**CTC Laboratories, Inc.**

1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China
Tel: +86-755-27521059 Fax: +86-755-27521011 Http://www.sz-ctc.org.cn

# TEST REPORT

| | |
|---|---|
| **Report No. ·····:** | **CTC20210767E03** |
| **FCC ID……..:** | **2AZPZ-T25** |
| **IC……..:** | **27212-T25** |
| **Applicant·····:** | **YAHAM OPTOELECTRONICS CO., LTD** |
| Address·····: | Bldg. A&D, Yongwei Industrial Park, #118 Yongfu Road, Fuhai Str., Bao'an Dist. Shenzhen China |
| Manufacturer·····: | YAHAM OPTOELECTRONICS CO., LTD |
| Address·····: | Bldg. A&D, Yongwei Industrial Park, #118 Yongfu Road, Fuhai Str., Bao'an Dist. Shenzhen China |
| **Product Name·····:** | **Taxi Roof LED Display** |
| Trade Mark·····: | / |
| Model/Type reference·····: | YHT-TAXI-T2.5 |
| Listed Model(s) ·····: | YHT-TAXI-T2.96, YHT-TAXI-T3.33 |
| **Standard·····:** | **FCC CFR47 PART 24E, 27**<br>**RSS-130 issue 2, RSS-133 issue 6, RSS-139 Issue 3** |
| Date of receipt of test sample…: | Apr. 21, 2021 |
| Date of testing……..: | Apr. 21, 2021 to May 24, 2021 |
| Date of issue……....: | May 24, 2021 |
| **Result……:** | **PASS** |

| | | |
|---|---|---|
| Compiled by:<br>(Printed name+signature) | Jim Jiang | Jim Jiang |
| Supervised by:<br>(Printed name+signature) | Miller Ma | Miller Ma |
| Approved by:<br>(Printed name+signature) | Walter Chen | Walter Chen |

| | |
|---|---|
| **Testing Laboratory Name……:** | **CTC Laboratories, Inc.** |
| Address……: | 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China |

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FCC Rules Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS
FCC Rules Part 24: PUBLIC MOBILE SERVICES
FCC Rules Part 27: MISCELLANEOUS WIRDELESS COMMUNICATIONS SERVICES
ANSI C63.26: 2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
KDB 971168 D01 Power Meas License Digital Systems v03: MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS
RSS-Gen Issue 5: General Requirements for Compliance of Radio Apparatus
RSS-130 Issue 2: Equipment Operating in the Frequency Bands 617-652 MHz, 663-698 MHz, 698-756 MHz and 777-787 MHz
RSS-133 Issue 6: 2 GHz Personal Communications Services
RSS-139 Issue 3: Advanced Wireless Services Equipment Operating in the Bands 1710-1780 MHz and 2110-2180 MHz

## 1.2. Report Version

| Revised No. | Date of issue | Description |
|---|---|---|
| 01 | May 24, 2021 | Original |
| | | |
| | | |
| | | |
| | | |

## 1.3. Test Description

| Test Item | Section in CFR 47 | RSS Rule | Result | Test Engineer |
|---|---|---|---|---|
| Conducted Output Power | Part 2.1046<br>Part 24.232(c)<br>Part 27.50 | RSS-130(4.4)<br>RSS-133(6.4)<br>RSS-139(6.4) | Pass | Rod Luo |
| Peak-to-Average Ratio | Part 24.232<br>Part 27.50 | RSS-130(4.4)<br>RSS-133(6.4)<br>RSS-139(6.4) | Pass | Rod Luo |
| 99% Occupied Bandwidth & 26 dB Bandwidth | Part 2.1049<br>Part 24.238(b)<br>Part 27.53 | RSS-GEN(6.6)<br>RSS-130(3.1)<br>RSS-133(6.5)<br>RSS-139(6.5) | Pass | Rod Luo |
| Band Edge | Part 2.1051<br>Part 24.238<br>Part 27.53 | RSS-130(4.6)<br>RSS-133(6.5)<br>RSS-139(6.5) | Pass | Rod Luo |
| Conducted Spurious Emissions | Part 2.1051<br>Part 24.238<br>Part 27.53 | RSS-130(4.6)<br>RSS-133(6.5)<br>RSS-139(6.5) | Pass | Rod Luo |
| Frequency stability VS Temperature | Part 2.1055(a)(1)(b)<br>Part 24.235<br>Part 27.54 | RSS-GEN(6.11)<br>RSS-130(4.3)<br>RSS-133(6.3)<br>RSS-199(4.3) | Pass | Rod Luo |
| Frequency stability VS Voltage | Part 2.1055(d)(1)(2)<br>Part 24.235<br>Part 27.54 | RSS-GEN(6.11)<br>RSS-133(6.3)<br>RSS-139(6.3) | Pass | Rod Luo |
| ERP and EIRP | Part 24.232(b)<br>Part 27.50 | RSS-130(4.4)<br>RSS-133(6.4)<br>RSS-139(6.4) | Pass | Rod Luo |
| Radiated Spurious Emissions | Part 2.1053<br>Part 24.238<br>Part 27.53 | RSS-130(4.6)<br>RSS-133(6.5)<br>RSS-139(6.5) | Pass | Rod Luo |
| Receiver Spurious Emissions | / | RSS-GEN(7.1.3) | Pass | Rod Luo |

Note: The measurement uncertainty is not included in the test result.

## 1.4. Test Facility

**Address of the report laboratory**

**CTC Laboratories, Inc.**

Add: 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

**Laboratory accreditation**

The test facility is recognized, certified, or accredited by the following organizations:

**CNAS-Lab Code: L5365**

CTC Laboratories, Inc. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation. Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

**A2LA-Lab Cert. No.: 4340.01**

CTC Laboratories, Inc. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

**Industry Canada (Registration No.: 9783A, CAB Identifier: CN0029)**

CTC Laboratories, Inc. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9783A on Jan, 2016.

**FCC (Registration No.: 951311, Designation Number CN1208)**

CTC Laboratories, Inc. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 951311, Aug. 26, 2017.

## 1.5. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the CTC Laboratories, Inc. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTC Laboratories, Inc. is reported:

| Test Items | Measurement Uncertainty | Notes |
|---|---|---|
| Frequency stability | 25 Hz | (1) |
| Transmitter power conducted | 0.57 dB | (1) |
| Transmitter power Radiated | 2.20 dB | (1) |
| Conducted spurious emission 9KHz-12.75 GHz | 1.60 dB | (1) |
| Conducted Emission 9KHz-30MHz | 3.39 dB | (1) |
| Radiated Emission 30~1000MHz | 4.24 dB | (1) |
| Radiated Emission 1~18GHz | 5.16 dB | (1) |
| Radiated Emission 18-40GHz | 5.54 dB | (1) |
| Occupied Bandwidth | --------- | (1) |
| Emission Mask | --------- | (1) |
| Modulation Characteristic | --------- | (1) |
| Transmitter Frequency Behavior | --------- | (1) |

Note: (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

## 1.6. Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

| | |
|---|---|
| Normal Temperature: | 21°C~27°C |
| Relative Humidity: | 40%~60% |
| Air Pressure: | 101kPa |

# 2. GENERAL INFORMATION

## 2.1. Client Information

| | |
|---|---|
| Applicant: | YAHAM OPTOELECTRONICS CO., LTD |
| Address: | Bldg. A&D, Yongwei Industrial Park, #118 Yongfu Road, Fuhai Str., Bao'an Dist. Shenzhen China |
| Manufacturer: | YAHAM OPTOELECTRONICS CO., LTD |
| Address: | Bldg. A&D, Yongwei Industrial Park, #118 Yongfu Road, Fuhai Str., Bao'an Dist. Shenzhen China |

## 2.2. General Description of EUT

| | |
|---|---|
| Product Name: | Taxi Roof LED Display |
| Trade Mark: | / |
| Model/Type reference: | YHT-TAXI-T2.5 |
| Listed Model(s): | YHT-TAXI-T2.96, YHT-TAXI-T3.33 |
| Model Difference: | All models are identical with each other except for LED spacing and LED numbers. Unless otherwise specified, all tests were performed on model YHT-TAXI-T2.5 to represent other models. |
| Power supply: | DC9~36V 34A~8A |
| Hardware version: | V1.0 |
| Software version: | V1.0 |
| **LTE** | |
| Operation Band: | Band 2: UL: 1850.7MHz~1909.3MHz, DL: 1930.7MHz~1989.3MHz<br>Band 4: UL: 1710.7MHz~1754.3MHz, DL: 2110.7MHz~2154.3MHz<br>Band 12: UL: 699.7MHz~715.3MHz, DL: 729.7MHz~745.3MHz |
| Modulation Type: | QPSK, 16QAM |
| Antenna type: | Patch Antenna |
| Antenna Gain: | FDD Band 2: 2.4dBi<br>FDD Band 4: 2.5dBi<br>FDD Band 12: 3.7dBi |

## 2.3. Description of Test Modes and Test Frequency

The EUT has been tested under typical operating condition. The CMW500 used to control the EUT staying in continuous transmitting and receiving mode for testing.

Test Frequency:

| Band 2 | | | |
|---|---|---|---|
| **Test channel** | **Bandwidth(MHz)** | **$N_{UL}$** | **Frequency of Uplink (MHz)** |
| Low Range | 1.4 | 18607 | 1850.70 |
| | 3 | 18615 | 1851.50 |
| | 5 | 18625 | 1852.50 |
| | 10 | 18650 | 1855.00 |
| | 15 | 18675 | 1857.50 |
| | 20 | 18700 | 1860.00 |
| Mid Range | 1.4/3/5/10/15/20 | 18900 | 1880.00 |
| High Range | 1.4 | 19193 | 1909.30 |
| | 3 | 19185 | 1908.50 |
| | 5 | 19175 | 1907.50 |
| | 10 | 19150 | 1905.00 |
| | 15 | 19125 | 1902.50 |
| | 20 | 19100 | 1900.00 |

| Band 4 | | | |
|---|---|---|---|
| **Test channel** | **Bandwidth(MHz)** | **$N_{UL}$** | **Frequency of Uplink (MHz)** |
| Low Range | 1.4 | 19957 | 1710.70 |
| | 3 | 19965 | 1711.50 |
| | 5 | 19975 | 1712.50 |
| | 10 | 20000 | 1715.00 |
| | 15 | 20025 | 1717.50 |
| | 20 | 20050 | 1720.00 |
| Mid Range | 1.4/3/5/10/15/20 | 20175 | 1732.50 |
| High Range | 1.4 | 20393 | 1754.30 |
| | 3 | 20385 | 1753.50 |
| | 5 | 20375 | 1712.50 |
| | 10 | 20350 | 1750.00 |
| | 15 | 20325 | 1747.50 |
| | 20 | 20300 | 1745.00 |

| Band 12 | | | |
|---|---|---|---|
| **Test channel** | **Bandwidth(MHz)** | **$N_{UL}$** | **Frequency of Uplink (MHz)** |
| Low Range | 1.4 | 23017 | 699.70 |
| | 3 | 23025 | 700.50 |
| | 5 | 23035 | 701.50 |
| | 10 | 23060 | 704.00 |
| Mid Range | 1.4/3/5/10 | 23095 | 707.50 |
| High Range | 1.4 | 23173 | 715.30 |
| | 3 | 23165 | 714.50 |
| | 5 | 23155 | 713.50 |
| | 10 | 23130 | 711.00 |

## 2.4. Measurement Instruments List

| Output Power (Radiated) & Radiated Spurious Emission | | | | | |
|---|---|---|---|---|---|
| Item | Test Equipment | Manufacturer | Model No. | Serial No. | Calibrated until |
| 1 | EMI Test Receiver | R&S | ESCI | 100967 | Dec. 25, 2021 |
| 2 | High pass filter | Compliance Direction systems | BSU-6 | 34202 | Dec. 25, 2021 |
| 3 | Log-Bicon Antenna | Schwarzbeck | CBL6141A | 4180 | Dec. 25, 2021 |
| 4 | Log-Bicon Antenna | Schwarzbeck | CBL6141A | 4181 | Dec. 25, 2021 |
| 5 | Spectrum Analyzer | HP | 8563E | 02052 | Dec. 25, 2021 |
| 6 | Horn Antenna | Schwarzbeck | BBHA 9120D | 648 | Dec. 25, 2021 |
| 7 | Horn Antenna | Schwarzbeck | BBHA 9120D | 649 | Dec. 25, 2021 |
| 8 | Ultra-Broadband Antenna | Schwarzbeck | BBHA9170 | 25841 | Dec. 25, 2021 |
| 9 | Ultra-Broadband Antenna | Schwarzbeck | BBHA9170 | 25842 | Dec. 25, 2021 |
| 10 | Pre-Amplifier | HP | 8447D | 1937A03050 | Dec. 25, 2021 |
| 11 | Pre-Amplifier | EMCI | EMC051835 | 980075 | Dec. 25, 2021 |
| 12 | Splitter | Mini-Circuit | ZAPD-4 | 400059 | Dec. 25, 2021 |
| 13 | Signal Generator | Agilent | N5182A | 1019356 | Dec. 25, 2021 |
| 14 | Wideband Radio Communication Tester | Rohde & Schwarz | CMW500 | 116410 | Dec. 25, 2021 |
| 15 | Antenna Mast | UC | UC3000 | N/A | N/A |
| 16 | Antenna mast | MATURO | TAM-4.0-P | N/A | N/A |
| 17 | Turn Table | UC | UC3000 | N/A | N/A |
| 18 | Cable Below 1GHz | Schwarzbeck | AK9515E | 33155 | Dec. 25, 2021 |
| 19 | Cable Above 1GHz | Hubersuhner | SUCOFLEX102 | DA1580 | Dec. 25, 2021 |

| Output Power(Conducted) & Occupied Bandwidth & Emission Bandwidth & Band Edge Compliance & Conducted Spurious Emission | | | | | |
|---|---|---|---|---|---|
| Item | Test Equipment | Manufacturer | Model No. | Serial No. | Calibrated until |
| 1 | UNIVERSAL RADIO COMMUNICATION | Rohde & Schwarz | CMU200 | 114694 | Dec. 25, 2021 |
| 2 | Spectrum Analyzer | Rohde & Schwarz | FSU | 100105 | Dec. 25, 2021 |
| 3 | Spectrum Analyzer | Rohde & Schwarz | FUV40-N | 101331 | Mar. 15, 2022 |
| 4 | Splitter | Mini-Circuit | ZAPD-4 | 400059 | Dec. 25, 2021 |

| Frequency Stability | | | | | |
|---|---|---|---|---|---|
| Item | Test Equipment | Manufacturer | Model No. | Serial No. | Calibrated until |
| 1 | UNIVERSAL RADIO COMMUNICATION | Rohde & Schwarz | CMU200 | 114694 | Dec. 25, 2021 |
| 2 | Spectrum Analyzer | Rohde & Schwarz | FSU | 100105 | Dec. 25, 2021 |
| 3 | Spectrum Analyzer | Rohde & Schwarz | FUV40-N | 101331 | Mar. 15, 2022 |
| 4 | Splitter | Mini-Circuit | ZAPD-4 | 400059 | Dec. 25, 2021 |
| 5 | Climate Chamber | ESPEC | EL-10KA | 05107008 | Dec. 25, 2021 |

Note: 1. The Cal. Interval was one year.
2. The cable loss has calculated in test result which connection between each test instruments.

# 3. TEST ITEM AND RESULTS

## 3.1. Conducted Output Power

**LIMIT**

Conducted Output Power: N/A

**TEST CONFIGURATION**

- For Conducted output Power


*Note: Measurement setup for testing on Antenna connector*

**TEST PROCEDURE**

- For Conducted output Power

1. The transmitter output port was connected to base station.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement.
3. Set EUT at maximum power through base station.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure the maximum PK burst power and maximum Avg. burst power.

**TEST RESULT**

Please see the Appendix for every tested Band.

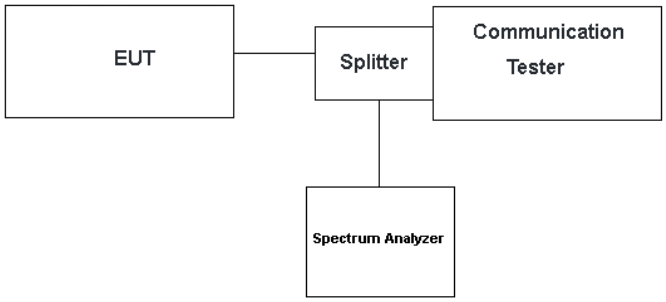
## 3.2. Peak-to-Average Ratio

**LIMIT**

The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13dB.

**TEST CONFIGURATION**

- For Peak-to-Average Ratio




**TEST PROCEDURE**

- For Peak-to-Average Ratio

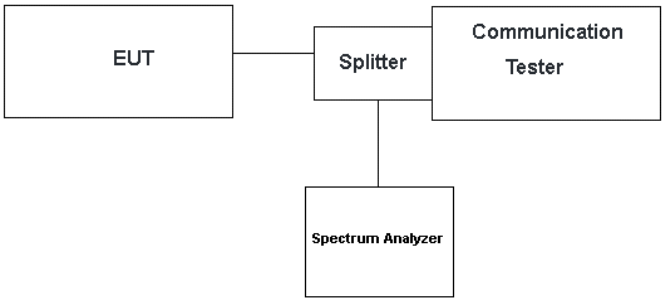
1. The testing follows FCC KDB 971168 v02r02 Section 5.7.1.
2. The EUT was connected to spectrum and communication tester via a splitter.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
6. Record the deviation as Peak to Average Ratio.

**TEST RESULT**

Please see the Appendix for every tested Band.

## 3.3. Occupy Bandwidth

**TEST CONFIGURATION**




**TEST PROCEDURE**

1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer.
2. RBW was set to about 1% of emission BW, VBW≥3 times RBW.
3. -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

**TEST RESULT**

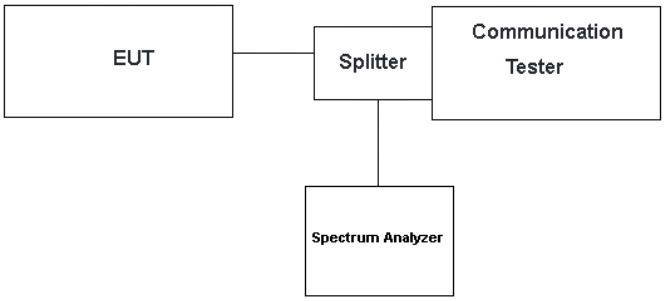
Please see the Appendix for every tested Band.

## 3.4. Out of Band Emission at Antenna Terminal

**LIMIT**

§24.238, §27.53 (c), (g), (h), §90.691, §90.543 (Band 14)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.
§27.53 (a) (Band 30, 40)
The minimum permissible attenuation level of any spurious emissions is 70 + 10 log (P) dB where transmitting power (P) in Watts.
§27.53 (m) (Band 7, 41)
The minimum permissible attenuation level of any spurious emissions is 55 + 10 log (P) dB where transmitting power (P) in Watts.
§96.41
(e) 3.5 GHz Emissions and Interference Limits—
(2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.

**TEST CONFIGURATION**




**TEST PROCEDURE**

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set at 1MHz; sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.
3. For the out of band: Set the RBW = 1MHz VBW⩾3 times RBW, Start=30MHz, Stop= 10th harmonic.

**TEST RESULT**

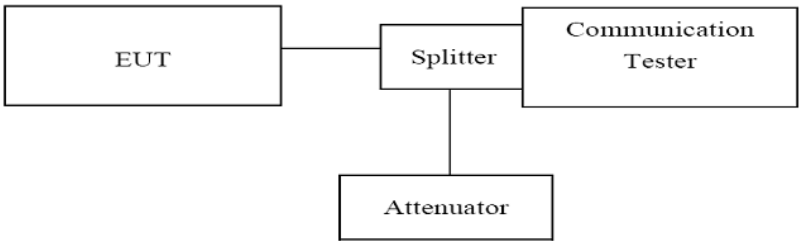
Please see the Appendix for every tested Band.

## 3.5. Receiver Spurious Emissions at Antenna Terminal

**LIMIT**

RSS-GEN7.1.3, Receiver-spurious emissions at any discrete frequency shall not exceed 2 nW in the band 30-1000 MHz, nor 5 nW above 1000 MHz.

**TEST CONFIGURATION**




**TEST PROCEDURE**

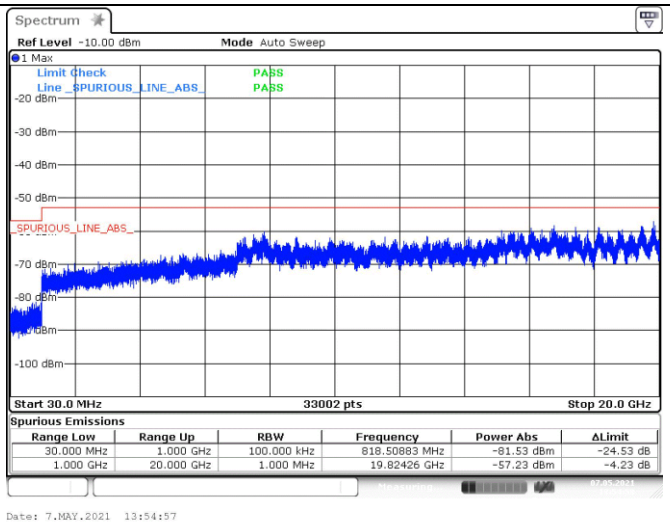
1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.
3. Set the RBW= 100kHz, VBW =300kHz, Below 1GHz
4. Set the RBW= 1MHz, VBW = 3MHz, Above1GHz,
5. Start=30MHz, Stop= 10th harmonic.

**TEST RESULT**

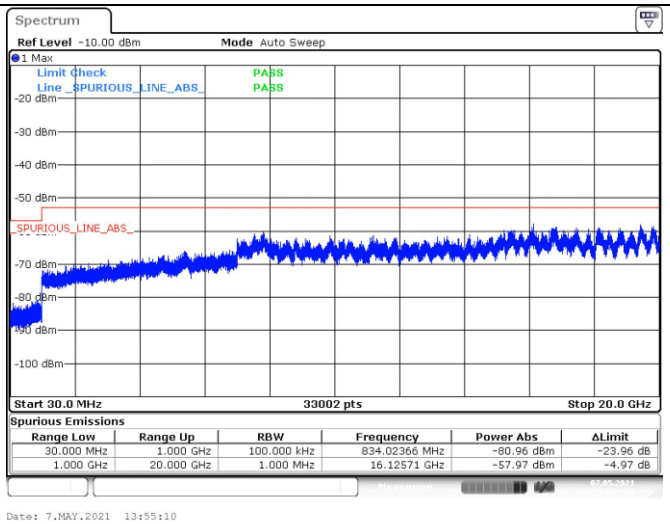
Remark: We test all modulation type, but only show worst case at report.

*Measured data (worst case):*

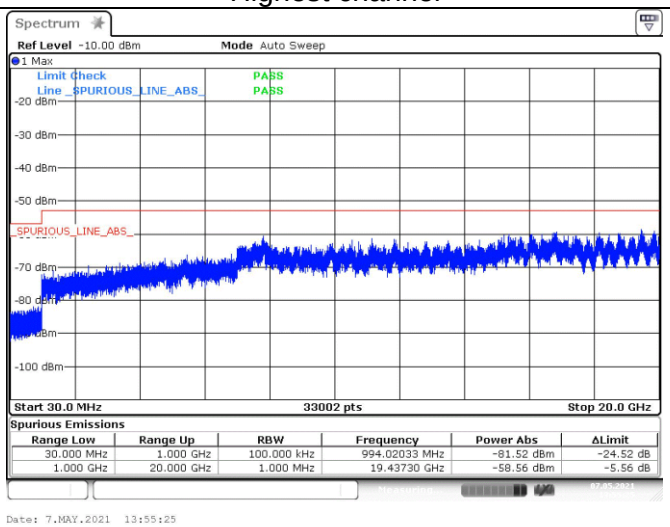
| Band 2 QPSK |
|---|
| 1.4MHz (30MHz~20GHz) |
| Lowest channel |



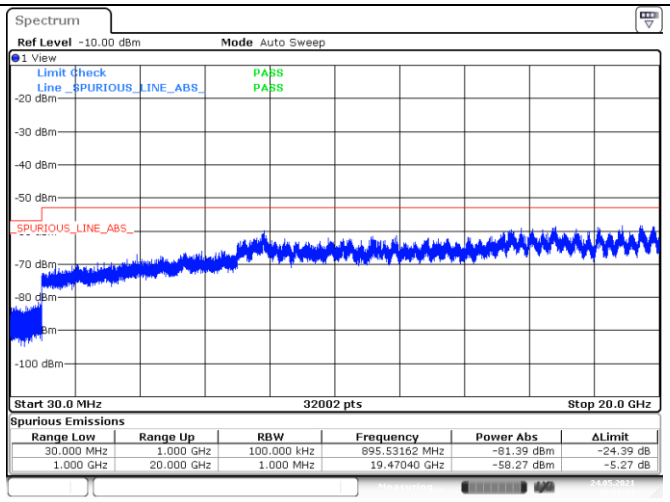

| Middle channel |
|---|



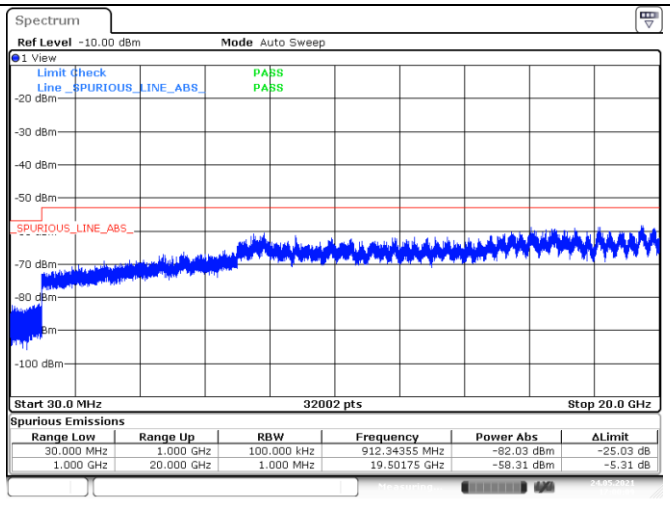

| Highest channel |
|---|



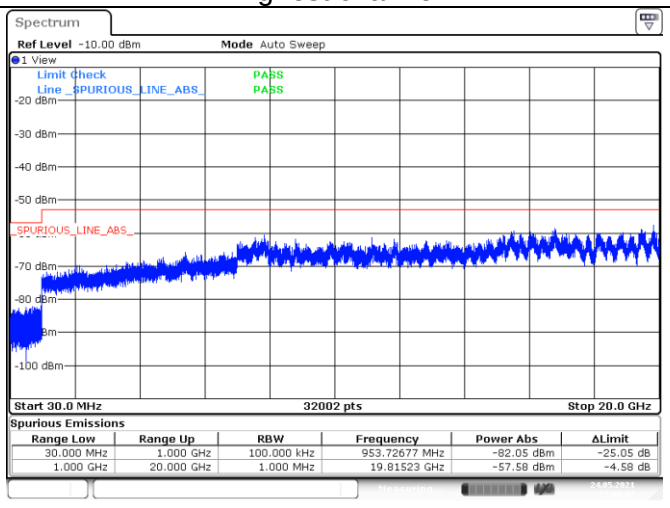
| Band 2 16QAM |
| --- |
| 1.4MHz (30MHz~20GHz) |
| Lowest channel |



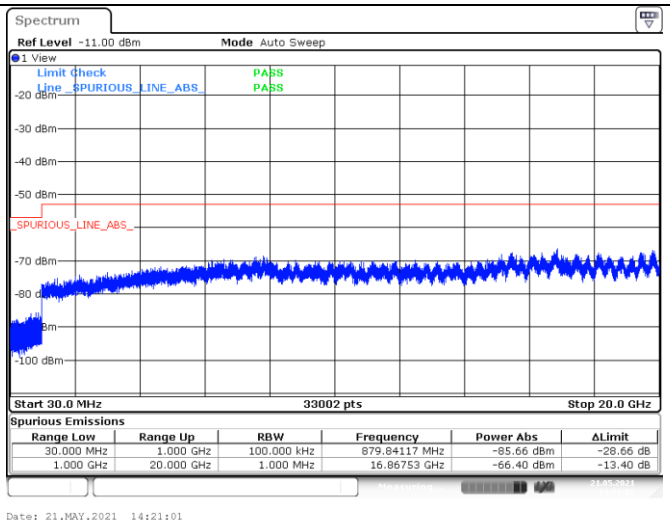

| Middle channel |
| --- |



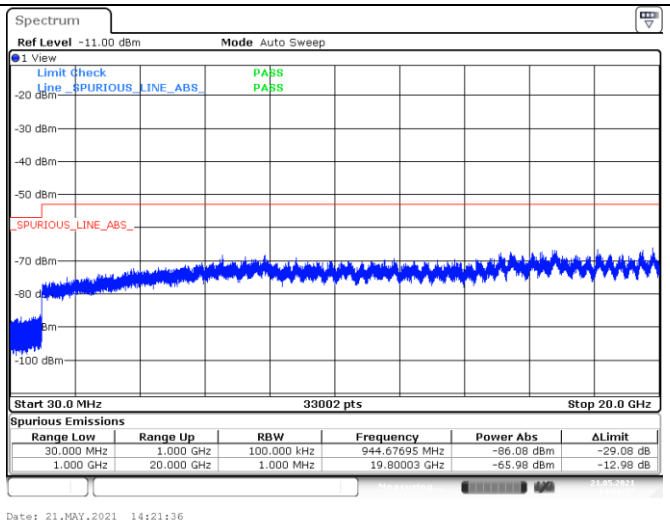

| Highest channel |
| --- |



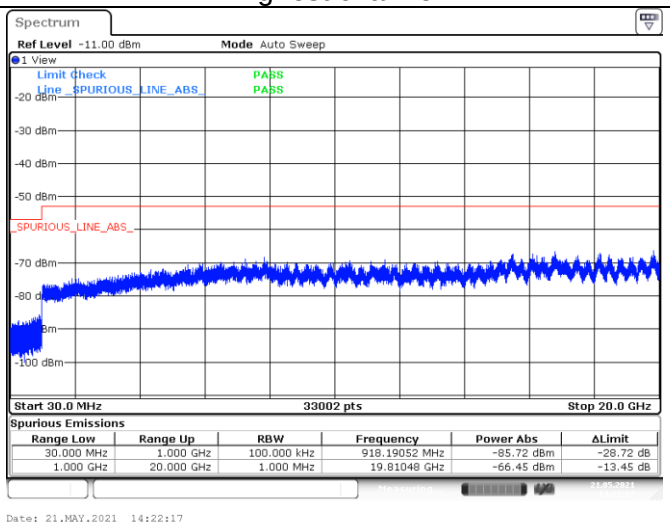
| Band 4 QPSK |
|---|
| 1.4MHz (30MHz~20GHz) |
| Lowest channel |



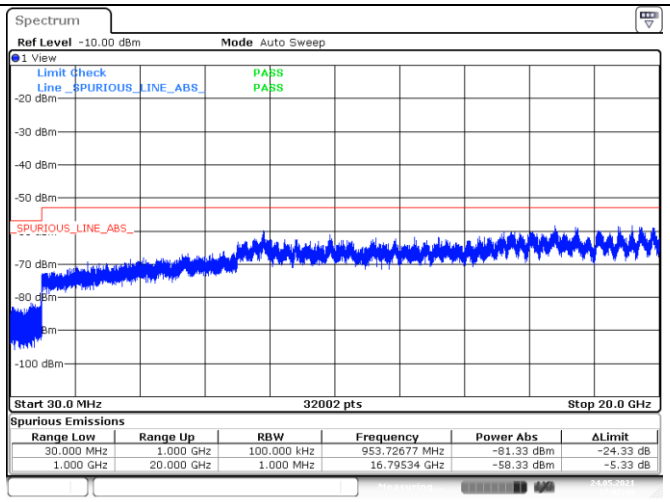

| Middle channel |
|---|



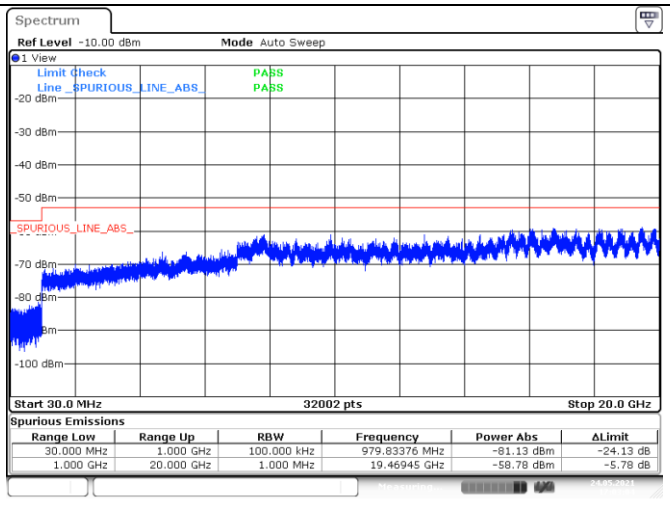

| Highest channel |
|---|



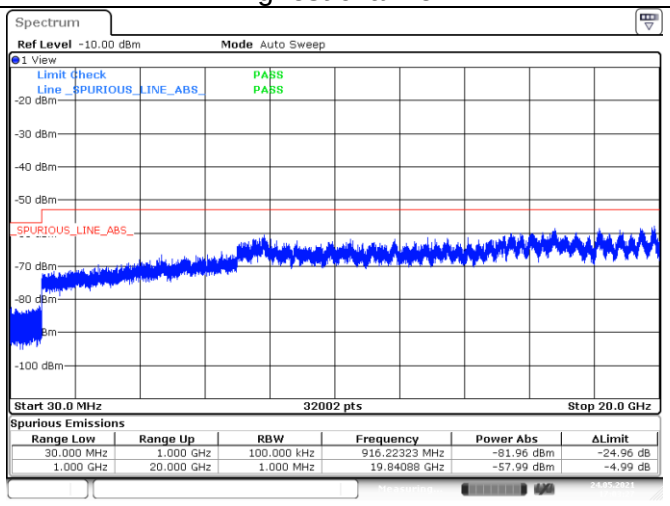
| Band 4 16QAM |
|---|
| 1.4MHz (30MHz~20GHz) |
| Lowest channel |



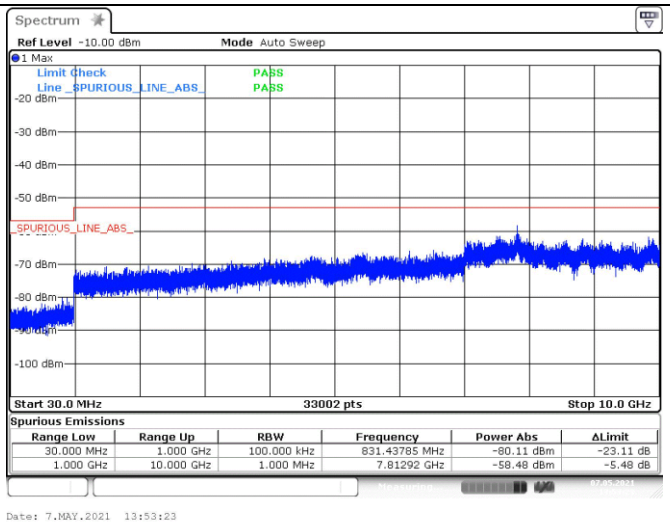

| Middle channel |
|---|



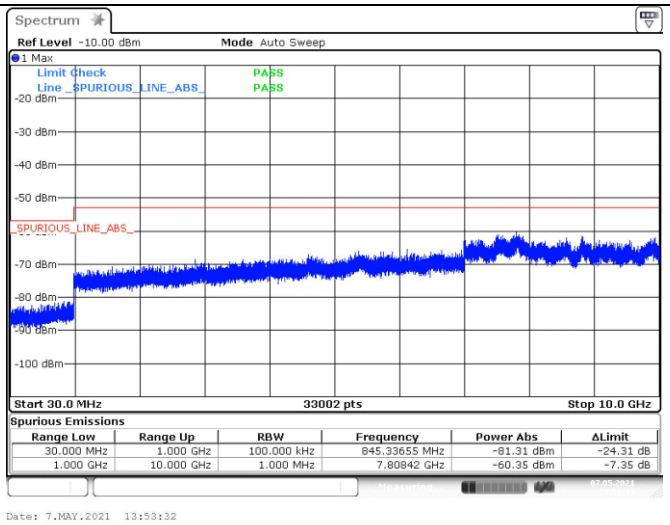

| Highest channel |
|---|



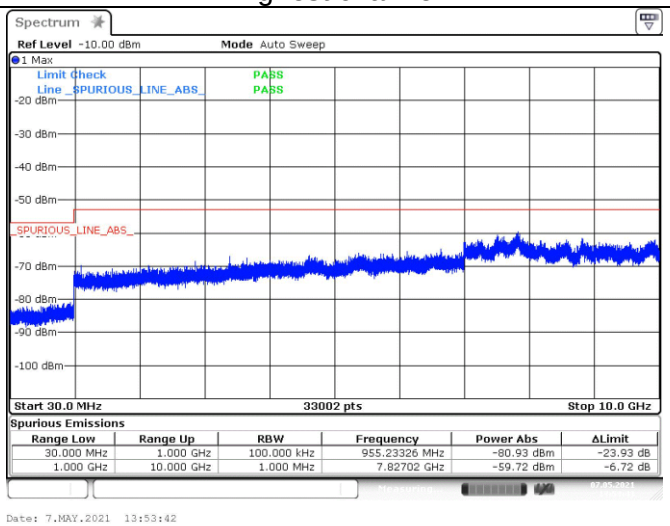
| Band 12 QPSK |
|---|
| 1.4MHz (30MHz~10GHz) |
| Lowest channel |



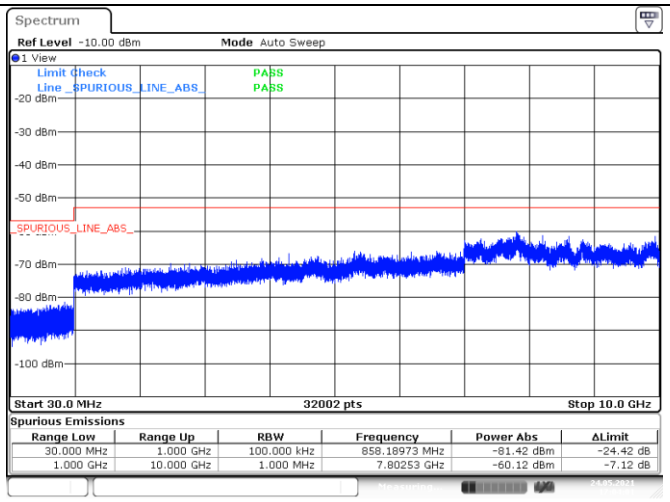

| Middle channel |
|---|



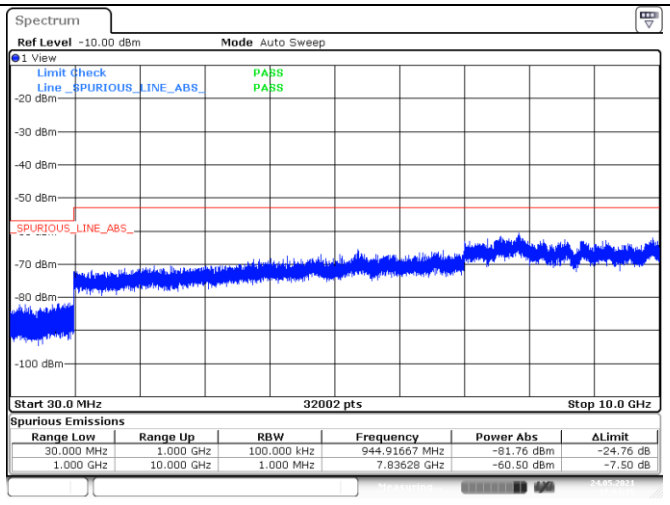

| Highest channel |
|---|



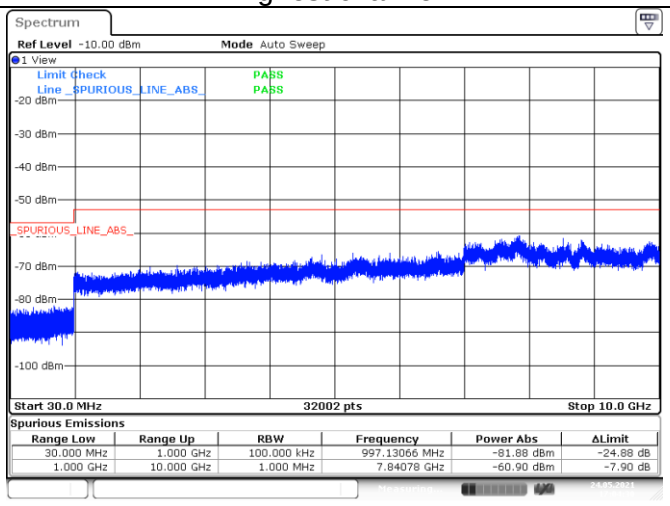
| Band 12 16QAM |
|---|
| 1.4MHz (30MHz~10GHz) |
| Lowest channel |




| Middle channel |
|---|




| Highest channel |
|---|



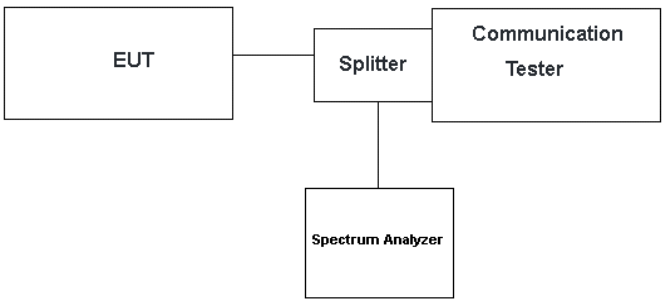
## 3.6. Band Edge Compliance

**LIMIT**

§24.238, §27.53(h)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.
§90.691 Emission mask requirements for EA-based systems.
(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:
(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10
Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.
(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5kHz.
§27.53 (Band 30)
(a) For operations in the 2305-2320 MHz band and the 2345-2360 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P (with averaging performed only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts:
(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.
§27.53 (Band 13)
(c)For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;
(5) Compliance with the provisions of paragraphs (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;
(6) Compliance with the provisions of paragraphs (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.
(f) Emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals. (-70 dBW/MHz = -40dBm/MHz).
§27.53 (Band 12, 17, 71)
(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside

a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.
§27.53 (Band 7, 41)
(m)(4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph
(m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.
FCC: §96.41
(e) 3.5 GHz Emissions and Interference Limits—(1) General protection levels. Except as otherwise specified in paragraph
(e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed −13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any emission shall not exceed −25 dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.
(2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed − 40dBm/MHz.

## TEST CONFIGURATION




## TEST PROCEDURE

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.

2. RBW was set to about 1% of emission BW, VBW≥3 times RBW.

## TEST RESULT

Please see the Appendix for every tested Band.

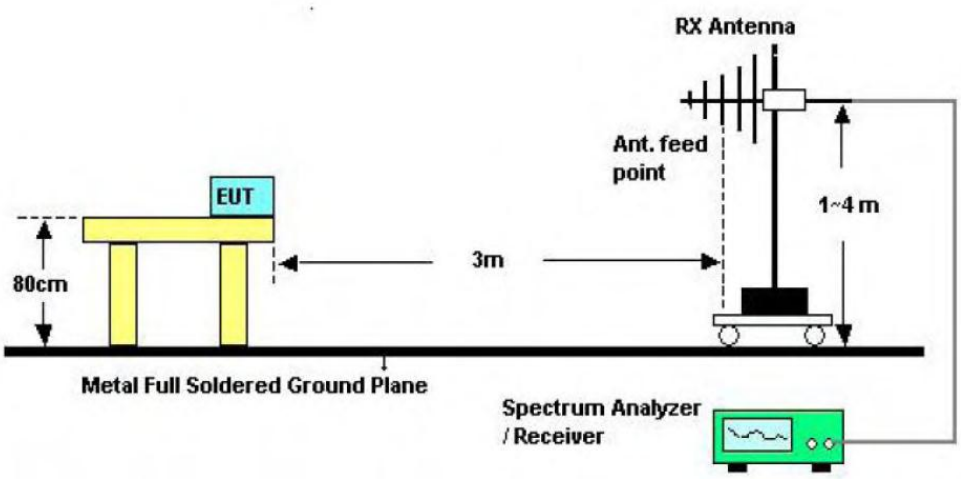
## 3.7. Radiated Power

**LIMIT**

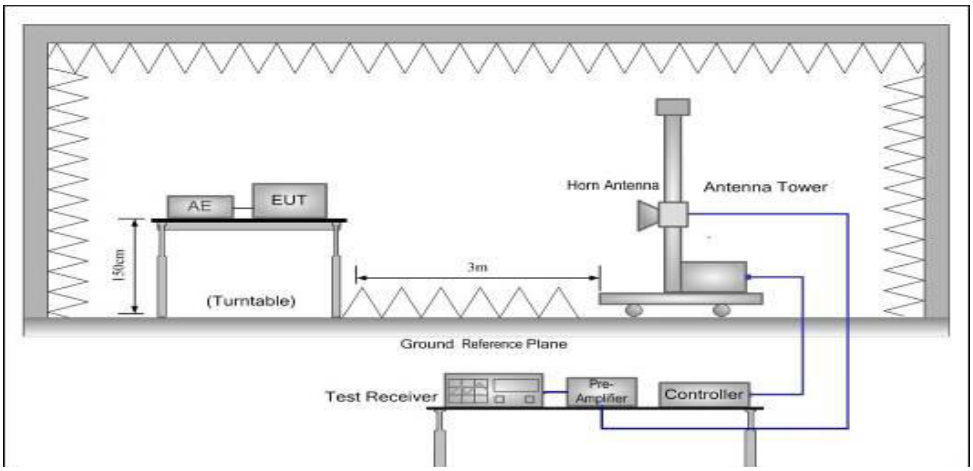
LTE FDD Band 2: 2W(33dBm) EIRP
LTE FDD Band 4: 1W(30dBm) EIRP
LTE FDD Band 12: 3W(34.77dBm) ERP
FCC: §2.1046, §24.232, §27.50, §90.635, §90.541, and §96.41

**TEST CONFIGURATION**

For the actual test configuration, please refer to the related Item – EUT Test Photos.




Below 1GHz




Above 1GHz

**TEST PROCEDURE**

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be

adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, and the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss (Pcl), the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:
   Power(EIRP)=PMea- PAg - Pcl + Ga
   We used N5182A microwave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substitution test; The measurement results are amend as described below:
   Power(EIRP)=PMea- Pcl + Ga
7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
   ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP - 2.15dBi.

**TEST RESULT**

Remark:

1. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “X axis” position was the worst, and test data recorded in this report.
2. We test all modulation types, all bandwidths, and record the worst case at the maximum bandwidth of each modulation.

| LTE Band 2 - 1.4MHz | | | | | |
|---|---|---|---|---|---|
| Modulation | Channel | EIRP (dBm) | | Limit (dBm) | Result |
| | | Vertical | Horizontal | | |
| QPSK | Low | 21.65 | 19.89 | ≤33 | PASS |
| | Mid | 22.20 | 19.20 | | |
| | High | 21.98 | 19.72 | | |
| 16QAM | Low | 22.00 | 19.53 | | |
| | Mid | 21.30 | 19.57 | | |
| | High | 21.65 | 19.86 | | |

| LTE Band 2 - 3MHz | | | | | |
|---|---|---|---|---|---|
| Modulation | Channel | EIRP (dBm) | | Limit (dBm) | Result |
| | | Vertical | Horizontal | | |
| QPSK | Low | 21.86 | 19.32 | ≤33 | PASS |
| | Mid | 21.48 | 19.53 | | |
| | High | 21.25 | 18.97 | | |
| 16QAM | Low | 21.77 | 19.57 | | |
| | Mid | 21.75 | 19.04 | | |
| | High | 21.68 | 19.65 | | |

| LTE Band 2 - 5MHz | | | | | |
|---|---|---|---|---|---|
| Modulation | Channel | EIRP (dBm) | | Limit (dBm) | Result |
| | | Vertical | Horizontal | | |
| QPSK | Low | 21.76 | 19.55 | ≤33 | PASS |
| | Mid | 21.74 | 19.35 | | |
| | High | 22.07 | 19.34 | | |
| 16QAM | Low | 21.35 | 19.67 | | |
| | Mid | 21.93 | 19.57 | | |
| | High | 21.48 | 19.20 | | |

| LTE Band 2 - 10MHz | | | | | |
|---|---|---|---|---|---|
| Modulation | Channel | EIRP (dBm) | | Limit (dBm) | Result |
| | | Vertical | Horizontal | | |
| QPSK | Low | 22.19 | 19.14 | ≤33 | PASS |
| | Mid | 21.56 | 19.07 | | |
| | High | 21.75 | 19.53 | | |
| 16QAM | Low | 22.18 | 19.39 | | |
| | Mid | 21.75 | 19.89 | | |
| | High | 21.59 | 19.21 | | |

| LTE Band 2 - 15MHz | | | | | |
|---|---|---|---|---|---|
| Modulation | Channel | EIRP (dBm) | | Limit (dBm) | Result |
| | | Vertical | Horizontal | | |
| QPSK | Low | 22.20 | 19.56 | ≤33 | PASS |
| | Mid | 21.35 | 19.08 | | |
| | High | 21.42 | 18.94 | | |
| 16QAM | Low | 21.59 | 19.38 | | |
| | Mid | 22.03 | 19.52 | | |
| | High | 21.66 | 19.89 | | |

| LTE Band 2 - 20MHz | | | | | |
|---|---|---|---|---|---|
| Modulation | Channel | EIRP (dBm) | | Limit (dBm) | Result |
| | | Vertical | Horizontal | | |
| QPSK | Low | 21.78 | 19.65 | ≤33 | PASS |
| | Mid | 21.96 | 19.61 | | |
| | High | 22.16 | 18.98 | | |
| 16QAM | Low | 21.49 | 19.68 | | |
| | Mid | 22.03 | 19.44 | | |
| | High | 21.84 | 19.27 | | |

| LTE Band 4 - 1.4MHz | | | | | |
|---|---|---|---|---|---|
| Modulation | Channel | EIRP (dBm) | | Limit (dBm) | Result |
| | | Vertical | Horizontal | | |
| QPSK | Low | 22.06 | 19.26 | ≤30 | PASS |
| | Mid | 21.38 | 19.60 | | |
| | High | 21.82 | 19.37 | | |
| 16QAM | Low | 21.69 | 19.02 | | |
| | Mid | 21.38 | 19.50 | | |
| | High | 22.01 | 19.35 | | |

| LTE Band 4 - 3MHz | | | | | |
|---|---|---|---|---|---|
| Modulation | Channel | EIRP (dBm) | | Limit (dBm) | Result |
| | | Vertical | Horizontal | | |
| QPSK | Low | 22.18 | 19.78 | ≤30 | PASS |
| | Mid | 21.84 | 18.94 | | |
| | High | 21.62 | 19.79 | | |
| 16QAM | Low | 21.67 | 19.93 | | |
| | Mid | 21.44 | 19.61 | | |
| | High | 22.09 | 19.33 | | |

| LTE Band 4 - 5MHz | | | | | |
|---|---|---|---|---|---|
| Modulation | Channel | EIRP (dBm) | | Limit (dBm) | Result |
| | | Vertical | Horizontal | | |
| QPSK | Low | 22.18 | 19.72 | ≤30 | PASS |
| | Mid | 21.23 | 19.44 | | |
| | High | 22.01 | 19.36 | | |
| 16QAM | Low | 21.67 | 19.88 | | |
| | Mid | 21.34 | 19.88 | | |
| | High | 21.64 | 19.33 | | |

| LTE Band 4 - 10MHz | | | | | |
|---|---|---|---|---|---|
| Modulation | Channel | EIRP (dBm) | | Limit (dBm) | Result |
| | | Vertical | Horizontal | | |
| QPSK | Low | 22.18 | 19.57 | ≤30 | PASS |
| | Mid | 22.05 | 19.71 | | |
| | High | 21.91 | 19.70 | | |
| 16QAM | Low | 21.42 | 19.19 | | |
| | Mid | 21.76 | 19.91 | | |
| | High | 21.38 | 19.23 | | |

| LTE Band 4 - 15MHz | | | | | |
|---|---|---|---|---|---|
| Modulation | Channel | EIRP (dBm) | | Limit (dBm) | Result |
| | | Vertical | Horizontal | | |
| QPSK | Low | 21.25 | 19.57 | ≤30 | PASS |
| | Mid | 21.92 | 19.54 | | |
| | High | 22.21 | 19.84 | | |
| 16QAM | Low | 21.76 | 19.73 | | |
| | Mid | 21.77 | 19.46 | | |
| | High | 22.03 | 19.47 | | |

| LTE Band 4 - 20MHz | | | | | |
|---|---|---|---|---|---|
| Modulation | Channel | EIRP (dBm) | | Limit (dBm) | Result |
| | | Vertical | Horizontal | | |
| QPSK | Low | 21.83 | 19.63 | ≤30 | PASS |
| | Mid | 21.67 | 19.81 | | |
| | High | 21.33 | 19.93 | | |
| 16QAM | Low | 21.77 | 19.33 | | |
| | Mid | 22.00 | 18.94 | | |
| | High | 21.53 | 19.82 | | |

| LTE Band 12 - 1.4MHz | | | | | |
|---|---|---|---|---|---|
| Modulation | Channel | ERP (dBm) | | Limit (dBm) | Result |
| | | Vertical | Horizontal | | |
| QPSK | Low | 21.75 | 19.36 | ≤34.77 | PASS |
| | Mid | 21.96 | 18.99 | | |
| | High | 21.51 | 19.68 | | |
| 16QAM | Low | 22.05 | 19.27 | | |
| | Mid | 21.44 | 19.12 | | |
| | High | 22.17 | 19.16 | | |

| LTE Band 12 - 3MHz | | | | | |
|---|---|---|---|---|---|
| Modulation | Channel | ERP (dBm) | | Limit (dBm) | Result |
| | | Vertical | Horizontal | | |
| QPSK | Low | 22.03 | 19.93 | ≤34.77 | PASS |
| | Mid | 21.33 | 19.25 | | |
| | High | 21.58 | 19.31 | | |
| 16QAM | Low | 21.53 | 19.25 | | |
| | Mid | 21.27 | 19.66 | | |
| | High | 21.55 | 19.20 | | |

| LTE Band 12 - 5MHz | | | | | |
|---|---|---|---|---|---|
| Modulation | Channel | ERP (dBm) | | Limit (dBm) | Result |
| | | Vertical | Horizontal | | |
| QPSK | Low | 21.45 | 18.99 | ≤34.77 | PASS |
| | Mid | 21.40 | 19.91 | | |
| | High | 22.09 | 19.39 | | |
| 16QAM | Low | 21.44 | 19.78 | | |
| | Mid | 21.28 | 19.28 | | |
| | High | 22.13 | 19.38 | | |

| LTE Band 12 -10MHz | | | | | |
|---|---|---|---|---|---|
| Modulation | Channel | ERP (dBm) | | Limit (dBm) | Result |
| | | Vertical | Horizontal | | |
| QPSK | Low | 21.99 | 19.94 | ≤34.77 | PASS |
| | Mid | 22.19 | 19.84 | | |
| | High | 22.16 | 19.87 | | |
| 16QAM | Low | 22.21 | 19.78 | | |
| | Mid | 22.18 | 19.39 | | |
| | High | 22.04 | 19.02 | | |

## 3.8. Radiated Spurious Emission

**LIMIT**

§24.238(a), §27.53 (g), (h), §90.691

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

§27.53 (Band 13)

(c) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

(f) Emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals. (-70 dBW/MHz = -40dBm/MHz).

FCC: § 90.669 Emission limits. (Band 26)

(a) On any frequency in an MTA licensee's spectrum block that is adjacent to a non-MTA frequency, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 plus 10 log10(P) decibels or 80 decibels, whichever is the lesser attenuation.

§27.53 (a) (Band 30)

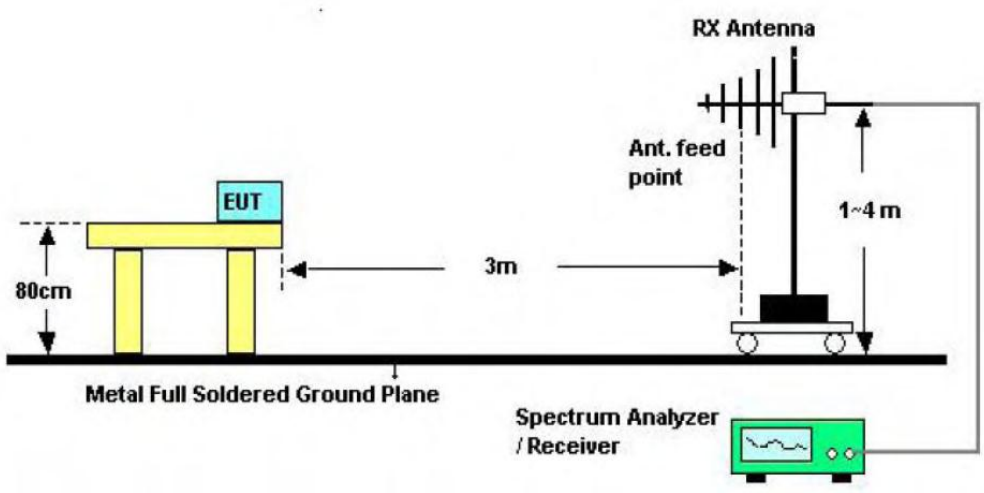
For mobile and portable stations operating in the 2305-2315 MHz: by a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

§27.53 (m) (Band 7, 41)

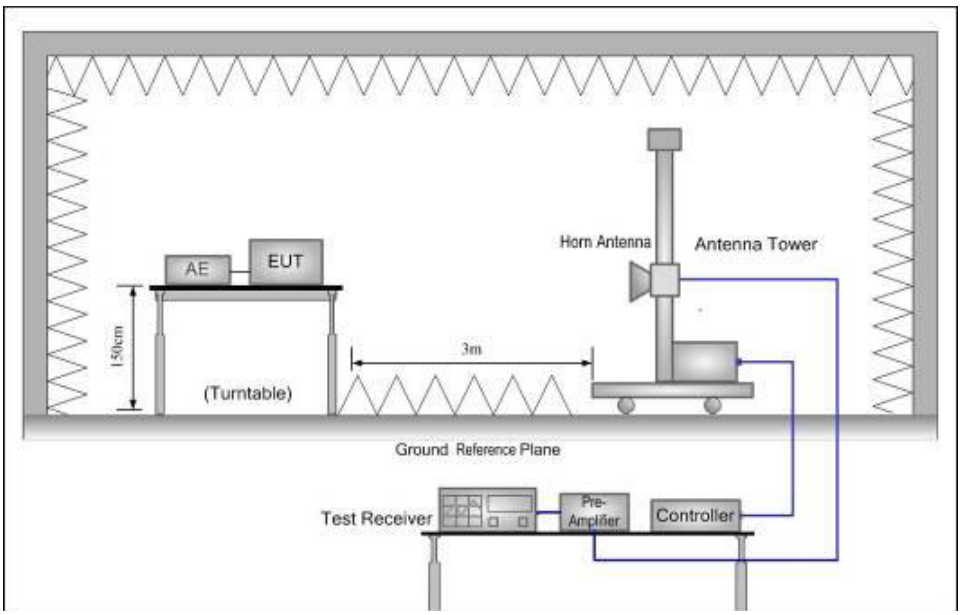
At least 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

**TEST CONFIGURATION**

For the actual test configuration, please refer to the related Item – EUT Test Photos.




Below 1GHz




Above 1GHz

**TEST PROCEDURE**

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, and the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:

7. Power(EIRP)=PMea- PAg - Pcl + Ga
   We used SMF100A microwave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substitution test; The measurement results are amend as described below:
   Power(EIRP)=PMea- Pcl + Ga
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
   ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP - 2.15dBi.
9. Test frequency range should extend to $10^{th}$ harmonic of highest fundamental frequency.

**TEST RESULT**

Remark:
1. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “X axis” position was the worst, and test data recorded in this report.
2. We test all modulation types, all bandwidths, and record the worst case at the maximum bandwidth of each modulation.

*Measured data (worst case):*

| Band 2 Radiated Spurious Emission | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bandwidth | Modulation | Test Channel | Spurious Emission | | | Limit (dBm) | Result |
| | | | Frequency | Level (dBm) | Polarization | | |
| 20MHz | QPSK | L | 3720.00 | -42.13 | Vertical | -13.00 | Pass |
| | | | 5580.00 | -48.30 | Vertical | | |
| | | | 3720.00 | -46.74 | Horizontal | | |
| | | | 5580.00 | -52.74 | Horizontal | | |
| 20MHz | QPSK | M | 3760.00 | -42.58 | Vertical | -13.00 | Pass |
| | | | 5640.00 | -49.05 | Vertical | | |
| | | | 3760.00 | -41.58 | Horizontal | | |
| | | | 5640.00 | -52.06 | Horizontal | | |
| 20MHz | QPSK | H | 3800.00 | -41.87 | Vertical | -13.00 | Pass |
| | | | 5700.00 | -48.77 | Vertical | | |
| | | | 3800.00 | -42.36 | Horizontal | | |
| | | | 5700.00 | -52.57 | Horizontal | | |
| 20MHz | 16QAM | L | 3720.00 | -41.84 | Vertical | -13.00 | Pass |
| | | | 5580.00 | -48.33 | Vertical | | |
| | | | 3720.00 | -41.60 | Horizontal | | |
| | | | 5580.00 | -52.28 | Horizontal | | |
| 20MHz | 16QAM | M | 3760.00 | -40.79 | Vertical | -13.00 | Pass |
| | | | 5640.00 | -47.57 | Vertical | | |
| | | | 3760.00 | -41.57 | Horizontal | | |
| | | | 5640.00 | -54.12 | Horizontal | | |
| 20MHz | 16QAM | H | 3800.00 | -41.53 | Vertical | -13.00 | Pass |
| | | | 5700.00 | -48.99 | Vertical | | |
| | | | 3800.00 | -42.85 | Horizontal | | |
| | | | 5700.00 | -54.03 | Horizontal | | |

Remark:

1. The emission behavior belongs to narrowband spurious emission.
2. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

| Band 4 Radiated Spurious Emission | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bandwidth | Modulation | Test Channel | Spurious Emission | | | Limit (dBm) | Result |
| | | | Frequency | Level (dBm) | Polarization | | |
| 20MHz | QPSK | L | 3440.00 | -41.03 | Vertical | -13.00 | Pass |
| | | | 5160.00 | -49.57 | Vertical | | |
| | | | 3440.00 | -45.66 | Horizontal | | |
| | | | 5160.00 | -52.23 | Horizontal | | |
| 20MHz | QPSK | M | 3465.00 | -40.67 | Vertical | -13.00 | Pass |
| | | | 5197.50 | -48.24 | Vertical | | |
| | | | 3465.00 | -41.25 | Horizontal | | |
| | | | 5197.50 | -53.63 | Horizontal | | |
| 20MHz | QPSK | H | 3490.00 | -41.24 | Vertical | -13.00 | Pass |
| | | | 5235.00 | -48.53 | Vertical | | |
| | | | 3490.00 | -40.69 | Horizontal | | |
| | | | 5235.00 | -54.30 | Horizontal | | |
| 20MHz | 16QAM | L | 3440.00 | -42.05 | Vertical | -13.00 | Pass |
| | | | 5160.00 | -47.98 | Vertical | | |
| | | | 3440.00 | -42.57 | Horizontal | | |
| | | | 5160.00 | -54.35 | Horizontal | | |
| 20MHz | 16QAM | M | 3465.00 | -41.14 | Vertical | -13.00 | Pass |
| | | | 5197.50 | -47.33 | Vertical | | |
| | | | 3465.00 | -41.99 | Horizontal | | |
| | | | 5197.50 | -53.68 | Horizontal | | |
| 20MHz | 16QAM | H | 3490.00 | -40.07 | Vertical | -13.00 | Pass |
| | | | 5235.00 | -48.44 | Vertical | | |
| | | | 3490.00 | -40.08 | Horizontal | | |
| | | | 5235.00 | -53.33 | Horizontal | | |

Remark:

1. The emission behavior belongs to narrowband spurious emission.
2. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

| Band 12 Radiated Spurious Emission | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bandwidth | Modulation | Test Channel | Spurious Emission | | | Limit (dBm) | Result |
| | | | Frequency | Level (dBm) | Polarization | | |
| 10MHz | QPSK | L | 1408.00 | -42.56 | Vertical | -13.00 | Pass |
| | | | 2112.00 | -48.86 | Vertical | | |
| | | | 1408.00 | -47.86 | Horizontal | | |
| | | | 2112.00 | -52.01 | Horizontal | | |
| 10MHz | QPSK | M | 1415.00 | -42.07 | Vertical | -13.00 | Pass |
| | | | 2122.50 | -47.62 | Vertical | | |
| | | | 1415.00 | -42.83 | Horizontal | | |
| | | | 2122.50 | -53.64 | Horizontal | | |
| 10MHz | QPSK | H | 1422.00 | -42.41 | Vertical | -13.00 | Pass |
| | | | 2133.00 | -49.33 | Vertical | | |
| | | | 1422.00 | -42.95 | Horizontal | | |
| | | | 2133.00 | -54.51 | Horizontal | | |
| 10MHz | 16QAM | L | 1408.00 | -42.78 | Vertical | -13.00 | Pass |
| | | | 2112.00 | -47.07 | Vertical | | |
| | | | 1408.00 | -41.20 | Horizontal | | |
| | | | 2112.00 | -54.69 | Horizontal | | |
| 10MHz | 16QAM | M | 1415.00 | -41.84 | Vertical | -13.00 | Pass |
| | | | 2122.50 | -47.23 | Vertical | | |
| | | | 1415.00 | -40.32 | Horizontal | | |
| | | | 2122.50 | -54.52 | Horizontal | | |
| 10MHz | 16QAM | H | 1422.00 | -40.69 | Vertical | -13.00 | Pass |
| | | | 2133.00 | -48.66 | Vertical | | |
| | | | 1422.00 | -42.03 | Horizontal | | |
| | | | 2133.00 | -54.60 | Horizontal | | |

Remark:

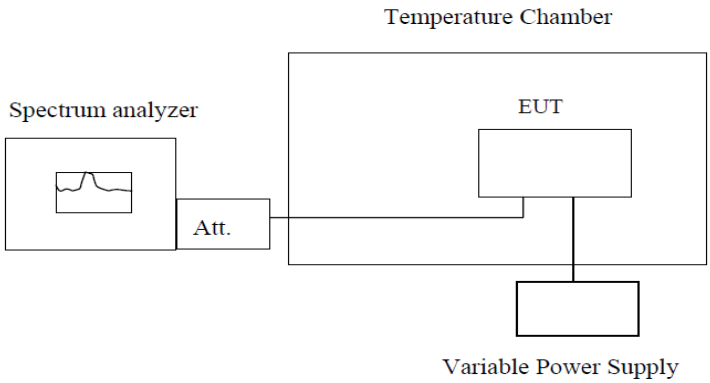
1. The emission behavior belongs to narrowband spurious emission.
2. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

## 3.9. Frequency Stability

**LIMIT**

Cellular Band: ±2.5ppm PCS Band: Within the authorized frequency block

**TEST CONFIGURATION**




**Note :** Measurement setup for testing on Antenna connector

**TEST PROCEDURE**

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25℃ operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to –10℃. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.
7. Reduce the input voltage to specified extreme voltage variation (+/- 10%) and endpoint, record the maximum frequency change.

**TEST RESULT**

Please see the Appendix for every tested Band.

**************************THE END**************************