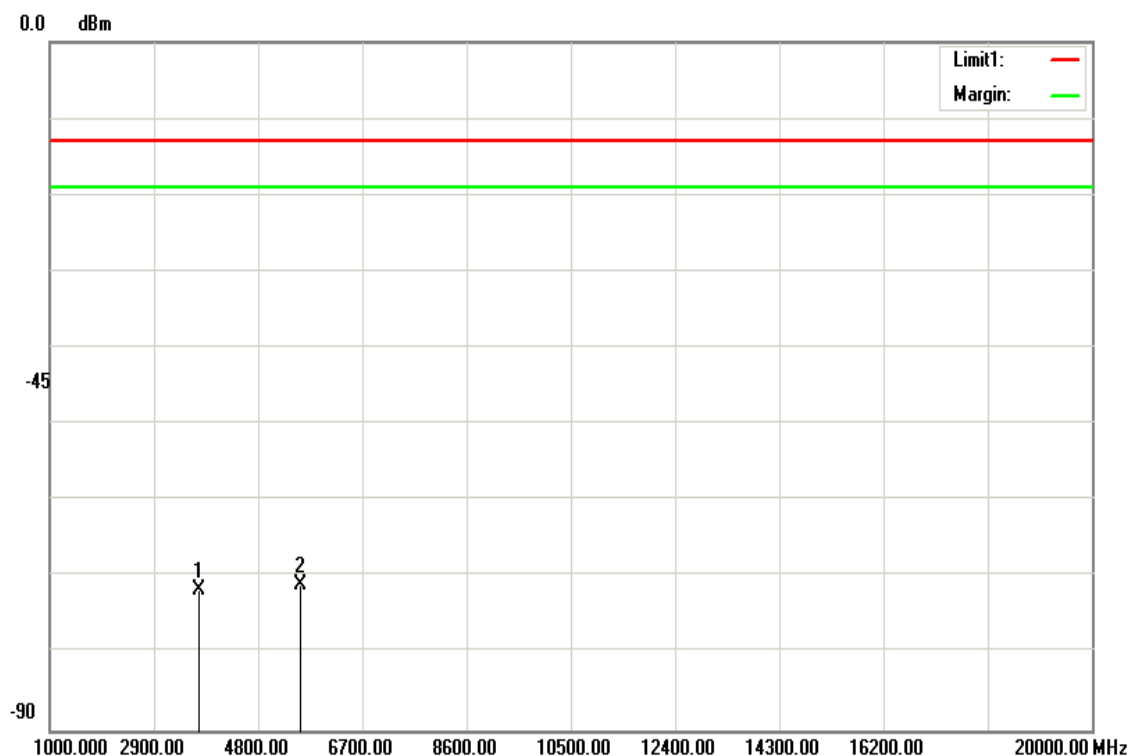
Test Date: October 2, 2018

Temperature: 22°C

Tested by: Jerry Chuang

Humidity: 40 %RH

Polarity: Ver.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 3720.000        | -65.12     | 6.65           | -71.77               | -13.00      | -58.77      | V                          |
| 5580.000        | -62.71     | 8.31           | -71.02               | -13.00      | -58.02      | V                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

### **Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

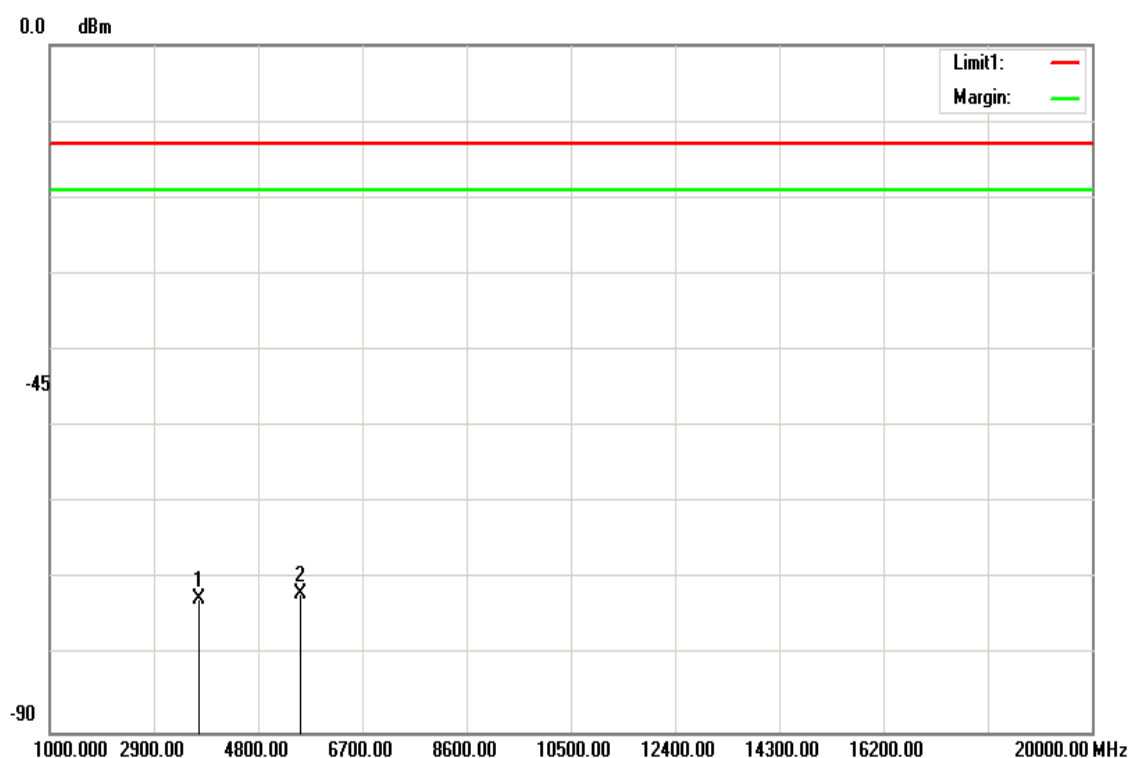


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**Operation Mode:** Tx / Low CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Hor.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 3720.000        | -65.81     | 6.65           | -72.46               | -13.00      | -59.46      | H                          |
| 5580.000        | -63.56     | 8.31           | -71.87               | -13.00      | -58.87      | H                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

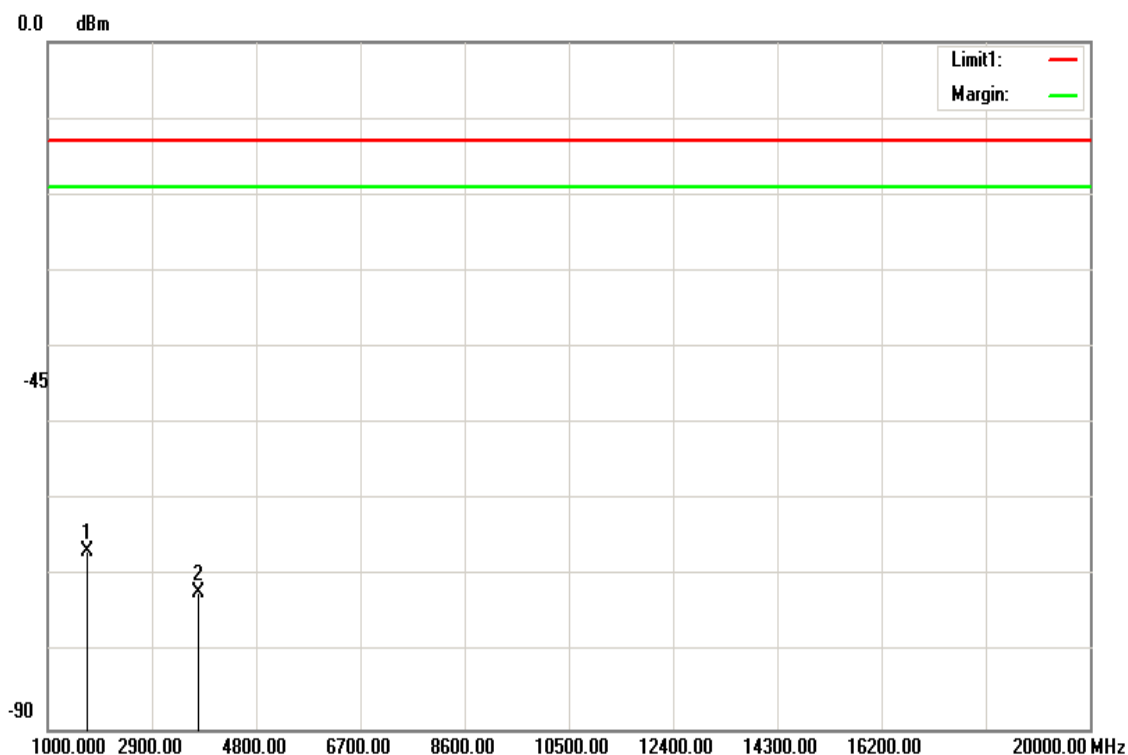


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**Operation Mode:** Tx / Mid CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Ver.



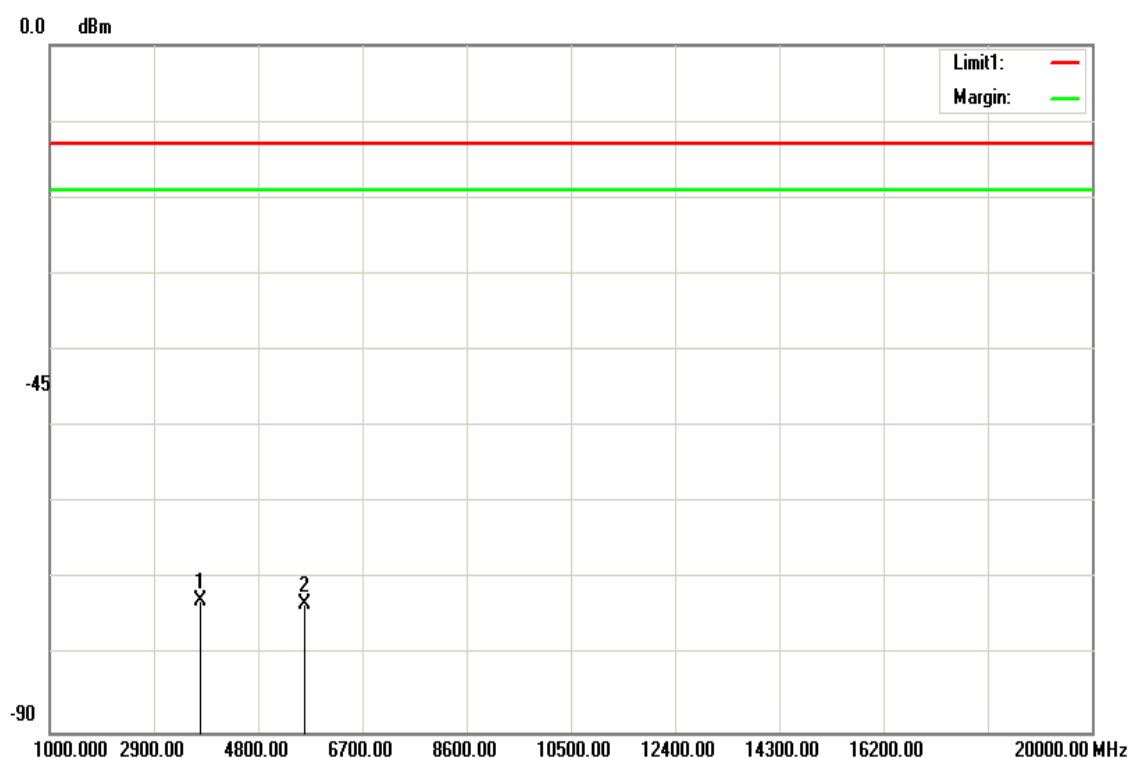
| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 1717.500        | -62.45     | 4.29           | -66.74               | -13.00      | -53.74      | V                          |
| 3760.000        | -65.47     | 6.68           | -72.15               | -13.00      | -59.15      | V                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

**Operation Mode:** Tx / Mid CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Hor.



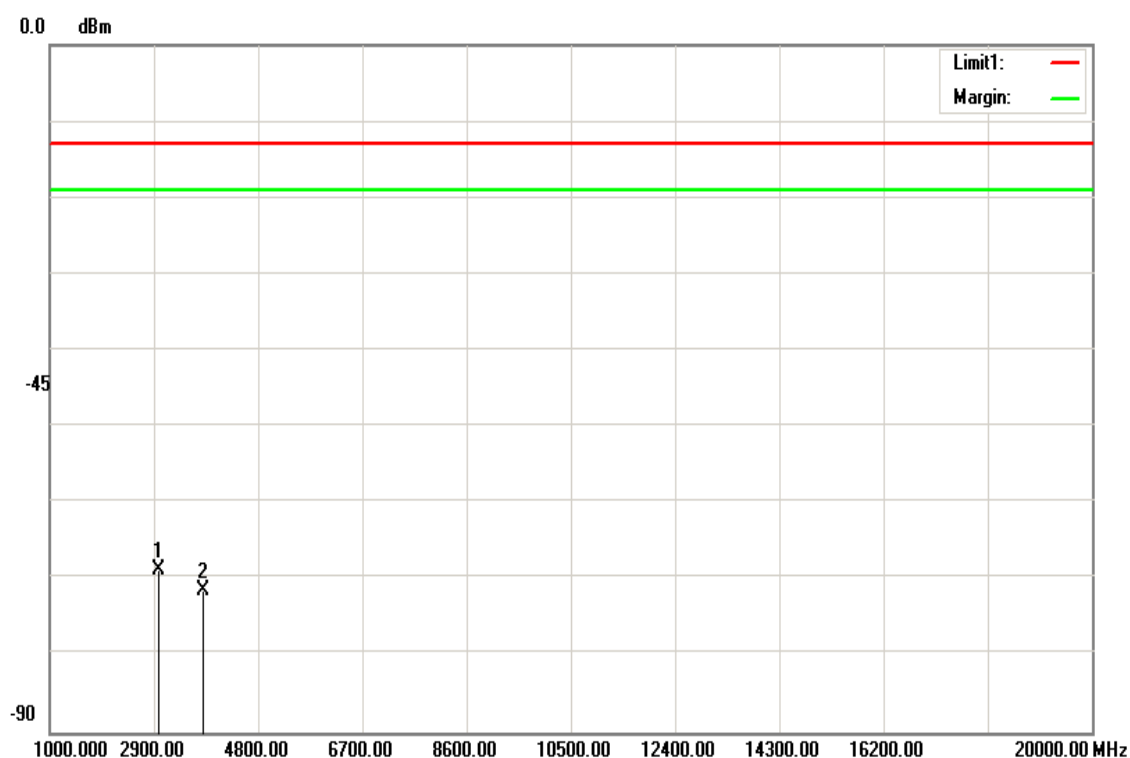
| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 3760.000        | -66.13     | 6.68           | -72.81               | -13.00      | -59.81      | H                          |
| 5640.000        | -64.9      | 8.37           | -73.27               | -13.00      | -60.27      | H                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

**Operation Mode:** Tx / High CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Ver.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 2998.500        | -62.85     | 5.91           | -68.76               | -13.00      | -55.76      | V                          |
| 3800.000        | -64.65     | 6.72           | -71.37               | -13.00      | -58.37      | V                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

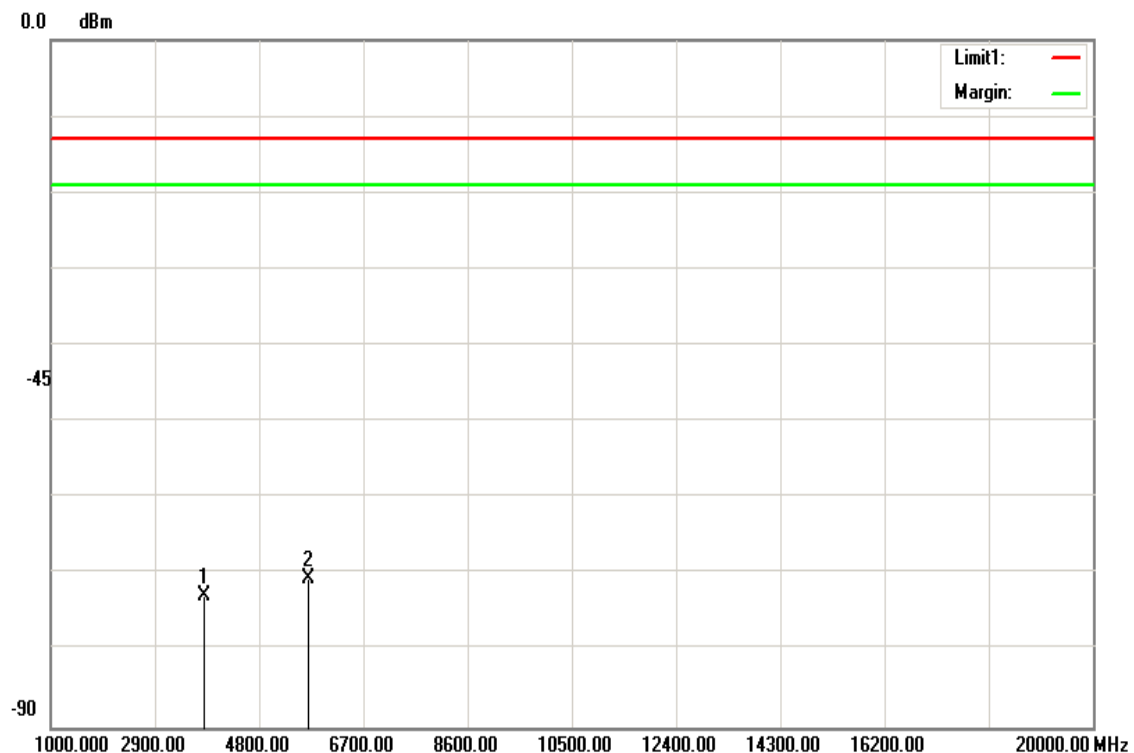


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**Operation Mode:** Tx / High CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Hor.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 3800.000        | -66.13     | 6.72           | -72.85               | -13.00      | -59.85      | H                          |
| 5700.000        | -62.09     | 8.42           | -70.51               | -13.00      | -57.51      | H                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

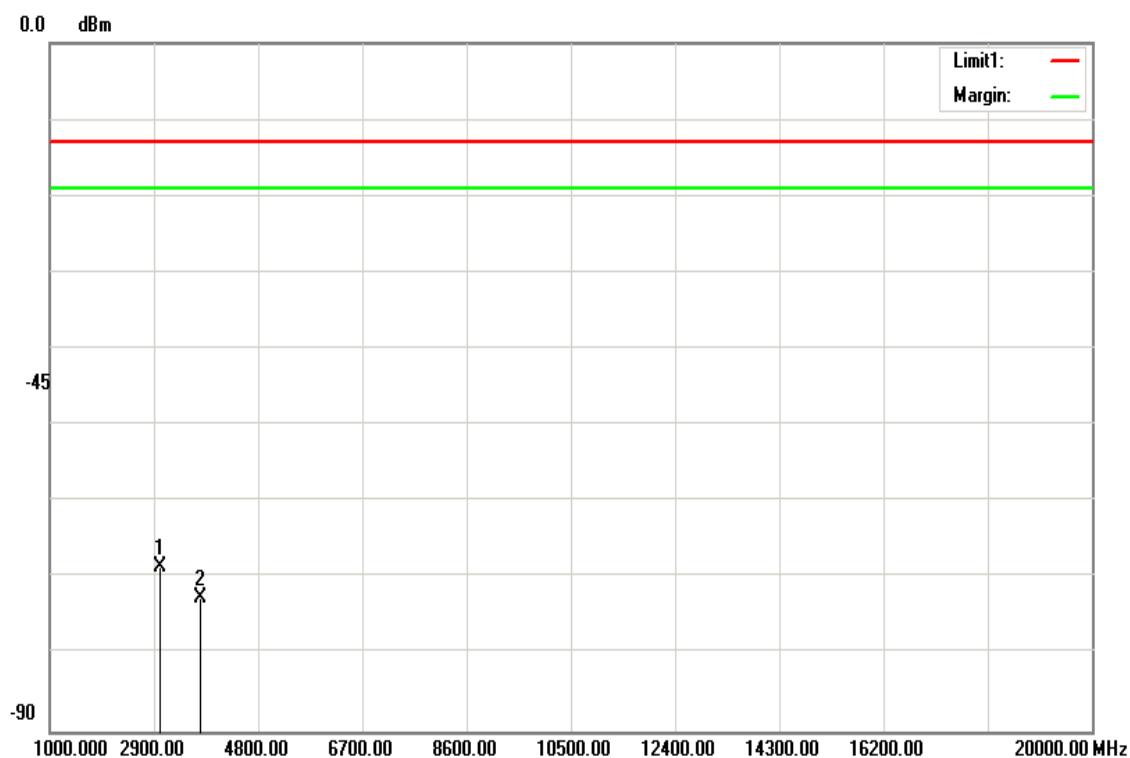
**LTE Band 2 / BW: 20MHz / 16QAM / RB =1, RB Offset = 0**
**Operation Mode:** Tx / Low CH

**Test Date:** October 2, 2018

**Temperature:** 22°C

**Tested by:** Jerry Chuang

**Humidity:** 40 %RH

**Polarity:** Ver.


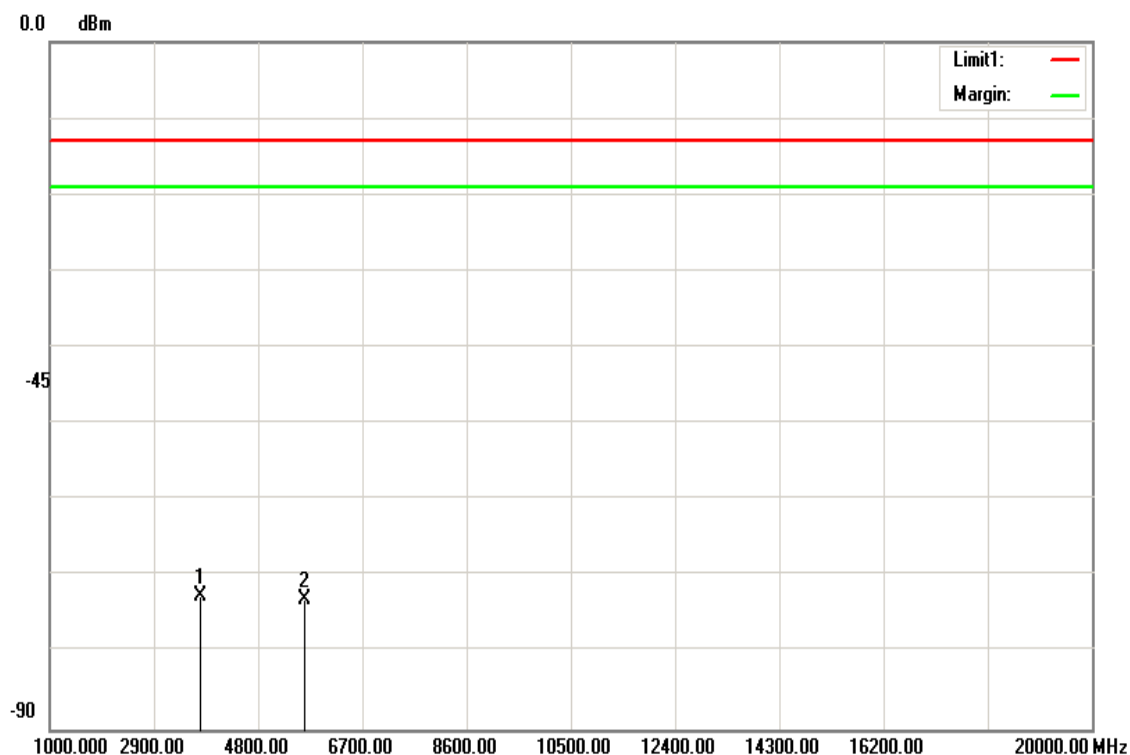
| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 3002.000        | -62.58     | 5.91           | -68.49               | -13.00      | -55.49      | V                          |
| 3760.000        | -65.99     | 6.68           | -72.67               | -13.00      | -59.67      | V                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

**Operation Mode:** Tx / Low CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Hor.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 3760.000        | -65.95     | 6.68           | -72.63               | -13.00      | -59.63      | H                          |
| 5640.000        | -64.55     | 8.37           | -72.92               | -13.00      | -59.92      | H                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

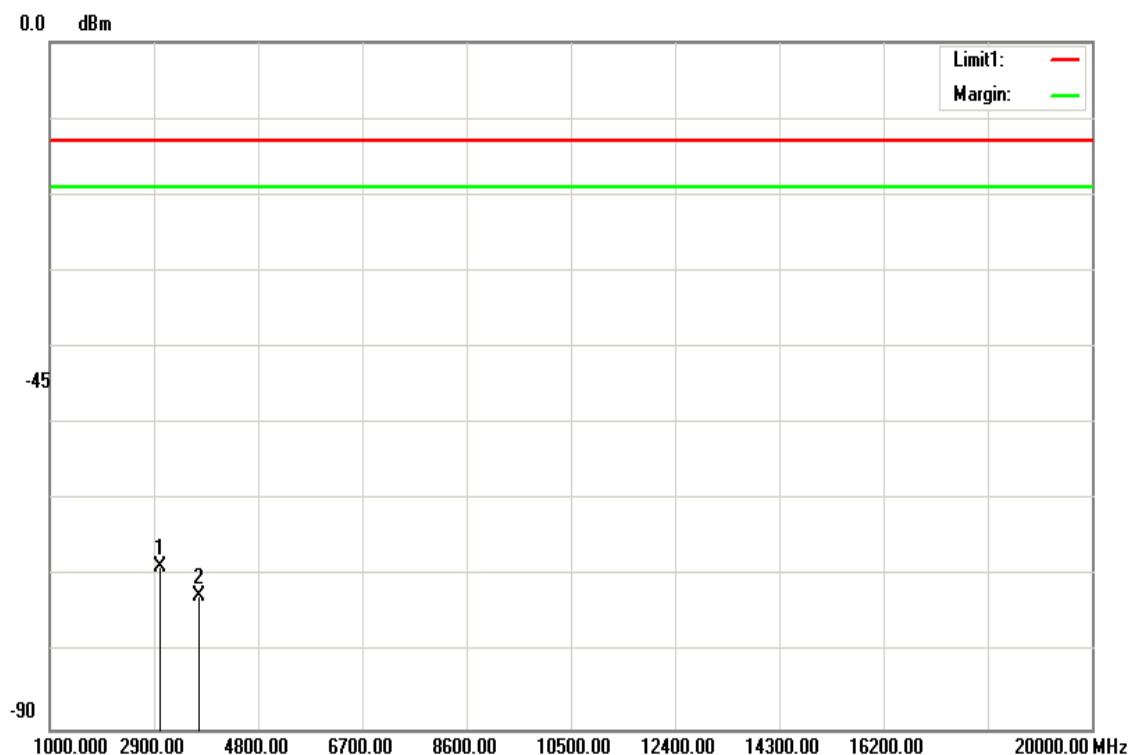


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**Operation Mode:** Tx / Mid CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Ver.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 3002.000        | -62.77     | 5.91           | -68.68               | -13.00      | -55.68      | V                          |
| 3720.000        | -65.89     | 6.65           | -72.54               | -13.00      | -59.54      | V                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

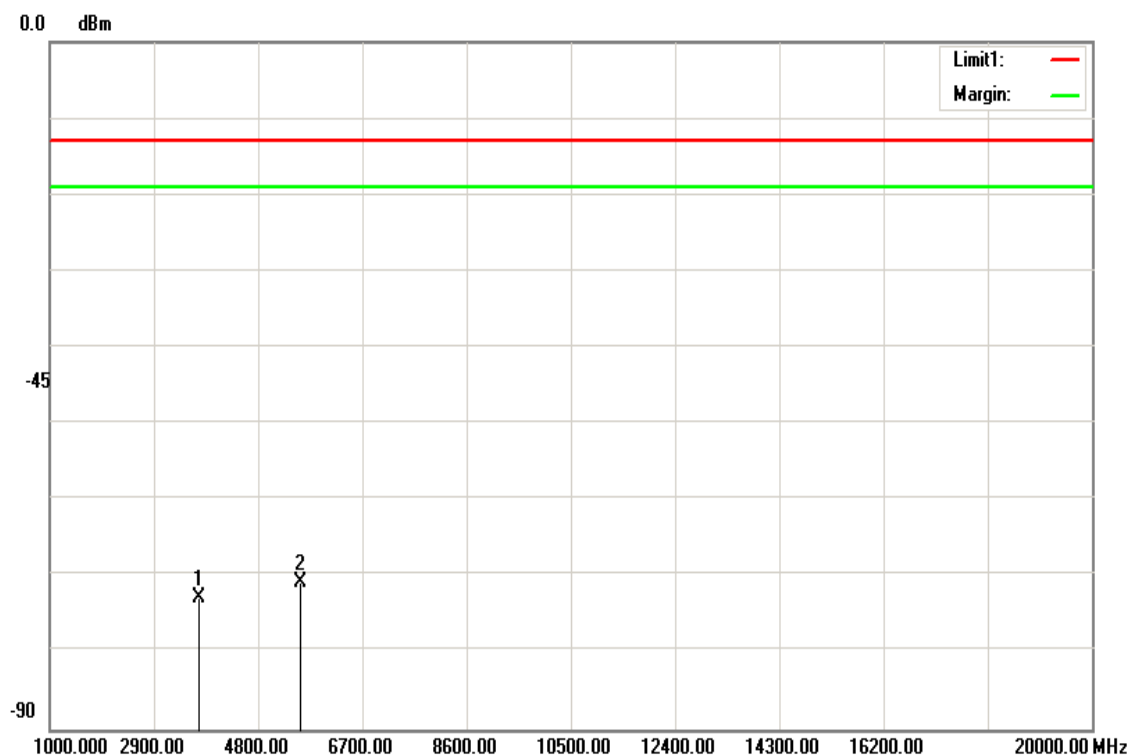


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**Operation Mode:** Tx / Mid CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Hor.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 3720.000        | -66.07     | 6.65           | -72.72               | -13.00      | -59.72      | H                          |
| 5580.000        | -62.44     | 8.31           | -70.75               | -13.00      | -57.75      | H                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

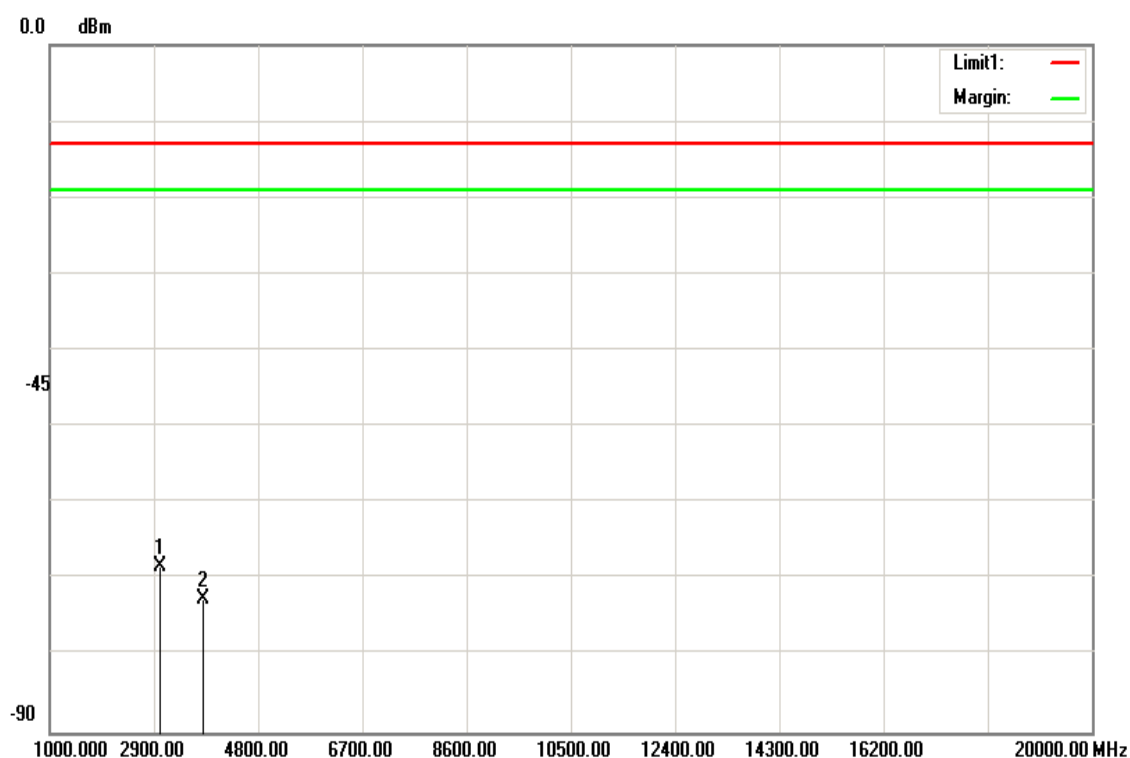


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**Operation Mode:** Tx / High CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Ver.



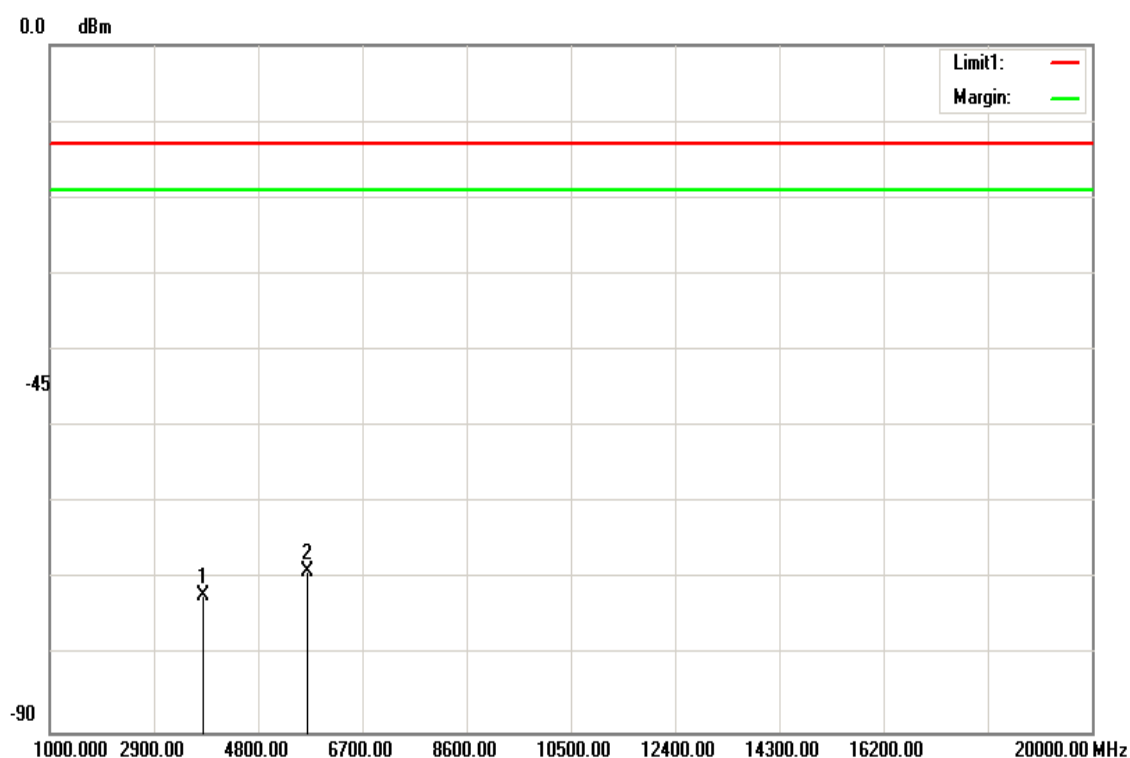
| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 3002.000        | -62.34     | 5.91           | -68.25               | -13.00      | -55.25      | V                          |
| 3800.000        | -65.93     | 6.72           | -72.65               | -13.00      | -59.65      | V                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

**Operation Mode:** Tx / High CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Hor.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 3800.000        | -65.42     | 6.72           | -72.14               | -13.00      | -59.14      | H                          |
| 5700.000        | -60.5      | 8.42           | -68.92               | -13.00      | -55.92      | H                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.



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## Test Results

### Below 1GHz

LTE Band 5 / BW: 10MHz / QPSK / RB =1, RB Offset = 0

Operation Mode: Tx / Mid CH

Test Date:

September 28, 2018

Temperature: 23°C

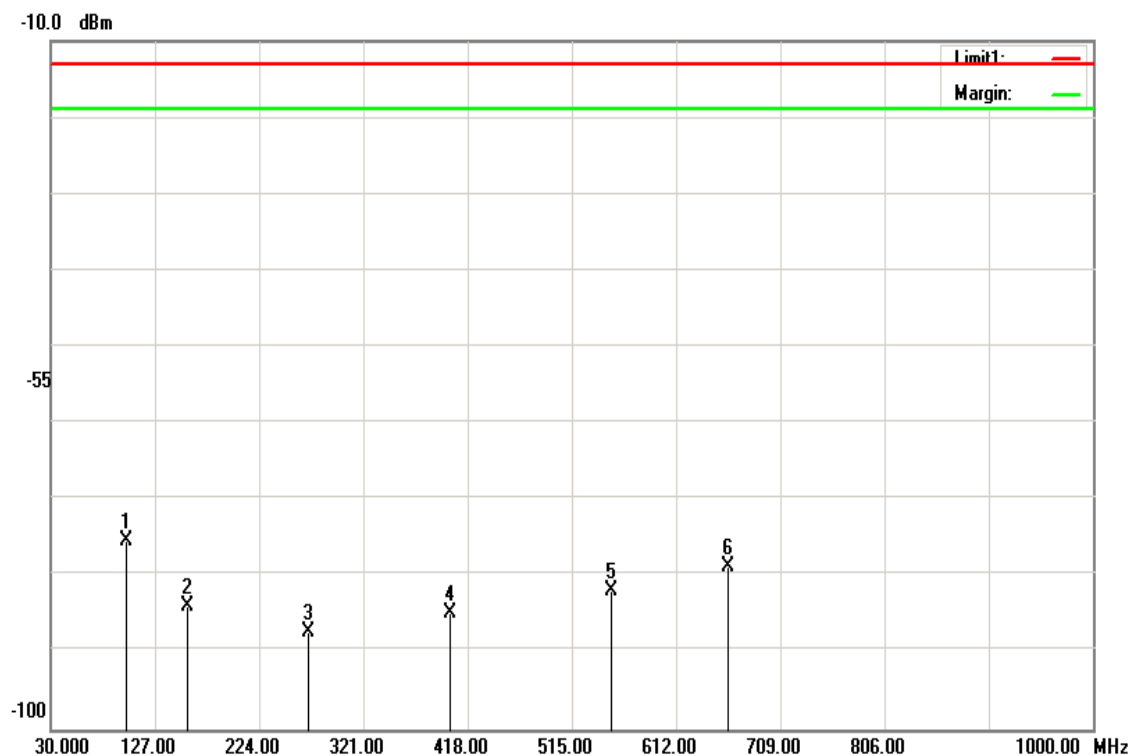
Tested by:

Jerry Chuang

Humidity: 41 %RH

Polarity:

Ver.



| Frequency (MHz) | S.G. (dBm) | Ant. Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------------|-------------|-------------|----------------------------|
| 100.8100        | -74.37     | 0.99            | -75.36               | -13.00      | -62.36      | V                          |
| 157.5550        | -82.78     | 1.24            | -84.02               | -13.00      | -71.02      | V                          |
| 270.0750        | -85.75     | 1.64            | -87.39               | -13.00      | -74.39      | V                          |
| 401.9950        | -82.87     | 2.01            | -84.88               | -13.00      | -71.88      | V                          |
| 551.8600        | -79.54     | 2.36            | -81.90               | -13.00      | -68.90      | V                          |
| 660.9850        | -76.09     | 2.59            | -78.68               | -13.00      | -65.68      | V                          |

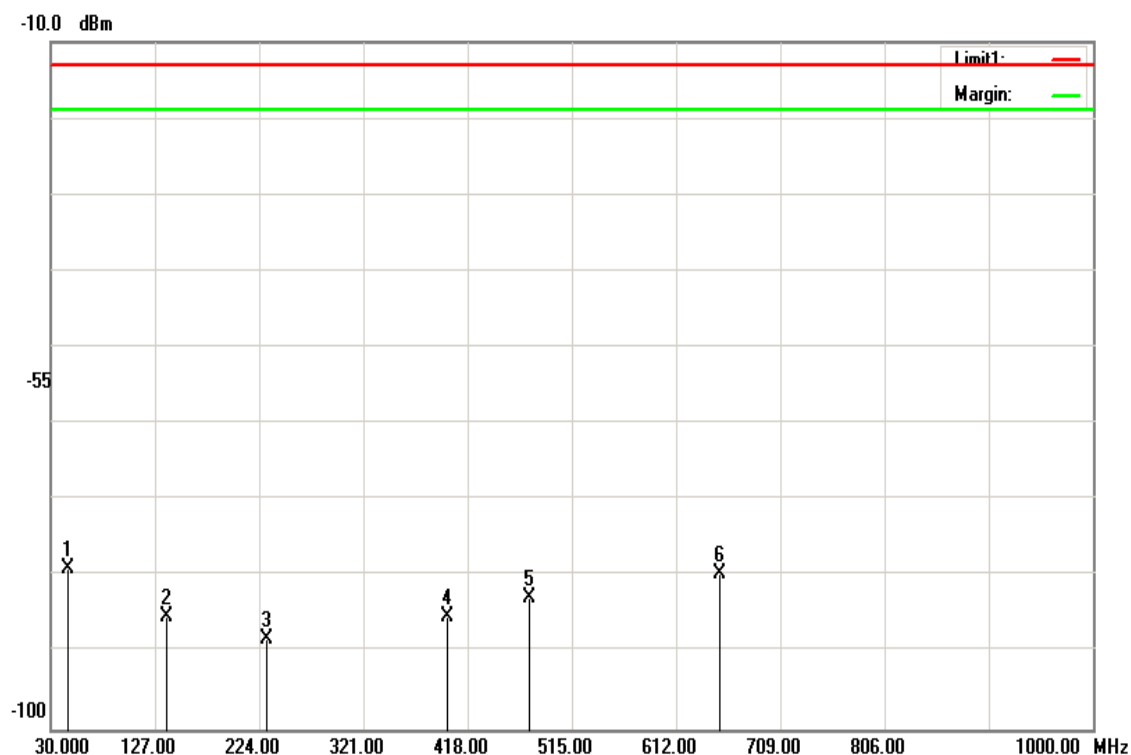
**Operation Mode:** Tx / Mid CH

**Test Date:** September 28, 2018

**Temperature:** 23°C

**Tested by:** Jerry Chuang

**Humidity:** 41 %RH

**Polarity:** Hor.


| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 46.9750         | -78.26     | 0.68           | -78.94               | -13.00      | -65.94      | H                          |
| 138.1550        | -84.21     | 1.16           | -85.37               | -13.00      | -72.37      | H                          |
| 231.2750        | -86.76     | 1.5            | -88.26               | -13.00      | -75.26      | H                          |
| 400.0550        | -83.22     | 2.01           | -85.23               | -13.00      | -72.23      | H                          |
| 475.7150        | -80.54     | 2.19           | -82.73               | -13.00      | -69.73      | H                          |
| 653.2250        | -76.97     | 2.58           | -79.55               | -13.00      | -66.55      | H                          |

**LTE Band 5 / BW: 10MHz / 16QAM / RB =1, RB Offset = 0**

**Operation Mode:** Tx / Mid CH

**Test Date:**

September 28, 2018

**Temperature:** 23°C

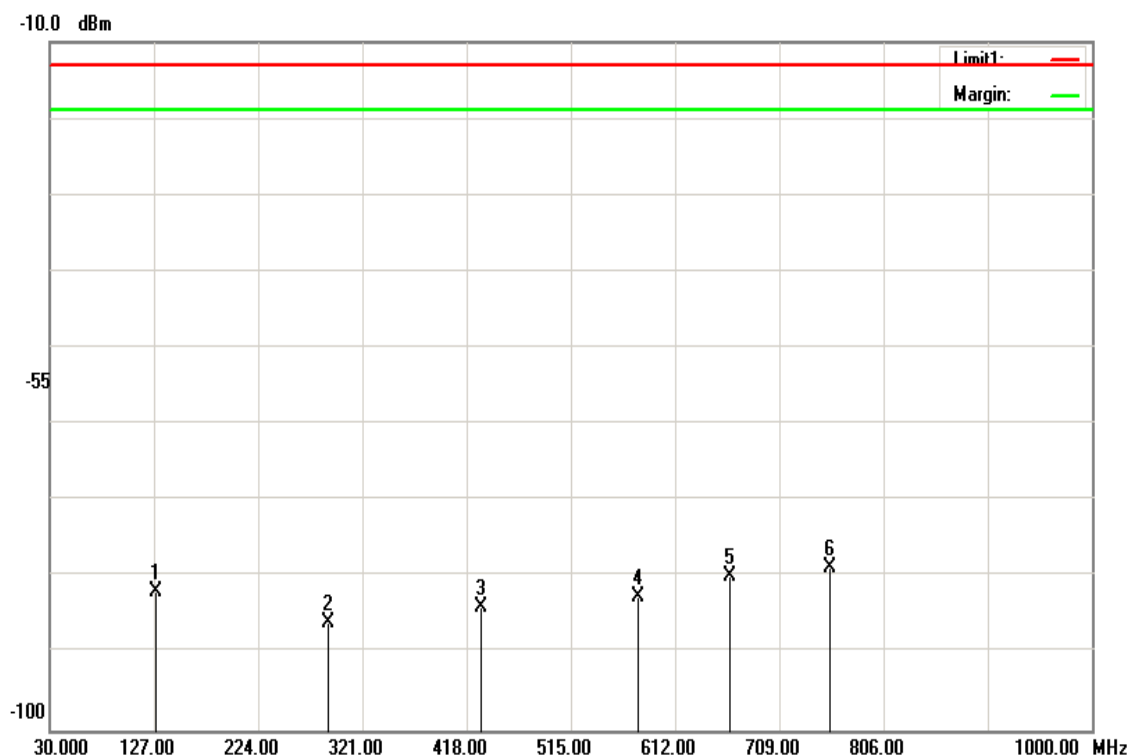
**Tested by:**

Jerry Chuang

**Humidity:** 41 %RH

**Polarity:**

Ver.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 128.9400        | -80.81     | 1.13           | -81.94               | -13.00      | -68.94      | V                          |
| 289.4750        | -84.26     | 1.69           | -85.95               | -13.00      | -72.95      | V                          |
| 431.5800        | -81.72     | 2.09           | -83.81               | -13.00      | -70.81      | V                          |
| 577.0800        | -80.1      | 2.42           | -82.52               | -13.00      | -69.52      | V                          |
| 662.9250        | -77.23     | 2.6            | -79.83               | -13.00      | -66.83      | V                          |
| 757.0150        | -76.05     | 2.79           | -78.84               | -13.00      | -65.84      | V                          |

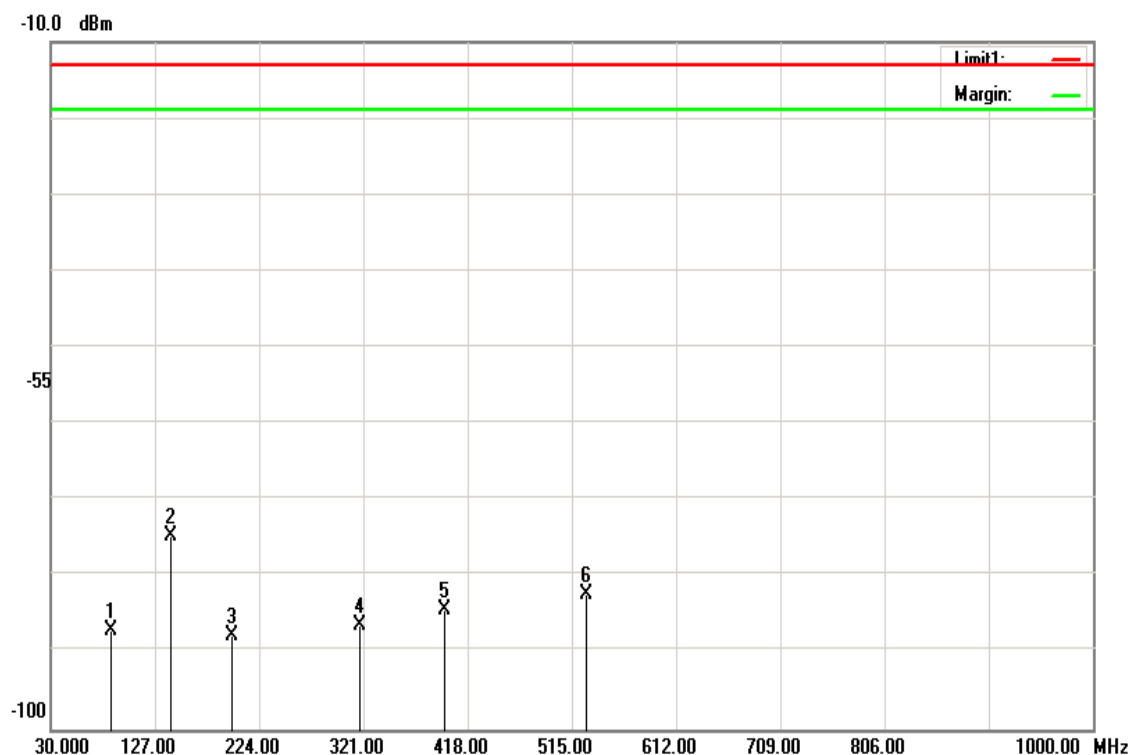
**Operation Mode:** Tx / Mid CH I

**Test Date:** September 28, 2018

**Temperature:** 23°C

**Tested by:** Jerry Chuang

**Humidity:** 41 %RH

**Polarity:** Hor.


| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 86.7450         | -86.22     | 0.91           | -87.13               | -13.00      | -74.13      | H                          |
| 142.0350        | -73.52     | 1.18           | -74.70               | -13.00      | -61.70      | H                          |
| 198.7800        | -86.37     | 1.4            | -87.77               | -13.00      | -74.77      | H                          |
| 318.0900        | -84.53     | 1.78           | -86.31               | -13.00      | -73.31      | H                          |
| 397.1450        | -82.3      | 2              | -84.30               | -13.00      | -71.30      | H                          |
| 528.5800        | -80.01     | 2.31           | -82.32               | -13.00      | -69.32      | H                          |



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**Above 1GHz**

**LTE Band 5 / BW: 10 MHz / QPSK / RB =1, RB Offset = 0**

**Operation Mode:** Tx / Low CH

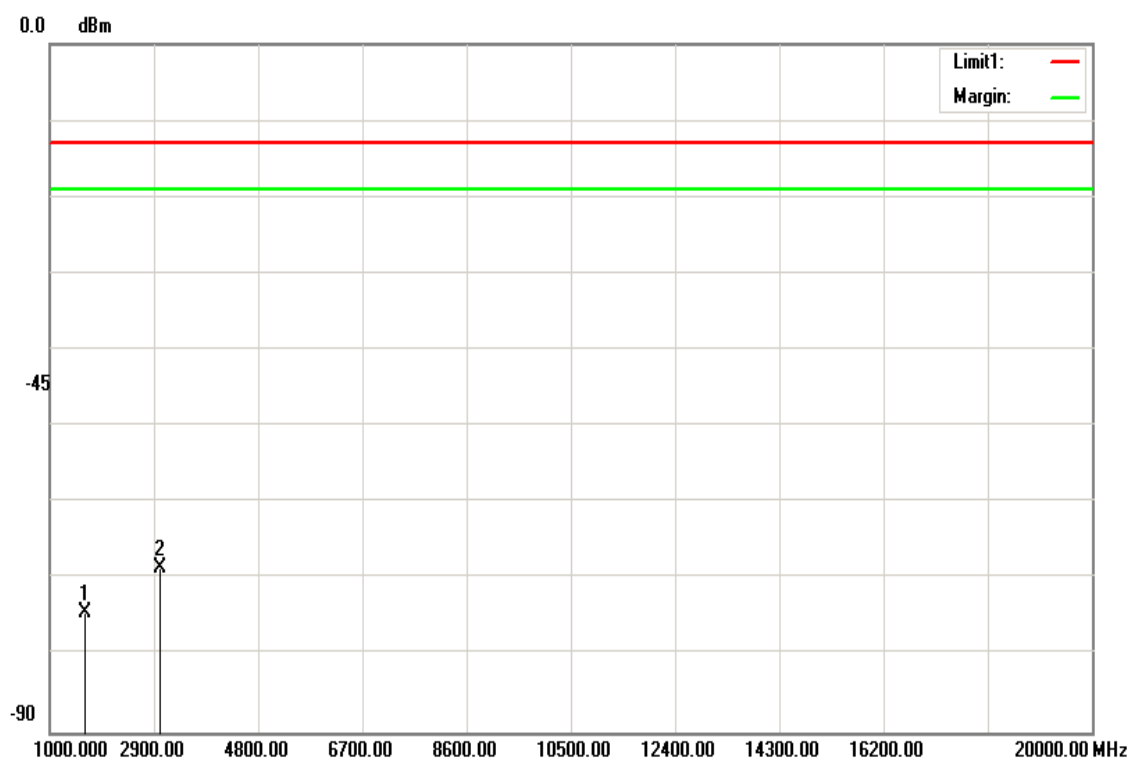
**Test Date:** October 2, 2018

**Temperature:** 22°C

**Tested by:** Jerry Chuang

**Humidity:** 40 %RH

**Polarity:** Ver.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 1658.000        | -70.07     | 4.21           | -74.28               | -13.00      | -61.28      | V                          |
| 3002.000        | -62.63     | 5.91           | -68.54               | -13.00      | -55.54      | V                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

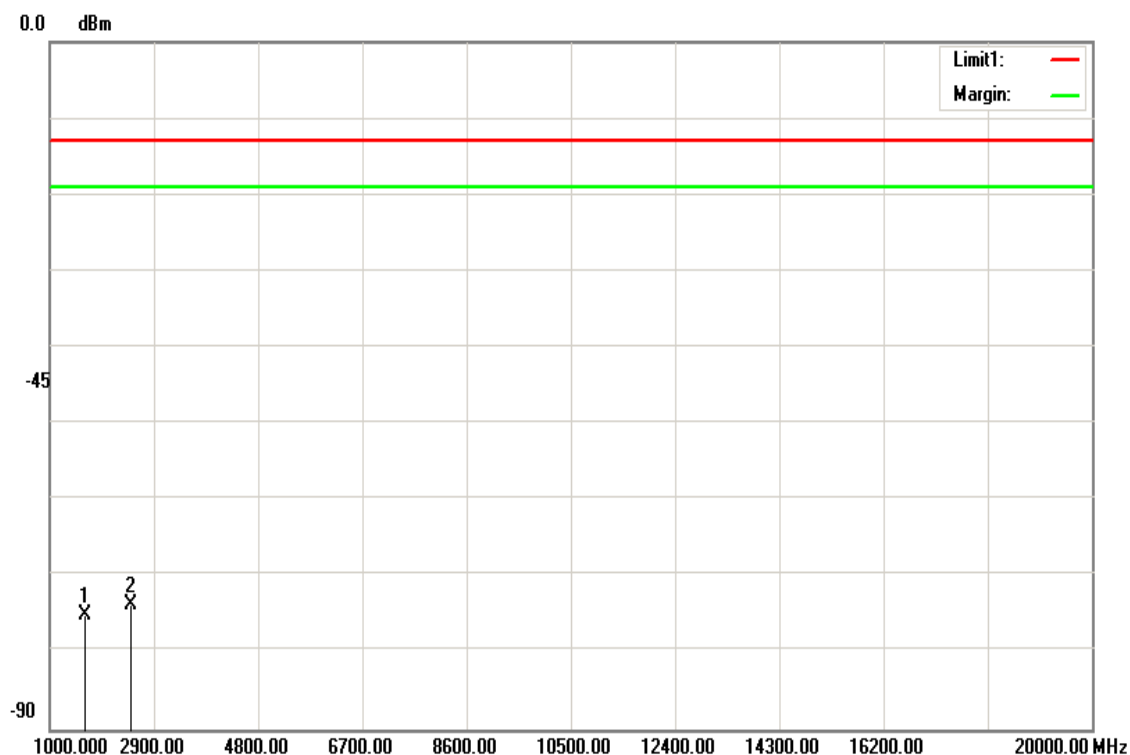


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**Operation Mode:** Tx / Low CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Hor.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 1658.000        | -70.73     | 4.21           | -74.94               | -13.00      | -61.94      | H                          |
| 2487.000        | -68.49     | 5.31           | -73.80               | -13.00      | -60.80      | H                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

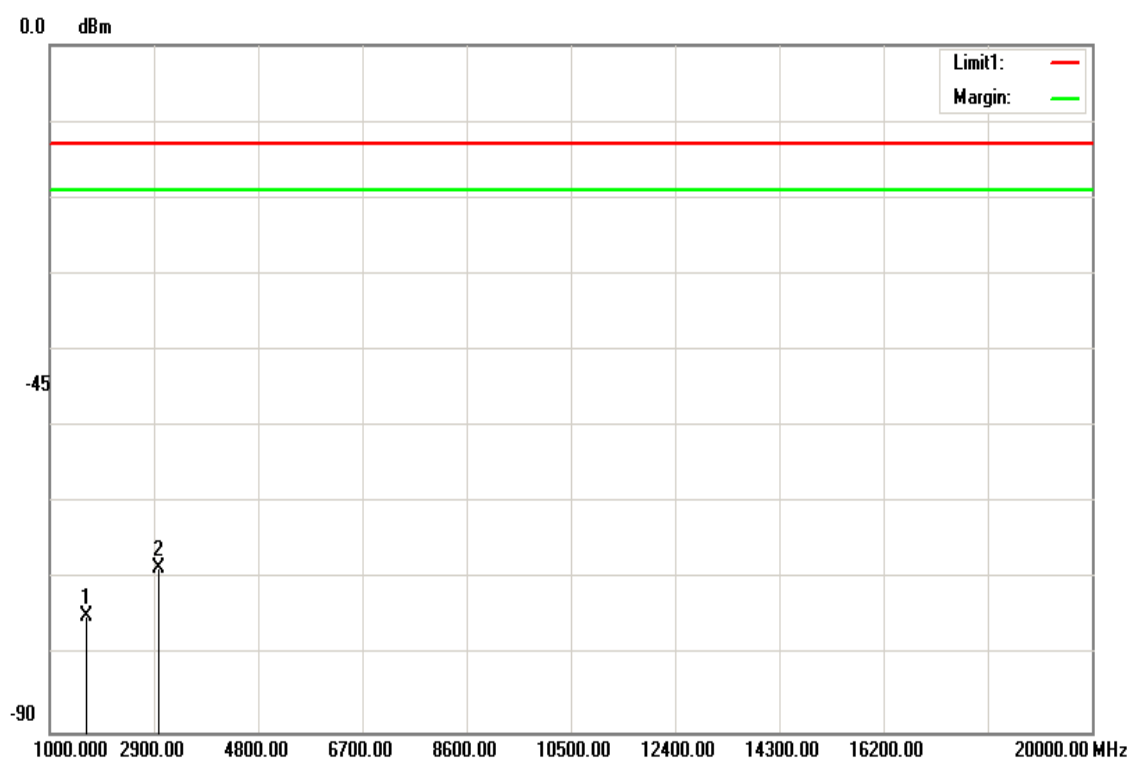


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**Operation Mode:** Tx / Mid CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Ver.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 1673.000        | -70.66     | 4.23           | -74.89               | -13.00      | -61.89      | V                          |
| 2998.500        | -62.63     | 5.91           | -68.54               | -13.00      | -55.54      | V                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

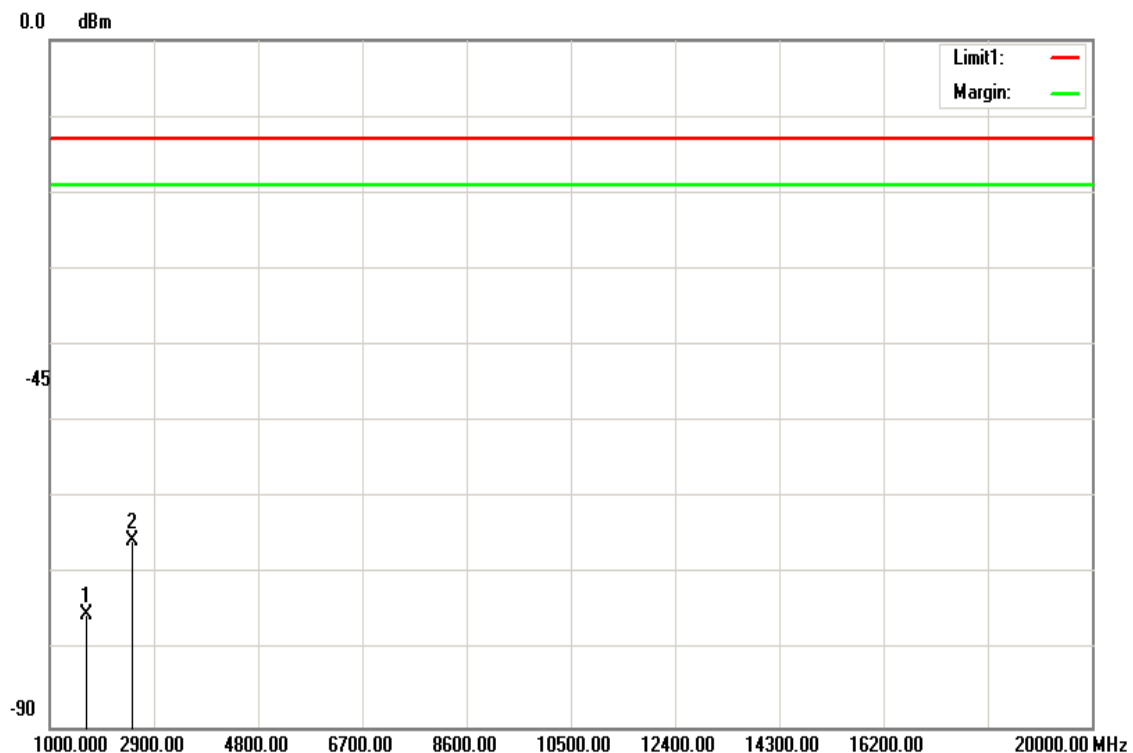


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**Operation Mode:** Tx / Mid CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Hor.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 1673.000        | -70.94     | 4.23           | -75.17               | -13.00      | -62.17      | H                          |
| 2498.000        | -60.21     | 5.33           | -65.54               | -13.00      | -52.54      | H                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

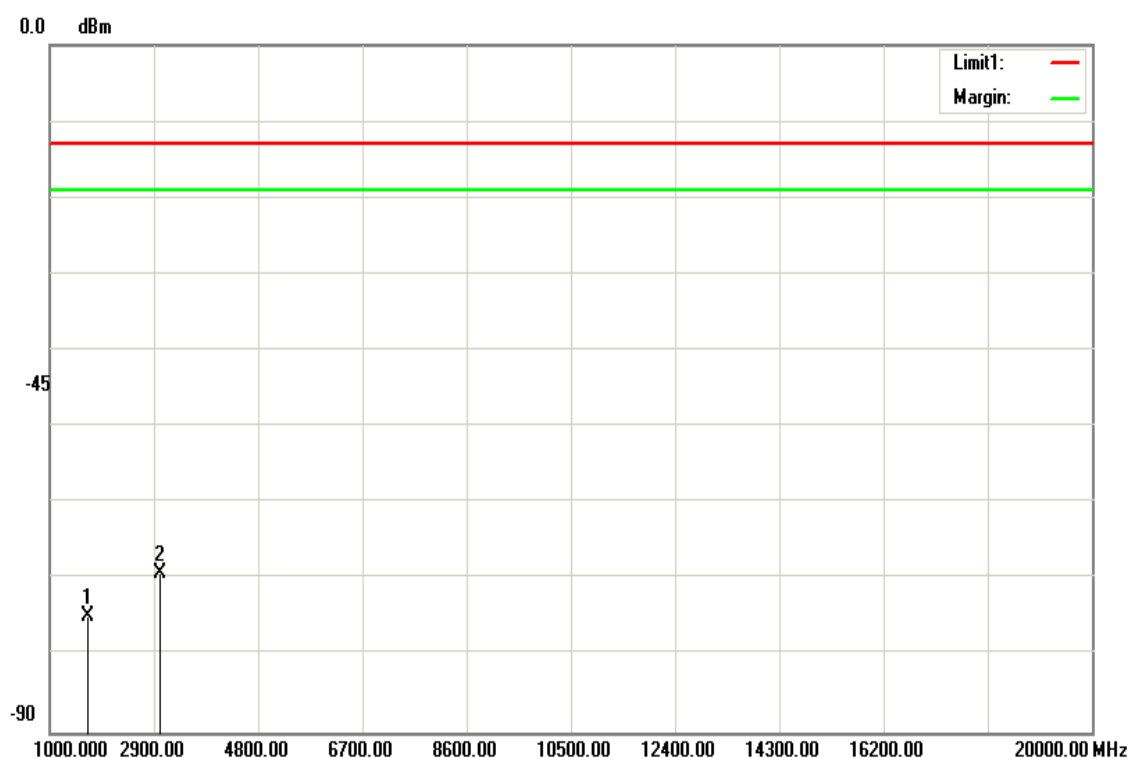


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**Operation Mode:** Tx / High CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Ver.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 1688.000        | -70.61     | 4.25           | -74.86               | -13.00      | -61.86      | V                          |
| 3002.000        | -63.33     | 5.91           | -69.24               | -13.00      | -56.24      | V                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.



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Operation Mode: Tx / High CH

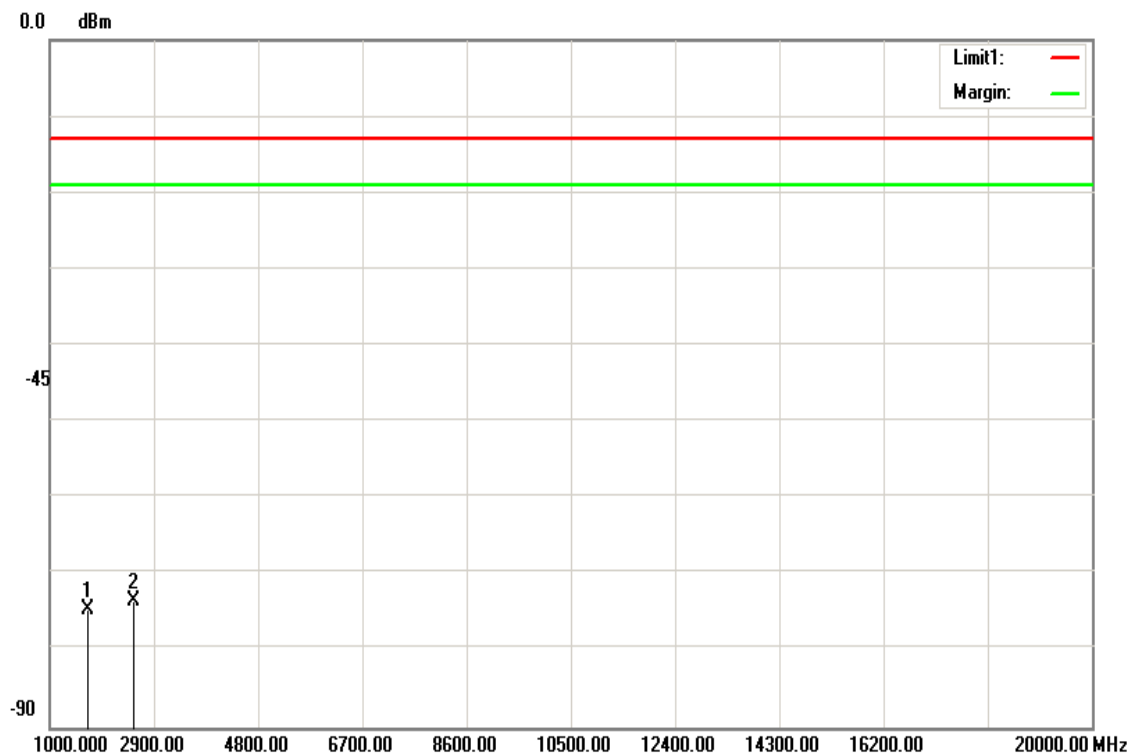
Test Date: October 2, 2018

Temperature: 22°C

Tested by: Jerry Chuang

Humidity: 40 %RH

Polarity: Hor.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 1688.000        | -70.39     | 4.25           | -74.64               | -13.00      | -61.64      | H                          |
| 2532.000        | -67.99     | 5.37           | -73.36               | -13.00      | -60.36      | H                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

**LTE Band 5 / BW: 10MHz / 16QAM / RB =1, RB Offset = 0**

**Operation Mode:** Tx / Low CH

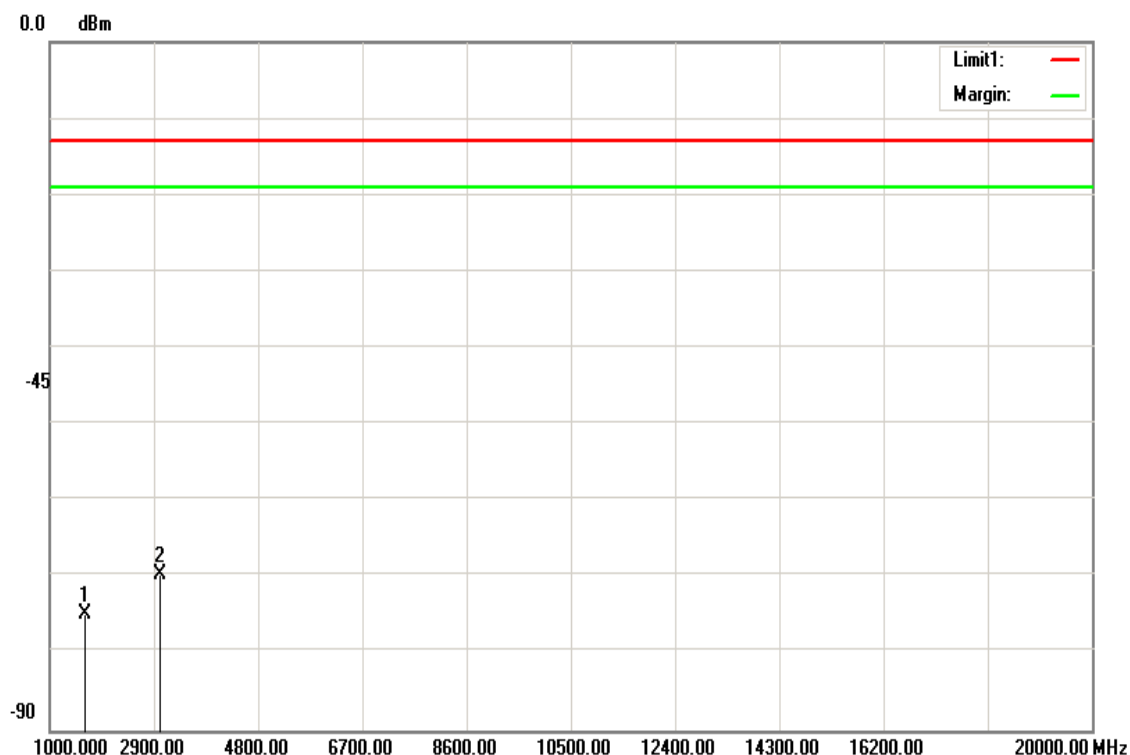
**Test Date:** October 2, 2018

**Temperature:** 22°C

**Tested by:** Jerry Chuang

**Humidity:** 40 %RH

**Polarity:** Ver.



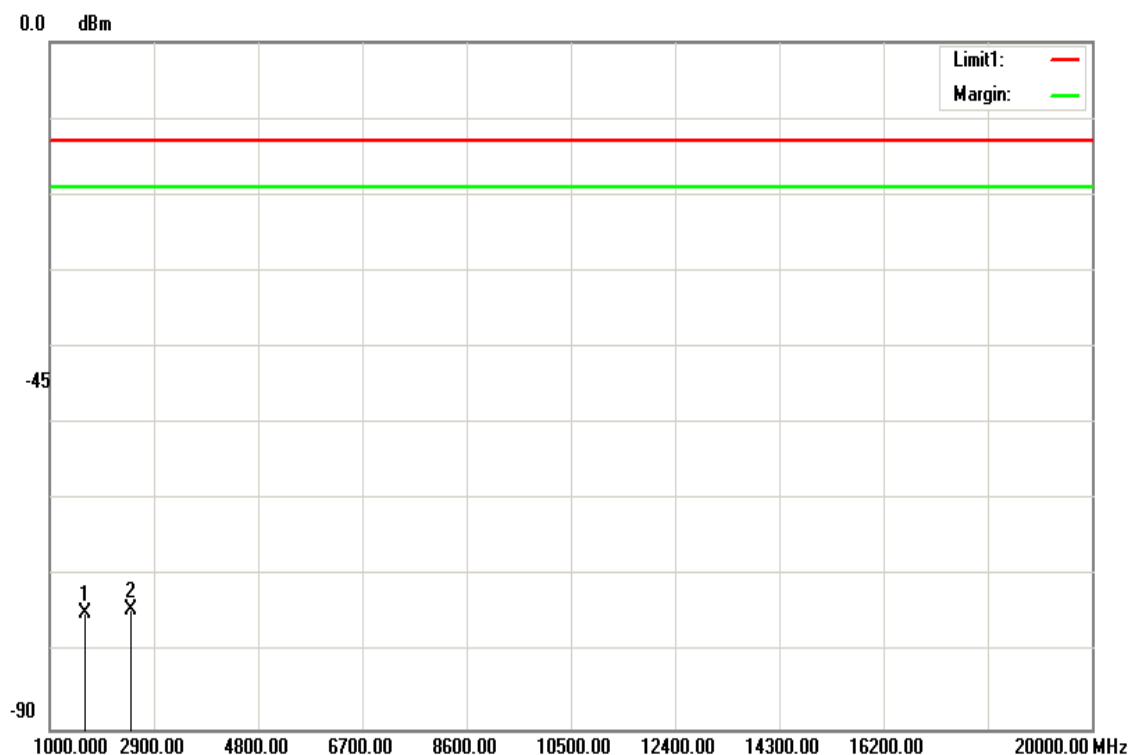
| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 1658.000        | -70.49     | 4.21           | -74.70               | -13.00      | -61.70      | V                          |
| 3002.000        | -63.65     | 5.91           | -69.56               | -13.00      | -56.56      | V                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

**Operation Mode:** Tx / Low CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Hor.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 1658.000        | -70.52     | 4.21           | -74.73               | -13.00      | -61.73      | H                          |
| 2487.000        | -69.01     | 5.31           | -74.32               | -13.00      | -61.32      | H                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

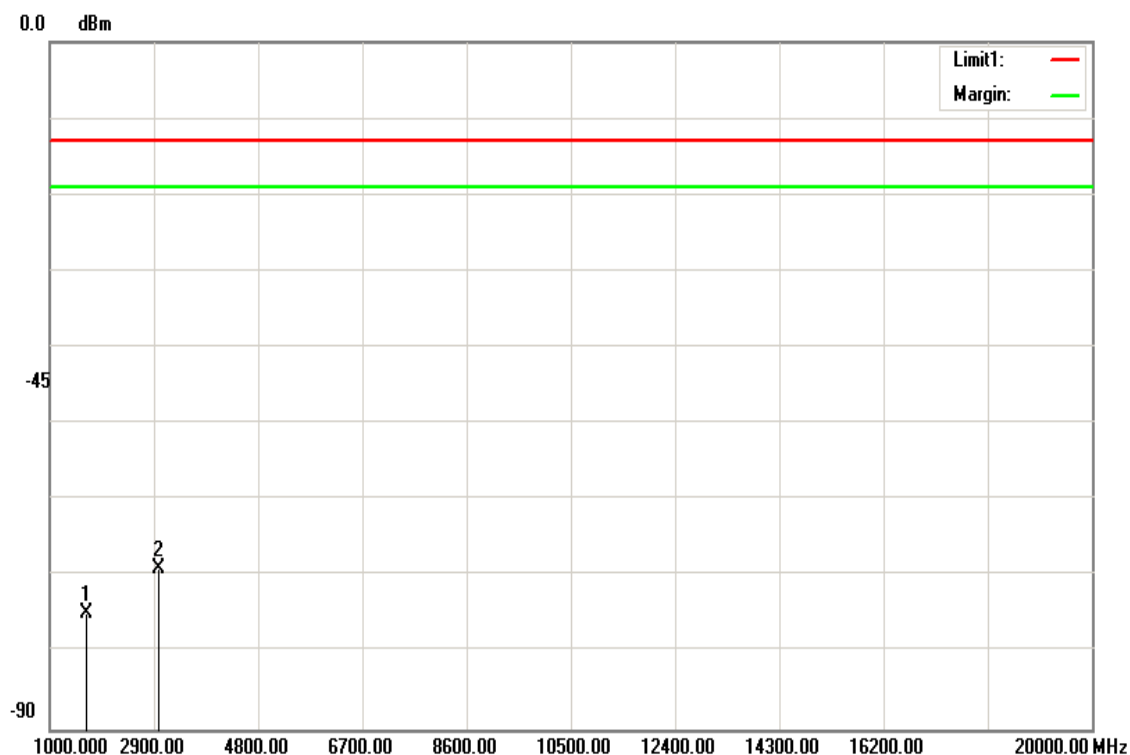


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**Operation Mode:** Tx / Mid CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Ver.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 1673.000        | -70.47     | 4.23           | -74.70               | -13.00      | -61.70      | V                          |
| 2998.500        | -63.12     | 5.91           | -69.03               | -13.00      | -56.03      | V                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

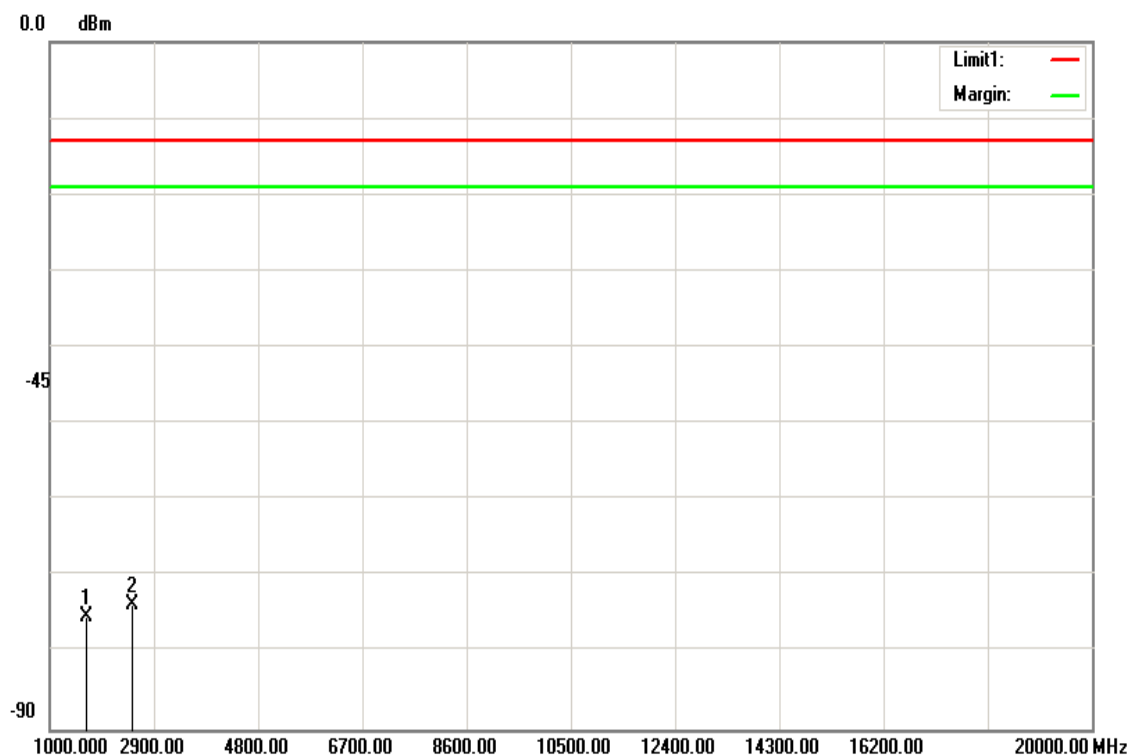


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**Operation Mode:** Tx / Mid CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Hor.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 1673.000        | -71.02     | 4.23           | -75.25               | -13.00      | -62.25      | H                          |
| 2509.000        | -68.25     | 5.34           | -73.59               | -13.00      | -60.59      | H                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

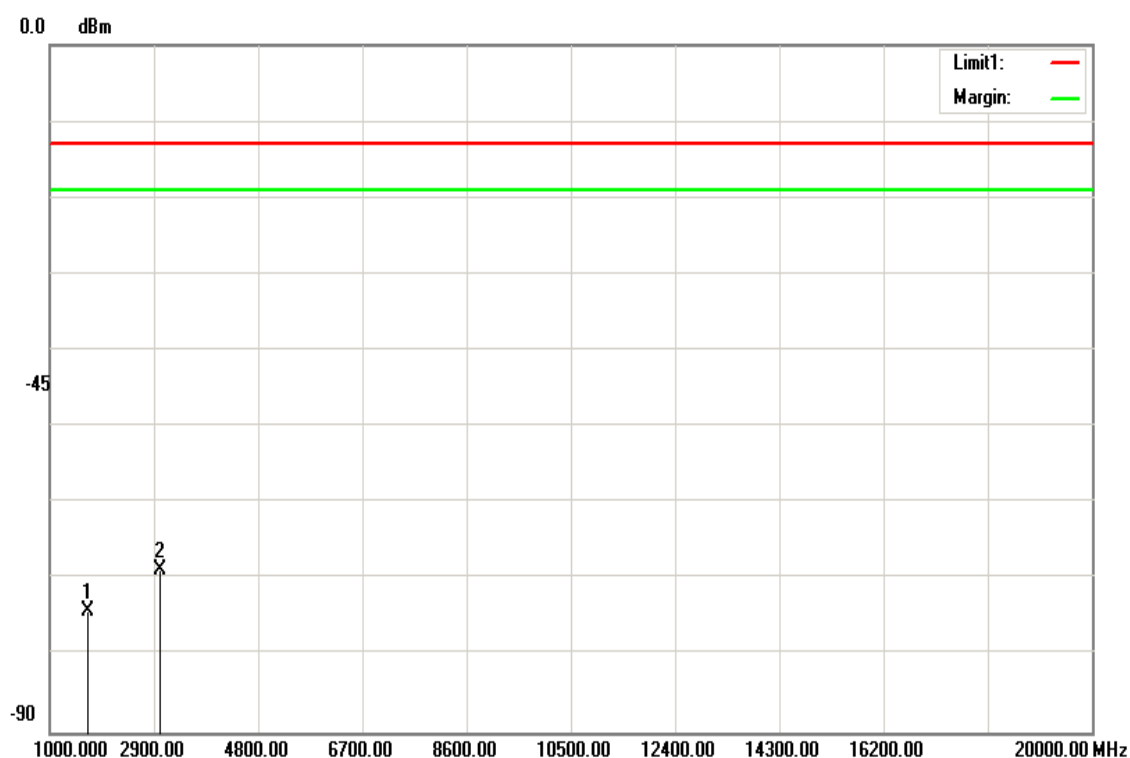
**Operation Mode:** Tx / High CH

**Test Date:** October 2, 2018

**Temperature:** 22°C

**Tested by:** Jerry Chuang

**Humidity:** 40 %RH

**Polarity:** Ver.


| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 1688.000        | -69.81     | 4.25           | -74.06               | -13.00      | -61.06      | V                          |
| 3002.000        | -62.82     | 5.91           | -68.73               | -13.00      | -55.73      | V                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

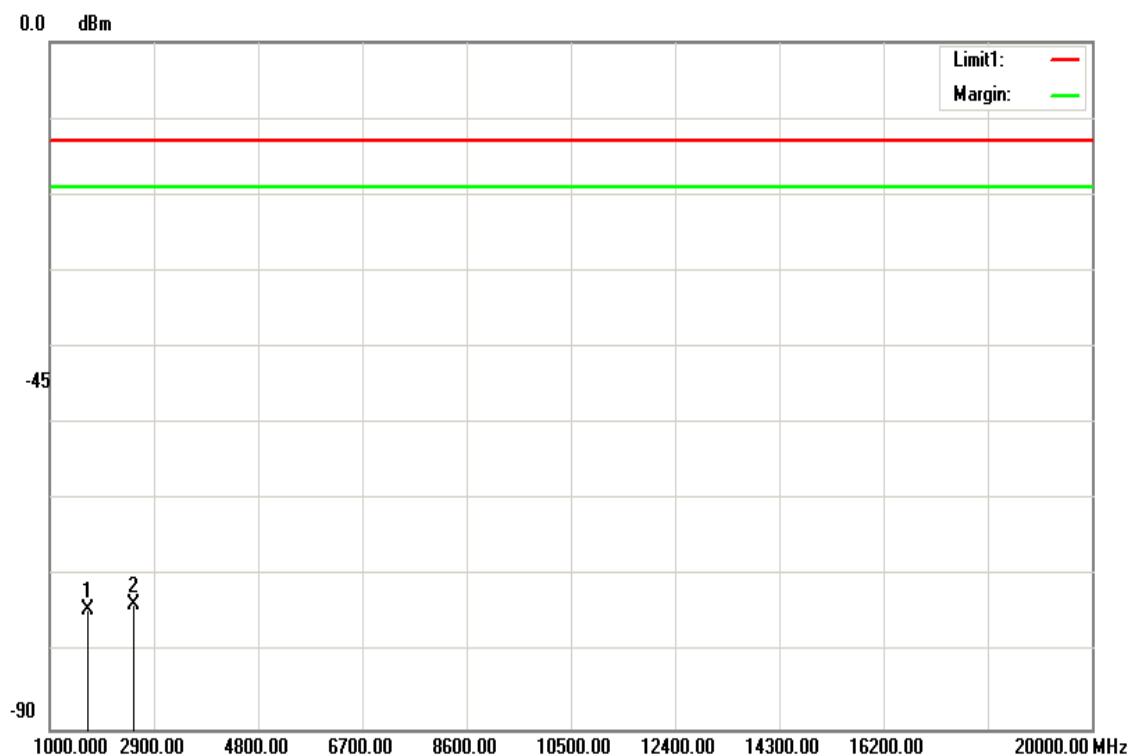


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**Operation Mode:** Tx / High CH  
**Temperature:** 22°C  
**Humidity:** 40 %RH

**Test Date:** October 2, 2018  
**Tested by:** Jerry Chuang  
**Polarity:** Hor.



| Frequency (MHz) | S.G. (dBm) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|----------------|----------------------|-------------|-------------|----------------------------|
| 1688.000        | -70.16     | 4.25           | -74.41               | -13.00      | -61.41      | H                          |
| 2532.000        | -68.28     | 5.37           | -73.65               | -13.00      | -60.65      | H                          |
| N/A             |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |
|                 |            |                |                      |             |             |                            |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

**- End of Test Report -**