

# FCC Test Report

**Client Name** : Jinan USR IOT Technology Limited

**Client Address** : Floor F1 & Part of Floor F2, Building No. 9, Diya shuang chuang Industrial Zone, No. 2566, Century Main Road, Gaoxin District, Jinan, Shandong, China

**Product Name** : 4G Cellular Router

**Report Date** : Sept. 16, 2022

**Shenzhen Anbotech Compliance Laboratory Limited**



# Contents

|                                                   |    |
|---------------------------------------------------|----|
| 1. General Information .....                      | 6  |
| 1.1. Client Information .....                     | 6  |
| 1.2. Description of Device (EUT) .....            | 6  |
| 1.3. Auxiliary Equipment Used During Test .....   | 8  |
| 1.4. Operation State .....                        | 8  |
| 1.5. Environmental Conditions .....               | 9  |
| 1.6. Test Equipment List .....                    | 10 |
| 1.7. Measurement Uncertainty .....                | 11 |
| 1.8. Description of Test Facility .....           | 11 |
| 2. Summary of Test .....                          | 12 |
| 2.1. Summary of test result .....                 | 12 |
| 3. Conducted Output Power Test .....              | 14 |
| 3.1. Test Standard and Limit .....                | 14 |
| 3.2. Test Setup .....                             | 14 |
| 3.3. Test Procedure .....                         | 14 |
| 3.4. Test Data .....                              | 14 |
| 4. Peak-Average Ratio .....                       | 15 |
| 4.1. Test Standard and Limit .....                | 15 |
| 4.2. Test Setup .....                             | 15 |
| 4.3. Test Procedure .....                         | 15 |
| 4.4. Test Data .....                              | 15 |
| 5. Modulation Characteristic .....                | 16 |
| 6. 99% Occupied Bandwidth & 26 dB Bandwidth ..... | 17 |
| 6.1. Test Standard and Limit .....                | 17 |
| 6.2. Test Setup .....                             | 17 |
| 6.3. Test Procedure .....                         | 17 |
| 6.4. Test Data .....                              | 17 |
| 7. Conducted Spurious Emission .....              | 18 |
| 7.1. Test Standard and Limit .....                | 18 |
| 7.2. Test Setup .....                             | 18 |
| 7.3. Test Procedure .....                         | 18 |
| 7.4. Test Data .....                              | 18 |
| 8. Band Edge .....                                | 19 |
| 8.1. Test Standard and Limit .....                | 19 |
| 8.2. Test Setup .....                             | 19 |
| 8.3. Test Procedure .....                         | 19 |



|                                                          |    |
|----------------------------------------------------------|----|
| 8.4. Test Data .....                                     | 20 |
| 9. Radiated Spurious Emission .....                      | 21 |
| 9.1. Test Standard and Limit .....                       | 21 |
| 9.2. Test Setup .....                                    | 21 |
| 9.3. Test Procedure .....                                | 22 |
| 9.4. Test Data .....                                     | 23 |
| 10. ERP and EIRP .....                                   | 36 |
| 10.1. Test Standard and Limit .....                      | 36 |
| 10.2. Test Setup .....                                   | 36 |
| 10.3. Test Procedure .....                               | 36 |
| 10.4. Test Data .....                                    | 38 |
| 11. Frequency stability VS Voltage measurement .....     | 43 |
| 11.1. Test Standard and Limit .....                      | 43 |
| 11.2. Test Setup .....                                   | 43 |
| 11.3. Test Procedure .....                               | 43 |
| 11.4. Test Data .....                                    | 43 |
| 12. Frequency stability VS Temperature measurement ..... | 44 |
| 12.1. Test Standard and Limit .....                      | 44 |
| 12.2. Test Setup .....                                   | 44 |
| 12.3. Test Procedure .....                               | 44 |
| 12.4. Test Data .....                                    | 44 |
| APPENDIX I -- TEST SETUP PHOTOGRAPH .....                | 45 |
| APPENDIX II -- EXTERNAL PHOTOGRAPH .....                 | 45 |
| APPENDIX III -- INTERNAL PHOTOGRAPH .....                | 45 |



## TEST REPORT

Applicant : Jinan USR IOT Technology Limited  
Manufacturer : Jinan USR IOT Technology Limited  
Product Name : 4G Cellular Router  
Model No. : USR-809, USR-M100, USR-M300, USR-G809-43, USR-G809-GNSS,  
USR-G809-405, USR-G809c, USR-G809w, USR-G809s, USR-G809m  
Trade Mark : **PUSR**<sup>®</sup>  
Rating(s) : Input: 12V= 1A

**Test Standard(s) : FCC PART 2, FCC Part 22(H), FCC Part 24(E), FCC Part 27(C)**

**Test Method(s) : ANSI C63.26-2015**

**KDB 971168 D01 Power Meas License Digital Systems v03r01**

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 22, FCC Part 24, FCC Part 27 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Receipt

Aug. 12, 2022

Date of Test :

Aug. 12~Sept. 02, 2022

Prepared by :

Tu Tu Hong

(TuTu Hong)

Approved & Authorized Signer :

Kingkong Jin

(Kingkong Jin)



## Revision History

| Report Version | Description     | Issued Date    |
|----------------|-----------------|----------------|
| R00            | Original Issue. | Sept. 16, 2022 |
|                |                 |                |
|                |                 |                |



## 1. General Information

### 1.1. Client Information

|              |   |                                                                                                                                                      |
|--------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicant    | : | Jinan USR IOT Technology Limited                                                                                                                     |
| Address      | : | Floor F1 & Part of Floor F2, Building No. 9, Diya shuang chuang Industrial Zone, No.2566, Century Main Road, Gaoxin District, Jinan, Shandong, China |
| Manufacturer | : | Jinan USR IOT Technology Limited                                                                                                                     |
| Address      | : | Floor F1 & Part of Floor F2, Building No. 9, Diya shuang chuang Industrial Zone, No.2566, Century Main Road, Gaoxin District, Jinan, Shandong, China |
| Factory      | : | Jinan USR IOT Technology Limited                                                                                                                     |
| Address      | : | Floor F1 & Part of Floor F2, Building No. 9, Diya shuang chuang Industrial Zone, No.2566, Century Main Road, Gaoxin District, Jinan, Shandong, China |

### 1.2. Description of Device (EUT)

|                   |   |                                                                                                                                                                                                                                          |
|-------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name      | : | 4G Cellular Router                                                                                                                                                                                                                       |
| Model No.         | : | USR-809, USR-M100, USR-M300, USR-G809-43, USR-G809-GNSS, USR-G809-405, USR-G809c, USR-G809w, USR-G809s, USR-G809m<br>(Note: All samples are the same except the model number & appearance color, so we prepare "USR-809" for test only.) |
| Trade Mark        | : | <b>PUSR®</b>                                                                                                                                                                                                                             |
| Test Power Supply | : | AC 120V, 60Hz for Adapter                                                                                                                                                                                                                |
| Test Sample No.   | : | 1-2-1(Normal Sample), 1-2-2(Engineering Sample)                                                                                                                                                                                          |
| Adapter           | : | N/A                                                                                                                                                                                                                                      |

#### RF Specification

|                    |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Support Band       | : | <input checked="" type="checkbox"/> FDD Band 2 <input checked="" type="checkbox"/> FDD Band 4 <input checked="" type="checkbox"/> FDD Band 5 <input type="checkbox"/> FDD Band 7<br><input checked="" type="checkbox"/> FDD Band 12 <input checked="" type="checkbox"/> FDD Band 13 <input type="checkbox"/> FDD Band 14 <input type="checkbox"/> FDD Band 17<br><input type="checkbox"/> FDD Band 25 <input type="checkbox"/> FDD Band 26 <input type="checkbox"/> TDD Band 38 <input type="checkbox"/> TDD Band 41<br><input type="checkbox"/> FDD Band 66 <input type="checkbox"/> FDD Band 71 |
| Transmit Frequency | : | FDD Band 2: 1850.7~1909.3MHz<br>FDD Band 4: 1710.7~1754.3MHz<br>FDD Band 5: 824.7~848.3MHz<br>FDD Band 12: 699.7~715.3MHz<br>FDD Band 13: 779.5~784.5MHz                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Receive Frequency  | : | FDD Band 2: 1930.7~1989.3MHz<br>FDD Band 4: 2110.7~2154.3MHz<br>FDD Band 5: 869.7~893.3MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |



|                                                                                                                                     |   |                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                     |   | FDD Band 12: 729.7~745.3MHz<br>FDD Band 13: 748.5~753.5MHz                                                                                                                                                                           |
| Modulation Type                                                                                                                     | : | QPSK, 16QAM                                                                                                                                                                                                                          |
| Power Class                                                                                                                         | : | Class 3                                                                                                                                                                                                                              |
| Antenna Type                                                                                                                        | : | External Antenna                                                                                                                                                                                                                     |
| Antenna Gain(Peak):                                                                                                                 |   | FDD Band 2: 4.5 dBi (Provided by customer)<br>FDD Band 4: 4.5 dBi (Provided by customer)<br>FDD Band 5: 4.5 dBi (Provided by customer)<br>FDD Band 12: 4.5 dBi (Provided by customer)<br>FDD Band 13: 4.5 dBi (Provided by customer) |
| <b>Remark:</b> 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. |   |                                                                                                                                                                                                                                      |



### 1.3. Auxiliary Equipment Used During Test

| Description | Rating(s)                                                                         |
|-------------|-----------------------------------------------------------------------------------|
| Adapter     | Model: ASSA67E-120200<br>Input: 100-240V~50/60Hz 0.8A<br>Output: DC 12V, 2A 24.0W |

### 1.4. Operation State

#### Test frequency list:

| Band       | Frequency (MHz)   |                             |                 |                           |                 |                             |
|------------|-------------------|-----------------------------|-----------------|---------------------------|-----------------|-----------------------------|
| FDD Band 2 | Test Frequency ID | Bandwidth [MHz]             | N <sub>UL</sub> | Frequency of Uplink [MHz] | N <sub>DL</sub> | Frequency of Downlink [MHz] |
|            | Low Range         | 1.4                         | 18607           | 1850.7                    | 607             | 1930.7                      |
|            |                   | 3                           | 18615           | 1851.5                    | 615             | 1931.5                      |
|            |                   | 5                           | 18625           | 1852.5                    | 625             | 1932.5                      |
|            |                   | 10                          | 18650           | 1855                      | 650             | 1935                        |
|            |                   | 15 [1]                      | 18675           | 1857.5                    | 675             | 1937.5                      |
|            | Mid Range         | 20 [1]                      | 18700           | 1860                      | 700             | 1940                        |
|            |                   | 1.4/3/5/10<br>15 [1]/20 [1] | 18900           | 1880                      | 900             | 1960                        |
|            | High Range        | 1.4                         | 19193           | 1909.3                    | 1193            | 1989.3                      |
|            |                   | 3                           | 19185           | 1908.5                    | 1185            | 1988.5                      |
|            |                   | 5                           | 19175           | 1907.5                    | 1175            | 1987.5                      |
|            |                   | 10                          | 19150           | 1905                      | 1150            | 1985                        |
|            |                   | 15 [1]                      | 19125           | 1902.5                    | 1125            | 1982.5                      |
|            |                   | 20 [1]                      | 19100           | 1900                      | 1100            | 1980                        |
| FDD Band 4 | Test Frequency ID | Bandwidth [MHz]             | N <sub>UL</sub> | Frequency of Uplink [MHz] | N <sub>DL</sub> | Frequency of Downlink [MHz] |
|            | Low Range         | 1.4                         | 19957           | 1710.7                    | 1957            | 2110.7                      |
|            |                   | 3                           | 19965           | 1711.5                    | 1965            | 2111.5                      |
|            |                   | 5                           | 19975           | 1712.5                    | 1975            | 2112.5                      |
|            |                   | 10                          | 20000           | 1715                      | 2000            | 2115                        |
|            |                   | 15                          | 20025           | 1717.5                    | 2025            | 2117.5                      |
|            | Mid Range         | 20                          | 20050           | 1720                      | 2050            | 2120                        |
|            |                   | 1.4/3/5/10/15/20            | 20175           | 1732.5                    | 2175            | 2132.5                      |
|            | High Range        | 1.4                         | 20393           | 1754.3                    | 2393            | 2154.3                      |
|            |                   | 3                           | 20385           | 1753.5                    | 2385            | 2153.5                      |
|            |                   | 5                           | 20375           | 1752.5                    | 2375            | 2152.5                      |
|            |                   | 10                          | 20350           | 1750                      | 2350            | 2150                        |
|            |                   | 15                          | 20325           | 1747.5                    | 2325            | 2147.5                      |
|            |                   | 20                          | 20300           | 1745                      | 2300            | 2145                        |
| FDD Band 5 | Test Frequency ID | Bandwidth [MHz]             | N <sub>UL</sub> | Frequency of Uplink [MHz] | N <sub>DL</sub> | Frequency of Downlink [MHz] |
|            | Low Range         | 1.4                         | 20407           | 824.7                     | 2407            | 869.7                       |
|            |                   | 3                           | 20415           | 825.5                     | 2415            | 870.5                       |
|            |                   | 5                           | 20425           | 826.5                     | 2425            | 871.5                       |
|            |                   | 10 [1]                      | 20450           | 829                       | 2450            | 874                         |
|            | Mid Range         | 1.4/3/5<br>10 [1]           | 20525           | 836.5                     | 2525            | 881.5                       |
|            | High Range        | 1.4                         | 20643           | 848.3                     | 2643            | 893.3                       |
|            |                   | 3                           | 20635           | 847.5                     | 2635            | 892.5                       |
|            |                   | 5                           | 20625           | 846.5                     | 2625            | 891.5                       |
|            |                   | 10 [1]                      | 20600           | 844                       | 2600            | 889                         |



| FDD Band 12 | Test Frequency ID | Bandwidth [MHz] | N <sub>UL</sub> | Frequency of Uplink [MHz] | N <sub>DL</sub> | Frequency of Downlink [MHz] |
|-------------|-------------------|-----------------|-----------------|---------------------------|-----------------|-----------------------------|
|             | Low Range         | 1.4             | 23017           | 699.7                     | 5017            | 729.7                       |
|             |                   | 3               | 23025           | 700.5                     | 5025            | 730.5                       |
|             |                   | 5 [1]           | 23035           | 701.5                     | 5035            | 731.5                       |
|             | Mid Range         | 10 [1]          | 23060           | 704                       | 5060            | 734                         |
|             |                   | 1.4/3           | 23095           | 707.5                     | 5095            | 737.5                       |
|             |                   | 5 [1]/10 [1]    |                 |                           |                 |                             |
|             | High Range        | 1.4             | 23173           | 715.3                     | 5173            | 745.3                       |
|             |                   | 3               | 23165           | 714.5                     | 5165            | 744.5                       |
|             |                   | 5 [1]           | 23155           | 713.5                     | 5155            | 743.5                       |
|             |                   | 10 [1]          | 23130           | 711                       | 5130            | 741                         |

| FDD Band 13 | Test Frequency ID | Bandwidth [MHz] | N <sub>UL</sub> | Frequency of Uplink [MHz] | N <sub>DL</sub> | Frequency of Downlink [MHz] |
|-------------|-------------------|-----------------|-----------------|---------------------------|-----------------|-----------------------------|
|             | Low Range         | 5 [1]           | 23205           | 779.5                     | 5205            | 748.5                       |
|             |                   | 10 [1]          | 23230           | 782                       | 5230            | 751                         |
|             | Mid Range         | 5 [1]/10 [1]    | 23230           | 782                       | 5230            | 751                         |
|             | High Range        | 5 [1]           | 23255           | 784.5                     | 5255            | 753.5                       |
|             |                   | 10 [1]          | 23230           | 782                       | 5230            | 751                         |

### 1.5. Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature range: | 21-25℃    |
| Humidity range:    | 40-75%    |
| Pressure range:    | 86-106kPa |



## 1.6. Test Equipment List

| Item | Equipment                                  | Manufacturer            | Model No.              | Serial No.    | Last Cal.     | Cal. Interval |
|------|--------------------------------------------|-------------------------|------------------------|---------------|---------------|---------------|
| 1.   | Spectrum Analysis                          | Agilent                 | E4407B                 | US39390582    | Oct. 22, 2021 | 1 Year        |
| 2.   | Preamplifier                               | SKET Electronic         | BK1G18G30D             | KD17503       | Oct. 22, 2021 | 1 Year        |
| 3.   | EMI Test Receiver                          | Rohde & Schwarz         | ESPI3                  | 101604        | Oct. 22, 2021 | 1Year         |
| 4.   | Double Ridged Horn Antenna                 | Instruments corporation | GTH-0118               | 351600        | Oct. 22, 2021 | 2 Year        |
| 5.   | Bilog Broadband Antenna                    | Schwarzbeck             | VULB9163               | VULB 9163-289 | Oct. 22, 2021 | 2 Year        |
| 6.   | Pre-amplifier                              | SONOMA                  | 310N                   | 186860        | Oct. 22, 2021 | 1 Year        |
| 7.   | EMI Test Software EZ-EMC                   | SHURPLE                 | N/A                    | N/A           | N/A           | N/A           |
| 8.   | MXA Spectrum Analysis                      | Agilent                 | N9020A                 | MY51170037    | Oct. 22, 2021 | 1 Year        |
| 9.   | MXG RF Vector Signal Generator             | Agilent                 | N5182A                 | MY48180656    | Oct. 22, 2021 | 1 Year        |
| 10.  | DC Power Supply                            | LW                      | TPR-6420D              | 374470        | Oct. 22, 2021 | 1 Year        |
| 11.  | Constant Temperature Humidity Chamber      | ZHONGJIAN               | ZJ-KHWS80B             | N/A           | Oct. 22, 2021 | 1 Year        |
| 12.  | Universal Radio Communication Tester       | Rohde & Schwarz         | CMU 200                | 117888        | Oct. 22, 2021 | 1 Year        |
| 13.  | Wideband Radio Communication Tester        | Rohde & Schwarz         | CMW 500                | 104209        | Oct. 22, 2021 | 1 Year        |
| 14.  | High-Pass Filter                           | CDKMV                   | ZHPF-BM1100 -4000-0730 | B2015094550   | Oct. 22, 2021 | 1 Year        |
| 15.  | High-Pass Filter                           | CDKMV                   | ZHPF-M3.5 -18G-3834    | 1307006523    | Oct. 22, 2021 | 1 Year        |
| 16.  | 4 Ch. Simultaneous Sampling 14 Bits 2 MS/s | Agilent                 | U2531A                 | TW54063507    | Oct. 22, 2021 | 1 Year        |
| 17.  | 4 Ch. Simultaneous Sampling 14 Bits 2 MS/s | Agilent                 | U2531A                 | TW54063513    | Oct. 22, 2021 | 1 Year        |



## 1.7. Measurement Uncertainty

Maximum measurement uncertainty

| Parameter                                       | Uncertainty |
|-------------------------------------------------|-------------|
| RF output power, conducted                      | ±1,5 dB     |
| Power Spectral Density, conducted               | ±3 dB       |
| Unwanted Emissions, conducted                   | ±3 dB       |
| All emissions, radiated                         | ±6 dB       |
| Temperature                                     | ±1 °C       |
| Humidity                                        | ±5 %        |
| DC and low frequency voltages                   | ±3 %        |
| Time                                            | ±5 %        |
| Confidence interval: 95%. Confidence factor:k=2 |             |

## 1.8. Description of Test Facility

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

### FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111.

### ISED-Registration No.: 8058A

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A.

### Test Location

Shenzhen Anbotek Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102



## 2. Summary of Test

### 2.1. Summary of test result

| Description of Test                      | FCC Rules                                                                                                           | Requirements                                                                                                                        | Result     |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|------------|
| Conducted Output Power                   | Part 2.1046<br>Part 22.913(a)<br>Part 24.232(b)<br>Part 27.50(b)<br>Part 27.50(c)<br>Part 27.50(d)<br>Part 27.50(h) | N/A                                                                                                                                 | Compliance |
| Peak-Average Ratio                       | Part 22.913<br>Part 24.232<br>Part 27.50                                                                            | ≤13dB                                                                                                                               | Compliance |
| Modulation Characteristics               | § 2.1047                                                                                                            | Digital modulation                                                                                                                  | N/A        |
| 99% Occupied Bandwidth & 26 dB Bandwidth | Part 2.1049                                                                                                         | OBW: No limit<br>EBW: No limit                                                                                                      | Compliance |
| Conducted Spurious Emission              | Part 2.1051<br>Part 22.917<br>Part 24.238<br>Part 27.53(c)(f)<br>Part 27.53(g)<br>Part 27.53(h)                     | ≤ -13dBm(LTE Band5)<br>≤ -13dBm(LTE Band2)<br>Refer to clause 7.1 for LTE Band13<br>≤ -13dBm(LTE Band12)<br>≤ -13dBm(LTE Band4)     | Compliance |
| Band Edge                                | Part 2.1051<br>Part 22.917<br>Part 24.238<br>Part 27.53(c)(f)<br>Part 27.53(g)<br>Part 27.53(h)                     | ≤ -13dBm (LTE Band5)<br>≤ -13dBm (LTE Band2)<br>Refer to clause 8.1 for LTE Band13<br>≤ -13dBm (LTE Band12)<br>≤ -13dBm (LTE Band4) | Compliance |
| Frequency stability VS. temperature      | Part 2.1055(a)(1)(b)<br>Part 22.355<br>Part 24.235<br>Part 27.54                                                    | ≤ ±2.5ppm                                                                                                                           | Compliance |



|                                    |                                                                                                    |                                                                                                                                                                                     |            |
|------------------------------------|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Frequency stability<br>VS. voltage | Part 2.1055(d)(1)(2)<br>Part 22.355<br>Part 24.235<br>Part 27.54                                   | $\leq \pm 2.5\text{ppm}$                                                                                                                                                            | Compliance |
| ERP and EIRP                       | Part 2.1046<br>Part 22.913(a)<br>Part 24.232(c)<br>Part 27.50(b)<br>Part 27.50(c)<br>Part 27.50(d) | ERP $\leq$ 7W(LTE Band 5)<br>EIRP $\leq$ 2W(LTE Band 2)<br>ERP $\leq$ 3W(LTE Band 13)<br>ERP $\leq$ 3W(LTE Band 12)<br>EIRP $\leq$ 1W(LTE Band 4)                                   | Compliance |
| Radiated Spurious<br>Emission      | Part 2.1053<br>Part 22.917<br>Part 24.238<br>Part 27.53(c)(f)<br>Part 27.53(g)<br>Part 27.53(h)    | $\leq -13\text{dBm}$ (LTE Band5)<br>$\leq -13\text{dBm}$ (LTE Band2)<br>Refer to clause 9.1 for LTE Band13<br>$\leq -13\text{dBm}$ (LTE Band12)<br>$\leq -13\text{dBm}$ (LTE Band4) | Compliance |

## Note:

1. "N/A" is an abbreviation for Not Applicable.
2. Testing was performed by configuring EUT to maximum output power status, the declared output power class for different

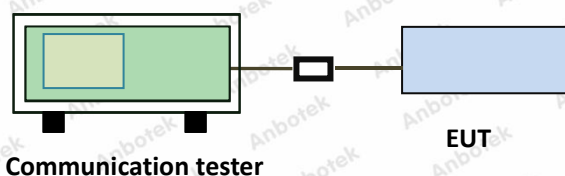


### 3. Conducted Output Power Test

#### 3.1. Test Standard and Limit

|                      |                                                                                                                     |
|----------------------|---------------------------------------------------------------------------------------------------------------------|
| Applicable Standard: | Part 2.1046<br>Part 22.913(a)<br>Part 24.232(b)<br>Part 27.50(b)<br>Part 27.50(c)<br>Part 27.50(d)<br>Part 27.50(h) |
| Limit:               | N/A                                                                                                                 |

#### 3.2. Test Setup



#### 3.3. Test Procedure

1. The EUT output port was connected to communication tester.
2. Set EUT at maximum power through communication tester.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure the maximum burst average power.

#### 3.4. Test Data

Pass

Please refer to Appendix A of the Appendix Test Data.

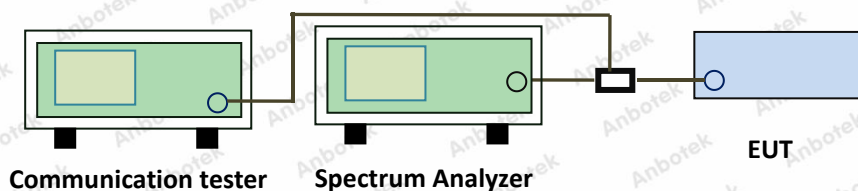


## 4. Peak-Average Ratio

### 4.1. Test Standard and Limit

|                      |                                          |
|----------------------|------------------------------------------|
| Applicable Standard: | Part 22.913<br>Part 24.232<br>Part 27.50 |
| Limit:               | ≤13dB                                    |

### 4.2. Test Setup



### 4.3. Test Procedure

According with KDB 971168 D01 Section 5.7:

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter.
2. Set EUT in maximum power output.
3. Center Frequency = Carrier frequency, RBW > Emission bandwidth of signal.
4. The signal analyzer was set to collect one million samples to generate the CCDF curve.
5. The measurement interval was set depending on the type of signal analyzed.
  - i. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms.
  - ii. For burst transmissions, the spectrum analyzer is set to use an internal “RF Burst” trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the “on time” of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power
6. Record the maximum PAPR level associated with a probability of 0.1%.

### 4.4. Test Data

Pass

Please refer to Appendix B of the Appendix Test Data.



## 5. Modulation Characteristic

According to FCC § 2.1047, Part 22H, Part 24E, Part 27C there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

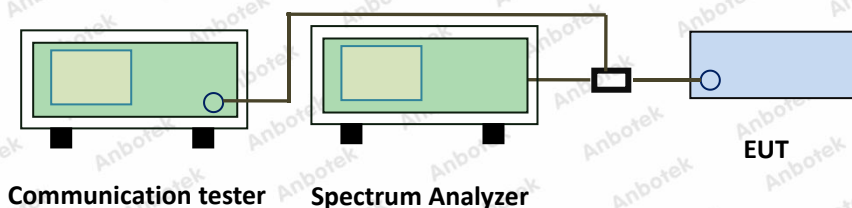


## 6. 99% Occupied Bandwidth & 26 dB Bandwidth

### 6.1. Test Standard and Limit

|                      |             |
|----------------------|-------------|
| Applicable Standard: | Part 2.1049 |
| Limit:               | N/A         |

### 6.2. Test Setup



### 6.3. Test Procedure

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter.
2. Set EUT in maximum power output.
3. Spectrum analyzer setting as follow:  
Center Frequency= Carrier frequency, RBW=1% to 5% of anticipated OBW, VBW= 3 \* RBW,  
Detector=Peak,  
Trace maximum hold.
4. Record the value of 99% Occupied bandwidth and -26dB bandwidth.

### 6.4. Test Data

Pass

Please refer to Appendix C of the Appendix Test Data.

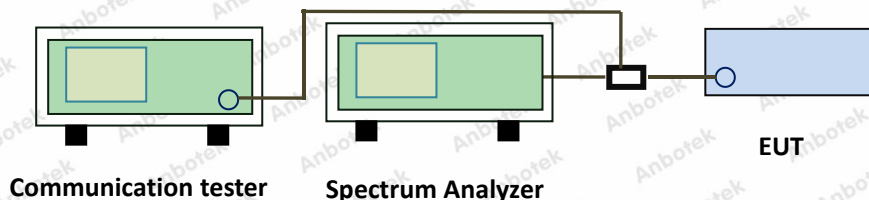


## 7. Conducted Spurious Emission

### 7.1. Test Standard and Limit

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicable Standard: | Part 2.1051<br>Part 22.917<br>Part 24.238<br>Part 27.53(c)(f)<br>Part 27.53(g)<br>Part 27.53(h)                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Limit:               | $\leq -13\text{dBm}$ (LTE Band 5)<br>$\leq -13\text{dBm}$ (LTE Band 2)<br>$\leq -13\text{dBm}$ (LTE Band 12)<br>$\leq -13\text{dBm}$ (LTE Band 4)<br><br>For LTE Band 13:<br>(1) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;<br>(2) For operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz. The limit of emissions is equal to -40 dBm. |

### 7.2. Test Setup



### 7.3. Test Procedure

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter.
2. Set EUT in maximum power output.
3. Spectrum analyzer setting as follow:  
Below 1GHz, RBW=100KHz, VBW = 300KHz, Detector=Peak, Sweep time= Auto  
Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peak, Sweep time= Auto  
Scan frequency range up to 10<sup>th</sup> harmonic.
4. Record the test plot.

### 7.4. Test Data

Pass

Please refer to Appendix E of the Appendix Test Data.

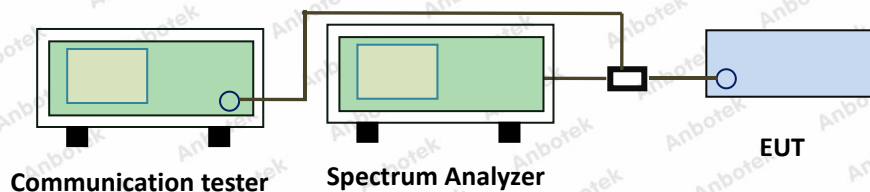


## 8. Band Edge

### 8.1. Test Standard and Limit

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicable Standard: | Part 2.1051<br>Part 22.917<br>Part 24.238<br>Part 27.53(c)(f)<br>Part 27.53(g)<br>Part 27.53(h)                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Limit:               | $\leq -13\text{dBm}$ (LTE Band 5)<br>$\leq -13\text{dBm}$ (LTE Band 2)<br>$\leq -13\text{dBm}$ (LTE Band 12)<br>$\leq -13\text{dBm}$ (LTE Band 4)<br><br>For LTE Band 13:<br>(1) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;<br>(2) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations. |

### 8.2. Test Setup



### 8.3. Test Procedure

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter.
2. Set EUT in maximum power output.
3. The band edges of low and high channels were measured.
4. Spectrum analyzer setting as follow:  
RBW=3KHz, VBW = 10KHz, Sweep time= Auto
5. Record the test plot.



**8.4. Test Data**

Pass

Please refer to Appendix D of the Appendix Test Data.

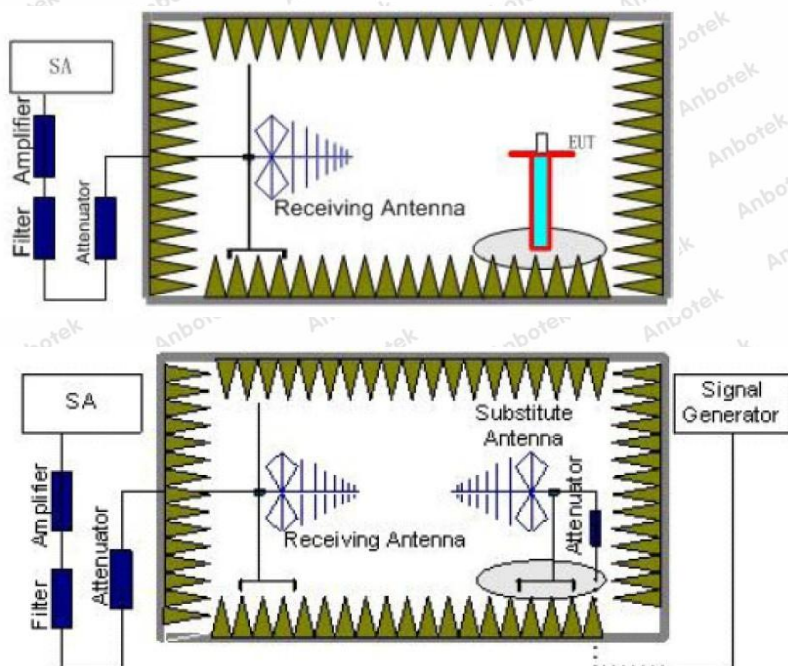


## 9. Radiated Spurious Emission

### 9.1. Test Standard and Limit

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicable Standard: | Part 2.1053<br>Part 22.917<br>Part 24.238<br>Part 27.53(c)(f)<br>Part 27.53(g)<br>Part 27.53(h)                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Limit:               | $\leq -13\text{dBm}$ (LTE Band 5)<br>$\leq -13\text{dBm}$ (LTE Band 2)<br>$\leq -13\text{dBm}$ (LTE Band 12)<br>$\leq -13\text{dBm}$ (LTE Band 4)<br><br>For LTE Band 13:<br>(1) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;<br>(2) For operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz. The limit of emissions is equal to -40 dBm. |

### 9.2. Test Setup



### 9.3. Test Procedure

1. Place the EUT in the center of the turntable.
  - a) For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table at a nominal height of 80 cm above the reference ground plane
  - b) For radiated measurements performed at frequencies above 1 GHz, the EUT shall be placed on an RF transparent table at a nominal height of 1.5 m above the ground plane.
2. Unless the EUT uses an integral antenna, the EUT shall be terminated with a non-radiating transmitter load. In cases where the EUT uses an adjustable antenna, the antenna shall be adjusted through typical positions and lengths to maximize emissions levels.
3. The EUT shall be tested while operating on the frequency per manufacturer specification. Set the transmitter to operate in continuous transmit mode.
4. Receiver or Spectrum set as follow:  
Below 1GHz, RBW=100kHz, VBW=300kHz, Detector=Peak, Sweep time=Auto  
Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peck, Sweep time=Auto
5. Each emission under consideration shall be evaluated:
  - a) Raise and lower the measurement antenna from 1 m to 4 m, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
  - b) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
  - c) Return the turntable to the azimuth where the highest emission amplitude level was observed.
  - d) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
  - e) Record the measured emission amplitude level and frequency
6. Repeat step 5 for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.
7. Set-up the substitution measurement with the reference point of the substitution antenna located as near as possible to where the center of the EUT radiating element was located during the initial EUT measurement.
8. Maintain the previous measurement instrument settings and test set-up, with the exception that the EUT is removed and replaced by the substitution antenna.
9. Connect a signal generator to the substitution antenna; locate the signal generator so as to minimize any potential influences on the measurement results. Set the signal generator to the frequency where emissions are detected, and set an output power level such that the radiated signal can be detected by the measurement instrument, with sufficient dynamic range relative to the noise floor.
10. For each emission that was detected and measured in the initial test
  - a) Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude.
  - b) Adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the amplitude level of the emission previously measured directly in step 5 and step 6.
  - c) Record the output power level of the signal generator when equivalence is achieved in step b).
11. Repeat step 8 through step 10 with the measurement antenna oriented in the opposite polarization.



12. Calculate the emission power in dBm referenced to a half-wave dipole using the following equation:

$$P_e = P_s(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$

where

$P_e$  = equivalent emission power in dBm

$P_s$  = source (signal generator) power in dBm

**NOTE**—dBd refers to the measured antenna gain in decibels relative to a half-wave dipole.

13. Correct the antenna gain of the substitution antenna if necessary to reference the emission power to a half-wave dipole. When using measurement antennas with the gain specified in dBi, the equivalent dipole-referenced gain can be determined from:

$$\text{gain (dBd)} = \text{gain (dBi)} - 2.15 \text{ dB.}$$

If necessary, the antenna gain can be calculated from calibrated antenna factor information

14. Provide the complete measurement results as a part of the test report.

#### 9.4. Test Data

Pass

Please to see the following pages

| LTE Band 2 |         |                 |                   |               |             |             |             |        |
|------------|---------|-----------------|-------------------|---------------|-------------|-------------|-------------|--------|
| Bandwidth  | Channel | Frequency (MHz) | Spurious Emission |               |             |             | Limit (dBm) | Result |
|            |         |                 | Polarization      | reading (dBm) | factor (dB) | Level (dBm) |             |        |
| 1.4MHz     | Low     | 3701.40         | Vertical          | -49.29        | 13.21       | -36.08      | -13.00      | PASS   |
|            |         | 5552.10         | V                 | -56.45        | 16.61       | -39.84      |             |        |
|            |         | 7402.80         | V                 | -58.79        | 18.03       | -40.76      |             |        |
|            |         | 3701.40         | Horizontal        | -50.19        | 13.21       | -36.98      | -13.00      | PASS   |
|            |         | 5552.10         | H                 | -57.30        | 16.61       | -40.69      |             |        |
|            |         | 7402.80         | H                 | -59.51        | 18.03       | -41.48      |             |        |
|            | Mid     | 3760.00         | Vertical          | -47.76        | 12.36       | -35.40      | -13.00      | PASS   |
|            |         | 5640.00         | V                 | -56.23        | 17.03       | -39.20      |             |        |
|            |         | 7520.00         | V                 | -58.01        | 17.85       | -40.16      |             |        |
|            |         | 3760.00         | Horizontal        | -48.52        | 12.36       | -36.16      | -13.00      | PASS   |
|            |         | 5640.00         | H                 | -57.05        | 17.03       | -40.02      |             |        |
|            |         | 7520.00         | H                 | -58.70        | 17.85       | -40.85      |             |        |
|            | High    | 3818.60         | Vertical          | -47.03        | 12.78       | -34.25      | -13.00      | PASS   |
|            |         | 5727.90         | V                 | -56.01        | 17.86       | -38.15      |             |        |
|            |         | 7637.20         | V                 | -57.72        | 18.56       | -39.16      |             |        |
|            |         | 3818.60         | Horizontal        | -48.54        | 12.78       | -35.76      | -13.00      | PASS   |
|            |         | 5727.90         | H                 | -57.50        | 17.86       | -39.64      |             |        |



|      |      |         |            |        |       |        |        |      |
|------|------|---------|------------|--------|-------|--------|--------|------|
|      |      | 7637.20 | H          | -59.09 | 18.56 | -40.53 |        |      |
| 3MHz | Low  | 3703.00 | Vertical   | -46.29 | 12.78 | -33.51 | -13.00 | PASS |
|      |      | 5554.50 | V          | -52.73 | 16.69 | -36.04 |        |      |
|      |      | 7406.00 | V          | -55.80 | 18.18 | -37.62 |        |      |
|      |      | 3703.00 | Horizontal | -46.72 | 12.78 | -33.94 | -13.00 | PASS |
|      |      | 5554.50 | H          | -54.17 | 16.69 | -37.48 |        |      |
|      |      | 7406.00 | H          | -57.58 | 18.18 | -39.40 |        |      |
|      | Mid  | 3760.00 | Vertical   | -44.24 | 12.79 | -31.45 | -13.00 | PASS |
|      |      | 5640.00 | V          | -50.82 | 16.72 | -34.10 |        |      |
|      |      | 7520.00 | V          | -53.72 | 18.22 | -35.50 |        |      |
|      |      | 3760.00 | Horizontal | -45.01 | 12.79 | -32.22 | -13.00 | PASS |
|      |      | 5640.00 | H          | -53.00 | 16.72 | -36.28 |        |      |
|      |      | 7520.00 | H          | -56.24 | 18.22 | -38.02 |        |      |
|      | High | 3817.00 | Vertical   | -42.49 | 12.93 | -29.56 | -13.00 | PASS |
|      |      | 5725.50 | V          | -49.74 | 17.01 | -32.73 |        |      |
|      |      | 7634.00 | V          | -53.02 | 18.41 | -34.61 |        |      |
|      |      | 3817.00 | Horizontal | -43.34 | 12.93 | -30.41 | -13.00 | PASS |
|      |      | 5725.50 | H          | -51.91 | 17.01 | -34.90 |        |      |
|      |      | 7634.00 | H          | -54.01 | 18.41 | -35.60 |        |      |
| 5MHz | Low  | 3705.00 | Vertical   | -40.78 | 13.25 | -27.53 | -13.00 | PASS |
|      |      | 5557.50 | V          | -46.24 | 16.59 | -29.65 |        |      |
|      |      | 7410.00 | V          | -50.42 | 18.12 | -32.30 |        |      |
|      |      | 3705.00 | Horizontal | -45.20 | 13.25 | -31.95 | -13.00 | PASS |
|      |      | 5557.50 | H          | -54.24 | 16.59 | -37.65 |        |      |
|      |      | 7410.00 | H          | -55.07 | 18.12 | -36.95 |        |      |
|      | Mid  | 3760.00 | Vertical   | -40.83 | 12.31 | -28.52 | -13.00 | PASS |
|      |      | 5640.00 | V          | -48.63 | 17.14 | -31.49 |        |      |
|      |      | 7520.00 | V          | -51.85 | 17.96 | -33.89 |        |      |
|      |      | 3760.00 | Horizontal | -46.55 | 12.31 | -34.24 | -13.00 | PASS |
|      |      | 5640.00 | H          | -56.35 | 17.14 | -39.21 |        |      |
|      |      | 7520.00 | H          | -56.10 | 17.96 | -38.14 |        |      |
|      | High | 3815.00 | Vertical   | -43.79 | 12.77 | -31.02 | -13.00 | PASS |
|      |      | 5722.50 | V          | -51.09 | 17.82 | -33.27 |        |      |
|      |      | 7630.00 | V          | -54.01 | 18.59 | -35.42 |        |      |
|      |      | 3815.00 | Horizontal | -48.80 | 12.77 | -36.03 | -13.00 | PASS |
|      |      | 5722.50 | H          | -58.69 | 17.82 | -40.87 |        |      |



|       |      |         |            |        |       |        |        |      |
|-------|------|---------|------------|--------|-------|--------|--------|------|
|       |      | 7630.00 | H          | -57.99 | 18.59 | -39.40 |        |      |
| 10MHz | Low  | 3710.00 | Vertical   | -41.95 | 12.59 | -29.36 | -13.00 | PASS |
|       |      | 5565.00 | V          | -48.98 | 16.61 | -32.37 |        |      |
|       |      | 7420.00 | V          | -52.69 | 18.35 | -34.34 |        |      |
|       |      | 3710.00 | Horizontal | -51.16 | 12.59 | -38.57 | -13.00 | PASS |
|       |      | 5565.00 | H          | -59.22 | 16.61 | -42.61 |        |      |
|       |      | 7420.00 | H          | -59.75 | 18.35 | -41.40 |        |      |
|       | Mid  | 3760.00 | Vertical   | -44.04 | 12.71 | -31.33 | -13.00 | PASS |
|       |      | 5640.00 | V          | -50.67 | 16.65 | -34.02 |        |      |
|       |      | 7520.00 | V          | -54.60 | 18.27 | -36.33 |        |      |
|       |      | 3760.00 | Horizontal | -52.58 | 12.71 | -39.87 | -13.00 | PASS |
|       |      | 5640.00 | H          | -61.20 | 16.65 | -44.55 |        |      |
|       |      | 7520.00 | H          | -61.20 | 18.27 | -42.93 |        |      |
|       | High | 3810.00 | Vertical   | -44.97 | 12.91 | -32.06 | -13.00 | PASS |
|       |      | 5715.00 | V          | -52.90 | 17.23 | -35.67 |        |      |
|       |      | 7620.00 | V          | -56.83 | 18.59 | -38.24 |        |      |
|       |      | 3810.00 | Horizontal | -51.21 | 12.91 | -38.30 | -13.00 | PASS |
|       |      | 5715.00 | H          | -60.87 | 17.23 | -43.64 |        |      |
|       |      | 7620.00 | H          | -60.30 | 18.59 | -41.71 |        |      |

|       |      |         |            |        |       |        |        |      |
|-------|------|---------|------------|--------|-------|--------|--------|------|
| 15MHz | Low  | 3715.00 | Vertical   | -43.93 | 13.21 | -30.72 | -13.00 | PASS |
|       |      | 5572.50 | V          | -51.11 | 16.65 | -34.46 |        |      |
|       |      | 7430.00 | V          | -55.24 | 18.29 | -36.95 |        |      |
|       |      | 3715.00 | Horizontal | -52.78 | 13.21 | -39.57 | -13.00 | PASS |
|       |      | 5572.50 | H          | -61.48 | 16.65 | -44.83 |        |      |
|       |      | 7430.00 | H          | -61.01 | 18.29 | -42.72 |        |      |
|       | Mid  | 3760.00 | Vertical   | -44.06 | 12.39 | -31.67 | -13.00 | PASS |
|       |      | 5640.00 | V          | -52.54 | 17.18 | -35.36 |        |      |
|       |      | 7520.00 | V          | -55.78 | 17.99 | -37.79 |        |      |
|       |      | 3760.00 | Horizontal | -50.76 | 12.39 | -38.37 | -13.00 | PASS |
|       |      | 5640.00 | H          | -60.76 | 17.18 | -43.58 |        |      |
|       |      | 7520.00 | H          | -60.00 | 17.99 | -42.01 |        |      |
|       | High | 3805.00 | Vertical   | -43.54 | 12.86 | -30.68 | -13.00 | PASS |
|       |      | 5707.50 | V          | -51.40 | 17.89 | -33.51 |        |      |
|       |      | 7610.00 | V          | -54.64 | 18.69 | -35.95 |        |      |



|       |      |         |            |        |       |        |        |      |
|-------|------|---------|------------|--------|-------|--------|--------|------|
| 20MHz |      | 3805.00 | Horizontal | -52.80 | 12.86 | -39.94 | -13.00 | PASS |
|       |      | 5707.50 | H          | -64.02 | 17.89 | -46.13 |        |      |
|       |      | 7610.00 | H          | -63.32 | 18.69 | -44.63 |        |      |
|       | Low  | 3720.00 | Vertical   | -44.81 | 12.57 | -32.24 | -13.00 | PASS |
|       |      | 5580.00 | V          | -51.88 | 16.59 | -35.29 |        |      |
|       |      | 7440.00 | V          | -55.96 | 18.67 | -37.29 |        |      |
|       |      | 3720.00 | Horizontal | -52.95 | 12.57 | -40.38 | -13.00 | PASS |
|       |      | 5580.00 | H          | -63.14 | 16.59 | -46.55 |        |      |
|       |      | 7440.00 | H          | -63.65 | 18.67 | -44.98 |        |      |
|       | Mid  | 3760.00 | Vertical   | -45.33 | 12.76 | -32.57 | -13.00 | PASS |
|       |      | 5640.00 | V          | -52.29 | 16.69 | -35.60 |        |      |
|       |      | 7520.00 | V          | -55.96 | 18.38 | -37.58 |        |      |
|       |      | 3760.00 | Horizontal | -53.43 | 12.76 | -40.67 | -13.00 | PASS |
|       |      | 5640.00 | H          | -63.48 | 16.69 | -46.79 |        |      |
|       |      | 7520.00 | H          | -63.58 | 18.38 | -45.20 |        |      |
|       | High | 3800.00 | Vertical   | -44.40 | 12.97 | -31.43 | -13.00 | PASS |
|       |      | 5700.00 | V          | -51.26 | 17.19 | -34.07 |        |      |
|       |      | 7600.00 | V          | -54.76 | 18.28 | -36.48 |        |      |
|       |      | 3800.00 | Horizontal | -53.95 | 12.97 | -40.98 | -13.00 | PASS |
|       |      | 5700.00 | H          | -64.27 | 17.19 | -47.08 |        |      |
|       |      | 7600.00 | H          | -63.73 | 18.28 | -45.45 |        |      |

| LTE Band 4 |         |                 |                   |               |             |             |             |        |
|------------|---------|-----------------|-------------------|---------------|-------------|-------------|-------------|--------|
| Bandwidth  | Channel | Frequency (MHz) | Spurious Emission |               |             |             | Limit (dBm) | Result |
|            |         |                 | Polarization      | reading (dBm) | factor (dB) | Level (dBm) |             |        |
| 1.4MHz     | Low     | 3421.40         | Vertical          | -47.18        | 12.89       | -34.29      | -13.00      | PASS   |
|            |         | 5132.10         | V                 | -55.20        | 15.86       | -39.34      |             |        |
|            |         | 6842.80         | V                 | -58.73        | 18.92       | -39.81      |             |        |
|            |         | 3421.40         | Horizontal        | -47.95        | 12.89       | -35.06      | -13.00      | PASS   |
|            |         | 5132.10         | H                 | -55.93        | 15.86       | -40.07      |             |        |
|            |         | 6842.80         | H                 | -59.35        | 18.92       | -40.43      |             |        |
|            | Mid     | 3465.00         | Vertical          | -46.20        | 12.49       | -33.71      | -13.00      | PASS   |
|            |         | 5197.50         | V                 | -54.50        | 15.71       | -38.79      |             |        |
|            |         | 6930.00         | V                 | -57.56        | 18.26       | -39.30      |             |        |



|      |      |         |            |        |       |        |        |      |
|------|------|---------|------------|--------|-------|--------|--------|------|
| 3MHz |      | 3465.00 | Horizontal | -46.84 | 12.49 | -34.35 | -13.00 | PASS |
|      |      | 5197.50 | H          | -55.21 | 15.71 | -39.50 |        |      |
|      |      | 6930.00 | H          | -58.14 | 18.26 | -39.88 |        |      |
|      | High | 3508.60 | Vertical   | -45.73 | 13.01 | -32.72 | -13.00 | PASS |
|      |      | 5262.90 | V          | -53.78 | 15.89 | -37.89 |        |      |
|      |      | 7017.20 | V          | -57.11 | 18.67 | -38.44 |        |      |
|      |      | 3508.60 | Horizontal | -46.55 | 13.01 | -33.54 | -13.00 | PASS |
|      |      | 5262.90 | H          | -54.62 | 15.89 | -38.73 |        |      |
|      |      | 7017.20 | H          | -57.82 | 18.67 | -39.15 |        |      |
|      | Low  | 3423.00 | Vertical   | -46.70 | 12.74 | -33.96 | -13.00 | PASS |
|      |      | 5134.50 | V          | -54.68 | 15.68 | -39.00 |        |      |
|      |      | 6846.00 | V          | -58.13 | 18.59 | -39.54 |        |      |
|      |      | 3423.00 | Horizontal | -47.27 | 12.74 | -34.53 | -13.00 | PASS |
|      |      | 5134.50 | H          | -55.97 | 15.68 | -40.29 |        |      |
|      |      | 6846.00 | H          | -58.93 | 18.59 | -40.34 |        |      |
| 3MHz | Mid  | 3465.00 | Vertical   | -47.75 | 12.49 | -35.26 | -13.00 | PASS |
|      |      | 5197.50 | V          | -56.19 | 15.89 | -40.30 |        |      |
|      |      | 6930.00 | V          | -59.20 | 18.66 | -40.54 |        |      |
|      |      | 3465.00 | Horizontal | -49.51 | 12.49 | -37.02 | -13.00 | PASS |
|      |      | 5197.50 | H          | -57.93 | 15.89 | -42.04 |        |      |
|      |      | 6930.00 | H          | -61.04 | 18.66 | -42.38 |        |      |
|      | High | 3507.00 | Vertical   | -49.57 | 13.44 | -36.13 | -13.00 | PASS |
|      |      | 5260.50 | V          | -56.98 | 15.89 | -41.09 |        |      |
|      |      | 7014.00 | V          | -59.68 | 18.39 | -41.29 |        |      |
|      |      | 3507.00 | Horizontal | -51.66 | 13.44 | -38.22 | -13.00 | PASS |
|      |      | 5260.50 | H          | -59.29 | 15.89 | -43.40 |        |      |
|      |      | 7014.00 | H          | -61.76 | 18.39 | -43.37 |        |      |

|      |     |         |            |        |       |        |        |      |
|------|-----|---------|------------|--------|-------|--------|--------|------|
| 5MHz | Low | 3425.00 | Vertical   | -47.41 | 12.87 | -34.54 | -13.00 | PASS |
|      |     | 5137.50 | V          | -55.77 | 15.85 | -39.92 |        |      |
|      |     | 6850.00 | V          | -58.63 | 18.93 | -39.70 |        |      |
|      |     | 3425.00 | Horizontal | -50.45 | 12.87 | -37.58 | -13.00 | PASS |
|      |     | 5137.50 | H          | -59.85 | 15.85 | -44.00 |        |      |
|      |     | 6850.00 | H          | -61.79 | 18.93 | -42.86 |        |      |
|      | Mid | 3465.00 | Vertical   | -47.49 | 12.47 | -35.02 | -13.00 | PASS |



|       |      |         |            |        |       |        |        |      |
|-------|------|---------|------------|--------|-------|--------|--------|------|
|       |      | 5197.50 | V          | -55.17 | 15.7  | -39.47 |        | PASS |
|       |      | 6930.00 | V          | -58.41 | 18.29 | -40.12 |        |      |
|       |      | 3465.00 | Horizontal | -50.61 | 12.47 | -38.14 |        |      |
|       |      | 5197.50 | H          | -59.25 | 15.7  | -43.55 |        |      |
|       |      | 6930.00 | H          | -60.94 | 18.29 | -42.65 |        |      |
|       |      | 3505.00 | Vertical   | -47.62 | 13.29 | -34.33 |        |      |
|       | High | 5257.50 | V          | -55.96 | 15.86 | -40.10 | -13.00 | PASS |
|       |      | 7010.00 | V          | -58.15 | 18.63 | -39.52 |        |      |
|       |      | 3505.00 | Horizontal | -50.98 | 13.29 | -37.69 |        |      |
|       |      | 5257.50 | H          | -58.99 | 15.86 | -43.13 |        |      |
|       |      | 7010.00 | H          | -60.92 | 18.63 | -42.29 |        |      |
|       |      | 3430.00 | Vertical   | -45.83 | 12.72 | -33.11 |        |      |
| 10MHz | Low  | 5145.00 | V          | -56.45 | 15.61 | -40.84 | -13.00 | PASS |
|       |      | 6860.00 | V          | -57.69 | 18.62 | -39.07 |        |      |
|       |      | 3430.00 | Horizontal | -50.67 | 12.72 | -37.95 |        |      |
|       |      | 5145.00 | H          | -58.98 | 15.61 | -43.37 |        |      |
|       |      | 6860.00 | H          | -61.12 | 18.62 | -42.50 |        |      |
|       |      | 3465.00 | Vertical   | -45.71 | 12.41 | -33.30 | -13.00 | PASS |
|       | Mid  | 5197.50 | V          | -56.94 | 15.92 | -41.02 |        |      |
|       |      | 6930.00 | V          | -58.23 | 18.63 | -39.60 |        |      |
|       |      | 3465.00 | Horizontal | -50.57 | 12.41 | -38.16 |        |      |
|       |      | 5197.50 | H          | -59.46 | 15.92 | -43.54 |        |      |
|       |      | 6930.00 | H          | -61.29 | 18.63 | -42.66 |        |      |
|       | High | 3500.00 | Vertical   | -46.97 | 13.41 | -33.56 | -13.00 | PASS |
|       |      | 5250.00 | V          | -56.85 | 15.59 | -41.26 |        |      |
|       |      | 7000.00 | V          | -58.14 | 18.31 | -39.83 |        |      |
|       |      | 3500.00 | Horizontal | -51.77 | 13.41 | -38.36 |        |      |
|       |      | 5250.00 | H          | -59.32 | 15.59 | -43.73 |        |      |
|       |      | 7000.00 | H          | -61.13 | 18.31 | -42.82 |        |      |

|       |     |         |            |        |       |        |        |      |
|-------|-----|---------|------------|--------|-------|--------|--------|------|
| 15MHz | Low | 3435.00 | Vertical   | -47.14 | 12.89 | -34.25 | -13.00 | PASS |
|       |     | 5152.50 | V          | -56.42 | 15.86 | -40.56 |        |      |
|       |     | 6870.00 | V          | -59.33 | 18.95 | -40.38 |        |      |
|       |     | 3435.00 | Horizontal | -50.28 | 12.89 | -37.39 |        |      |
|       |     | 5152.50 | H          | -60.50 | 15.86 | -44.64 |        |      |



|       |      |         |            |        |       |        |        |      |
|-------|------|---------|------------|--------|-------|--------|--------|------|
|       | Mid  | 6870.00 | H          | -60.08 | 18.95 | -41.13 | -13.00 | PASS |
|       |      | 3465.00 | Vertical   | -48.33 | 12.49 | -35.84 |        |      |
|       |      | 5197.50 | V          | -54.80 | 15.73 | -39.07 |        |      |
|       |      | 6930.00 | V          | -60.09 | 18.31 | -41.78 | -13.00 | PASS |
|       |      | 3465.00 | Horizontal | -48.65 | 12.49 | -36.16 |        |      |
|       |      | 5197.50 | H          | -61.37 | 15.73 | -45.64 |        |      |
|       |      | 6930.00 | H          | -58.49 | 18.31 | -40.18 | -13.00 | PASS |
|       | High | 3495.00 | Vertical   | -50.33 | 13.32 | -37.01 |        |      |
|       |      | 5242.50 | V          | -53.89 | 15.88 | -38.01 |        |      |
|       |      | 6990.00 | V          | -59.42 | 18.65 | -40.77 |        |      |
|       |      | 3495.00 | Horizontal | -48.36 | 13.32 | -35.04 | -13.00 | PASS |
|       |      | 5242.50 | H          | -59.35 | 15.88 | -43.47 |        |      |
|       |      | 6990.00 | H          | -58.29 | 18.65 | -39.64 |        |      |
| 20MHz | Low  | 3440.00 | Vertical   | -48.03 | 12.74 | -35.29 | -13.00 | PASS |
|       |      | 5160.00 | V          | -53.27 | 15.65 | -37.62 |        |      |
|       |      | 6880.00 | V          | -59.08 | 18.64 | -40.44 |        |      |
|       |      | 3440.00 | Horizontal | -48.89 | 12.74 | -36.15 | -13.00 | PASS |
|       |      | 5160.00 | H          | -60.00 | 15.65 | -44.35 |        |      |
|       |      | 6880.00 | H          | -58.54 | 18.64 | -39.90 |        |      |
|       | Mid  | 3465.00 | Vertical   | -48.01 | 12.44 | -35.57 | -13.00 | PASS |
|       |      | 5197.50 | V          | -53.68 | 15.93 | -37.75 |        |      |
|       |      | 6930.00 | V          | -59.20 | 18.64 | -40.56 |        |      |
|       |      | 3465.00 | Horizontal | -48.77 | 12.44 | -36.33 | -13.00 | PASS |
|       |      | 5197.50 | H          | -60.46 | 15.93 | -44.53 |        |      |
|       |      | 6930.00 | H          | -60.33 | 18.64 | -41.69 |        |      |
|       | High | 3490.00 | Vertical   | -50.16 | 13.43 | -36.73 | -13.00 | PASS |
|       |      | 5235.00 | V          | -54.30 | 15.61 | -38.69 |        |      |
|       |      | 6980.00 | V          | -59.76 | 18.34 | -41.42 |        |      |
|       |      | 3490.00 | Horizontal | -50.57 | 13.43 | -37.14 | -13.00 | PASS |
|       |      | 5235.00 | H          | -60.34 | 15.61 | -44.73 |        |      |
|       |      | 6980.00 | H          | -60.76 | 18.34 | -42.42 |        |      |



| LTE Band 5 |         |                    |                   |                  |                |                |                |        |
|------------|---------|--------------------|-------------------|------------------|----------------|----------------|----------------|--------|
| Bandwidth  | Channel | Frequency<br>(MHz) | Spurious Emission |                  |                |                | Limit<br>(dBm) | Result |
|            |         |                    | Polarization      | reading<br>(dBm) | factor<br>(dB) | Level<br>(dBm) |                |        |
| 1.4MHz     | Low     | 1649.40            | Vertical          | -43.23           | 7.29           | -35.94         | -13.00         | PASS   |
|            |         | 2474.10            | V                 | -52.80           | 9.41           | -43.39         |                |        |
|            |         | 3298.80            | V                 | -56.79           | 12.69          | -44.10         |                |        |
|            |         | 1649.40            | Horizontal        | -44.98           | 7.29           | -37.69         | -13.00         | PASS   |
|            |         | 2474.10            | H                 | -54.86           | 9.41           | -45.45         |                |        |
|            |         | 3298.80            | H                 | -58.66           | 12.69          | -45.97         |                |        |
|            | Mid     | 1673.00            | Vertical          | -42.74           | 7.32           | -35.42         | -13.00         | PASS   |
|            |         | 2509.50            | V                 | -52.29           | 9.39           | -42.90         |                |        |
|            |         | 3346.00            | V                 | -56.31           | 12.78          | -43.53         |                |        |
|            |         | 1673.00            | Horizontal        | -44.48           | 7.32           | -37.16         | -13.00         | PASS   |
|            |         | 2509.50            | H                 | -54.34           | 9.39           | -44.95         |                |        |
|            |         | 3346.00            | H                 | -58.28           | 12.78          | -45.50         |                |        |
|            | High    | 1696.60            | Vertical          | -42.16           | 7.33           | -34.83         | -13.00         | PASS   |
|            |         | 2544.90            | V                 | -51.88           | 9.46           | -42.42         |                |        |
|            |         | 3393.20            | V                 | -55.78           | 12.71          | -43.07         |                |        |
|            |         | 1696.60            | Horizontal        | -42.42           | 7.33           | -35.09         | -13.00         | PASS   |
|            |         | 2544.90            | H                 | -51.64           | 9.46           | -42.18         |                |        |
|            |         | 3393.20            | H                 | -56.21           | 12.71          | -43.50         |                |        |
| 3MHz       | Low     | 1651.00            | Vertical          | -41.11           | 7.36           | -33.75         | -13.00         | PASS   |
|            |         | 2476.50            | V                 | -50.92           | 9.51           | -41.41         |                |        |
|            |         | 3302.00            | V                 | -54.93           | 12.72          | -42.21         |                |        |
|            |         | 1651.00            | Horizontal        | -41.74           | 7.36           | -34.38         | -13.00         | PASS   |
|            |         | 2476.50            | H                 | -51.02           | 9.51           | -41.51         |                |        |
|            |         | 3302.00            | H                 | -55.65           | 12.72          | -42.93         |                |        |
|            | Mid     | 1673.00            | Vertical          | -40.63           | 7.41           | -33.22         | -13.00         | PASS   |
|            |         | 2509.50            | V                 | -50.43           | 9.52           | -40.91         |                |        |
|            |         | 3346.00            | V                 | -54.47           | 12.73          | -41.74         |                |        |
|            |         | 1673.00            | Horizontal        | -40.84           | 7.41           | -33.43         | -13.00         | PASS   |
|            |         | 2509.50            | H                 | -50.26           | 9.52           | -40.74         |                |        |
|            |         | 3346.00            | H                 | -54.93           | 12.73          | -42.20         |                |        |
|            | High    | 1695.00            | Vertical          | -39.57           | 7.52           | -32.05         | -13.00         | PASS   |



|  |  |         |            |        |       |        |        |      |
|--|--|---------|------------|--------|-------|--------|--------|------|
|  |  | 2542.50 | V          | -49.31 | 9.46  | -39.85 |        |      |
|  |  | 3390.00 | V          | -53.54 | 12.81 | -40.73 |        |      |
|  |  | 1695.00 | Horizontal | -40.08 | 7.52  | -32.56 |        |      |
|  |  | 2542.50 | H          | -49.39 | 9.46  | -39.93 | -13.00 | PASS |
|  |  | 3390.00 | H          | -54.32 | 12.81 | -41.51 |        |      |

|       |      |         |            |        |       |        |        |      |
|-------|------|---------|------------|--------|-------|--------|--------|------|
| 5MHz  | Low  | 1653.00 | Vertical   | -37.50 | 7.61  | -29.89 |        |      |
|       |      | 2479.50 | V          | -48.00 | 9.49  | -38.51 | -13.00 | PASS |
|       |      | 3306.00 | V          | -51.82 | 12.86 | -38.96 |        |      |
|       |      | 1653.00 | Horizontal | -40.69 | 7.61  | -33.08 |        |      |
|       |      | 2479.50 | H          | -49.91 | 9.49  | -40.42 | -13.00 | PASS |
|       |      | 3306.00 | H          | -54.78 | 12.86 | -41.92 |        |      |
|       | Mid  | 1673.00 | Vertical   | -38.00 | 7.72  | -30.28 |        |      |
|       |      | 2509.50 | V          | -48.41 | 9.53  | -38.88 | -13.00 | PASS |
|       |      | 3346.00 | V          | -52.14 | 12.84 | -39.30 |        |      |
|       |      | 1673.00 | Horizontal | -40.95 | 7.72  | -33.23 |        |      |
|       |      | 2509.50 | H          | -50.07 | 9.53  | -40.54 | -13.00 | PASS |
|       |      | 3346.00 | H          | -54.88 | 12.84 | -42.04 |        |      |
|       | High | 1693.00 | Vertical   | -38.55 | 7.79  | -30.76 |        |      |
|       |      | 2539.50 | V          | -48.85 | 9.53  | -39.32 | -13.00 | PASS |
|       |      | 3386.00 | V          | -52.60 | 12.89 | -39.71 |        |      |
|       |      | 1693.00 | Horizontal | -40.12 | 7.79  | -32.33 |        |      |
|       |      | 2539.50 | H          | -49.23 | 9.53  | -39.70 | -13.00 | PASS |
|       |      | 3386.00 | H          | -54.21 | 12.89 | -41.32 |        |      |
| 10MHz | Low  | 1658.00 | Vertical   | -37.96 | 7.81  | -30.15 |        |      |
|       |      | 2487.00 | V          | -48.36 | 9.56  | -38.80 | -13.00 | PASS |
|       |      | 3316.00 | V          | -52.18 | 12.91 | -39.27 |        |      |
|       |      | 1658.00 | Horizontal | -40.84 | 7.81  | -33.03 |        |      |
|       |      | 2487.00 | H          | -49.91 | 9.56  | -40.35 | -13.00 | PASS |
|       |      | 3316.00 | H          | -54.79 | 12.91 | -41.88 |        |      |
|       | Mid  | 1673.00 | Vertical   | -38.50 | 7.83  | -30.67 |        |      |
|       |      | 2509.50 | V          | -48.88 | 9.59  | -39.29 | -13.00 | PASS |
|       |      | 3346.00 | V          | -52.67 | 12.94 | -39.73 |        |      |
|       |      | 1673.00 | Horizontal | -41.05 | 7.83  | -33.22 |        |      |
|       |      | 2509.50 | H          | -50.09 | 9.59  | -40.50 | -13.00 | PASS |
|       |      | 3346.00 | H          | -54.97 | 12.94 | -42.03 |        |      |



|  |      |         |            |        |       |        |        |      |
|--|------|---------|------------|--------|-------|--------|--------|------|
|  | High | 1688.00 | Vertical   | -38.79 | 7.89  | -30.90 | -13.00 | PASS |
|  |      | 2532.00 | V          | -49.12 | 9.62  | -39.50 |        |      |
|  |      | 3376.00 | V          | -52.89 | 12.96 | -39.93 |        |      |
|  |      | 1688.00 | Horizontal | -41.29 | 7.89  | -33.40 | -13.00 | PASS |
|  |      | 2532.00 | H          | -50.29 | 9.62  | -40.67 |        |      |
|  |      | 3376.00 | H          | -55.13 | 12.96 | -42.17 |        |      |

| LTE Band 12 |         |                    |                   |                  |                |                |                |        |
|-------------|---------|--------------------|-------------------|------------------|----------------|----------------|----------------|--------|
| Bandwidth   | Channel | Frequency<br>(MHz) | Spurious Emission |                  |                |                | Limit<br>(dBm) | Result |
|             |         |                    | Polarization      | reading<br>(dBm) | factor<br>(dB) | Level<br>(dBm) |                |        |
| 1.4MHz      | Low     | 1399.40            | Vertical          | -39.98           | 4.21           | -35.77         | -13.00         | PASS   |
|             |         | 2099.10            | V                 | -48.52           | 9.12           | -39.40         |                |        |
|             |         | 2798.80            | V                 | -51.80           | 11.36          | -40.44         |                |        |
|             |         | 1399.40            | Horizontal        | -41.31           | 4.21           | -37.10         | -13.00         | PASS   |
|             |         | 2099.10            | H                 | -49.77           | 9.12           | -40.65         |                |        |
|             |         | 2798.80            | H                 | -52.87           | 11.36          | -41.51         |                |        |
|             | Mid     | 1415.00            | Vertical          | -39.03           | 4.26           | -34.77         | -13.00         | PASS   |
|             |         | 2122.50            | V                 | -47.61           | 9.15           | -38.46         |                |        |
|             |         | 2830.00            | V                 | -50.94           | 11.39          | -39.55         |                |        |
|             |         | 1415.00            | Horizontal        | -40.14           | 4.26           | -35.88         | -13.00         | PASS   |
|             |         | 2122.50            | H                 | -48.81           | 9.15           | -39.66         |                |        |
|             |         | 2830.00            | H                 | -51.96           | 11.39          | -40.57         |                |        |
|             | High    | 1430.60            | Vertical          | -37.35           | 4.29           | -33.06         | -13.00         | PASS   |
|             |         | 2145.90            | V                 | -46.01           | 9.11           | -36.90         |                |        |
|             |         | 2861.20            | V                 | -49.38           | 11.31          | -38.07         |                |        |
|             |         | 1430.60            | Horizontal        | -39.57           | 4.29           | -35.28         | -13.00         | PASS   |
|             |         | 2145.90            | H                 | -48.21           | 9.11           | -39.10         |                |        |
|             |         | 2861.20            | H                 | -51.40           | 11.31          | -40.09         |                |        |
| 3MHz        | Low     | 1401.00            | Vertical          | -36.28           | 4.32           | -31.96         | -13.00         | PASS   |
|             |         | 2101.50            | V                 | -42.93           | 9.16           | -33.77         |                |        |
|             |         | 2802.00            | V                 | -47.14           | 11.35          | -35.79         |                |        |
|             |         | 1401.00            | Horizontal        | -36.89           | 4.32           | -32.57         | -13.00         | PASS   |
|             |         | 2101.50            | H                 | -45.05           | 9.16           | -35.89         |                |        |
|             |         | 2802.00            | H                 | -49.76           | 11.35          | -38.41         |                |        |



|  |      |         |            |        |       |        |        |      |
|--|------|---------|------------|--------|-------|--------|--------|------|
|  | Mid  | 1415.00 | Vertical   | -33.16 | 4.26  | -28.90 | -13.00 | PASS |
|  |      | 2122.50 | V          | -40.04 | 9.15  | -30.89 |        |      |
|  |      | 2830.00 | V          | -44.03 | 11.39 | -32.64 |        |      |
|  |      | 1415.00 | Horizontal | -34.28 | 4.26  | -30.02 | -13.00 | PASS |
|  |      | 2122.50 | H          | -43.25 | 9.15  | -34.10 |        |      |
|  |      | 2830.00 | H          | -47.75 | 11.39 | -36.36 |        |      |
|  | High | 1429.00 | Vertical   | -30.52 | 4.42  | -26.10 | -13.00 | PASS |
|  |      | 2143.50 | V          | -38.11 | 9.25  | -28.86 |        |      |
|  |      | 2858.00 | V          | -42.77 | 11.46 | -31.31 |        |      |
|  |      | 1429.00 | Horizontal | -31.76 | 4.42  | -27.34 | -13.00 | PASS |
|  |      | 2143.50 | H          | -41.31 | 9.25  | -32.06 |        |      |
|  |      | 2858.00 | H          | -44.22 | 11.46 | -32.76 |        |      |

|       |      |         |            |        |       |        |        |      |
|-------|------|---------|------------|--------|-------|--------|--------|------|
| 5MHz  | Low  | 1403.00 | Vertical   | -27.22 | 4.13  | -23.09 | -13.00 | PASS |
|       |      | 2104.50 | V          | -33.36 | 9.06  | -24.30 |        |      |
|       |      | 2806.00 | V          | -39.16 | 11.27 | -27.89 |        |      |
|       |      | 1403.00 | Horizontal | -33.76 | 4.13  | -29.63 | -13.00 | PASS |
|       |      | 2104.50 | H          | -45.19 | 9.06  | -36.13 |        |      |
|       |      | 2806.00 | H          | -46.03 | 11.27 | -34.76 |        |      |
|       | Mid  | 1415.00 | Vertical   | -28.82 | 4.26  | -24.56 | -13.00 | PASS |
|       |      | 2122.50 | V          | -36.18 | 9.15  | -27.03 |        |      |
|       |      | 2830.00 | V          | -41.64 | 11.39 | -30.25 |        |      |
|       |      | 1415.00 | Horizontal | -37.29 | 4.26  | -33.03 | -13.00 | PASS |
|       |      | 2122.50 | H          | -47.59 | 9.15  | -38.44 |        |      |
|       |      | 2830.00 | H          | -47.91 | 11.39 | -36.52 |        |      |
|       | High | 1427.00 | Vertical   | -32.49 | 4.22  | -28.27 | -13.00 | PASS |
|       |      | 2140.50 | V          | -38.83 | 9.16  | -29.67 |        |      |
|       |      | 2854.00 | V          | -43.84 | 11.32 | -32.52 |        |      |
|       |      | 1427.00 | Horizontal | -39.91 | 4.22  | -35.69 | -13.00 | PASS |
|       |      | 2140.50 | H          | -50.07 | 9.16  | -40.91 |        |      |
|       |      | 2854.00 | H          | -49.72 | 11.32 | -38.40 |        |      |
| 10MHz | Low  | 1408.00 | Vertical   | -30.09 | 4.29  | -25.80 | -13.00 | PASS |
|       |      | 2112.00 | V          | -37.53 | 9.19  | -28.34 |        |      |
|       |      | 2816.00 | V          | -42.27 | 11.35 | -30.92 |        |      |
|       |      | 1408.00 | Horizontal | -43.75 | 4.29  | -39.46 | -13.00 | PASS |
|       |      | 2112.00 | H          | -52.68 | 9.19  | -43.49 |        |      |



|  |      |         |            |        |       |        |        |      |
|--|------|---------|------------|--------|-------|--------|--------|------|
|  | Mid  | 2816.00 | H          | -52.72 | 11.35 | -41.37 | -13.00 | PASS |
|  |      | 1415.00 | Vertical   | -32.98 | 4.26  | -28.72 |        |      |
|  |      | 2122.50 | V          | -39.94 | 9.15  | -30.79 |        |      |
|  |      | 2830.00 | V          | -45.26 | 11.39 | -33.87 | -13.00 | PASS |
|  |      | 1415.00 | Horizontal | -45.65 | 4.26  | -41.39 |        |      |
|  |      | 2122.50 | H          | -55.51 | 9.15  | -46.36 |        |      |
|  | High | 2830.00 | H          | -55.03 | 11.39 | -43.64 | -13.00 | PASS |
|  |      | 1422.00 | Vertical   | -34.17 | 4.36  | -29.81 |        |      |
|  |      | 2133.00 | V          | -42.50 | 9.27  | -33.23 |        |      |
|  |      | 2844.00 | V          | -48.09 | 11.39 | -36.70 | -13.00 | PASS |
|  |      | 1422.00 | Horizontal | -43.42 | 4.36  | -39.06 |        |      |
|  |      | 2133.00 | H          | -54.28 | 9.27  | -45.01 |        |      |
|  |      | 2844.00 | H          | -53.22 | 11.39 | -41.83 |        |      |

| LTE Band 13 |         |                 |                   |               |             |             |             |        |
|-------------|---------|-----------------|-------------------|---------------|-------------|-------------|-------------|--------|
| Bandwidth   | Channel | Frequency (MHz) | Spurious Emission |               |             |             | Limit (dBm) | Result |
|             |         |                 | Polarization      | reading (dBm) | factor (dB) | Level (dBm) |             |        |
| 5MHz        | Low     | 1559.00         | Vertical          | -59.49        | 4.98        | -54.51      | -40.00      | PASS   |
|             |         | 2338.50         | V                 | -49.15        | 9.12        | -40.03      | -13.00      |        |
|             |         | 3118.00         | V                 | -53.17        | 12.46       | -40.71      | -13.00      |        |
|             |         | 1559.00         | Horizontal        | -60.60        | 4.98        | -55.62      | -40.00      | PASS   |
|             |         | 2338.50         | H                 | -50.19        | 9.12        | -41.07      | -13.00      |        |
|             |         | 3118.00         | H                 | -54.06        | 12.46       | -41.60      | -13.00      |        |
|             | Mid     | 1564.00         | Vertical          | -58.71        | 5.03        | -53.68      | -40.00      | PASS   |
|             |         | 2346.00         | V                 | -48.44        | 9.19        | -39.25      | -13.00      |        |
|             |         | 3128.00         | V                 | -52.44        | 12.47       | -39.97      | -13.00      |        |
|             |         | 1564.00         | Horizontal        | -59.63        | 5.03        | -54.60      | -40.00      | PASS   |
|             |         | 2346.00         | H                 | -49.44        | 9.19        | -40.25      | -13.00      |        |
|             |         | 3128.00         | H                 | -53.29        | 12.47       | -40.82      | -13.00      |        |
|             | High    | 1569.00         | Vertical          | -57.35        | 5.09        | -52.26      | -40.00      | PASS   |
|             |         | 2353.50         | V                 | -47.17        | 9.22        | -37.95      | -13.00      |        |
|             |         | 3138.00         | V                 | -51.27        | 12.53       | -38.74      | -13.00      |        |
|             |         | 1569.00         | Horizontal        | -59.19        | 5.09        | -54.10      | -40.00      | PASS   |
|             |         | 2353.50         | H                 | -49.00        | 9.22        | -39.78      | -13.00      |        |
|             |         | 3138.00         | H                 | -52.95        | 12.53       | -40.42      | -13.00      |        |



|       |     |         |            |        |       |        |        |      |
|-------|-----|---------|------------|--------|-------|--------|--------|------|
| 10MHz | Mid | 1564.00 | Vertical   | -56.37 | 5.03  | -51.34 | -40.00 | PASS |
|       |     | 2346.00 | V          | -44.54 | 9.19  | -35.35 | -13.00 |      |
|       |     | 3128.00 | V          | -49.31 | 12.47 | -36.84 |        |      |
|       |     | 1564.00 | Horizontal | -56.88 | 5.03  | -51.85 | -40.00 | PASS |
|       |     | 2346.00 | H          | -46.30 | 9.19  | -37.11 | -13.00 |      |
|       |     | 3128.00 | H          | -51.49 | 12.47 | -39.02 |        |      |

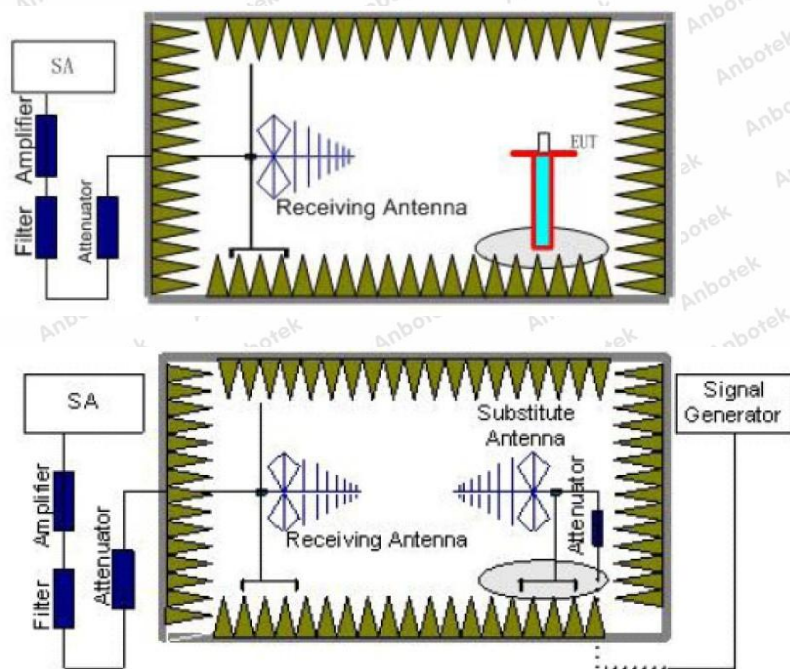


## 10. ERP and EIRP

### 10.1. Test Standard and Limit

|                      |                                                                                                                                                                                                          |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicable Standard: | Part 2.1046<br>Part 22.913(a)<br>Part 24.232(c)<br>Part 27.50(b)<br>Part 27.50(c)<br>Part 27.50(d)                                                                                                       |
| Limit:               | $ERP \leq 7W(38.45dBm)$ (LTE Band 5)<br>$EIRP \leq 2W(33.00dBm)$ (LTE Band 2)<br>$ERP \leq 3W(34.77dBm)$ (LTE Band 13)<br>$ERP \leq 3W(34.77dBm)$ (LTE Band 12)<br>$EIRP \leq 1W(30.00dBm)$ (LTE Band 4) |

### 10.2. Test Setup



### 10.3. Test Procedure

#### 1. Place the EUT in the center of the turntable.

- For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table at a nominal height of 80 cm above the reference ground plane
- For radiated measurements performed at frequencies above 1 GHz, the EUT shall be placed on an RF transparent table at a nominal height of 1.5 m above the ground plane.



2. Unless the EUT uses an integral antenna, the EUT shall be terminated with a non-radiating transmitter load. In cases where the EUT uses an adjustable antenna, the antenna shall be adjusted through typical positions and lengths to maximize emissions levels.
3. The EUT shall be tested while operating on the frequency per manufacturer specification. Set the transmitter to operate in continuous transmit mode.
4. Receiver or Spectrum set as follow:  
Below 1GHz, RBW=100kHz, VBW=300kHz, Detector=Peak, Sweep time=Auto  
Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peck, Sweep time=Auto
5. Each emission under consideration shall be evaluated:
  - a) Raise and lower the measurement antenna from 1 m to 4 m, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
  - b) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
  - c) Return the turntable to the azimuth where the highest emission amplitude level was observed.
  - d) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
  - e) Record the measured emission amplitude level and frequency
6. Repeat step 5 for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.
7. Set-up the substitution measurement with the reference point of the substitution antenna located as near as possible to where the center of the EUT radiating element was located during the initial EUT measurement.
8. Maintain the previous measurement instrument settings and test set-up, with the exception that the EUT is removed and replaced by the substitution antenna.
9. Connect a signal generator to the substitution antenna; locate the signal generator so as to minimize any potential influences on the measurement results. Set the signal generator to the frequency where emissions are detected, and set an output power level such that the radiated signal can be detected by the measurement instrument, with sufficient dynamic range relative to the noise floor.
10. For each emission that was detected and measured in the initial test
  - a) Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude.
  - b) Adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the amplitude level of the emission previously measured directly in step 5 and step 6.
  - c) Record the output power level of the signal generator when equivalence is achieved in step b).
11. Repeat step 8 through step 10 with the measurement antenna oriented in the opposite polarization.
12. Calculate the emission power in dBm referenced to a half-wave dipole using the following equation:  
$$Pe = Ps(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$

where

Pe = equivalent emission power in dBm

Ps = source (signal generator) power in dBm

*NOTE—dBd refers to the measured antenna gain in decibels relative to a half-wave dipole.*



13. Correct the antenna gain of the substitution antenna if necessary to reference the emission power to a half-wave dipole. When using measurement antennas with the gain specified in dBi, the equivalent dipole-referenced gain can be determined from:

$$\text{gain (dBd)} = \text{gain (dBi)} - 2.15 \text{ dB.}$$

If necessary, the antenna gain can be calculated from calibrated antenna factor information

14. Provide the complete measurement results as a part of the test report.

#### 10.4. Test Data

Pass

Please to see the following pages

| LTE Band 2 |            |         |            |            |             |        |
|------------|------------|---------|------------|------------|-------------|--------|
| Bandwidth  | Modulation | Channel | EIRP (dBm) |            | Limit (dBm) | Result |
|            |            |         | Vertical   | Horizontal |             |        |
| 1.4MHz     | QPSK       | Low     | 22.24      | 19.53      | 33.00       | PASS   |
|            |            | Mid     | 22.59      | 19.43      |             |        |
|            |            | High    | 22.55      | 19.61      |             |        |
|            | 16QAM      | Low     | 18.03      | 15.81      |             | PASS   |
|            |            | Mid     | 18.54      | 16.14      |             |        |
|            |            | High    | 18.28      | 16.54      |             |        |
| 3MHz       | QPSK       | Low     | 21.72      | 18.55      | 33.00       | PASS   |
|            |            | Mid     | 22.26      | 19.40      |             |        |
|            |            | High    | 21.99      | 19.21      |             |        |
|            | 16QAM      | Low     | 19.41      | 17.23      |             | PASS   |
|            |            | Mid     | 19.30      | 16.86      |             |        |
|            |            | High    | 18.34      | 16.87      |             |        |
| 5MHz       | QPSK       | Low     | 23.97      | 20.69      | 33.00       | PASS   |
|            |            | Mid     | 24.29      | 20.40      |             |        |
|            |            | High    | 24.62      | 20.68      |             |        |
|            | 16QAM      | Low     | 19.97      | 16.92      |             | PASS   |
|            |            | Mid     | 20.19      | 17.15      |             |        |
|            |            | High    | 19.83      | 17.44      |             |        |
| 10MHz      | QPSK       | Low     | 23.89      | 20.88      | 33.00       | PASS   |
|            |            | Mid     | 24.20      | 20.59      |             |        |
|            |            | High    | 24.51      | 21.09      |             |        |
|            | 16QAM      | Low     | 19.88      | 17.22      |             | PASS   |
|            |            | Mid     | 20.11      | 17.58      |             |        |
|            |            | High    | 19.75      | 17.75      |             |        |
| 15MHz      | QPSK       | Low     | 23.15      | 19.73      | 33.00       | PASS   |
|            |            | Mid     | 23.66      | 20.41      |             |        |



|       |       |      |       |       |       |      |
|-------|-------|------|-------|-------|-------|------|
| 20MHz | 16QAM | High | 23.70 | 20.49 | 33.00 | PASS |
|       |       | Low  | 21.02 | 18.45 |       |      |
|       |       | Mid  | 20.66 | 18.12 |       |      |
|       |       | High | 19.62 | 17.92 |       |      |
|       | QPSK  | Low  | 23.54 | 20.08 |       | PASS |
|       |       | Mid  | 24.26 | 20.88 |       |      |
|       |       | High | 24.30 | 20.88 |       |      |
|       | 16QAM | Low  | 21.58 | 19.23 |       | PASS |
|       |       | Mid  | 21.15 | 18.51 |       |      |
|       |       | High | 20.08 | 18.12 |       |      |

| LTE Band 4 |            |         |            |            |             |        |
|------------|------------|---------|------------|------------|-------------|--------|
| Bandwidth  | Modulation | Channel | EIRP (dBm) |            | Limit (dBm) | Result |
|            |            |         | Vertical   | Horizontal |             |        |
| 1.4MHz     | QPSK       | Low     | 22.45      | 20.60      | 30.00       | PASS   |
|            |            | Mid     | 22.96      | 21.04      |             |        |
|            |            | High    | 23.04      | 20.71      |             |        |
|            | 16QAM      | Low     | 19.83      | 18.68      |             | PASS   |
|            |            | Mid     | 20.27      | 19.16      |             |        |
|            |            | High    | 20.21      | 18.99      |             |        |
| 3MHz       | QPSK       | Low     | 22.94      | 20.60      | 30.00       | PASS   |
|            |            | Mid     | 22.86      | 20.75      |             |        |
|            |            | High    | 22.67      | 20.53      |             |        |
|            | 16QAM      | Low     | 20.16      | 19.19      |             | PASS   |
|            |            | Mid     | 20.52      | 18.56      |             |        |
|            |            | High    | 20.55      | 19.23      |             |        |
| 5MHz       | QPSK       | Low     | 23.64      | 21.22      | 30.00       | PASS   |
|            |            | Mid     | 23.93      | 21.64      |             |        |
|            |            | High    | 23.98      | 21.35      |             |        |
|            | 16QAM      | Low     | 20.72      | 19.12      |             | PASS   |
|            |            | Mid     | 21.05      | 20.21      |             |        |
|            |            | High    | 20.86      | 19.33      |             |        |
| 10MHz      | QPSK       | Low     | 23.13      | 21.04      | 30.00       | PASS   |
|            |            | Mid     | 23.52      | 21.44      |             |        |
|            |            | High    | 23.57      | 21.11      |             |        |
|            | 16QAM      | Low     | 20.34      | 19.03      |             | PASS   |
|            |            | Mid     | 20.72      | 19.46      |             |        |



|       |       |      |       |       |       |      |
|-------|-------|------|-------|-------|-------|------|
|       |       | High | 20.58 | 19.24 |       |      |
| 15MHz | QPSK  | Low  | 23.66 | 20.97 | 30.00 | PASS |
|       |       | Mid  | 23.44 | 21.11 |       |      |
|       |       | High | 23.23 | 20.91 |       |      |
|       | 16QAM | Low  | 20.69 | 19.45 |       | PASS |
|       |       | Mid  | 20.99 | 19.19 |       |      |
|       |       | High | 20.94 | 19.43 |       |      |
| 20MHz | QPSK  | Low  | 23.72 | 21.04 | 30.00 | PASS |
|       |       | Mid  | 23.72 | 21.23 |       |      |
|       |       | High | 23.47 | 20.98 |       |      |
|       | 16QAM | Low  | 20.67 | 19.54 |       | PASS |
|       |       | Mid  | 21.25 | 19.11 |       |      |
|       |       | High | 21.23 | 19.62 |       |      |

| LTE Band 5 |            |         |           |            |             |        |
|------------|------------|---------|-----------|------------|-------------|--------|
| Bandwidth  | Modulation | Channel | ERP (dBm) |            | Limit (dBm) | Result |
|            |            |         | Vertical  | Horizontal |             |        |
| 1.4MHz     | QPSK       | Low     | 22.83     | 21.61      | 38.45       | PASS   |
|            |            | Mid     | 23.41     | 21.90      |             |        |
|            |            | High    | 23.36     | 21.90      |             |        |
|            | 16QAM      | Low     | 19.72     | 18.51      |             | PASS   |
|            |            | Mid     | 19.88     | 19.16      |             |        |
|            |            | High    | 19.96     | 18.78      |             |        |
| 3MHz       | QPSK       | Low     | 24.85     | 20.74      | 38.45       | PASS   |
|            |            | Mid     | 24.31     | 20.97      |             |        |
|            |            | High    | 23.54     | 20.67      |             |        |
|            | 16QAM      | Low     | 19.54     | 19.57      |             | PASS   |
|            |            | Mid     | 19.86     | 18.74      |             |        |
|            |            | High    | 19.95     | 18.43      |             |        |
| 5MHz       | QPSK       | Low     | 24.09     | 21.22      | 38.45       | PASS   |
|            |            | Mid     | 23.79     | 21.46      |             |        |
|            |            | High    | 23.05     | 20.98      |             |        |
|            | 16QAM      | Low     | 20.60     | 19.62      |             | PASS   |
|            |            | Mid     | 20.38     | 19.84      |             |        |
|            |            | High    | 20.28     | 19.66      |             |        |
| 10MHz      | QPSK       | Low     | 23.96     | 21.26      | 38.45       | PASS   |



|  |       |      |       |       |  |      |
|--|-------|------|-------|-------|--|------|
|  | 16QAM | Mid  | 23.67 | 21.51 |  | PASS |
|  |       | High | 22.97 | 21.01 |  |      |
|  |       | Low  | 20.62 | 18.98 |  |      |
|  |       | Mid  | 20.88 | 19.68 |  |      |
|  |       | High | 21.04 | 19.34 |  |      |

| LTE Band 12 |            |         |           |            |             |        |
|-------------|------------|---------|-----------|------------|-------------|--------|
| Bandwidth   | Modulation | Channel | ERP (dBm) |            | Limit (dBm) | Result |
|             |            |         | Vertical  | Horizontal |             |        |
| 1.4MHz      | QPSK       | Low     | 21.84     | 19.28      | 34.77       | PASS   |
|             |            | Mid     | 21.98     | 19.17      |             |        |
|             |            | High    | 22.10     | 19.28      |             |        |
|             | 16QAM      | Low     | 18.58     | 16.40      |             | PASS   |
|             |            | Mid     | 18.84     | 16.62      |             |        |
|             |            | High    | 18.79     | 16.90      |             |        |
| 3MHz        | QPSK       | Low     | 21.44     | 18.52      | 34.77       | PASS   |
|             |            | Mid     | 21.72     | 19.14      |             |        |
|             |            | High    | 21.67     | 18.97      |             |        |
|             | 16QAM      | Low     | 19.64     | 17.49      |             | PASS   |
|             |            | Mid     | 19.43     | 17.17      |             |        |
|             |            | High    | 18.84     | 17.15      |             |        |
| 5MHz        | QPSK       | Low     | 23.18     | 20.18      | 34.77       | PASS   |
|             |            | Mid     | 23.30     | 19.92      |             |        |
|             |            | High    | 23.70     | 20.11      |             |        |
|             | 16QAM      | Low     | 20.09     | 17.26      |             | PASS   |
|             |            | Mid     | 20.12     | 17.40      |             |        |
|             |            | High    | 19.99     | 17.60      |             |        |
| 10MHz       | QPSK       | Low     | 23.12     | 20.33      | 34.77       | PASS   |
|             |            | Mid     | 23.23     | 20.07      |             |        |
|             |            | High    | 23.62     | 20.42      |             |        |
|             | 16QAM      | Low     | 20.01     | 17.49      |             | PASS   |
|             |            | Mid     | 20.06     | 17.74      |             |        |
|             |            | High    | 19.93     | 17.84      |             |        |



| LTE Band 13 |            |         |           |            |             |        |
|-------------|------------|---------|-----------|------------|-------------|--------|
| Bandwidth   | Modulation | Channel | ERP (dBm) |            | Limit (dBm) | Result |
|             |            |         | Vertical  | Horizontal |             |        |
| 5MHz        | QPSK       | Low     | 21.01     | 19.42      | 34.77       | PASS   |
|             |            | Mid     | 21.18     | 19.38      |             |        |
|             |            | High    | 20.91     | 19.42      |             |        |
|             | 16QAM      | Low     | 19.57     | 18.15      |             | PASS   |
|             |            | Mid     | 19.80     | 18.26      |             |        |
|             |            | High    | 19.46     | 18.37      |             |        |
| 10MHz       | QPSK       | Mid     | 20.83     | 19.09      | 34.77       | PASS   |
|             | 16QAM      | Mid     | 21.06     | 19.37      |             |        |

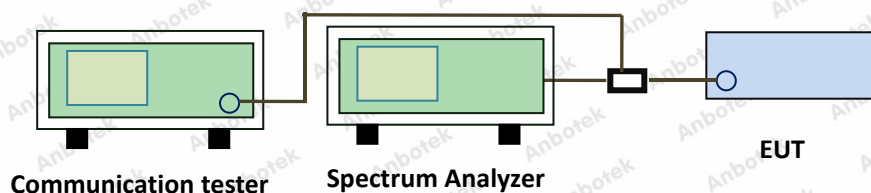


## 11. Frequency stability VS Voltage measurement

### 11.1. Test Standard and Limit

|                      |                                                                  |
|----------------------|------------------------------------------------------------------|
| Applicable Standard: | Part 2.1055(d)(1)(2)<br>Part 22.355<br>Part 24.235<br>Part 27.54 |
| Limit:               | $\leq \pm 2.5\text{ppm}$                                         |

### 11.2. Test Setup



### 11.3. Test Procedure

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. The EUT output port was connected to communication tester.
3. The EUT was placed inside the temperature chamber at 25°C.
4. The power supply voltage to the EUT was varied  $\pm 15\%$  of the nominal value measured at the input to the EUT.
5. Record the maximum frequency change.

### 11.4. Test Data

Pass

Please refer to Appendix F of the Appendix Test Data.

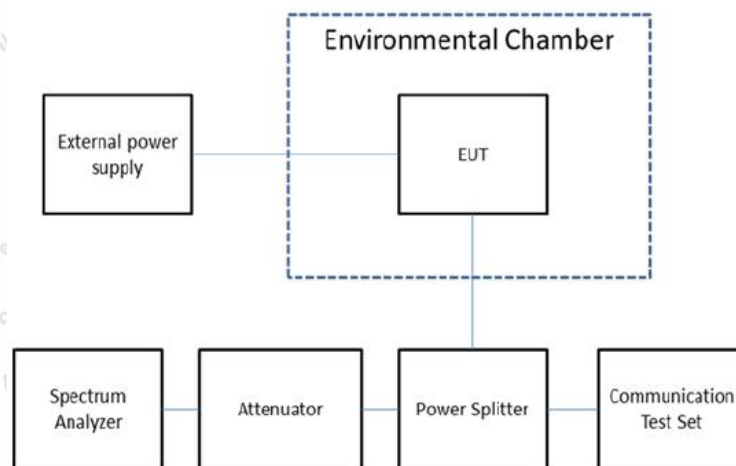


## 12. Frequency stability VS Temperature measurement

### 12.1. Test Standard and Limit

|                      |                                                                  |
|----------------------|------------------------------------------------------------------|
| Applicable Standard: | Part 2.1055(a)(1)(b)<br>Part 22.355<br>Part 24.235<br>Part 27.54 |
| Limit:               | $\leq \pm 2.5\text{ppm}$                                         |

### 12.2. Test Setup



### 12.3. Test Procedure

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. The EUT output port was connected to communication tester.
3. The EUT was placed inside the temperature chamber.
4. Turn EUT off and set the chamber temperature to  $-30^{\circ}\text{C}$ . After the temperature stabilized for approximately 30 minutes recorded the frequency.
5. Repeat step 4 measure with  $10^{\circ}\text{C}$  increased per stage until the highest temperature of  $+50^{\circ}\text{C}$  reached.

### 12.4. Test Data

Pass

Please refer to Appendix G of the Appendix Test Data.



## **APPENDIX I -- TEST SETUP PHOTOGRAPH**

Please refer to separated files Appendix I -- Test Setup Photograph

## **APPENDIX II -- EXTERNAL PHOTOGRAPH**

Please refer to separated files Appendix II -- External Photograph

## **APPENDIX III -- INTERNAL PHOTOGRAPH**

Please refer to separated files Appendix III -- Internal Photograph

----- End of Report -----

