

# TEST REPORT

**Reference No.**..... : WTD22D05095850W003 V1  
**FCC ID** ..... : 2AEPIELEMENT5  
**Applicant**..... : COLOMBIANA DE COMERCIO S.A.  
**Address**..... : Car. 43E No 8-71, Medellin, Colombia  
**Manufacturer** ..... : MOBIWIRE MOBILES (NINGBO) CO., LTD  
**Address**..... : Ningbo Fenghua No.999, Dacheng East Road, Fenghua, Zhejiang, China  
**Product**..... : SMARTPHONE  
**Model(s)** ..... : ELEMENT 5  
**Brand Name**..... : Kalley  
**Standards**..... : FCC CFR47 Part 22 Subpart H  
FCC CFR47 Part 24 Subpart E  
**Date of Receipt sample** .... : 2022-05-16  
**Date of Test** ..... : 2022-05-16 to 2022-06-14  
**Date of Issue**..... : 2022-07-08  
**Test Result**..... : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

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### 3 Revision History

| Test report No.           | Date of Receipt sample | Date of Test                   | Date of Issue | Purpose   | Comment | Approved |
|---------------------------|------------------------|--------------------------------|---------------|-----------|---------|----------|
| WTD22D05095850<br>W003    | 2022-05-16             | 2022-05-16<br>to<br>2022-06-14 | 2022-06-14    | Original  | -       | Replaced |
| WTD22D05095850<br>W003 V1 | 2022-05-16             | 2022-05-16<br>to<br>2022-06-14 | 2022-07-08    | Version 1 | Updated | Valid    |

## 4 General Information

### 4.1 General Description of E.U.T.

|                                       |   |
|---------------------------------------|---|
| Product:                              | SMARTPHONE  |
| Model(s):                             | ELEMENT 5   |
| Model Description:                    | N/A   |
| GSM Band(s):                          | GSM 850/900/1800/1900MHz  |
| GPRS/EGPRS Class:                     | 12  |
| WCDMA Band(s):                        | FDD Band II/V   |
| LTE Band(s):                          | FDD Band 4/7  |
| Wi-Fi Specification:                  | 2.4G-802.11b/g/n HT20/n HT40<br>5G-802.11a/ n(HT20/40)/ac(HT20/40/80) |
| Bluetooth Version:                    | Bluetooth 5.0+ EDR  |
| GPS:                                  | Support   |
| Hardware Version:                     | V01B  |
| Software Version:                     | Kalley_ELEMENT_5_V01_20220509   |
| Highest frequency<br>(Exclude Radio): | 1.8GHz  |
| Storage Location:                     | Internal Storage  |

Note:

This EUT has two SIM card slots, and use same one RF module. We found that RF parameters are the same, when we insert the card 1 and card 2. So we usually performed the test under main card slot 1.

### 4.2 Details of E.U.T.

|                       |  |
|-----------------------|--|
| Operation Frequency:  | GSM/GPRS 850/EDGE: 824~849MHz<br>PCS/GPRS 1900/EDGE: 1850~1910MHz<br>WCDMA Band II: 1850~1910MHz<br>WCDMA Band V: 824~849MHz |
| Max. RF output power: | GSM 850: 33.20dBm<br>PCS1900: 30.21dBm<br>WCDMA Band II: 22.54dBm<br>WCDMA Band V: 22.06dBm                                  |
| Type of Modulation:   | GSM,GPRS: GMSK<br>EDGE: GMSK, 8PSK<br>WCDMA: BPSK, 16QAM   |
| Antenna installation: | GSM/WCDMA: internal permanent antenna  |
| Antenna Gain:         | GSM 850: -2dBi<br>PCS1900: 0dBi<br>WCDMA Band II: 0dBi<br>WCDMA Band V: -2dBi  |

Ratings: Battery DC 3.8V, 2000mAh  
DC 5.0V==0.55A charging from adapter  
(Adapter Input: 100-240V~50-60Hz 250mA)

Adapter: Manufacturer: SHENZHEN BAIJUNDA ELECTRONIC CO. LTD  
Model No.: UT-332A-5055

Type of Emission: GSM850: 245KGXW, GPRS850: 244KGXW,  
EGPRS850: 258KG7W  
PCS1900: 246KGXW, GPRS1900: 245KGXW,  
EGPRS1900: 249KG7W  
WCDMA850: 4M17F9W, WCDMA1900: 4M17F9W

### 4.3 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

| Support Band   | Test Mode         | Channel Frequency | Channel Number |
|--|-------------------|-------------------|----------------|
| GSM 850  | GSM/GPRS/EDGE     | 824.2 MHz         | 128            |
|  |                   | 836.6 MHz         | 190            |
|  |                   | 848.8 MHz         | 251            |
| PCS 1900   | GSM/GPRS/EDGE     | 1850.2 MHz        | 512            |
|  |                   | 1880.0 MHz        | 661            |
|  |                   | 1909.8 MHz        | 810            |
| WCDMA Band V   | WCDMA/HSUPA/HSDPA | 826.4 MHz         | 4132           |
|  |                   | 836.6 MHz         | 4183           |
|  |                   | 846.6 MHz         | 4233           |
| WCDMA Band II  | WCDMA/HSUPA/HSDPA | 1852.4MHz         | 9262           |
|  |                   | 1880.0MHz         | 9400           |
|  |                   | 1907.6MHz         | 9538           |
| Remark: All mode(s) were tested and the worst data was recorded. |                   |                   |                |

### 4.4 Test Facility

The test facility has a test site registered with the following organizations:

**ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.**

Waltek Testing Group Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files.

Registration number 7760A, October 15, 2016.

**FCC Designation No.: CN1201. Test Firm Registration No.: 523476.**

Waltek Testing Group Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration number 523476, September 10, 2019.

## 5 Test Summary

| Test Items                             | Test Requirement                     | Result |
|--|--------------------------------------|--------|
| RF Output Power                        | 2.1046<br>22.913 (a)<br>24.232 (c)   | PASS   |
| Peak-to-Average Ratio                  | 24.232 (d)                           | PASS   |
| Bandwidth                              | 2.1049<br>22.905<br>22.917<br>24.238 | PASS   |
| Spurious Emissions at Antenna Terminal | 2.1051<br>22.917 (a)<br>24.238 (a)   | PASS   |
| Field Strength of Spurious Radiation   | 2.1053<br>22.917 (a)<br>24.238 (a)   | PASS   |
| Out of band emission, Band Edge        | 22.917 (a)<br>24.238 (a)             | PASS   |
| Frequency Stability                    | 2.1055<br>22.355<br>24.235           | PASS   |
| Maximum Permissible Exposure<br>(SAR)  | 1.1307<br>2.1093                     | PASS   |



## 6 Equipment Used during Test

### 6.1 Equipments List

| Conducted Emissions Test Site 1#                              |                                      |                                  |              |            |                       |                      |
|---|--------------------------------------|----------------------------------|--------------|------------|-----------------------|----------------------|
| Item  | Equipment                            | Manufacturer                     | Model No.    | Serial No. | Last Calibration Date | Calibration Due Date |
| 1.  | EMI Test Receiver                    | R&S                              | ESCI         | 100947     | 2021-07-26            | 2022-07-25           |
| 2.  | LISN                                 | R&S                              | ENV216       | 101215     | 2021-07-26            | 2022-07-25           |
| 3.  | Cable                                | Top                              | TYPE16(3.5M) | -          | 2021-07-26            | 2022-07-25           |
| 3m Semi-anechoic Chamber for Radiation Emissions Test site 1# |                                      |                                  |              |            |                       |                      |
| Item  | Equipment                            | Manufacturer                     | Model No.    | Serial No. | Last Calibration Date | Calibration Due Date |
| 1   | Spectrum Analyzer                    | R&S                              | FSP          | 100091     | 2022-04-28            | 2023-04-27           |
| 2   | Trilog Broadband Antenna             | SCHWARZBECK                      | VULB9163     | 336        | 2021-07-26            | 2022-07-25           |
| 3   | Coaxial Cable (below 1GHz)           | Top                              | TYPE16(13M)  | -          | 2021-08-23            | 2022-08-22           |
| 4   | Broad-band Horn Antenna              | SCHWARZBECK                      | BBHA 9120 D  | 667        | 2022-04-28            | 2023-04-27           |
| 5   | Broad-band Horn Antenna              | SCHWARZBECK                      | BBHA 9170    | 335        | 2022-04-28            | 2023-04-27           |
| 6   | Broadband Preamplifier               | COMPLIANCE DIRECTION             | PAP-1G18     | 2004       | 2021-07-30            | 2022-07-29           |
| 7   | Coaxial Cable (above 1GHz)           | Top                              | 1GHz-25GHz   | EW02014-7  | 2022-04-28            | 2023-04-27           |
| 8   | Universal Radio Communication Tester | R&S                              | CMU 200      | 121315     | 2021-07-26            | 2022-07-25           |
| 9   | Signal Generator                     | R&S                              | SMP22        | 100102     | 2021-07-26            | 2022-07-25           |
| 10  | Smart Antenna                        | SCHWARZBECK                      | HA08         | -          | 2022-04-28            | 2023-04-27           |
| 3m Semi-anechoic Chamber for Radiation Emissions Test site 2# |                                      |                                  |              |            |                       |                      |
| Item  | Equipment                            | Manufacturer                     | Model No.    | Serial No  | Last Calibration Date | Calibration Due Date |
| 1   | Test Receiver                        | R&S                              | ESCI         | 101296     | 2022-04-28            | 2023-04-27           |
| 2   | Trilog Broadband Antenna             | SCHWARZBECK                      | VULB9160     | 9160-3325  | 2021-10-31            | 2022-10-30           |
| 3   | Active Loop Antenna                  | Com-Power Corp.                  | AL-130R      | 10160007   | 2022-05-02            | 2023-05-01           |
| 4   | Amplifier                            | Compliance pirection systems inc | PAP-0203     | 22024      | 2022-04-28            | 2023-04-27           |
| 5   | Cable                                | HUBER+SUHNER                     | CBL2         | 525178     | 2022-04-28            | 2023-04-27           |
| RF Conducted Testing  |                                      |                                  |              |            |                       |                      |
| Item  | Equipment                            | Manufacturer                     | Model No.    | Serial No. | Last Calibration      | Calibration Due Date |

|    |                                      |                   |         |            | Date       |            |
|----|--------------------------------------|-------------------|---------|------------|------------|------------|
| 1. | Spectrum Analyzer                    | R&S               | FSP40   | 100501     | 2021-07-26 | 2022-07-25 |
| 2. | EXA Signal Analyzer                  | Malaysia Keysight | N9010A  | MY50520207 | 2022-04-28 | 2023-04-27 |
| 3. | Universal Radio Communication Tester | R&S               | CMU 200 | 121315     | 2021-07-26 | 2022-07-25 |

## 6.2 Measurement Uncertainty

| Parameter                                       | Uncertainty                             |
|---|---|
| Conducted Emission                              | ± 3.64 dB(AC mains 150KHz~30MHz)        |
| Radiated Spurious Emissions                     | ± 5.08 dB (Bilog antenna 30M~1000MHz)   |
|   | ± 5.47 dB (Horn antenna 1000M~25000MHz) |
| Radio Frequency                                 | ± 1 x 10 <sup>-7</sup> Hz               |
| RF Power  | ± 0.42 dB                               |
| RF Power Density                                | ± 0.7dB                                 |
| Conducted Spurious Emissions                    | ± 2.76 dB (9kHz~26500MHz)               |
| Confidence interval: 95%. Confidence factor:k=2 |   |

## 7 RF OUTPUT POWER

|                   |   |
|-------------------|---|
| Test Requirement: | FCC Part 2.1046, 22.913 (a), 24.232 (c) |
| Test Method:      | ANSI/TIA-603-E:2016<br>ANSI C63.26:2015 |
| Test Mode:        | TX transmitting                         |

### 7.1 EUT Operation

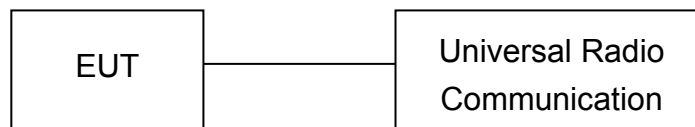
Operating Environment :

|                       |           |
|-----------------------|-----------|
| Temperature:          | 22.5 °C   |
| Humidity:             | 52.1 % RH |
| Atmospheric Pressure: | 101.2kPa  |

### 7.2 Test Procedure

Conducted method:

The RF output of the transmitter was connected to the wireless test set and the spectrum analyzer through sufficient attenuation.



Radiated method:

1. The setup of EUT is according with per TIA/EIA Standard 603D.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

### 7.3 Test Result

#### Conducted Power

| GSM - Burst Average Power (dBm) |        |       |       |         |       |        |
|---------------------------------|--------|-------|-------|---------|-------|--------|
| Band                            | GSM850 |       |       | PCS1900 |       |        |
| Channel                         | 128    | 190   | 251   | 512     | 661   | 810    |
| Frequency (MHz)                 | 824.2  | 836.6 | 848.8 | 1850.2  | 1880  | 1909.8 |
| GSM                             | 33.16  | 33.00 | 32.81 | 28.83   | 29.71 | 30.21  |
| GPRS (1 slot)                   | 33.20  | 33.04 | 32.74 | 27.71   | 28.59 | 29.14  |
| GPRS (2 slots)                  | 31.66  | 31.53 | 31.27 | 26.53   | 27.38 | 27.85  |
| GPRS (3 slots)                  | 29.75  | 29.65 | 29.35 | 25.34   | 26.19 | 26.75  |
| GPRS (4 slots)                  | 28.87  | 28.70 | 28.47 | 24.79   | 25.48 | 25.91  |
| EGPRS (1 slot)                  | 27.16  | 27.02 | 26.99 | 24.83   | 25.86 | 26.05  |
| EGPRS (2 slots)                 | 25.84  | 25.27 | 25.69 | 23.78   | 24.34 | 24.83  |
| EGPRS (3 slots)                 | 23.55  | 23.73 | 23.52 | 22.46   | 23.51 | 23.79  |
| EGPRS (4 slots)                 | 22.31  | 22.21 | 22.07 | 21.89   | 22.86 | 22.84  |

| WCDMA - Average Power (dBm) |               |       |        |              |       |       |
|-----------------------------|---------------|-------|--------|--------------|-------|-------|
| Band                        | WCDMA Band II |       |        | WCDMA Band V |       |       |
| Channel                     | 9262          | 9400  | 9538   | 4132         | 4183  | 4233  |
| Frequency (MHz)             | 1852.4        | 1880  | 1907.6 | 826.4        | 836.6 | 846.6 |
| RMC 12.2k                   | 22.54         | 22.53 | 22.53  | 21.96        | 22.06 | 22.02 |
| HSDPA Subtest-1             | 22.47         | 22.49 | 22.48  | 21.91        | 21.98 | 21.96 |
| HSDPA Subtest-2             | 22.35         | 22.38 | 22.37  | 21.83        | 21.86 | 21.83 |
| HSDPA Subtest-3             | 22.26         | 22.26 | 22.29  | 21.75        | 21.78 | 21.72 |
| HSDPA Subtest-4             | 22.18         | 22.15 | 22.16  | 21.69        | 21.67 | 21.64 |
| HSUPA Subtest-1             | 21.01         | 21.10 | 21.15  | 21.50        | 21.65 | 21.49 |
| HSUPA Subtest-2             | 20.93         | 21.02 | 21.06  | 21.43        | 21.53 | 21.38 |
| HSUPA Subtest-3             | 20.86         | 20.91 | 20.98  | 21.36        | 21.48 | 21.26 |
| HSUPA Subtest-4             | 20.75         | 20.82 | 20.86  | 21.28        | 21.39 | 21.19 |
| HSUPA Subtest-5             | 20.68         | 20.69 | 20.73  | 21.16        | 21.28 | 21.12 |

**Radiated Power**

## ERP and EIRP

## Cellular Band 850 (Part 22H)

| Frequency             | Receiver Reading | Turn table Angle | RX Antenna |       | Substituted |       |              | Absolute Level | Part 22H |        |
|-----------------------|------------------|------------------|------------|-------|-------------|-------|--------------|----------------|----------|--------|
|                       |                  |                  | Height     | Polar | SG Level    | Cable | Antenna Gain |                | Limit    | Margin |
| (MHz)                 | (dBμV)           | Degree           | (m)        | (H/V) | (dBm)       | (dB)  | (dB)         | (dBm)          | (dBm)    | (dB)   |
| GSM 850 Channel 128   |                  |                  |            |       |             |       |              |                |          |        |
| 824.20                | 99.92            | 253              | 1.7        | H     | 32.89       | 0.20  | 0.00         | <b>32.69</b>   | 38.45    | -5.76  |
| 824.20                | 99.48            | 358              | 2.3        | V     | 32.38       | 0.20  | 0.00         | 32.18          | 38.45    | -6.27  |
| GSM 850 Channel 190   |                  |                  |            |       |             |       |              |                |          |        |
| 836.60                | 99.57            | 199              | 1.1        | H     | 32.54       | 0.20  | 0.00         | 32.34          | 38.45    | -6.11  |
| 836.60                | 99.67            | 278              | 1.2        | V     | 32.57       | 0.20  | 0.00         | 32.37          | 38.45    | -6.08  |
| GSM 850 Channel 251   |                  |                  |            |       |             |       |              |                |          |        |
| 848.80                | 99.44            | 329              | 1.9        | H     | 32.41       | 0.20  | 0.00         | 32.21          | 38.45    | -6.24  |
| 848.80                | 99.45            | 305              | 1.2        | V     | 32.35       | 0.20  | 0.00         | 32.15          | 38.45    | -6.30  |
| GPRS 850 Channel 128  |                  |                  |            |       |             |       |              |                |          |        |
| 824.20                | 99.61            | 281              | 1.5        | H     | 32.58       | 0.20  | 0.00         | 32.38          | 38.45    | -6.07  |
| 824.20                | 99.77            | 193              | 1.9        | V     | 32.67       | 0.20  | 0.00         | 32.47          | 38.45    | -5.98  |
| GPRS 850 Channel 190  |                  |                  |            |       |             |       |              |                |          |        |
| 836.60                | 99.85            | 206              | 2.3        | H     | 32.82       | 0.20  | 0.00         | 32.62          | 38.45    | -5.83  |
| 836.60                | 99.49            | 241              | 2.3        | V     | 32.39       | 0.20  | 0.00         | 32.19          | 38.45    | -6.26  |
| GPRS 850 Channel 251  |                  |                  |            |       |             |       |              |                |          |        |
| 848.80                | 99.68            | 239              | 1.1        | H     | 32.65       | 0.20  | 0.00         | 32.45          | 38.45    | -6.00  |
| 848.80                | 99.46            | 99               | 2.2        | V     | 32.36       | 0.20  | 0.00         | 32.16          | 38.45    | -6.29  |
| EGPRS 850 Channel 128 |                  |                  |            |       |             |       |              |                |          |        |
| 824.20                | 90.01            | 201              | 1.1        | H     | 22.98       | 0.20  | 0.00         | <b>22.78</b>   | 38.45    | -15.67 |
| 824.20                | 89.60            | 54               | 1.6        | V     | 22.50       | 0.20  | 0.00         | 22.30          | 38.45    | -16.15 |
| EGPRS 850 Channel 190 |                  |                  |            |       |             |       |              |                |          |        |
| 836.60                | 89.91            | 168              | 2.1        | H     | 22.88       | 0.20  | 0.00         | 22.68          | 38.45    | -15.77 |
| 836.60                | 89.54            | 103              | 2.1        | V     | 22.44       | 0.20  | 0.00         | 22.24          | 38.45    | -16.21 |
| EGPRS 850 Channel 251 |                  |                  |            |       |             |       |              |                |          |        |
| 848.80                | 89.90            | 205              | 1.0        | H     | 22.87       | 0.20  | 0.00         | 22.67          | 38.45    | -15.78 |
| 848.80                | 89.67            | 15               | 1.7        | V     | 22.57       | 0.20  | 0.00         | 22.37          | 38.45    | -16.08 |

## Cellular Band 1900 (Part 24E)

| Frequency              | Receiver Reading | Turn table Angle | RX Antenna |       | Substituted |       |              | Absolute Level | Part 24E |        |
|------------------------|------------------|------------------|------------|-------|-------------|-------|--------------|----------------|----------|--------|
|                        |                  |                  | Height     | Polar | SG Level    | Cable | Antenna Gain |                | Limit    | Margin |
| (MHz)                  | (dBμV)           | Degree           | (m)        | (H/V) | (dBm)       | (dB)  | (dB)         | (dBm)          | (dBm)    | (dB)   |
| PCS 1900 Channel 512   |                  |                  |            |       |             |       |              |                |          |        |
| 1850.20                | 93.73            | 8                | 2.5        | H     | 19.76       | 0.31  | 10.40        | 29.85          | 33       | -3.15  |
| 1850.20                | 93.25            | 157              | 1.3        | V     | 19.97       | 0.31  | 10.40        | 30.06          | 33       | -2.94  |
| PCS 1900 Channel 661   |                  |                  |            |       |             |       |              |                |          |        |
| 1880.00                | 93.26            | 344              | 2.4        | H     | 19.41       | 0.31  | 10.40        | 29.50          | 33       | -3.50  |
| 1880.00                | 93.31            | 28               | 2.0        | V     | 20.19       | 0.31  | 10.40        | 30.28          | 33       | -2.72  |
| PCS 1900 Channel 810   |                  |                  |            |       |             |       |              |                |          |        |
| 1909.80                | 93.60            | 36               | 1.9        | H     | 19.87       | 0.32  | 10.40        | 29.95          | 33       | -3.05  |
| 1909.80                | 93.72            | 113              | 2.4        | V     | 20.76       | 0.32  | 10.40        | <b>30.84</b>   | 33       | -2.16  |
| GPRS 1900 Channel 512  |                  |                  |            |       |             |       |              |                |          |        |
| 1850.20                | 93.72            | 321              | 1.4        | H     | 19.75       | 0.31  | 10.40        | 29.84          | 33       | -3.16  |
| 1850.20                | 93.47            | 84               | 1.8        | V     | 20.19       | 0.31  | 10.40        | 30.28          | 33       | -2.72  |
| GPRS 1900 Channel 661  |                  |                  |            |       |             |       |              |                |          |        |
| 1880.00                | 93.67            | 256              | 1.6        | H     | 19.82       | 0.31  | 10.40        | 29.91          | 33       | -3.09  |
| 1880.00                | 93.38            | 167              | 2.0        | V     | 20.26       | 0.31  | 10.40        | 30.35          | 33       | -2.65  |
| GPRS 1900 Channel 810  |                  |                  |            |       |             |       |              |                |          |        |
| 1909.80                | 93.41            | 52               | 1.9        | H     | 19.68       | 0.32  | 10.40        | 29.76          | 33       | -3.24  |
| 1909.80                | 93.41            | 180              | 1.5        | V     | 20.45       | 0.32  | 10.40        | 30.53          | 33       | -2.47  |
| EGPRS 1900 Channel 512 |                  |                  |            |       |             |       |              |                |          |        |
| 1850.20                | 89.05            | 272              | 1.9        | H     | 15.08       | 0.31  | 10.40        | 25.17          | 33       | -7.83  |
| 1850.20                | 88.66            | 158              | 1.4        | V     | 15.38       | 0.31  | 10.40        | 25.47          | 33       | -7.53  |
| EGPRS 1900 Channel 661 |                  |                  |            |       |             |       |              |                |          |        |
| 1880.00                | 88.95            | 124              | 1.2        | H     | 15.10       | 0.31  | 10.40        | 25.19          | 33       | -7.81  |
| 1880.00                | 88.68            | 272              | 2.0        | V     | 15.56       | 0.31  | 10.40        | 25.65          | 33       | -7.35  |
| EGPRS 1900 Channel 810 |                  |                  |            |       |             |       |              |                |          |        |
| 1909.80                | 88.73            | 166              | 2.4        | H     | 15.00       | 0.32  | 10.40        | 25.08          | 33       | -7.92  |
| 1909.80                | 88.82            | 12               | 1.5        | V     | 15.86       | 0.32  | 10.40        | <b>25.94</b>   | 33       | -7.06  |

## WCDMA Band V (Part 22H)

| Frequency                       | Receiver Reading | Turn table Angle | RX Antenna |       | Substituted |       |              | Absolute Level | Part 22H |        |
|---------------------------------|------------------|------------------|------------|-------|-------------|-------|--------------|----------------|----------|--------|
|                                 |                  |                  | Height     | Polar | SG Level    | Cable | Antenna Gain |                | Limit    | Margin |
| (MHz)                           | (dBμV)           | Degree           | (m)        | (H/V) | (dBm)       | (dB)  | (dB)         | (dBm)          | (dBm)    | (dB)   |
| WCDMA Band V Voice Channel 4132 |                  |                  |            |       |             |       |              |                |          |        |
| 826.40                          | 89.59            | 184              | 2.2        | H     | 22.56       | 0.20  | 0.00         | <b>22.36</b>   | 38.45    | -16.09 |
| 826.40                          | 89.26            | 351              | 1.2        | V     | 22.16       | 0.20  | 0.00         | 21.96          | 38.45    | -16.49 |
| WCDMA Band V Voice Channel 4183 |                  |                  |            |       |             |       |              |                |          |        |
| 836.60                          | 89.40            | 180              | 1.3        | H     | 22.37       | 0.20  | 0.00         | 22.17          | 38.45    | -16.28 |
| 836.60                          | 89.32            | 217              | 2.4        | V     | 22.22       | 0.20  | 0.00         | 22.02          | 38.45    | -16.43 |
| WCDMA Band V Voice Channel 4233 |                  |                  |            |       |             |       |              |                |          |        |
| 846.60                          | 89.12            | 289              | 1.4        | H     | 22.09       | 0.20  | 0.00         | 21.89          | 38.45    | -16.56 |
| 846.60                          | 88.22            | 236              | 2.0        | V     | 21.12       | 0.20  | 0.00         | 20.92          | 38.45    | -17.53 |
| WCDMA Band V HSDPA Channel 4132 |                  |                  |            |       |             |       |              |                |          |        |
| 826.40                          | 88.10            | 82               | 2.4        | H     | 21.07       | 0.20  | 0.00         | 20.87          | 38.45    | -17.58 |
| 826.40                          | 89.25            | 110              | 1.9        | V     | 22.15       | 0.20  | 0.00         | 21.95          | 38.45    | -16.50 |
| WCDMA Band V HSDPA Channel 4183 |                  |                  |            |       |             |       |              |                |          |        |
| 836.60                          | 88.39            | 65               | 2.0        | H     | 21.36       | 0.20  | 0.00         | 21.16          | 38.45    | -17.29 |
| 836.60                          | 88.25            | 109              | 1.3        | V     | 21.15       | 0.20  | 0.00         | 20.95          | 38.45    | -17.50 |
| WCDMA Band V HSDPA Channel 4233 |                  |                  |            |       |             |       |              |                |          |        |
| 846.60                          | 88.33            | 169              | 1.3        | H     | 21.30       | 0.20  | 0.00         | 21.10          | 38.45    | -17.35 |
| 846.60                          | 88.23            | 172              | 1.6        | V     | 21.13       | 0.20  | 0.00         | 20.93          | 38.45    | -17.52 |
| WCDMA Band V HSUPA Channel 4132 |                  |                  |            |       |             |       |              |                |          |        |
| 826.40                          | 87.10            | 145              | 1.4        | H     | 20.07       | 0.20  | 0.00         | 19.87          | 38.45    | -18.58 |
| 826.40                          | 87.18            | 159              | 2.3        | V     | 20.08       | 0.20  | 0.00         | 19.88          | 38.45    | -18.57 |
| WCDMA Band V HSUPA Channel 4183 |                  |                  |            |       |             |       |              |                |          |        |
| 836.60                          | 87.59            | 100              | 2.5        | H     | 20.56       | 0.20  | 0.00         | 20.36          | 38.45    | -18.09 |
| 836.60                          | 87.34            | 133              | 1.4        | V     | 20.24       | 0.20  | 0.00         | 20.04          | 38.45    | -18.41 |
| WCDMA Band V HSUPA Channel 4233 |                  |                  |            |       |             |       |              |                |          |        |
| 846.60                          | 87.59            | 246              | 1.4        | H     | 20.56       | 0.20  | 0.00         | 20.36          | 38.45    | -18.09 |
| 846.60                          | 87.50            | 95               | 1.4        | V     | 20.40       | 0.20  | 0.00         | 20.20          | 38.45    | -18.25 |

## WCDMA Band II (Part 24E)

| Frequency                        | Receiver Reading | Turn table Angle | RX Antenna |       | Substituted |       |              | Absolute Level | Part 24E |        |
|----------------------------------|------------------|------------------|------------|-------|-------------|-------|--------------|----------------|----------|--------|
|                                  |                  |                  | Height     | Polar | SG Level    | Cable | Antenna Gain |                | Limit    | Margin |
| (MHz)                            | (dBμV)           | Degree           | (m)        | (H/V) | (dBm)       | (dB)  | (dB)         | (dBm)          | (dBm)    | (dB)   |
| WCDMA Band II Voice Channel 9262 |                  |                  |            |       |             |       |              |                |          |        |
| 1852.40                          | 85.91            | 206              | 2.0        | H     | 11.94       | 0.31  | 10.40        | 22.03          | 33       | -10.97 |
| 1852.40                          | 85.26            | 298              | 1.4        | V     | 11.98       | 0.31  | 10.40        | <b>22.07</b>   | 33       | -10.93 |
| WCDMA Band II Voice Channel 9400 |                  |                  |            |       |             |       |              |                |          |        |
| 1880.00                          | 85.48            | 10               | 2.3        | H     | 11.63       | 0.31  | 10.40        | 21.72          | 33       | -11.28 |
| 1880.00                          | 85.08            | 225              | 1.9        | V     | 11.96       | 0.31  | 10.40        | 22.05          | 33       | -10.95 |
| WCDMA Band II Voice Channel 9538 |                  |                  |            |       |             |       |              |                |          |        |
| 1907.60                          | 85.45            | 258              | 1.8        | H     | 11.72       | 0.32  | 10.40        | 21.80          | 33       | -11.20 |
| 1907.60                          | 84.82            | 240              | 1.3        | V     | 11.86       | 0.32  | 10.40        | 21.94          | 33       | -11.06 |
| WCDMA Band II HSDPA Channel 9262 |                  |                  |            |       |             |       |              |                |          |        |
| 1852.40                          | 84.64            | 324              | 1.6        | H     | 10.67       | 0.31  | 10.40        | 20.76          | 33       | -12.24 |
| 1852.40                          | 84.51            | 263              | 1.8        | V     | 11.23       | 0.31  | 10.40        | 21.32          | 33       | -11.68 |
| WCDMA Band II HSDPA Channel 9400 |                  |                  |            |       |             |       |              |                |          |        |
| 1880.00                          | 84.56            | 172              | 2.1        | H     | 10.71       | 0.31  | 10.40        | 20.80          | 33       | -12.20 |
| 1880.00                          | 84.62            | 240              | 2.2        | V     | 11.50       | 0.31  | 10.40        | 21.59          | 33       | -11.41 |
| WCDMA Band II HSDPA Channel 9538 |                  |                  |            |       |             |       |              |                |          |        |
| 1907.60                          | 84.43            | 198              | 1.2        | H     | 10.70       | 0.32  | 10.40        | 20.78          | 33       | -12.22 |
| 1907.60                          | 84.84            | 318              | 2.3        | V     | 11.88       | 0.32  | 10.40        | 21.96          | 33       | -11.04 |
| WCDMA Band II HSUPA Channel 9262 |                  |                  |            |       |             |       |              |                |          |        |
| 1852.40                          | 83.57            | 56               | 2.2        | H     | 9.60        | 0.31  | 10.40        | 19.69          | 33       | -13.31 |
| 1852.40                          | 83.49            | 43               | 1.2        | V     | 10.21       | 0.31  | 10.40        | 20.30          | 33       | -12.70 |
| WCDMA Band II HSUPA Channel 9400 |                  |                  |            |       |             |       |              |                |          |        |
| 1880.00                          | 83.68            | 44               | 1.1        | H     | 9.83        | 0.31  | 10.40        | 19.92          | 33       | -13.08 |
| 1880.00                          | 83.61            | 71               | 2.1        | V     | 10.49       | 0.31  | 10.40        | 20.58          | 33       | -12.42 |
| WCDMA Band II HSUPA Channel 9538 |                  |                  |            |       |             |       |              |                |          |        |
| 1907.60                          | 83.75            | 139              | 1.6        | H     | 10.02       | 0.32  | 10.40        | 20.10          | 33       | -12.90 |
| 1907.60                          | 83.63            | 158              | 1.7        | V     | 10.67       | 0.32  | 10.40        | 20.75          | 33       | -12.25 |



## 8 Peak-to-Average Ratio

|                   |                 |
|-------------------|-----------------|
| Test Requirement: | 24.232 (d)      |
| Test Method:      | N/A             |
| Test Mode:        | TX transmitting |

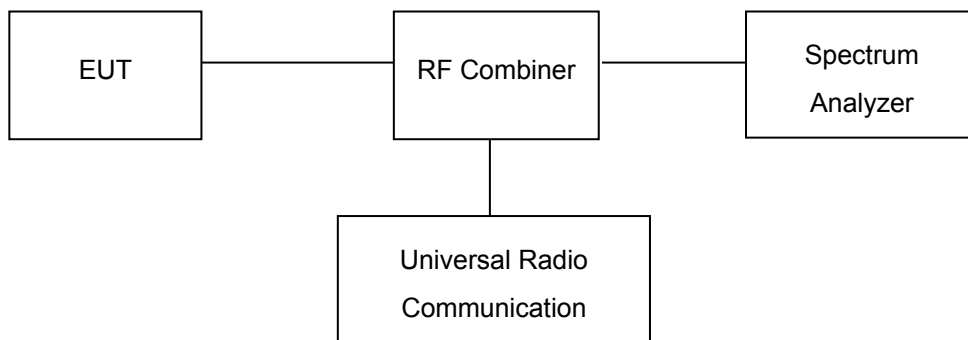
### 8.1 EUT Operation

Operating Environment :

|                       |          |
|-----------------------|----------|
| Temperature:          | 22.5 °C  |
| Humidity:             | 52.3% RH |
| Atmospheric Pressure: | 101.2kPa |

### 8.2 Test Procedure

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. Set EUT to transmit at maximum output power.
3. When the duty cycle is less than 98%, then signal gating will be implemented on the spectrum analyzer by triggering from the system simulator.
4. Set the CCDF (Complementary Cumulative Distribution Function) option of the spectrum analyzer. Record the maximum PAPR level associated with a probability of 0.1%.



### 8.3 Test Result

#### Cellular Band (Part 24E)

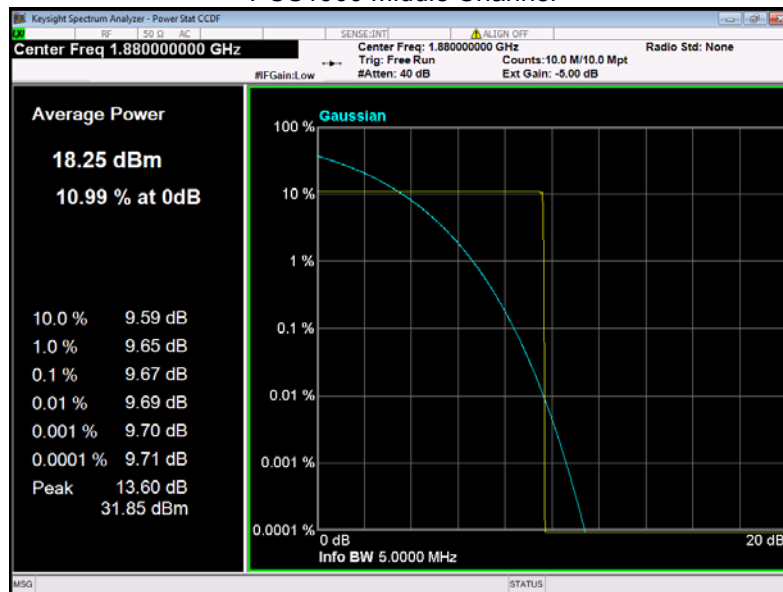
Remark: All test data were reported and only the worst case (middle channel mode) test graphs were showed in test report.

| Mode                       | PCS 1900 |        |        | GPRS 1900 |        |        | EDGE 1900 |        |        | Limit (dB) |
|----------------------------|----------|--------|--------|-----------|--------|--------|-----------|--------|--------|------------|
| Channel                    | 512      | 661    | 810    | 512       | 661    | 810    | 512       | 661    | 810    |            |
| Frequency (MHz)            | 1850.2   | 1880.0 | 1909.8 | 1850.2    | 1880.0 | 1909.8 | 1850.2    | 1880.0 | 1909.8 |            |
| Peak-to-Average Ratio (dB) | 9.61     | 9.67   | 9.46   | 9.44      | 9.69   | 9.28   | 9.24      | 9.53   | 9.33   | 13         |

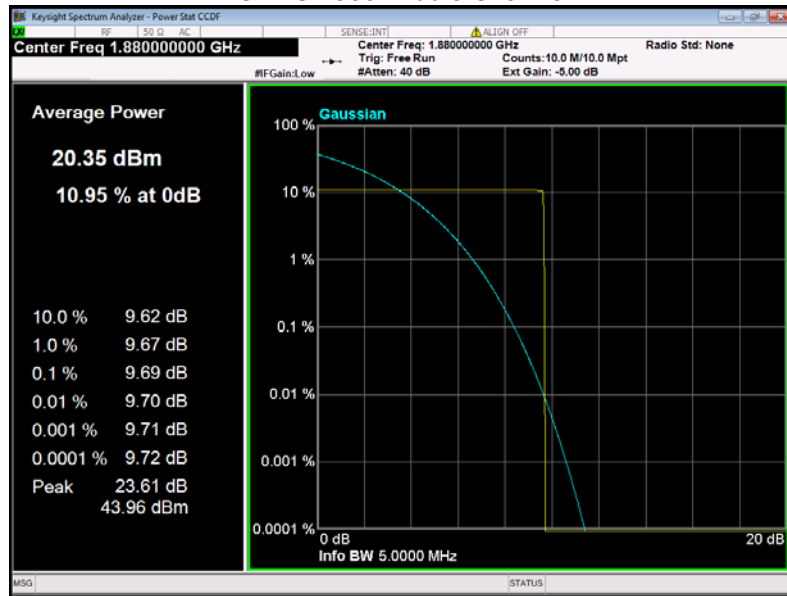
| Mode                       | WCDMA Band II |        |        | Limit (dB) |
|----------------------------|---------------|--------|--------|------------|
| Channel                    | 9262          | 9400   | 9538   |            |
| Frequency (MHz)            | 1852.4        | 1880.0 | 1907.6 |            |
| Peak-to-Average Ratio (dB) | 2.93          | 3.07   | 3.25   | 13         |

#### Test Plots (Part 24E)

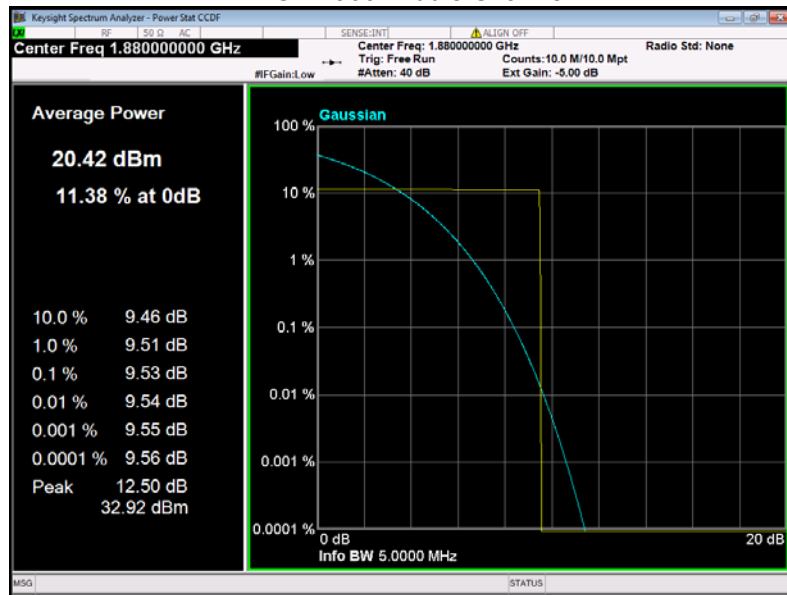
##### PCS1900 Middle Channel



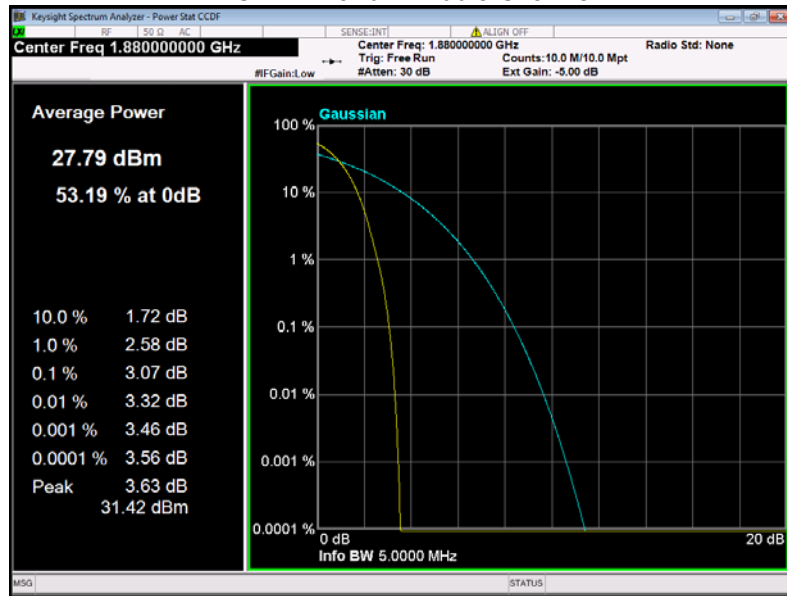
GPRS 1900 Middle Channel



EDGE 1900 Middle Channel



### WCDMA Band II Middle Channel



## 9 BANDWIDTH

Test Requirement: FCC Part 2.1049, 22.917, 22.905, 24.238

Test Method: ANSI/TIA-603-E:2016

ANSI C63.26:2015

Test Mode: TX transmitting

### 9.1 EUT Operation

Operating Environment :

Temperature: 22.5 °C

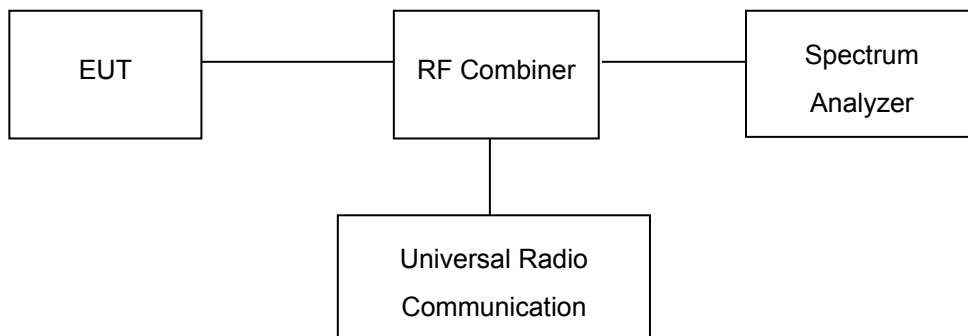
Humidity: 52.3% RH

Atmospheric Pressure: 101.2kPa

### 9.2 Test Procedure

The RF output of the transmitter was connected to the wireless test set and the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set in the range of 1 to 5 % of the anticipated OBW (Cellular /PCS) and the 26 dB & 99% bandwidth was recorded.



### 9.3 Test Result

Remark: All test data were reported and only the worst case (middle channel mode) test graphs were showed in test report.

Cellular Band (Part 22H)

| Test Mode | Channel | Frequency (MHz) | 99% Occupied Bandwidth(kHz) | 26 dB Emission Bandwidth(kHz) |
|-----------|---------|-----------------|-----------------------------|-------------------------------|
| GSM 850   | 128     | 824.2           | 247.20                      | 309.40                        |
|           | 190     | 836.6           | 247.21                      | 309.40                        |
|           | 251     | 848.8           | 247.20                      | 309.39                        |
| GPRS 850  | 128     | 824.2           | 242.86                      | 307.60                        |
|           | 190     | 836.6           | 242.88                      | 307.60                        |
|           | 251     | 848.8           | 242.87                      | 307.59                        |
| EGPRS 850 | 128     | 824.2           | 246.99                      | 313.39                        |
|           | 190     | 836.6           | 246.99                      | 313.40                        |
|           | 251     | 848.8           | 246.98                      | 313.39                        |

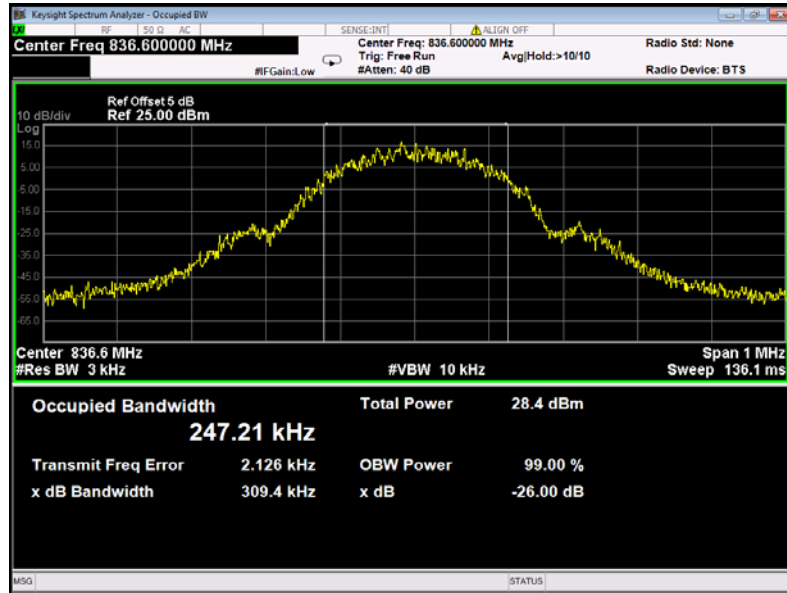
| Test Mode       | Channel      | Frequency (MHz) | 99% Occupied Bandwidth(MHz) | 26 dB Emission Bandwidth(MHz) |      |
|-----------------|--------------|-----------------|-----------------------------|-------------------------------|------|
| WCDMA<br>Band V | RMC12.2k     | 4132            | 826.4                       | 4.16                          | 4.73 |
|                 |              | 4183            | 836.6                       | 4.18                          | 4.74 |
|                 |              | 4233            | 846.6                       | 4.17                          | 4.73 |
|                 | HSDPA(16QAM) | 4132            | 826.4                       | 4.17                          | 4.69 |
|                 |              | 4183            | 836.6                       | 4.18                          | 4.70 |
|                 |              | 4233            | 846.6                       | 4.18                          | 4.70 |
|                 | HSUPA(BPSK)  | 4132            | 826.4                       | 4.17                          | 4.68 |
|                 |              | 4183            | 836.6                       | 4.17                          | 4.69 |
|                 |              | 4233            | 846.6                       | 4.17                          | 4.69 |

Cellular Band (Part 24E)

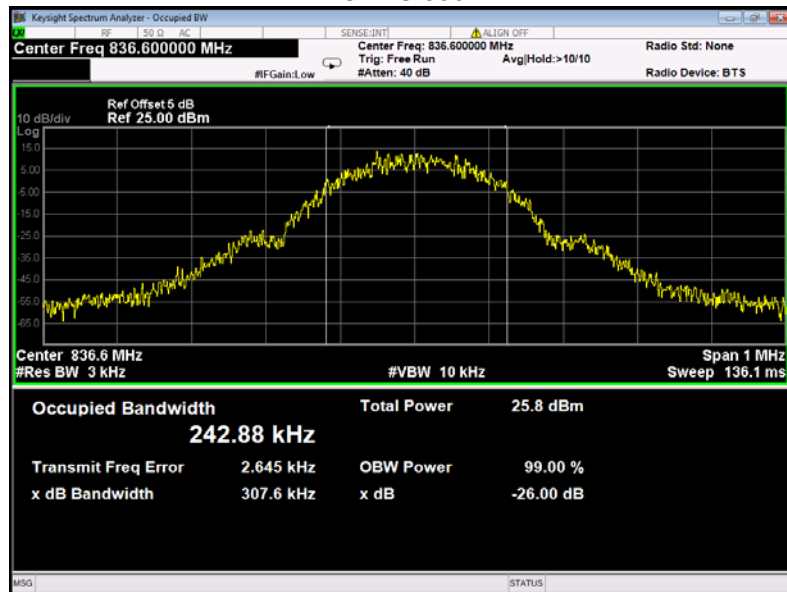
| Test Mode  | Channel | Frequency (MHz) | 99% Occupied Bandwidth(kHz) | 26 dB Emission Bandwidth(kHz) |
|------------|---------|-----------------|-----------------------------|-------------------------------|
| PCS 1900   | 512     | 1850.2          | 245.86                      | 312.69                        |
|            | 661     | 1880.0          | 245.87                      | 312.70                        |
|            | 810     | 1909.8          | 245.86                      | 312.69                        |
| GPRS 1900  | 512     | 1850.2          | 242.26                      | 311.40                        |
|            | 661     | 1880.0          | 242.27                      | 311.40                        |
|            | 810     | 1909.8          | 242.26                      | 311.38                        |
| EGPRS 1900 | 512     | 1850.2          | 244.84                      | 303.59                        |
|            | 661     | 1880.0          | 244.85                      | 303.60                        |
|            | 810     | 1909.8          | 244.84                      | 303.60                        |

| Test Mode     | Channel      | Frequency (MHz) | 99% Occupied Bandwidth(MHz) | 26 dB Emission Bandwidth(MHz) |      |
|---------------|--------------|-----------------|-----------------------------|-------------------------------|------|
| WCDMA Band II | RMC12.2k     | 9262            | 1852.4                      | 4.16                          | 4.66 |
|               |              | 9400            | 1880.0                      | 4.16                          | 4.67 |
|               |              | 9538            | 1907.6                      | 4.15                          | 4.65 |
|               | HSDPA(16QAM) | 9262            | 1852.4                      | 4.18                          | 4.66 |
|               |              | 9400            | 1880.0                      | 4.19                          | 4.67 |
|               |              | 9538            | 1907.6                      | 4.18                          | 4.66 |
|               | HSUPA(BPSK)  | 9262            | 1852.4                      | 4.17                          | 4.65 |
|               |              | 9400            | 1880.0                      | 4.19                          | 4.66 |
|               |              | 9538            | 1907.6                      | 4.18                          | 4.66 |

Test Plots (worst case)  
 Cellular Band (Part 22H)  
 GSM 850

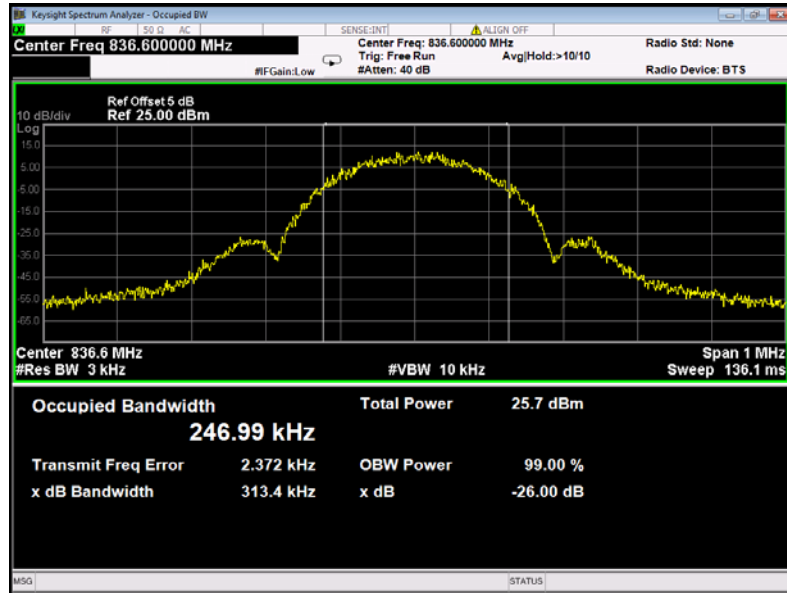


GPRS 850

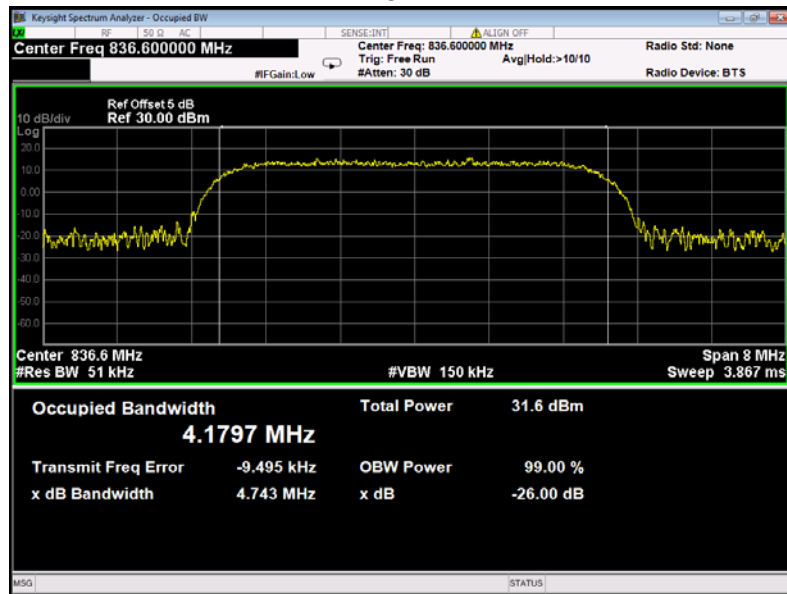




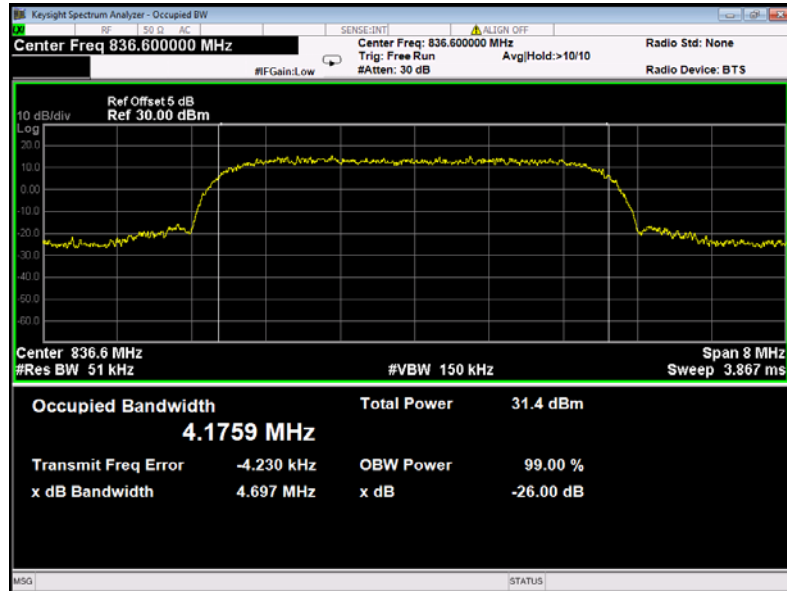
### EGPRS 850



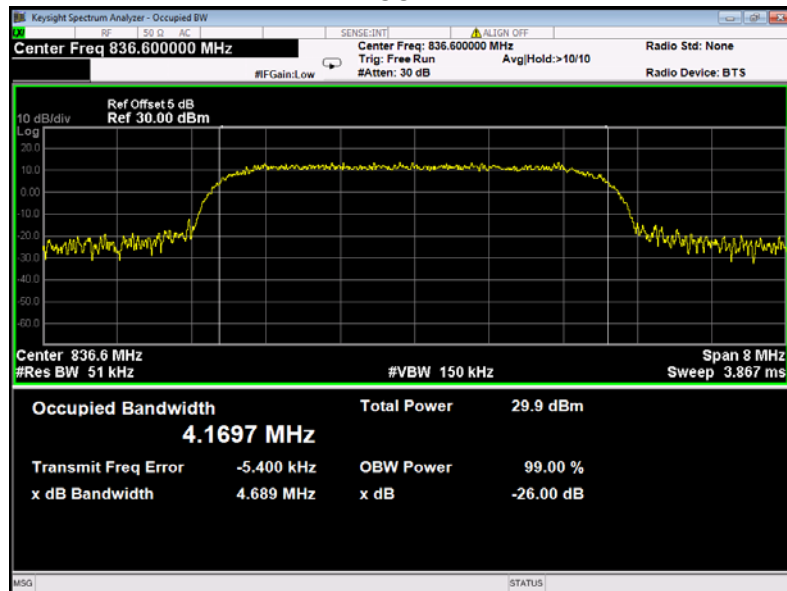
### WCDMA band V RMC12.2k



### HSDPA

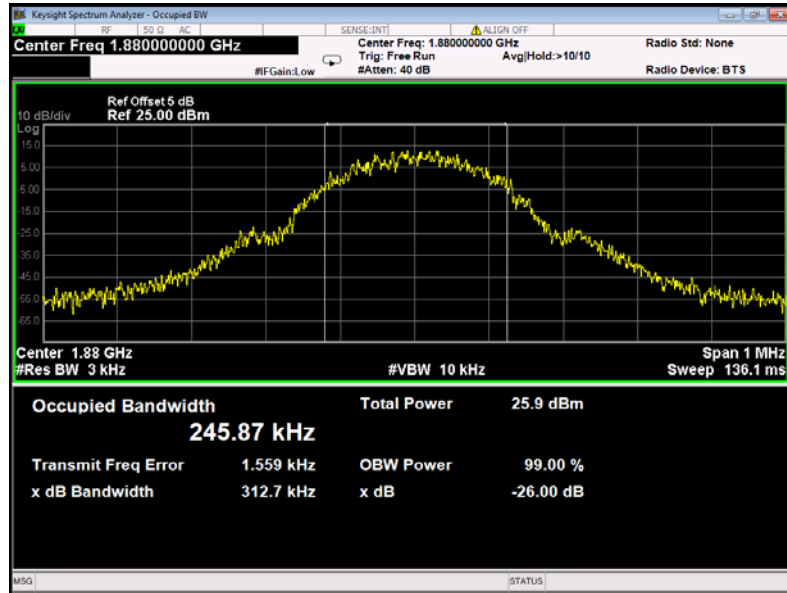


### HSUPA

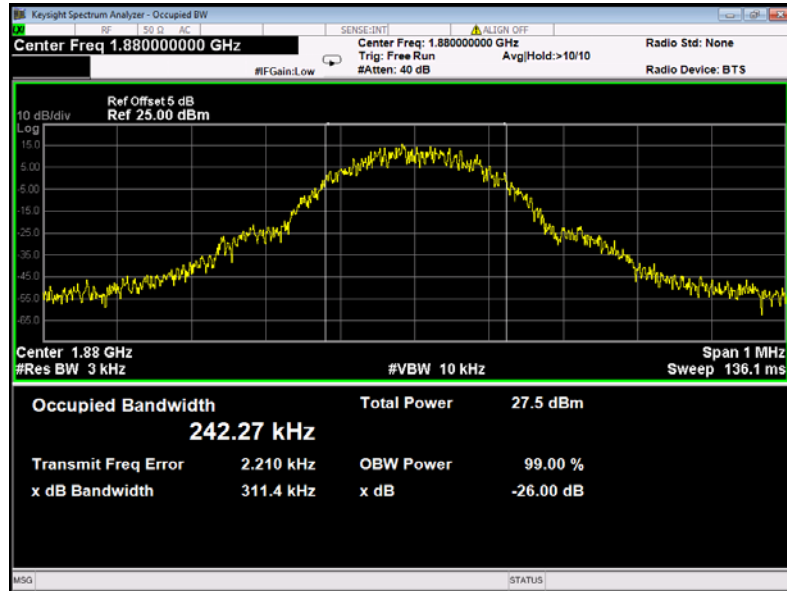


Cellular Band (Part 24E)

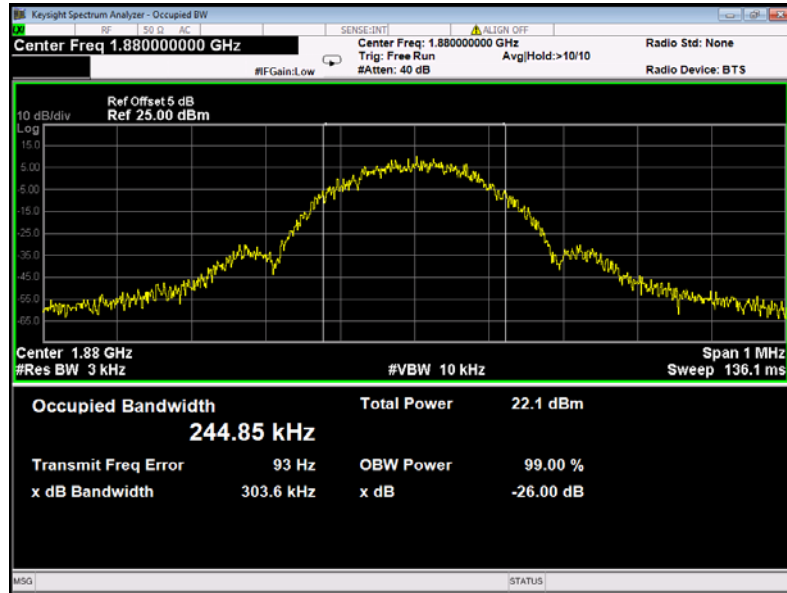
PCS 1900



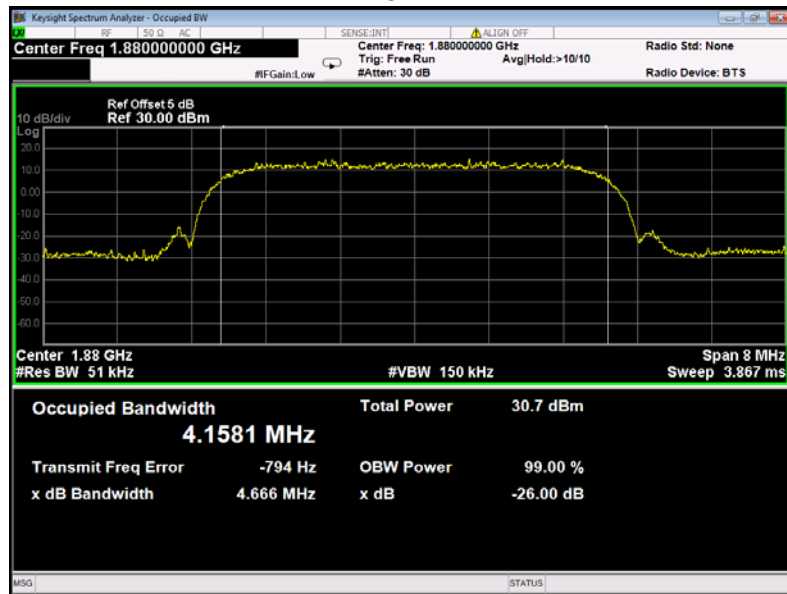
GPRS 1900



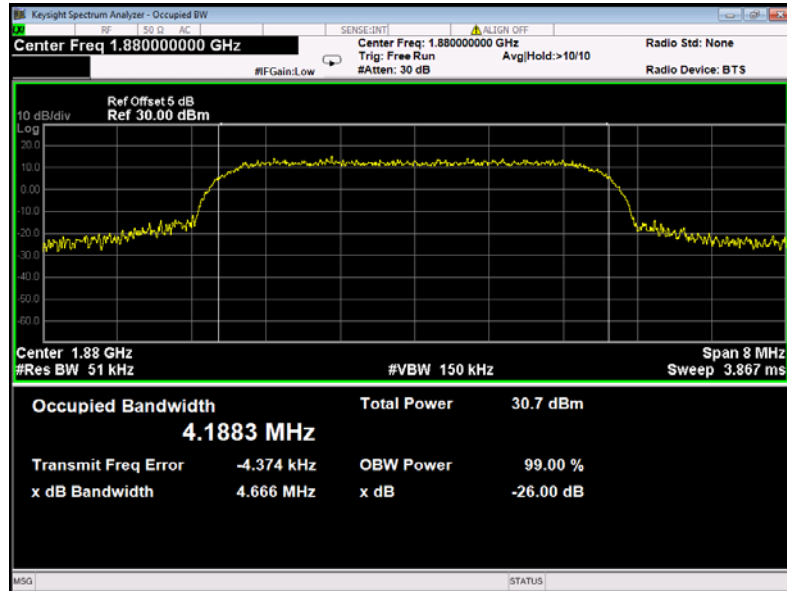
EGPRS 1900



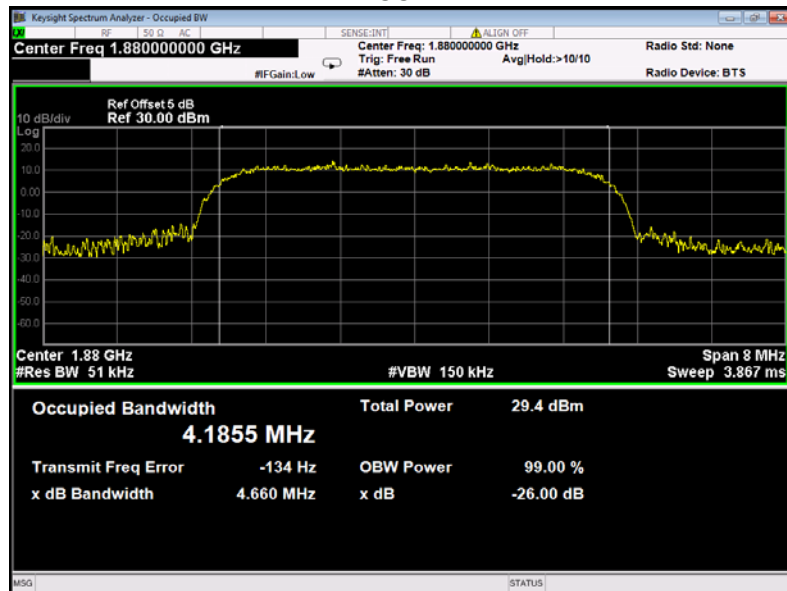
WCDMA band II  
RMC12.2k



### HSDPA



### HSUPA



## 10 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

|                   |   |
|-------------------|---|
| Test Requirement: | FCC Part 2.1051, 22.917(a), 24.238(a)   |
| Test Method:      | ANSI/TIA-603-E:2016<br>ANSI C63.26:2015 |
| Test Mode:        | TX transmitting                         |

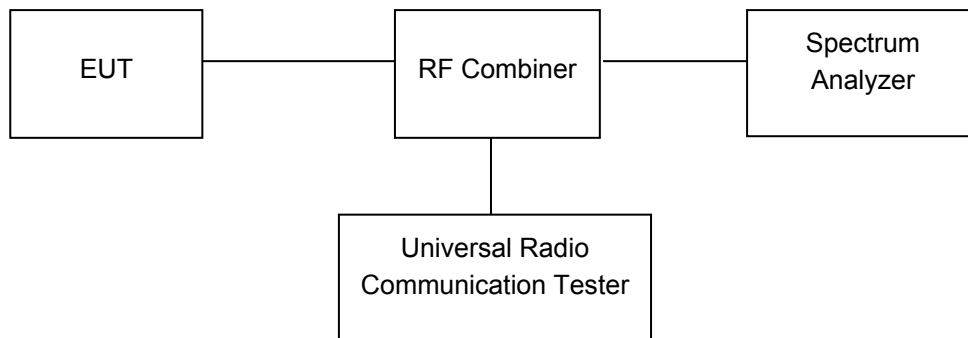
### 10.1 EUT Operation

Operating Environment :

|                       |           |
|-----------------------|-----------|
| Temperature:          | 23.5 °C   |
| Humidity:             | 52.1 % RH |
| Atmospheric Pressure: | 101.3kPa  |

### 10.2 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonics.



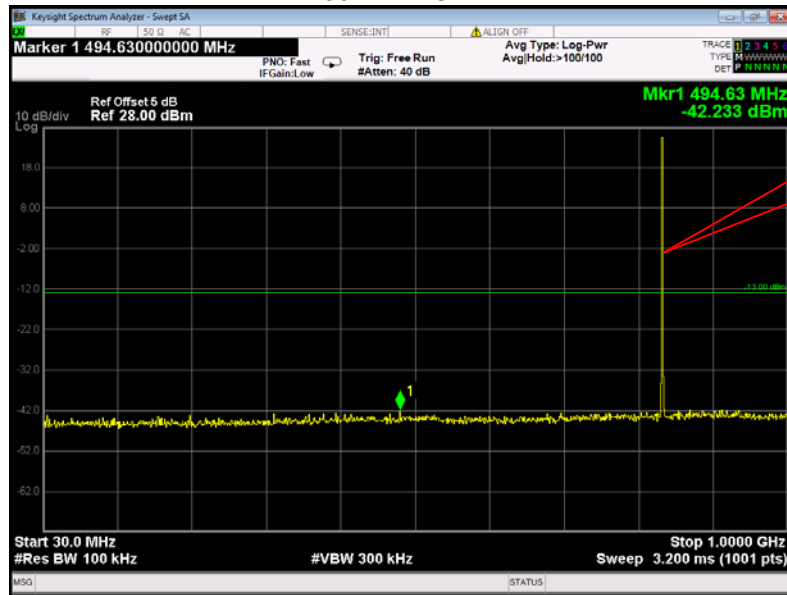
### 10.3 Test Result

Remark: All test data were reported and only the worst case (middle channel mode) test graphs were showed in test report.

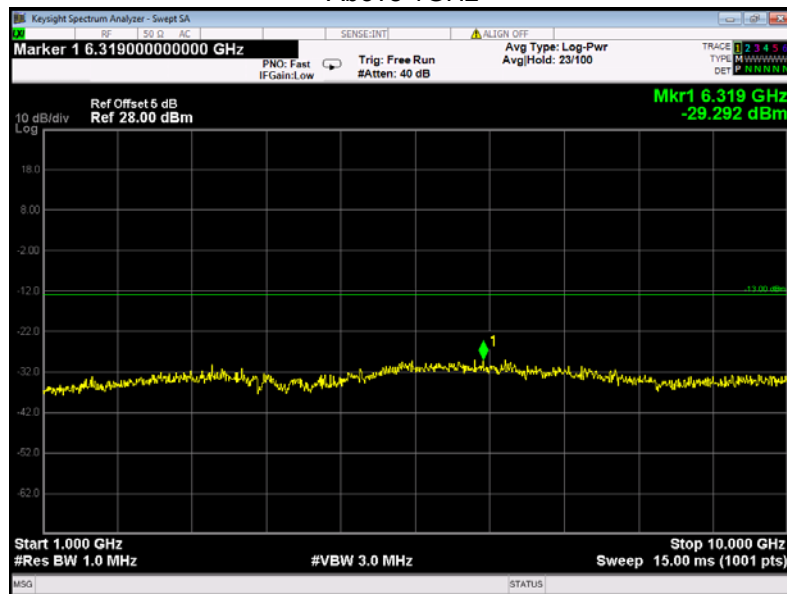
Cellular Band (Part 22H)

GSM 850 - channel 190

30MHz-1GHz



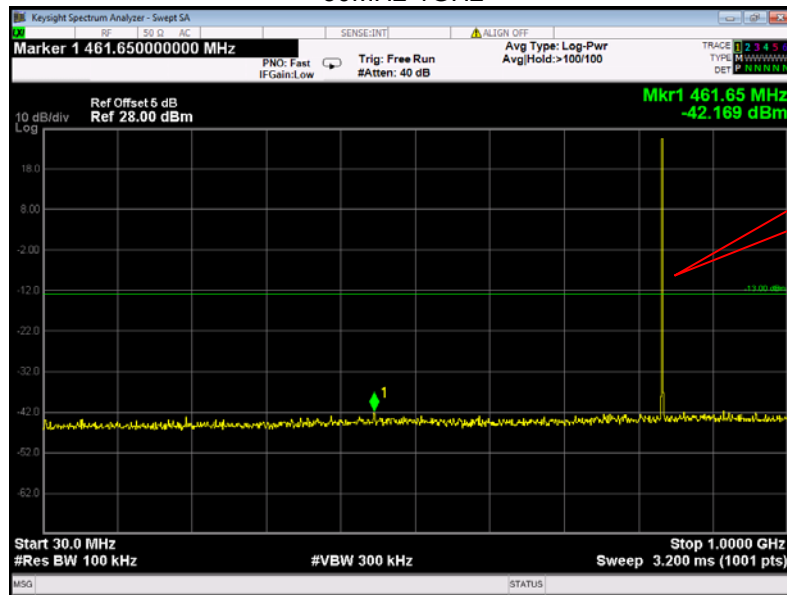
Above 1GHz



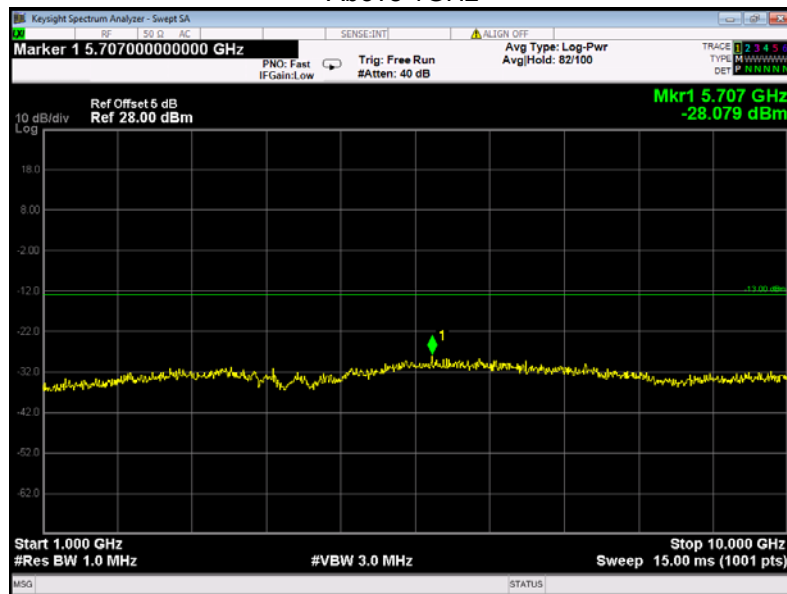
Cellular Band (Part 22H)

GPRS 850 - channel 190

30MHz-1GHz

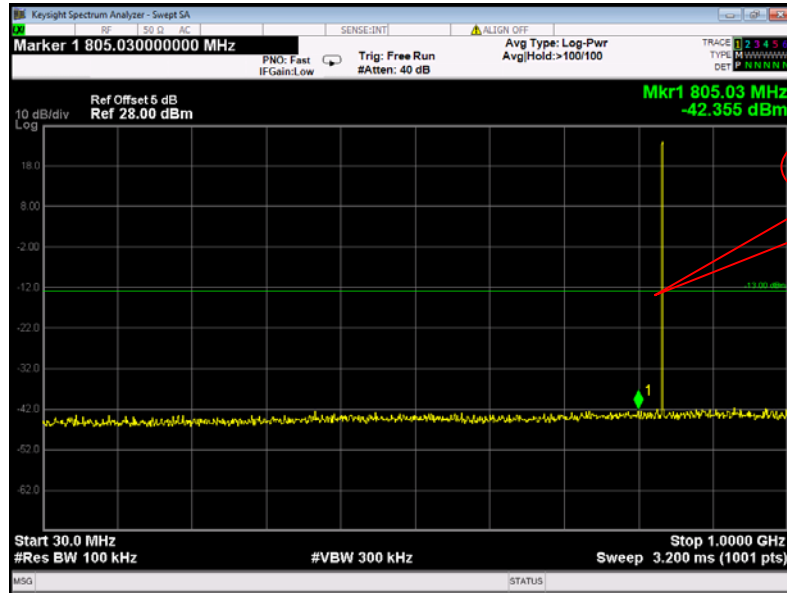


Above 1GHz

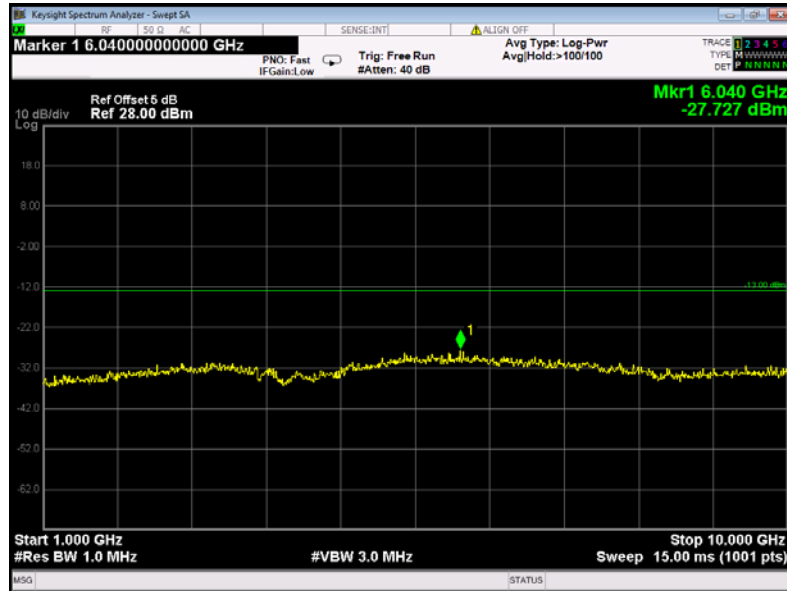




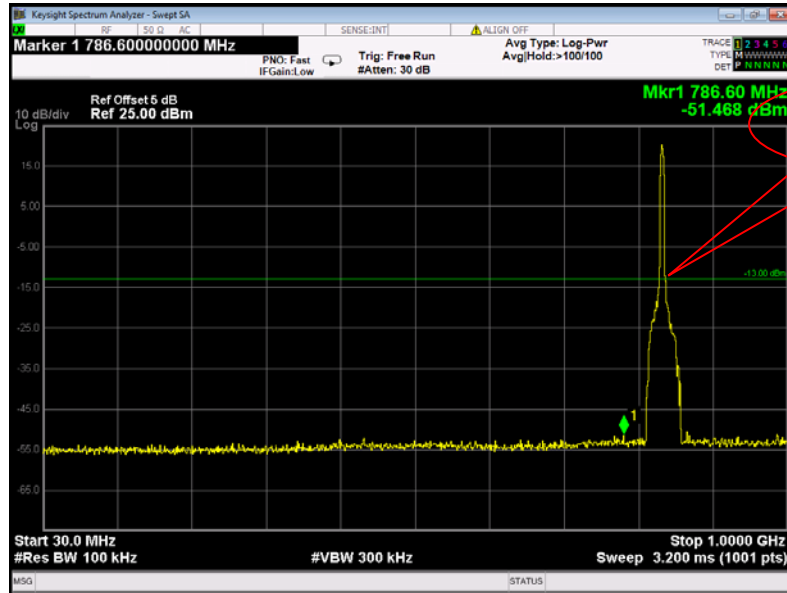
Cellular Band (Part 22H)  
EGPRS 850 - channel 190  
30MHz-1GHz



Above 1GHz

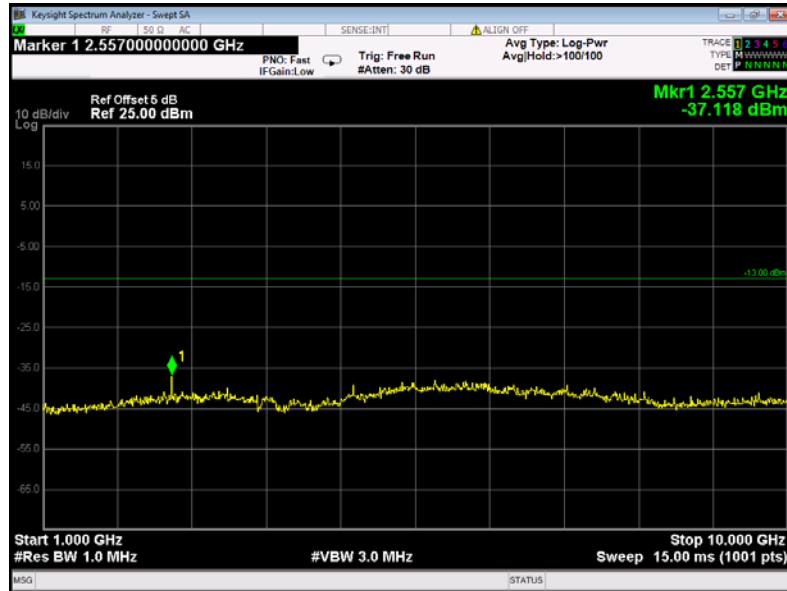


Cellular Band (Part 22H)  
WCDMA band V - channel 4183  
30MHz-1GHz



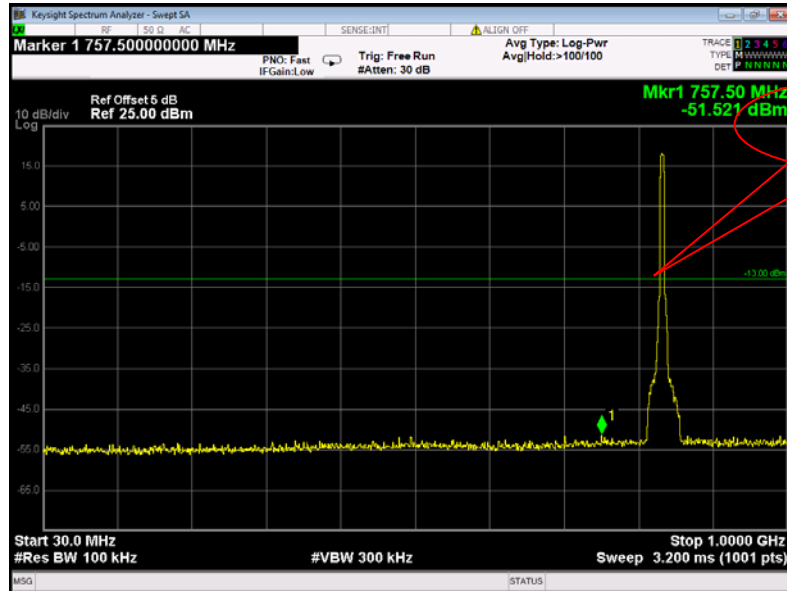
Fundamental

Above 1GHz

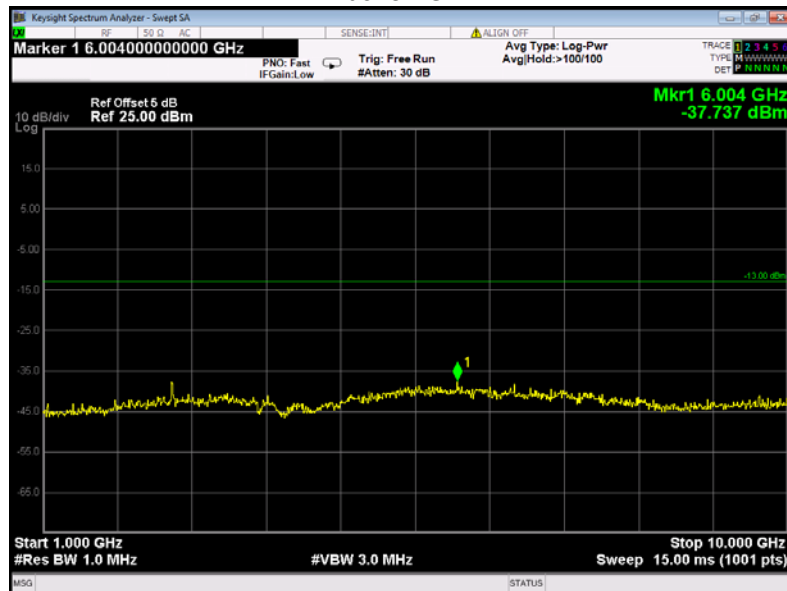


WCDMA band V - channel 4183 (HSDPA)

30MHz-1GHz

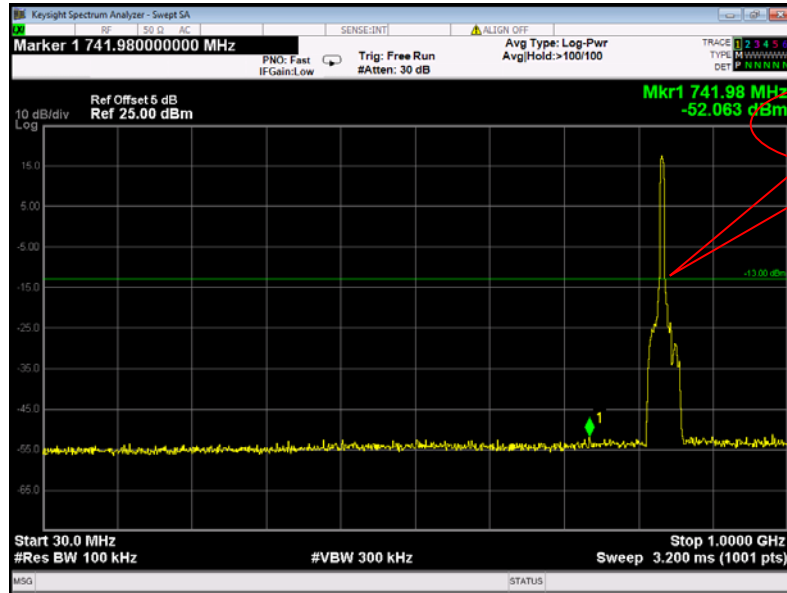


Above 1GHz



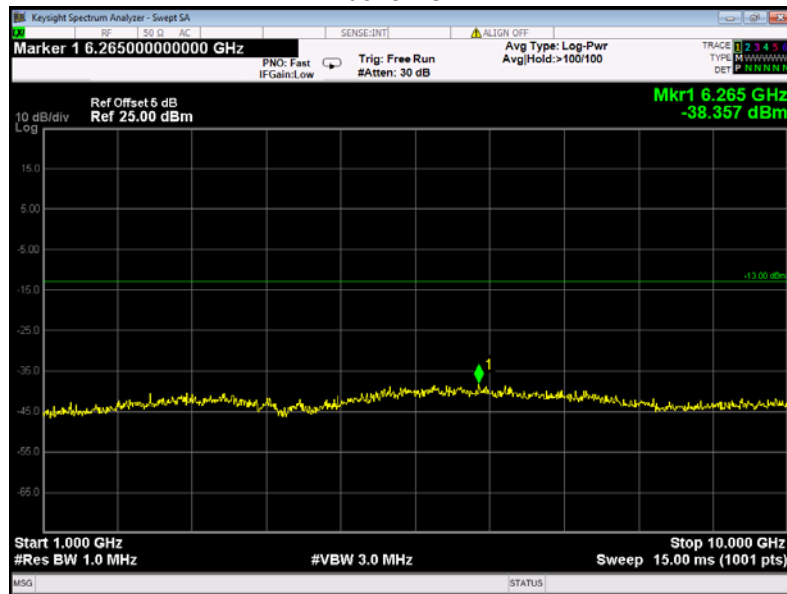
WCDMA band V - channel 4183 (HSUPA)

30MHz-1GHz



Fundamental

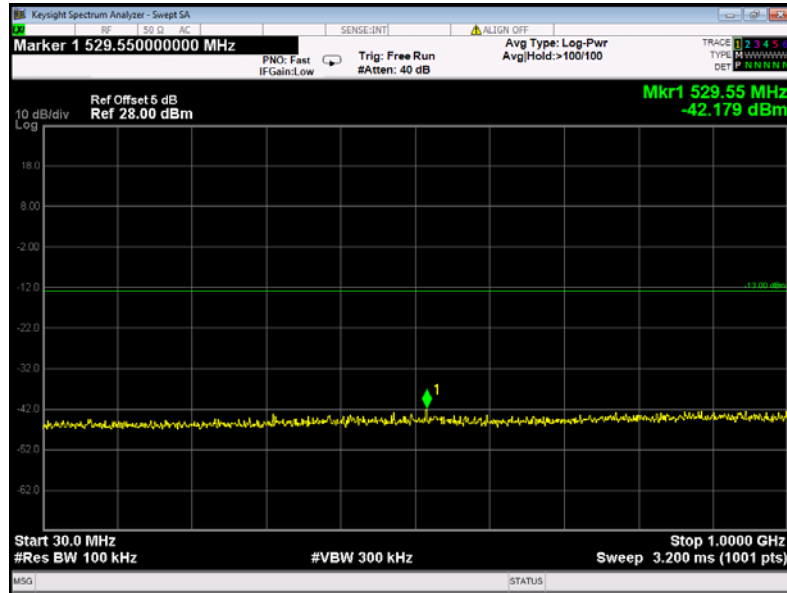
Above 1GHz



Cellular Band (Part 24E)

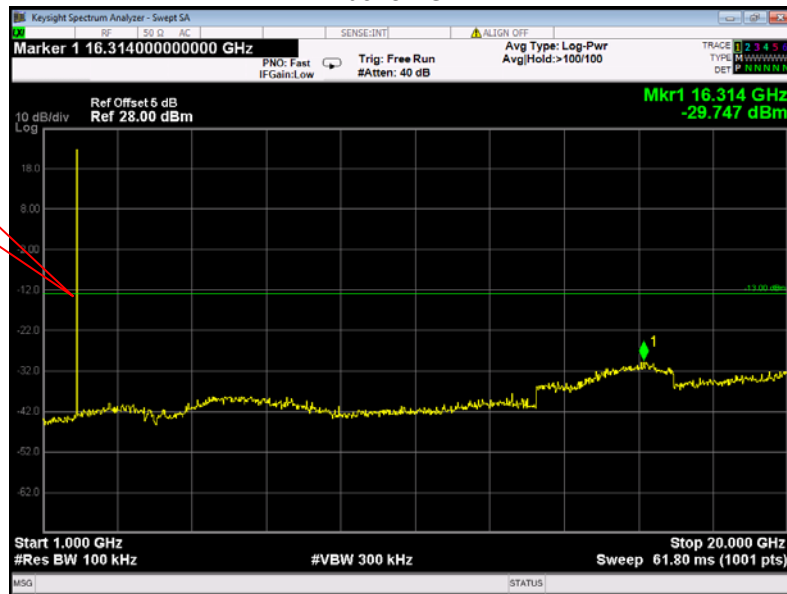
PCS 1900 - channel 661

30MHz-1GHz

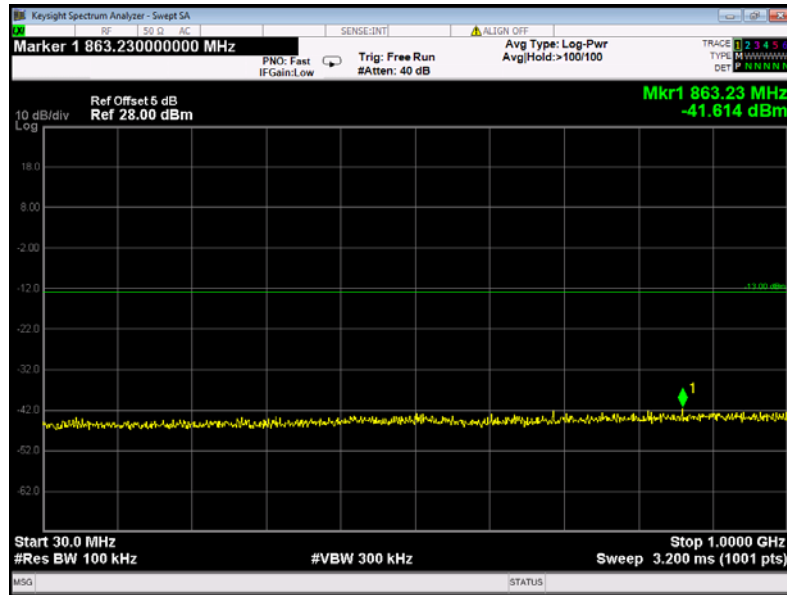


Above 1GHz

Fundamental



Cellular Band (Part 24E)  
GPRS 1900 - channel 661  
30MHz-1GHz

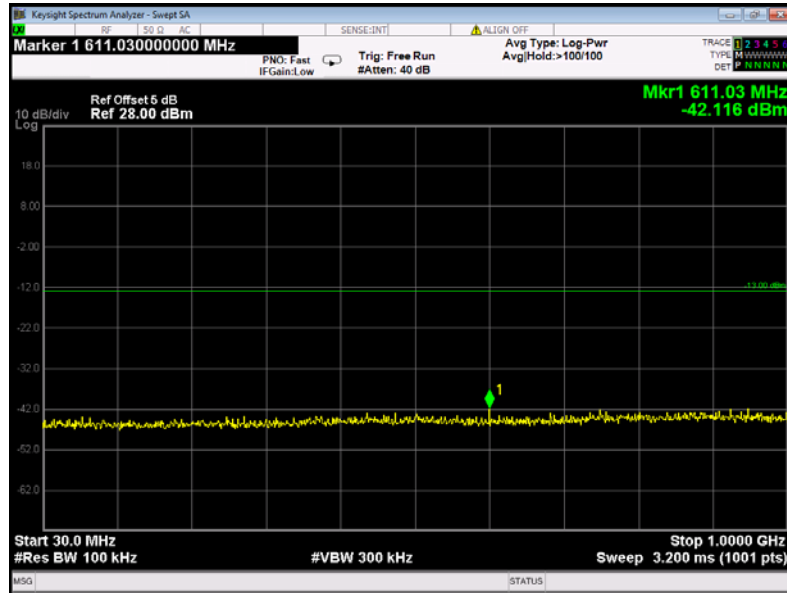


Above 1GHz

Fundamental



Cellular Band (Part 24E)  
EGPRS 1900 - channel 661  
30MHz-1GHz



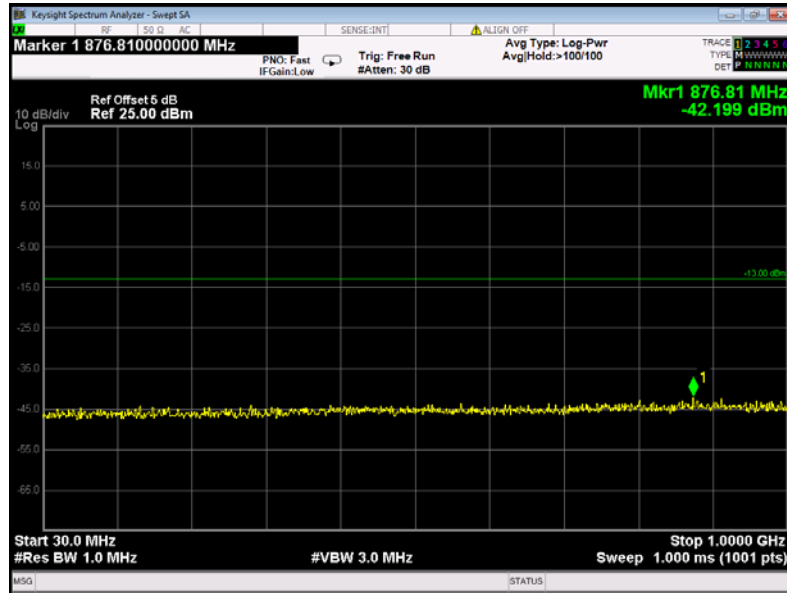
Above 1GHz

Fundamental



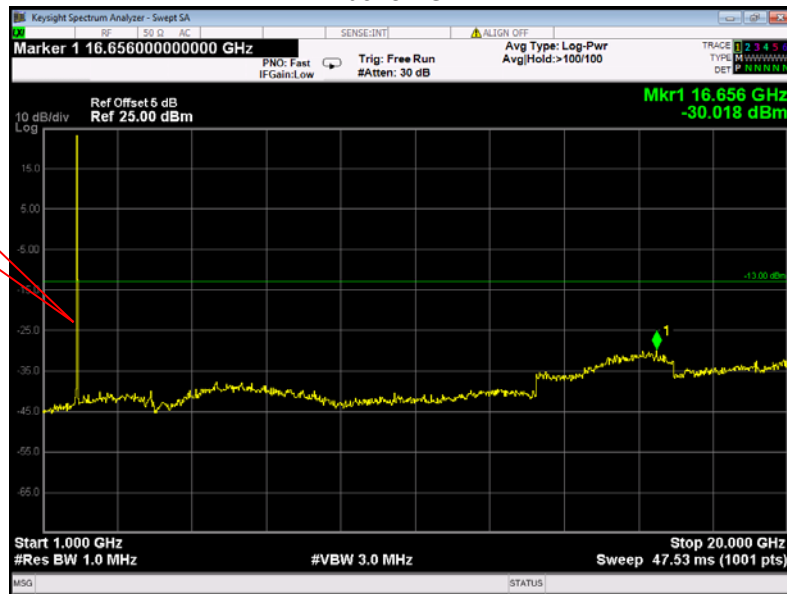
WCDMA band II - channel 9400

30MHz-1GHz



Above 1GHz

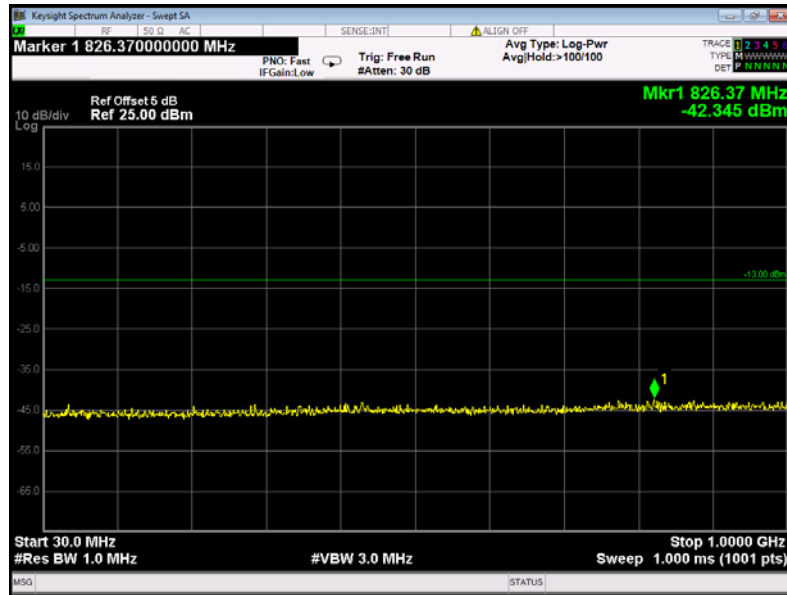
Fundamental





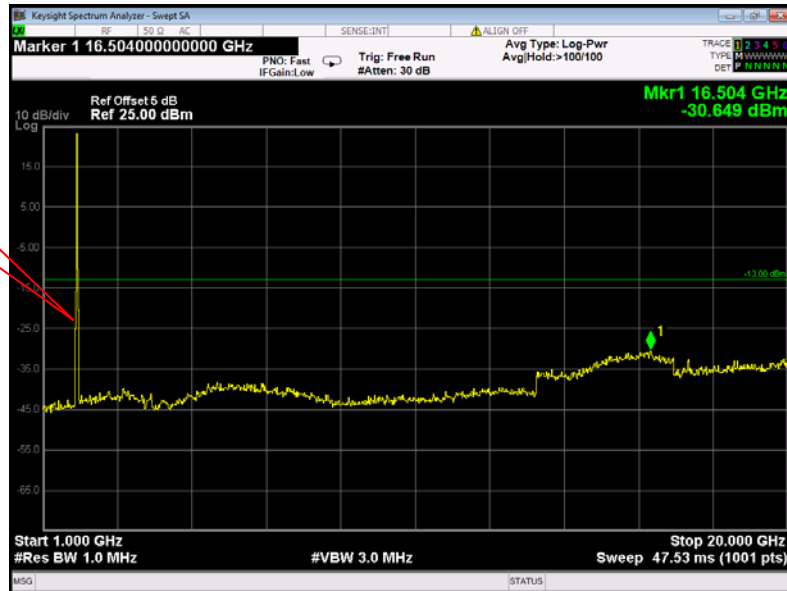
WCDMA band II - channel 9400 (HSDPA)

30MHz-1GHz



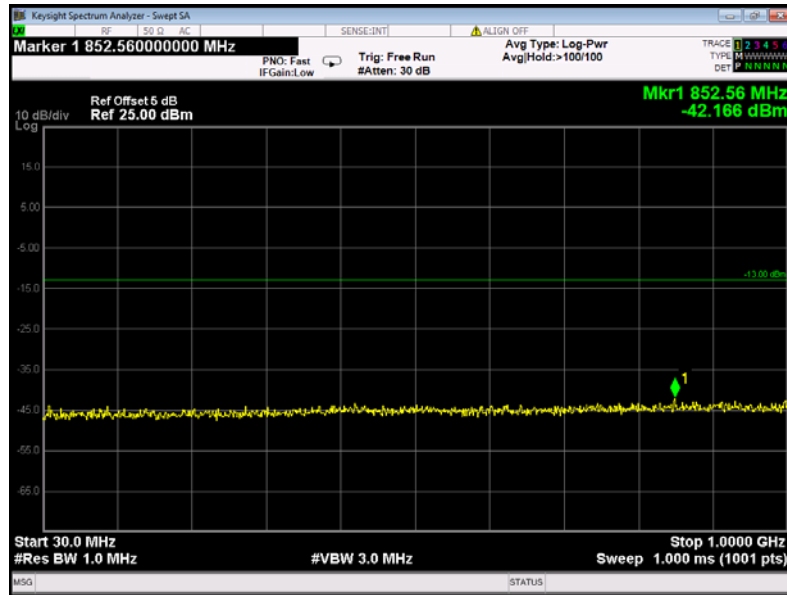
Above 1GHz

Fundamental



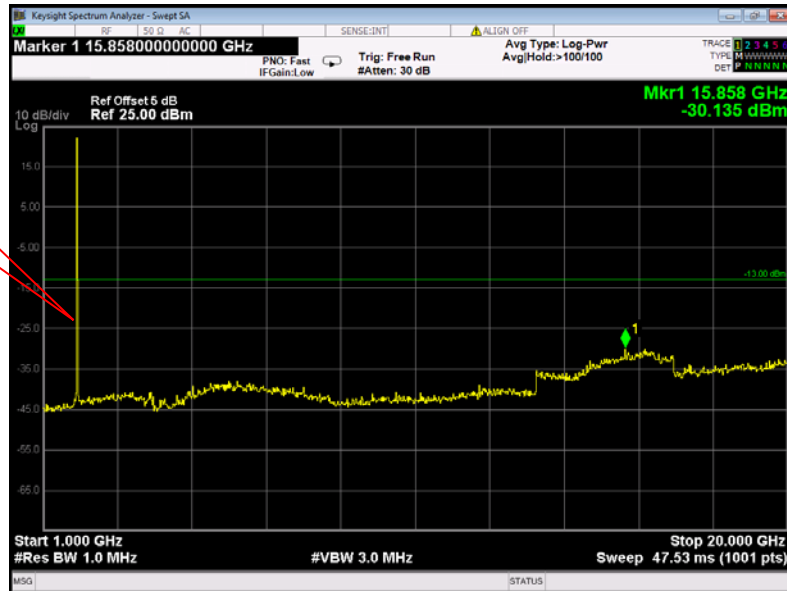
WCDMA band II - channel 9400 (HSUPA)

30MHz-1GHz



Above 1GHz

Fundamental



## 11 SPURIOUS RADIATED EMISSIONS

Test Requirement: FCC Part 2.1053, 22.917, 24.238

Test Method: ANSI/TIA-603-E:2016

ANSI C63.26:2015

Test Mode: TX transmitting

### 11.1 EUT Operation

Operating Environment :

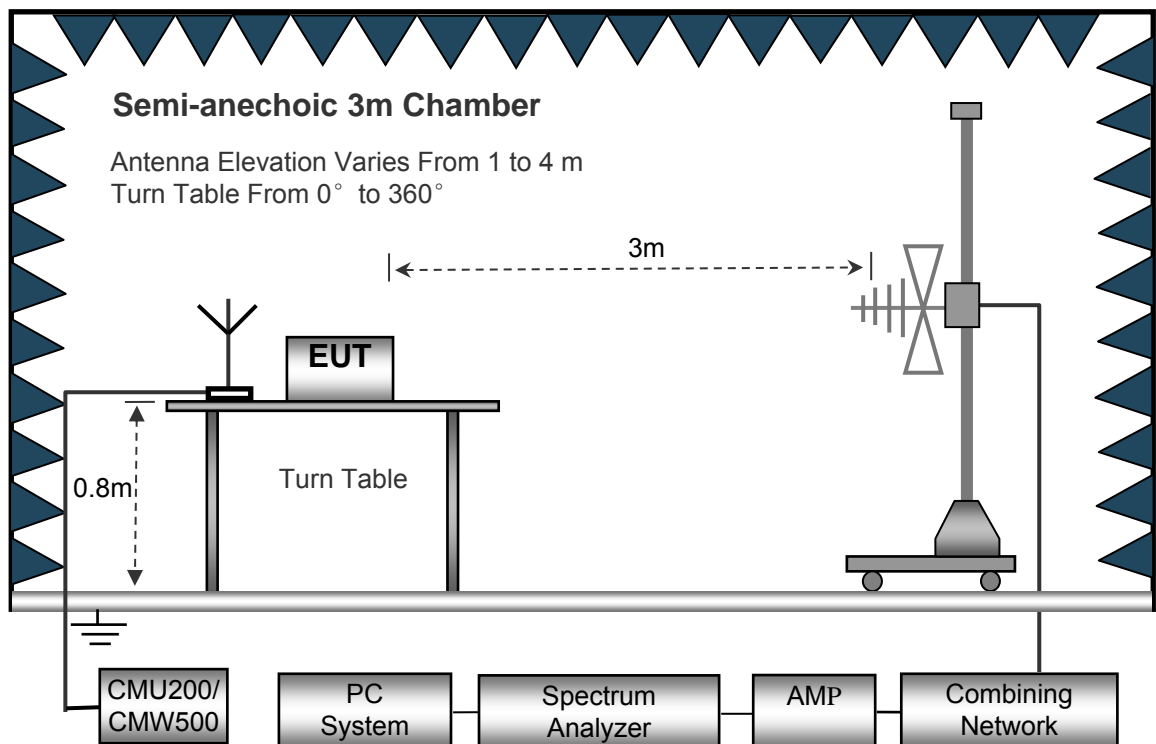
Temperature: 23.5 °C

Humidity: 52.1 % RH

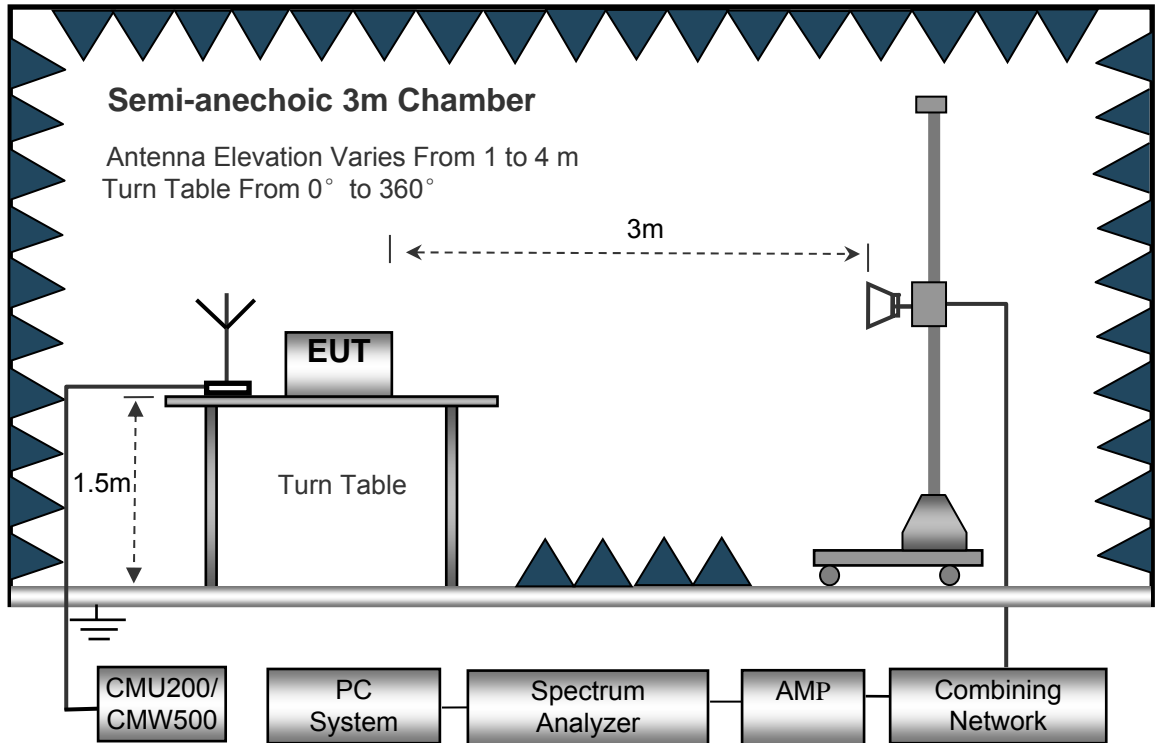
Atmospheric Pressure: 101.2kPa

### 11.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site. The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



### 11.3 Spectrum Analyzer Setup

30MHz ~ 1GHz

Sweep Speed ..... Auto  
 Detector ..... PK  
 Resolution Bandwidth..... 100kHz  
 Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed ..... Auto  
 Detector ..... PK  
 Resolution Bandwidth..... 1MHz  
 Video Bandwidth..... 3MHz  
 Detector ..... Ave.  
 Resolution Bandwidth..... 1MHz  
 Video Bandwidth..... 10Hz

## 11.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m for below 1GHz and 1.5m for above 1GHz above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from 30MHz up to the tenth harmonic of the highest fundamental frequency.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the Z position. So the data shown was the Z position only.
7. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.  
Spurious emissions in dB =  $10 \lg(\text{TXpwr in Watts}/0.001)$  – the absolute level  
Spurious attenuation limit in dB =  $43 + 10 \text{Log}_{10}(\text{power out in Watts})$
8. Repeat above procedures until the measurements for all frequencies are completed.

## 11.5 Summary of Test Results

For 26MHz~30MHz,

The measurements were more than 20 dB below the limit and not reported.

Remark: Test performed from 30MHz to 10<sup>th</sup> harmonics with low/middle/high channels, only the worst data were recorded.

### Cellular Band (Part 22H)

| Frequency                 | Receiver Reading | Turn table Angle | RX Antenna |       | Substituted |       |              | Absolute Level | Result |        |
|---------------------------|------------------|------------------|------------|-------|-------------|-------|--------------|----------------|--------|--------|
|                           |                  |                  | Height     | Polar | SG Level    | Cable | Antenna Gain |                | Limit  | Margin |
| (MHz)                     | (dBμV)           | Degree           | (m)        | (H/V) | (dBm)       | (dB)  | (dB)         | (dBm)          | (dBm)  | (dB)   |
| GSM 850 Channel 128       |                  |                  |            |       |             |       |              |                |        |        |
| 223.12                    | 42.36            | 266              | 1.7        | H     | -68.15      | 0.15  | 0.00         | -68.30         | -13.00 | -55.30 |
| 223.12                    | 44.55            | 21               | 1.2        | V     | -63.04      | 0.15  | 0.00         | -63.19         | -13.00 | -50.19 |
| 1648.40                   | 66.43            | 279              | 1.1        | H     | -47.54      | 0.30  | 9.40         | -38.44         | -13.00 | -25.44 |
| 1648.40                   | 58.20            | 83               | 1.2        | V     | -55.33      | 0.30  | 9.40         | -46.23         | -13.00 | -33.23 |
| 2472.60                   | 58.35            | 128              | 1.0        | H     | -55.65      | 0.43  | 10.60        | -45.48         | -13.00 | -32.48 |
| 2472.60                   | 48.45            | 324              | 1.5        | V     | -61.83      | 0.43  | 10.60        | -51.66         | -13.00 | -38.66 |
| WCDMA Band V Channel 4233 |                  |                  |            |       |             |       |              |                |        |        |
| 199.38                    | 41.01            | 213              | 1.5        | H     | -69.50      | 0.15  | 0.00         | -69.65         | -13.00 | -56.65 |
| 199.38                    | 45.67            | 130              | 1.2        | V     | -61.92      | 0.15  | 0.00         | -62.07         | -13.00 | -49.07 |
| 1693.20                   | 58.88            | 271              | 1.8        | H     | -55.09      | 0.30  | 9.40         | -45.99         | -13.00 | -32.99 |
| 1693.20                   | 48.74            | 282              | 2.2        | V     | -64.79      | 0.30  | 9.40         | -55.69         | -13.00 | -42.69 |
| 2539.80                   | 47.82            | 268              | 1.0        | H     | -66.18      | 0.43  | 10.60        | -56.01         | -13.00 | -43.01 |
| 2539.80                   | 39.00            | 318              | 1.4        | V     | -71.28      | 0.43  | 10.60        | -61.11         | -13.00 | -48.11 |

## Cellular Band (Part 24E)

| Frequency                  | Receiver Reading | Turn table Angle | RX Antenna |       | Substituted |       |              | Absolute Level | Result |        |
|----------------------------|------------------|------------------|------------|-------|-------------|-------|--------------|----------------|--------|--------|
|                            |                  |                  | Height     | Polar | SG Level    | Cable | Antenna Gain |                | Limit  | Margin |
| (MHz)                      | (dB $\mu$ V)     | Degree           | (m)        | (H/V) | (dBm)       | (dB)  | (dB)         | (dBm)          | (dBm)  | (dB)   |
| PCS 1900 Channel 512       |                  |                  |            |       |             |       |              |                |        |        |
| 223.12                     | 49.90            | 218              | 1.1        | H     | -60.61      | 0.15  | 0.00         | -60.76         | -13.00 | -47.76 |
| 223.12                     | 40.84            | 360              | 2.0        | V     | -66.75      | 0.15  | 0.00         | -66.90         | -13.00 | -53.90 |
| 3700.40                    | 65.95            | 141              | 1.9        | H     | -45.59      | 2.37  | 12.50        | -35.46         | -13.00 | -22.46 |
| 3700.40                    | 59.98            | 139              | 2.0        | V     | -49.83      | 2.37  | 12.50        | -39.70         | -13.00 | -26.70 |
| 5550.60                    | 53.58            | 214              | 1.1        | H     | -56.03      | 2.86  | 12.90        | -45.99         | -13.00 | -32.99 |
| 5550.60                    | 44.73            | 288              | 2.0        | V     | -64.15      | 2.86  | 12.90        | -54.11         | -13.00 | -41.11 |
| WCDMA Band II Channel 9400 |                  |                  |            |       |             |       |              |                |        |        |
| 199.38                     | 47.93            | 77               | 2.0        | H     | -62.58      | 0.15  | 0.00         | -62.73         | -13.00 | -49.73 |
| 199.38                     | 39.12            | 197              | 2.0        | V     | -68.47      | 0.15  | 0.00         | -68.62         | -13.00 | -55.62 |
| 3760.00                    | 58.49            | 310              | 1.3        | H     | -53.05      | 2.37  | 12.50        | -42.92         | -13.00 | -29.92 |
| 3760.00                    | 53.66            | 257              | 1.6        | V     | -56.15      | 2.37  | 12.50        | -46.02         | -13.00 | -33.02 |
| 5640.00                    | 46.06            | 311              | 2.0        | H     | -63.55      | 2.86  | 12.90        | -53.51         | -13.00 | -40.51 |
| 5640.00                    | 38.50            | 297              | 2.0        | V     | -70.38      | 2.86  | 12.90        | -60.34         | -13.00 | -47.34 |

Note: 1) Absolute Level = SG Level - Cable loss + Antenna Gain

2) Margin = Limit- Absolute Level

## 12 Band Edge Measurement

|                   |   |
|-------------------|---|
| Test Requirement: | FCC Part 2.1051, 22.917(a), 24.238(a)   |
| Test Method:      | ANSI/TIA-603-E:2016<br>ANSI C63.26:2015 |
| Test Mode:        | TX transmitting                         |

### 12.1 EUT Operation

Operating Environment :

|                       |           |
|-----------------------|-----------|
| Temperature:          | 23.5 °C   |
| Humidity:             | 52.3 % RH |
| Atmospheric Pressure: | 101.3kPa  |

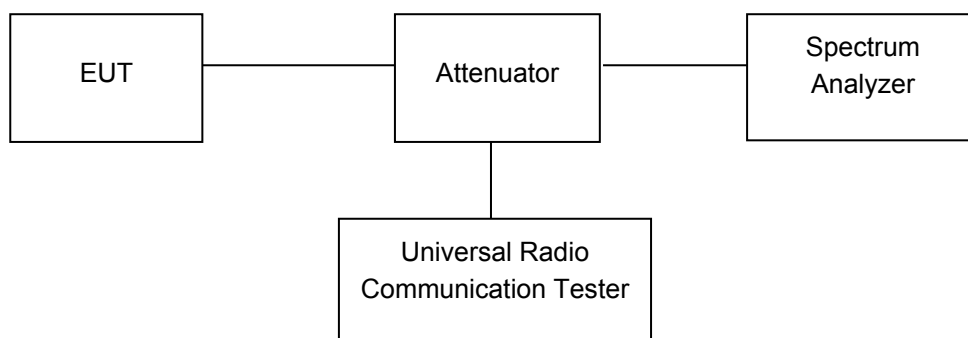
### 12.2 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

According to FCC Part 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the TX transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

According to FCC Part 24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the TX transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

The center of the spectrum analyzer was set to block edge frequency



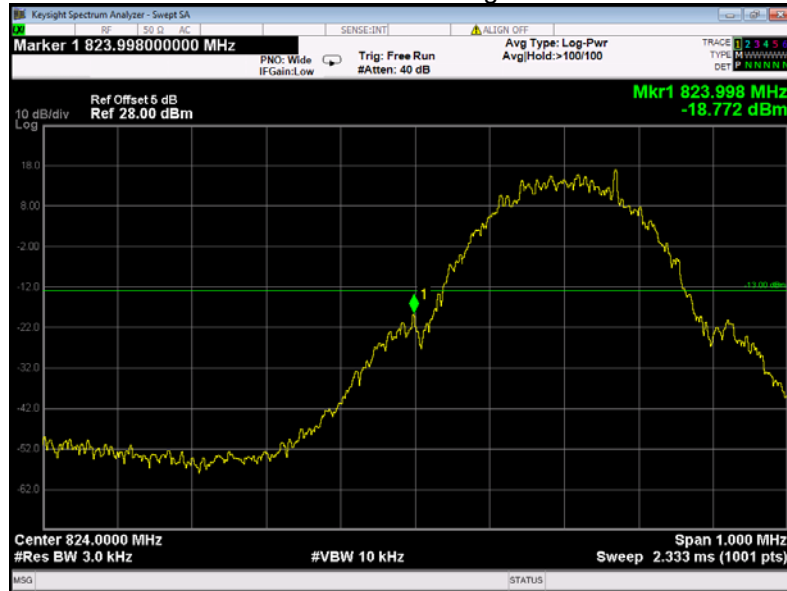


### 12.3 Test Result

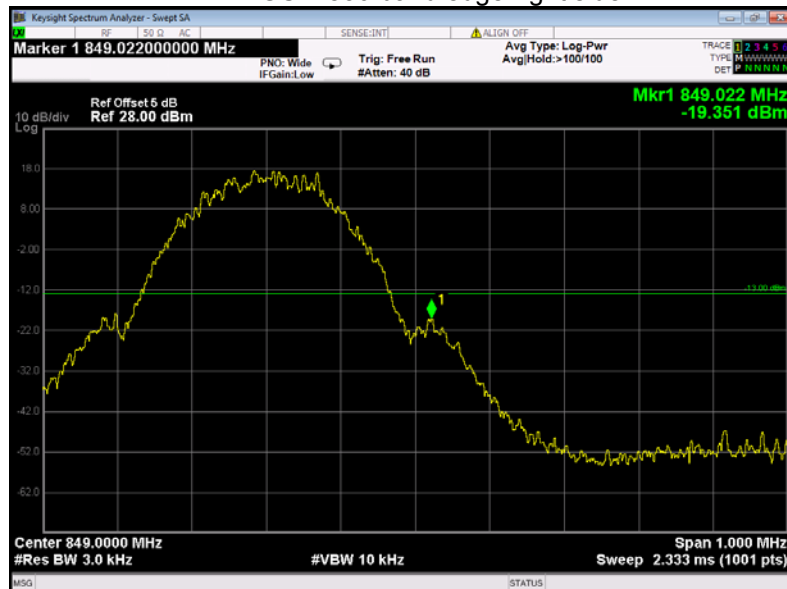
Test plots

Cellular Band (Part 22H)

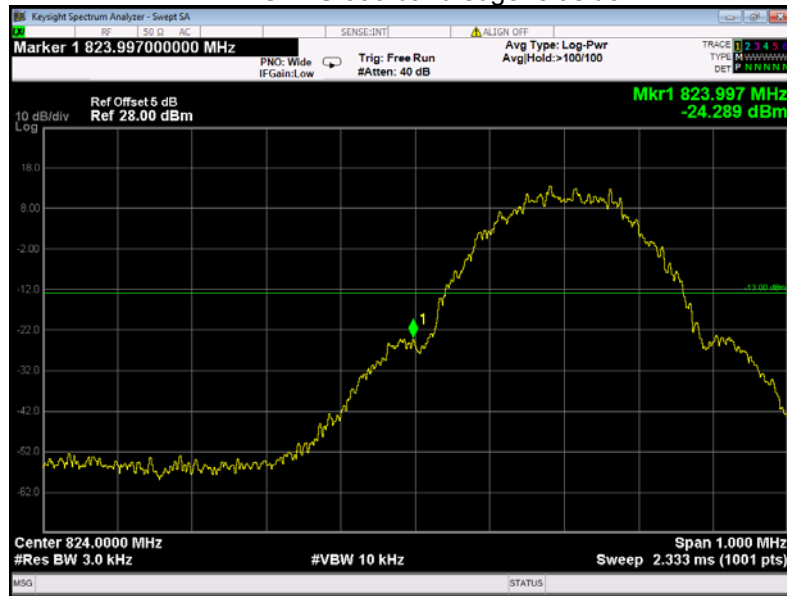
GSM 850 band edge-left side



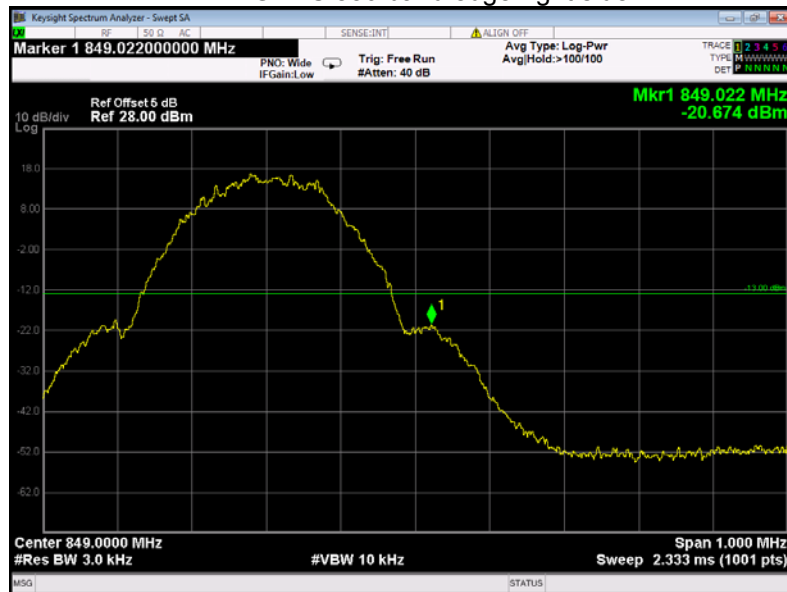
GSM 850 band edge-right side



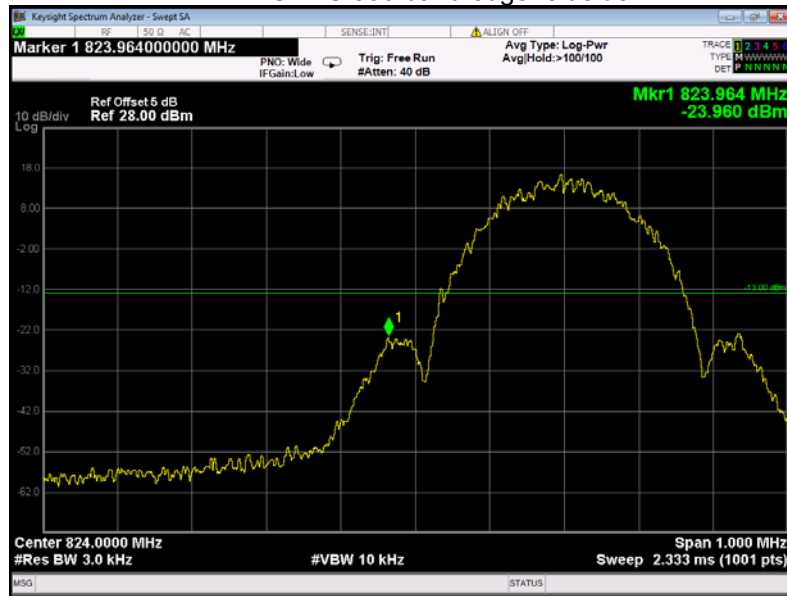
GPRS 850 band edge-left side



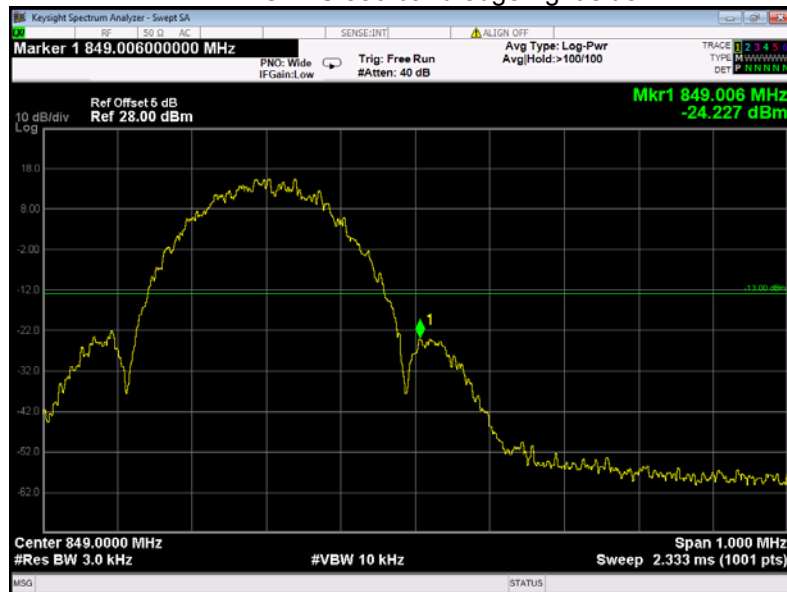
GPRS 850 band edge-right side



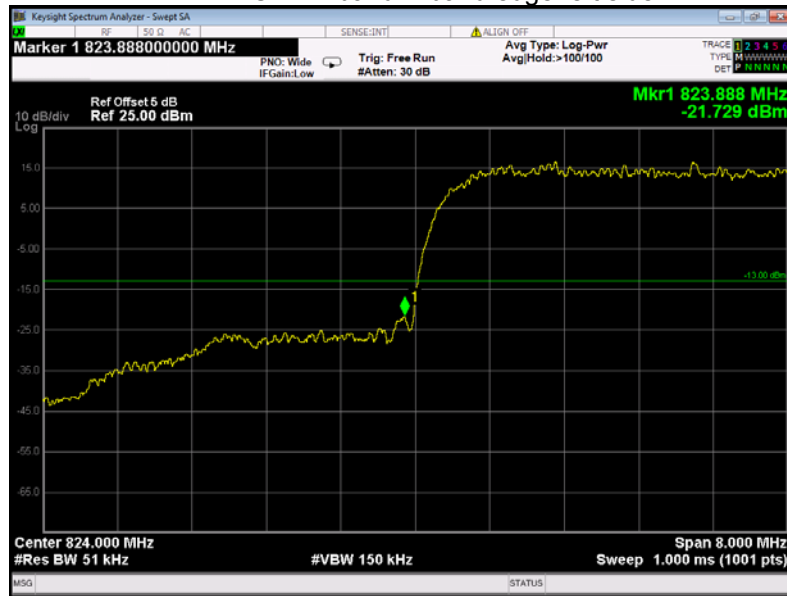
EGPRS 850 band edge-left side



EGPRS 850 band edge-right side



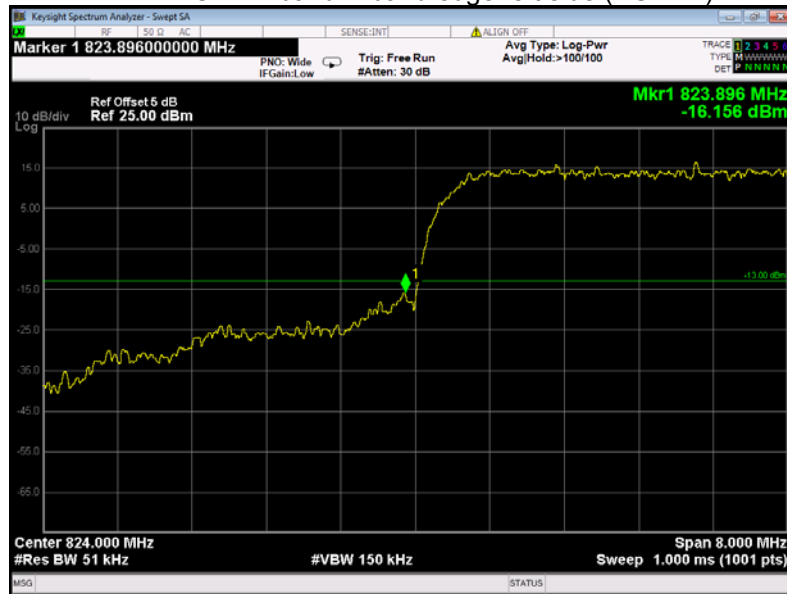
WCDMA band V band edge-left side



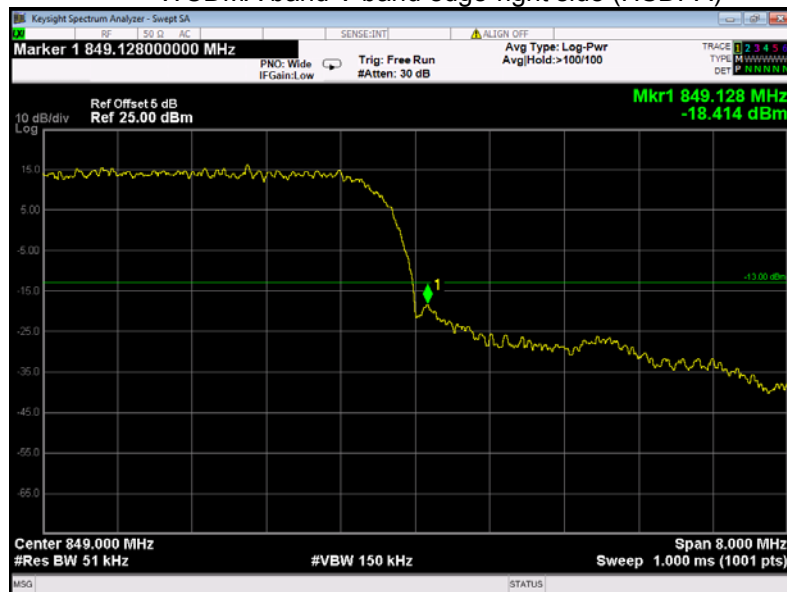
WCDMA band V band edge-right side



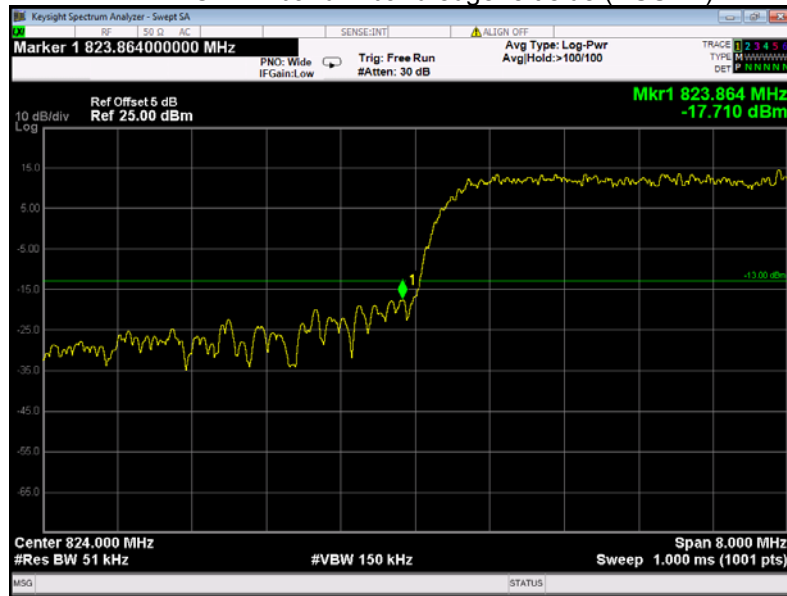
WCDMA band V band edge-left side (HSDPA)



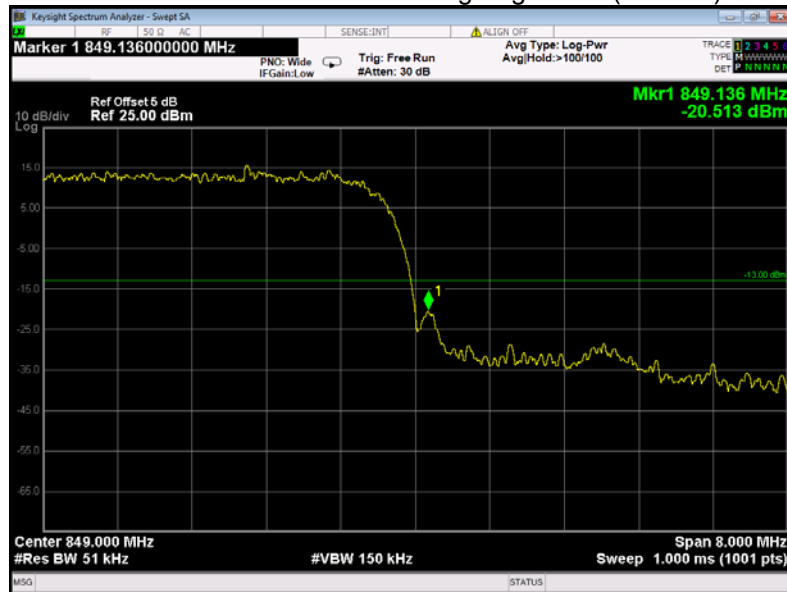
WCDMA band V band edge-right side (HSDPA)



WCDMA band V band edge-left side (HSUPA)

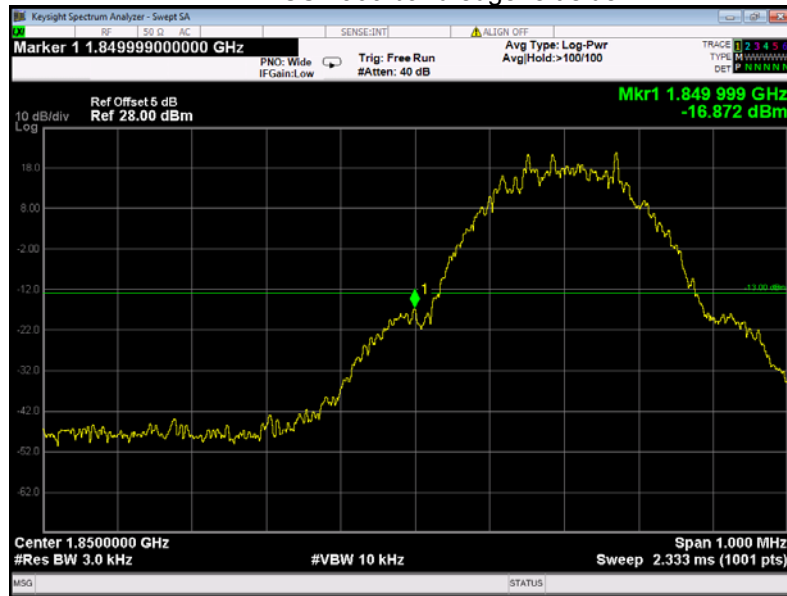


WCDMA band V band edge-right side (HSUPA)

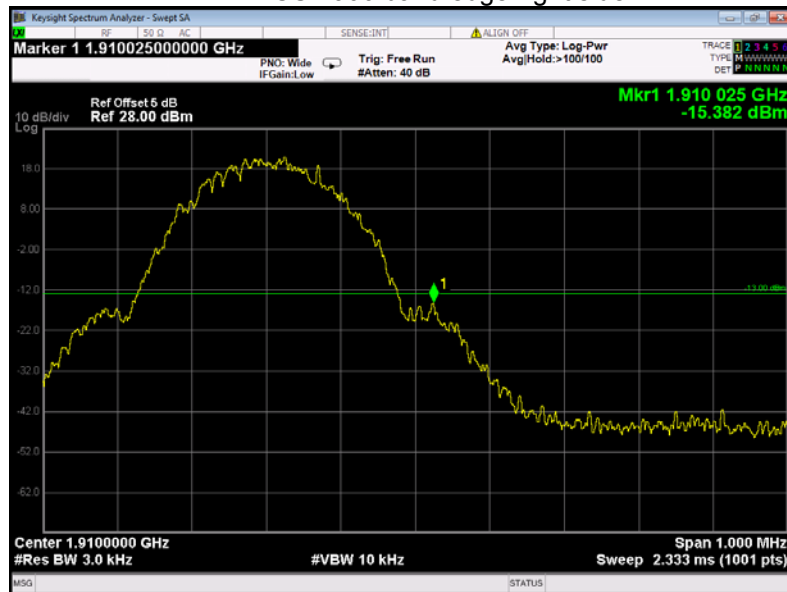


Cellular Band (Part 24E)

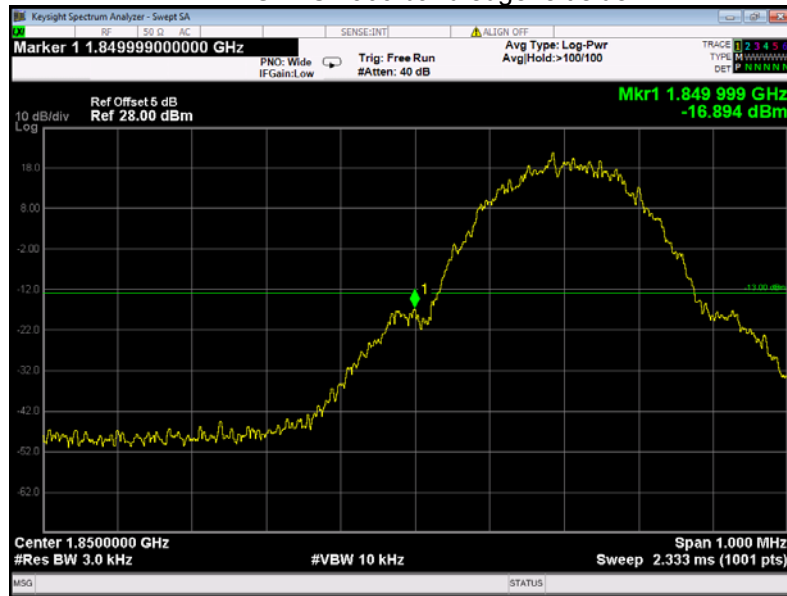
PCS 1900 band edge-left side



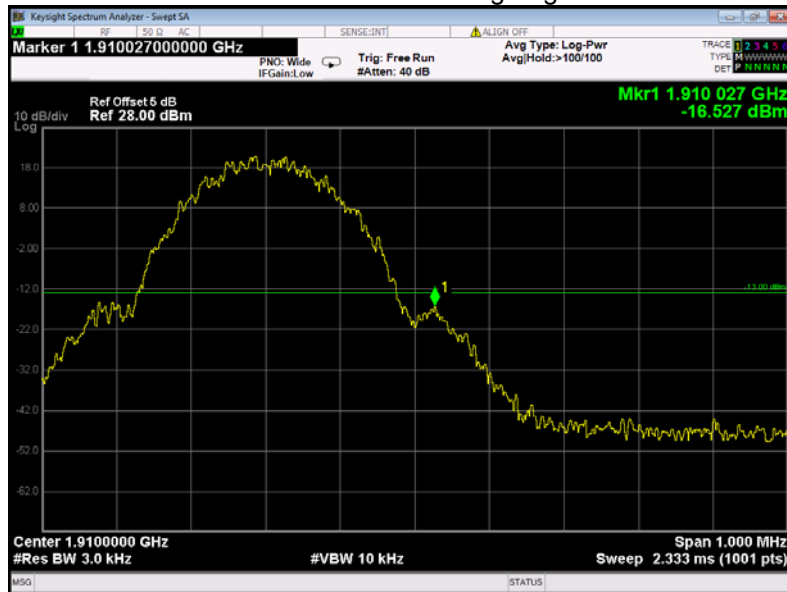
PCS 1900 band edge-right side



GPRS 1900 band edge-left side

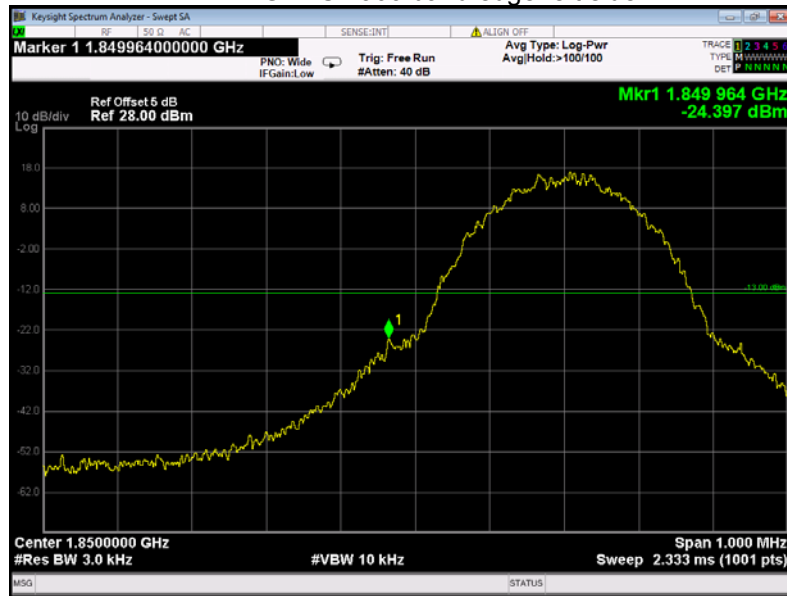


GPRS 1900 band edge-right side

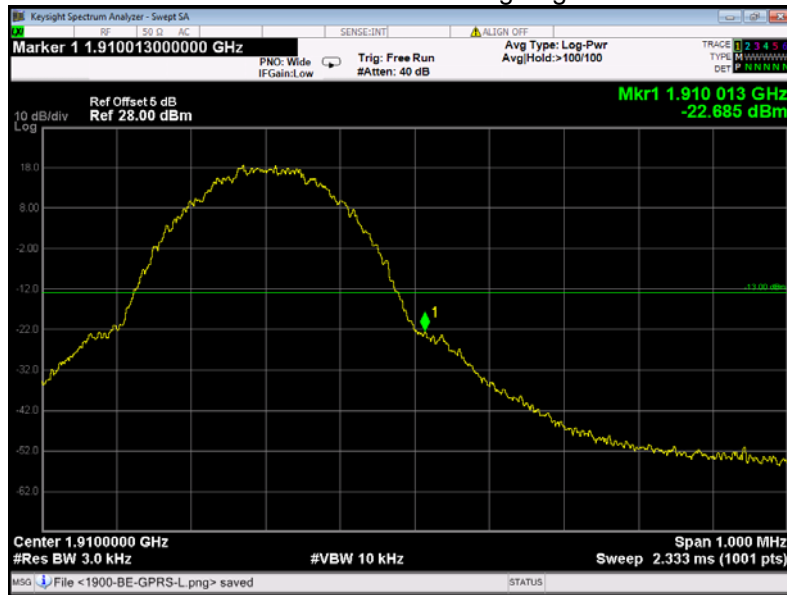




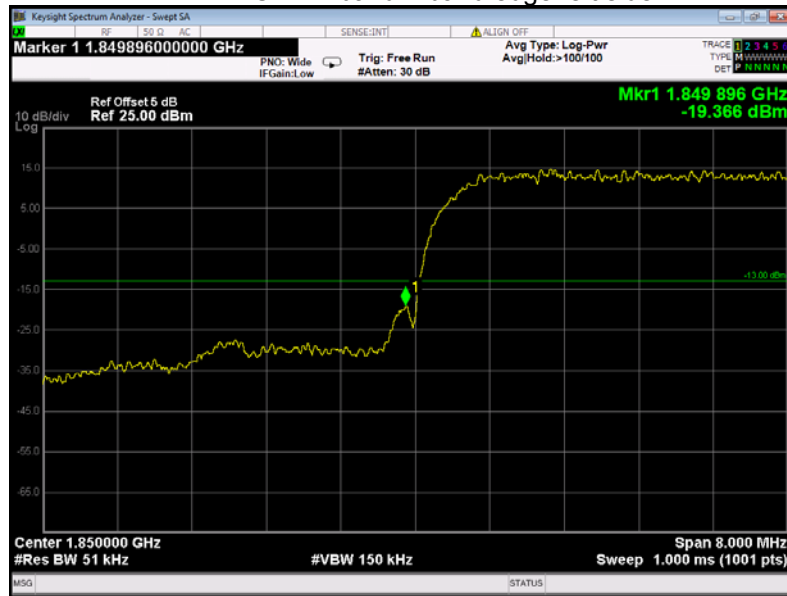
EGPRS 1900 band edge-left side



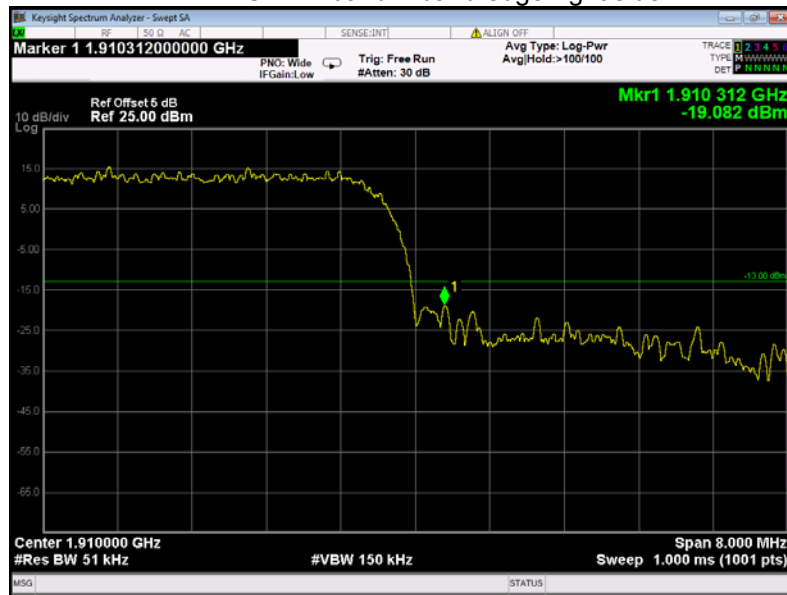
EGPRS 1900 band edge-right side



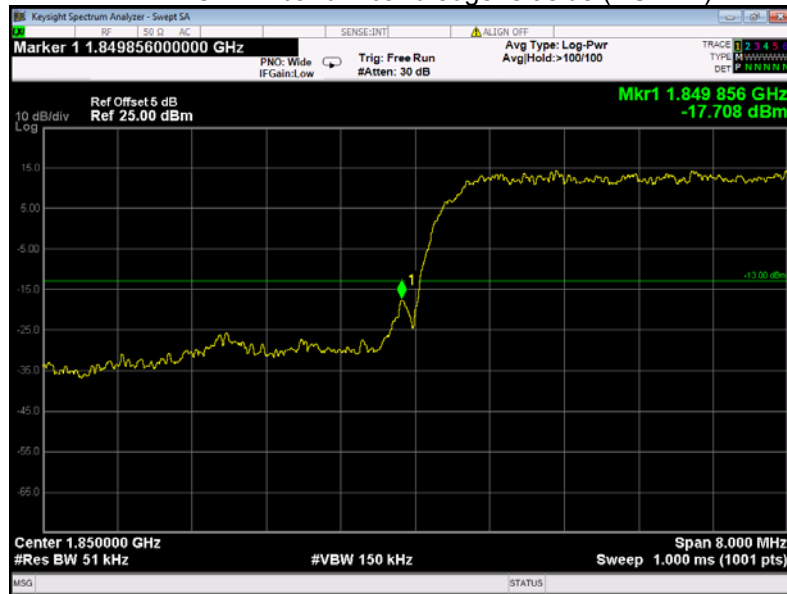
WCDMA band II band edge-left side



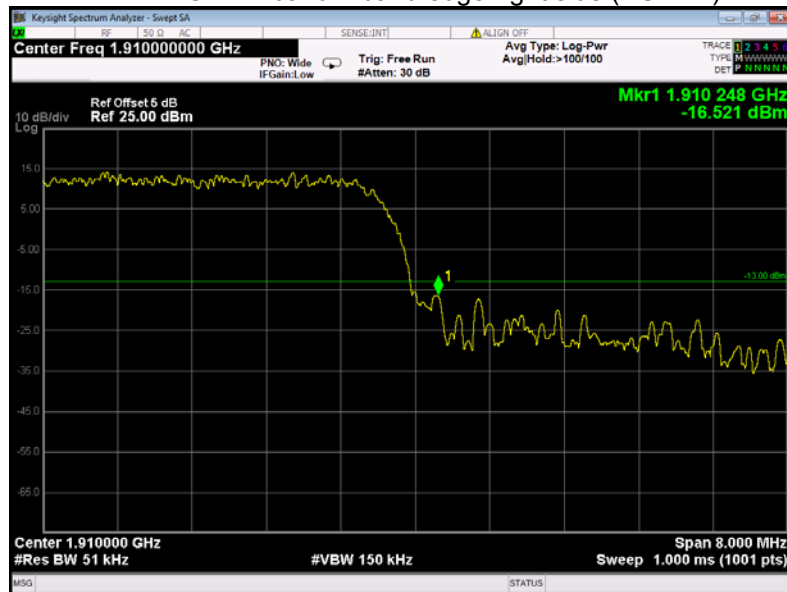
WCDMA band II band edge-right side



WCDMA band II band edge-left side (HSDPA)



WCDMA band II band edge-right side (HSDPA)



WCDMA band II band edge-left side (HSUPA)



WCDMA band II band edge-right side (HSUPA)



## 13 FREQUENCY STABILITY

|                   |   |
|-------------------|---|
| Test Requirement: | FCC Part 2.1055, 22.355, 24.235         |
| Test Method:      | ANSI/TIA-603-E:2016<br>ANSI C63.26:2015 |
| Test Mode:        | TX transmitting                         |

### 13.1 EUT Operation

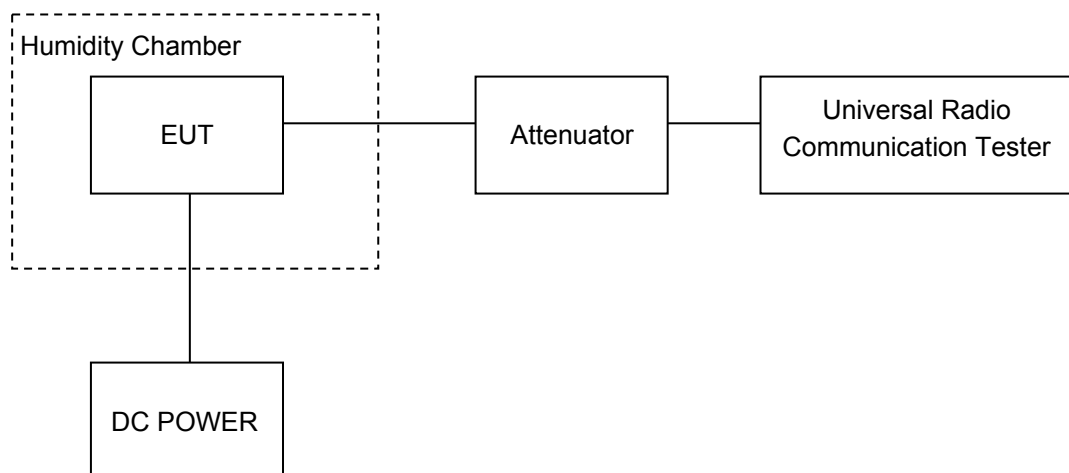
|                         |           |
|-------------------------|-----------|
| Operating Environment : |           |
| Temperature:            | 22.9 °C   |
| Humidity:               | 52.0 % RH |
| Atmospheric Pressure:   | 101.3kPa  |

### 13.2 Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: For hand carried, battery powered equipment; reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.



### 13.3 Test Result

Cellular Band (Part 22H)

| GSM 850 Test Frequency:836.6MHz |                    |                      |                       |             |
|---------------------------------|--------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                | Power Supply (VDC) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| 50                              | 3.8                | 12                   | 0.0143                | 2.5         |
| 40                              |                    | 9                    | 0.0108                | 2.5         |
| 30                              |                    | 15                   | 0.0179                | 2.5         |
| 20                              |                    | 7                    | 0.0084                | 2.5         |
| 10                              |                    | 9                    | 0.0108                | 2.5         |
| 0                               |                    | 0                    | 0.0000                | 2.5         |
| -10                             |                    | 16                   | 0.0191                | 2.5         |
| -20                             |                    | 10                   | 0.0120                | 2.5         |
| -30                             |                    | 15                   | 0.0179                | 2.5         |
| 20                              |                    | 3.42                 | 1                     | 0.0012      |
| 20                              | 4.18               | 13                   | 0.0155                | 2.5         |

| GPRS 850 Test Frequency:836.6MHz |                    |                      |                       |             |
|----------------------------------|--------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                 | Power Supply (VDC) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| 50                               | 3.8                | 9                    | 0.0108                | 2.5         |
| 40                               |                    | 15                   | 0.0179                | 2.5         |
| 30                               |                    | 8                    | 0.0096                | 2.5         |
| 20                               |                    | 9                    | 0.0108                | 2.5         |
| 10                               |                    | 14                   | 0.0167                | 2.5         |
| 0                                |                    | 5                    | 0.0060                | 2.5         |
| -10                              |                    | 8                    | 0.0096                | 2.5         |
| -20                              |                    | 11                   | 0.0131                | 2.5         |
| -30                              |                    | 0                    | 0.0000                | 2.5         |
| 20                               |                    | 3.42                 | 9                     | 0.0108      |
| 20                               | 4.18               | 9                    | 0.0108                | 2.5         |

| EGPRS 850 Test Frequency:836.6MHz |                    |                      |                       |             |
|-----------------------------------|--------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                  | Power Supply (VDC) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| 50                                | 3.8                | 2                    | 0.0024                | 2.5         |
| 40                                |                    | 11                   | 0.0131                | 2.5         |
| 30                                |                    | 4                    | 0.0048                | 2.5         |
| 20                                |                    | 9                    | 0.0108                | 2.5         |
| 10                                |                    | 9                    | 0.0108                | 2.5         |
| 0                                 |                    | 4                    | 0.0048                | 2.5         |
| -10                               |                    | 3                    | 0.0036                | 2.5         |
| -20                               |                    | 7                    | 0.0084                | 2.5         |
| -30                               |                    | 13                   | 0.0155                | 2.5         |
| 20                                |                    | 3.42                 | 3                     | 0.0036      |
| 20                                | 4.18               | 16                   | 0.0191                | 2.5         |

| WCDMA Band V Test Frequency:836.6MHz |                    |                      |                       |             |
|--------------------------------------|--------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                     | Power Supply (VDC) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| 50                                   | 3.8                | 15                   | 0.0179                | 2.5         |
| 40                                   |                    | 13                   | 0.0155                | 2.5         |
| 30                                   |                    | 10                   | 0.0120                | 2.5         |
| 20                                   |                    | 9                    | 0.0108                | 2.5         |
| 10                                   |                    | 15                   | 0.0179                | 2.5         |
| 0                                    |                    | 10                   | 0.0120                | 2.5         |
| -10                                  |                    | 17                   | 0.0203                | 2.5         |
| -20                                  |                    | 9                    | 0.0108                | 2.5         |
| -30                                  |                    | 2                    | 0.0024                | 2.5         |
| 20                                   |                    | 3.42                 | 17                    | 0.0203      |
| 20                                   | 4.18               | 8                    | 0.0096                | 2.5         |

| WCDMA Band V Test Frequency:836.6MHz(HSDPA) |                    |                      |                       |             |
|---|--------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                            | Power Supply (VDC) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| 50  | 3.8                | 2                    | 0.0024                | 2.5         |
| 40  |                    | 3                    | 0.0036                | 2.5         |
| 30  |                    | 0                    | 0.0000                | 2.5         |
| 20  |                    | 6                    | 0.0072                | 2.5         |
| 10  |                    | 10                   | 0.0120                | 2.5         |
| 0   |                    | 1                    | 0.0012                | 2.5         |
| -10   |                    | 0                    | 0.0000                | 2.5         |
| -20   |                    | -3                   | -0.0036               | 2.5         |
| -30   |                    | 3                    | 0.0036                | 2.5         |
| 20  |                    | 3.42                 | -2                    | -0.0024     |
| 20  | 4.18               | 12                   | 0.0143                | 2.5         |

| WCDMA Band V Test Frequency:836.6MHz(HSUPA) |                    |                      |                       |             |
|---|--------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                            | Power Supply (VDC) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| 50  | 3.8                | -2                   | -0.0024               | 2.5         |
| 40  |                    | 4                    | 0.0048                | 2.5         |
| 30  |                    | 4                    | 0.0048                | 2.5         |
| 20  |                    | 7                    | 0.0084                | 2.5         |
| 10  |                    | 8                    | 0.0096                | 2.5         |
| 0   |                    | 0                    | 0.0000                | 2.5         |
| -10   |                    | 15                   | 0.0179                | 2.5         |
| -20   |                    | 10                   | 0.0120                | 2.5         |
| -30   |                    | 9                    | 0.0108                | 2.5         |
| 20  |                    | 3.42                 | 0                     | 0.0000      |
| 20  | 4.18               | 14                   | 0.0167                | 2.5         |



## PCS Band (Part 24E)

| PCS 1900 Test Frequency:1880.0MHz |                    |                      |                       |             |
|-----------------------------------|--------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                  | Power Supply (VDC) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| 50                                | 3.8                | 10                   | 0.0053                | 2.5         |
| 40                                |                    | 2                    | 0.0011                | 2.5         |
| 30                                |                    | 13                   | 0.0069                | 2.5         |
| 20                                |                    | 8                    | 0.0043                | 2.5         |
| 10                                |                    | 5                    | 0.0027                | 2.5         |
| 0                                 |                    | 6                    | 0.0032                | 2.5         |
| -10                               |                    | 6                    | 0.0032                | 2.5         |
| -20                               |                    | 14                   | 0.0074                | 2.5         |
| -30                               |                    | 5                    | 0.0027                | 2.5         |
| 20                                |                    | 3.42                 | 2                     | 0.0011      |
| 20                                | 4.18               | 13                   | 0.0069                | 2.5         |

| GPRS 1900 Test Frequency:1880.0MHz |                    |                      |                       |             |
|------------------------------------|--------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                   | Power Supply (VDC) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| 50                                 | 3.8                | 1                    | 0.0005                | 2.5         |
| 40                                 |                    | 4                    | 0.0021                | 2.5         |
| 30                                 |                    | 14                   | 0.0074                | 2.5         |
| 20                                 |                    | 9                    | 0.0048                | 2.5         |
| 10                                 |                    | 11                   | 0.0059                | 2.5         |
| 0                                  |                    | 8                    | 0.0043                | 2.5         |
| -10                                |                    | 3                    | 0.0016                | 2.5         |
| -20                                |                    | 9                    | 0.0048                | 2.5         |
| -30                                |                    | 5                    | 0.0027                | 2.5         |
| 20                                 |                    | 3.42                 | 1                     | 0.0005      |
| 20                                 | 4.18               | 3                    | 0.0016                | 2.5         |

| EGPRS 1900 Test Frequency:1880.0MHz |                    |                      |                       |             |
|-------------------------------------|--------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                    | Power Supply (VDC) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| 50                                  | 3.8                | 16                   | 0.0085                | 2.5         |
| 40                                  |                    | 7                    | 0.0037                | 2.5         |
| 30                                  |                    | 17                   | 0.0090                | 2.5         |
| 20                                  |                    | 9                    | 0.0048                | 2.5         |
| 10                                  |                    | 10                   | 0.0053                | 2.5         |
| 0                                   |                    | 10                   | 0.0053                | 2.5         |
| -10                                 |                    | 0                    | 0.0000                | 2.5         |
| -20                                 |                    | 1                    | 0.0005                | 2.5         |
| -30                                 |                    | 15                   | 0.0080                | 2.5         |
| 20                                  |                    | 3.42                 | 7                     | 0.0037      |
| 20                                  | 4.18               | 4                    | 0.0021                | 2.5         |

| WCDMA Band II Test Frequency:1880.0MHz |                    |                      |                       |             |
|--|--------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                       | Power Supply (VDC) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| 50                                     | 3.8                | 6                    | 0.0032                | 2.5         |
| 40                                     |                    | 3                    | 0.0016                | 2.5         |
| 30                                     |                    | 11                   | 0.0059                | 2.5         |
| 20                                     |                    | 8                    | 0.0043                | 2.5         |
| 10                                     |                    | 15                   | 0.0080                | 2.5         |
| 0                                      |                    | 4                    | 0.0021                | 2.5         |
| -10                                    |                    | 10                   | 0.0053                | 2.5         |
| -20                                    |                    | 0                    | 0.0000                | 2.5         |
| -30                                    |                    | 17                   | 0.0090                | 2.5         |
| 20                                     |                    | 3.42                 | 5                     | 0.0027      |
| 20                                     | 4.18               | 7                    | 0.0037                | 2.5         |

| WCDMA Band II Test Frequency:1880.0MHz(HSDPA) |                    |                      |                       |             |
|---|--------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                              | Power Supply (VDC) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| 50  | 3.8                | 10                   | 0.0058                | 2.5         |
| 40  |                    | 16                   | 0.0092                | 2.5         |
| 30  |                    | 7                    | 0.0040                | 2.5         |
| 20  |                    | 9                    | 0.0052                | 2.5         |
| 10  |                    | 7                    | 0.0040                | 2.5         |
| 0   |                    | 18                   | 0.0104                | 2.5         |
| -10   |                    | 4                    | 0.0023                | 2.5         |
| -20   |                    | 6                    | 0.0035                | 2.5         |
| -30   |                    | 8                    | 0.0046                | 2.5         |
| 20  |                    | 3.42                 | 9                     | 0.0052      |
| 20  | 4.18               | 17                   | 0.0098                | 2.5         |

| WCDMA Band II Test Frequency:1880.0MHz(HSUPA) |                    |                      |                       |             |
|---|--------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                              | Power Supply (VDC) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| 50  | 3.8                | 10                   | 0.0053                | 2.5         |
| 40  |                    | 1                    | 0.0005                | 2.5         |
| 30  |                    | 18                   | 0.0096                | 2.5         |
| 20  |                    | 9                    | 0.0048                | 2.5         |
| 10  |                    | 5                    | 0.0027                | 2.5         |
| 0   |                    | 12                   | 0.0064                | 2.5         |
| -10   |                    | 11                   | 0.0059                | 2.5         |
| -20   |                    | 2                    | 0.0011                | 2.5         |
| -30   |                    | 1                    | 0.0005                | 2.5         |
| 20  |                    | 3.42                 | 3                     | 0.0016      |
| 20  | 4.18               | 2                    | 0.0011                | 2.5         |

## **14 RF Exposure**

Remark: refer to SAR test report: WTD22X05095859W.

