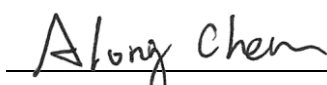


# FCC Test Report

**FCC ID** : MXF-BC4GMCPG  
**Equipment** : Router Wireless 4G  
**Model No.** : BC-4GMCPGa  
**Brand Name** : Blu-Castle  
**Applicant** : Gemtek Technology Co., Ltd.  
**Address** : No. 15-1 Zhonghua Road, Hsinchu Industrial  
Park, Hukou, Hsinchu, Taiwan, 30352.  
**Standard** : 47 CFR FCC Part 24 Subpart E  
**Received Date** : Nov. 05, 2016  
**Tested Date** : Nov. 22 ~ Nov. 25, 2016

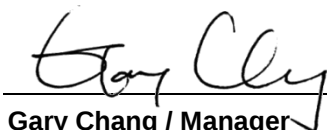
We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:



Along Chen / Assistant Manager

Approved by:



Gary Chang / Manager



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## Release Record

| Report No.  | Version | Description   | Issued Date   |
|-------------|---------|---------------|---------------|
| FG6N0501P24 | Rev. 01 | Initial issue | Dec. 15, 2016 |

## Summary of Test Results

| FCC Rules          | Test Items                              | Measured                                    | Result |
|--------------------|-----------------------------------------|---------------------------------------------|--------|
| 2.1046 / 24.232(c) | Equivalent Isotropically Radiated Power | Power[dBm] :<br>GPRS: 32.67<br>WCDMA: 28.09 | Pass   |
| 2.1053 / 24.238(a) | Radiated Emissions                      | Meet the requirement of limit               | Pass   |
| 2.1051 / 24.238(a) | Conducted Emissions                     | Meet the requirement of limit               | Pass   |
| 2.1051 / 24.238(a) | Band Edge                               | Meet the requirement of limit               | Pass   |
| 2.1049             | Occupied Bandwidth                      | Meet the requirement of limit               | Pass   |
| 24.232(d)          | Peak to average ratio                   | Meet the requirement of limit               | Pass   |
| 2.1055 / 24.235    | Frequency Stability                     | Meet the requirement of limit               | Pass   |

# 1 General Description

## 1.1 Information

### 1.1.1 Specification of the Equipment under Test (EUT)

|                      |                                                         |
|----------------------|---------------------------------------------------------|
| Operating Band       | GPRS: 1850.2 ~ 1909.8 MHz<br>WCDMA: 1852.4 ~ 1907.6 MHz |
| Modulation           | GPRS / EDGE<br>WCDMA / HSDPA / HSUPA / DC-HSDPA         |
| Multislot Class      | 33                                                      |
| 3GPP Release Version | R5 / R6 / R8                                            |

### 1.1.2 Maximum EIRP, Frequency Tolerance and Emission Designator

| System     | Modulation | Maximum EIRP(W) | Frequency Tolerance (ppm) | Emission Designator |
|------------|------------|-----------------|---------------------------|---------------------|
| GPRS 1900  | GMSK       | 1.849           | 0.030                     | 246KGXW             |
| WCDMA 1900 | QPSK       | 0.644           | 0.028                     | 4M15F9W             |

### 1.1.3 Antenna Details

| Type     | Gain (dBi) | Connector | Remark           |
|----------|------------|-----------|------------------|
| Monopole | 2.5        | No        | Internal antenna |
| Dipole   | 2.5        | R-SMA     | External antenna |

Note: External antenna is for support unit only.

### 1.1.4 EUT Operational Condition

|                      |                                                  |                                                  |                                                  |
|----------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| Supply Voltage       | 12Vdc from AC adapter                            |                                                  |                                                  |
| Operational Voltage  | <input checked="" type="checkbox"/> Vnom (120 V) | <input checked="" type="checkbox"/> Vmax (138 V) | <input checked="" type="checkbox"/> Vmin (102 V) |
| Operational Climatic | <input checked="" type="checkbox"/> Tnom (20°C)  | <input checked="" type="checkbox"/> Tmax (50°C)  | <input checked="" type="checkbox"/> Tmin (-30°C) |

### 1.1.5 Accessories

| No. | Equipment | Description                                                                                                                            |
|-----|-----------|----------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Adapter   | Brand: APD<br>Model: WA-12M12FU<br>I/P: 100-240Vac, 50-60Hz, 0.5A Max.<br>O/P: 12Vdc, 1A<br>Power line: 1.2m non-shielded without core |

### 1.1.6 Operating Channel List

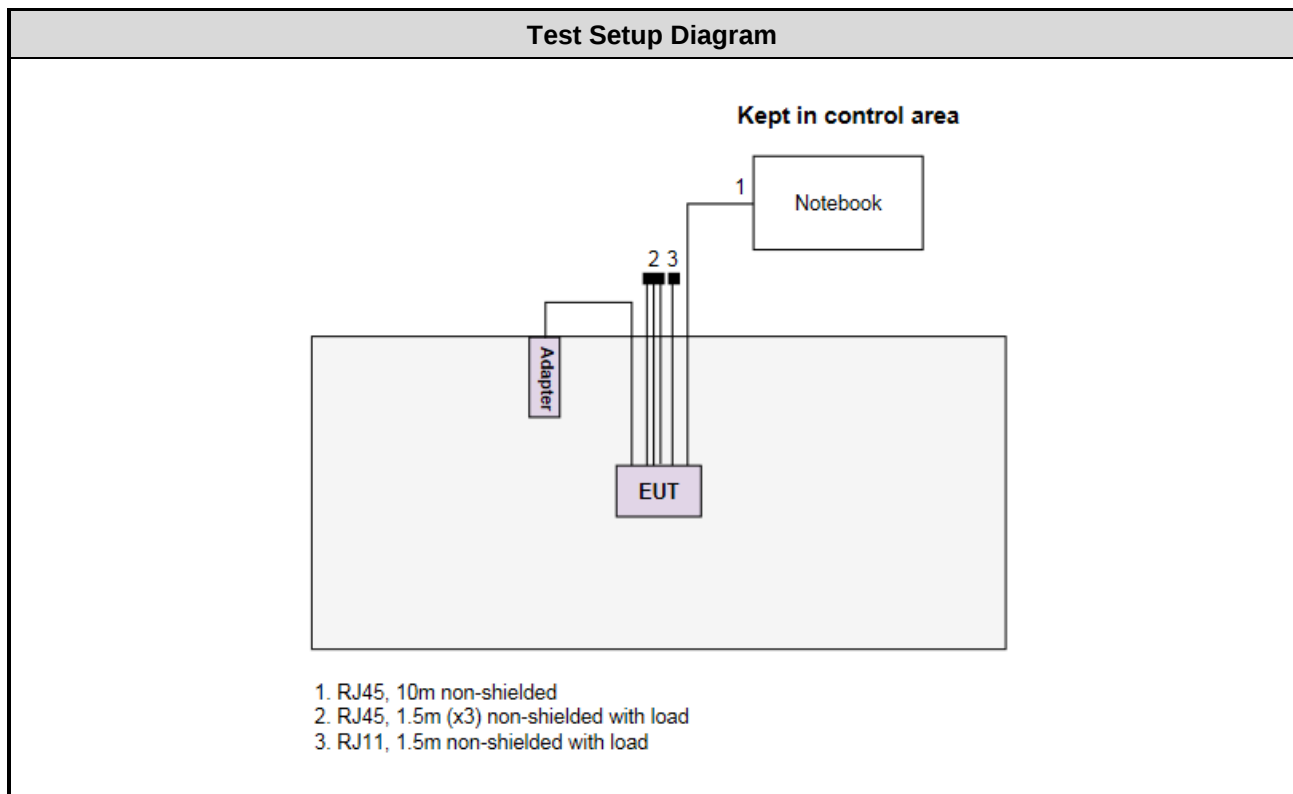
| GPRS   |         |                 |
|--------|---------|-----------------|
|        | Channel | Frequency (MHz) |
| Low    | 512     | 1850.2          |
| Middle | 661     | 1880.0          |
| High   | 810     | 1909.8          |

| WCDMA  |         |                 |
|--------|---------|-----------------|
|        | Channel | Frequency (MHz) |
| Low    | 9262    | 1852.4          |
| Middle | 9400    | 1880.0          |
| High   | 9538    | 1907.6          |

## 1.2 Local Support Equipment List

| Support Equipment List |           |       |                |         |        |                               |
|------------------------|-----------|-------|----------------|---------|--------|-------------------------------|
| No.                    | Equipment | Brand | Model          | S/N     | FCC ID | Signal cable / Length (m)     |
| 1                      | Notebook  | DELL  | Latitude E6430 | 74GB4X1 | DoC    | RJ45, 10m non-shielded.       |
| 2                      | RJ45 Load | ICC   | ---            | ---     | ---    | RJ45, 1.5m (x3) non-shielded. |
| 3                      | RJ11 Load | ICC   | ---            | ---     | ---    | RJ11, 1.5m non-shielded.      |

## 1.3 Test Setup Chart



## 1.4 The Equipment List

| Test Item                                                           | Radiated Emission          |                       |                  |                  |                   |
|---------------------------------------------------------------------|----------------------------|-----------------------|------------------|------------------|-------------------|
| Test Site                                                           | 966 chamber1 / (03CH01-WS) |                       |                  |                  |                   |
| Instrument                                                          | Manufacturer               | Model No.             | Serial No.       | Calibration Date | Calibration Until |
| Radio Communication Analyzer                                        | Anritsu                    | MT8820C               | 6201240341       | Mar. 28, 2016    | Mar. 27, 2017     |
| Receiver                                                            | R&S                        | ESR3                  | 101657           | Jan. 12, 2016    | Jan. 11, 2017     |
| Bilog Antenna                                                       | SCHWARZBECK                | VULB9168              | VULB9168-522     | Aug. 04, 2016    | Aug. 03, 2017     |
| Horn Antenna 1G-18G                                                 | SCHWARZBECK                | BBHA 9120 D           | BBHA 9120 D 1096 | Dec. 16, 2015    | Dec. 15, 2016     |
| Horn Antenna 18G-40G                                                | SCHWARZBECK                | BBHA 9170             | BBHA 9170517     | Oct. 25, 2016    | Oct. 24, 2017     |
| Loop Antenna                                                        | R&S                        | HFH2-Z2               | 100330           | Nov. 10, 2016    | Nov. 09, 2017     |
| Loop Antenna Cable                                                  | KOAX KABEL                 | 101354-BW             | 101354-BW        | Dec. 10, 2015    | Dec. 09, 2016     |
| Preamplifier                                                        | EMC                        | EMC02325              | 980225           | Aug. 05, 2016    | Aug. 04, 2017     |
| Preamplifier                                                        | Agilent                    | 83017A                | MY39501308       | Oct. 06, 2016    | Oct. 05, 2017     |
| Preamplifier                                                        | EMC                        | EMC184045B            | 980192           | Aug. 24, 2016    | Aug. 23, 2017     |
| RF Cable                                                            | HUBER+SUHNER               | SUCOFLEX104           | MY16014/4        | Dec. 10, 2015    | Dec. 09, 2016     |
| RF Cable                                                            | HUBER+SUHNER               | SUCOFLEX104           | MY16019/4        | Dec. 10, 2015    | Dec. 09, 2016     |
| RF Cable                                                            | HUBER+SUHNER               | SUCOFLEX104           | MY16139/4        | Dec. 10, 2015    | Dec. 09, 2016     |
| LF cable 1M                                                         | EMC                        | EMCCFD400-NM-N M-1000 | 16052            | Dec. 10, 2015    | Dec. 09, 2016     |
| LF cable 3M                                                         | Woken                      | CFD400NL-LW           | CFD400NL-001     | Dec. 10, 2015    | Dec. 09, 2016     |
| LF cable 10M                                                        | Woken                      | CFD400NL-LW           | CFD400NL-002     | Dec. 10, 2015    | Dec. 09, 2016     |
| Measurement Software                                                | AUDIX                      | e3                    | 6.120210g        | NA               | NA                |
| Note: Calibration Interval of instruments listed above is one year. |                            |                       |                  |                  |                   |

| Test Item                                                           | RF Conducted |                  |             |                  |                   |
|---------------------------------------------------------------------|--------------|------------------|-------------|------------------|-------------------|
| Test Site                                                           | (TH01-WS)    |                  |             |                  |                   |
| Instrument                                                          | Manufacturer | Model No.        | Serial No.  | Calibration Date | Calibration Until |
| Spectrum Analyzer                                                   | R&S          | FSV40            | 101063      | Feb. 17, 2016    | Feb. 16, 2017     |
| Spectrum Analyzer                                                   | Agilent      | N9010A           | MY53400091  | Sep. 09, 2016    | Sep. 08, 2017     |
| TEMP&HUMIDITY CHAMBER                                               | GIANT FORCE  | GCT-225-40-SP-SD | MAF1212-002 | Nov. 27, 2015    | Nov. 26, 2016     |
| Power Meter                                                         | Anritsu      | ML2495A          | 1241002     | Oct. 06, 2016    | Oct. 05, 2017     |
| Power Sensor                                                        | Anritsu      | MA2411B          | 1207366     | Oct. 06, 2016    | Oct. 05, 2017     |
| Radio Communication Analyzer                                        | Anritsu      | MT8820C          | 6201240341  | Mar. 28, 2016    | Mar. 27, 2017     |
| AC POWER SOURCE                                                     | APC          | AFC-500W         | F312060012  | Oct. 28, 2016    | Oct. 27, 2017     |
| Measurement Software                                                | Sporton      | Sporton_1        | 1.3.30      | NA               | NA                |
| Note: Calibration Interval of instruments listed above is one year. |              |                  |             |                  |                   |

## 1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards.

47 CFR FCC Part 24 Subpart E

ANSI C63.4-2014

ANSI/TIA-603-D 2010

FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

FCC KDB 412172 D01 Determining ERP and EIRP v01r01

## 1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ( $k=2$ ))

| Measurement Uncertainty        |                 |
|--------------------------------|-----------------|
| Parameters                     | Uncertainty     |
| Bandwidth                      | $\pm 34.134$ Hz |
| Conducted power                | $\pm 0.808$ dB  |
| Frequency error                | $\pm 34.134$ Hz |
| Conducted emission             | $\pm 2.670$ dB  |
| Radiated emission $\leq 1$ GHz | $\pm 3.66$ dB   |
| Radiated emission $> 1$ GHz    | $\pm 5.63$ dB   |
| Temperature                    | $\pm 0.6$ °C    |

## 2 Test Configuration

### 2.1 Testing Condition and Location Information

| Test Item          | Test Site | Ambient Condition | Tested By   |
|--------------------|-----------|-------------------|-------------|
| Radiated Emissions | 03CH01-WS | 24°C / 62%        | Vincent Yeh |
| RF Conducted       | TH01-WS   | 23°C / 64%        | Alex Huang  |

➤ FCC site registration No.: 181692

➤ IC site registration No.: 10807A-1

### 2.2 The Worst Test Modes and Channel Details

| Test item                | Mode          | Test channel                      |
|--------------------------|---------------|-----------------------------------|
| E.I.R.P                  | GPRS<br>WCDMA | 512, 661, 810<br>9262, 9400, 9538 |
| Radiated Emission ≤ 1GHz | GPRS<br>WCDMA | 512<br>9400                       |
| Radiated Emission > 1GHz | GPRS<br>WCDMA | 512, 661, 810<br>9262, 9400, 9538 |
| Conducted Emissions      | GPRS<br>WCDMA | 512, 661, 810<br>9262, 9400, 9538 |
| Band Edge                | GPRS<br>WCDMA | 512, 810<br>9262, 9538            |
| Occupied Bandwidth       | GPRS<br>WCDMA | 512, 661, 810<br>9262, 9400, 9538 |
| Peak to average ratio    | GPRS<br>WCDMA | 512, 661, 810<br>9262, 9400, 9538 |
| Frequency Stability      | GPRS<br>WCDMA | 661<br>9400                       |

**NOTE:**

1. For Radiated Emissions test, external and internal antenna was tested as below configuration.

Configuration 1: with internal antenna

Configuration 2: with external antenna

### 3 Test Results

#### 3.1 Equivalent Isotropically Radiated Power

##### 3.1.1 Limit of Equivalent Isotropically Radiated Power

Mobile and portable stations are limited to 2 watts EIRP.

##### 3.1.2 Test Procedures

###### For Conducted Power Measurement

1. The EUT links up with simulator and is set to maximum output power level at low / middel / high channel.
2. Measure the output power of low / middle / high channel of the EUT

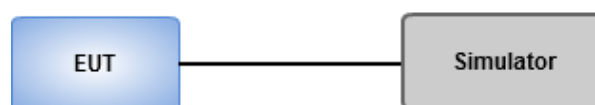
###### For EIRP Measurement

EIPR can be calculated by below formula from KDB 412172 D01.

1.  $EIRP = P_T + G_T - L_C$   
 $P_T$  = transmitter output power, in dBm.  
 $G_T$  = gain of the transmitting antenna, in dBi (EIRP).  
 $L_C$  = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

##### 3.1.3 Test Setup

###### Conducted Power Measurement



### 3.1.4 Test Result of Conducted power (dBm)

| Band                    | GPRS 1900 |        |        |
|-------------------------|-----------|--------|--------|
| Channel                 | 512       | 661    | 810    |
| Frequency (MHz)         | 1850.2    | 1880.0 | 1909.8 |
| GPRS 8 (GMSK, 1 slot)   | 30.17     | 30.15  | 30.13  |
| GPRS 10 (GMSK, 2 slots) | 30.13     | 30.12  | 30.09  |
| GPRS 11 (GMSK, 3 slots) | 30.00     | 30.06  | 30.04  |
| GPRS 12 (GMSK, 4 slots) | 29.87     | 29.93  | 29.93  |
| EDGE 8 (8PSK, 1 slot)   | 28.18     | 28.24  | 28.15  |
| EDGE 10 (8PSK, 2 slots) | 28.10     | 28.21  | 28.04  |
| EDGE 11 (8PSK, 3 slots) | 28.08     | 28.11  | 28.01  |
| EDGE 12 (8PSK, 4 slots) | 28.04     | 28.07  | 27.96  |
| GPRS 30 (GMSK, 1 slot)  | 30.14     | 30.15  | 30.10  |
| GPRS 31 (GMSK, 2 slots) | 30.06     | 30.11  | 30.06  |
| GPRS 32 (GMSK, 3 slots) | 30.00     | 30.02  | 30.01  |
| GPRS 33 (GMSK, 4 slots) | 29.90     | 29.95  | 29.95  |
| EDGE 30 (8PSK, 1 slot)  | 28.18     | 28.22  | 28.04  |
| EDGE 31 (8PSK, 2 slots) | 28.13     | 28.17  | 28.00  |
| EDGE 32 (8PSK, 3 slots) | 28.10     | 28.12  | 27.96  |
| EDGE 33 (8PSK, 4 slots) | 28.04     | 28.04  | 27.94  |

| Band               | WCDMA II |        |        |
|--------------------|----------|--------|--------|
| Channel            | 9262     | 9400   | 9538   |
| Frequency (MHz)    | 1852.4   | 1880.0 | 1907.6 |
| RMC 12.2kbps       | 25.38    | 25.59  | 25.41  |
| HSDPA Subtest-1    | 24.49    | 24.81  | 25.05  |
| HSDPA Subtest-2    | 24.38    | 24.77  | 25.00  |
| HSDPA Subtest-3    | 23.99    | 24.17  | 24.36  |
| HSDPA Subtest-4    | 23.92    | 24.19  | 24.41  |
| DC-HSDPA Subtest-1 | 24.29    | 24.67  | 24.89  |
| DC-HSDPA Subtest-2 | 24.22    | 24.61  | 24.87  |
| DC-HSDPA Subtest-3 | 23.82    | 24.02  | 24.19  |
| DC-HSDPA Subtest-4 | 23.81    | 24.03  | 24.25  |
| HSUPA Subtest-1    | 24.45    | 24.44  | 24.50  |
| HSUPA Subtest-2    | 23.44    | 23.44  | 23.49  |
| HSUPA Subtest-3    | 23.55    | 23.44  | 23.55  |
| HSUPA Subtest-4    | 23.43    | 23.64  | 23.62  |
| HSUPA Subtest-5    | 24.52    | 24.76  | 24.82  |

### 3.1.5 Test Result of Equivalent Isotropically Radiated Power (dBm)

| Mode    | GPRS            |                                  |                        |            |          |           |
|---------|-----------------|----------------------------------|------------------------|------------|----------|-----------|
| Channel | Frequency (MHz) | Max Conducted Output Power (dBm) | Max Antenna Gain (dBi) | EIRP (dBm) | EIRP (W) | Limit (W) |
| 512     | 1850.2          | 30.17                            | 2.5                    | 32.67      | 1.849    | 2         |
| 661     | 1880.0          | 30.15                            | 2.5                    | 32.65      | 1.841    | 2         |
| 810     | 1909.8          | 30.13                            | 2.5                    | 32.63      | 1.832    | 2         |

| Mode    | WCDMA           |                                  |                        |            |         |           |
|---------|-----------------|----------------------------------|------------------------|------------|---------|-----------|
| Channel | Frequency (MHz) | Max Conducted Output Power (dBm) | Max Antenna Gain (dBi) | EIRP (dBm) | ERP (W) | Limit (W) |
| 9262    | 1852.4          | 25.38                            | 2.5                    | 27.88      | 0.614   | 2         |
| 9400    | 1880.0          | 25.59                            | 2.5                    | 28.09      | 0.644   | 2         |
| 9538    | 1907.6          | 25.41                            | 2.5                    | 27.91      | 0.618   | 2         |

NOTE: EIRP = Conducted Output Power + Antenna Gain.

## **3.2 Radiated Emissions**

### **3.2.1 Limit of Radiated Emissions**

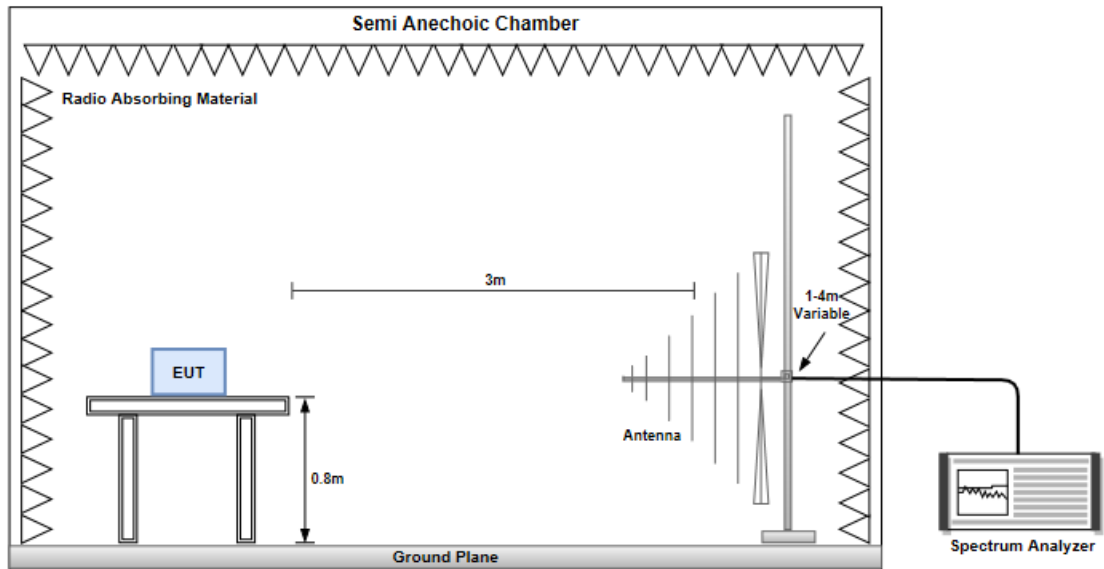
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB equal to -13dBm.

### **3.2.2 Test Procedures**

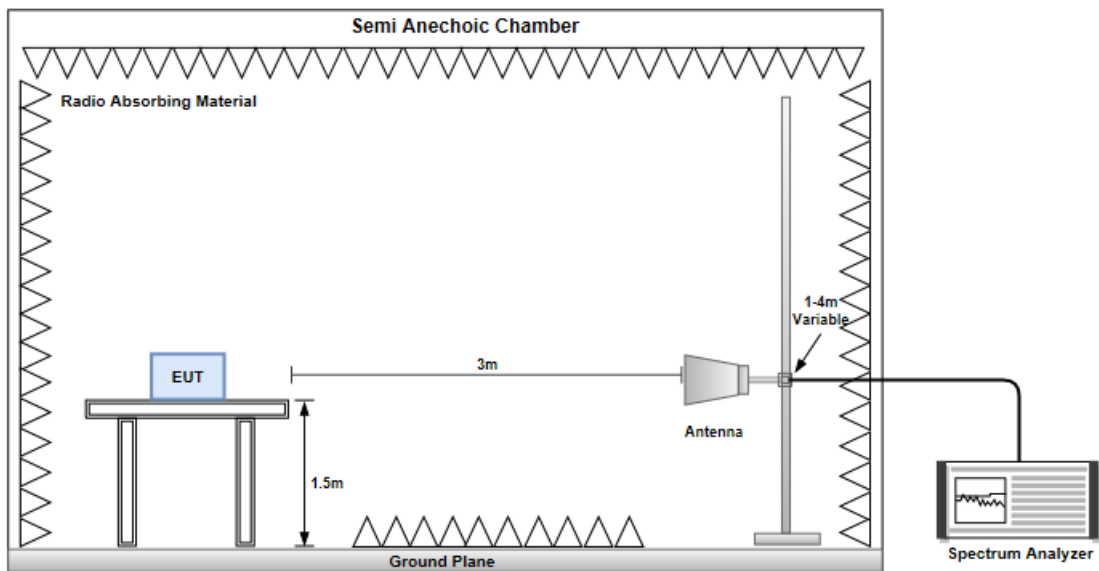
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.
4. After finding the max radiated emission, substitution method will be used for getting effective radiated power. EUT will be removed and substitution antenna will be placed at same position. Signal generator will output CW signal to substitution antenna through a RF cable. Rotate turntable and move antenna to find maximum radiated emission. Adjust output power of signal generator to let the maximum radiated emission is same as step 3. Record the output power level.
5. E.I.R.P = output power of step 4 + gain of substitution antenna – cable loss of RF cable.

### 3.2.3 Test Setup

#### Radiated Emissions below 1 GHz



#### Radiated Emissions above 1 GHz



### Configuration 1: with internal antenna

#### 3.2.4 Test Result of Radiated Emissions below 1GHz

| Mode            | GPRS, Channel: 512 |               |             |             |                   |                       |                        |
|-----------------|--------------------|---------------|-------------|-------------|-------------------|-----------------------|------------------------|
| Frequency (MHz) | Antenna Polarity   | E.I.R.P (dBm) | Limit (dBm) | Margin (dB) | S.A Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) |
| 39.70           | H                  | -61.22        | -13.00      | -48.22      | -68.98            | -48.89                | -12.33                 |
| 81.41           | H                  | -63.05        | -13.00      | -50.05      | -60.80            | -61.13                | -1.92                  |
| 125.06          | H                  | -59.76        | -13.00      | -46.76      | -58.67            | -58.80                | -0.96                  |
| 165.80          | H                  | -62.51        | -13.00      | -49.51      | -61.95            | -62.99                | 0.48                   |
| 571.26          | H                  | -63.40        | -13.00      | -50.40      | -68.77            | -67.19                | 3.79                   |
| 720.64          | H                  | -47.71        | -13.00      | -34.71      | -55.54            | -51.31                | 3.60                   |
| 39.70           | V                  | -51.67        | -13.00      | -38.67      | -49.46            | -39.34                | -12.33                 |
| 89.17           | V                  | -55.02        | -13.00      | -42.02      | -55.12            | -54.49                | -0.53                  |
| 125.06          | V                  | -55.52        | -13.00      | -42.52      | -56.09            | -54.56                | -0.96                  |
| 250.19          | V                  | -57.91        | -13.00      | -44.91      | -60.42            | -62.37                | 4.46                   |
| 574.17          | V                  | -56.47        | -13.00      | -43.47      | -64.91            | -60.23                | 3.76                   |
| 721.61          | V                  | -42.85        | -13.00      | -29.85      | -52.22            | -46.44                | 3.59                   |

Note: EIRP = S.G Power value + Correction factor

| Mode            | WCDMA, Channel: 9400 |               |             |             |                   |                       |                        |
|-----------------|----------------------|---------------|-------------|-------------|-------------------|-----------------------|------------------------|
| Frequency (MHz) | Antenna Polarity     | E.I.R.P (dBm) | Limit (dBm) | Margin (dB) | S.A Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) |
| 39.70           | H                    | -58.61        | -13.00      | -45.61      | -66.37            | -46.28                | -12.33                 |
| 77.53           | H                    | -61.87        | -13.00      | -48.87      | -59.95            | -58.78                | -3.09                  |
| 125.06          | H                    | -59.88        | -13.00      | -46.88      | -58.79            | -58.92                | -0.96                  |
| 162.89          | H                    | -64.12        | -13.00      | -51.12      | -63.66            | -64.23                | 0.11                   |
| 250.19          | H                    | -64.75        | -13.00      | -51.75      | -62.25            | -69.21                | 4.46                   |
| 721.61          | H                    | -46.00        | -13.00      | -33.00      | -53.87            | -49.59                | 3.59                   |
| 39.70           | V                    | -52.39        | -13.00      | -39.39      | -50.18            | -40.06                | -12.33                 |
| 87.23           | V                    | -56.08        | -13.00      | -43.08      | -55.83            | -56.00                | -0.08                  |
| 125.06          | V                    | -55.72        | -13.00      | -42.72      | -56.29            | -54.76                | -0.96                  |
| 250.19          | V                    | -57.46        | -13.00      | -44.46      | -59.97            | -61.92                | 4.46                   |
| 425.76          | V                    | -61.80        | -13.00      | -48.80      | -65.22            | -65.95                | 4.15                   |
| 715.79          | V                    | -41.52        | -13.00      | -28.52      | -50.79            | -45.14                | 3.62                   |

Note: EIRP = S.G Power value + Correction factor

## Configuration 2: with external antenna

### 3.2.5 Test Result of Radiated Emissions below 1GHz

| Mode            | GPRS, Channel: 512 |               |             |             |                   |                       |                        |
|-----------------|--------------------|---------------|-------------|-------------|-------------------|-----------------------|------------------------|
| Frequency (MHz) | Antenna Polarity   | E.I.R.P (dBm) | Limit (dBm) | Margin (dB) | S.A Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) |
| 38.73           | H                  | -60.09        | -13.00      | -47.09      | 7.77              | -47.62                | -12.47                 |
| 77.53           | H                  | -60.14        | -13.00      | -47.14      | -1.92             | -57.05                | -3.09                  |
| 125.06          | H                  | -60.93        | -13.00      | -47.93      | -1.09             | -59.97                | -0.96                  |
| 158.04          | H                  | -63.19        | -13.00      | -50.19      | -0.32             | -62.82                | -0.37                  |
| 571.26          | H                  | -63.13        | -13.00      | -50.13      | 5.37              | -66.92                | 3.79                   |
| 721.61          | H                  | -43.09        | -13.00      | -30.09      | 7.87              | -46.68                | 3.59                   |
| 39.70           | V                  | -53.77        | -13.00      | -40.77      | -51.56            | -41.44                | -12.33                 |
| 86.26           | V                  | -55.79        | -13.00      | -42.79      | -55.36            | -55.41                | -0.38                  |
| 125.06          | V                  | -55.34        | -13.00      | -42.34      | -55.91            | -54.38                | -0.96                  |
| 250.19          | V                  | -57.22        | -13.00      | -44.22      | -59.73            | -61.68                | 4.46                   |
| 573.20          | V                  | -57.03        | -13.00      | -44.03      | -65.43            | -60.80                | 3.77                   |
| 722.58          | V                  | -44.60        | -13.00      | -31.60      | -53.98            | -48.19                | 3.59                   |

Note: EIRP = S.G Power value + Correction factor

| Mode            | WCDMA, Channel: 9400 |               |             |             |                   |                       |                        |
|-----------------|----------------------|---------------|-------------|-------------|-------------------|-----------------------|------------------------|
| Frequency (MHz) | Antenna Polarity     | E.I.R.P (dBm) | Limit (dBm) | Margin (dB) | S.A Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) |
| 38.73           | H                    | -60.13        | -13.00      | -47.13      | -67.90            | -47.66                | -12.47                 |
| 76.56           | H                    | -62.11        | -13.00      | -49.11      | -60.30            | -58.74                | -3.37                  |
| 125.06          | H                    | -59.76        | -13.00      | -46.76      | -58.67            | -58.80                | -0.96                  |
| 166.77          | H                    | -62.94        | -13.00      | -49.94      | -62.34            | -63.55                | 0.61                   |
| 250.19          | H                    | -62.80        | -13.00      | -49.80      | -60.30            | -67.26                | 4.46                   |
| 722.58          | H                    | -49.21        | -13.00      | -36.21      | -57.12            | -52.80                | 3.59                   |
| 39.70           | V                    | -53.06        | -13.00      | -40.06      | -50.85            | -40.73                | -12.33                 |
| 93.05           | V                    | -55.81        | -13.00      | -42.81      | -56.08            | -56.45                | 0.64                   |
| 125.19          | V                    | -54.58        | -13.00      | -41.58      | -55.15            | -53.62                | -0.96                  |
| 250.19          | V                    | -55.59        | -13.00      | -42.59      | -58.10            | -60.05                | 4.46                   |
| 564.47          | V                    | -60.48        | -13.00      | -47.48      | -68.53            | -64.33                | 3.85                   |
| 721.61          | V                    | -46.66        | -13.00      | -33.66      | -56.03            | -50.25                | 3.59                   |

Note: EIRP = S.G Power value + Correction factor

### Configuration 1: with internal antenna

#### 3.2.6 Test Result of Radiated Emissions above 1GHz

| Mode            | GPRS, Channel: 512 |             |             |             |                   |                       |                        |
|-----------------|--------------------|-------------|-------------|-------------|-------------------|-----------------------|------------------------|
| Frequency (MHz) | Antenna Polarity   | E.R.P (dBm) | Limit (dBm) | Margin (dB) | S.A Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) |
| 3700.40         | H                  | -41.53      | -13.00      | -28.53      | -55.17            | -48.25                | 6.72                   |
| 5550.60         | H                  | -43.36      | -13.00      | -30.36      | -60.65            | -49.59                | 6.23                   |
| 7400.80         | H                  | -39.69      | -13.00      | -26.69      | -60.80            | -42.60                | 2.91                   |
| 3700.00         | V                  | -43.38      | -13.00      | -30.38      | -57.31            | -50.10                | 6.72                   |
| 5550.60         | V                  | -44.19      | -13.00      | -31.19      | -61.84            | -50.42                | 6.23                   |
| 7400.80         | V                  | -39.35      | -13.00      | -26.35      | -61.60            | -42.26                | 2.91                   |

| Mode            | GPRS, Channel: 661 |             |             |             |                   |                       |                        |
|-----------------|--------------------|-------------|-------------|-------------|-------------------|-----------------------|------------------------|
| Frequency (MHz) | Antenna Polarity   | E.R.P (dBm) | Limit (dBm) | Margin (dB) | S.A Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) |
| 3760.00         | H                  | -42.43      | -13.00      | -29.43      | -56.14            | -49.13                | 6.70                   |
| 5640.00         | H                  | -43.85      | -13.00      | -30.85      | -61.31            | -50.05                | 6.20                   |
| 7520.00         | H                  | -41.23      | -13.00      | -28.23      | -62.01            | -44.21                | 2.98                   |
| 3760.00         | V                  | -46.06      | -13.00      | -33.06      | -60.09            | -52.76                | 6.70                   |
| 5640.00         | V                  | -43.48      | -13.00      | -30.48      | -61.33            | -49.68                | 6.20                   |
| 7520.00         | V                  | -39.66      | -13.00      | -26.66      | -61.51            | -42.64                | 2.98                   |

| Mode            | GPRS, Channel: 810 |             |             |             |                   |                       |                        |
|-----------------|--------------------|-------------|-------------|-------------|-------------------|-----------------------|------------------------|
| Frequency (MHz) | Antenna Polarity   | E.R.P (dBm) | Limit (dBm) | Margin (dB) | S.A Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) |
| 3819.60         | H                  | -39.67      | -13.00      | -26.67      | -53.49            | -46.36                | 6.69                   |
| 5729.40         | H                  | -40.64      | -13.00      | -27.64      | -58.27            | -46.77                | 6.13                   |
| 7639.20         | H                  | -42.41      | -13.00      | -29.41      | -63.14            | -45.45                | 3.04                   |
| 3819.60         | V                  | -43.35      | -13.00      | -30.35      | -57.50            | -50.04                | 6.69                   |
| 5729.40         | V                  | -42.18      | -13.00      | -29.18      | -60.32            | -48.31                | 6.13                   |
| 7639.20         | V                  | -40.33      | -13.00      | -27.33      | -62.05            | -43.37                | 3.04                   |

Note: EIRP = S.G Power value + Correction factor

| Mode            | WCDMA, Channel: 9262 |             |             |             |                   |                       |                        |
|-----------------|----------------------|-------------|-------------|-------------|-------------------|-----------------------|------------------------|
| Frequency (MHz) | Antenna Polarity     | E.R.P (dBm) | Limit (dBm) | Margin (dB) | S.A Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) |
| 3704.80         | H                    | -38.56      | -13.00      | -25.56      | -52.21            | -45.28                | 6.72                   |
| 5557.20         | H                    | -40.47      | -13.00      | -27.47      | -57.78            | -46.70                | 6.23                   |
| 7409.60         | H                    | -37.47      | -13.00      | -24.47      | -58.55            | -40.39                | 2.92                   |
| 3704.80         | V                    | -41.69      | -13.00      | -28.69      | -55.64            | -48.41                | 6.72                   |
| 5557.20         | V                    | -40.33      | -13.00      | -27.33      | -57.99            | -46.56                | 6.23                   |
| 7409.60         | V                    | -36.36      | -13.00      | -23.36      | -58.58            | -39.28                | 2.92                   |

| Mode            | WCDMA, Channel: 9400 |             |             |             |                   |                       |                        |
|-----------------|----------------------|-------------|-------------|-------------|-------------------|-----------------------|------------------------|
| Frequency (MHz) | Antenna Polarity     | E.R.P (dBm) | Limit (dBm) | Margin (dB) | S.A Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) |
| 3760.00         | H                    | -38.33      | -13.00      | -25.33      | -52.04            | -45.03                | 6.70                   |
| 5640.00         | H                    | -41.25      | -13.00      | -28.25      | -58.71            | -47.45                | 6.20                   |
| 7520.00         | H                    | -38.86      | -13.00      | -25.86      | -59.64            | -41.84                | 2.98                   |
| 3760.00         | V                    | -42.63      | -13.00      | -29.63      | -56.66            | -49.33                | 6.70                   |
| 5640.00         | V                    | -41.42      | -13.00      | -28.42      | -59.27            | -47.62                | 6.20                   |
| 7520.00         | V                    | -37.15      | -13.00      | -24.15      | -59.00            | -40.13                | 2.98                   |

| Mode            | WCDMA, Channel: 9538 |             |             |             |                   |                       |                        |
|-----------------|----------------------|-------------|-------------|-------------|-------------------|-----------------------|------------------------|
| Frequency (MHz) | Antenna Polarity     | E.R.P (dBm) | Limit (dBm) | Margin (dB) | S.A Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) |
| 3815.20         | H                    | -36.64      | -13.00      | -23.64      | -50.45            | -43.33                | 6.69                   |
| 5722.80         | H                    | -37.68      | -13.00      | -24.68      | -55.30            | -43.82                | 6.14                   |
| 7630.40         | H                    | -39.40      | -13.00      | -26.40      | -60.11            | -42.44                | 3.04                   |
| 3815.20         | V                    | -40.64      | -13.00      | -27.64      | -54.78            | -47.33                | 6.69                   |
| 5722.80         | V                    | -40.21      | -13.00      | -27.21      | -58.33            | -46.35                | 6.14                   |
| 7630.40         | V                    | -38.79      | -13.00      | -25.79      | -60.50            | -41.83                | 3.04                   |

Note: EIRP = S.G Power value + Correction factor

## Configuration 2: with external antenna

### 3.2.7 Test Result of Radiated Emissions above 1GHz

| Mode            | GPRS, Channel: 512 |             |             |             |                   |                       |                        |
|-----------------|--------------------|-------------|-------------|-------------|-------------------|-----------------------|------------------------|
| Frequency (MHz) | Antenna Polarity   | E.R.P (dBm) | Limit (dBm) | Margin (dB) | S.A Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) |
| 3700.40         | H                  | -43.23      | -13.00      | -30.23      | -56.87            | -49.95                | 6.72                   |
| 5550.60         | H                  | -45.82      | -13.00      | -32.82      | -63.11            | -52.05                | 6.23                   |
| 7400.80         | H                  | -42.75      | -13.00      | -29.75      | -63.86            | -45.66                | 2.91                   |
| 3700.40         | V                  | -46.99      | -13.00      | -33.99      | -60.92            | -53.71                | 6.72                   |
| 5550.60         | V                  | -45.28      | -13.00      | -32.28      | -62.93            | -51.51                | 6.23                   |
| 7400.80         | V                  | -41.74      | -13.00      | -28.74      | -63.99            | -44.65                | 2.91                   |

| Mode            | GPRS, Channel: 661 |             |             |             |                   |                       |                        |
|-----------------|--------------------|-------------|-------------|-------------|-------------------|-----------------------|------------------------|
| Frequency (MHz) | Antenna Polarity   | E.R.P (dBm) | Limit (dBm) | Margin (dB) | S.A Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) |
| 3760.00         | H                  | -44.99      | -13.00      | -31.99      | -58.70            | -51.69                | 6.70                   |
| 5640.00         | H                  | -45.13      | -13.00      | -32.13      | -62.59            | -51.33                | 6.20                   |
| 7520.00         | H                  | -43.59      | -13.00      | -30.59      | -64.37            | -46.57                | 2.98                   |
| 3760.00         | V                  | -47.37      | -13.00      | -34.37      | -61.40            | -54.07                | 6.70                   |
| 5640.00         | V                  | -45.16      | -13.00      | -32.16      | -63.01            | -51.36                | 6.20                   |
| 7520.00         | V                  | -42.17      | -13.00      | -29.17      | -64.02            | -45.15                | 2.98                   |

| Mode            | GPRS, Channel: 810 |             |             |             |                   |                       |                        |
|-----------------|--------------------|-------------|-------------|-------------|-------------------|-----------------------|------------------------|
| Frequency (MHz) | Antenna Polarity   | E.R.P (dBm) | Limit (dBm) | Margin (dB) | S.A Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) |
| 3819.60         | H                  | -41.28      | -13.00      | -28.28      | -55.10            | -47.97                | 6.69                   |
| 5729.40         | H                  | -42.28      | -13.00      | -29.28      | -59.91            | -48.41                | 6.13                   |
| 7639.20         | H                  | -43.43      | -13.00      | -30.43      | -64.16            | -46.47                | 3.04                   |
| 3819.60         | V                  | -45.64      | -13.00      | -32.64      | -59.79            | -52.33                | 6.69                   |
| 5729.40         | V                  | -44.56      | -13.00      | -31.56      | -62.70            | -50.69                | 6.13                   |
| 7639.20         | V                  | -43.85      | -13.00      | -30.85      | -65.57            | -46.89                | 3.04                   |

Note: EIRP = S.G Power value + Correction factor

| Mode            | WCDMA, Channel: 9262 |             |             |             |                   |                       |                        |
|-----------------|----------------------|-------------|-------------|-------------|-------------------|-----------------------|------------------------|
| Frequency (MHz) | Antenna Polarity     | E.R.P (dBm) | Limit (dBm) | Margin (dB) | S.A Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) |
| 3704.80         | H                    | -40.36      | -13.00      | -27.36      | -54.01            | -47.08                | 6.72                   |
| 5557.20         | H                    | -42.80      | -13.00      | -29.80      | -60.11            | -49.03                | 6.23                   |
| 7409.60         | H                    | -38.86      | -13.00      | -25.86      | -59.94            | -41.78                | 2.92                   |
| 3704.80         | V                    | -43.52      | -13.00      | -30.52      | -57.47            | -50.24                | 6.72                   |
| 5557.20         | V                    | -42.49      | -13.00      | -29.49      | -60.15            | -48.72                | 6.23                   |
| 7409.60         | V                    | -37.88      | -13.00      | -24.88      | -60.10            | -40.80                | 2.92                   |

| Mode            | WCDMA, Channel: 9400 |             |             |             |                   |                       |                        |
|-----------------|----------------------|-------------|-------------|-------------|-------------------|-----------------------|------------------------|
| Frequency (MHz) | Antenna Polarity     | E.R.P (dBm) | Limit (dBm) | Margin (dB) | S.A Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) |
| 3760.00         | H                    | -40.63      | -13.00      | -27.63      | -54.34            | -47.33                | 6.70                   |
| 5640.00         | H                    | -42.76      | -13.00      | -29.76      | -60.22            | -48.96                | 6.20                   |
| 7520.00         | H                    | -40.25      | -13.00      | -27.25      | -61.03            | -43.23                | 2.98                   |
| 3760.00         | V                    | -44.89      | -13.00      | -31.89      | -58.92            | -51.59                | 6.70                   |
| 5640.00         | V                    | -42.48      | -13.00      | -29.48      | -60.33            | -48.68                | 6.20                   |
| 7520.00         | V                    | -38.77      | -13.00      | -25.77      | -60.62            | -41.75                | 2.98                   |

| Mode            | WCDMA, Channel: 9538 |             |             |             |                   |                       |                        |
|-----------------|----------------------|-------------|-------------|-------------|-------------------|-----------------------|------------------------|
| Frequency (MHz) | Antenna Polarity     | E.R.P (dBm) | Limit (dBm) | Margin (dB) | S.A Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) |
| 3815.20         | H                    | -38.54      | -13.00      | -25.54      | -52.35            | -45.23                | 6.69                   |
| 5722.80         | H                    | -39.44      | -13.00      | -26.44      | -57.06            | -45.58                | 6.14                   |
| 7630.40         | H                    | -40.66      | -13.00      | -27.66      | -61.37            | -43.70                | 3.04                   |
| 3815.20         | V                    | -42.33      | -13.00      | -29.33      | -56.37            | -49.02                | 6.69                   |
| 5722.80         | V                    | -41.72      | -13.00      | -28.72      | -59.84            | -47.86                | 6.14                   |
| 7630.40         | V                    | -40.12      | -13.00      | -27.12      | -61.83            | -43.16                | 3.04                   |

Note: EIRP = S.G Power value + Correction factor

### 3.3 Conducted Emissions

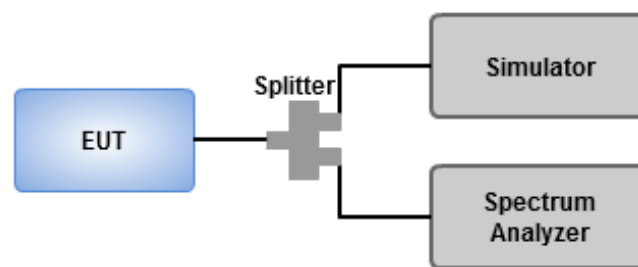
#### 3.3.1 Limit of Conducted Emissions

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB equal to -13dBm.

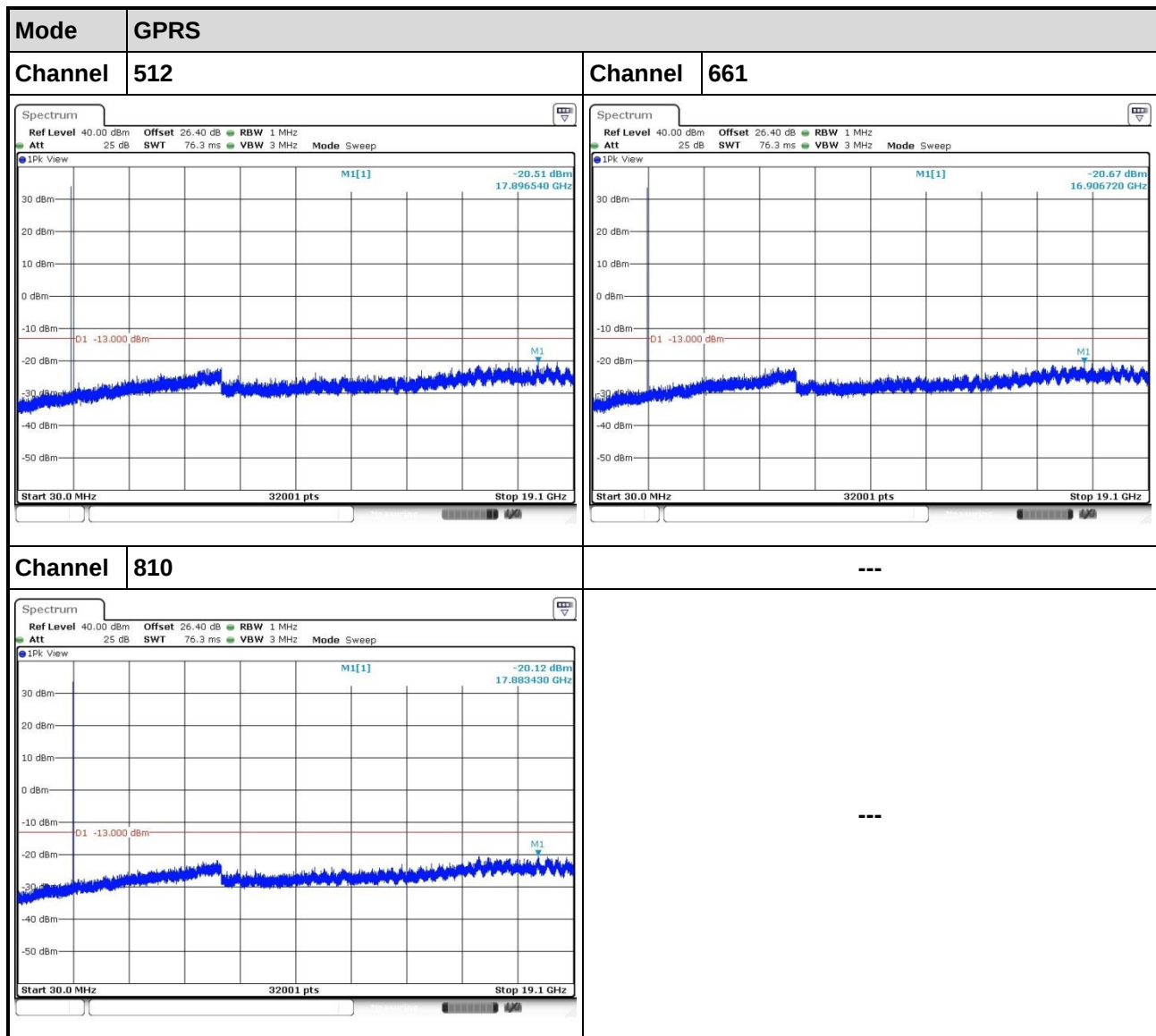
#### 3.3.2 Test Procedures

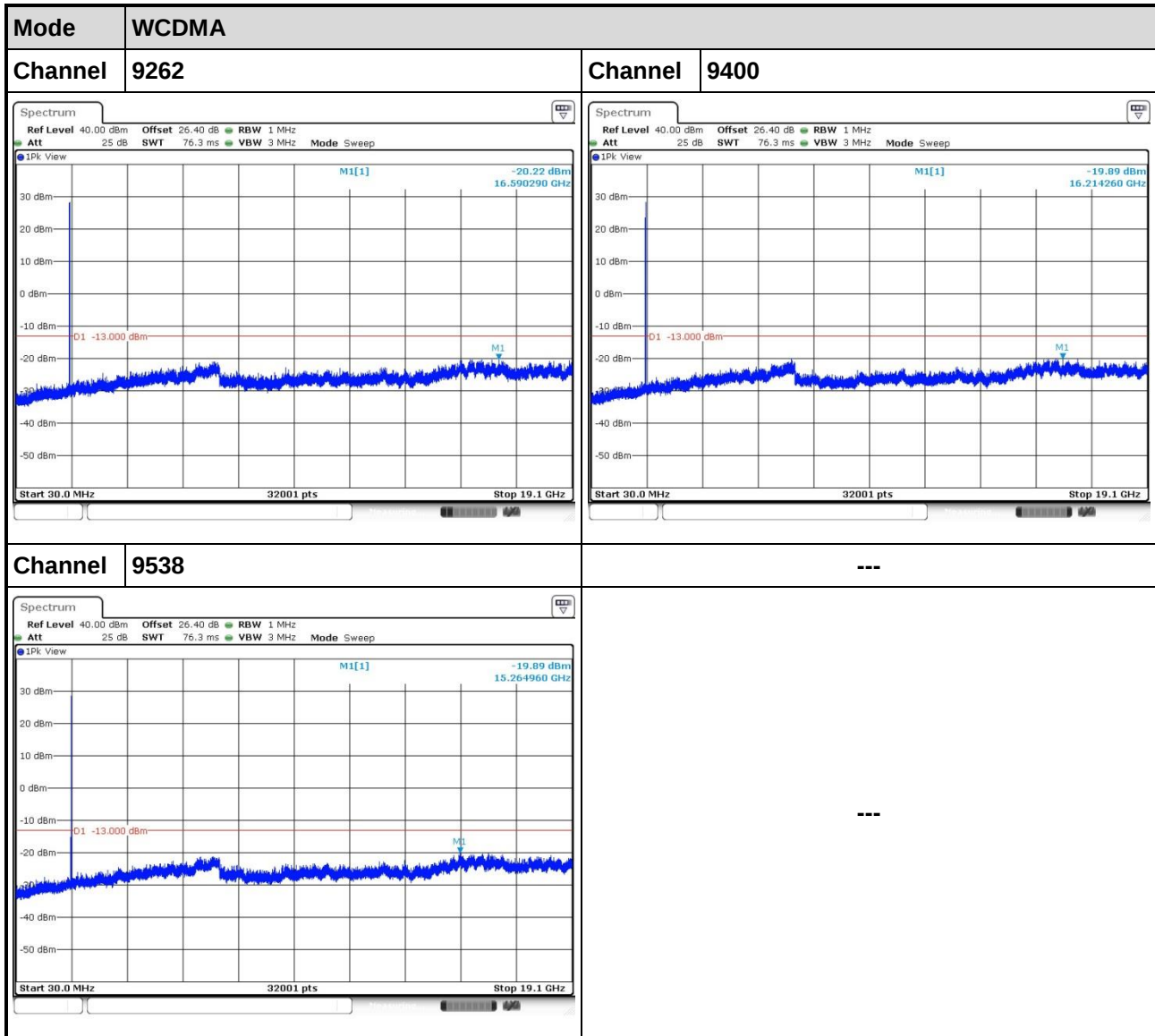
1. Lowest, middle and highest operating channels are tested for this item.
2. Scan frequency range is from 30MHz~19.1GHz.
3. Set RBW = 1MHz, VBW = 3MHz, detector = Peak, sweep time = auto.
4. Record the max trace value and capture the test plot of each sub frequency band.

#### 3.3.3 Test Setup



### 3.3.4 Test Result of Conducted Emissions





### 3.4 Band Edge

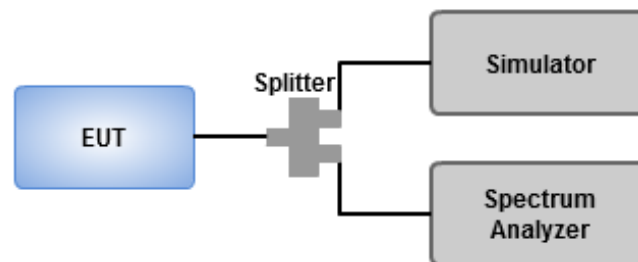
#### 3.4.1 Limit of Band Edge

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB equal to -13dBm.

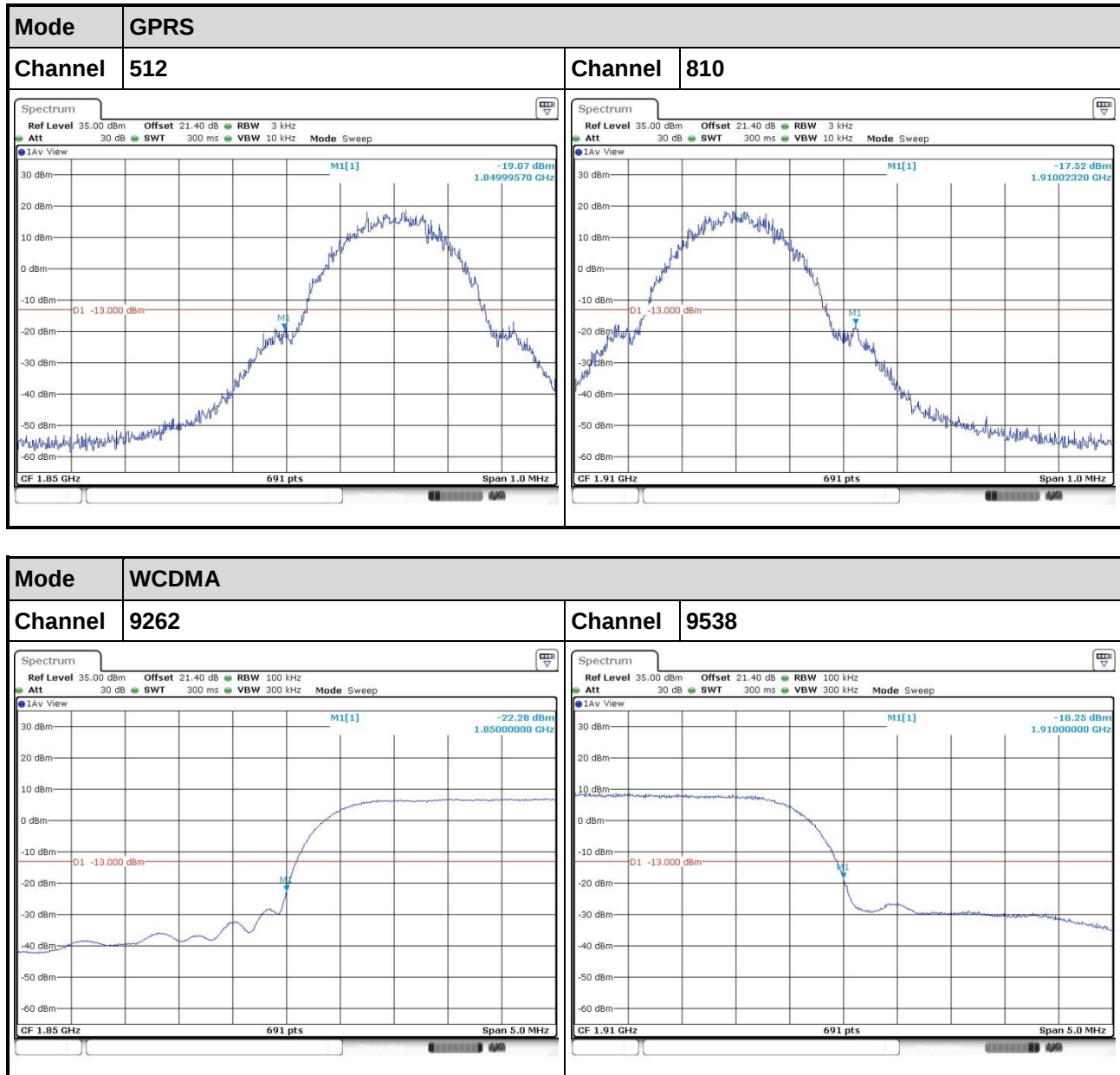
#### 3.4.2 Test Procedures

1. Lowest and highest operating channels are tested for this item.
2. The center frequency of spectrum analyzer will be set to 1850 and 1910 MHz.
3. Set RBW = 3kHz, VBW = 10kHz, span = 1 MHz, detector = RMS, sweep time = auto for GPRS.  
Set RBW = 100kHz, VBW = 300kHz, span = 5 MHz, detector = RMS, sweep time = auto for WCDMA.
4. Record the max trace value and capture the test plot.

#### 3.4.3 Test Setup



### 3.4.4 Test Result of Band Edge

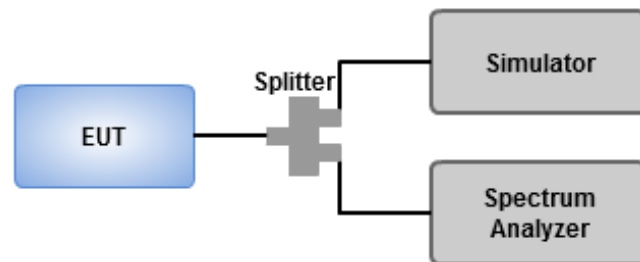


## 3.5 Occupied Bandwidth

### 3.5.1 Test Procedures

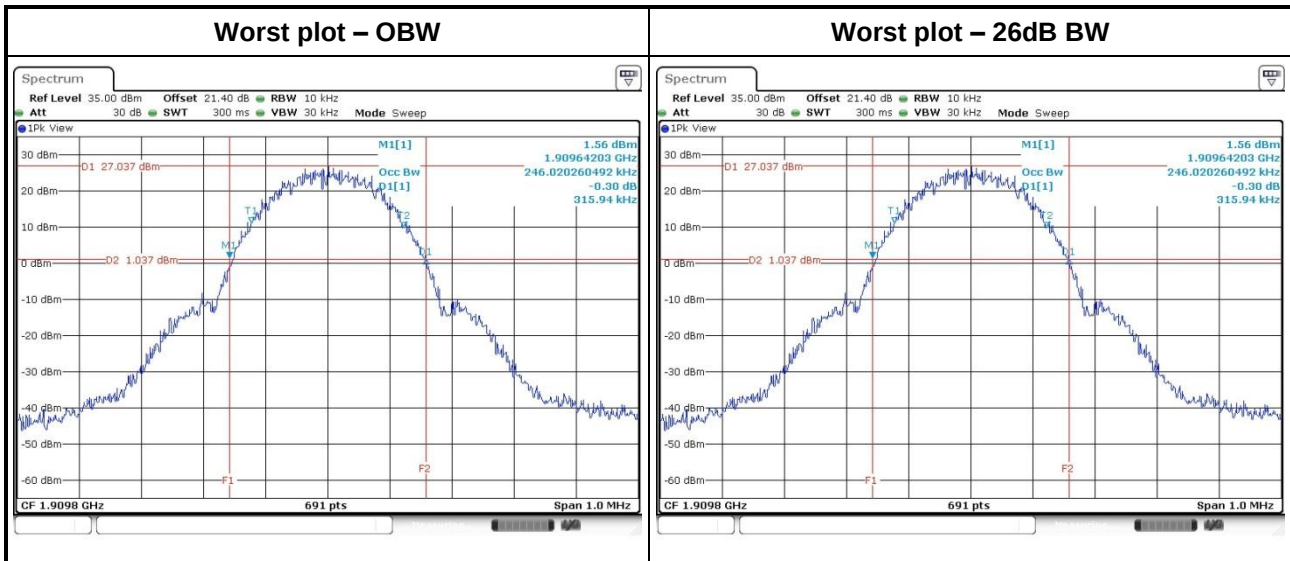
1. Set RBW = 10kHz, VBW = 30kHz for GPRS mode.  
Set RBW = 100kHz, VBW = 300kHz for WCDMA mode.
2. Detector = Sample, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Using occupied bandwidth measurement function of spectrum analyzer to measure occupied bandwidth.

### 3.5.2 Test Setup

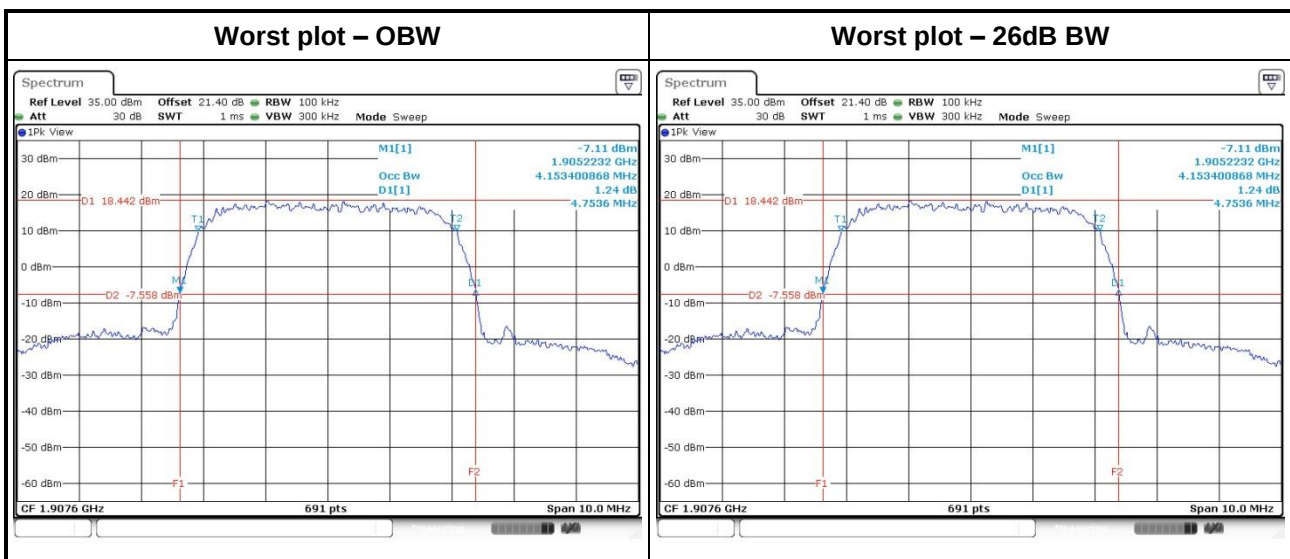


### 3.5.3 Test Result of Occupied Bandwidth

| MODE | Channel | Frequency (MHz) | 26dB BW (kHz) | 99% OBW (kHz) |
|------|---------|-----------------|---------------|---------------|
| GPRS | 512     | 1850.2          | 314.49        | 246.02        |
| GPRS | 661     | 1880.0          | 308.70        | 244.57        |
| GPRS | 810     | 1909.8          | 315.94        | 246.02        |



| MODE  | Channel | Frequency (MHz) | OBW (MHz) | 26dB BW (MHz) |
|-------|---------|-----------------|-----------|---------------|
| WCDMA | 9262    | 1852.4          | 4.12      | 4.7391        |
| WCDMA | 9400    | 1880.0          | 4.15      | 4.7391        |
| WCDMA | 9538    | 1907.6          | 4.15      | 4.7536        |



## 3.6 Peak to Average Ratio

### 3.6.1 Limit of Peak to Average Ratio

Peak-to-average ratio (PAR) of the transmission may not exceed 13 dB

### 3.6.2 Test Procedures

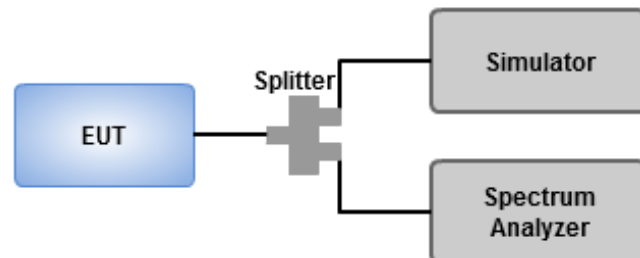
#### For GPRS mode

1. Set RBW=1MHz, RBW=3MHz, Peak detector in Trace 1.
2. Set RBW=1MHz, RBW=3MHz, RMS detector in Trace 2.
3. Trigger function is enabled for measuring signal at burst on time. Measure the difference between trace1 and trace 2.

#### For WCDMA mode

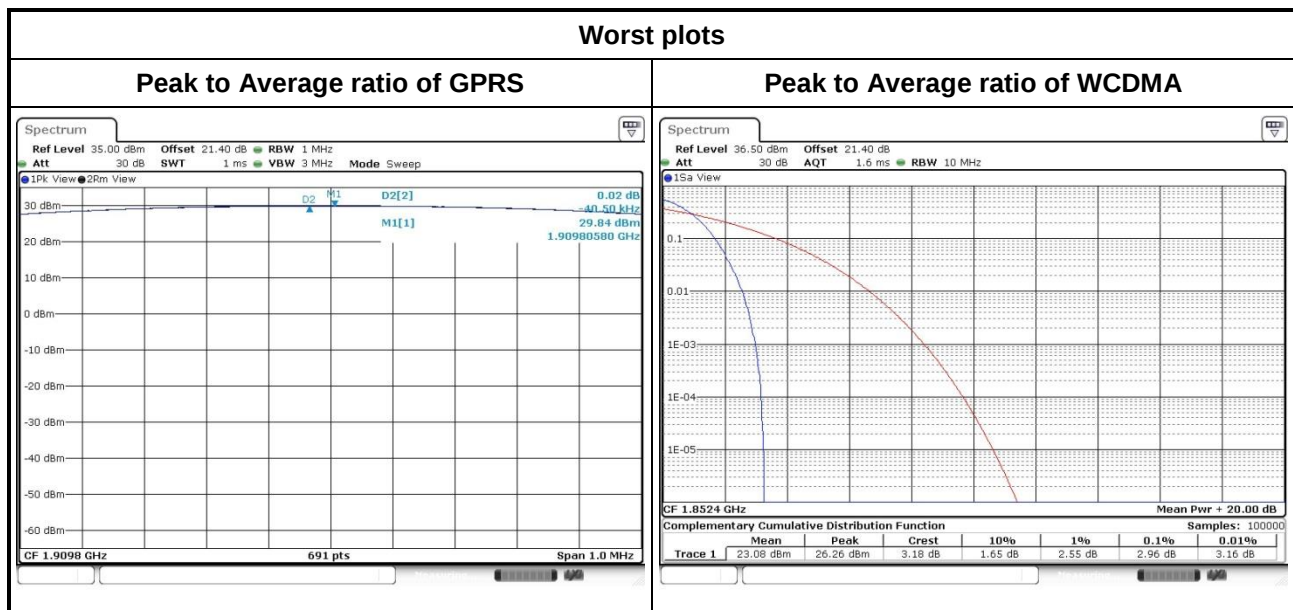
1. Enable CCDF function of spectrum analyzer and set RBW=10MHz.
2. Set the number of counts to a value that stabilizes the measured CCDF curve.
3. Record the maximum PAPR level associated with a probability of 0.1%.

### 3.6.3 Test Setup



### 3.6.4 Test Result of Peak to Average ratio

| MODE  | Channel | Frequency (MHz) | Peak to Average ratio (dB) |
|-------|---------|-----------------|----------------------------|
| GPRS  | 512     | 1850.2          | 0.01                       |
| GPRS  | 661     | 1880.0          | 0.01                       |
| GPRS  | 810     | 1909.8          | 0.02                       |
| WCDMA | 9262    | 1852.4          | 2.96                       |
| WCDMA | 9400    | 1880.0          | 2.75                       |
| WCDMA | 9538    | 1907.6          | 2.43                       |



## 3.7 Frequency Stability

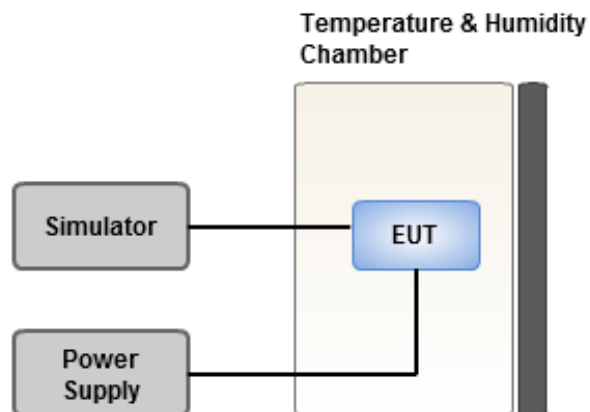
### 3.7.1 Limit of Frequency Stability

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

### 3.7.2 Test Procedures

1. EUT was placed at temperature chamber and connected to an external power supply.
2. Temperature and voltage condition shall be tested to confirm frequency stability.
3. Temperature range is from -30~50°C and voltage range is from lowest to highest working voltage.
4. Tem Link up EUT and simulator. Confirm frequency drift value of simulator and record it.

### 3.7.3 Test Setup



### 3.7.4 Test Result of Frequency Stability

| Temperature (°C) | Voltage (ac) | Frequency Drift (ppm) |       | Limit (ppm) |
|------------------|--------------|-----------------------|-------|-------------|
|                  |              | GPRS                  | WCDMA |             |
| 20               | 138          | 0.028                 | 0.019 | 2.5         |
| 20               | 102          | 0.026                 | 0.021 | 2.5         |
| 50               | 120          | 0.030                 | 0.020 | 2.5         |
| 40               | 120          | 0.028                 | 0.022 | 2.5         |
| 30               | 120          | 0.027                 | 0.019 | 2.5         |
| 20               | 120          | 0.024                 | 0.028 | 2.5         |
| 10               | 120          | 0.028                 | 0.022 | 2.5         |
| 0                | 120          | 0.024                 | 0.023 | 2.5         |
| -10              | 120          | 0.026                 | 0.027 | 2.5         |
| -20              | 120          | 0.028                 | 0.021 | 2.5         |
| -30              | 120          | 0.029                 | 0.019 | 2.5         |

## 4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <http://www.icertifi.com.tw>.

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