



## Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

# TEST REPORT

## FCC Part 27

Report Reference No.....: CTA25073100104

FCC ID.....: 2BRNM-Q8

Compiled by

( position+printed name+signature) :: File administrators Zoey Cao

Supervised by

( position+printed name+signature) :: Project Engineer Ace Chai

Approved by

( position+printed name+signature) :: RF Manager Eric Wang

Date of issue.....: Aug. 13, 2025

Testing Laboratory Name .....: Shenzhen CTA Testing Technology Co., Ltd.

Address .....: Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

Applicant's name .....: Shenzhen Qianxun Yunchuang Technology Co., Ltd.

Address .....: 204, No. 228 Hekan North Road, Wuhe Community, Bantian Street, Longgang District, Shenzhen, China

Test specification .....

FCC CFR Title 47 Part 2, Part 27

Standard .....: ANSI/TIA-603-E-2016  
KDB 971168 D01

Shenzhen CTA Testing Technology Co., Ltd. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen CTA Testing Technology Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen CTA Testing Technology Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Test item description.....: GPS TRACKER

Trade Mark .....: N/A

Manufacturer .....: Shenzhen Qianxun Yunchuang Technology Co., Ltd.

Model/Type reference.....: Q8

Listed Models .....: Refer to page 2

Ratings .....: DC 3.7V From battery and DC 5.0V From external circuit

Modulation .....: QPSK, 16QAM

Frequency.....: E-UTRA Band 66

Result.....: PASS

# TEST REPORT

Equipment under Test : GPS TRACKER

Model /Type : Q8

Listed Models : Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q9, Q10, Q11, Q12, Q13, Q14, Q15, Q16, Q17, Q18, Q19, Q20, P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, GF01, GF02, GF03, GF04, GF05, GF06, GF07, GF08, GF09, GF10, GF11, GF12, GF13, GF14, GF15, GF16, GF17, GF18, GF19, GF20, GF21, GF22, PG01, PG02, PG03, PG04, PG05, PG06, PG07, PG08, PG09, PG10, PG11, PG12, PG13, PG14, PG15, PG16, PG17, PG18, D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12, D13, D14, D15, M1, M2, M3, M4, M5, M6, M7, M8, M9, M10

Model difference : The PCB board, circuit, structure and internal of these models are the same, Only model number and colour is different for these model.

Applicant : Shenzhen Qianxun Yunchuang Technology Co., Ltd.

Address : 204, No. 228 Hekan North Road, Wuhe Community, Bantian Street, Longgang District, Shenzhen, China

Manufacturer : Shenzhen Qianxun Yunchuang Technology Co., Ltd.

Address : 204, No. 228 Hekan North Road, Wuhe Community, Bantian Street, Longgang District, Shenzhen, China

| Test result | Pass * |
|-------------|--------|
|-------------|--------|

\* In the configuration tested, the EUT complied with the standards specified page 4.

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

## Contents

|     |  |    |
|-----|--|----|
| 1   | SUMMARY .....  | 4  |
| 1.1 | TEST STANDARDS .....   | 4  |
| 1.2 | Test Description .....   | 4  |
| 1.3 | Address of the test laboratory .....                             | 4  |
| 1.4 | Test Facility .....  | 4  |
| 1.5 | Statement of the measurement uncertainty .....                   | 5  |
| 2   | GENERAL INFORMATION .....  | 6  |
| 2.1 | Environmental conditions .....                                   | 6  |
| 2.2 | General Description of EUT .....                                 | 6  |
| 2.3 | EUT configuration .....  | 6  |
| 2.4 | Description of Test Modes and Test Frequency .....               | 6  |
| 2.5 | Equipments Used during the Test .....                            | 7  |
| 2.6 | Related Submittal(s) / Grant (s) .....                           | 7  |
| 2.7 | Modifications .....  | 7  |
| 3   | TEST CONDITIONS AND RESULTS .....                                | 8  |
| 3.1 | Output Power .....   | 8  |
| 3.2 | Peak-to-Average Ratio (PAR) .....                                | 12 |
| 3.3 | Occupied Bandwidth and Emission Bandwidth .....                  | 13 |
| 3.4 | Band Edge compliance .....                                       | 14 |
| 3.5 | Spurious Emission .....  | 15 |
| 3.6 | Frequency Stability under Temperature & Voltage Variations ..... | 19 |
| 4   | Test Setup Photos of the EUT .....                               | 21 |
| 5   | Photos of the EUT .....  | 21 |

# 1 SUMMARY

## 1.1 TEST STANDARDS

The tests were performed according to following standards:

[FCC Part 2](#): FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

[FCC Part 27](#): MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

[ANSI/TIA-603-E-2016](#): Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

[ANSI C63.26-2015](#): IEEE/ANSI Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

[FCC KDB971168D01](#) Power Meas License Digital Systems

## 1.2 Test Description

| Test Item                              | Section in CFR 47               | Result |
|--|---------------------------------|--------|
| RF Output Power                        | Part 2.1046<br>Part 27.50(d)(4) | Pass   |
| Peak-to-Average Ratio                  | Part 27.50(d)(5)                | Pass   |
| 99% & -26 dB Occupied Bandwidth        | Part 2.1049<br>Part 27.53(h)    | Pass   |
| Spurious Emissions at Antenna Terminal | Part 2.1051<br>Part 27.53(h)    | Pass   |
| Field Strength of Spurious Radiation   | Part 2.1053<br>Part 27.53(h)    | Pass   |
| Out of band emission, Band Edge        | Part 2.1051<br>Part 27.53(h)    | Pass   |
| Frequency stability                    | Part 2.1055<br>Part 27.54       | Pass   |

## 1.3 Address of the test laboratory

**Shenzhen CTA Testing Technology Co., Ltd.**

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

## 1.4 Test Facility

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

### FCC-Registration No.: 165725

Shenzhen Global Test Service Co.,Ltd EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

### A2LA-Lab Cert. No.: 4758.01

Shenzhen CTA Testing Technology Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

**CNAS-Lab Code: L8169**

Shenzhen CTA Testing Technology Co., Ltd. Has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories. Date of Registration: Dec. 11, 2015. Valid time is until Dec. 10, 2024.

**1.5 Statement of the measurement uncertainty**

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

Hereafter the best measurement capability for Shenzhen CTA Testing Technology Co., Ltd. Is reported:

| Test                                     | Range       | Measurement Uncertainty | Notes |
|--|-------------|-------------------------|-------|
| Radiated Emission                        | 9KHz~30MHz  | 3.02 dB                 | (1)   |
| Radiated Emission                        | 30~1000MHz  | 4.06 dB                 | (1)   |
| Radiated Emission                        | 1~18GHz     | 5.14 dB                 | (1)   |
| Radiated Emission                        | 18-40GHz    | 5.38 dB                 | (1)   |
| Conducted Disturbance                    | 0.15~30MHz  | 2.14 dB                 | (1)   |
| Output Peak power                        | 30MHz~18GHz | 0.55 dB                 | (1)   |
| Power spectral density                   | /           | 0.57 dB                 | (1)   |
| Spectrum bandwidth                       | /           | 1.1%                    | (1)   |
| Radiated spurious emission (30MHz-1GHz)  | 30~1000MHz  | 4.10 dB                 | (1)   |
| Radiated spurious emission (1GHz-18GHz)  | 1~18GHz     | 4.32 dB                 | (1)   |
| Radiated spurious emission (18GHz-40GHz) | 18-40GHz    | 5.54 dB                 | (1)   |
| Time                                     | /           | ±2%                     | (1)   |

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

## 2 GENERAL INFORMATION

### 2.1 Environmental conditions

|                                |   |               |
|--------------------------------|---|---------------|
| Date of receipt of test sample | : | Aug. 04, 2025 |
| Testing commenced on           | : | Aug. 04, 2025 |
| Testing concluded on           | : | Aug. 13, 2025 |

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

|                     |         |
|---------------------|---------|
| Normal Temperature: | 25°C    |
| Relative Humidity:  | 55 %    |
| Air Pressure:       | 101 kPa |

### 2.2 General Description of EUT

|                        |  |
|------------------------|--|
| Product Name:          | GPS TRACKER  |
| Model/Type reference:  | Q8   |
| Power supply:          | DC 3.7V From battery and DC 5.0V From external circuit               |
| Hardware version:      | Q8-V1.0-20250218   |
| Software version:      | Q66 V1.11 20250306 123200  |
| Testing sample ID :    | CTA250731001-1# (Engineer sample)<br>CTA250731001-2# (Normal sample) |
| <b>LTE</b>             |  |
| Operation Band:        | E-UTRA Band 66   |
| Support Bandwidth:     | Band 66: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz                     |
| TX/RX Frequency Range: | E-UTRA Band 66(1710 MHz -1780MHz)                                    |
| Modulation Type:       | QPSK, 16QAM  |
| Release Version:       | Release 9  |
| Category:              | Cat 4  |
| Antenna Type:          | FPC Antenna  |
| Antenna Gain:          | 1.0 dBi  |

Note: For more details, refer to the user's manual of the EUT.

### 2.3 EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- - supplied by the manufacturer
- - supplied by the lab

|   |  |
|---|--|
| ○ Adapter<br>(Auxiliary test supplied by test Lab): | Input: AC 100-240V 50/60Hz<br>Output: DC 5V 2A |
|---|--|

### 2.4 Description of Test Modes and Test Frequency

The EUT has been tested under typical operating condition. The CMW500 used to control the EUT staying in continuous transmitting and receiving mode for testing. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.



## 2.5 Equipments Used during the Test

| Test Equipment                      | Manufacturer | Model No.     | Equipment No. | Calibration Date | Calibration Due Date |
|-------------------------------------|--------------|---------------|---------------|------------------|----------------------|
| LISN                                | R&S          | ENV216        | CTA-308       | 2025/08/04       | 2026/08/03           |
| LISN                                | R&S          | ENV216        | CTA-314       | 2025/07/30       | 2026/07/29           |
| EMI Test Receiver                   | R&S          | ESPI          | CTA-307       | 2025/07/30       | 2026/07/29           |
| EMI Test Receiver                   | R&S          | ESCI          | CTA-306       | 2025/07/30       | 2026/07/29           |
| Spectrum Analyzer                   | Agilent      | N9020A        | CTA-301       | 2025/07/30       | 2026/07/29           |
| Vector Signal generator             | Agilent      | N5182A        | CTA-305       | 2025/07/30       | 2026/07/29           |
| Analog Signal Generator             | R&S          | E4421B        | CTA-304       | 2025/07/30       | 2026/07/29           |
| WIDEBAND RADIO COMMUNICATION TESTER | CMW500       | R&S           | CTA-302       | 2025/07/30       | 2026/07/29           |
| Temperature and humidity meter      | Chigo        | ZG-7020       | CTA-326       | 2025/07/31       | 2026/07/30           |
| Ultra-Broadband Antenna             | Schwarzbeck  | VULB9163      | CTA-310       | 2023/10/17       | 2026/10/16           |
| Horn Antenna                        | Schwarzbeck  | BBHA 9120D    | CTA-309       | 2023/10/13       | 2026/10/12           |
| Loop Antenna                        | Zhinan       | ZN30900C      | CTA-311       | 2023/10/17       | 2026/10/16           |
| Horn Antenna                        | Schwarzbeck  | BBHA 9170     | CTA-346       | 2025/05/18       | 2028/05/17           |
| Amplifier                           | Schwarzbeck  | BBV9745       | CTA-312       | 2025/07/30       | 2026/07/29           |
| Amplifier                           | Tonscend     | TAP-011840    | CTA-313       | 2025/07/30       | 2026/07/29           |
| High-Pass Filter                    | XingBo       | XBLBQ-GTA18   | CTA-402       | 2025/07/30       | 2026/07/29           |
| High-Pass Filter                    | XingBo       | XBLBQ-GTA27   | CTA-403       | 2025/07/30       | 2026/07/29           |
| Automatic control unit              | Tonscend     | JS0806-2      | CTA-404       | 2025/07/30       | 2026/07/29           |
| Power Sensor                        | Agilent      | U2021XA       | CTA-405       | 2025/07/30       | 2026/07/29           |
| Amplifier                           | SKET         | LNPA 1840G-50 | CTA-345       | 2025/05/17       | 2026/05/16           |
| Spectrum analyzer                   | R&S          | FSV40-N       | CTA-344       | 2025/05/17       | 2026/05/16           |
| Power Meter                         | R&S          | NRVS          | CTA-354       | 2025/07/30       | 2026/07/29           |

| Test Equipment    | Manufacturer | Model No.   | Version number | Calibration Date | Calibration Due Date |
|-------------------|--------------|-------------|----------------|------------------|----------------------|
| EMI Test Software | Tonscend     | TS®JS32-RE  | 5.0.0.2        | N/A              | N/A                  |
| EMI Test Software | Tonscend     | TS®JS32-CE  | 5.0.0.1        | N/A              | N/A                  |
| RF Test Software  | Tonscend     | TS®JS1120-3 | 3.1.65         | N/A              | N/A                  |
| RF Test Software  | Tonscend     | TS®JS1120   | 3.1.46         | N/A              | N/A                  |

## 2.6 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for filing to comply with of the FCC Part 27 Rules.

## 2.7 Modifications

No modifications were implemented to meet testing criteria.

### 3 TEST CONDITIONS AND RESULTS

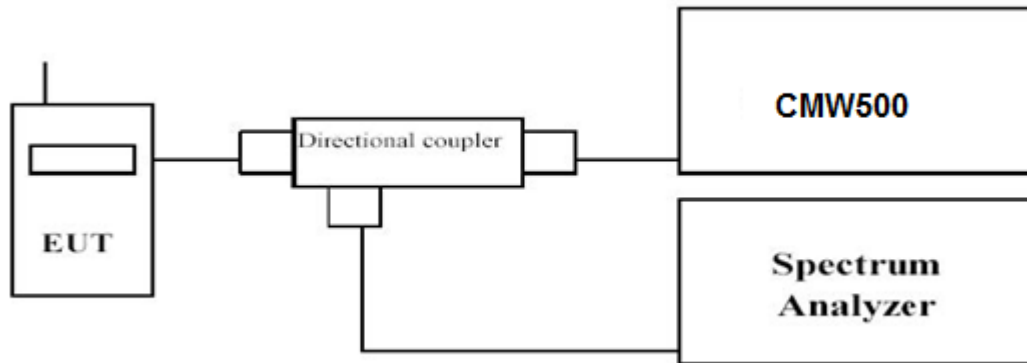
#### 3.1 Output Power

##### LIMIT

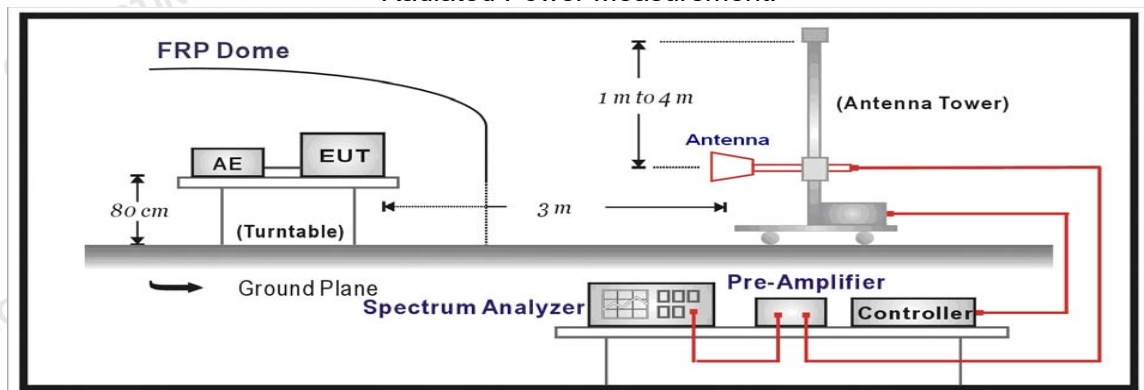
According to §27.50 (d) (4): Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

##### TEST CONFIGURATION

Conducted Power Measurement



Radiated Power Measurement:



##### TEST PROCEDURE

The EUT was setup according to ANSI/TIA-603-E-2016

##### **Conducted Power Measurement:**

- Place the EUT on a bench and set it in transmitting mode.
- Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMW500 by a Directional Couple.
- EUT Communicate with CMW500 then selects a channel for testing.
- Add a correction factor to the display of spectrum, and then test.

##### **Radiated Power Measurement:**

- The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
- The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter
- The output of the test antenna shall be connected to the measuring receiver.
- The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.



- e) The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- f) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- g) The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- h) The maximum signal level detected by the measuring receiver shall be noted.
- i) The transmitter shall be replaced by a substitution antenna.
- j) The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- k) The substitution antenna shall be connected to a calibrated signal generator.
- l) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- m) The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
- n) The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
- o) The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
- p) The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
- q) Test site anechoic chamber refer to ANSI C63.4.

## **TEST RESULTS**

### **Conducted Measurement:**

**-----Passed-----**

*Please refer to the FCC Appendix RF Test Data for-LTE Band66.*

**Radiated Measurement:**

Remark:

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 66; recorded worst case for each Channel Bandwidth of LTE FDD Band 66.
2.  $EIRP = P_{Mea}(dBm) - P_{cl}(dB) + P_{Ag}(dB) + G_a(dBi)$

**LTE FDD Band 66 Channel Bandwidth 1.4MHz QPSK**

| Frequency (MHz) | P <sub>Mea</sub> (dBm) | P <sub>cl</sub> (dB) | G <sub>a</sub> Antenna Gain(dB) | P <sub>Ag</sub> (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|----------------------|---------------------------------|----------------------|------------|-------------|-------------|--------------|
| 1710.7          | -19.50                 | 2.75                 | 8.98                            | 35.7                 | 22.43      | 30.00       | -7.57       | V            |
| 1745.0          | -20.00                 | 2.85                 | 9.47                            | 35.7                 | 22.32      | 30.00       | -7.68       | V            |
| 1779.3          | -18.58                 | 2.92                 | 9.5                             | 35.7                 | 23.70      | 30.00       | -6.30       | V            |

**LTE FDD Band 66 Channel Bandwidth 3MHz QPSK**

| Frequency (MHz) | P <sub>Mea</sub> (dBm) | P <sub>cl</sub> (dB) | G <sub>a</sub> Antenna Gain(dB) | P <sub>Ag</sub> (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|----------------------|---------------------------------|----------------------|------------|-------------|-------------|--------------|
| 1711.5          | -18.88                 | 2.75                 | 8.98                            | 35.7                 | 23.05      | 30.00       | -6.95       | V            |
| 1745.0          | -18.96                 | 2.85                 | 9.47                            | 35.7                 | 23.36      | 30.00       | -6.64       | V            |
| 1778.5          | -19.93                 | 2.92                 | 9.5                             | 35.7                 | 22.35      | 30.00       | -7.65       | V            |

**LTE FDD Band 66 Channel Bandwidth 5MHz QPSK**

| Frequency (MHz) | P <sub>Mea</sub> (dBm) | P <sub>cl</sub> (dB) | G <sub>a</sub> Antenna Gain(dB) | P <sub>Ag</sub> (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|----------------------|---------------------------------|----------------------|------------|-------------|-------------|--------------|
| 1712.5          | -19.45                 | 2.75                 | 8.98                            | 35.7                 | 22.48      | 30.00       | -7.52       | V            |
| 1745.0          | -19.60                 | 2.85                 | 9.47                            | 35.7                 | 22.72      | 30.00       | -7.28       | V            |
| 1777.5          | -18.90                 | 2.92                 | 9.5                             | 35.7                 | 23.38      | 30.00       | -6.62       | V            |

**LTE FDD Band 66 Channel Bandwidth 10MHz QPSK**

| Frequency (MHz) | P <sub>Mea</sub> (dBm) | P <sub>cl</sub> (dB) | G <sub>a</sub> Antenna Gain(dB) | P <sub>Ag</sub> (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|----------------------|---------------------------------|----------------------|------------|-------------|-------------|--------------|
| 1715.0          | -18.98                 | 2.75                 | 8.98                            | 35.7                 | 22.95      | 30.00       | -7.05       | V            |
| 1745.0          | -19.27                 | 2.85                 | 9.47                            | 35.7                 | 23.05      | 30.00       | -6.95       | V            |
| 1775.0          | -18.71                 | 2.92                 | 9.5                             | 35.7                 | 23.57      | 30.00       | -6.43       | V            |

**LTE FDD Band 66 Channel Bandwidth 15MHz QPSK**

| Frequency (MHz) | P <sub>Mea</sub> (dBm) | P <sub>cl</sub> (dB) | G <sub>a</sub> Antenna Gain(dB) | P <sub>Ag</sub> (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|----------------------|---------------------------------|----------------------|------------|-------------|-------------|--------------|
| 1717.5          | -18.15                 | 2.75                 | 8.98                            | 35.7                 | 23.78      | 30.00       | -6.22       | V            |
| 1745.0          | -19.85                 | 2.85                 | 9.47                            | 35.7                 | 22.47      | 30.00       | -7.53       | V            |
| 1772.5          | -19.60                 | 2.92                 | 9.5                             | 35.7                 | 22.68      | 30.00       | -7.32       | V            |

**LTE FDD Band 66 Channel Bandwidth 20MHz QPSK**

| Frequency (MHz) | P <sub>Mea</sub> (dBm) | P <sub>cl</sub> (dB) | G <sub>a</sub> Antenna Gain(dB) | P <sub>Ag</sub> (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|----------------------|---------------------------------|----------------------|------------|-------------|-------------|--------------|
| 1720.0          | -19.77                 | 2.75                 | 8.98                            | 35.7                 | 22.16      | 30.00       | -7.84       | V            |
| 1745.0          | -18.12                 | 2.85                 | 9.47                            | 35.7                 | 24.20      | 30.00       | -5.80       | V            |
| 1770.0          | -19.02                 | 2.92                 | 9.5                             | 35.7                 | 23.26      | 30.00       | -6.74       | V            |

**LTE FDD Band 66 Channel Bandwidth 1.4MHz 16QAM**

| Frequency (MHz) | P <sub>Mea</sub> (dBm) | P <sub>cl</sub> (dB) | G <sub>a</sub> Antenna Gain(dB) | P <sub>Ag</sub> (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|----------------------|---------------------------------|----------------------|------------|-------------|-------------|--------------|
| 1710.7          | -19.21                 | 2.75                 | 8.98                            | 35.7                 | 22.72      | 30.00       | -7.28       | V            |
| 1745.0          | -19.38                 | 2.85                 | 9.47                            | 35.7                 | 22.94      | 30.00       | -7.06       | V            |
| 1779.3          | -19.80                 | 2.92                 | 9.5                             | 35.7                 | 22.48      | 30.00       | -7.52       | V            |

**LTE FDD Band 66 Channel Bandwidth 3MHz 16QAM**

| Frequency (MHz) | P <sub>Mea</sub> (dBm) | P <sub>cl</sub> (dB) | G <sub>a</sub> Antenna Gain(dB) | P <sub>Ag</sub> (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|----------------------|---------------------------------|----------------------|------------|-------------|-------------|--------------|
| 1711.5          | -17.87                 | 2.75                 | 8.98                            | 35.7                 | 24.06      | 30.00       | -5.94       | V            |
| 1745.0          | -18.77                 | 2.85                 | 9.47                            | 35.7                 | 23.55      | 30.00       | -6.45       | V            |
| 1778.5          | -19.48                 | 2.92                 | 9.5                             | 35.7                 | 22.80      | 30.00       | -7.20       | V            |

**LTE FDD Band 66 Channel Bandwidth 5MHz 16QAM**

| Frequency (MHz) | P <sub>Mea</sub> (dBm) | P <sub>cl</sub> (dB) | G <sub>a</sub> Antenna Gain(dB) | P <sub>Ag</sub> (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|----------------------|---------------------------------|----------------------|------------|-------------|-------------|--------------|
| 1712.5          | -19.57                 | 2.75                 | 8.98                            | 35.7                 | 22.36      | 30.00       | -7.64       | V            |
| 1745.0          | -19.85                 | 2.85                 | 9.47                            | 35.7                 | 22.47      | 30.00       | -7.53       | V            |
| 1777.5          | -18.55                 | 2.92                 | 9.5                             | 35.7                 | 23.73      | 30.00       | -6.27       | V            |

**LTE FDD Band 66 Channel Bandwidth 10MHz 16QAM**

| Frequency (MHz) | P <sub>Mea</sub> (dBm) | P <sub>cl</sub> (dB) | G <sub>a</sub> Antenna Gain(dB) | P <sub>Ag</sub> (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|----------------------|---------------------------------|----------------------|------------|-------------|-------------|--------------|
| 1715.0          | -19.63                 | 2.75                 | 8.98                            | 35.7                 | 22.30      | 30.00       | -7.70       | V            |
| 1745.0          | -19.07                 | 2.85                 | 9.47                            | 35.7                 | 23.25      | 30.00       | -6.75       | V            |
| 1775.0          | -19.77                 | 2.92                 | 9.5                             | 35.7                 | 22.51      | 30.00       | -7.49       | V            |

**LTE FDD Band 66 Channel Bandwidth 15MHz 16QAM**

| Frequency (MHz) | P <sub>Mea</sub> (dBm) | P <sub>cl</sub> (dB) | G <sub>a</sub> Antenna Gain(dB) | P <sub>Ag</sub> (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|----------------------|---------------------------------|----------------------|------------|-------------|-------------|--------------|
| 1717.5          | -19.22                 | 2.75                 | 8.98                            | 35.7                 | 22.71      | 30.00       | -7.29       | V            |
| 1745.0          | -17.63                 | 2.85                 | 9.47                            | 35.7                 | 24.69      | 30.00       | -5.31       | V            |
| 1772.5          | -17.84                 | 2.92                 | 9.5                             | 35.7                 | 24.44      | 30.00       | -5.56       | V            |

**LTE FDD Band 66 Channel Bandwidth 20MHz 16QAM**

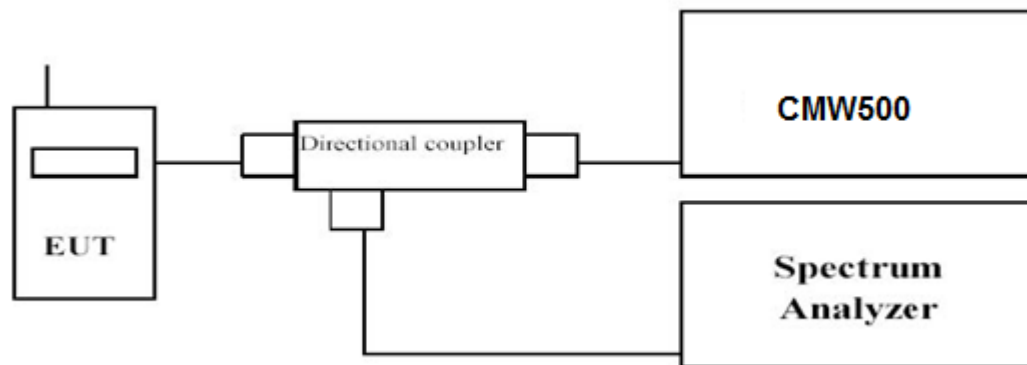
| Frequency (MHz) | P <sub>Mea</sub> (dBm) | P <sub>cl</sub> (dB) | G <sub>a</sub> Antenna Gain(dB) | P <sub>Ag</sub> (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|----------------------|---------------------------------|----------------------|------------|-------------|-------------|--------------|
| 1720.0          | -19.68                 | 2.75                 | 8.98                            | 35.7                 | 22.25      | 30.00       | -7.75       | V            |
| 1745.0          | -18.56                 | 2.85                 | 9.47                            | 35.7                 | 23.76      | 30.00       | -6.24       | V            |
| 1770.0          | -19.18                 | 2.92                 | 9.5                             | 35.7                 | 23.10      | 30.00       | -6.90       | V            |

### 3.2 Peak-to-Average Ratio (PAR)

#### LIMIT

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

#### TEST CONFIGURATION



#### TEST PROCEDURE

1. Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
2. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
3. Set the number of counts to a value that stabilizes the measured CCDF curve;
4. Set the measurement interval as follows:
  - 1). for continuous transmissions, set to 1 ms,
  - 2). for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
5. Record the maximum PAPR level associated with a probability of 0.1%.

#### TEST RESULTS

-----Passed-----

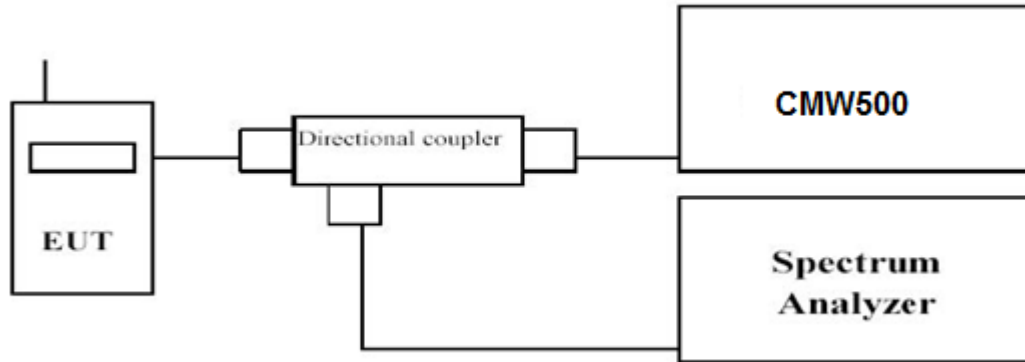
Please refer to the FCC Appendix RF Test Data for-LTE Band66.

### 3.3 Occupied Bandwidth and Emission Bandwidth

#### LIMIT

N/A

#### TEST CONFIGURATION



#### 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 low, middle and high channel in each band. The -26dBc Emission bandwidth was also measured and recorded.

Set RBW was set to about 1% of emission BW, VBW $\geq$ 3 times RBW.

-26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

#### TEST RESULTS

-----Passed-----

Please refer to the FCC Appendix RF Test Data for-LTE Band66.

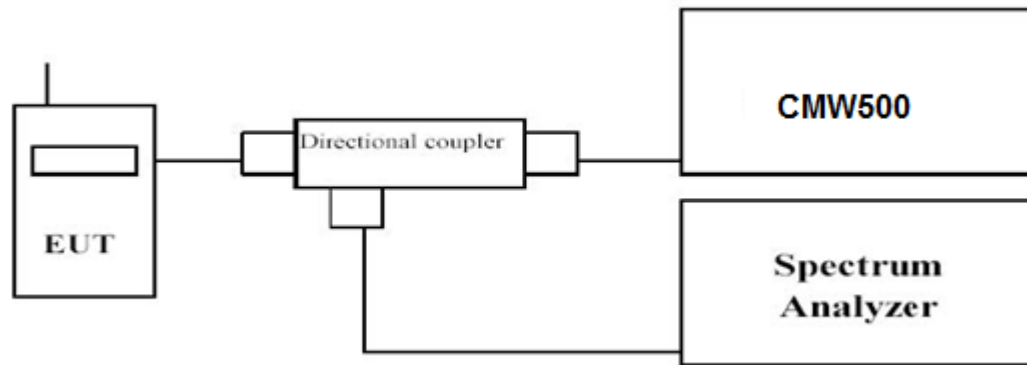


### 3.4 Band Edge compliance

#### LIMIT

According to §27.53 (h): for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10} (P)$  dB.

#### TEST CONFIGURATION



#### TEST PROCEDURE

1. The transmitter output port was connected to base station.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement.
3. Set EUT at maximum power through base station.
4. Select lowest and highest channels for each band and different modulation.
5. Measure Band edge using RMS (Average) detector by spectrum

#### TEST RESULTS

-----Passed-----

Please refer to the FCC Appendix RF Test Data for-LTE Band66.

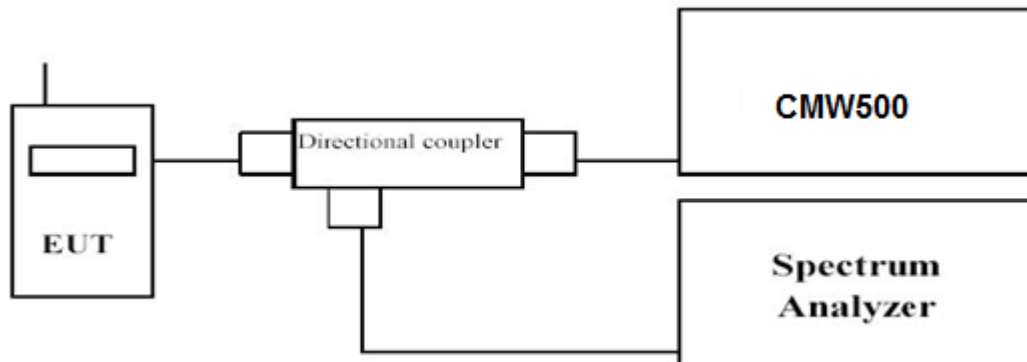
### 3.5 Spurious Emission

#### LIMIT

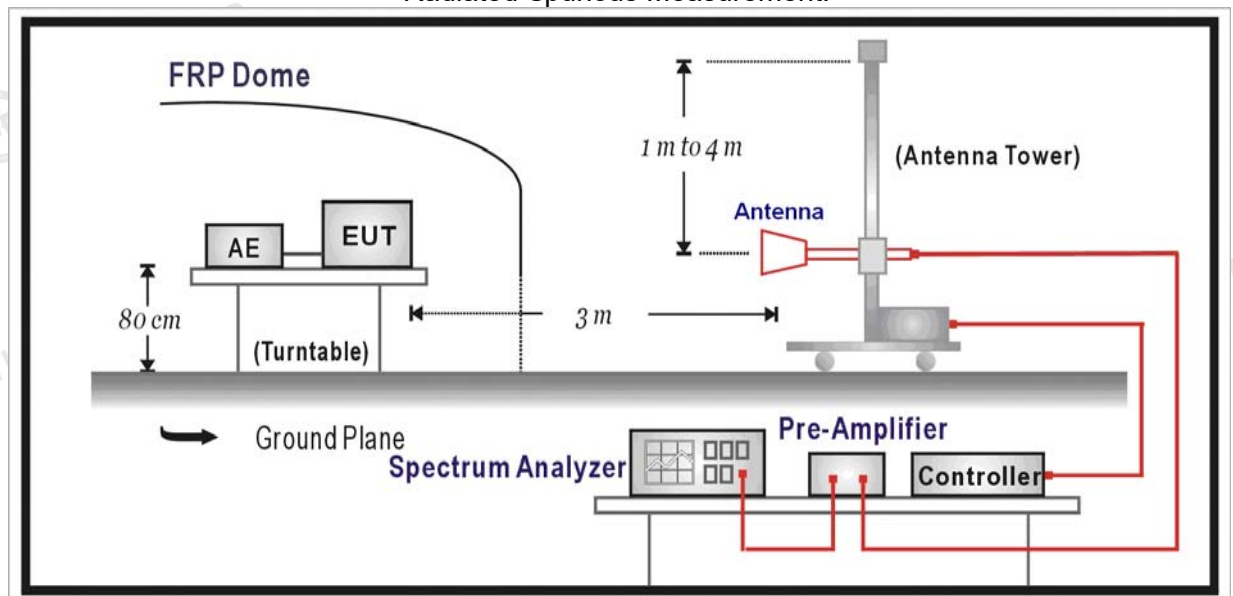
According to §27.53 (h): for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10} (P)$  dB.

#### TEST CONFIGURATION

Conducted Spurious Measurement:



Radiated Spurious Measurement:



#### TEST PROCEDURE

The EUT was setup according to ANSI/TIA-603-E-2016

##### **Conducted Spurious Measurement:**

- Place the EUT on a bench and set it in transmitting mode.
- Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMW500 by a Directional Coupler.
- EUT Communicate with CMW500 then selects a channel for testing.
- Add a correction factor to the display of spectrum, and then test.
- The resolution bandwidth of the spectrum analyzer was set sufficient scans were taken to show the out of band Emission if any up to 10th harmonic.

**Radiated Spurious Measurement:**

- a. The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
- b. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter
- c. The output of the test antenna shall be connected to the measuring receiver.
- d. The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- e. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- f. The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- g. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- h. The maximum signal level detected by the measuring receiver shall be noted.
- i. The transmitter shall be replaced by a substitution antenna.
- j. The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- k. The substitution antenna shall be connected to a calibrated signal generator.
- l. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- m. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
- n. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
- o. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
- p. The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
- q. The resolution bandwidth of the spectrum analyzer was set at 100 kHz for below 1GHz and 1MHz for above 1GHz. The frequency range was checked up to 10th harmonic.
- r. Test site anechoic chamber refer to ANSI C63.4.

**TEST RESULTS**

**Conducted Measurement:**

**-----Passed-----**

*Please refer to the FCC Appendix RF Test Data for-LTE Band66.*

**Radiated Measurement:****Remark:**

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 66;

**LTE FDD Band 66 Channel Bandwidth 20MHz QPSK Low Channel**

| Frequency (MHz) | P <sub>Mea</sub> (dBm) | P <sub>cl</sub> (dB) | Distance (m) | G <sub>a</sub> Antenna Gain(dB) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|----------------------|--------------|---------------------------------|-----------------|-------------|-------------|--------------|
| 3440.00         | -44.35                 | 4.02                 | 3.00         | 12.5                            | -35.87          | -13.00      | -22.87      | H            |
| 5160.00         | -48.30                 | 5.11                 | 3.00         | 13.38                           | -40.03          | -13.00      | -27.03      | H            |
| 3440.00         | -41.41                 | 4.02                 | 3.00         | 12.5                            | -32.93          | -13.00      | -19.93      | V            |
| 5160.00         | -47.43                 | 5.11                 | 3.00         | 13.38                           | -39.16          | -13.00      | -26.16      | V            |

**LTE FDD Band 66 Channel Bandwidth 20MHz QPSK Middle Channel**

| Frequency (MHz) | P <sub>Mea</sub> (dBm) | P <sub>cl</sub> (dB) | Distance (m) | G <sub>a</sub> Antenna Gain(dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|----------------------|--------------|---------------------------------|------------|-------------|-------------|--------------|
| 3490.00         | -42.86                 | 4.02                 | 3.00         | 12.5                            | -34.38     | -13.00      | -21.38      | H            |
| 5235.00         | -49.00                 | 5.11                 | 3.00         | 13.38                           | -40.73     | -13.00      | -27.73      | H            |
| 3490.00         | -42.99                 | 4.02                 | 3.00         | 12.5                            | -34.51     | -13.00      | -21.51      | V            |
| 5235.00         | -48.60                 | 5.11                 | 3.00         | 13.38                           | -40.33     | -13.00      | -27.33      | V            |

**LTE FDD Band 66 Channel Bandwidth 20MHz QPSK High Channel**

| Frequency (MHz) | P <sub>Mea</sub> (dBm) | P <sub>cl</sub> (dB) | Distance (m) | G <sub>a</sub> Antenna Gain(dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|----------------------|--------------|---------------------------------|------------|-------------|-------------|--------------|
| 3540.00         | -44.95                 | 4.02                 | 3.00         | 12.5                            | -36.47     | -13.00      | -23.47      | H            |
| 5310.00         | -52.52                 | 5.11                 | 3.00         | 13.38                           | -44.25     | -13.00      | -31.25      | H            |
| 3540.00         | -42.84                 | 4.02                 | 3.00         | 12.5                            | -34.36     | -13.00      | -21.36      | V            |
| 5310.00         | -54.24                 | 5.11                 | 3.00         | 13.38                           | -45.97     | -13.00      | -32.97      | V            |

**Notes:**

1. All channel bandwidth were tested, the report recorded the worst data.
2.  $EIRP = P_{Mea}(dBm) - P_{cl}(dB) + P_{Ag}(dB) + G_a(dBi)$
3.  $ERP = EIRP - 2.15dBi$  as EIRP by subtracting the gain of the dipole.
4.  $Margin = EIRP - Limit$
5. We measured all modes and only recorded the worst case.

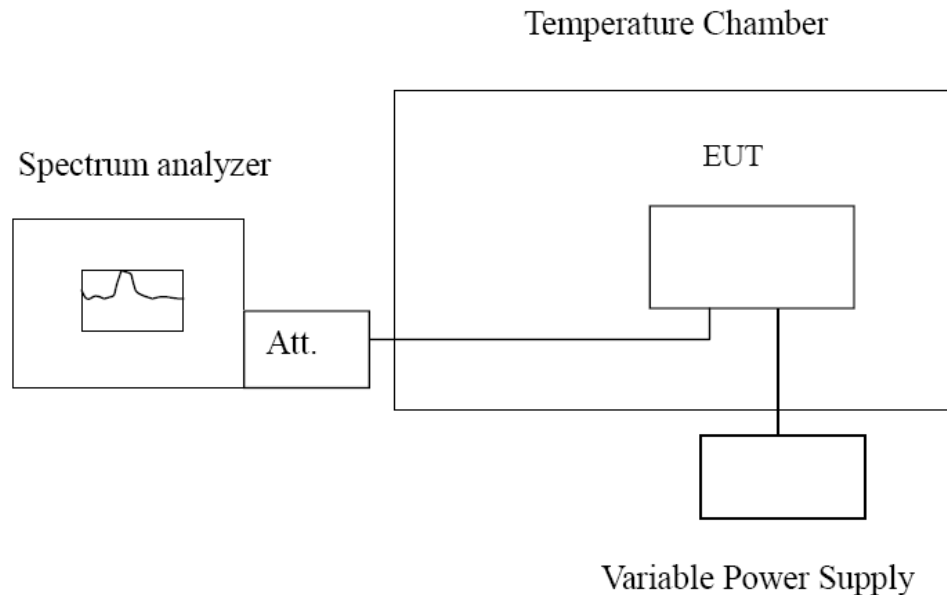


### 3.6 Frequency Stability under Temperature & Voltage Variations

#### LIMIT

According to §27.54, §2.1055 requirement, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation and should not exceed 2.5ppm.

#### TEST CONFIGURATION



#### TEST PROCEDURE

The EUT was setup according to ANSI/TIA-603-E-2016

##### **Frequency Stability under Temperature Variations:**

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30°C.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE band 66, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50°C.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 °C increments from +50°C to -30°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements
9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

##### **Frequency Stability under Voltage Variations:**

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation ( $\pm 15\%$ ) and endpoint, record the maximum frequency change.

## **TEST RESULTS**

**-----Passed-----**

*Please refer to the FCC Appendix RF Test Data for-LTE Band66.*

#### **4 Test Setup Photos of the EUT**

Please refer to separated files for Test Setup Photos of the EUT.

#### **5 Photos of the EUT**

Please refer to separated files for External Photos & Internal Photos of the EUT.

\*\*\*\*\* **End of Report** \*\*\*\*\*