# FCC CFR47 PART 22H, 24E, 27
# CERTIFICATION TEST REPORT
# FCC ID: 2AOWKGQ3086

| | |
|---|---|
| **Product:** | Mobile Phone |
| **Trade Mark:** | ulefone |
| **Model Number:** | GQ3086 |
| **Family Model:** | Armor 9, Armor 9E, Armor 9S, Armor 9P, Armor 7X, Armor 7A, Armor 9 Pro, Armor 9 Lite |
| **Report No.:** | STR200327001006E |

**Prepared for**

Shenzhen Gotron Electronic CO.,LTD.
518, 5F, R&D building, Tsinghua Hi-Tech park, Nanshan district, Shenzhen 518057 P.R.China

**Prepared by**

Shenzhen NTEK Testing Technology Co., Ltd.
1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street
Bao'an District, Shenzhen 518126 P.R. China
Tel.: +86-755-6115 9388 Fax.: +86-755-6115 6599
Website:http://www.ntek.org.cn

# TEST RESULT CERTIFICATION

| | |
|---|---|
| **Applicant's name** ..... : | Shenzhen Gotron Electronic CO.,LTD. |
| Address..... : | 518, 5F, R&D building, Tsinghua Hi-Tech park, Nanshan district, Shenzhen 518057 P.R.China |
| **Manufacturer's Name**..... : | Shenzhen Gotron Electronic CO.,LTD. |
| Address..... : | 518, 5F, R&D building, Tsinghua Hi-Tech park, Nanshan district, Shenzhen 518057 P.R.China |
| Product name..... : | Mobile Phone |
| Model and/or type reference .. : | GQ3086 |
| Family Model： | Armor 9, Armor 9E, Armor 9S, Armor 9P, Armor 7X, Armor 7A, Armor 9 Pro, Armor 9 Lite |
| **Standards**..... : | FCC CFR 47 Part 22H, Part 24E, Part 27 |
| Test procedure ..... : | ANSI C63.26:2015 |
| | ANSI/TIA-603-E-2016 |

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of NTEK, this document may be altered or revised by NTEK, personal only, and shall be noted in the revision of the document.

**Date of Test** .....

Date (s) of performance of tests..... 27 Mar. 2020 ~ 17 Jun, 2020

Date of Issue..... 18 Jun, 2020

Test Result..... **Pass**

Testing Engineer : Cheng Jiawen

(Cheng Jiawen)

Technical Manager : Jason chen

(Jason Chen)

Authorized Signatory : Sam . Chen

(Sam Chen)

# TABLE OF CONTENTS

1. GENERAL INFORMATION ..... 5

1.1 PRODUCT DESCRIPTION ..... 5

1.2 RELATED SUBMITTAL(S) / GRANT (S) ..... 7

1.3 TEST METHODOLOGY ..... 7

1.4 TEST FACILITY ..... 7

MEASUREMENT UNCERTAINTY ..... 7

1.5 SPECIAL ACCESSORIES ..... 7

1.6 WORST-CASE CONFIGURATION AND MODE ..... 7

1.6 SUMMARY OF TEST RESULTS ..... 8

2. SYSTEM TEST CONFIGURATION ..... 10

2.1 EUT CONFIGURATION ..... 10

2.2 EUT EXERCISE ..... 10

2.3 CONFIGURATION OF EUT SYSTEM ..... 10

2.4 TEST SETUP ..... 11

3.TEST AND MEASUREMENT EQUIPMENT ..... 12

4. OUTPUT POWER ..... 14

4.1 OUTPUT POWER MEASUREMENT ..... 14

6. BANDEDGE AND EMISSION MASK ..... 17

7. OUT OF BAND EMISSIONS ..... 18

7.1 MEASUREMENT METHOD ..... 19

8. RADIATED MEASUREMENT ..... 20

8.1. RADIATED POWER (ERP & EIRP) ..... 20

8.2 LTE BAND 2 ..... 21

8.3 LTE BAND 4 ..... 25

8.4 LTE BAND 5 ..... 29

8.5 LTE BAND 7 ..... 31
8.6 LTE BAND 17 ..... 33
8.7 LTE BAND 66 ..... 35

9. SPURIOUS RADIATION EMISSION ..... 39
9.1 LTE BAND 2 ..... 41
9.2 LTE BAND 4 ..... 43
9.3 LTE BAND 5 ..... 45
9.4 LTE BAND 7 ..... 47
9.5 LTE BAND 17 ..... 49
9.6 LTE BAND 66 ..... 51

10. FREQUENCY STABILITY ..... 52
10.1 LTE BAND 2 ..... 53
10.2 LTE BAND 4 ..... 55
10.3 LTE BAND 5 ..... 57
10.4 LTE BAND 7 ..... 59
10.5 LTE BAND 17 ..... 61
10.6 LTE BAND 66 ..... 63

11. PEAK-TO-AVERAGE RATIO ..... 65
11.1 Description of the PAR Measurement ..... 65
11.2 Measuring Instruments ..... 65
11.3 Test Procedures ..... 65
11.4 Test Setup ..... 65

# 1. GENERAL INFORMATION

## 1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

| | |
|---|---|
| Product Designation: | Mobile Phone |
| Trade Mark | ulefone |
| Model Name | GQ3086 |
| Family Model | Armor 9, Armor 9E, Armor 9S, Armor 9P, Armor 7X, Armor 7A, Armor 9 Pro, Armor 9 Lite |
| Model Difference | All models are the same circuit and RF module, except the model name. |
| FCC ID: | 2AOWKGQ3086 |
| Frequency Bands: | U.S. Bands:<br>☒LTE FDD Band 2, 4, 5, 7, 17, 66 |
| Frequency Range: | LTE FDD Band 2 Uplink: 1850MHz-1910MHz,<br>Downlink: 1930MHz-1990MHz;<br>LTE FDD Band 4 Uplink: 1710MHz-1755MHz,<br>Downlink: 2110MHz-2155MHz;<br>LTE FDD Band 5 Uplink: 824MHz-849MHz,<br>Downlink: 869MHz-894MHz;<br>LTE-FDD Band 7 Uplink: 2500MHz-2570MHz,<br>Downlink: 2620MHz-2690MHz;<br>LTE FDD Band 17 Uplink: 704MHz-716MHz,<br>Downlink: 734MHz-746MHz;<br>LTE FDD Band 66 Uplink: 1710MHz-1780MHz,<br>Downlink: 2110MHz-2200MHz; |
| Type of Modulation: | QPSK/16QAM |
| SIM Card | SIM 1 and SIM 2 is a chipset unit and tested as a single chipset. The SIM 1 is chosen for test. |
| Antenna: | PIFA Antenna |
| Antenna gain: | Band 2: 1.86dBi, Band 4: 0.5dBi, Band 5: 0.75dBi, Band 7: 1.32dBi, Band 17: 0.52dBi, Band 66: 1.23dBi |
| Power Supply: | DC 3.85V/6600mAh from Battery or DC 5V from USB Port. |
| Adapter: | Model: APS-KI018WU-G<br>Input: 100-240V~50/60Hz 0.5A Max<br>Output: 5V/7V/9V⎓2.0A, 12V⎓1.5A |
| Extreme Vol. Limits: | DC 3.4V to DC 4.4V (Nominal DC 3.85V)（Note 1） |
| HW Version | S95_V1.1 |
| SW Version | Armor 9_TF1_EEA_V01 |

** Note1: The High Voltage 4.4V and Low Voltage 3.4V was declared by manufacturer, The EUT couldn’t be operate normally with higher or lower voltage.

## 1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AOWKGQ3086** filing to comply with the FCC Part 22H&24E &27.

### 1.3 TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI/TIA-603-E-2016, FCC CFR 47 Part 2, Part 22, Part 24, Part 27, ANSI C63.26:2015.

### 1.4 TEST FACILITY

The test site used to collect the radiated data is located at:

ShenZhen NTEK Testing Technology Co., Ltd.

1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R.China.

The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.26:2015& ANSI C63.4: 2014.

FCC Registration No.:463705

IC Registration No.:9270A-1,

CNAS Registration No.:L5516

## MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

| No. | Item | Uncertainty |
|---|---|---|
| 1 | Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 2.5dB |
| | | |

### 1.5 SPECIAL ACCESSORIES

The battery and the charger, earphone supplied by the applicant were used as accessories and being tested with EUT intended for FCC grant together.

### 1.6 WORST-CASE CONFIGURATION AND MODE

The worst-case scenario for all measurements is based on the investigation results.

The device has LTE Bands of: Band 2, Band 4, Band 5, Band 7, Band 17, Band 66.

The RB Size was selected to measure for peak or average ERP and EIRP, which was based on the conducted power verification baseline data.

For the fundamental investigation of radiated emissions, the EUT is investigated for vertical and horizontal antenna orientations and X Y and Z orientations of the EUT alone. After the investigations the worst case was determined to be at X orientation for all LTE bands.

## 1.6 SUMMARY OF TEST RESULTS

| FCC Part22, Subpart H/ FCC Part24, Subpart E, FCC Part27, Subpart L, KDB 971168 D01 Power Meas License Digital Systems v03 | | | |
|---|---|---|---|
| **FCC Rule** | **Test Item** | **Verdict** | **Remark** |
| 2.1046 | Conducted Output Power | PASS | |
| 22.913(d)<br>24.232(d)<br>27.50(d)(5)<br>KDB 971168 D01 Clause 5.7 | Peak-to-Average Ratio | PASS | |
| 2.1049<br>22.917(b)<br>24.238(b)<br>KDB 971168 D01 Clause 4.2 | Occupied Bandwidth | PASS | |
| 2.1051<br>22.917(a)<br>24.238(a)<br>27.53(c), (g), (h)<br>KDB 971168 D01 Clause 6 | Band Edge | PASS | |
| 22.913(a)(2)<br>27.50(b)(10), (c)(10)<br>KDB 971168 D01 Clause 5.6 | Effective Radiated Power | PASS | |
| 24.232(c)<br>27.50(h)(2), (d)(4)<br>KDB 971168 D01 Clause 5.6 | Equivalent Isotropic Radiated Power | PASS | |
| 2.1053<br>22.917(a)<br>24.238(a)<br>27.53(c)(g)(h)(m)<br>KDB 971168 D01 Clause 7 | Field Strength of Spurious Radiation | PASS | |
| 2.1055<br>22.355<br>24.235<br>27.54<br>KDB 971168 D01 Clause 9 | Frequency Stability for Temperature & Voltage | PASS | |

| | | | |
|---|---|---|---|
| 2.1051<br>22.917(a)<br>24.238(a)<br>27.53(c)(g)(h)(m)<br>KDB 971168 D01 Clause 6 | Conducted Emission | PASS | |

Remark:

1. “N/A” denotes test is not applicable in this Test Report.
2. All test items were verified and recorded according to the standards and without any deviation during the test.
3. No modifications are made to the EUT during all test items.

# 2. SYSTEM TEST CONFIGURATION

## 2.1 EUT CONFIGURATION

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

## 2.2 EUT EXERCISE

The Transmitter was operated in the maximum output power mode through Communication Tester. The TX frequency was fixed which was for the purpose of the measurements.

## 2.3 CONFIGURATION OF EUT SYSTEM

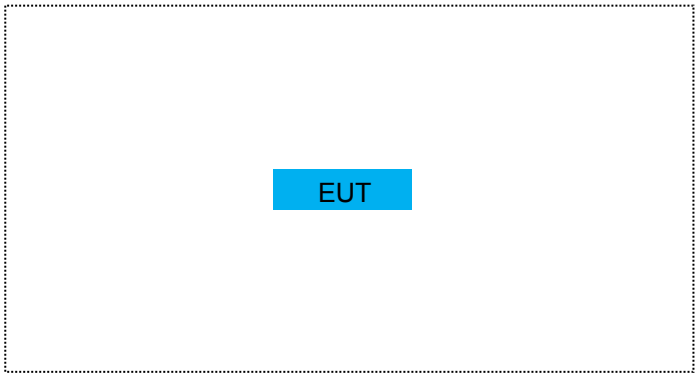
Table 2-1 Equipment Used in EUT System

| Item | Equipment | Model No. | ID or Specification | Note |
|---|---|---|---|---|
| 1 | Mobile Phone | GQ3086 | FCC ID: 2AOWKGQ3086 | EUT |
| | | | | |
| | | | | |

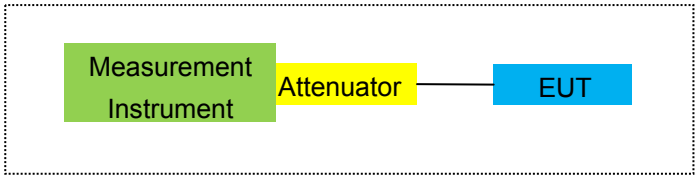
*Note: All the accessories have been used during the test.*
*the following "EUT" in setup diagram means EUT system.*

## 2.4 TEST SETUP

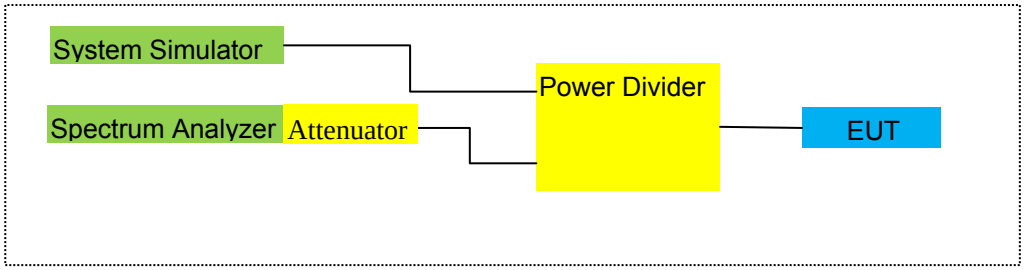
For Radiated Test Cases



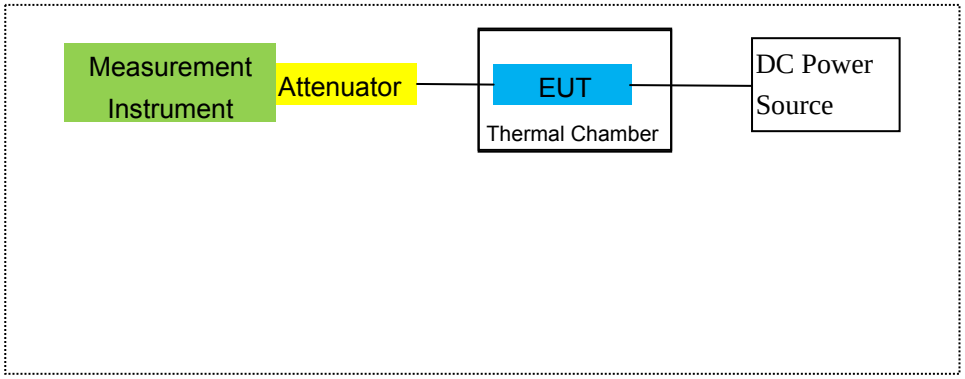

For Conducted Output Power




For Peak-to Average Ratio, Occupied Bandwidth, Conducted Band edge and Conducted Spurious Emission




For Frequency Stability




Note: EUT built-in battery-powered, the battery is fully-charged.

# 3.TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Last calibration | Calibrated until | Calibration period |
|---|---|---|---|---|---|---|---|
| 1 | MXA Signal Analyzer | Agilent | N9020A | MY49100060 | 2019.08.28 | 2020.08.27 | 1 year |
| 2 | Test Receiver | R&S | ESPI | 101318 | 2020.05.11 | 2021.05.10 | 1 year |
| 3 | Bilog Antenna | TESEQ | CBL6111D | 31216 | 2020.04.11 | 2021.04.10 | 1 year |
| 4 | 50Ω Coaxial Switch | Anritsu | MP59B | 6200983705 | 2020.05.11 | 2023.05.10 | 1 year |
| 5 | Horn Antenna | EM | EM-AH-10180 | 2011071402 | 2020.04.11 | 2021.04.10 | 1 year |
| 6 | Horn Ant | Schwarzbeck | BBHA 9170 | 9170-181 | 2019.12.10 | 2020.12.09 | 1 year |
| 7 | Amplifier | EM | EM-30180 | 060538 | 2019.08.06 | 2020.08.05 | 1 year |
| 8 | Loop Antenna | ARA | PLA-1030/B | 1029 | 2020.05.11 | 2021.05.10 | 1 year |
| 9 | Power Meter | R&S | NRVS | 100696 | 2019.08.06 | 2020.08.05 | 1 year |
| 10 | Power Sensor | R&S | URV5-Z4 | 0395.1619.05 | 2020.05.11 | 2021.05.10 | 1 year |
| 11 | Test Cable | N/A | R-01 | N/A | 2019.08.06 | 2022.08.05 | 3 year |
| 12 | Test Cable | N/A | R-02 | N/A | 2019.08.06 | 2020.08.05 | 3 year |
| 13 | Test Cable | N/A | R-03 | N/A | 2019.06.28 | 2022.06.27 | 3 year |
| 14 | Test Receiver | R&S | ESCI | 101160 | 2020.05.11 | 2021.05.10 | 1 year |
| 15 | LISN | R&S | ENV216 | 101313 | 2020.05.11 | 2021.05.10 | 1 year |
| 16 | LISN | EMCO | 3816/2 | 00042990 | 2020.05.11 | 2021.05.10 | 1 year |
| 17 | 50Ω Coaxial Switch | Anritsu | MP59B | 6200264417 | 2019.05.13<br>2020.05.11 | 2020.05.12<br>2021.05.10 | 1 year |
| 18 | Passive Voltage Probe | R&S | ESH2-Z3 | 100196 | 2020.04.11 | 2021.04.10 | 3 year |
| 19 | Test Cable | N/A | C01 | N/A | 2020.05.11 | 2023.05.10 | 3 year |
| 20 | Test Cable | N/A | C02 | N/A | 2020.05.11 | 2023.05.10 | 3 year |
| 21 | Test Cable | N/A | C03 | N/A | 2020.05.11 | 2021.05.10 | 1 year |
| 22 | Attenuator | MCE | 24-10-34 | BN9258 | 2020.05.11 | 2021.05.10 | 1 year |
| 23 | Spectrum Analyzer | agilent | e4440a | us44300399 | 2020.05.11 | 2021.05.10 | 1 year |
| 24 | test receiver | R&S | ESCI | a0304218 | 2020.05.11 | 2021.05.10 | 1 year |
| 25 | Communication Tester | R&S | CMU200 | A0304247 | 2019.08.06 | 2020.08.05 | 1 year |
| 26 | Thermal Chamber | Ten Billion | TTC-B3C | TBN-960502 | 2020.05.11 | 2021.05.10 | 1 year |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 27 | DC Power Source | N/A | PS-6005D | 20170402923 | 2017.06.06 | 2020.06.05 | 3 year |
| 28 | PSG Analog Signal Generator | Agilent | E8257D | MY51110112 | 2019.08.06 | 2020.08.05 | 1 year |
| 29 | Communication Tester | R&S | CMW500 | 148500 | 2020.05.11 | 2021.05.10 | 1 year |

Note: Each piece of equipment is scheduled for calibration once a year except the Test Cable& DC Power Source which is scheduled for calibration every 3 years.

# 4. OUTPUT POWER

## 4.1 OUTPUT POWER MEASUREMENT

**LTE Measurement Procedure:**

All LTE bands conducted power peak and average are obtained from the CMW500 telecommunication test set. The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

**Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3**

| Modulation | Channel bandwidth / Transmission bandwidth (RB) | | | | | | MPR (dB) |
|---|---|---|---|---|---|---|---|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz | |
| QPSK | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 1 |
| 16 QAM | ≤ 5 | ≤ 4 | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | ≤ 1 |
| 16 QAM | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 2 |

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of “NS_01”.3

**Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)**

| Network Signalling value | Requirements (sub-clause) | E-UTRA Band | Channel bandwidth (MHz) | Resources Blocks ($N_{RB}$) | A-MPR (dB) |
|---|---|---|---|---|---|
| NS_01 | 6.6.2.1.1 | Table 5.5-1 | 1.4, 3, 5, 10, 15, 20 | Table 5.6-1 | NA |
| NS_03 | 6.6.2.2.1 | 2, 4,10, 23, 25, 35, 36 | 3 | >5 | ≤ 1 |
| | | | 5 | >6 | ≤ 1 |
| | | | 10 | >6 | ≤ 1 |
| | | | 15 | >8 | ≤ 1 |
| | | | 20 | >10 | ≤ 1 |
| NS_04 | 6.6.2.2.2 | 41 | 5 | >6 | ≤ 1 |
| | | | 10, 15, 20 | See Table 6.2.4-4 | |
| NS_05 | 6.6.3.3.1 | 1 | 10,15,20 | ≥ 50 | ≤ 1 |
| NS_06 | 6.6.2.2.3 | 12, 13, 14, 17 | 1.4, 3, 5, 10 | Table 5.6-1 | n/a |
| NS_07 | 6.6.2.2.3<br>6.6.3.3.2 | 13 | 10 | Table 6.2.4-2 | Table 6.2.4-2 |
| NS_08 | 6.6.3.3.3 | 19 | 10, 15 | > 44 | ≤ 3 |
| NS_09 | 6.6.3.3.4 | 21 | 10, 15 | > 40 | ≤ 1 |
| | | | | > 55 | ≤ 2 |
| NS_10 | | 20 | 15, 20 | Table 6.2.4-3 | Table 6.2.4-3 |
| NS_11 | 6.6.2.2.1 | 23[1] | 1.4, 3, 5, 10 | Table 6.2.4-5 | Table 6.2.4-5 |
| -- | | | | | |
| NS_32 | - | - | - | - | - |
| Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region. | | | | | |

Test data reference attachment.

# 5. OCCUPIED BANDWIDTH

**RULE PART(S)**

FCC: §2.1049

**LIMITS**

For reporting purposes only

**TEST PROCEDURE**

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

**MODES TESTED**

LTE Band 2
LTE Band 4
LTE Band 5
LTE Band 7
LTE Band 17
LTE Band 66

**RESULTS**

**PASS**

Test data reference attachment.

# 6. BANDEDGE AND EMISSION MASK

**RULE PART(S)**

FCC: §2.1051,§22.917(a), §24.238(a), §27.53(c)(g)(h)(m)
FCC: §2.1046, §22.913, §24.232

**LIMITS**

The minimum permissible attenuation level of any spurious emission is 43 + log10(P[Watts]), where P is the transmitter power in Watts.
The minimum permissible attenuation level for Band 7 is as following.
Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.
Per 27.53(c.5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.
For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c.4) is 65 + 10log10(P) = -35dBm in a 6.25kHz bandwidth.
Per 27.53(m) for operations in the BRS/EBS bands, 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.

**TEST PROCEDURE**

The transmitter output was connected to a CMW500Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.
For each band edge measurement:
Set the spectrum analyzer span to include the block edge frequency
Set a marker to point the corresponding band edge frequency in each test case.
Set display line
Set resolution bandwidth to at least 1% of emission bandwidth.

**MODES TESTED**

LTE Band 2/4/5/7/17/66

**RESULTS**

Test data reference attachment.

# 7. OUT OF BAND EMISSIONS

**RULE PART(S)**

FCC: §2.1051,§22.917(a), §24.238(a), §27.53(c)(g)(h)(m)

**LIMITS**

The minimum permissible attenuation level of any spurious emission is 43 + log10(P[Watts]), where P is the transmitter power in Watts.
The minimum permissible attenuation level for Band 7 is as following.
Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.
Per 27.53(c.5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.
For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c.4) is 65 + 10log10(P) = -35dBm in a 6.25kHz bandwidth.
Per 27.53(m) for operations in the BRS/EBS bands, 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.

**TEST PROCEDURE**

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.
For each out of band emissions measurement:

Set display line

Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

**MODES TESTED**

LTE Band 2
LTE Band 4
LTE Band 5
LTE Band 7
LTE Band 17
LTE Band 66

## 7.1 MEASUREMENT METHOD

The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.

Test data reference attachment.

Note: Both QPSK and 16QAM has been tested, the worst case is QPSK mode, the report just reported the worst case.

# 8. RADIATED MEASUREMENT

## 8.1. RADIATED POWER (ERP & EIRP)

**RULE PART(S)**

FCC: §2.1046, §22.913(a)(2), §24.232(c) and §27.50 (h)(2), (b)(10), (c)(10), (d)(4)

**LIMITS:**

22.913(a) (2)- The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.
24.232 (c) Mobile and portable stations are limited to 2 watts EIRP.
27.50 (c) (10) the following power and antenna height requirements apply to stations transmitting in the 698–746 MHz band, the portable stations (hand-held devices) are limited to 3 watts ERP.
27.50 (b)(10) Portable stations (hand-held devices) transmitting in the 746–757 MHz, 758–763 MHz, 776–793 MHz, and 805–806 MHz bands are limited to 3 watts ERP.
27.50 (d)(4) The following power and antenna height requirements apply to stations transmitting in the 1710–1755 MHz and 2110–2155 MHz bands: Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.
27.50 (h)(2)Mobile and other user stations in the 2500–2570 MHz and 2620–2690 MHz bands. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

**TEST PROCEDURE**

ANSI/TIA-603-E Clause 2.2.17
KDB 971168 v02r01 RF power output using broadband peak and average power meter method.
KDB 971168 D01 Power Meas License Digital Systems v02r01, “Measurement Guidance for Certification of Licensed Digital Transmitters”

**MODES TESTED**

LTE Band 2
LTE Band 4
LTE Band 5
LTE Band 7
LTE Band 17
LTE Band 66

**RESULTS**

Pass

## 8.2 LTE BAND 2

| Radiated Power (EIRP) for Band 2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mode | RB/RB SIZE | Frequency | Result | | | | | | Conclusion |
| | | | SG Level (dBm) | Cable Loss (dBm) | Antenna Gain (dB) | Max. EIRP Average (dBm) | Max. EIRP Average (mW) | Polarization Of Max. ERP | |
| 1.4MHz Band QPSK | 1/#Mid | 1850.7 | 0.66 | 3.76 | 28.24 | 25.14 | 326.588 | Horizontal | Pass |
| | | 1880 | 0.85 | 3.91 | 28.22 | 25.16 | 328.095 | Horizontal | Pass |
| | | 1909.3 | 0.94 | 3.93 | 28.20 | 25.21 | 331.894 | Horizontal | Pass |
| 3.0MHz Band QPSK | 1/#Mid | 1851.5 | 0.60 | 3.77 | 28.23 | 25.06 | 320.627 | Horizontal | Pass |
| | | 1880 | 0.75 | 3.91 | 28.24 | 25.08 | 322.107 | Horizontal | Pass |
| | | 1908.5 | 0.88 | 3.94 | 28.25 | 25.19 | 330.370 | Horizontal | Pass |
| 5.0MHz Band QPSK | 1/#Mid | 1852.5 | 0.71 | 3.77 | 28.31 | 25.25 | 334.965 | Horizontal | Pass |
| | | 1880 | 1.09 | 3.91 | 28.22 | 25.40 | 346.737 | Horizontal | Pass |
| | | 1907.5 | 1.16 | 3.94 | 28.20 | 25.42 | 348.337 | Horizontal | Pass |
| 10.0MHz Band QPSK | 1/#Mid | 1855 | 0.85 | 3.79 | 28.33 | 25.39 | 345.939 | Horizontal | Pass |
| | | 1880 | 1.15 | 3.95 | 28.22 | 25.42 | 348.337 | Horizontal | Pass |
| | | 1905 | 1.26 | 3.97 | 28.19 | 25.48 | 353.183 | Horizontal | Pass |
| 15.0MHz Band QPSK | 1/#Mid | 1857.5 | 0.89 | 3.79 | 28.34 | 25.44 | 349.945 | Horizontal | Pass |
| | | 1880 | 1.10 | 3.95 | 28.22 | 25.37 | 344.350 | Horizontal | Pass |
| | | 1902.5 | 1.24 | 3.97 | 28.18 | 25.45 | 350.752 | Horizontal | Pass |
| 20.0MHz Band QPSK | 1/#Mid | 1860 | 0.90 | 3.81 | 28.35 | 25.44 | 349.945 | Horizontal | Pass |
| | | 1880 | 1.23 | 3.96 | 28.22 | 25.49 | 353.997 | Horizontal | Pass |
| | | 1900 | 1.29 | 4.00 | 28.16 | 25.45 | 350.752 | Horizontal | Pass |
| 1.4MHz Band QPSK | 1/#Mid | 1850.7 | -0.04 | 3.76 | 28.24 | 24.44 | 277.971 | Vertical | Pass |
| | | 1880 | 0.53 | 3.91 | 28.22 | 24.84 | 304.789 | Vertical | Pass |
| | | 1909.3 | 0.40 | 3.93 | 28.20 | 24.67 | 293.089 | Vertical | Pass |
| 3.0MHz Band QPSK | 1/#Mid | 1851.5 | -0.34 | 3.77 | 28.23 | 24.12 | 258.226 | Vertical | Pass |
| | | 1880 | -0.26 | 3.91 | 28.24 | 24.07 | 255.270 | Vertical | Pass |
| | | 1908.5 | 0.32 | 3.94 | 28.25 | 24.63 | 290.402 | Vertical | Pass |
| 5.0MHz Band QPSK | 1/#Mid | 1852.5 | -0.42 | 3.77 | 28.31 | 24.12 | 258.226 | Vertical | Pass |
| | | 1880 | 0.27 | 3.91 | 28.22 | 24.58 | 287.078 | Vertical | Pass |
| | | 1907.5 | -0.10 | 3.94 | 28.20 | 24.16 | 260.615 | Vertical | Pass |
| 10.0MHz Band QPSK | 1/#Mid | 1855 | -0.25 | 3.79 | 28.33 | 24.29 | 268.534 | Vertical | Pass |
| | | 1880 | 0.09 | 3.95 | 28.22 | 24.36 | 272.898 | Vertical | Pass |
| | | 1905 | 0.03 | 3.97 | 28.19 | 24.25 | 266.073 | Vertical | Pass |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 15.0MHz Band QPSK | 1/#Mid | 1857.5 | -0.45 | 3.79 | 28.34 | 24.10 | 257.040 | Vertical | Pass |
| | | 1880 | 0.50 | 3.95 | 28.22 | 24.77 | 299.916 | Vertical | Pass |
| | | 1902.5 | -0.29 | 3.97 | 28.18 | 23.92 | 246.604 | Vertical | Pass |
| 20.0MHz Band QPSK | 1/#Mid | 1860 | -0.46 | 3.81 | 28.35 | 24.08 | 255.859 | Vertical | Pass |
| | | 1880 | 0.53 | 3.96 | 28.22 | 24.79 | 301.301 | Vertical | Pass |
| | | 1900 | 0.55 | 4.00 | 28.16 | 24.71 | 295.801 | Vertical | Pass |

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

| Radiated Power (EIRP) for Band 2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mode | RB/RB SIZE | Frequency | Result | | | | | | Conclusion |
| | | | SG Level (dBm) | Cable Loss (dBm) | Antenna Gain (dB) | Max. EIRP Average (dBm) | Max. EIRP Average (mW) | Polarization Of Max. ERP | |
| 1.4MHz Band 16 QAM | 1/#Mid | 1850.7 | -0.46 | 3.76 | 28.24 | 24.02 | 252.348 | Horizontal | Pass |
| | | 1880 | 0.07 | 3.91 | 28.22 | 24.38 | 274.157 | Horizontal | Pass |
| | | 1909.3 | 0.14 | 3.93 | 28.20 | 24.41 | 276.058 | Horizontal | Pass |
| 3.0MHz Band 16 QAM | 1/#Mid | 1851.5 | 0.04 | 3.77 | 28.23 | 24.50 | 281.838 | Horizontal | Pass |
| | | 1880 | -0.04 | 3.91 | 28.24 | 24.29 | 268.534 | Horizontal | Pass |
| | | 1908.5 | -0.25 | 3.94 | 28.25 | 24.06 | 254.683 | Horizontal | Pass |
| 5.0MHz Band 16 QAM | 1/#Mid | 1852.5 | 0.10 | 3.77 | 28.31 | 24.64 | 291.072 | Horizontal | Pass |
| | | 1880 | 0.19 | 3.91 | 28.22 | 24.50 | 281.838 | Horizontal | Pass |
| | | 1907.5 | 0.51 | 3.94 | 28.20 | 24.77 | 299.916 | Horizontal | Pass |
| 10.0MHz Band 16 QAM | 1/#Mid | 1855 | 0.05 | 3.79 | 28.33 | 24.59 | 287.740 | Horizontal | Pass |
| | | 1880 | 0.06 | 3.95 | 28.22 | 24.33 | 271.019 | Horizontal | Pass |
| | | 1905 | 0.59 | 3.97 | 28.19 | 24.81 | 302.691 | Horizontal | Pass |
| 15.0MHz Band 16 QAM | 1/#Mid | 1857.5 | 0.07 | 3.79 | 28.34 | 24.62 | 289.734 | Horizontal | Pass |
| | | 1880 | 0.28 | 3.95 | 28.22 | 24.55 | 285.102 | Horizontal | Pass |
| | | 1902.5 | 0.32 | 3.97 | 28.18 | 24.53 | 283.792 | Horizontal | Pass |
| 20.0MHz Band 16 QAM | 1/#Mid | 1860 | 0.18 | 3.81 | 28.35 | 24.72 | 296.483 | Horizontal | Pass |
| | | 1880 | 0.48 | 3.96 | 28.22 | 24.74 | 297.852 | Horizontal | Pass |
| | | 1900 | 0.66 | 4.00 | 28.16 | 24.82 | 303.389 | Horizontal | Pass |
| 1.4MHz Band 16 QAM | 1/#Mid | 1850.7 | -1.30 | 3.76 | 28.24 | 23.18 | 207.970 | Vertical | Pass |
| | | 1880 | -0.68 | 3.91 | 28.22 | 23.63 | 230.675 | Vertical | Pass |
| | | 1909.3 | -1.38 | 3.93 | 28.20 | 22.89 | 194.536 | Vertical | Pass |
| 3.0MHz Band 16 QAM | 1/#Mid | 1851.5 | -1.34 | 3.77 | 28.23 | 23.12 | 205.116 | Vertical | Pass |
| | | 1880 | -0.49 | 3.91 | 28.24 | 23.84 | 242.103 | Vertical | Pass |
| | | 1908.5 | -0.60 | 3.94 | 28.25 | 23.71 | 234.963 | Vertical | Pass |
| 5.0MHz Band 16 QAM | 1/#Mid | 1852.5 | -1.13 | 3.77 | 28.31 | 23.41 | 219.280 | Vertical | Pass |
| | | 1880 | -0.68 | 3.91 | 28.22 | 23.63 | 230.675 | Vertical | Pass |
| | | 1907.5 | -1.18 | 3.94 | 28.20 | 23.08 | 203.236 | Vertical | Pass |
| 10.0MHz Band 16 QAM | 1/#Mid | 1855 | -1.40 | 3.79 | 28.33 | 23.14 | 206.063 | Vertical | Pass |
| | | 1880 | -1.39 | 3.95 | 28.22 | 22.88 | 194.089 | Vertical | Pass |
| | | 1905 | -1.27 | 3.97 | 28.19 | 22.95 | 197.242 | Vertical | Pass |
| 15.0MHz Band 16 QAM | 1/#Mid | 1857.5 | -1.04 | 3.79 | 28.34 | 23.51 | 224.388 | Vertical | Pass |
| | | 1880 | -0.96 | 3.95 | 28.22 | 23.31 | 214.289 | Vertical | Pass |
| | | 1902.5 | -0.71 | 3.97 | 28.18 | 23.50 | 223.872 | Vertical | Pass |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 20.0MHz Band 16 QAM | 1/#Mid | 1860 | -1.03 | 3.81 | 28.35 | 23.51 | 224.388 | Vertical | Pass |
| | | 1880 | -0.88 | 3.96 | 28.22 | 23.38 | 217.771 | Vertical | Pass |
| | | 1900 | -0.99 | 4.00 | 28.16 | 23.17 | 207.491 | Vertical | Pass |

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

## 8.3 LTE BAND 4

| Radiated Power (EIRP) for Band 4 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mode | RB/RB SIZE | Frequency | Result | | | | | | Conclusion |
| | | | SG Level (dBm) | Cable Loss (dBm) | Antenna Gain (dB) | Max. EIRP Average (dBm) | Max. EIRP Average (mW) | Polarization Of Max. ERP | |
| 1.4MHz Band QPSK | 1/#Mid | 1710.7 | 0.05 | 3.12 | 27.58 | 24.51 | 282.488 | Horizontal | Pass |
| | | 1732.5 | 0.06 | 3.27 | 27.61 | 24.40 | 275.423 | Horizontal | Pass |
| | | 1754.3 | 0.08 | 3.29 | 27.63 | 24.42 | 276.694 | Horizontal | Pass |
| 3.0MHz Band QPSK | 1/#Mid | 1711.5 | -0.12 | 3.13 | 27.61 | 24.36 | 272.898 | Horizontal | Pass |
| | | 1732.5 | -0.04 | 3.27 | 27.61 | 24.30 | 269.153 | Horizontal | Pass |
| | | 1753.5 | 0.04 | 3.30 | 27.62 | 24.36 | 272.898 | Horizontal | Pass |
| 5.0MHz Band QPSK | 1/#Mid | 1712.5 | 0.11 | 3.13 | 27.63 | 24.61 | 289.068 | Horizontal | Pass |
| | | 1732.5 | 0.21 | 3.27 | 27.61 | 24.55 | 285.102 | Horizontal | Pass |
| | | 1752.5 | 0.33 | 3.30 | 27.60 | 24.63 | 290.402 | Horizontal | Pass |
| 10.0MHz Band QPSK | 1/#Mid | 1715 | 0.17 | 3.15 | 27.64 | 24.66 | 292.415 | Horizontal | Pass |
| | | 1732.5 | 0.40 | 3.31 | 27.61 | 24.70 | 295.121 | Horizontal | Pass |
| | | 1750 | 0.38 | 3.33 | 27.59 | 24.64 | 291.072 | Horizontal | Pass |
| 15.0MHz Band QPSK | 1/#Mid | 1717.5 | 0.16 | 3.15 | 27.65 | 24.66 | 292.415 | Horizontal | Pass |
| | | 1732.5 | 0.32 | 3.31 | 27.61 | 24.62 | 289.734 | Horizontal | Pass |
| | | 1747.5 | 0.38 | 3.33 | 27.57 | 24.62 | 289.734 | Horizontal | Pass |
| 20.0MHz Band QPSK | 1/#Mid | 1720 | 0.22 | 3.17 | 27.66 | 24.71 | 295.801 | Horizontal | Pass |
| | | 1732.5 | 0.39 | 3.32 | 27.61 | 24.68 | 293.765 | Horizontal | Pass |
| | | 1745 | 0.45 | 3.36 | 27.56 | 24.65 | 291.743 | Horizontal | Pass |
| 1.4MHz Band QPSK | 1/#Mid | 1710.7 | -1.10 | 3.12 | 27.58 | 23.36 | 216.770 | Vertical | Pass |
| | | 1732.5 | -0.65 | 3.27 | 27.61 | 23.69 | 233.884 | Vertical | Pass |
| | | 1754.3 | -0.84 | 3.29 | 27.63 | 23.50 | 223.872 | Vertical | Pass |
| 3.0MHz Band QPSK | 1/#Mid | 1711.5 | -0.75 | 3.13 | 27.61 | 23.73 | 236.048 | Vertical | Pass |
| | | 1732.5 | -0.38 | 3.27 | 27.61 | 23.96 | 248.886 | Vertical | Pass |
| | | 1753.5 | -0.28 | 3.30 | 27.62 | 24.04 | 253.513 | Vertical | Pass |
| 5.0MHz Band QPSK | 1/#Mid | 1712.5 | -0.37 | 3.13 | 27.63 | 24.13 | 258.821 | Vertical | Pass |
| | | 1732.5 | -0.32 | 3.27 | 27.61 | 24.02 | 252.348 | Vertical | Pass |
| | | 1752.5 | -0.61 | 3.30 | 27.60 | 23.69 | 233.884 | Vertical | Pass |
| 10.0MHz Band QPSK | 1/#Mid | 1715 | -0.73 | 3.15 | 27.64 | 23.76 | 237.684 | Vertical | Pass |
| | | 1732.5 | -0.48 | 3.31 | 27.61 | 23.82 | 240.991 | Vertical | Pass |
| | | 1750 | -0.50 | 3.33 | 27.59 | 23.76 | 237.684 | Vertical | Pass |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 15.0MHz Band QPSK | 1/#Mid | 1717.5 | -0.56 | 3.15 | 27.65 | 23.94 | 247.742 | Vertical | Pass |
| | | 1732.5 | -0.20 | 3.31 | 27.61 | 24.10 | 257.040 | Vertical | Pass |
| | | 1747.5 | -0.12 | 3.33 | 27.57 | 24.12 | 258.226 | Vertical | Pass |
| 20.0MHz Band QPSK | 1/#Mid | 1720 | -0.82 | 3.17 | 27.66 | 23.67 | 232.809 | Vertical | Pass |
| | | 1732.5 | -0.37 | 3.32 | 27.61 | 23.92 | 246.604 | Vertical | Pass |
| | | 1745 | -0.38 | 3.36 | 27.56 | 23.82 | 240.991 | Vertical | Pass |

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

| Radiated Power (EIRP) for Band 4 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mode | RB/RB SIZE | Frequency | Result | | | | | | Conclusion |
| | | | SG Level (dBm) | Cable Loss (dBm) | Antenna Gain (dB) | Max. EIRP Average (dBm) | Max. EIRP Average (mW) | Polarization Of Max. ERP | |
| 1.4MHz Band 16 QAM | 1/#Mid | 1710.7 | -0.76 | 3.12 | 27.58 | 23.70 | 234.423 | Horizontal | Pass |
| | | 1732.5 | -0.61 | 3.27 | 27.61 | 23.73 | 236.048 | Horizontal | Pass |
| | | 1754.3 | -0.61 | 3.29 | 27.63 | 23.73 | 236.048 | Horizontal | Pass |
| 3.0MHz Band 16 QAM | 1/#Mid | 1711.5 | -0.70 | 3.13 | 27.61 | 23.78 | 238.781 | Horizontal | Pass |
| | | 1732.5 | -0.83 | 3.27 | 27.61 | 23.51 | 224.388 | Horizontal | Pass |
| | | 1753.5 | -1.05 | 3.30 | 27.62 | 23.27 | 212.324 | Horizontal | Pass |
| 5.0MHz Band 16 QAM | 1/#Mid | 1712.5 | -0.53 | 3.13 | 27.63 | 23.97 | 249.459 | Horizontal | Pass |
| | | 1732.5 | -0.49 | 3.27 | 27.61 | 23.85 | 242.661 | Horizontal | Pass |
| | | 1752.5 | -0.18 | 3.30 | 27.60 | 24.12 | 258.226 | Horizontal | Pass |
| 10.0MHz Band 16 QAM | 1/#Mid | 1715 | -0.60 | 3.15 | 27.64 | 23.89 | 244.906 | Horizontal | Pass |
| | | 1732.5 | -0.79 | 3.31 | 27.61 | 23.51 | 224.388 | Horizontal | Pass |
| | | 1750 | -0.17 | 3.33 | 27.59 | 24.09 | 256.448 | Horizontal | Pass |
| 15.0MHz Band 16 QAM | 1/#Mid | 1717.5 | -0.40 | 3.15 | 27.65 | 24.10 | 257.040 | Horizontal | Pass |
| | | 1732.5 | -0.46 | 3.31 | 27.61 | 23.84 | 242.103 | Horizontal | Pass |
| | | 1747.5 | -0.48 | 3.33 | 27.57 | 23.76 | 237.684 | Horizontal | Pass |
| 20.0MHz Band 16 QAM | 1/#Mid | 1720 | -0.35 | 3.17 | 27.66 | **24.14** | 259.418 | Horizontal | Pass |
| | | 1732.5 | -0.36 | 3.32 | 27.61 | 23.93 | 247.172 | Horizontal | Pass |
| | | 1745 | -0.17 | 3.36 | 27.56 | 24.03 | 252.930 | Horizontal | Pass |
| 1.4MHz Band 16 QAM | 1/#Mid | 1710.7 | -2.17 | 3.12 | 27.58 | 22.29 | 169.434 | Vertical | Pass |
| | | 1732.5 | -1.34 | 3.27 | 27.61 | 23.00 | 199.526 | Vertical | Pass |
| | | 1754.3 | -1.45 | 3.29 | 27.63 | 22.89 | 194.536 | Vertical | Pass |
| 3.0MHz Band 16 QAM | 1/#Mid | 1711.5 | -1.51 | 3.13 | 27.61 | 22.97 | 198.153 | Vertical | Pass |
| | | 1732.5 | -1.80 | 3.27 | 27.61 | 22.54 | 179.473 | Vertical | Pass |
| | | 1753.5 | -1.63 | 3.30 | 27.62 | 22.69 | 185.780 | Vertical | Pass |
| 5.0MHz Band 16 QAM | 1/#Mid | 1712.5 | -2.29 | 3.13 | 27.63 | 22.21 | 166.341 | Vertical | Pass |
| | | 1732.5 | -1.54 | 3.27 | 27.61 | 22.80 | 190.546 | Vertical | Pass |
| | | 1752.5 | -1.45 | 3.30 | 27.60 | 22.85 | 192.752 | Vertical | Pass |
| 10.0MHz Band 16 QAM | 1/#Mid | 1715 | -1.70 | 3.15 | 27.64 | 22.79 | 190.108 | Vertical | Pass |
| | | 1732.5 | -1.99 | 3.31 | 27.61 | 22.31 | 170.216 | Vertical | Pass |
| | | 1750 | -1.16 | 3.33 | 27.59 | 23.10 | 204.174 | Vertical | Pass |
| 15.0MHz Band 16 QAM | 1/#Mid | 1717.5 | -1.76 | 3.15 | 27.65 | 22.74 | 187.932 | Vertical | Pass |
| | | 1732.5 | -1.50 | 3.31 | 27.61 | 22.80 | 190.546 | Vertical | Pass |
| | | 1747.5 | -1.39 | 3.33 | 27.57 | 22.85 | 192.752 | Vertical | Pass |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 20.0MHz Band 16 QAM | 1/#Mid | 1720 | -1.89 | 3.17 | 27.66 | 22.60 | 181.970 | Vertical | Pass |
| | | 1732.5 | -1.26 | 3.32 | 27.61 | 23.03 | 200.909 | Vertical | Pass |
| | | 1745 | -2.02 | 3.36 | 27.56 | 22.18 | 165.196 | Vertical | Pass |

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

## 8.4 LTE BAND 5

| Radiated Power (ERP) for Band 5 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mode | RB/RB SIZE | Frequency | Result | | | | | | | Conclusion |
| | | | SG Level (dBm) | Cable Loss (dBm) | Antenna Gain (dB) | Correction (dB) | Max. ERP Average (dBm) | Max. ERP Average (mW) | Polarization Of Max. ERP | |
| 1.4MHz Band QPSK | 1/#Mid | 824.7 | 8.94 | 2.01 | 19.68 | 2.15 | 24.46 | 279.254 | Horizontal | Pass |
| | | 836.5 | 8.82 | 2.01 | 19.77 | 2.15 | 24.43 | 277.332 | Horizontal | Pass |
| | | 848.3 | 8.62 | 2.02 | 19.82 | 2.15 | 24.27 | 267.301 | Horizontal | Pass |
| 3.0MHz Band QPSK | 1/#Mid | 825.5 | 8.71 | 2.01 | 19.70 | 2.15 | 24.25 | 266.073 | Horizontal | Pass |
| | | 836.5 | 8.61 | 2.01 | 19.77 | 2.15 | 24.22 | 264.241 | Horizontal | Pass |
| | | 847.5 | 8.48 | 2.02 | 19.81 | 2.15 | 24.12 | 258.226 | Horizontal | Pass |
| 5.0MHz Band QPSK | 1/#Mid | 826.5 | 8.99 | 2.01 | 19.71 | 2.15 | 24.54 | 284.446 | Horizontal | Pass |
| | | 836.5 | 8.87 | 2.01 | 19.77 | 2.15 | 24.48 | 280.543 | Horizontal | Pass |
| | | 846.5 | 8.71 | 2.02 | 19.79 | 2.15 | 24.33 | 271.019 | Horizontal | Pass |
| 10.0MHz Band QPSK | 1/#Mid | 829 | 9.01 | 2.01 | 19.73 | 2.15 | 24.58 | 287.078 | Horizontal | Pass |
| | | 836.5 | 8.96 | 2.01 | 19.77 | 2.15 | 24.57 | 286.418 | Horizontal | Pass |
| | | 844 | 8.86 | 2.02 | 19.78 | 2.15 | 24.47 | 279.898 | Horizontal | Pass |
| 1.4MHz Band QPSK | 1/#Mid | 824.7 | 8.15 | 2.01 | 19.68 | 2.15 | 23.67 | 232.809 | Vertical | Pass |
| | | 836.5 | 7.73 | 2.01 | 19.77 | 2.15 | 23.34 | 215.774 | Vertical | Pass |
| | | 848.3 | 7.21 | 2.02 | 19.82 | 2.15 | 22.86 | 193.197 | Vertical | Pass |
| 3.0MHz Band QPSK | 1/#Mid | 825.5 | 7.90 | 2.01 | 19.70 | 2.15 | 23.44 | 220.800 | Vertical | Pass |
| | | 836.5 | 8.06 | 2.01 | 19.77 | 2.15 | 23.67 | 232.809 | Vertical | Pass |
| | | 847.5 | 7.88 | 2.02 | 19.81 | 2.15 | 23.52 | 224.905 | Vertical | Pass |
| 5.0MHz Band QPSK | 1/#Mid | 826.5 | 7.61 | 2.01 | 19.71 | 2.15 | 23.16 | 207.014 | Vertical | Pass |
| | | 836.5 | 7.61 | 2.01 | 19.77 | 2.15 | 23.22 | 209.894 | Vertical | Pass |
| | | 846.5 | 7.63 | 2.02 | 19.79 | 2.15 | 23.25 | 211.349 | Vertical | Pass |
| 10.0MHz Band QPSK | 1/#Mid | 829 | 7.74 | 2.01 | 19.73 | 2.15 | 23.31 | 214.289 | Vertical | Pass |
| | | 836.5 | 7.96 | 2.01 | 19.77 | 2.15 | 23.57 | 227.510 | Vertical | Pass |
| | | 844 | 7.94 | 2.02 | 19.78 | 2.15 | 23.55 | 226.464 | Vertical | Pass |

| Radiated Power (ERP) for Band 5 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mode | RB/RB SIZE | Frequency | Result | | | | | | | Conclusion |
| | | | SG Level (dBm) | Cable Loss (dBm) | Antenna Gain (dB) | Correction (dB) | Max. ERP Average (dBm) | Max. ERP Average (mW) | Polarization Of Max. ERP | |
| 1.4MHz Band 16 QAM | 1/#Mid | 824.7 | 8.09 | 2.01 | 19.68 | 2.15 | 23.61 | 229.615 | Horizontal | Pass |
| | | 836.5 | 8.02 | 2.01 | 19.77 | 2.15 | 23.63 | 230.675 | Horizontal | Pass |
| | | 848.3 | 7.86 | 2.02 | 19.82 | 2.15 | 23.51 | 224.388 | Horizontal | Pass |
| 3.0MHz Band 16 QAM | 1/#Mid | 825.5 | 8.17 | 2.01 | 19.70 | 2.15 | 23.71 | 234.963 | Horizontal | Pass |
| | | 836.5 | 7.88 | 2.01 | 19.77 | 2.15 | 23.49 | 223.357 | Horizontal | Pass |
| | | 847.5 | 7.36 | 2.02 | 19.81 | 2.15 | 23.00 | 199.526 | Horizontal | Pass |
| 5.0MHz Band 16 QAM | 1/#Mid | 826.5 | 8.49 | 2.01 | 19.71 | 2.15 | 24.04 | 253.513 | Horizontal | Pass |
| | | 836.5 | 8.26 | 2.01 | 19.77 | 2.15 | 23.87 | 243.781 | Horizontal | Pass |
| | | 846.5 | 8.01 | 2.02 | 19.79 | 2.15 | 23.63 | 230.675 | Horizontal | Pass |
| 10.0MHz Band 16 QAM | 1/#Mid | 829 | 8.49 | 2.01 | 19.73 | 2.15 | 24.06 | 254.683 | Horizontal | Pass |
| | | 836.5 | 8.21 | 2.01 | 19.77 | 2.15 | 23.82 | 240.991 | Horizontal | Pass |
| | | 844 | 7.75 | 2.02 | 19.78 | 2.15 | 23.36 | 216.770 | Horizontal | Pass |
| 1.4MHz Band 16 QAM | 1/#Mid | 824.7 | 6.36 | 2.01 | 19.68 | 2.15 | 21.88 | 154.170 | Vertical | Pass |
| | | 836.5 | 8.13 | 2.01 | 19.77 | 2.15 | 23.74 | 236.592 | Vertical | Pass |
| | | 848.3 | 7.85 | 2.02 | 19.82 | 2.15 | 23.50 | 223.872 | Vertical | Pass |
| 3.0MHz Band 16 QAM | 1/#Mid | 825.5 | 7.52 | 2.01 | 19.70 | 2.15 | 23.06 | 202.302 | Vertical | Pass |
| | | 836.5 | 6.54 | 2.01 | 19.77 | 2.15 | 22.15 | 164.059 | Vertical | Pass |
| | | 847.5 | 7.44 | 2.02 | 19.81 | 2.15 | 23.08 | 203.236 | Vertical | Pass |
| 5.0MHz Band 16 QAM | 1/#Mid | 826.5 | 7.03 | 2.01 | 19.71 | 2.15 | 22.58 | 181.134 | Vertical | Pass |
| | | 836.5 | 6.20 | 2.01 | 19.77 | 2.15 | 21.81 | 151.705 | Vertical | Pass |
| | | 846.5 | 6.51 | 2.02 | 19.79 | 2.15 | 22.13 | 163.305 | Vertical | Pass |
| 10.0MHz Band 16 QAM | 1/#Mid | 829 | 6.72 | 2.01 | 19.73 | 2.15 | 22.29 | 169.434 | Vertical | Pass |
| | | 836.5 | 7.67 | 2.01 | 19.77 | 2.15 | 23.28 | 212.814 | Vertical | Pass |
| | | 844 | 7.08 | 2.02 | 19.78 | 2.15 | 22.69 | 185.780 | Vertical | Pass |

Note:
ERP=EIRP-2.15
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

## 8.5 LTE BAND 7

| Radiated Power (EIRP) for Band 7 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mode | RB/RB SIZE | Frequency | Result | | | | | | Conclusion |
| | | | SG Level (dBm) | Cable Loss (dBm) | Antenna Gain (dB) | Max. EIRP Average (dBm) | Max. EIRP Average (mW) | Polarization Of Max. ERP | |
| 5.0MHz Band QPSK | 1/#Mid | 2502.5 | 1.93 | 4.54 | 27.75 | 25.14 | 326.588 | Horizontal | Pass |
| | | 2535 | 2.10 | 4.69 | 27.72 | 25.13 | 325.837 | Horizontal | Pass |
| | | 2567.5 | 2.17 | 4.71 | 27.71 | 25.17 | 328.852 | Horizontal | Pass |
| 10.0MHz Band QPSK | 1/#Mid | 2505 | 2.00 | 4.55 | 27.76 | 25.21 | 331.894 | Horizontal | Pass |
| | | 2535 | 2.19 | 4.69 | 27.72 | 25.22 | 332.660 | Horizontal | Pass |
| | | 2565 | 2.27 | 4.72 | 27.70 | 25.25 | 334.965 | Horizontal | Pass |
| 15.0MHz Band QPSK | 1/#Mid | 2507.5 | 1.99 | 4.55 | 27.77 | 25.21 | 331.894 | Horizontal | Pass |
| | | 2535 | 2.13 | 4.69 | 27.72 | 25.16 | 328.095 | Horizontal | Pass |
| | | 2562.5 | 2.23 | 4.72 | 27.69 | 25.20 | 331.131 | Horizontal | Pass |
| 20.0MHz Band QPSK | 1/#Mid | 2510 | 2.05 | 4.57 | 27.78 | **25.26** | 335.738 | Horizontal | Pass |
| | | 2535 | 2.23 | 4.73 | 27.72 | 25.22 | 332.660 | Horizontal | Pass |
| | | 2560 | 2.27 | 4.75 | 27.68 | 25.20 | 331.131 | Horizontal | Pass |
| 5.0MHz Band QPSK | 1/#Mid | 2502.5 | 0.18 | 4.54 | 27.75 | 23.39 | 218.273 | Vertical | Pass |
| | | 2535 | 0.78 | 4.69 | 27.72 | 23.81 | 240.436 | Vertical | Pass |
| | | 2567.5 | 0.88 | 4.71 | 27.71 | 23.88 | 244.343 | Vertical | Pass |
| 10.0MHz Band QPSK | 1/#Mid | 2505 | 0.65 | 4.55 | 27.76 | 23.86 | 243.220 | Vertical | Pass |
| | | 2535 | 0.73 | 4.69 | 27.72 | 23.76 | 237.684 | Vertical | Pass |
| | | 2565 | 0.35 | 4.72 | 27.70 | 23.33 | 215.278 | Vertical | Pass |
| 15.0MHz Band QPSK | 1/#Mid | 2507.5 | 0.99 | 4.55 | 27.77 | 24.21 | 263.633 | Vertical | Pass |
| | | 2535 | 0.96 | 4.69 | 27.72 | 23.99 | 250.611 | Vertical | Pass |
| | | 2562.5 | 0.80 | 4.72 | 27.69 | 23.77 | 238.232 | Vertical | Pass |
| 20.0MHz Band QPSK | 1/#Mid | 2510 | 0.63 | 4.57 | 27.78 | 23.84 | 242.103 | Vertical | Pass |
| | | 2535 | 1.05 | 4.73 | 27.72 | 24.04 | 253.513 | Vertical | Pass |
| | | 2560 | 0.56 | 4.75 | 27.68 | 23.49 | 223.357 | Vertical | Pass |

| Radiated Power (EIRP) for Band 7 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mode | RB/RB SIZE | Frequency | Result | | | | | | Conclusion |
| | | | SG Level (dBm) | Cable Loss (dBm) | Antenna Gain (dB) | Max. EIRP Average (dBm) | Max. EIRP Average (mW) | Polarization Of Max. ERP | |
| 5.0MHz Band 16 QAM | 1/#Mid | 2502.5 | 1.24 | 4.54 | 27.75 | 24.45 | 278.612 | Horizontal | Pass |
| | | 2535 | 1.55 | 4.69 | 27.72 | 24.58 | 287.078 | Horizontal | Pass |
| | | 2567.5 | 1.47 | 4.71 | 27.71 | 24.47 | 279.898 | Horizontal | Pass |
| 10.0MHz Band 16 QAM | 1/#Mid | 2505 | 1.35 | 4.55 | 27.76 | 24.56 | 285.759 | Horizontal | Pass |
| | | 2535 | 1.34 | 4.69 | 27.72 | 24.37 | 273.527 | Horizontal | Pass |
| | | 2565 | 1.07 | 4.72 | 27.70 | 24.05 | 254.097 | Horizontal | Pass |
| 15.0MHz Band 16 QAM | 1/#Mid | 2507.5 | 1.17 | 4.55 | 27.77 | 24.39 | 274.789 | Horizontal | Pass |
| | | 2535 | 1.20 | 4.69 | 27.72 | 24.23 | 264.850 | Horizontal | Pass |
| | | 2562.5 | 1.59 | 4.72 | 27.69 | 24.56 | 285.759 | Horizontal | Pass |
| 20.0MHz Band 16 QAM | 1/#Mid | 2510 | 1.29 | 4.57 | 27.78 | 24.50 | 281.838 | Horizontal | Pass |
| | | 2535 | 1.62 | 4.73 | 27.72 | **24.61** | 289.068 | Horizontal | Pass |
| | | 2560 | 1.52 | 4.75 | 27.68 | 24.45 | 278.612 | Horizontal | Pass |
| 5.0MHz Band 16 QAM | 1/#Mid | 2502.5 | 0.43 | 4.54 | 27.75 | 23.64 | 231.206 | Vertical | Pass |
| | | 2535 | 0.71 | 4.69 | 27.72 | 23.74 | 236.592 | Vertical | Pass |
| | | 2567.5 | -0.12 | 4.71 | 27.71 | 22.88 | 194.089 | Vertical | Pass |
| 10.0MHz Band 16 QAM | 1/#Mid | 2505 | 0.33 | 4.55 | 27.76 | 23.54 | 225.944 | Vertical | Pass |
| | | 2535 | 0.82 | 4.69 | 27.72 | 23.85 | 242.661 | Vertical | Pass |
| | | 2565 | 1.23 | 4.72 | 27.70 | 24.21 | 263.633 | Vertical | Pass |
| 15.0MHz Band 16 QAM | 1/#Mid | 2507.5 | 0.54 | 4.55 | 27.77 | 23.76 | 237.684 | Vertical | Pass |
| | | 2535 | 0.92 | 4.69 | 27.72 | 23.95 | 248.313 | Vertical | Pass |
| | | 2562.5 | -0.23 | 4.72 | 27.69 | 22.74 | 187.932 | Vertical | Pass |
| 20.0MHz Band 16 QAM | 1/#Mid | 2510 | -0.50 | 4.57 | 27.78 | 22.71 | 186.638 | Vertical | Pass |
| | | 2535 | -0.27 | 4.73 | 27.72 | 22.72 | 187.068 | Vertical | Pass |
| | | 2560 | -0.52 | 4.75 | 27.68 | 22.41 | 174.181 | Vertical | Pass |

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

## 8.6 LTE BAND 17

| Radiated Power (ERP) for Band 17 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mode | RB/RB SIZE | Frequency | Result | | | | | | | Conclusion |
| | | | SG Level (dBm) | Cable Loss (dBm) | Antenna Gain (dB) | Correction (dB) | Max. ERP Average (dBm) | Max. ERP Average (mW) | Polarization Of Max. ERP | |
| 5.0MHz Band QPSK | 1/#Mid | 706.5 | 9.54 | 1.91 | 19.23 | 2.15 | 24.71 | 295.801 | Vertical | Pass |
| | | 710 | 9.40 | 1.91 | 19.26 | 2.15 | 24.60 | 288.403 | Vertical | Pass |
| | | 713.5 | 9.30 | 1.92 | 19.33 | 2.15 | 24.56 | 285.759 | Vertical | Pass |
| 10.0MHz Band QPSK | 1/#Mid | 709 | 9.55 | 1.91 | 19.25 | 2.15 | 24.74 | 297.852 | Vertical | Pass |
| | | 710 | 9.50 | 1.91 | 19.26 | 2.15 | 24.70 | 295.121 | Vertical | Pass |
| | | 711 | 9.46 | 1.92 | 19.32 | 2.15 | 24.71 | 295.801 | Vertical | Pass |
| 5.0MHz Band QPSK | 1/#Mid | 706.5 | 7.86 | 1.91 | 19.23 | 2.15 | 23.03 | 200.909 | Horizontal | Pass |
| | | 710 | 7.62 | 1.91 | 19.26 | 2.15 | 22.82 | 191.426 | Horizontal | Pass |
| | | 713.5 | 8.11 | 1.92 | 19.33 | 2.15 | 23.37 | 217.270 | Horizontal | Pass |
| 10.0MHz Band QPSK | 1/#Mid | 709 | 7.75 | 1.91 | 19.25 | 2.15 | 22.94 | 196.789 | Horizontal | Pass |
| | | 710 | 8.26 | 1.91 | 19.26 | 2.15 | 23.46 | 221.820 | Horizontal | Pass |
| | | 711 | 7.73 | 1.92 | 19.32 | 2.15 | 22.98 | 198.609 | Horizontal | Pass |

| Radiated Power (ERP) for Band 17 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mode | RB/RB SIZE | Frequency | Result | | | | | | | Conclusion |
| | | | SG Level (dBm) | Cable Loss (dBm) | Antenna Gain (dB) | Correction (dB) | Max. ERP Average (dBm) | Max. ERP Average (mW) | Polarization Of Max. ERP | |
| 5.0MHz Band 16 QAM | 1/#Mid | 706.5 | 8.89 | 1.91 | 19.23 | 2.15 | 24.06 | 254.683 | Vertical | Pass |
| | | 710 | 8.80 | 1.91 | 19.26 | 2.15 | 24.00 | 251.189 | Vertical | Pass |
| | | 713.5 | 8.60 | 1.92 | 19.33 | 2.15 | 23.86 | 243.220 | Vertical | Pass |
| 10.0MHz Band 16 QAM | 1/#Mid | 709 | 8.43 | 1.91 | 19.25 | 2.15 | 23.62 | 230.144 | Vertical | Pass |
| | | 710 | 8.96 | 1.91 | 19.26 | 2.15 | 24.16 | 260.615 | Vertical | Pass |
| | | 711 | 8.69 | 1.92 | 19.32 | 2.15 | 23.94 | 247.742 | Vertical | Pass |
| 5.0MHz Band 16 QAM | 1/#Mid | 706.5 | 7.76 | 1.91 | 19.23 | 2.15 | 22.93 | 196.336 | Horizontal | Pass |
| | | 710 | 7.42 | 1.91 | 19.26 | 2.15 | 22.62 | 182.810 | Horizontal | Pass |
| | | 713.5 | 8.08 | 1.92 | 19.33 | 2.15 | 23.34 | 215.774 | Horizontal | Pass |
| 10.0MHz Band 16 QAM | 1/#Mid | 709 | 7.83 | 1.91 | 19.25 | 2.15 | 23.02 | 200.447 | Horizontal | Pass |
| | | 710 | 7.63 | 1.91 | 19.26 | 2.15 | 22.83 | 191.867 | Horizontal | Pass |
| | | 711 | 7.56 | 1.92 | 19.32 | 2.15 | 22.81 | 190.985 | Horizontal | Pass |

Note:
ERP=EIRP-2.15
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

## 8.7 LTE BAND 66

| Radiated Power (EIRP) for Band 66 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mode | RB/RB SIZE | Frequency | Result | | | | | | Conclusion |
| | | | SG Level (dBm) | Cable Loss (dBm) | Antenna Gain (dB) | Max. EIRP Average (dBm) | Max. EIRP Average (mW) | Polarization Of Max. ERP | |
| 1.4MHz Band QPSK | 6/0 | 1710.7 | 0.27 | 3.76 | 28.24 | 24.75 | 298.538 | Horizontal | Pass |
| | | 1745 | 0.41 | 3.91 | 28.22 | 24.72 | 296.483 | Horizontal | Pass |
| | | 1779.3 | 0.54 | 3.93 | 28.2 | 24.81 | 302.691 | Horizontal | Pass |
| 3.0MHz Band QPSK | 15/0 | 1711.5 | 0.21 | 3.77 | 28.23 | 24.67 | 293.089 | Horizontal | Pass |
| | | 1745 | 0.30 | 3.91 | 28.24 | 24.63 | 290.402 | Horizontal | Pass |
| | | 1778.5 | 0.28 | 3.94 | 28.25 | 24.59 | 287.740 | Horizontal | Pass |
| 5.0MHz Band QPSK | 25/0 | 1712.5 | 0.31 | 3.77 | 28.31 | 24.85 | 305.492 | Horizontal | Pass |
| | | 1745 | 0.63 | 3.91 | 28.22 | 24.94 | 311.889 | Horizontal | Pass |
| | | 1777.5 | 0.57 | 3.94 | 28.2 | 24.83 | 304.089 | Horizontal | Pass |
| 10.0MHz Band QPSK | 50/0 | 1715 | 0.42 | 3.79 | 28.33 | 24.96 | 313.329 | Horizontal | Pass |
| | | 1745 | 0.69 | 3.95 | 28.22 | 24.96 | 313.329 | Horizontal | Pass |
| | | 1775 | 0.68 | 3.97 | 28.19 | 24.90 | 309.030 | Horizontal | Pass |
| 15.0MHz Band QPSK | 75/0 | 1717.5 | 0.40 | 3.79 | 28.34 | 24.95 | 312.608 | Horizontal | Pass |
| | | 1745 | 0.59 | 3.95 | 28.22 | 24.86 | 306.196 | Horizontal | Pass |
| | | 1772.5 | 0.64 | 3.97 | 28.18 | 24.85 | 305.492 | Horizontal | Pass |
| 20.0MHz Band QPSK | 100/0 | 1720 | 0.43 | 3.81 | 28.35 | 24.97 | 314.051 | Horizontal | Pass |
| | | 1745 | 0.69 | 3.96 | 28.22 | 24.95 | 312.608 | Horizontal | Pass |
| | | 1770 | 0.67 | 4 | 28.16 | 24.83 | 304.089 | Horizontal | Pass |
| 1.4MHz Band QPSK | 6/0 | 1710.7 | -1.22 | 3.76 | 28.24 | 23.26 | 211.836 | Vertical | Pass |
| | | 1745 | -0.64 | 3.91 | 28.22 | 23.67 | 232.809 | Vertical | Pass |
| | | 1779.3 | -0.30 | 3.93 | 28.2 | 23.97 | 249.459 | Vertical | Pass |
| 3.0MHz Band QPSK | 15/0 | 1711.5 | -0.29 | 3.77 | 28.23 | 24.17 | 261.216 | Vertical | Pass |
| | | 1745 | -0.55 | 3.91 | 28.24 | 23.78 | 238.781 | Vertical | Pass |
| | | 1778.5 | -1.05 | 3.94 | 28.25 | 23.26 | 211.836 | Vertical | Pass |
| 5.0MHz Band QPSK | 25/0 | 1712.5 | -1.02 | 3.77 | 28.31 | 23.52 | 224.905 | Vertical | Pass |
| | | 1745 | -0.61 | 3.91 | 28.22 | 23.70 | 234.423 | Vertical | Pass |
| | | 1777.5 | -0.28 | 3.94 | 28.2 | 23.98 | 250.035 | Vertical | Pass |
| 10.0MHz Band | 50/0 | 1715 | -0.37 | 3.79 | 28.34 | 24.18 | 261.818 | Vertical | Pass |
| | | 1745 | -0.23 | 3.95 | 28.22 | 24.04 | 253.513 | Vertical | Pass |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| QPSK | | 1775 | -0.26 | 3.97 | 28.18 | 23.95 | 248.313 | Vertical | Pass |
| 15.0MHz | 75/0 | 1717.5 | -0.46 | 3.81 | 28.35 | 24.08 | 255.859 | Vertical | Pass |
| Band | | 1745 | -0.84 | 3.96 | 28.22 | 23.42 | 219.786 | Vertical | Pass |
| QPSK | | 1772.5 | -0.56 | 4 | 28.16 | 23.60 | 229.087 | Vertical | Pass |
| 20.0MHz | 100/0 | 1720 | -0.44 | 3.79 | 28.34 | 24.11 | 257.632 | Vertical | Pass |
| Band | | 1745 | -0.62 | 3.95 | 28.22 | 23.65 | 231.739 | Vertical | Pass |
| QPSK | | 1770 | -0.58 | 3.97 | 28.18 | 23.63 | 230.675 | Vertical | Pass |

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

| Radiated Power (EIRP) for Band 66 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mode | RB/RB SIZE | Frequency | Result | | | | | | Conclusion |
| | | | SG Level (dBm) | Cable Loss (dBm) | Antenna Gain (dB) | Max. EIRP Average (dBm) | Max. EIRP Average (mW) | Polarization Of Max. ERP | |
| 1.4MHz Band 16 QAM | 6/0 | 1710.7 | -0.56 | 3.76 | 28.24 | 23.92 | 246.604 | Horizontal | Pass |
| | | 1745 | -0.17 | 3.91 | 28.22 | 24.14 | 259.418 | Horizontal | Pass |
| | | 1779.3 | -0.35 | 3.93 | 28.2 | 23.92 | 246.604 | Horizontal | Pass |
| 3.0MHz Band 16 QAM | 15/0 | 1711.5 | -0.95 | 3.77 | 28.23 | 23.51 | 224.388 | Horizontal | Pass |
| | | 1745 | -0.20 | 3.91 | 28.24 | 24.13 | 258.821 | Horizontal | Pass |
| | | 1778.5 | -0.49 | 3.94 | 28.25 | 23.82 | 240.991 | Horizontal | Pass |
| 5.0MHz Band 16 QAM | 25/0 | 1712.5 | -0.37 | 3.77 | 28.31 | 24.17 | 261.216 | Horizontal | Pass |
| | | 1745 | -0.43 | 3.91 | 28.22 | 23.88 | 244.343 | Horizontal | Pass |
| | | 1777.5 | -0.10 | 3.94 | 28.2 | 24.16 | 260.615 | Horizontal | Pass |
| 10.0MHz Band 16 QAM | 50/0 | 1715 | -0.42 | 3.79 | 28.33 | 24.12 | 258.226 | Horizontal | Pass |
| | | 1745 | -0.08 | 3.95 | 28.22 | 24.19 | 262.422 | Horizontal | Pass |
| | | 1775 | -0.40 | 3.97 | 28.19 | 23.82 | 240.991 | Horizontal | Pass |
| 15.0MHz Band 16 QAM | 75/0 | 1717.5 | -0.41 | 3.79 | 28.34 | 24.14 | 259.418 | Horizontal | Pass |
| | | 1745 | -0.23 | 3.95 | 28.22 | 24.04 | 253.513 | Horizontal | Pass |
| | | 1772.5 | -0.02 | 3.97 | 28.18 | 24.19 | 262.422 | Horizontal | Pass |
| 20.0MHz Band 16 QAM | 100/0 | 1720 | -0.24 | 3.81 | 28.35 | 24.30 | 269.153 | Horizontal | Pass |
| | | 1745 | -0.02 | 3.96 | 28.22 | 24.24 | 265.461 | Horizontal | Pass |
| | | 1770 | 0.04 | 4 | 28.16 | 24.20 | 263.027 | Horizontal | Pass |
| 1.4MHz Band 16 QAM | 6/0 | 1710.7 | -2.11 | 3.76 | 28.24 | 22.37 | 172.584 | Vertical | Pass |
| | | 1745 | -1.19 | 3.91 | 28.22 | 23.12 | 205.116 | Vertical | Pass |
| | | 1779.3 | -1.08 | 3.93 | 28.2 | 23.19 | 208.449 | Vertical | Pass |
| 3.0MHz Band 16 QAM | 15/0 | 1711.5 | -1.75 | 3.77 | 28.23 | 22.71 | 186.638 | Vertical | Pass |
| | | 1745 | -1.54 | 3.91 | 28.24 | 22.79 | 190.108 | Vertical | Pass |
| | | 1778.5 | -1.66 | 3.94 | 28.25 | 22.65 | 184.077 | Vertical | Pass |
| 5.0MHz Band 16 QAM | 25/0 | 1712.5 | -1.49 | 3.77 | 28.31 | 23.05 | 201.837 | Vertical | Pass |
| | | 1745 | -1.86 | 3.91 | 28.22 | 22.45 | 175.792 | Vertical | Pass |
| | | 1777.5 | -2.02 | 3.94 | 28.2 | 22.24 | 167.494 | Vertical | Pass |
| 10.0MHz Band 16 QAM | 50/0 | 1715 | -0.40 | 3.79 | 28.34 | 24.15 | 260.016 | Vertical | Pass |
| | | 1745 | -0.79 | 3.95 | 28.22 | 23.48 | 222.844 | Vertical | Pass |
| | | 1775 | -0.37 | 3.97 | 28.18 | 23.84 | 242.103 | Vertical | Pass |
| 15.0MHz Band 16 QAM | 75/0 | 1717.5 | -2.12 | 3.81 | 28.35 | 22.42 | 174.582 | Vertical | Pass |
| | | 1745 | -0.11 | 3.96 | 28.22 | 24.15 | 260.016 | Vertical | Pass |
| | | 1772.5 | -0.93 | 4 | 28.16 | 23.23 | 210.378 | Vertical | Pass |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 20.0MHz Band 16 QAM | 100/0 | 1720 | -1.35 | 3.79 | 28.34 | 23.20 | 208.930 | Vertical | Pass |
| | | 1745 | -0.78 | 3.95 | 28.22 | 23.49 | 223.357 | Vertical | Pass |
| | | 1770 | -0.70 | 3.97 | 28.18 | 23.51 | 224.388 | Vertical | Pass |

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

# 9. SPURIOUS RADIATION EMISSION

**RULE PART(S)**

FCC: §2.1051,§22.917(a), §24.238(a), §27.53(c)(g)(h)(m)

**LIMIT**

For Band 7, the minimum permissible attenuation level of any spurious emission is 55 + log10 (P [Watts]).
The minimum permissible attenuation level of any spurious emission is 43 + log10 (P [Watts]), where P is the transmitter power in Watts.

**TEST PROCEDURE**

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth ( i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

The unwanted emission power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth in the 1 MHz band immediately outside and adjacent to the channel edge of the equipment. Beyond the 1 MHz band immediately outside the channel edge of the equipment, a resolution bandwidth of 1 MHz shall be employed. A narrower resolution bandwidth is allowed to be used provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz or 1% of the occupied bandwidth as applicable.

The power of any unwanted emissions measured from the channel edge of the equipment shall be attenuated below the transmitter power, P (dBW), as follows:
a. for base station and subscriber equipment, other than mobile subscriber equipment, the attenuation shall not be less than 43 + 10 Log10 (p), dB; and
b. for mobile subscriber equipment, the attenuation shall not be less than 43 + 10 Log10 (p), dB at the channel edges and 55 + 10 Log10 (p) at 5.5 MHz away and beyond the channel edges where p in (a) and (b) is the transmitter power measured in watts.

**MODES TESTED**

LTE Band 2
LTE Band 4
LTE Band 5
LTE Band 7
LTE Band 17
LTE Band 66

**RESULTS**

PASS

## 9.1 LTE BAND 2

**QPSK EIRP POWER FOR LTE BAND 2 (1.4MHZ BANDWIDTH)**

| Test Results for Low Channel 1710.7MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency(MHz) | SG Level(dBm) | Cable Loss(dB) | Antenna Gain(dB) | Absolute Level(dBm) | Limit （dBm） | Margin(dBm) | Polarity |
| 3701.4 | -53.08 | 4.04 | 33.51 | -23.61 | -13 | -10.61 | Horizontal |
| 3701.4 | -50.15 | 4.04 | 33.51 | -20.68 | -13 | -7.68 | Vertical |
| 5552.1 | -47.53 | 5.24 | 35.84 | -16.93 | -13 | -3.93 | Vertical |
| 5552.1 | -51.74 | 5.24 | 35.84 | -21.14 | -13 | -8.14 | Horizontal |
| 188.491 | -36.95 | 1.43 | 16.02 | -22.36 | -13 | -9.36 | Vertical |
| 407.106 | -37.71 | 1.30 | 17.99 | -21.02 | -13 | -8.02 | Horizontal |
| **Test Results for Mid Channel 1732.5MHz** | | | | | | | |
| 3760.0 | -50.78 | 4.04 | 33.56 | -21.26 | -13 | -8.26 | Horizontal |
| 3760.0 | -48.80 | 4.04 | 33.56 | -19.28 | -13 | -6.28 | Vertical |
| 5640.0 | -51.67 | 5.24 | 35.91 | -21.00 | -13 | -8.00 | Vertical |
| 5640.0 | -53.62 | 5.24 | 35.91 | -22.95 | -13 | -9.95 | Horizontal |
| 205.356 | -40.80 | 1.62 | 16.97 | -25.45 | -13 | -12.45 | Vertical |
| 409.306 | -43.12 | 1.74 | 15.98 | -28.89 | -13 | -15.89 | Horizontal |
| **Test Results for High Channel 1754.3MHz** | | | | | | | |
| 3818.6 | -51.54 | 4.04 | 34.00 | -21.58 | -13 | -8.58 | Horizontal |
| 3818.6 | -48.05 | 4.04 | 34.00 | -18.09 | -13 | -5.09 | Vertical |
| 5727.9 | -50.09 | 5.24 | 36.04 | -19.29 | -13 | -6.29 | Vertical |
| 5727.9 | -49.27 | 5.24 | 36.04 | -18.47 | -13 | -5.47 | Horizontal |
| 201.809 | -43.47 | 1.42 | 17.29 | -27.60 | -13 | -14.60 | Vertical |
| 466.005 | -40.38 | 1.50 | 17.90 | -23.97 | -13 | -10.97 | Horizontal |

**QPSK EIRP POWER FOR LTE BAND 2 (20.0MHZ BANDWIDTH)**

| Test Results for Low Channel 1710.7MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency(MHz) | SG Level(dBm) | Cable Loss(dB) | Antenna Gain(dB) | Absolute Level(dBm) | Limit （dBm） | Margin(dBm) | Polarity |
| 3720.0 | -44.99 | 4.07 | 33.54 | -15.52 | -13 | -2.52 | Horizontal |
| 3720.0 | -50.66 | 4.07 | 33.54 | -21.19 | -13 | -8.19 | Vertical |
| 5580.0 | -51.04 | 5.28 | 35.86 | -20.46 | -13 | -7.46 | Vertical |
| 5580.0 | -53.05 | 5.28 | 35.86 | -22.47 | -13 | -9.47 | Horizontal |
| 207.162 | -41.77 | 1.58 | 16.89 | -26.45 | -13 | -13.45 | Vertical |
| 433.01 | -41.27 | 1.76 | 17.26 | -25.77 | -13 | -12.77 | Horizontal |
| **Test Results for Mid Channel 1732.5MHz** | | | | | | | |
| 3760.0 | -49.13 | 4.04 | 33.56 | -19.61 | -13 | -6.61 | Horizontal |
| 3760.0 | -44.96 | 4.04 | 33.56 | -15.44 | -13 | -2.44 | Vertical |
| 5640.0 | -51.07 | 5.24 | 35.91 | -20.40 | -13 | -7.40 | Vertical |
| 5640.0 | -50.19 | 5.24 | 35.91 | -19.52 | -13 | -6.52 | Horizontal |
| 191.745 | -36.16 | 1.46 | 16.27 | -21.35 | -13 | -8.35 | Vertical |
| 325.472 | -39.92 | 1.59 | 15.15 | -26.36 | -13 | -13.36 | Horizontal |
| **Test Results for High Channel 1754.3MHz** | | | | | | | |
| 3800.0 | -50.01 | 4.04 | 34.00 | -20.05 | -13 | -7.05 | Horizontal |
| 3800.0 | -49.29 | 4.04 | 34.00 | -19.33 | -13 | -6.33 | Vertical |
| 5700.0 | -46.53 | 5.24 | 36.04 | -15.73 | -13 | -2.73 | Vertical |
| 5700.0 | -53.03 | 5.24 | 36.04 | -22.23 | -13 | -9.23 | Horizontal |
| 186.439 | -41.83 | 1.36 | 17.39 | -25.79 | -13 | -12.79 | Vertical |
| 404.866 | -44.01 | 1.66 | 15.39 | -30.28 | -13 | -17.28 | Horizontal |

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(dBm)-Limit(dBm)

. Both QPSK and 16QAM has been tested, the worst case is QPSK mode, the report just reported the worst case.

## 9.2 LTE BAND 4

**QPSK EIRP POWER FOR LTE BAND 4 (1.4MHZ BANDWIDTH)**

| Test Results for Low Channel 1710.7MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency(MHz) | SG Level(dBm) | Cable Loss(dB) | Antenna Gain(dB) | Absolute Level(dBm) | Limit （dBm） | Margin(dBm) | Polarity |
| 3421.4 | -51.55 | 4.02 | 29.80 | -25.77 | -13 | -12.77 | Horizontal |
| 3421.4 | -53.14 | 4.02 | 29.80 | -27.36 | -13 | -14.36 | Vertical |
| 5132.1 | -53.57 | 5.24 | 35.84 | -22.97 | -13 | -9.97 | Vertical |
| 5132.1 | -52.55 | 5.24 | 35.84 | -21.95 | -13 | -8.95 | Horizontal |
| 200.195 | -41.03 | 1.68 | 16.04 | -26.67 | -13 | -13.67 | Vertical |
| 311.432 | -44.95 | 1.78 | 17.74 | -28.99 | -13 | -15.99 | Horizontal |
| **Test Results for Mid Channel 1732.5MHz** | | | | | | | |
| 3465.0 | -51.10 | 4.03 | 30.00 | -25.13 | -13 | -12.13 | Horizontal |
| 3465.0 | -45.27 | 4.03 | 30.00 | -19.30 | -13 | -6.30 | Vertical |
| 5197.5 | -45.73 | 5.25 | 35.86 | -15.12 | -13 | -2.12 | Vertical |
| 5197.5 | -52.93 | 5.25 | 35.86 | -22.32 | -13 | -9.32 | Horizontal |
| 207.39 | -44.90 | 1.72 | 17.69 | -28.93 | -13 | -15.93 | Vertical |
| 321.306 | -38.95 | 1.62 | 16.02 | -24.54 | -13 | -11.54 | Horizontal |
| **Test Results for High Channel 1754.3MHz** | | | | | | | |
| 3508.6 | -44.19 | 4.05 | 30.01 | -18.23 | -13 | -5.23 | Horizontal |
| 3508.6 | -50.30 | 4.05 | 30.01 | -24.34 | -13 | -11.34 | Vertical |
| 5262.9 | -52.10 | 5.26 | 35.86 | -21.50 | -13 | -8.50 | Vertical |
| 5262.9 | -49.07 | 5.26 | 35.86 | -18.47 | -13 | -5.47 | Horizontal |
| 196.837 | -43.14 | 1.80 | 16.69 | -28.25 | -13 | -15.25 | Vertical |
| 443.334 | -39.44 | 1.75 | 16.66 | -24.54 | -13 | -11.54 | Horizontal |

**QPSK EIRP POWER FOR LTE BAND 4 (20.0MHZ BANDWIDTH)**

| Test Results for Low Channel 1720MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency(MHz) | SG Level(dBm) | Cable Loss(dB) | Antenna Gain(dB) | Absolute Level(dBm) | Limit （dBm） | Margin(dBm) | Polarity |
| 3440.0 | -53.65 | 4.02 | 29.80 | -27.87 | -13 | -14.87 | Horizontal |
| 3440.0 | -44.46 | 4.02 | 29.80 | -18.68 | -13 | -5.68 | Vertical |
| 5160.0 | -51.07 | 5.24 | 35.84 | -20.47 | -13 | -7.47 | Vertical |
| 5160.0 | -50.25 | 5.24 | 35.84 | -19.65 | -13 | -6.65 | Horizontal |
| 212.483 | -38.75 | 1.57 | 17.26 | -23.06 | -13 | -10.06 | Vertical |
| 257.535 | -38.21 | 1.78 | 16.35 | -23.64 | -13 | -10.64 | Horizontal |
| **Test Results for Mid Channel 1732.5MHz** | | | | | | | |
| 3465.0 | -53.91 | 4.03 | 30.00 | -27.94 | -13 | -14.94 | Horizontal |
| 3465.0 | -49.34 | 4.03 | 30.00 | -23.37 | -13 | -10.37 | Vertical |
| 5197.5 | -47.22 | 5.25 | 35.86 | -16.61 | -13 | -3.61 | Vertical |
| 5197.5 | -50.84 | 5.25 | 35.86 | -20.23 | -13 | -7.23 | Horizontal |
| 189.61 | -39.81 | 1.44 | 17.95 | -23.30 | -13 | -10.30 | Vertical |
| 325.308 | -38.56 | 1.65 | 16.09 | -24.12 | -13 | -11.12 | Horizontal |
| **Test Results for High Channel 1745MHz** | | | | | | | |
| 3490.0 | -53.62 | 2.91 | 27.68 | -28.85 | -13 | -15.85 | Horizontal |
| 3490.0 | -47.99 | 2.91 | 27.68 | -23.22 | -13 | -10.22 | Vertical |
| 5235.0 | -49.18 | 5.26 | 35.86 | -18.58 | -13 | -5.58 | Vertical |
| 5235.0 | -50.01 | 5.26 | 35.86 | -19.41 | -13 | -6.41 | Horizontal |
| 176.292 | -43.52 | 1.61 | 16.85 | -28.28 | -13 | -15.28 | Vertical |
| 428.437 | -39.14 | 1.61 | 15.19 | -25.56 | -13 | -12.56 | Horizontal |

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(dBm)-Limit(dBm)

. Both QPSK and 16QAM has been tested, the worst case is QPSK mode, the report just reported the worst case.

## 9.3 LTE BAND 5

**QPSK EIRP POWER FOR LTE BAND 5 (1.4MHZ BANDWIDTH)**

| Test Results for Low Channel 824.7MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency(MHz) | SG Level(dBm) | Cable Loss(dB) | Antenna Gain(dB) | Absolute Level(dBm) | Limit （dBm） | Margin(dBm) | Polarity |
| 1649.4 | -44.73 | 2.78 | 27.50 | -20.01 | -13 | -7.01 | Horizontal |
| 1649.4 | -51.54 | 2.78 | 27.50 | -26.82 | -13 | -13.82 | Vertical |
| 2474.1 | -44.30 | 2.90 | 27.80 | -19.40 | -13 | -6.40 | Vertical |
| 2474.1 | -53.06 | 2.90 | 27.80 | -28.16 | -13 | -15.16 | Horizontal |
| 204.646 | -41.10 | 1.76 | 17.59 | -25.27 | -13 | -12.27 | Vertical |
| 346.133 | -40.26 | 1.63 | 15.87 | -26.02 | -13 | -13.02 | Horizontal |
| **Test Results For Mid Channel 836.5MHz** | | | | | | | |
| 1673.0 | -47.98 | 2.80 | 27.48 | -23.30 | -13 | -10.30 | Horizontal |
| 1673.0 | -44.85 | 2.80 | 27.48 | -20.17 | -13 | -7.17 | Vertical |
| 2509.5 | -47.61 | 2.91 | 27.70 | -22.82 | -13 | -9.82 | Vertical |
| 2509.5 | -53.70 | 2.91 | 27.70 | -28.91 | -13 | -15.91 | Horizontal |
| 202.985 | -37.33 | 1.61 | 15.68 | -23.26 | -13 | -10.26 | Vertical |
| 403.44 | -44.07 | 1.59 | 17.52 | -28.15 | -13 | -15.15 | Horizontal |
| **Test Results for High Channel 848.3MHz** | | | | | | | |
| 1696.6 | -48.49 | 2.82 | 27.43 | -23.88 | -13 | -10.88 | Horizontal |
| 1696.6 | -48.53 | 2.82 | 27.43 | -23.92 | -13 | -10.92 | Vertical |
| 2544.9 | -44.52 | 2.92 | 27.74 | -19.70 | -13 | -6.70 | Vertical |
| 2544.9 | -50.82 | 2.92 | 27.74 | -26.00 | -13 | -13.00 | Horizontal |
| 190.873 | -40.72 | 1.69 | 16.67 | -25.73 | -13 | -12.73 | Vertical |
| 258.16 | -44.29 | 1.70 | 17.18 | -28.81 | -13 | -15.81 | Horizontal |

**QPSK EIRP POWER FOR LTE BAND 5 (10MHZ BANDWIDTH)**

| Test Results for Low Channel 829MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency(MHz) | SG Level(dBm) | Cable Loss(dB) | Antenna Gain(dB) | Absolute Level(dBm) | Limit （dBm） | Margin(dBm) | Polarity |
| 1658.0 | -46.11 | 2.78 | 27.50 | -21.39 | -13 | -8.39 | Horizontal |
| 1658.0 | -53.33 | 2.78 | 27.50 | -28.61 | -13 | -15.61 | Vertical |
| 2487.0 | -49.07 | 2.90 | 27.80 | -24.17 | -13 | -11.17 | Vertical |
| 2487.0 | -51.51 | 2.90 | 27.80 | -26.61 | -13 | -13.61 | Horizontal |
| 188.241 | -40.20 | 1.71 | 15.57 | -26.34 | -13 | -13.34 | Vertical |
| 376.596 | -42.10 | 1.34 | 16.40 | -27.04 | -13 | -14.04 | Horizontal |
| **Test Results For Mid Channel 836.5MHz** | | | | | | | |
| 1673.0 | -53.74 | 2.80 | 27.48 | -29.06 | -13 | -16.06 | Horizontal |
| 1673.0 | -50.09 | 2.80 | 27.48 | -25.41 | -13 | -12.41 | Vertical |
| 2509.5 | -48.35 | 2.91 | 27.70 | -23.56 | -13 | -10.56 | Vertical |
| 2509.5 | -49.83 | 2.91 | 27.70 | -25.04 | -13 | -12.04 | Horizontal |
| 192.798 | -34.18 | 1.44 | 17.04 | -18.58 | -13 | -5.58 | Vertical |
| 434.908 | -35.47 | 1.76 | 17.62 | -19.61 | -13 | -6.61 | Horizontal |
| **Test Results for High Channel 844MHz** | | | | | | | |
| 1688.0 | -53.05 | 2.82 | 27.43 | -28.44 | -13 | -15.44 | Horizontal |
| 1688.0 | -44.83 | 2.82 | 27.43 | -20.22 | -13 | -7.22 | Vertical |
| 2532.0 | -45.18 | 2.92 | 27.74 | -20.36 | -13 | -7.36 | Vertical |
| 2532.0 | -53.27 | 2.92 | 27.74 | -28.45 | -13 | -15.45 | Horizontal |
| 203.669 | -43.63 | 1.74 | 17.70 | -27.67 | -13 | -14.67 | Vertical |
| 409.533 | -43.92 | 1.41 | 17.46 | -27.86 | -13 | -14.86 | Horizontal |

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(dBm)-Limit(dBm)

. Both QPSK and 16QAM has been tested, the worst case is QPSK mode, the report just reported the worst case.

## 9.4 LTE BAND 7

**QPSK EIRP POWER FOR LTE BAND 7 (5.0MHZ BANDWIDTH)**

| Test Results for Low Channel 2502.5MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency(MHz) | SG Level(dBm) | Cable Loss(dB) | Antenna Gain(dB) | Absolute Level(dBm) | Limit （dBm） | Margin(dBm) | Polarity |
| 5005.0 | -62.97 | 5.23 | 35.81 | -32.39 | -25 | -7.39 | Horizontal |
| 5005.0 | -60.94 | 5.23 | 35.81 | -30.36 | -25 | -5.36 | Vertical |
| 7507.5 | -59.42 | 5.67 | 36.85 | -28.24 | -25 | -3.24 | Vertical |
| 7507.5 | -62.25 | 5.67 | 36.85 | -31.07 | -25 | -6.07 | Horizontal |
| 213.6 | -47.09 | 1.73 | 17.97 | -30.85 | -25 | -5.85 | Vertical |
| 319.6 | -46.15 | 1.38 | 15.11 | -32.42 | -25 | -7.42 | Horizontal |
| **Test Results for Mid Channel 2535MHz** | | | | | | | |
| 5070.0 | -62.94 | 5.23 | 35.82 | -32.35 | -25 | -7.35 | Horizontal |
| 5070.0 | -64.18 | 5.23 | 35.82 | -33.59 | -25 | -8.59 | Vertical |
| 7605.0 | -60.18 | 5.67 | 36.85 | -29.00 | -25 | -4.00 | Vertical |
| 7605.0 | -60.19 | 5.67 | 36.85 | -29.01 | -25 | -4.01 | Horizontal |
| 269.3 | -51.91 | 1.77 | 16.17 | -37.50 | -25 | -12.50 | Vertical |
| 544.9 | -48.79 | 1.63 | 15.21 | -35.21 | -25 | -10.21 | Horizontal |
| **Test Results for High Channel 2567.5MHz** | | | | | | | |
| 5135.0 | -62.27 | 5.24 | 35.83 | -31.68 | -25 | -6.68 | Horizontal |
| 5135.0 | -60.50 | 5.24 | 35.83 | -29.91 | -25 | -4.91 | Vertical |
| 7702.5 | -59.57 | 5.68 | 36.87 | -28.38 | -25 | -3.38 | Vertical |
| 7702.5 | -61.32 | 5.68 | 36.87 | -30.13 | -25 | -5.13 | Horizontal |
| 409.3 | -45.17 | 1.58 | 17.56 | -29.19 | -25 | -4.19 | Vertical |
| 563.5 | -52.67 | 1.45 | 16.58 | -37.54 | -25 | -12.54 | Horizontal |

**QPSK EIRP POWER FOR LTE BAND 7 (20.0MHZ BANDWIDTH)**

| Test Results for Low Channel 2510MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency(MHz) | SG Level(dBm) | Cable Loss(dB) | Antenna Gain(dB) | Absolute Level(dBm) | Limit （dBm） | Margin(dBm) | Polarity |
| 5020.0 | -59.01 | 5.23 | 35.82 | -28.42 | -25 | -3.42 | Horizontal |
| 5020.0 | -60.86 | 5.23 | 35.82 | -30.27 | -25 | -5.27 | Vertical |
| 7530.0 | -63.83 | 5.67 | 36.86 | -32.64 | -25 | -7.64 | Vertical |
| 7530.0 | -64.39 | 5.67 | 36.86 | -33.20 | -25 | -8.20 | Horizontal |
| 469.9 | -46.70 | 1.63 | 15.76 | -32.57 | -25 | -7.57 | Vertical |
| 271.7 | -52.17 | 1.71 | 15.44 | -38.44 | -25 | -13.44 | Horizontal |
| **Test Results for Mid Channel 2535MHz** | | | | | | | |
| 5070.0 | -63.71 | 5.23 | 35.82 | -33.12 | -25 | -8.12 | Horizontal |
| 5070.0 | -63.69 | 5.23 | 35.82 | -33.10 | -25 | -8.10 | Vertical |
| 7605.0 | -61.18 | 5.67 | 36.85 | -30.00 | -25 | -5.00 | Vertical |
| 7605.0 | -63.29 | 5.67 | 36.85 | -32.11 | -25 | -7.11 | Horizontal |
| 357.3 | -53.55 | 1.79 | 16.84 | -38.49 | -25 | -13.49 | Vertical |
| 442.2 | -51.78 | 1.71 | 17.64 | -35.85 | -25 | -10.85 | Horizontal |
| **Test Results for High Channel 2560MHz** | | | | | | | |
| 5120.0 | -61.09 | 5.24 | 35.83 | -30.50 | -25 | -5.50 | Horizontal |
| 5120.0 | -59.55 | 5.24 | 35.83 | -28.96 | -25 | -3.96 | Vertical |
| 7680.0 | -64.96 | 5.70 | 36.88 | -33.78 | -25 | -8.78 | Vertical |
| 7680.0 | -62.19 | 5.70 | 36.88 | -31.01 | -25 | -6.01 | Horizontal |
| 345.9 | -44.33 | 1.79 | 16.84 | -29.27 | -25 | -4.27 | Vertical |
| 486.2 | -45.86 | 1.71 | 17.64 | -29.93 | -25 | -4.93 | Horizontal |

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(dBm)-Limit(dBm)

. Both QPSK and 16QAM has been tested, the worst case is QPSK mode, the report just reported the worst case.

## 9.5 LTE BAND 17

**QPSK EIRP POWER FOR LTE BAND 17 (5MHZ BANDWIDTH)**

| Test Results for Low Channel 706.5MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency(MHz) | SG Level(dBm) | Cable Loss(dB) | Antenna Gain(dB) | Absolute Level(dBm) | Limit （dBm） | Margin(dBm) | Polarity |
| 1413.0 | -47.39 | 2.61 | 27.28 | -22.72 | -13 | -9.72 | Horizontal |
| 1413.0 | -48.89 | 2.61 | 27.28 | -24.22 | -13 | -11.22 | Vertical |
| 2119.5 | -47.56 | 2.87 | 27.59 | -22.84 | -13 | -9.84 | Vertical |
| 2119.5 | -52.67 | 2.87 | 27.59 | -27.95 | -13 | -14.95 | Horizontal |
| 195.506 | -41.00 | 1.71 | 16.15 | -26.56 | -13 | -13.56 | Vertical |
| 380.019 | -39.00 | 1.41 | 17.32 | -23.09 | -13 | -10.09 | Horizontal |
| **Test Results For Mid Channel 710MHz** | | | | | | | |
| 1420.0 | -53.41 | 2.62 | 27.30 | -28.73 | -13 | -15.73 | Horizontal |
| 1420.0 | -48.05 | 2.62 | 27.30 | -23.37 | -13 | -10.37 | Vertical |
| 2130.0 | -52.57 | 2.87 | 27.62 | -27.82 | -13 | -14.82 | Vertical |
| 2130.0 | -49.06 | 2.87 | 27.62 | -24.31 | -13 | -11.31 | Horizontal |
| 181.378 | -42.63 | 1.42 | 15.25 | -28.81 | -13 | -15.81 | Vertical |
| 323.031 | -40.33 | 1.36 | 17.19 | -24.50 | -13 | -11.50 | Horizontal |
| **Test Results for High Channel 713.5MHz** | | | | | | | |
| 1427.0 | -51.12 | 2.66 | 27.28 | -26.50 | -13 | -13.50 | Horizontal |
| 1427.0 | -49.73 | 2.66 | 27.28 | -25.11 | -13 | -12.11 | Vertical |
| 2140.5 | -46.79 | 2.88 | 27.60 | -22.07 | -13 | -9.07 | Vertical |
| 2140.5 | -52.69 | 2.88 | 27.60 | -27.97 | -13 | -14.97 | Horizontal |
| 210.742 | -41.27 | 1.32 | 17.29 | -25.30 | -13 | -12.30 | Vertical |
| 238.037 | -38.62 | 1.72 | 16.89 | -23.45 | -13 | -10.45 | Horizontal |

**QPSK EIRP POWER FOR LTE BAND 17 (10MHZ BANDWIDTH)**

| Test Results for Low Channel 709MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency(MHz) | SG Level(dBm) | Cable Loss(dB) | Antenna Gain(dB) | Absolute Level(dBm) | Limit （dBm） | Margin(dBm) | Polarity |
| 1418.0 | -50.20 | 2.62 | 27.30 | -25.52 | -13 | -12.52 | Horizontal |
| 1418.0 | -48.48 | 2.62 | 27.30 | -23.80 | -13 | -10.80 | Vertical |
| 2127.0 | -46.60 | 2.87 | 27.62 | -21.85 | -13 | -8.85 | Vertical |
| 2127.0 | -50.36 | 2.87 | 27.62 | -25.61 | -13 | -12.61 | Horizontal |
| 212.385 | -38.91 | 1.35 | 16.91 | -23.35 | -13 | -10.35 | Vertical |
| 340.107 | -34.52 | 1.62 | 16.31 | -19.83 | -13 | -6.83 | Horizontal |
| **Test Results for Mid Channel 710MHz** | | | | | | | |
| 1420.0 | -46.26 | 2.62 | 27.30 | -21.58 | -13 | -8.58 | Horizontal |
| 1420.0 | -47.73 | 2.62 | 27.30 | -23.05 | -13 | -10.05 | Vertical |
| 2130.0 | -46.82 | 2.87 | 27.62 | -22.07 | -13 | -9.07 | Vertical |
| 2130.0 | -51.02 | 2.87 | 27.62 | -26.27 | -13 | -13.27 | Horizontal |
| 205.852 | -38.30 | 1.51 | 17.14 | -22.67 | -13 | -9.67 | Vertical |
| 363.86 | -42.43 | 1.77 | 16.88 | -27.32 | -13 | -14.32 | Horizontal |
| **Test Results for High Channel 711MHz** | | | | | | | |
| 1422.0 | -46.75 | 2.62 | 27.30 | -22.07 | -13 | -9.07 | Horizontal |
| 1422.0 | -50.74 | 2.62 | 27.30 | -26.06 | -13 | -13.06 | Vertical |
| 2133.0 | -52.73 | 2.87 | 27.62 | -27.98 | -13 | -14.98 | Vertical |
| 2133.0 | -50.86 | 2.87 | 27.62 | -26.11 | -13 | -13.11 | Horizontal |
| 176.105 | -36.68 | 1.78 | 15.95 | -22.51 | -13 | -9.51 | Vertical |
| 400.71 | -36.37 | 1.34 | 17.95 | -19.77 | -13 | -6.77 | Horizontal |

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(dBm)-Limit(dBm)

. Both QPSK and 16QAM has been tested, the worst case is QPSK mode, the report just reported the worst case.

## 9.6 LTE BAND 66

**QPSK EIRP POWER FOR LTE BAND 66 (1.4MHZ BANDWIDTH)**

| Test Results for Low Channel 1710.7MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency(MHz) | SG Level(dBm) | Cable Loss(dB) | Antenna Gain(dB) | Absolute Level(dBm) | Limit （dBm） | Margin(dBm) | Polarity |
| 1413 | -50.99 | 2.61 | 27.28 | -26.32 | -13 | -13.32 | Horizontal |
| 1413 | -52.88 | 2.61 | 27.28 | -28.21 | -13 | -15.21 | Vertical |
| 2119.5 | -52.29 | 2.87 | 27.59 | -27.57 | -13 | -14.57 | Vertical |
| 2119.5 | -46.03 | 2.87 | 27.59 | -21.31 | -13 | -8.31 | Horizontal |
| **Test Results For Mid Channel 1745MHz** | | | | | | | |
| 1420 | -47.51 | 2.62 | 27.3 | -22.83 | -13 | -9.83 | Horizontal |
| 1420 | -53.24 | 2.62 | 27.3 | -28.56 | -13 | -15.56 | Vertical |
| 2130 | -50.05 | 2.87 | 27.62 | -25.30 | -13 | -12.30 | Vertical |
| 2130 | -53.04 | 2.87 | 27.62 | -28.29 | -13 | -15.29 | Horizontal |
| **Test Results for High Channel 1779.3MHz** | | | | | | | |
| 1427 | -51.75 | 2.66 | 27.28 | -27.13 | -13 | -14.13 | Horizontal |
| 1427 | -48.18 | 2.66 | 27.28 | -23.56 | -13 | -10.56 | Vertical |
| 2140.5 | -45.80 | 2.88 | 27.6 | -21.08 | -13 | -8.08 | Vertical |
| 2140.5 | -51.40 | 2.88 | 27.6 | -26.68 | -13 | -13.68 | Horizontal |

**QPSK EIRP POWER FOR LTE BAND 66 (20MHZ BANDWIDTH)**

| Test Results for Low Channel 1720MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency(MHz) | SG Level(dBm) | Cable Loss(dB) | Antenna Gain(dB) | Absolute Level(dBm) | Limit （dBm） | Margin(dBm) | Polarity |
| 1418 | -44.11 | 2.62 | 27.3 | -19.43 | -13 | -6.43 | Horizontal |
| 1418 | -51.45 | 2.62 | 27.3 | -26.77 | -13 | -13.77 | Vertical |
| 2127 | -48.84 | 2.87 | 27.62 | -24.09 | -13 | -11.09 | Vertical |
| 2127 | -49.14 | 2.87 | 27.62 | -24.39 | -13 | -11.39 | Horizontal |
| **Test Results for Mid Channel 1745MHz** | | | | | | | |
| 1420 | -45.98 | 2.62 | 27.3 | -21.30 | -13 | -8.30 | Horizontal |
| 1420 | -44.84 | 2.62 | 27.3 | -20.16 | -13 | -7.16 | Vertical |
| 2130 | -46.83 | 2.87 | 27.62 | -22.08 | -13 | -9.08 | Vertical |
| 2130 | -50.77 | 2.87 | 27.62 | -26.02 | -13 | -13.02 | Horizontal |
| **Test Results for High Channel 1770MHz** | | | | | | | |
| 1422 | -50.95 | 2.62 | 27.3 | -26.27 | -13 | -13.27 | Horizontal |
| 1422 | -53.71 | 2.62 | 27.3 | -29.03 | -13 | -16.03 | Vertical |
| 2133 | -53.99 | 2.87 | 27.62 | -29.24 | -13 | -16.24 | Vertical |
| 2133 | -45.58 | 2.87 | 27.62 | -20.83 | -13 | -7.83 | Horizontal |

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(dBm)-Limit(dBm)

. We test both H direction and V direction, recorded worst case direction.

# 10. FREQUENCY STABILITY

**RULE PART(S)**

FCC: §2.1055, §22.355, §24.235, §27.54

**LIMITS**

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.

§24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

**TEST PROCEDURE**

Use CMW 500 with Frequency Error measurement capability.

Temp. = −30° to +50°C

Voltage =low voltage, DC 3.4V, Normal, DC 3.85V and High voltage, DC 4.2V.

**Frequency Stability vs Temperature:**

The EUT is place inside a temperature chamber. The temperature is set to -30ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached.

**Frequency Stability vs Voltage:**

The peak frequency error is recorded (worst-case).

**MODES TESTED**

LTE Band 2

LTE Band 4

LTE Band 5

LTE Band 7

LTE Band 17

LTE Band 66

**RESULTS**

See the following pages.

## 10.1 LTE BAND 2

**QPSK, (20MHz BANDWIDTH)**

**Frequency error vs. Voltage**

| Voltage [Vdc] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 2 QPSK, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)** | | | | |
| 3.4 | 1880 | 12.5 | 0.006624 | 2.5 |
| 3.85 | 1880 | 14.2 | 0.007561 | 2.5 |
| 4.4 | 1880 | 13.3 | 0.007060 | 2.5 |

**Frequency error vs. Temperature**

| Temperature [° C] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 2 QPSK, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)** | | | | |
| Normal (25C) | 1880 | 12.4 | 0.006593 | 2.5 |
| Extreme (50C) | 1880 | 11.7 | 0.006248 | 2.5 |
| Extreme (40C) | 1880 | 13.7 | 0.007281 | 2.5 |
| Extreme (30C) | 1880 | 13.7 | 0.007272 | 2.5 |
| Extreme (10C) | 1880 | 13.7 | 0.007270 | 2.5 |
| Extreme (0C) | 1880 | 11.8 | 0.006302 | 2.5 |
| Extreme (-10C) | 1880 | 13.1 | 0.006980 | 2.5 |
| Extreme (-20C) | 1880 | 13.7 | 0.007261 | 2.5 |
| Extreme (-30C) | 1880 | 15.1 | 0.008007 | 2.5 |

**16QAM, (20MHz BANDWIDTH)**

**Frequency error vs. Voltage**

| Voltage [Vdc] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 2 16QAM, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)** | | | | |
| 3.4 | 1880 | 9.7 | 0.005134 | 2.5 |
| 3.85 | 1880 | 8.5 | 0.004496 | 2.5 |
| 4.4 | 1880 | 7.8 | 0.004171 | 2.5 |

**Frequency error vs. Temperature**

| Temperature [° C] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 2 16QAM, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)** | | | | |
| Normal (25C) | 1880 | 9.5 | 0.005071 | 2.5 |
| Extreme (50C) | 1880 | 8.4 | 0.004484 | 2.5 |
| Extreme (40C) | 1880 | 7.7 | 0.004081 | 2.5 |
| Extreme (30C) | 1880 | 8.7 | 0.004613 | 2.5 |
| Extreme (10C) | 1880 | 9.2 | 0.004913 | 2.5 |
| Extreme (0C) | 1880 | 8.4 | 0.004464 | 2.5 |
| Extreme (-10C) | 1880 | 9.1 | 0.004839 | 2.5 |
| Extreme (-20C) | 1880 | 8.9 | 0.004746 | 2.5 |
| Extreme (-30C) | 1880 | 8.3 | 0.004390 | 2.5 |

***Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

## 10.2 LTE BAND 4

**QPSK, (10MHz BANDWIDTH)**

**Frequency error vs. Voltage**

| Voltage [Vdc] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 4 QPSK, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)** | | | | |
| 3.4 | 1732.5 | 9.0 | 0.005178 | 2.5 |
| 3.85 | 1732.5 | 9.3 | 0.005396 | 2.5 |
| 4.4 | 1732.5 | 8.5 | 0.004898 | 2.5 |

**Frequency error vs. Temperature**

| Temperature [°C] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 4 QPSK, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)** | | | | |
| Normal (25C) | 1732.5 | 8.4 | 0.004867 | 2.5 |
| Extreme (50C) | 1732.5 | 8.6 | 0.004961 | 2.5 |
| Extreme (40C) | 1732.5 | 7.5 | 0.004319 | 2.5 |
| Extreme (30C) | 1732.5 | 5.6 | 0.003209 | 2.5 |
| Extreme (10C) | 1732.5 | 7.1 | 0.004127 | 2.5 |
| Extreme (0C) | 1732.5 | 9.1 | 0.005274 | 2.5 |
| Extreme (-10C) | 1732.5 | 8.3 | 0.004767 | 2.5 |
| Extreme (-20C) | 1732.5 | 6.4 | 0.003707 | 2.5 |
| Extreme (-30C) | 1732.5 | 8.0 | 0.004624 | 2.5 |

**16QAM, (20MHz BANDWIDTH)**

**Frequency error vs. Voltage**

| Voltage [Vdc] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 4 16QAM, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)** | | | | |
| 3.4 | 1732.5 | 9.9 | 0.005734 | 2.5 |
| 3.85 | 1732.5 | 9.3 | 0.005365 | 2.5 |
| 4.4 | 1732.5 | 8.5 | 0.004898 | 2.5 |

**Frequency error vs. Temperature**

| Temperature [°C] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 4 16QAM, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)** | | | | |
| Normal (25C) | 1732.5 | 9.4 | 0.005434 | 2.5 |
| Extreme (50C) | 1732.5 | 9.4 | 0.005404 | 2.5 |
| Extreme (40C) | 1732.5 | 8.0 | 0.004628 | 2.5 |
| Extreme (30C) | 1732.5 | 8.9 | 0.005154 | 2.5 |
| Extreme (10C) | 1732.5 | 8.6 | 0.004991 | 2.5 |
| Extreme (0C) | 1732.5 | 7.8 | 0.004482 | 2.5 |
| Extreme (-10C) | 1732.5 | 8.7 | 0.005046 | 2.5 |
| Extreme (-20C) | 1732.5 | 9.0 | 0.005220 | 2.5 |
| Extreme (-30C) | 1732.5 | 8.4 | 0.004842 | 2.5 |

***Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

## 10.3 LTE BAND 5

**QPSK, (10MHz BANDWIDTH)**

**Frequency error vs. Voltage**

| Voltage [Vdc] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 5 QPSK, (CH 20525 RB size 50 RB Offset 0 10MHz BANDWIDTH)** | | | | |
| 3.4 | 836.5 | 5.5 | 0.006620 | 2.5 |
| 3.85 | 836.5 | 6.8 | 0.008122 | 2.5 |
| 4.4 | 836.5 | 4.7 | 0.005636 | 2.5 |

**Frequency error vs. Temperature**

| Temperature [° C] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 5 QPSK, (CH 20525 RB size 50 RB Offset 0 10MHz BANDWIDTH)** | | | | |
| Normal (25C) | 836.5 | 6.4 | 0.007643 | 2.5 |
| Extreme (50C) | 836.5 | 5.7 | 0.006859 | 2.5 |
| Extreme (40C) | 836.5 | 6.0 | 0.007217 | 2.5 |
| Extreme (30C) | 836.5 | 5.9 | 0.007062 | 2.5 |
| Extreme (10C) | 836.5 | 5.9 | 0.007028 | 2.5 |
| Extreme (0C) | 836.5 | 5.0 | 0.005935 | 2.5 |
| Extreme (-10C) | 836.5 | 5.6 | 0.006749 | 2.5 |
| Extreme (-20C) | 836.5 | 6.1 | 0.007259 | 2.5 |
| Extreme (-30C) | 836.5 | 6.5 | 0.007714 | 2.5 |

**16QAM, (10MHz BANDWIDTH)**

**Frequency error vs. Voltage**

| Voltage [Vdc] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 5 16QAM, (CH 20525 RB size 50 RB Offset 0 10MHz BANDWIDTH)** | | | | |
| 3.4 | 836.5 | 6.1 | 0.007260 | 2.5 |
| 3.85 | 836.5 | 6.7 | 0.008005 | 2.5 |
| 4.4 | 836.5 | 5.3 | 0.006288 | 2.5 |

**Frequency error vs. Temperature**

| Temperature [° C] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 5 16QAM, (CH 20525 RB size 50 RB Offset 0 10MHz BANDWIDTH)** | | | | |
| Normal (25C) | 836.5 | 6.1 | 0.007313 | 2.5 |
| Extreme (50C) | 836.5 | 5.8 | 0.006875 | 2.5 |
| Extreme (40C) | 836.5 | 5.7 | 0.006805 | 2.5 |
| Extreme (30C) | 836.5 | 6.2 | 0.007466 | 2.5 |
| Extreme (10C) | 836.5 | 5.0 | 0.005945 | 2.5 |
| Extreme (0C) | 836.5 | 5.6 | 0.006647 | 2.5 |
| Extreme (-10C) | 836.5 | 5.5 | 0.006563 | 2.5 |
| Extreme (-20C) | 836.5 | 6.1 | 0.007301 | 2.5 |
| Extreme (-30C) | 836.5 | 6.4 | 0.007598 | 2.5 |

***Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

## 10.4 LTE BAND 7

**QPSK, (20MHz BANDWIDTH)**

**Frequency error vs. Voltage**

| Voltage [Vdc] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 7 QPSK, (CH 21100 RB size 100 RB Offset 0 20MHz BANDWIDTH)** | | | | |
| 3.4 | 2535 | 10.2 | 0.004034 | 2.5 |
| 3.85 | 2535 | 8.4 | 0.003321 | 2.5 |
| 4.4 | 2535 | 8.7 | 0.003444 | 2.5 |

**Frequency error vs. Temperature**

| Temperature [° C] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 7 QPSK, (CH 21100 RB size 100 RB Offset 0 20MHz BANDWIDTH)** | | | | |
| Normal (25C) | 2535 | 9.0 | 0.003550 | 2.5 |
| Extreme (50C) | 2535 | 8.5 | 0.003358 | 2.5 |
| Extreme (40C) | 2535 | 8.6 | 0.003403 | 2.5 |
| Extreme (30C) | 2535 | 9.1 | 0.003583 | 2.5 |
| Extreme (10C) | 2535 | 7.8 | 0.003086 | 2.5 |
| Extreme (0C) | 2535 | 8.2 | 0.003216 | 2.5 |
| Extreme (-10C) | 2535 | 9.6 | 0.003806 | 2.5 |
| Extreme (-20C) | 2535 | 9.2 | 0.003623 | 2.5 |
| Extreme (-30C) | 2535 | 8.1 | 0.003195 | 2.5 |

**16QAM, (20MHz BANDWIDTH)**

**Frequency error vs. Voltage**

| Voltage [Vdc] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 7 16QAM, (CH 21100 RB size 100 RB Offset 0 20MHz BANDWIDTH)** | | | | |
| 3.4 | 2535 | 6.4 | 0.002536 | 2.5 |
| 3.85 | 2535 | 6.9 | 0.002704 | 2.5 |
| 4.4 | 2535 | 5.5 | 0.002176 | 2.5 |

**Frequency error vs. Temperature**

| Temperature [° C] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 7 16QAM, (CH 21100 RB size 100 RB Offset 0 20MHz BANDWIDTH)** | | | | |
| Normal (25C) | 2535 | 6.9 | 0.002706 | 2.5 |
| Extreme (50C) | 2535 | 6.1 | 0.002397 | 2.5 |
| Extreme (40C) | 2535 | 5.4 | 0.002132 | 2.5 |
| Extreme (30C) | 2535 | 6.4 | 0.002506 | 2.5 |
| Extreme (10C) | 2535 | 5.6 | 0.002216 | 2.5 |
| Extreme (0C) | 2535 | 5.0 | 0.001968 | 2.5 |
| Extreme (-10C) | 2535 | 5.6 | 0.002225 | 2.5 |
| Extreme (-20C) | 2535 | 6.2 | 0.002456 | 2.5 |
| Extreme (-30C) | 2535 | 5.3 | 0.002077 | 2.5 |

***Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

## 10.5 LTE BAND 17

**QPSK, (10MHz BANDWIDTH)**

**Frequency error vs. Voltage**

| Voltage [Vdc] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 17 QPSK, (CH 23790 RB size 50 RB Offset 0 10MHz BANDWIDTH)** | | | | |
| 3.4 | 710.0 | 10.1 | 0.014194 | 2.5 |
| 3.85 | 710.0 | 9.4 | 0.013179 | 2.5 |
| 4.4 | 710.0 | 7.9 | 0.011062 | 2.5 |

**Frequency error vs. Temperature**

| Temperature [° C] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 17 QPSK, (CH 23790 RB size 50 RB Offset 0 10MHz BANDWIDTH)** | | | | |
| Normal (25C) | 710.0 | 9.2 | 0.012999 | 2.5 |
| Extreme (50C) | 710.0 | 8.6 | 0.012076 | 2.5 |
| Extreme (40C) | 710.0 | 8.0 | 0.011248 | 2.5 |
| Extreme (30C) | 710.0 | 9.0 | 0.012706 | 2.5 |
| Extreme (10C) | 710.0 | 8.9 | 0.012476 | 2.5 |
| Extreme (0C) | 710.0 | 8.3 | 0.011715 | 2.5 |
| Extreme (-10C) | 710.0 | 8.5 | 0.012006 | 2.5 |
| Extreme (-20C) | 710.0 | 9.3 | 0.013066 | 2.5 |
| Extreme (-30C) | 710.0 | 7.7 | 0.010869 | 2.5 |

**16QAM, (10MHz BANDWIDTH)**

**Frequency error vs. Voltage**

| Voltage [Vdc] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 17 16QAM, (CH 23790 RB size 50 RB Offset 0 10MHz BANDWIDTH)** | | | | |
| 3.4 | 710.0 | 9.6 | 0.013536 | 2.5 |
| 3.85 | 710.0 | 9.2 | 0.013021 | 2.5 |
| 4.4 | 710.0 | 8.5 | 0.011980 | 2.5 |

**Frequency error vs. Temperature**

| Temperature [° C] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 17 QPSK, (CH 23790 RB size 50 RB Offset 0 10MHz BANDWIDTH)** | | | | |
| Normal (25C) | 710.0 | 8.9 | 0.012559 | 2.5 |
| Extreme (50C) | 710.0 | 8.4 | 0.011837 | 2.5 |
| Extreme (40C) | 710.0 | 8.2 | 0.011508 | 2.5 |
| Extreme (30C) | 710.0 | 8.5 | 0.011938 | 2.5 |
| Extreme (10C) | 710.0 | 7.8 | 0.011048 | 2.5 |
| Extreme (0C) | 710.0 | 8.7 | 0.012222 | 2.5 |
| Extreme (-10C) | 710.0 | 9.4 | 0.013198 | 2.5 |
| Extreme (-20C) | 710.0 | 8.4 | 0.011846 | 2.5 |
| Extreme (-30C) | 710.0 | 8.5 | 0.012013 | 2.5 |

***Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

## 10.6 LTE BAND 66

**QPSK, (20MHz BANDWIDTH)**

**Frequency error vs. Voltage**

| Voltage [Vdc] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 66 QPSK, (CH 132322 RB size 100 RB Offset 0 20MHz BANDWIDTH)** | | | | |
| 3.4 | 1745 | 6.4 | 0.003653 | 2.5 |
| 3.85 | 1745 | 6.9 | 0.003937 | 2.5 |
| 4.4 | 1745 | 7.4 | 0.004218 | 2.5 |

**Frequency error vs. Temperature**

| Temperature [° C] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 66 QPSK, (CH 132322 RB size 100 RB Offset 0 20MHz BANDWIDTH)** | | | | |
| Normal (25C) | 1745 | 5.6 | 0.003211 | 2.5 |
| Extreme (50C) | 1745 | 7.3 | 0.004183 | 2.5 |
| Extreme (40C) | 1745 | 6.9 | 0.003939 | 2.5 |
| Extreme (30C) | 1745 | 6.6 | 0.003796 | 2.5 |
| Extreme (10C) | 1745 | 7.5 | 0.004296 | 2.5 |
| Extreme (0C) | 1745 | 6.9 | 0.003945 | 2.5 |
| Extreme (-10C) | 1745 | 5.8 | 0.003341 | 2.5 |
| Extreme (-20C) | 1745 | 6.2 | 0.003536 | 2.5 |
| Extreme (-30C) | 1745 | 5.6 | 0.003191 | 2.5 |

**16QAM, (20MHz BANDWIDTH)**

**Frequency error vs. Voltage**

| Voltage [Vdc] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 66 16QAM, (CH 132322 RB size 100 RB Offset 0 20MHz BANDWIDTH)** | | | | |
| 3.4 | 1745 | 9.0 | 0.005132 | 2.5 |
| 3.85 | 1745 | 7.8 | 0.004466 | 2.5 |
| 4.4 | 1745 | 9.0 | 0.005162 | 2.5 |

**Frequency error vs. Temperature**

| Temperature [° C] | Frequency [MHz] | Frequency* Error[Hz] | Frequency Error[ppm] | Limit [ppm] |
|---|---|---|---|---|
| **BAND 66 QPSK, (CH 132322 RB size 100 RB Offset 0 20MHz BANDWIDTH)** | | | | |
| Normal (25C) | 1745 | 9.0 | 0.005131 | 2.5 |
| Extreme (50C) | 1745 | 7.8 | 0.004490 | 2.5 |
| Extreme (40C) | 1745 | 8.9 | 0.005081 | 2.5 |
| Extreme (30C) | 1745 | 8.5 | 0.004857 | 2.5 |
| Extreme (10C) | 1745 | 8.7 | 0.004974 | 2.5 |
| Extreme (0C) | 1745 | 6.5 | 0.003705 | 2.5 |
| Extreme (-10C) | 1745 | 8.0 | 0.004597 | 2.5 |
| Extreme (-20C) | 1745 | 8.9 | 0.005123 | 2.5 |
| Extreme (-30C) | 1745 | 5.4 | 0.003079 | 2.5 |

***Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

# 11. Peak-to-Average Ratio

## 11.1 Description of the PAR Measurement

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

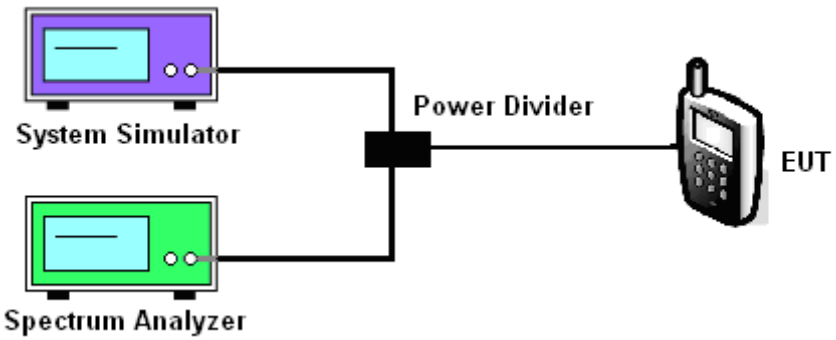
## 11.2 Measuring Instruments

See list of measuring instruments of this test report.

## 11.3 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. For GSM/EGPRS operating modes:
   a. Set the RBW = 1MHz, VBW = 1MHz, Peak detector in spectrum analyzer.
   b. Set EUT in maximum power output, and triggered the burst signal.
   c. Measured respectively the Peak level and Mean level, and the deviation was recorded as Peak to Average Ratio.
4. For UMTS operating modes:
   a. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
   b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.

## 11.4 Test Setup




**MODES TESTED**

LTE Band 2/4/5/7/17/66

Test data reference attachment.

**----END OF REPORT----**