# FCC RF Test Report

| | | |
|---|---|---|
| APPLICANT | : | ASUSTeK COMPUTER INC. |
| EQUIPMENT | : | ASUS Phone |
| BRAND NAME | : | ASUS |
| MODEL NAME | : | ASUS_Z016D |
| FCC ID | : | MSQZ016D |
| STANDARD | : | FCC 47 CFR Part 2, 27 |
| CLASSIFICATION | : | PCS Licensed Transmitter Held to Ear (PCE) |

The product was received on Apr. 19, 2016 and completely tested on Aug. 05, 2016. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI / TIA / EIA-603-C-2004 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

Testing Laboratory 1190

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# REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|---|---|---|---|
| FG641901C | Rev. 01 | Initial issue of report | Aug. 16, 2016 |
| FG641901C | Rev. 02 | Revising radiated spurious emission data | Aug. 22, 2016 |
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# SUMMARY OF TEST RESULT

| Report Section | FCC Rule | Description | Limit | Result | Remark |
|---|---|---|---|---|---|
| 3.4 | §2.1046 | Conducted Output Power | Reporting Only | PASS | - |
| - | - | Peak-to-Average Ratio | <13dB | N/A | Reporting only |
| 3.5 | §27.50 (a)(3) | EIRP Power Density | EIRP < 250mW/5MHz | PASS | - |
| 3.6 | §2.1049 | Occupied Bandwidth | Reporting Only | PASS | - |
| 3.7 | §2.1051<br>§27.53 (a)(4) | Conducted Band Edge Measurement | Refer standard | PASS | - |
| 3.8 | §2.1051<br>§27.53 (a)(4) | Conducted Spurious Emission | < $70+10\log_{10}$(P[Watts]) | PASS | - |
| 3.9 | §2.1055<br>§27.54 | Frequency Stability Temperature & Voltage | Within the band | PASS | - |
| 4.4 | §2.1053<br>§27.53 (a)(4) | Radiated Spurious Emission | < $70+10\log_{10}$(P[Watts]) | PASS | Under limit 7.02 dB at 9222.000 MHz |

# 1 General Description

## 1.1 Applicant

**ASUSTeK COMPUTER INC.**
4F, No. 150, LI-TE RD., PEITOU, TAIPEI, TAIWAN

## 1.2 Manufacturer

**COTEK ELECTRONICS (SUZHOU) CO., LTD.**
No. 288, Mayun Road, Suzhou New District, Jiangsu, PRC

## 1.3 Product Feature of Equipment Under Test

| Product Feature | |
|---|---|
| **Equipment** | ASUS Phone |
| **Brand Name** | ASUS |
| **Model Name** | ASUS_Z016D |
| **FCC ID** | MSQZ016D |
| **EUT supports Radios application** | CDMA/EV-DO /GSM/EGPRS/WCDMA/HSPA/LTE/NFC<br>WLAN 11a/b/g/n HT20/HT40<br>WLAN 11ac VHT20/VHT40/VHT80<br>Bluetooth v4.2 BR/EDR/LE |
| **HW Version** | REV2.0 |
| **SW Version** | 4.0.20.270 |
| **EUT Stage** | Production Unit |

## 1.4 Product Specification of Equipment Under Test

| Standards-related Product Specification | |
|---|---|
| **Tx Frequency** | LTE Band 30 : 2305 MHz ~ 2315 MHz |
| **RX Frequency** | LTE Band 30 : 2350 MHz ~ 2360 MHz |
| **Bandwidth** | LTE Band 30 : 5MHz / 10MHz |
| **Maximum Output Power to Antenna** | LTE Band 30 : 17.51 dBm |
| **Antenna Gain** | **<Bottom Antenna>**<br>LTE Band 30 : -4.2 dBi |

## 1.5 Modification of EUT

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

## 1.6 Maximum Frequency Tolerance, Maximum conducted power, and Emission Designator

| LTE Band 30 | QPSK | | | 16QAM | | |
|---|---|---|---|---|---|---|
| BW(MHz) | Emission Designator (99%OBW) | Maximum conducted power | Frequency Tolerance (ppm) | Emission Designator (99%OBW) | Maximum conducted power | Frequency Tolerance (ppm) |
| **5** | 4M50G7D | 17.37 | - | 4M52W7D | 16.63 | - |
| **10** | 9M01G7D | 17.51 | 0.0091 | 9M05W7D | 16.85 | - |

## 1.7 Testing Site

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

| | |
|---|---|
| **Test Site** | SPORTON INTERNATIONAL INC. |
| **Test Site Location** | No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park,<br>Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.<br>TEL: +886-3-327-3456 ; FAX: +886-3-328-4978 |
| **Test Site No.** | **Sporton Site No.** |
| | TH05-HY |

| | |
|---|---|
| **Test Site** | SPORTON INTERNATIONAL INC. |
| **Test Site Location** | No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd.<br>Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.<br>TEL: +886-3-327-0855 |
| **Test Site No.** | **Sporton Site No.** |
| | 03CH11-HY |

## 1.8 Applied Standards

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

- 47 CFR Part 2, Part 27(D)
- ANSI / TIA / EIA-603
- FCC KDB 971168 Power Meas License Digital Systems D01 v02r02

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

# 2 Test Configuration of Equipment Under Test

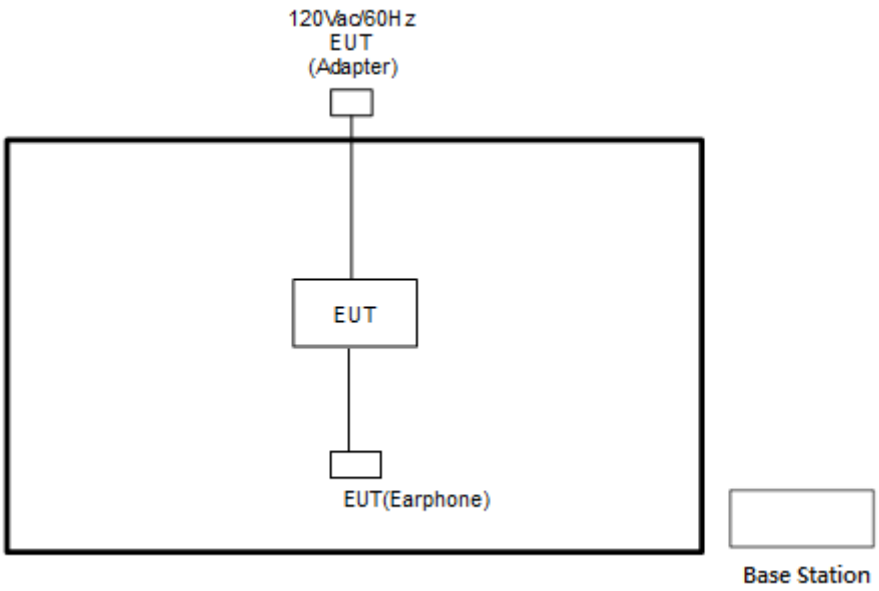
## 2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r02 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

| Conducted Test Cases | Band | Bandwidth (MHz) | | | | | | Modulation | | RB # | | | Test Channel | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.4 | 3 | 5 | 10 | 15 | 20 | QPSK | 16QAM | 1 | Half | Full | L | M | H |
| Max. Output Power | 30 | - | - | v | v | - | - | v | v | v | v | v | v | v | v |
| Peak-to-Average Ratio | 30 | - | - | | v | - | - | v | v | v | | v | | v | |
| E.I.R.P PSD | 30 | - | - | v | v | - | - | v | v | v | | | v | v | v |
| 26dB and 99% Bandwidth | 30 | - | - | v | v | - | - | v | v | | | v | v | v | v |
| Conducted Band Edge | 30 | - | - | v | v | - | - | v | v | v | | v | v | | v |
| Conducted Spurious Emission | 30 | - | - | v | v | - | - | v | v | v | | | v | v | v |
| Frequency Stability | 30 | - | - | v | v | - | - | v | | | | v | | v | |
| Radiated Spurious Emission | 30 | - | - | v | v | - | - | v | | v | | | v | v | v |
| Note | 1. The mark "**v** " means that this configuration is chosen for testing<br>2. The mark "-" means that this bandwidth is not supported.<br>3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported. | | | | | | | | | | | | | | |

## 2.2 Connection Diagram of Test System




## 2.3 Support Unit used in test configuration and system

| Item | Equipment | Trade Name | Model No. | FCC ID | Data Cable | Power Cord |
|---|---|---|---|---|---|---|
| 1. | System Simulator | Anritsu | MT8820C | N/A | N/A | Unshielded, 1.8 m |

## 2.4 Measurement Results Explanation Example

**For all conducted test items:**

The offset level is set in the spectrum analyzer to compensate the RF cable 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.

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

*Offset = RF cable loss + attenuator factor.*

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Example :

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

= 4.2 + 10 = 14.2 (dB)

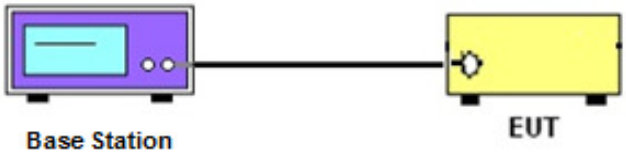
# 3 Conducted Test Items

## 3.1 Measuring Instruments

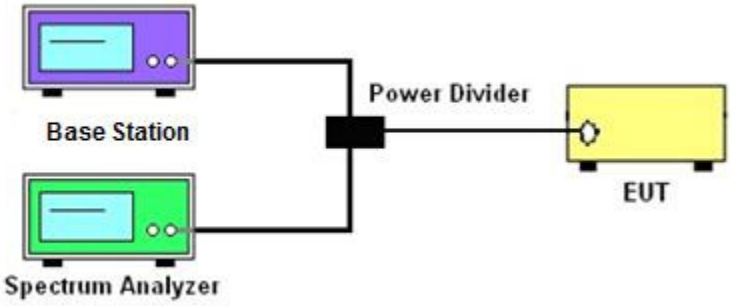
See list of measuring instruments of this test report.

## 3.2 Test Setup

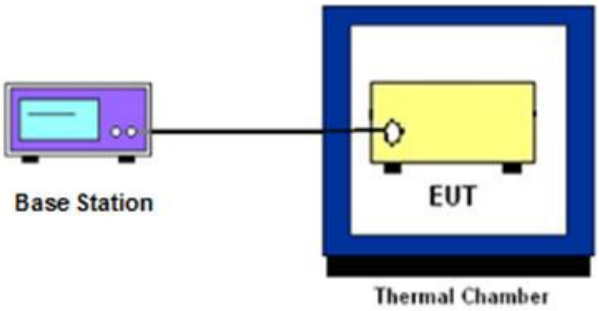
### 3.2.1 Conducted Output Power




### 3.2.2 Peak-to-Average Ratio, Occupied / 26dB Bandwidth ,Band-Edge and Conducted Spurious Emission




### 3.2.3 Frequency Stability




## 3.3 Test Result of Conducted Test

Please refer to Appendix A.

## 3.4 Conducted Output Power Measurement

### 3.4.1 Description of the Conducted Output Power Measurement

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals shall be reported.

### 3.4.2 Test Procedures

1. The transmitter output port was connected to base station.
2. Set EUT at maximum power through base station.
3. Select lowest, middle, and highest channels for each band and different modulation.

## 3.5 EIRP Power Density

### 3.5.1 Description of EIRP Power Density

For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, *except that* for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off.

### 3.5.2 Test Procedures

1. Set instrument center frequency to OBW center frequency.
2. Set span to at least 1.5 times the OBW.
3. Set the RBW to the specified reference bandwidth (often 1 MHz).
4. Set VBW ≥ 3 × RBW.
5. Detector = RMS (power averaging).
6. Ensure that the number of measurement points in the sweep ≥ 2 × span/RBW.
7. Sweep time = auto couple.
8. Employ trace averaging (RMS) mode over a minimum of 100 traces.
9. Use the peak marker function to determine the maximum amplitude level within the reference bandwidth (PSD).

## 3.6 Occupied Bandwidth

### 3.6.1 Description of Occupied Bandwidth Measurement

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26dB occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal 26 dB.
The 26 dB emission bandwidth(EBW) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

### 3.6.2 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The 26dB and 99% occupied bandwidth (BW) of the middle channel for the highest RF powers with full RB sizes were measured.

## 3.7 Conducted Band Edge Measurement

### 3.7.1 Description of Conducted Band Edge Measurement

27.53 (a)(4)

For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:

(i) By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz;

(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz;

(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

### 3.7.2 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The band edges of low and high channels were measured with RBW ≥ 1% EBW set in Spectrum Analyzer, while the EUT was transmitting under maximum power.
3. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
4. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
   = P(W)- [43 + 10log(P)] (dB) = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB) = -13dBm.

## 3.8 Conducted Spurious Emission Measurement

### 3.8.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 70 + 10 log (P) dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 9 kHz up to a frequency including its $10^{th}$ harmonic.

### 3.8.2 Test Procedures

1. The EUT was connected to spectrum analyzer and base station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. The limit line is derived from 70 + 10log(P)dB below the transmitter power P(Watts)
   = P(W)- [70 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [70 + 10log(P)] (dB)
   = -40dBm.

## 3.9 Frequency Stability Measurement

### 3.9.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

### 3.9.2 Test Procedures for Temperature Variation

1. The EUT was set up in the thermal chamber and connected with the base station.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

### 3.9.3 Test Procedures for Voltage Variation

1. The EUT was placed in a temperature chamber at 25±5° C and connected with the base station.
2. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.

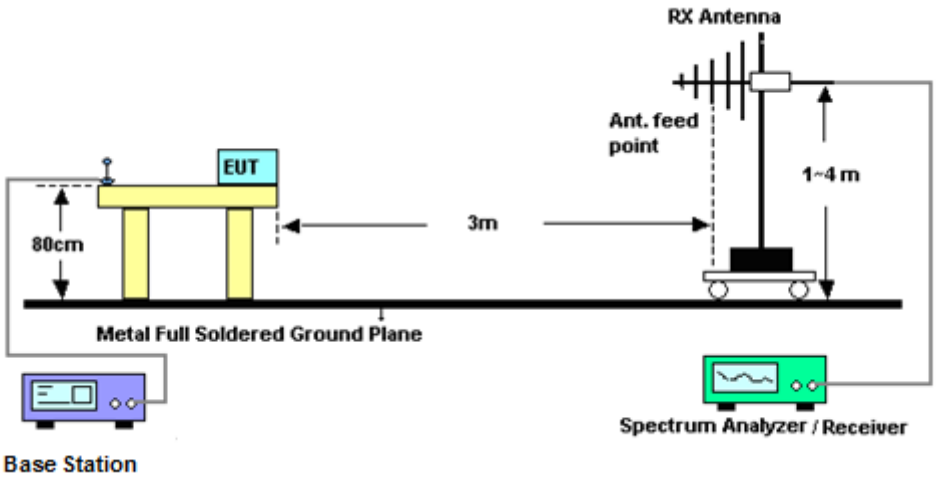
# 4 Radiated Test Items

## 4.1 Measuring Instruments

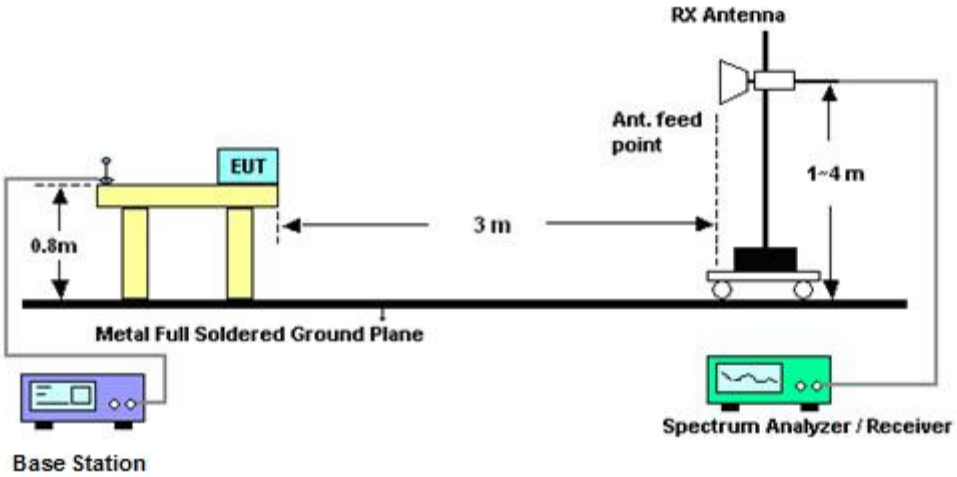
See list of measuring instruments of this test report.

## 4.2 Test Setup

### 4.2.1 For radiated test from 30MHz to 1GHz




### 4.2.2 For radiated test above 1GHz




## 4.3 Test Result of Radiated Test

Please refer to Appendix B.

## 4.4 Radiated Spurious Emission Measurement

### 4.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI / TIA / EIA-603-C-2004.

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 70 + 10 log (P) dB.

### 4.4.2 Test Procedures

1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, Sweep = 500ms, Taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
    The limit line is derived from 70 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [70 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [70 + 10log(P)] (dB)
    = -40dBm.
11. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain

# 5 List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| LTE Base Station | Anritsu | MT8820C | 6201432821 | GSM/GPRS /WCDMA/LTE | Oct. 16, 2015 | Apr. 19, 2016 ~ Aug. 05, 2016 | Oct. 15, 2016 | Conducted (TH05-HY) |
| Spectrum Analyzer | Rohde & Schwarz | FSV30 | 100895 | 9kHz~30GHz | Apr. 27, 2015 | Apr. 19, 2016 ~ Aug. 25, 2016 | Apr. 26, 2016 | Conducted (TH05-HY) |
| Spectrum Analyzer | Rohde & Schwarz | FSV30 | 100895 | 9kHz~30GHz | Apr. 26, 2016 | Apr. 26, 2016 ~ Aug. 05, 2016 | Apr. 25, 2017 | Conducted (TH05-HY) |
| EMI Test Receiver | Keysight | N9038A(MXE) | MY54130085 | 20Hz ~ 8.4GHz | Nov. 04 ,2015 | Apr. 19, 2016 ~ Aug. 05, 2016 | Nov. 03, 2016 | Conducted (TH05-HY) |
| Temperature Chamber | ESPEC | SH-641 | 92013720 | -30˚C ~70˚C | Sep. 08, 2015 | Apr. 19, 2016 ~ Aug. 05, 2016 | Sep. 07, 2016 | Conducted (TH05-HY) |
| Programmable Power Supply | GW Instek | PSS-2005 | EL890089 | 1V~20V 0.5A~5A | Jan. 18, 2016 | Apr. 19, 2016 ~ Aug. 05, 2016 | Jan. 17, 2017 | Conducted (TH05-HY) |
| Amplifier | SONOMA | 310N | 187312 | 9kHz~1GHz | Nov. 20, 2015 | Jul. 13, 2016 ~ Jul. 28, 2016 | Nov. 19, 2016 | Radiation (03CH11-HY) |
| Bilog Antenna | TESEQ | CBL 6111D | 35414 | 30MHz~1GHz | Nov. 17, 2015 | Jul. 13, 2016 ~ Jul. 28, 2016 | Nov. 16, 2016 | Radiation (03CH11-HY) |
| Horn Antenna | SCHWARZBECK | BBHA 9120 D | 9120D-1326 | 1GHz ~ 18GHz | Oct. 08, 2015 | Jul. 13, 2016 ~ Jul. 28, 2016 | Oct. 07, 2016 | Radiation (03CH11-HY) |
| Spectrum Analyzer | Keysight | N9010A | MY54200486 | 10Hz ~ 44GHZ | Sep. 24, 2015 | Jul. 13, 2016 ~ Jul. 28, 2016 | Sep. 23, 2016 | Radiation (03CH11-HY) |
| Antenna Mast | EMEC | AM-BS-4500-B | N/A | 1~4m | N/A | Jul. 13, 2016 ~ Jul. 28, 2016 | N/A | Radiation (03CH11-HY) |
| Turn Table | EMEC | TT 2000 | N/A | 0~360 Degree | N/A | Jul. 13, 2016 ~ Jul. 28, 2016 | N/A | Radiation (03CH11-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK | BBHA 9170 | BBHA9170576 | 18GHz ~ 40GHz | Apr. 15, 2016 | Jul. 13, 2016 ~ Jul. 28, 2016 | Apr. 14, 2017 | Radiation (03CH11-HY) |
| Bilog Antenna | TESEQ | CBL 6111D | 40103 | 30MHz to 1GHz | Jan. 13, 2016 | Jul. 13, 2016 ~ Jul. 28, 2016 | Jan. 12, 2017 | Radiation (03CH11-HY) |
| Horn Antenna | SCHWARZBECK | BBHA 9120 D | 9120D-1522 | 1G~18GHz | Mar. 31, 2016 | Jul. 13, 2016 ~ Jul. 28, 2016 | Mar. 30, 2017 | Radiation (03CH11-HY) |
| Preamplifier | MITEQ | TTA0204 | 1872107 | 2GHz~40GHz | Feb. 15, 2016 | Jul. 13, 2016 ~ Jul. 28, 2016 | Feb. 14, 2017 | Radiation (03CH11-HY) |
| Signal Generator | Rohde & Schwarz | SMF100A | 101107 | 100kHz~40GHz | May 19, 2016 | Jul. 13, 2016 ~ Jul. 28, 2016 | May 18, 2017 | Radiation (03CH11-HY) |
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 100315 | 9 kHz~30 MHz | Sep. 02, 2015 | Jul. 13, 2016 ~ Jul. 28, 2016 | Sep. 01, 2016 | Radiation (03CH11-HY) |

# 6 Uncertainty of Evaluation

**Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)**

| | |
|---|---|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 3.37 |

**Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)**

| | |
|---|---|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 4.03 |

# Appendix A. Test Results of Conducted Test

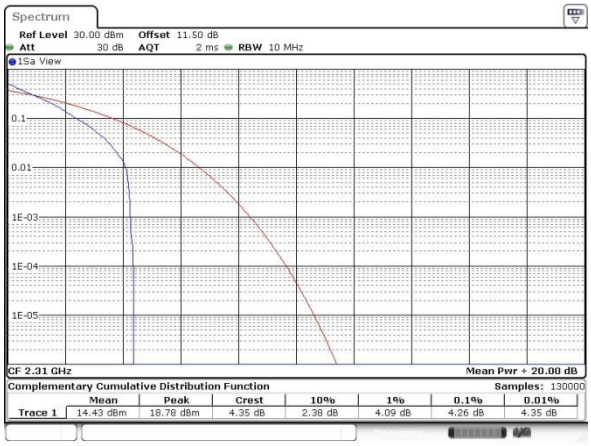
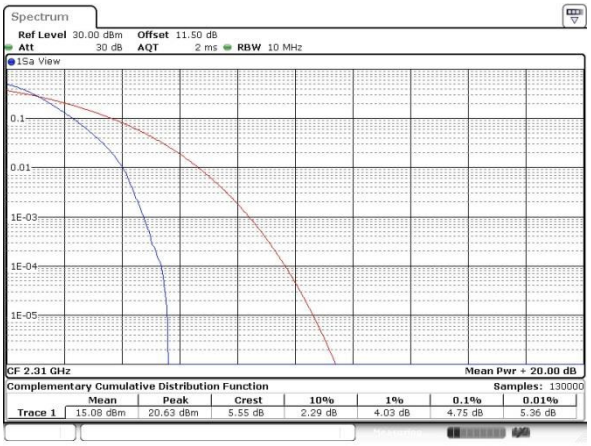
## Conducted Output Power(Average power)

| LTE Band 30 Maximum Average Power [dBm] | | | | | | |
|---|---|---|---|---|---|---|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest |
| 10 | 1 | 0 | QPSK | - | 17.51 | - |
| 10 | 1 | 25 | | - | 17.32 | - |
| 10 | 1 | 49 | | - | 17.32 | - |
| 10 | 25 | 0 | | - | 16.55 | - |
| 10 | 25 | 12 | | - | 16.43 | - |
| 10 | 25 | 25 | | - | 16.47 | - |
| 10 | 50 | 0 | | - | 16.54 | - |
| 10 | 1 | 0 | 16-QAM | - | 16.85 | - |
| 10 | 1 | 25 | | - | 16.63 | - |
| 10 | 1 | 49 | | - | 16.61 | - |
| 10 | 25 | 0 | | - | 15.56 | - |
| 10 | 25 | 12 | | - | 15.43 | - |
| 10 | 25 | 25 | | - | 15.46 | - |
| 10 | 50 | 0 | | - | 15.61 | - |
| 5 | 1 | 0 | QPSK | 17.29 | 17.37 | 17.29 |
| 5 | 1 | 12 | | 17.25 | 17.20 | 17.26 |
| 5 | 1 | 24 | | 17.28 | 17.29 | 17.23 |
| 5 | 12 | 0 | | 16.30 | 16.32 | 16.35 |
| 5 | 12 | 7 | | 16.27 | 16.29 | 16.32 |
| 5 | 12 | 13 | | 16.38 | 16.29 | 16.29 |
| 5 | 25 | 0 | | 16.30 | 16.28 | 16.31 |
| 5 | 1 | 0 | 16-QAM | 16.57 | 16.63 | 16.62 |
| 5 | 1 | 12 | | 16.52 | 16.56 | 16.54 |
| 5 | 1 | 24 | | 16.51 | 16.56 | 16.49 |
| 5 | 12 | 0 | | 15.36 | 15.39 | 15.39 |
| 5 | 12 | 7 | | 15.34 | 15.32 | 15.40 |
| 5 | 12 | 13 | | 15.44 | 15.33 | 15.31 |
| 5 | 25 | 0 | | 15.32 | 15.30 | 15.34 |

# LTE Band 30

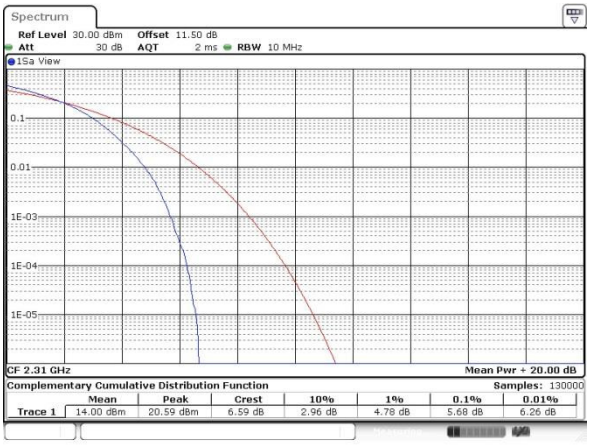
## Peak-to-Average Ratio

| Mode | LTE Band 30 / 10MHz | | | | |
|---|---|---|---|---|---|
| Mod. | QPSK | | 16QAM | | Limit: 13dB |
| RB Size | 1RB | Full RB | 1RB | Full RB | Result |
| Middle CH | 4.26 | 4.75 | 4.9 | 5.68 | PASS |

| LTE Band 30 / 10MHz / QPSK | |
|---|---|
| **Middle Channel / 1RB** | **Middle Channel / Full RB** |
|  |  |





| LTE Band 30 / 10MHz / 16QAM | |
|---|---|
| **Middle Channel / 1RB** | **Middle Channel / Full RB** |
| |  |

# EIRP Power Density

| Mode | LTE Band 30 : Conducted Power Density (dBm/5MHz) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BW | 1.4MHz | | 3MHz | | 5MHz | | 10MHz | | 15MHz | | 20MHz | |
| Mod. | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM |
| Lowest CH | - | - | - | - | 17.83 | 17.05 | - | - | - | - | - | - |
| Middle CH | - | - | - | - | 17.69 | 16.86 | 17.85 | 17.13 | - | - | - | - |
| Highest CH | - | - | - | - | 17.72 | 16.84 | - | - | - | - | - | - |

| Mode | LTE Band 30 : EIRP Power Density (dBm/5MHz) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BW | 1.4MHz | | 3MHz | | 5MHz | | 10MHz | | 15MHz | | 20MHz | |
| Mod. | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM |
| Lowest CH | - | - | - | - | 16.63 | 15.85 | - | - | - | - | - | - |
| Middle CH | - | - | - | - | 16.49 | 15.66 | 16.65 | 15.93 | - | - | - | - |
| Highest CH | - | - | - | - | 16.52 | 15.64 | - | - | - | - | - | - |
| Antenna Gain | -1.2 dBi | | | | | | | | | | | |
| Limit | 250mW / 5MHz = 24dBm / 5MHz | | | | | | | | | | | |
| Result | Pass | | | | | | | | | | | |

## LTE Band 30 / 5MHz

### Lowest Channel / 5MHz / 1RB0 / QPSK

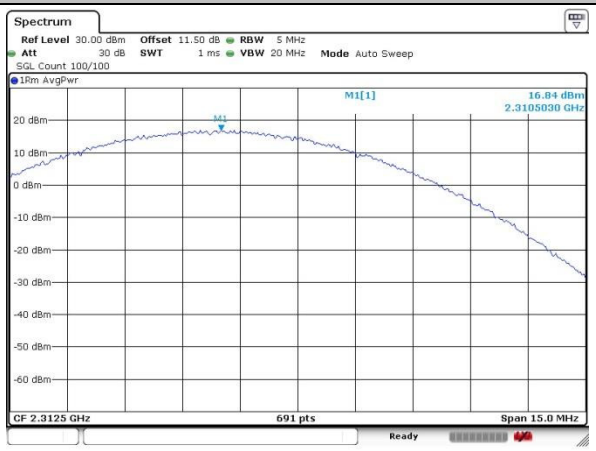
### Lowest Channel / 5MHz / 1RB0 / 16QAM

### Middle Channel / 5MHz / 1RB0 / QPSK

### Middle Channel / 5MHz / 1RBmax / 16QAM

### Highest Channel / 5MHz / Full RB / QPSK

### Highest Channel / 5MHz / Full RB / 16QAM



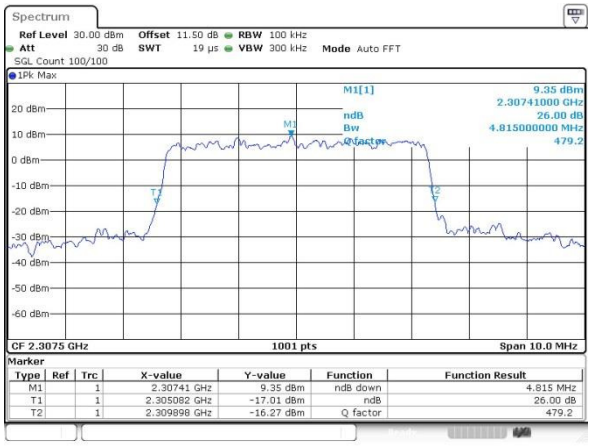
| LTE Band 30 / 10MHz | |
|---|---|
| **Lowest Channel / 10MHz / 1RB0 / QPSK** | **Lowest Channel / 10MHz / 1RB0 / 16QAM** |
| | |

# 26dB Bandwidth

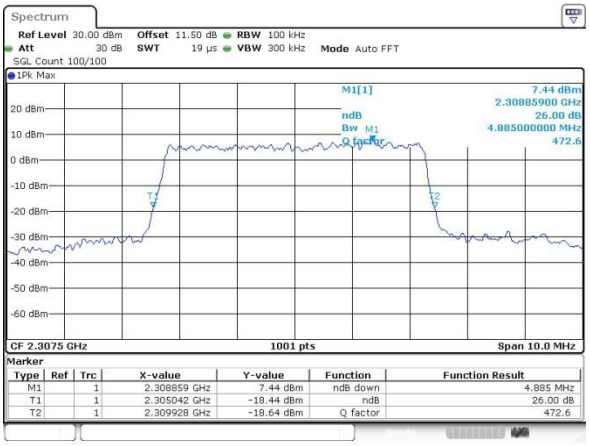
| Mode | LTE Band 30 : 26dB BW(MHz) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BW | 1.4MHz | | 3MHz | | 5MHz | | 10MHz | | 15MHz | | 20MHz | |
| Mod. | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM |
| Lowest CH | - | - | - | - | 4.82 | 4.89 | - | - | - | - | - | - |
| Middle CH | - | - | - | - | 4.93 | 4.92 | 9.71 | 9.67 | - | - | - | - |
| Highest CH | - | - | - | - | 4.87 | 4.82 | - | - | - | - | - | - |

## LTE Band 30

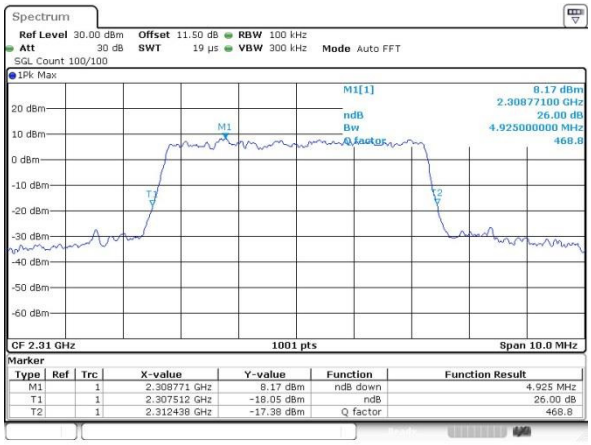
### Lowest Channel / 5MHz / QPSK



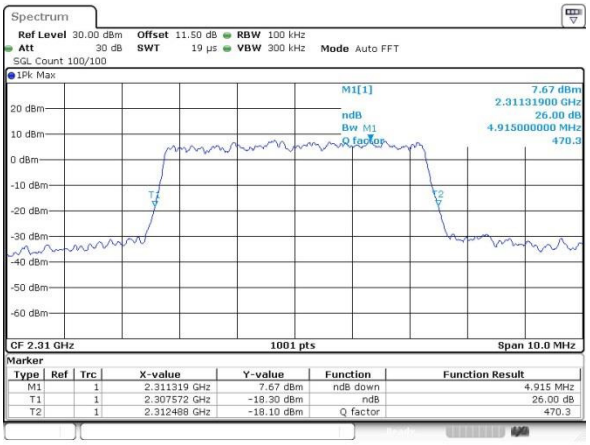

### Lowest Channel / 5MHz / 16QAM



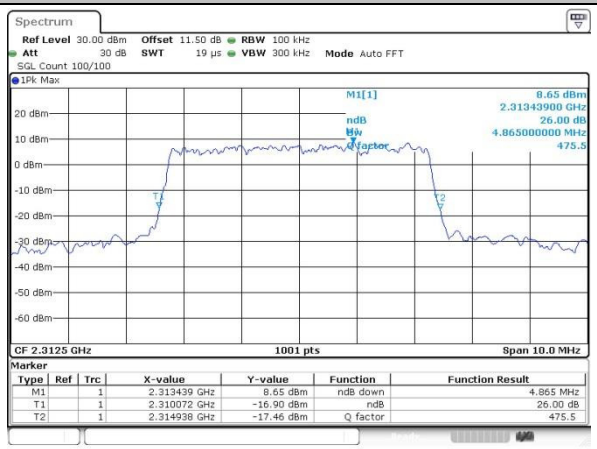

### Middle Channel / 5MHz / QPSK



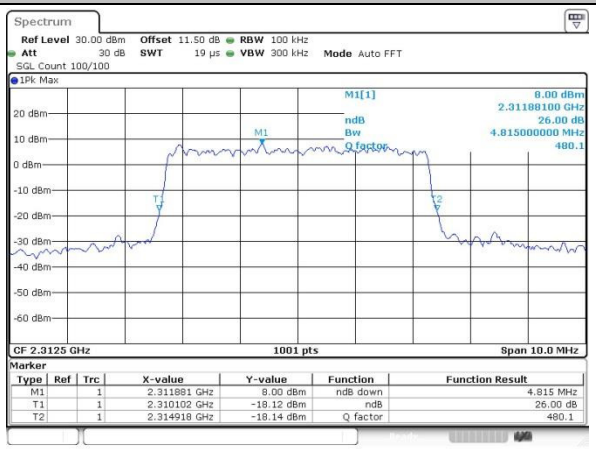

### Middle Channel / 5MHz / 16QAM



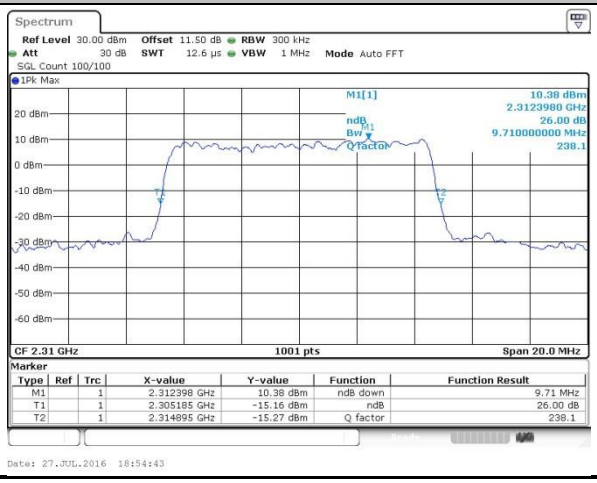

### Highest Channel / 5MHz / QPSK

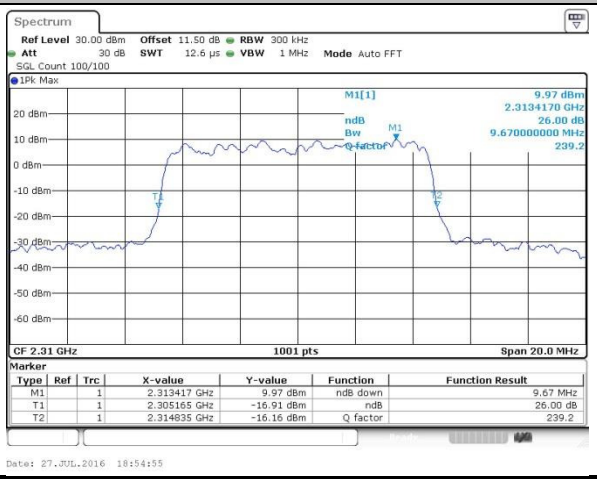



### Highest Channel / 5MHz / 16QAM



| LTE Band 30 | |
|---|---|
| **Middle Channel / 10MHz / QPSK** | **Middle Channel / 10MHz / 16QAM** |



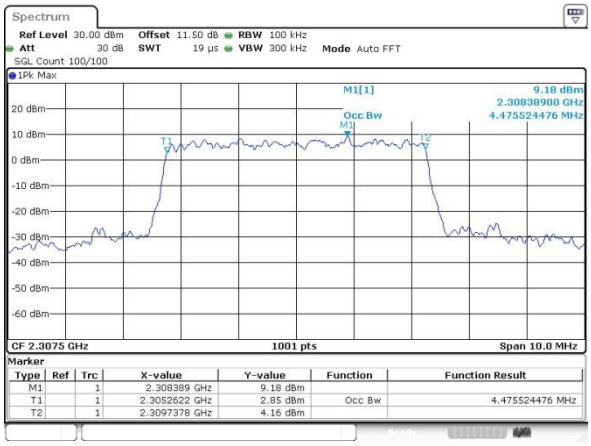



# Occupied Bandwidth

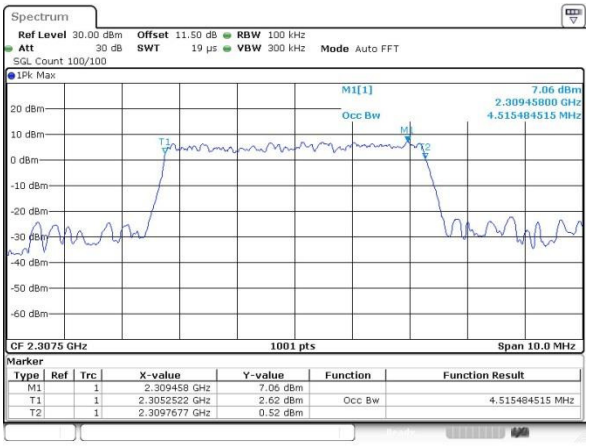
| Mode | LTE Band 30 : 99%OBW(MHz) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BW | 1.4MHz | | 3MHz | | 5MHz | | 10MHz | | 15MHz | | 20MHz | |
| Mod. | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM |
| Lowest CH | - | - | - | - | 4.48 | 4.52 | - | - | - | - | - | - |
| Middle CH | - | - | - | - | 4.49 | 4.5 | 9.01 | 9.05 | - | - | - | - |
| Highest CH | - | - | - | - | 4.5 | 4.49 | - | - | - | - | - | - |

## LTE Band 30

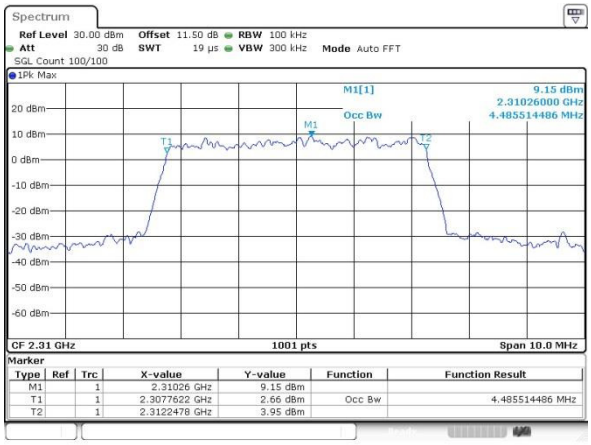
### Lowest Channel / 5MHz / QPSK



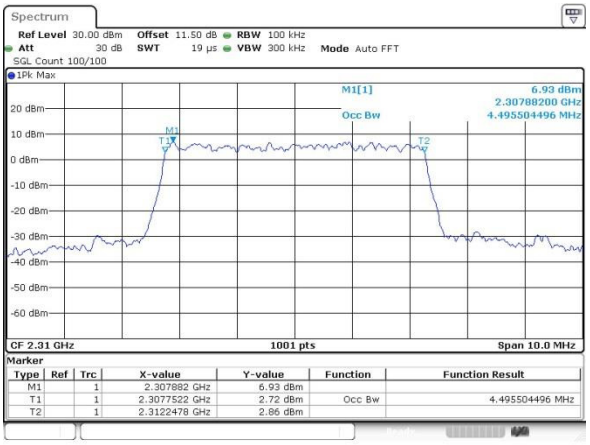

### Lowest Channel / 5MHz / 16QAM



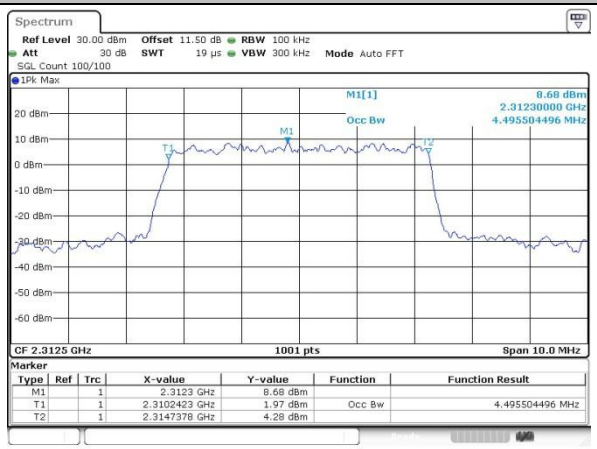

### Middle Channel / 5MHz / QPSK



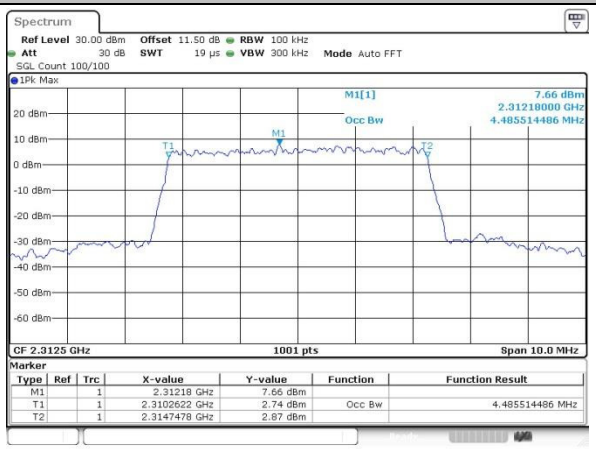

### Middle Channel / 5MHz / 16QAM

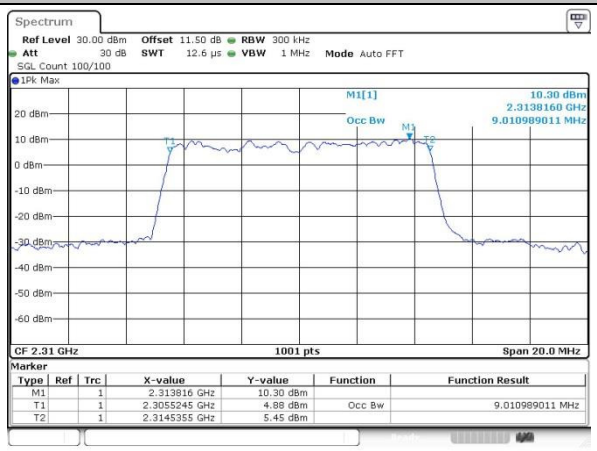
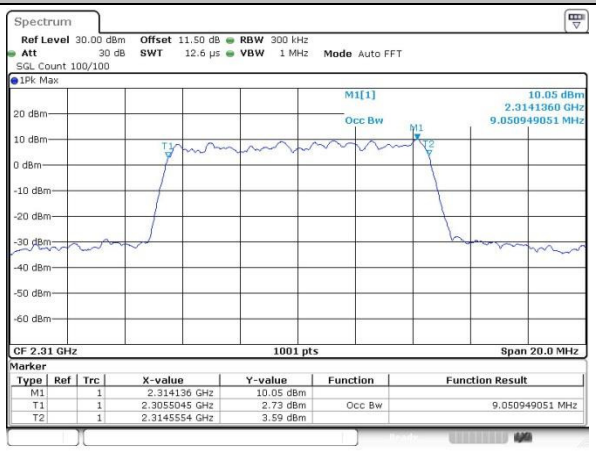



### Highest Channel / 5MHz / QPSK




### Highest Channel / 5MHz / 16QAM

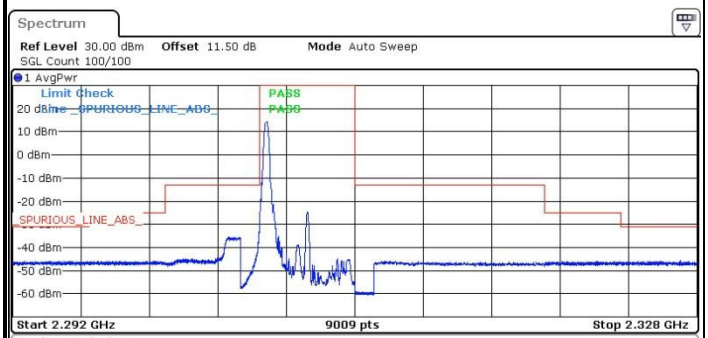


| LTE Band 30 | |
|---|---|
| **Middle Channel / 10MHz / QPSK** | **Middle Channel / 10MHz / 16QAM** |
|  |  |

# Conducted Band Edge

## LTE Band 30 / 5MHz / QPSK

### Lowest Band Edge / 1 RB




Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29506 GHz | -45.98 dBm | -14.98 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29692 GHz | -45.87 dBm | -20.87 dB |
| 2.300 GHz | 2.304 GHz | 1.000 MHz | 2.30396 GHz | -35.44 dBm | -22.44 dB |
| 2.304 GHz | 2.305 GHz | 50.000 kHz | 2.30500 GHz | -29.90 dBm | -16.90 dB |
| 2.305 GHz | 2.310 GHz | 100.000 kHz | 2.30535 GHz | 14.33 dBm | -15.67 dB |
| 2.310 GHz | 2.311 GHz | 50.000 kHz | 2.31004 GHz | -59.11 dBm | -46.11 dB |
| 2.311 GHz | 2.320 GHz | 1.000 MHz | 2.31333 GHz | -46.01 dBm | -33.01 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32278 GHz | -45.89 dBm | -20.89 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32711 GHz | -45.83 dBm | -14.83 dB |

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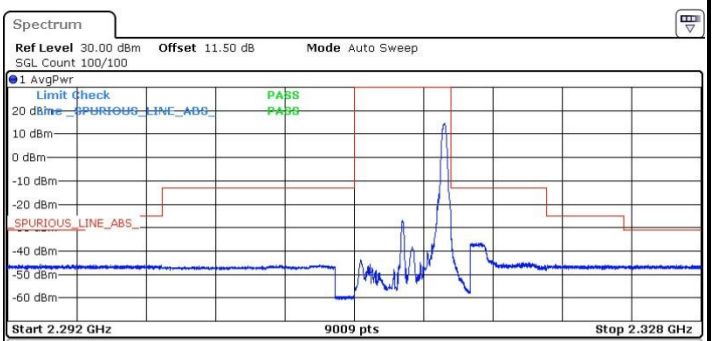
### Highest Band Edge / 1 RB




Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29369 GHz | -45.56 dBm | -14.56 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29911 GHz | -45.91 dBm | -20.91 dB |
| 2.300 GHz | 2.309 GHz | 1.000 MHz | 2.30819 GHz | -46.09 dBm | -33.09 dB |
| 2.309 GHz | 2.310 GHz | 50.000 kHz | 2.30973 GHz | -59.22 dBm | -46.22 dB |
| 2.310 GHz | 2.315 GHz | 100.000 kHz | 2.31468 GHz | 14.46 dBm | -15.54 dB |
| 2.315 GHz | 2.316 GHz | 50.000 kHz | 2.31500 GHz | -31.18 dBm | -18.18 dB |
| 2.316 GHz | 2.320 GHz | 1.000 MHz | 2.31662 GHz | -36.64 dBm | -23.64 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32044 GHz | -45.76 dBm | -20.76 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32467 GHz | -45.97 dBm | -14.97 dB |

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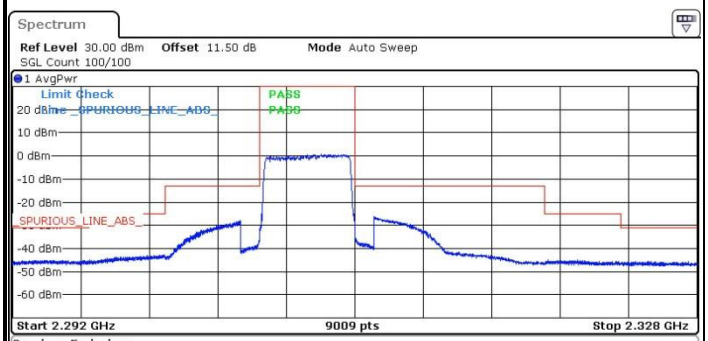
### Lowest Band Edge / Full RB




Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29345 GHz | -45.12 dBm | -14.12 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29999 GHz | -42.59 dBm | -17.59 dB |
| 2.300 GHz | 2.304 GHz | 1.000 MHz | 2.30393 GHz | -28.13 dBm | -15.13 dB |
| 2.304 GHz | 2.305 GHz | 50.000 kHz | 2.30500 GHz | -35.30 dBm | -22.30 dB |
| 2.305 GHz | 2.310 GHz | 100.000 kHz | 2.30822 GHz | 0.64 dBm | -29.36 dB |
| 2.310 GHz | 2.311 GHz | 50.000 kHz | 2.31000 GHz | -34.86 dBm | -21.86 dB |
| 2.311 GHz | 2.320 GHz | 1.000 MHz | 2.31101 GHz | -26.28 dBm | -13.28 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32016 GHz | -44.93 dBm | -19.93 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32539 GHz | -45.70 dBm | -14.70 dB |

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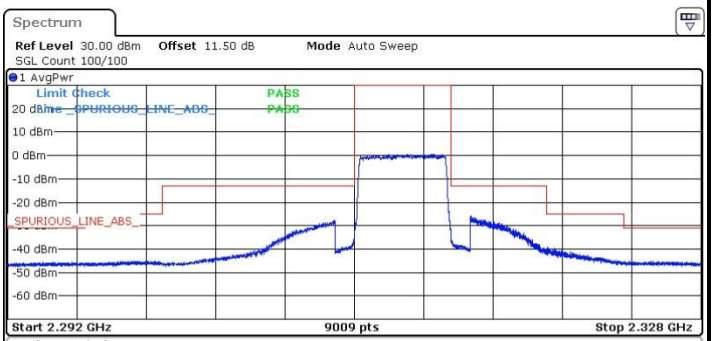
### Highest Band Edge / Full RB




Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29534 GHz | -45.55 dBm | -14.55 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29797 GHz | -45.13 dBm | -20.13 dB |
| 2.300 GHz | 2.309 GHz | 1.000 MHz | 2.30897 GHz | -27.79 dBm | -14.79 dB |
| 2.309 GHz | 2.310 GHz | 50.000 kHz | 2.31000 GHz | -35.22 dBm | -22.22 dB |
| 2.310 GHz | 2.315 GHz | 100.000 kHz | 2.31398 GHz | 0.49 dBm | -29.51 dB |
| 2.315 GHz | 2.316 GHz | 50.000 kHz | 2.31500 GHz | -35.32 dBm | -22.32 dB |
| 2.316 GHz | 2.320 GHz | 1.000 MHz | 2.31607 GHz | -25.99 dBm | -12.99 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32004 GHz | -39.46 dBm | -14.46 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32404 GHz | -45.23 dBm | -14.23 dB |

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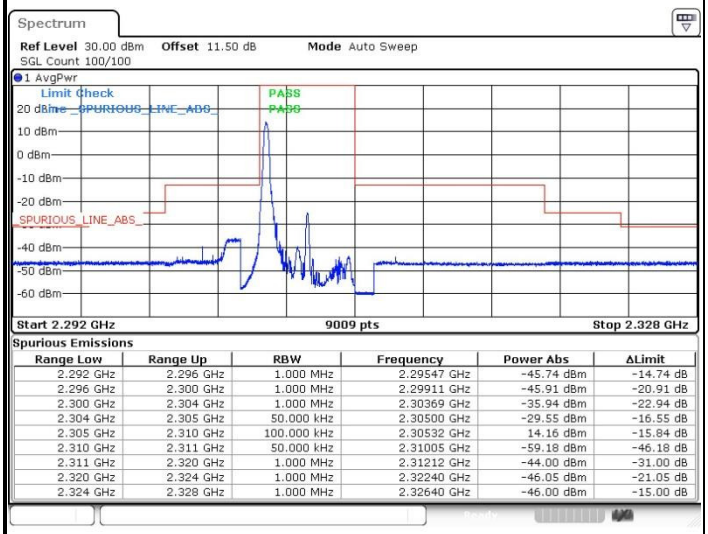
## LTE Band 30 / 5MHz / 16QAM

### Lowest Band Edge / 1RB




Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29547 GHz | -45.74 dBm | -14.74 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29911 GHz | -45.91 dBm | -20.91 dB |
| 2.300 GHz | 2.304 GHz | 1.000 MHz | 2.30369 GHz | -35.94 dBm | -22.94 dB |
| 2.304 GHz | 2.305 GHz | 50.000 kHz | 2.30500 GHz | -29.55 dBm | -16.55 dB |
| 2.305 GHz | 2.310 GHz | 100.000 kHz | 2.30532 GHz | 14.16 dBm | -15.84 dB |
| 2.310 GHz | 2.311 GHz | 50.000 kHz | 2.31005 GHz | -59.18 dBm | -46.18 dB |
| 2.311 GHz | 2.320 GHz | 1.000 MHz | 2.31212 GHz | -44.00 dBm | -31.00 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32240 GHz | -46.05 dBm | -21.05 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32640 GHz | -46.00 dBm | -15.00 dB |

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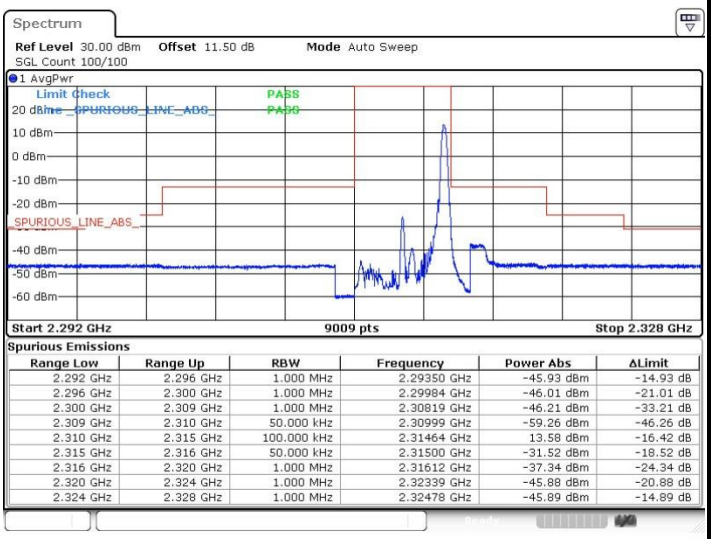
### Highest Band Edge / 1 RB

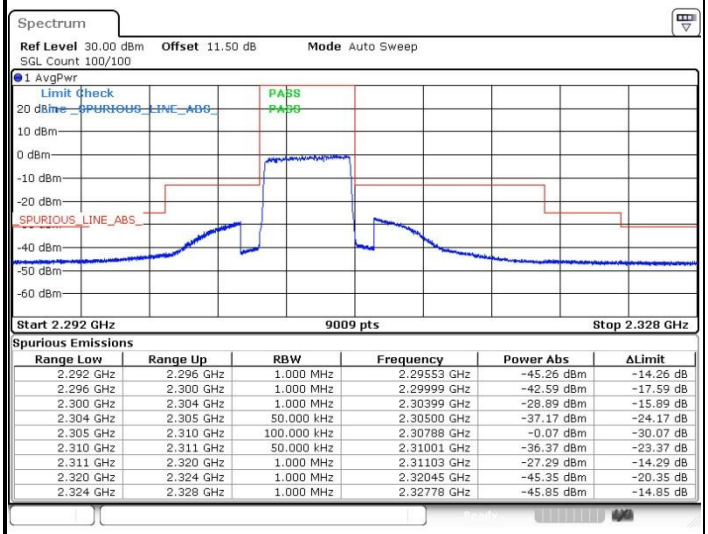



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29350 GHz | -45.93 dBm | -14.93 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29984 GHz | -46.01 dBm | -21.01 dB |
| 2.300 GHz | 2.309 GHz | 1.000 MHz | 2.30819 GHz | -46.21 dBm | -33.21 dB |
| 2.309 GHz | 2.310 GHz | 50.000 kHz | 2.30999 GHz | -59.26 dBm | -46.26 dB |
| 2.310 GHz | 2.315 GHz | 100.000 kHz | 2.31464 GHz | 13.58 dBm | -16.42 dB |
| 2.315 GHz | 2.316 GHz | 50.000 kHz | 2.31500 GHz | -31.52 dBm | -18.52 dB |
| 2.316 GHz | 2.320 GHz | 1.000 MHz | 2.31612 GHz | -37.34 dBm | -24.34 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32339 GHz | -45.88 dBm | -20.88 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32478 GHz | -45.89 dBm | -14.89 dB |

Date: 27.JUL.2016 18:48:11

### Lowest Band Edge / Full RB

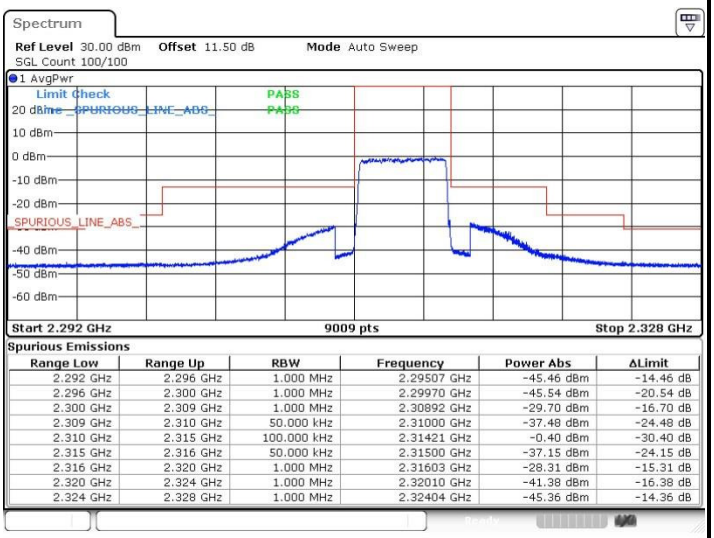



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29553 GHz | -45.26 dBm | -14.26 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29999 GHz | -42.59 dBm | -17.59 dB |
| 2.300 GHz | 2.304 GHz | 1.000 MHz | 2.30399 GHz | -28.89 dBm | -15.89 dB |
| 2.304 GHz | 2.305 GHz | 50.000 kHz | 2.30500 GHz | -37.17 dBm | -24.17 dB |
| 2.305 GHz | 2.310 GHz | 100.000 kHz | 2.30788 GHz | -0.07 dBm | -30.07 dB |
| 2.310 GHz | 2.311 GHz | 50.000 kHz | 2.31001 GHz | -36.37 dBm | -23.37 dB |
| 2.311 GHz | 2.320 GHz | 1.000 MHz | 2.31103 GHz | -27.29 dBm | -14.29 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32045 GHz | -45.35 dBm | -20.35 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32778 GHz | -45.85 dBm | -14.85 dB |

Date: 27.JUL.2016 17:34:48

### Highest Band Edge / Full RB



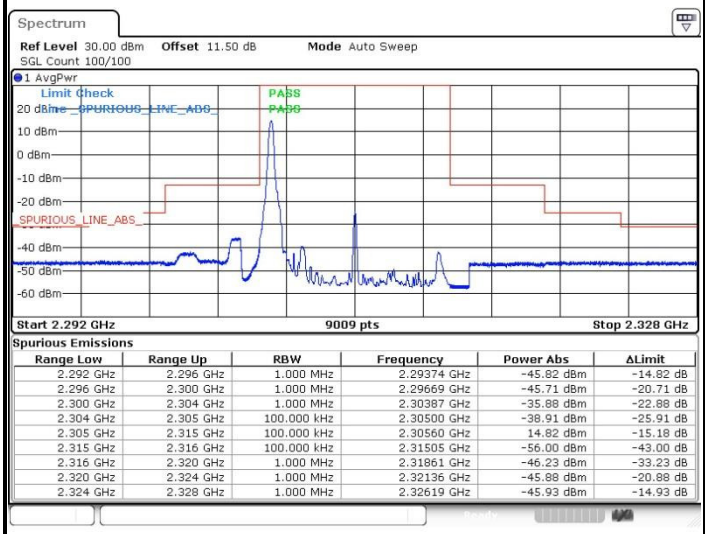

Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29507 GHz | -45.46 dBm | -14.46 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29970 GHz | -45.54 dBm | -20.54 dB |
| 2.300 GHz | 2.309 GHz | 1.000 MHz | 2.30892 GHz | -29.70 dBm | -16.70 dB |
| 2.309 GHz | 2.310 GHz | 50.000 kHz | 2.31000 GHz | -37.48 dBm | -24.48 dB |
| 2.310 GHz | 2.315 GHz | 100.000 kHz | 2.31421 GHz | -0.40 dBm | -30.40 dB |
| 2.315 GHz | 2.316 GHz | 50.000 kHz | 2.31500 GHz | -37.15 dBm | -24.15 dB |
| 2.316 GHz | 2.320 GHz | 1.000 MHz | 2.31603 GHz | -28.31 dBm | -15.31 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32010 GHz | -41.38 dBm | -16.38 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32404 GHz | -45.36 dBm | -14.36 dB |

Date: 27.JUL.2016 18:50:33

## LTE Band 30 / 10MHz / QPSK

### Lowest Band Edge / 1 RB

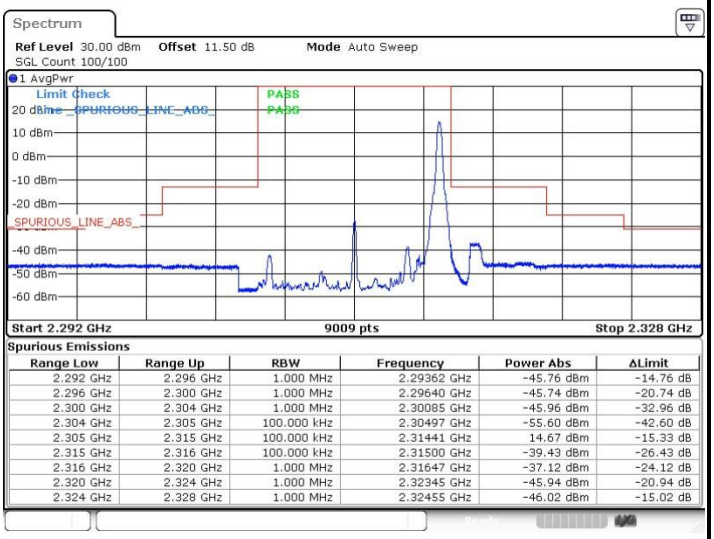



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29374 GHz | -45.82 dBm | -14.82 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29669 GHz | -45.71 dBm | -20.71 dB |
| 2.300 GHz | 2.304 GHz | 1.000 MHz | 2.30387 GHz | -35.88 dBm | -22.88 dB |
| 2.304 GHz | 2.305 GHz | 100.000 kHz | 2.30500 GHz | -38.91 dBm | -25.91 dB |
| 2.305 GHz | 2.315 GHz | 100.000 kHz | 2.30560 GHz | 14.82 dBm | -15.18 dB |
| 2.315 GHz | 2.316 GHz | 100.000 kHz | 2.31505 GHz | -56.00 dBm | -43.00 dB |
| 2.316 GHz | 2.320 GHz | 1.000 MHz | 2.31861 GHz | -46.23 dBm | -33.23 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32136 GHz | -45.88 dBm | -20.88 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32619 GHz | -45.93 dBm | -14.93 dB |

Date: 27.JUL.2016 19:03:12

### Highest Band Edge / 1 RB

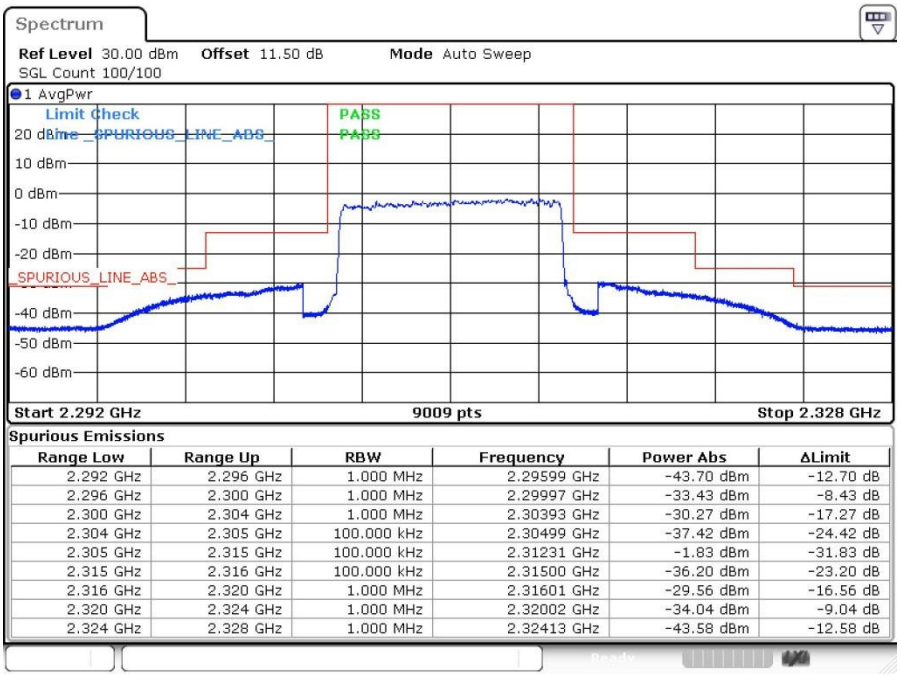



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29362 GHz | -45.76 dBm | -14.76 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29640 GHz | -45.74 dBm | -20.74 dB |
| 2.300 GHz | 2.304 GHz | 1.000 MHz | 2.30085 GHz | -45.96 dBm | -32.96 dB |
| 2.304 GHz | 2.305 GHz | 100.000 kHz | 2.30497 GHz | -55.60 dBm | -42.60 dB |
| 2.305 GHz | 2.315 GHz | 100.000 kHz | 2.31441 GHz | 14.67 dBm | -15.33 dB |
| 2.315 GHz | 2.316 GHz | 100.000 kHz | 2.31500 GHz | -39.43 dBm | -26.43 dB |
| 2.316 GHz | 2.320 GHz | 1.000 MHz | 2.31647 GHz | -37.12 dBm | -24.12 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32345 GHz | -45.94 dBm | -20.94 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32455 GHz | -46.02 dBm | -15.02 dB |

Date: 27.JUL.2016 19:05:35

### Band Edge / Full RB



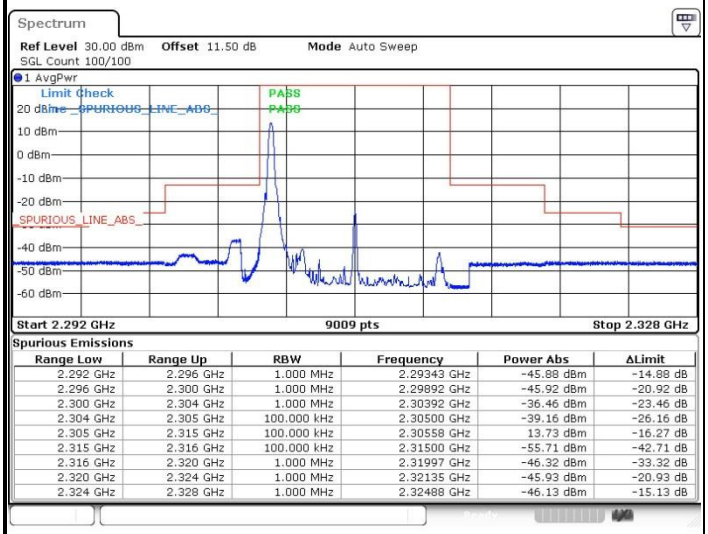

Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29599 GHz | -43.70 dBm | -12.70 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29997 GHz | -33.43 dBm | -8.43 dB |
| 2.300 GHz | 2.304 GHz | 1.000 MHz | 2.30393 GHz | -30.27 dBm | -17.27 dB |
| 2.304 GHz | 2.305 GHz | 100.000 kHz | 2.30499 GHz | -37.42 dBm | -24.42 dB |
| 2.305 GHz | 2.315 GHz | 100.000 kHz | 2.31231 GHz | -1.83 dBm | -31.83 dB |
| 2.315 GHz | 2.316 GHz | 100.000 kHz | 2.31500 GHz | -36.20 dBm | -23.20 dB |
| 2.316 GHz | 2.320 GHz | 1.000 MHz | 2.31601 GHz | -29.56 dBm | -16.56 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32002 GHz | -34.04 dBm | -9.04 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32413 GHz | -43.58 dBm | -12.58 dB |

Date: 27.JUL.2016 19:07:57

## LTE Band 30 / 10MHz / 16QAM

### Lowest Band Edge / 1 RB

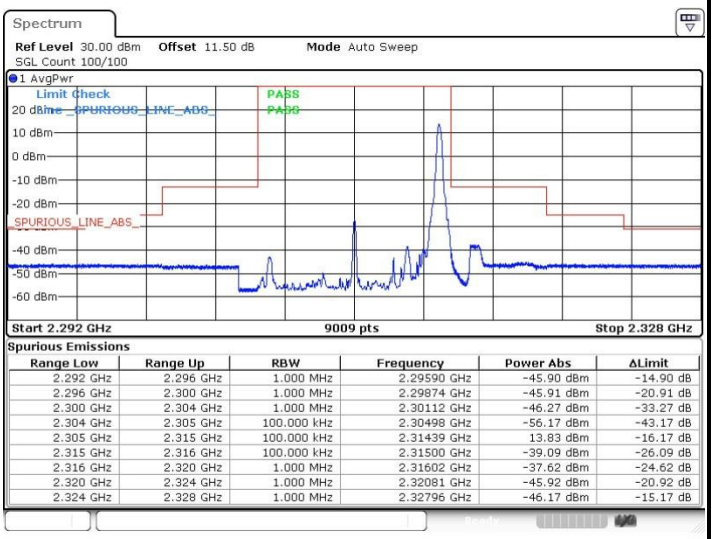



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29343 GHz | -45.88 dBm | -14.88 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29892 GHz | -45.92 dBm | -20.92 dB |
| 2.300 GHz | 2.304 GHz | 1.000 MHz | 2.30392 GHz | -36.46 dBm | -23.46 dB |
| 2.304 GHz | 2.305 GHz | 100.000 kHz | 2.30500 GHz | -39.16 dBm | -26.16 dB |
| 2.305 GHz | 2.315 GHz | 100.000 kHz | 2.30558 GHz | 13.73 dBm | -16.27 dB |
| 2.315 GHz | 2.316 GHz | 100.000 kHz | 2.31500 GHz | -55.71 dBm | -42.71 dB |
| 2.316 GHz | 2.320 GHz | 1.000 MHz | 2.31997 GHz | -46.32 dBm | -33.32 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32135 GHz | -45.93 dBm | -20.93 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32488 GHz | -46.13 dBm | -15.13 dB |

Date: 27.JUL.2016 19:04:23

### Highest Band Edge / 1 RB

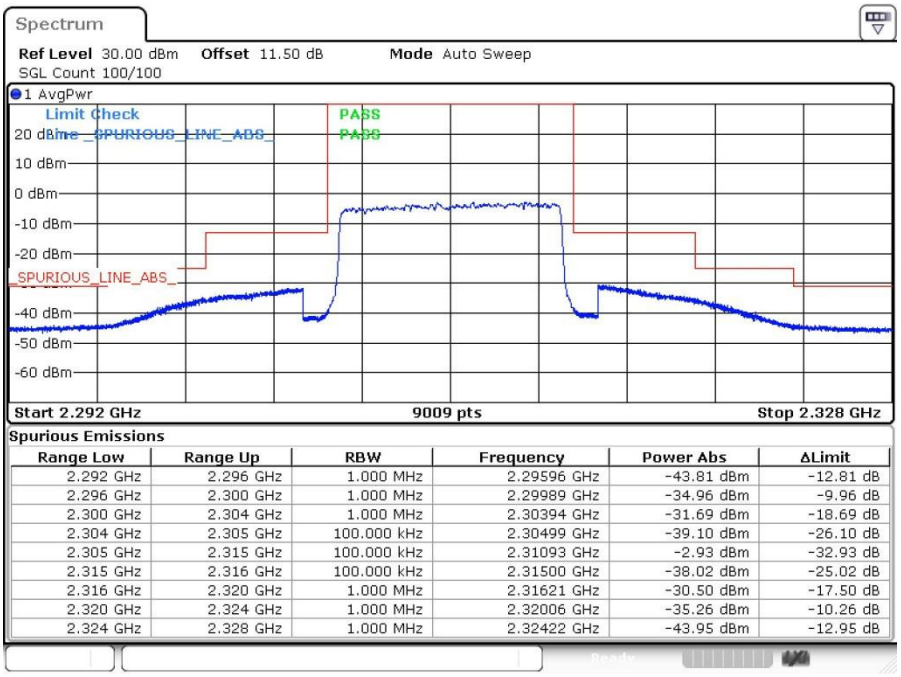



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29590 GHz | -45.90 dBm | -14.90 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29874 GHz | -45.91 dBm | -20.91 dB |
| 2.300 GHz | 2.304 GHz | 1.000 MHz | 2.30112 GHz | -46.27 dBm | -33.27 dB |
| 2.304 GHz | 2.305 GHz | 100.000 kHz | 2.30498 GHz | -56.17 dBm | -43.17 dB |
| 2.305 GHz | 2.315 GHz | 100.000 kHz | 2.31439 GHz | 13.83 dBm | -16.17 dB |
| 2.315 GHz | 2.316 GHz | 100.000 kHz | 2.31500 GHz | -39.09 dBm | -26.09 dB |
| 2.316 GHz | 2.320 GHz | 1.000 MHz | 2.31602 GHz | -37.62 dBm | -24.62 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32081 GHz | -45.92 dBm | -20.92 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32796 GHz | -46.17 dBm | -15.17 dB |

Date: 27.JUL.2016 19:06:46

### Band Edge / Full RB




Spurious Emissions

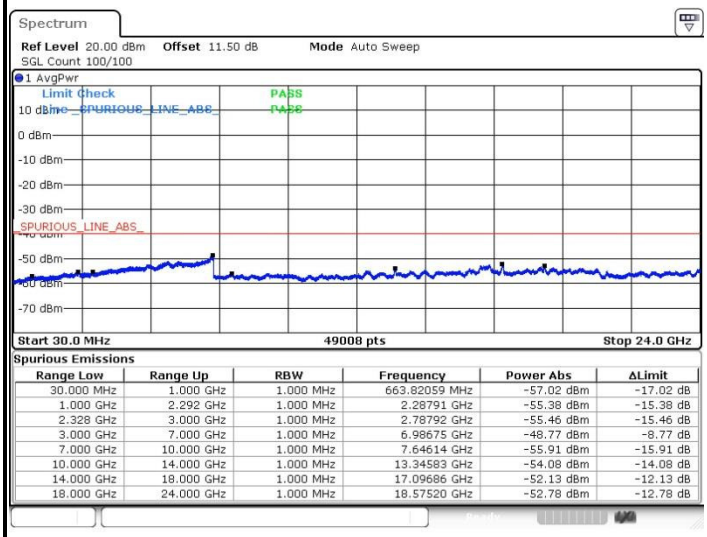
| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29596 GHz | -43.81 dBm | -12.81 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29989 GHz | -34.96 dBm | -9.96 dB |
| 2.300 GHz | 2.304 GHz | 1.000 MHz | 2.30394 GHz | -31.69 dBm | -18.69 dB |
| 2.304 GHz | 2.305 GHz | 100.000 kHz | 2.30499 GHz | -39.10 dBm | -26.10 dB |
| 2.305 GHz | 2.315 GHz | 100.000 kHz | 2.31093 GHz | -2.93 dBm | -32.93 dB |
| 2.315 GHz | 2.316 GHz | 100.000 kHz | 2.31500 GHz | -38.02 dBm | -25.02 dB |
| 2.316 GHz | 2.320 GHz | 1.000 MHz | 2.31621 GHz | -30.50 dBm | -17.50 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32006 GHz | -35.26 dBm | -10.26 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32422 GHz | -43.95 dBm | -12.95 dB |

Date: 27.JUL.2016 19:09:08

# Conducted Spurious Emission

## LTE Band 30 / 5MHz

### Lowest Channel / QPSK

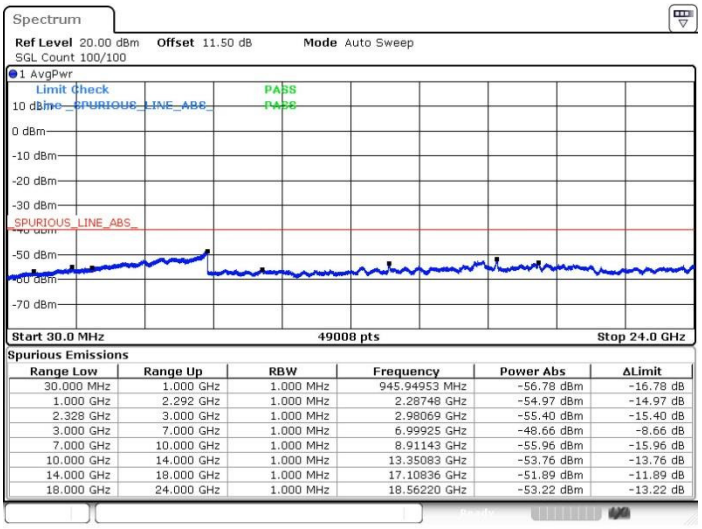



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 30.000 MHz | 1.000 GHz | 1.000 MHz | 663.82059 MHz | -57.02 dBm | -17.02 dB |
| 1.000 GHz | 2.292 GHz | 1.000 MHz | 2.28791 GHz | -55.38 dBm | -15.38 dB |
| 2.328 GHz | 3.000 GHz | 1.000 MHz | 2.78792 GHz | -55.46 dBm | -15.46 dB |
| 3.000 GHz | 7.000 GHz | 1.000 MHz | 6.98675 GHz | -48.77 dBm | -8.77 dB |
| 7.000 GHz | 10.000 GHz | 1.000 MHz | 7.64614 GHz | -55.91 dBm | -15.91 dB |
| 10.000 GHz | 14.000 GHz | 1.000 MHz | 13.34583 GHz | -54.08 dBm | -14.08 dB |
| 14.000 GHz | 18.000 GHz | 1.000 MHz | 17.09686 GHz | -52.13 dBm | -12.13 dB |
| 18.000 GHz | 24.000 GHz | 1.000 MHz | 18.57520 GHz | -52.78 dBm | -12.78 dB |

Date: 27.JUL.2016 18:41:26

### Lowest Channel / 16QAM

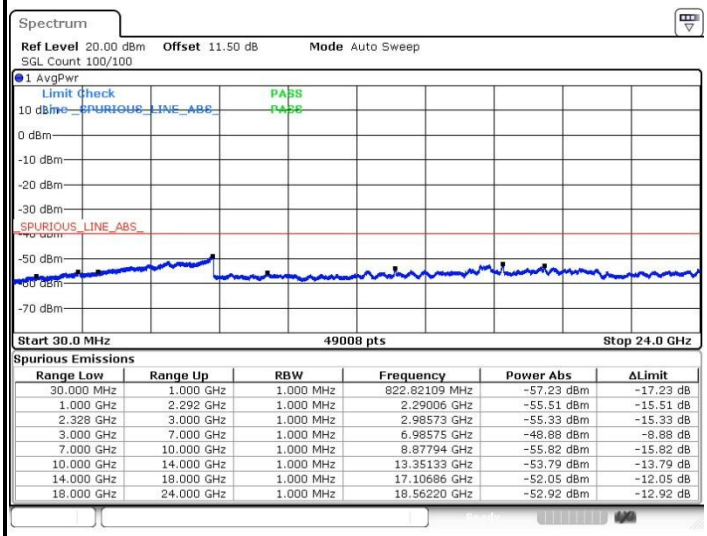



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 30.000 MHz | 1.000 GHz | 1.000 MHz | 945.94953 MHz | -56.78 dBm | -16.78 dB |
| 1.000 GHz | 2.292 GHz | 1.000 MHz | 2.28748 GHz | -54.97 dBm | -14.97 dB |
| 2.328 GHz | 3.000 GHz | 1.000 MHz | 2.98069 GHz | -55.40 dBm | -15.40 dB |
| 3.000 GHz | 7.000 GHz | 1.000 MHz | 6.99925 GHz | -48.66 dBm | -8.66 dB |
| 7.000 GHz | 10.000 GHz | 1.000 MHz | 8.91143 GHz | -55.96 dBm | -15.96 dB |
| 10.000 GHz | 14.000 GHz | 1.000 MHz | 13.35083 GHz | -53.76 dBm | -13.76 dB |
| 14.000 GHz | 18.000 GHz | 1.000 MHz | 17.10836 GHz | -51.89 dBm | -11.89 dB |
| 18.000 GHz | 24.000 GHz | 1.000 MHz | 18.56220 GHz | -53.22 dBm | -13.22 dB |

Date: 27.JUL.2016 18:42:22

### Middle Channel / QPSK

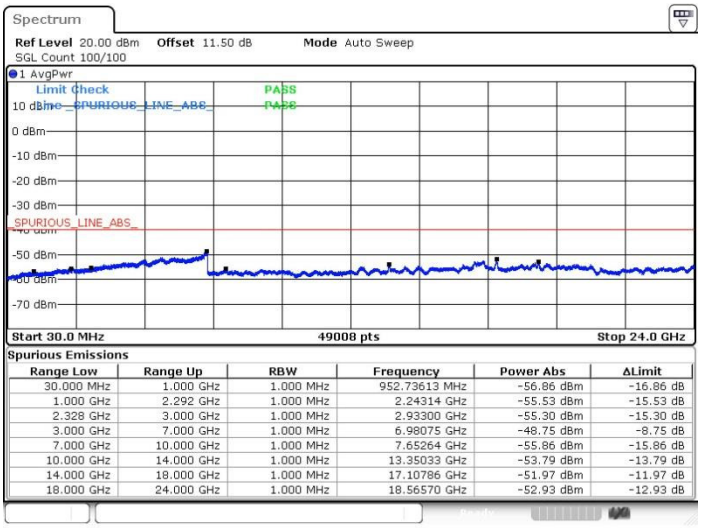



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 30.000 MHz | 1.000 GHz | 1.000 MHz | 822.82109 MHz | -57.23 dBm | -17.23 dB |
| 1.000 GHz | 2.292 GHz | 1.000 MHz | 2.29006 GHz | -55.51 dBm | -15.51 dB |
| 2.328 GHz | 3.000 GHz | 1.000 MHz | 2.98573 GHz | -55.33 dBm | -15.33 dB |
| 3.000 GHz | 7.000 GHz | 1.000 MHz | 6.98575 GHz | -48.88 dBm | -8.88 dB |
| 7.000 GHz | 10.000 GHz | 1.000 MHz | 8.87794 GHz | -55.82 dBm | -15.82 dB |
| 10.000 GHz | 14.000 GHz | 1.000 MHz | 13.35133 GHz | -53.79 dBm | -13.79 dB |
| 14.000 GHz | 18.000 GHz | 1.000 MHz | 17.10686 GHz | -52.05 dBm | -12.05 dB |
| 18.000 GHz | 24.000 GHz | 1.000 MHz | 18.56220 GHz | -52.92 dBm | -12.92 dB |

Date: 27.JUL.2016 18:44:04

### Middle Channel / 16QAM



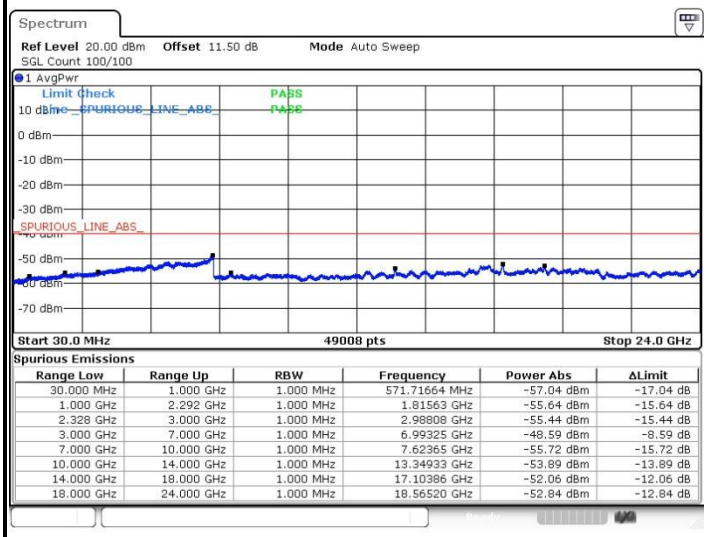

Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 30.000 MHz | 1.000 GHz | 1.000 MHz | 952.73613 MHz | -56.86 dBm | -16.86 dB |
| 1.000 GHz | 2.292 GHz | 1.000 MHz | 2.24314 GHz | -55.53 dBm | -15.53 dB |
| 2.328 GHz | 3.000 GHz | 1.000 MHz | 2.93300 GHz | -55.30 dBm | -15.30 dB |
| 3.000 GHz | 7.000 GHz | 1.000 MHz | 6.98075 GHz | -48.75 dBm | -8.75 dB |
| 7.000 GHz | 10.000 GHz | 1.000 MHz | 7.65264 GHz | -55.86 dBm | -15.86 dB |
| 10.000 GHz | 14.000 GHz | 1.000 MHz | 13.35033 GHz | -53.79 dBm | -13.79 dB |
| 14.000 GHz | 18.000 GHz | 1.000 MHz | 17.10786 GHz | -51.97 dBm | -11.97 dB |
| 18.000 GHz | 24.000 GHz | 1.000 MHz | 18.56570 GHz | -52.93 dBm | -12.93 dB |

Date: 27.JUL.2016 18:44:59

## LTE Band 30 / 5MHz

### Highest Channel / QPSK

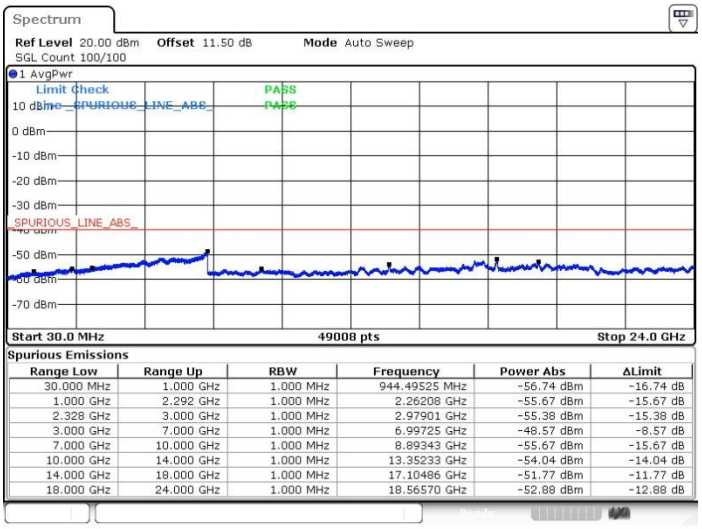



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 30.000 MHz | 1.000 GHz | 1.000 MHz | 571.71664 MHz | -57.04 dBm | -17.04 dB |
| 1.000 GHz | 2.292 GHz | 1.000 MHz | 1.81563 GHz | -55.64 dBm | -15.64 dB |
| 2.328 GHz | 3.000 GHz | 1.000 MHz | 2.98808 GHz | -55.44 dBm | -15.44 dB |
| 3.000 GHz | 7.000 GHz | 1.000 MHz | 6.99325 GHz | -48.59 dBm | -8.59 dB |
| 7.000 GHz | 10.000 GHz | 1.000 MHz | 7.62365 GHz | -55.72 dBm | -15.72 dB |
| 10.000 GHz | 14.000 GHz | 1.000 MHz | 13.34933 GHz | -53.89 dBm | -13.89 dB |
| 14.000 GHz | 18.000 GHz | 1.000 MHz | 17.10386 GHz | -52.06 dBm | -12.06 dB |
| 18.000 GHz | 24.000 GHz | 1.000 MHz | 18.56520 GHz | -52.84 dBm | -12.84 dB |

Date: 27.JUL.2016 18:51:29

### Highest Channel / 16QAM



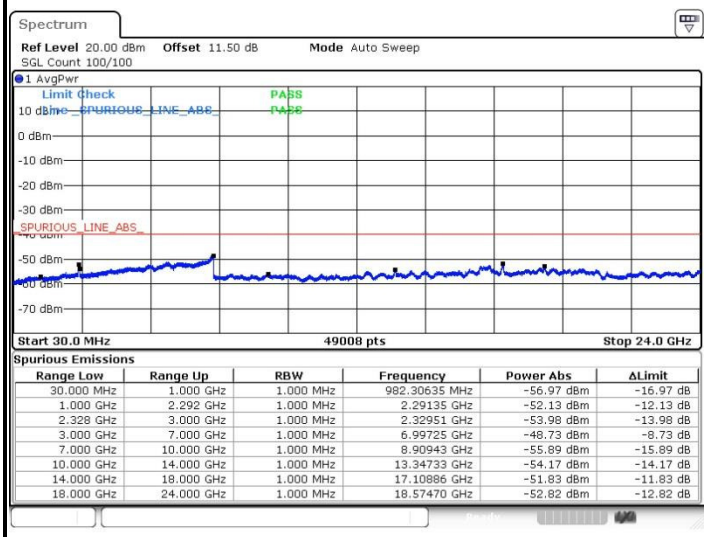

Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 30.000 MHz | 1.000 GHz | 1.000 MHz | 944.49525 MHz | -56.74 dBm | -16.74 dB |
| 1.000 GHz | 2.292 GHz | 1.000 MHz | 2.26208 GHz | -55.67 dBm | -15.67 dB |
| 2.328 GHz | 3.000 GHz | 1.000 MHz | 2.97901 GHz | -55.38 dBm | -15.38 dB |
| 3.000 GHz | 7.000 GHz | 1.000 MHz | 6.99725 GHz | -48.57 dBm | -8.57 dB |
| 7.000 GHz | 10.000 GHz | 1.000 MHz | 8.89343 GHz | -55.67 dBm | -15.67 dB |
| 10.000 GHz | 14.000 GHz | 1.000 MHz | 13.35233 GHz | -54.04 dBm | -14.04 dB |
| 14.000 GHz | 18.000 GHz | 1.000 MHz | 17.10486 GHz | -51.77 dBm | -11.77 dB |
| 18.000 GHz | 24.000 GHz | 1.000 MHz | 18.56570 GHz | -52.88 dBm | -12.88 dB |

Date: 27.JUL.2016 18:52:24

## LTE Band 30 / 10MHz

### Middle Channel / QPSK

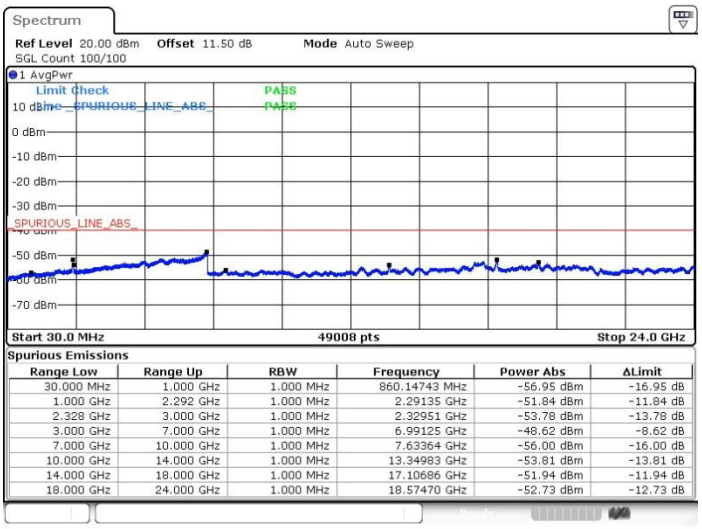



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 30.000 MHz | 1.000 GHz | 1.000 MHz | 982.30635 MHz | -56.97 dBm | -16.97 dB |
| 1.000 GHz | 2.292 GHz | 1.000 MHz | 2.29135 GHz | -52.13 dBm | -12.13 dB |
| 2.328 GHz | 3.000 GHz | 1.000 MHz | 2.32951 GHz | -53.98 dBm | -13.98 dB |
| 3.000 GHz | 7.000 GHz | 1.000 MHz | 6.99725 GHz | -48.73 dBm | -8.73 dB |
| 7.000 GHz | 10.000 GHz | 1.000 MHz | 8.90943 GHz | -55.89 dBm | -15.89 dB |
| 10.000 GHz | 14.000 GHz | 1.000 MHz | 13.34733 GHz | -54.17 dBm | -14.17 dB |
| 14.000 GHz | 18.000 GHz | 1.000 MHz | 17.10886 GHz | -51.83 dBm | -11.83 dB |
| 18.000 GHz | 24.000 GHz | 1.000 MHz | 18.57470 GHz | -52.82 dBm | -12.82 dB |

Date: 27.JUL.2016 19:00:33

### Middle Channel / 16QAM




Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 30.000 MHz | 1.000 GHz | 1.000 MHz | 860.14743 MHz | -56.95 dBm | -16.95 dB |
| 1.000 GHz | 2.292 GHz | 1.000 MHz | 2.29135 GHz | -51.84 dBm | -11.84 dB |
| 2.328 GHz | 3.000 GHz | 1.000 MHz | 2.32951 GHz | -53.78 dBm | -13.78 dB |
| 3.000 GHz | 7.000 GHz | 1.000 MHz | 6.99125 GHz | -48.62 dBm | -8.62 dB |
| 7.000 GHz | 10.000 GHz | 1.000 MHz | 7.63364 GHz | -56.00 dBm | -16.00 dB |
| 10.000 GHz | 14.000 GHz | 1.000 MHz | 13.34983 GHz | -53.81 dBm | -13.81 dB |
| 14.000 GHz | 18.000 GHz | 1.000 MHz | 17.10686 GHz | -51.94 dBm | -11.94 dB |
| 18.000 GHz | 24.000 GHz | 1.000 MHz | 18.57470 GHz | -52.73 dBm | -12.73 dB |

Date: 27.JUL.2016 19:01:31

# Frequency Stability

| Test Conditions | | LTE Band 30 (QPSK) / Middle Channel | Limit |
|---|---|---|---|
| Temperature (°C) | Voltage (Volt) | BW 10MHz | Note 2. |
| | | Deviation (ppm) | Result |
| 50 | Normal Voltage | 0.0000 | PASS |
| 40 | Normal Voltage | 0.0090 | |
| 30 | Normal Voltage | 0.0090 | |
| 20(Ref.) | Normal Voltage | 0.0000 | |
| 10 | Normal Voltage | 0.0088 | |
| 0 | Normal Voltage | 0.0086 | |
| -10 | Normal Voltage | 0.0006 | |
| -20 | Normal Voltage | 0.0086 | |
| -30 | Normal Voltage | 0.0001 | |
| 20 | Maximum Voltage | 0.0006 | |
| 20 | Normal Voltage | 0.0000 | |
| 20 | Battery End Point | 0.0091 | |

**Note:**

1. Normal Voltage =3.85 V.；Battery End Point (BEP) =3.6 V.；Maximum Voltage =4.35 V.
2. Note: The frequency fundamental emissions stay within the authorized frequency block.

# Appendix B. Test Results of Radiated Test

## EIRP

**<Bottom Ant.>**

| LTE Band 30 / 5MHz (Average) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Mode | RB | | Horizontal | | Vertical | |
| | | Size | Offset | EIRP(dBm) | EIRP(W) | EIRP(dBm) | EIRP(W) |
| Lowest | QPSK | 1 | 0 | 14.71 | 0.0296 | 15.84 | 0.0384 |
| Middle | | 1 | 0 | 14.76 | 0.0299 | 15.75 | 0.0376 |
| Highest | | 1 | 0 | 14.83 | 0.0304 | 15.91 | 0.0390 |
| Lowest | 16QAM | 1 | 0 | 14.03 | 0.0253 | 15.09 | 0.0323 |
| Middle | | 1 | 0 | 14.18 | 0.0262 | 15.24 | 0.0334 |
| Highest | | 1 | 0 | 13.99 | 0.0251 | 15.39 | 0.0346 |
| Limit | EIRP < 0.25W | | | Result | | PASS | |

| LTE Band 30 / 10MHz (Average) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Mode | RB | | Horizontal | | Vertical | |
| | | Size | Offset | EIRP(dBm) | EIRP(W) | EIRP(dBm) | EIRP(W) |
| Lowest | QPSK | - | - | - | - | - | - |
| Middle | | 1 | 0 | 14.78 | 0.0301 | 16.05 | 0.0403 |
| Highest | | - | - | - | - | - | - |
| Lowest | 16QAM | - | - | - | - | - | - |
| Middle | | 1 | 0 | 14.18 | 0.0262 | 15.46 | 0.0352 |
| Highest | | - | - | - | - | - | - |
| Limit | EIRP < 0.25W | | | Result | | PASS | |

**<Bottom Antenna with SIM 1>**

| LTE Band 30 / 5MHz / QPSK / RB Size 1 Offset 0 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Channel | Frequency ( MHz ) | EIRP ( dBm ) | Limit ( dBm ) | Over Limit ( dB ) | SPA Reading (dBm) | S.G. Power ( dBm ) | TX Cable loss ( dB ) | TX Antenna Gain (dBi) | Polarization (H/V) |
| Lowest | 6918 | -52.83 | -40 | -12.83 | -76.3 | -60.91 | 2.62 | 10.70 | H |
| | 9222 | -47.02 | -40 | -7.02 | -75.8 | -57.1 | 2.53 | 12.61 | H |
| | 11526 | -47.07 | -40 | -7.07 | -77.55 | -56.69 | 2.68 | 12.30 | H |
| | 6918 | -47.73 | -40 | -7.73 | -70.92 | -55.81 | 2.62 | 10.70 | V |
| | 9222 | -48.41 | -40 | -8.41 | -74.73 | -58.49 | 2.53 | 12.61 | V |
| | 11526 | -47.99 | -40 | -7.99 | -77.49 | -57.61 | 2.68 | 12.30 | V |
| Middle | 6924 | -52.62 | -40 | -12.62 | -76.03 | -60.71 | 2.62 | 10.71 | H |
| | 9234 | -47.86 | -40 | -7.86 | -78.44 | -57.93 | 2.53 | 12.61 | H |
| | 11540 | -47.90 | -40 | -7.90 | -78.44 | -57.52 | 2.68 | 12.30 | H |
| | 6924 | -49.84 | -40 | -9.84 | -73 | -57.93 | 2.62 | 10.71 | V |
| | 9234 | -50.24 | -40 | -10.24 | -76.58 | -60.31 | 2.53 | 12.61 | V |
| | 11540 | -48.63 | -40 | -8.63 | -78.12 | -58.25 | 2.68 | 12.30 | V |
| Highest | 6930 | -53.05 | -40 | -13.05 | -76.54 | -61.15 | 2.61 | 10.72 | H |
| | 9240 | -47.75 | -40 | -7.75 | -76.58 | -57.82 | 2.53 | 12.60 | H |
| | 11550 | -47.47 | -40 | -7.47 | -78.1 | -57.09 | 2.68 | 12.30 | H |
| | 6930 | -49.26 | -40 | -9.26 | -72.51 | -57.36 | 2.61 | 10.72 | V |
| | 9240 | -50.14 | -40 | -10.14 | -76.32 | -60.21 | 2.53 | 12.60 | V |
| | 11550 | -48.06 | -40 | -8.06 | -77.6 | -57.68 | 2.68 | 12.30 | V |

**Remark:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

| LTE Band 30 / 10MHz / QPSK / RB Size 1 Offset 0 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Channel | Frequency ( MHz ) | EIRP ( dBm ) | Limit ( dBm ) | Over Limit ( dB ) | SPA Reading (dBm) | S.G. Power ( dBm ) | TX Cable loss ( dB ) | TX Antenna Gain (dBi) | Polarization (H/V) |
| Middle | 6918 | -53.07 | -40 | -13.07 | -76.5 | -61.15 | 2.62 | 10.70 | H |
| | 9222 | -47.15 | -40 | -7.15 | -75.96 | -57.23 | 2.53 | 12.61 | H |
| | 11526 | -48.24 | -40 | -8.24 | -78.73 | -57.86 | 2.68 | 12.30 | H |
| | 6918 | -48.28 | -40 | -8.28 | -71.52 | -56.36 | 2.62 | 10.70 | V |
| | 9222 | -49.33 | -40 | -9.33 | -75.67 | -59.41 | 2.53 | 12.61 | V |
| | 11526 | -48.50 | -40 | -8.50 | -77.96 | -58.12 | 2.68 | 12.30 | V |

**Remark:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

**<Bottom Antenna with SIM 2>**

| LTE Band 30 / 5MHz / QPSK / RB Size 1 Offset 0 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Channel | Frequency ( MHz ) | EIRP ( dBm ) | Limit ( dBm ) | Over Limit ( dB ) | SPA Reading (dBm) | S.G. Power ( dBm ) | TX Cable loss ( dB ) | TX Antenna Gain (dBi) | Polarization (H/V) |
| Lowest | 4610 | -60.29 | -40 | -20.29 | -77.66 | -67.1 | 2.11 | 8.92 | H |
| | 6918 | -52.42 | -40 | -12.42 | -75.68 | -60.5 | 2.62 | 10.70 | H |
| | 9222 | -47.12 | -40 | -7.12 | -73.51 | -57.2 | 2.53 | 12.61 | H |
| | 4610 | -61.29 | -40 | -21.29 | -77.4 | -68.1 | 2.11 | 8.92 | V |
| | 6918 | -49.52 | -40 | -9.52 | -72.2 | -57.6 | 2.62 | 10.70 | V |
| | 9222 | -50.12 | -40 | -10.12 | -76.3 | -60.2 | 2.53 | 12.61 | V |
| Middle | 4615 | -60.69 | -40 | -20.69 | -77.54 | -67.5 | 2.12 | 8.93 | H |
| | 6924 | -52.11 | -40 | -12.11 | -75.23 | -60.2 | 2.62 | 10.71 | H |
| | 9234 | -47.63 | -40 | -7.63 | -75.4 | -57.7 | 2.53 | 12.61 | H |
| | 4615 | -61.69 | -40 | -21.69 | -77.46 | -68.5 | 2.12 | 8.93 | V |
| | 6924 | -48.51 | -40 | -8.51 | -71.49 | -56.6 | 2.62 | 10.71 | V |
| | 9234 | -50.83 | -40 | -10.83 | -76.98 | -60.9 | 2.53 | 12.61 | V |
| Highest | 4620 | -59.38 | -40 | -19.38 | -76.77 | -66.2 | 2.12 | 8.94 | H |
| | 6930 | -52.70 | -40 | -12.70 | -75.89 | -60.8 | 2.61 | 10.72 | H |
| | 9240 | -47.43 | -40 | -7.43 | -75.27 | -57.5 | 2.53 | 12.60 | H |
| | 4620 | -60.88 | -40 | -20.88 | -76.95 | -67.7 | 2.12 | 8.94 | V |
| | 6930 | -49.40 | -40 | -9.40 | -72.32 | -57.5 | 2.61 | 10.72 | V |
| | 9240 | -50.63 | -40 | -10.63 | -76.73 | -60.7 | 2.53 | 12.60 | V |

**Remark:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.