

# FCC TEST REPORT

Product Name: Mobile Phone  
Trade Mark: BLU  
Model No.: TANK MEGA  
Report Number: 200410001RFM-1  
Test Standards: FCC 47 CFR Part 22 Subpart H  
FCC 47 CFR Part 24 Subpart E  
FCC ID: YHLBLUTANKMG  
Test Result: PASS  
Date of Issue: June 1, 2020

Prepared for:

**BLU Products, Inc.**  
**10814 NW 33rd St # 100 Doral, FL 33172 ,USA**

Prepared by:

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UTTR-RF-FCC23G-V1.0

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## Version

| Version No. | Date         | Description |
|-------------|--------------|-------------|
| V1.0        | June 1, 2020 | Original    |



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## 1. GENERAL INFORMATION

### 1.1 CLIENT INFORMATION

|                                 |                                             |
|---------------------------------|---------------------------------------------|
| <b>Applicant:</b>               | BLU Products, Inc.                          |
| <b>Address of Applicant:</b>    | 10814 NW 33rd St # 100 Doral, FL 33172 ,USA |
| <b>Manufacturer:</b>            | BLU Products, Inc.                          |
| <b>Address of Manufacturer:</b> | 10814 NW 33rd St # 100 Doral, FL 33172 ,USA |

### 1.2 EUT INFORMATION

#### 1.2.1 General Description of EUT

|                               |                                  |                      |
|-------------------------------|----------------------------------|----------------------|
| <b>Product Name:</b>          | Mobile Phone                     |                      |
| <b>Model No.:</b>             | TANK MEGA                        |                      |
| <b>Trade Mark:</b>            | BLU                              |                      |
| <b>DUT Stage:</b>             | Identical Prototype              |                      |
| <b>EUT Supports Function:</b> | <b>GSM Bands:</b>                | GSM850/1900          |
|                               | <b>UTRA Bands:</b>               | Band II/ Band V      |
|                               | <b>2.4 GHz ISM Band:</b>         | IEEE 802.11b/g/n     |
|                               |                                  | Bluetooth V2.1 + EDR |
| <b>Sample Received Date:</b>  | April 14, 2020                   |                      |
| <b>Sample Tested Date:</b>    | April 14, 2020 to April 30, 2020 |                      |

#### 1.2.2 Description of Accessories

| Adapter              |                                       |
|----------------------|---------------------------------------|
| <b>Model No.:</b>    | US-WW-1003                            |
| <b>Input:</b>        | 100-240 V~50/60 Hz 0.2A               |
| <b>Output:</b>       | 5.0 V $\equiv$ 1000 mA                |
| <b>DC Cable:</b>     | 1.0 Meter, Unshielded without ferrite |
| <b>Manufacturer:</b> | Shenzhen NANBANG Electronics CO.Ltd   |

| Battery                        |                                              |
|--------------------------------|----------------------------------------------|
| <b>Model No.:</b>              | C724211360L                                  |
| <b>Battery Type:</b>           | Lithium-ion Rechargeable Battery             |
| <b>Rated Voltage:</b>          | 3.7 Vdc                                      |
| <b>Limited Charge Voltage:</b> | 4.2 Vdc                                      |
| <b>Rated Capacity:</b>         | 3600 mAh                                     |
| <b>Manufacturer:</b>           | Guizhou Aerospace Power Technology Co., Ltd. |

### 1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

|                                  |                                          |                   |
|----------------------------------|------------------------------------------|-------------------|
| <b>Support Networks:</b>         | GSM, GPRS, WCDMA, HSDPA, HSUPA, DC-HSDPA |                   |
| <b>Type of Modulation:</b>       | GSM/GPRS:                                | GMSK              |
|                                  | WCDMA                                    | BPSK              |
|                                  | HSDPA                                    | QPSK              |
|                                  | HSUPA:                                   | QPSK              |
|                                  | DC-HSDPA:                                | 64QAM             |
| <b>Frequency Range:</b>          | GSM/GPRS 850:                            | 824.2-848.8 MHz   |
|                                  | GSM/GPRS 1900:                           | 1850.2-1909.8 MHz |
|                                  | WCDMA Band II:                           | 1852.4-1907.6 MHz |
|                                  | WCDMA Band V:                            | 826.4-846.6 MHz   |
| <b>Max RF Output Power:</b>      | GSM/GPRS 850:                            | 34.07dBm          |
|                                  | GSM/GPRS 1900:                           | 31.57dBm          |
|                                  | WCDMA Band II:                           | 25.07dBm          |
|                                  | WCDMA Band V:                            | 24.89dBm          |
| <b>Emission Designator:</b>      | GSM/GPRS 850:                            | 245KGXW           |
|                                  | GSM/GPRS 1900:                           | 247KGXW           |
|                                  | WCDMA Band II:                           | 4M19F9W           |
|                                  | WCDMA Band V:                            | 4M15F9W           |
| <b>Antenna Type:</b>             | PIFA Antenna                             |                   |
| <b>Antenna Gain:</b>             | GSM 850:                                 | 0.5 dBi           |
|                                  | PCS 1900:                                | 1.0 dBi           |
|                                  | WCDMA Band II:                           | 1.0 dBi           |
|                                  | WCDMA Band V:                            | 1.0 dBi           |
| <b>Normal Test Voltage:</b>      | 3.7 Vdc                                  |                   |
| <b>Extreme Test Voltage:</b>     | 3.5 to 4.25Vdc                           |                   |
| <b>Extreme Test Temperature:</b> | -30 °C to +50 °C                         |                   |

## 1.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

### 1) Support Equipment

| Description | Manufacturer | Model No. | Serial Number | Supplied by |
|-------------|--------------|-----------|---------------|-------------|
| -           | -            | -         | -             | -           |

### 2) Support Cable

| Cable No. | Description   | Connector | Length     | Supplied by |
|-----------|---------------|-----------|------------|-------------|
| 1         | Antenna Cable | SMA       | 0.30 Meter | UnionTrust  |

## 1.5 TEST LOCATION

### Shenzhen UnionTrust Quality and Technology Co., Ltd.

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## 1.6 TEST FACILITY

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

### CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

### A2LA-Lab Certificate No.: 4312.01

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

### ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

### FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

## 1.7 DEVIATION FROM STANDARDS

None.

## 1.8 ABNORMALITIES FROM STANDARD CONDITIONS

None.

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## 1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

## 1.10 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

| No. | Item                                    | Measurement Uncertainty  |
|-----|-----------------------------------------|--------------------------|
| 1   | Conducted emission 9KHz-150KHz          | ±3.2 dB                  |
| 2   | Conducted emission 150KHz-30MHz         | ±2.7 dB                  |
| 3   | Radiated spurious emissions 30MHz-1GHz  | ± 4.9 dB                 |
| 4   | Radiated spurious emissions 1GHz-18GHz  | ± 4.8 dB                 |
| 5   | Radiated spurious emissions 18GHz-40GHz | ± 5.1 dB                 |
| 6   | Occupied Bandwidth                      | ± 1.86 %                 |
| 7   | DC Supply Voltages                      | ± 0.68 %                 |
| 8   | Temperature                             | ± 0.62 °C                |
| 9   | Humidity                                | ± 3.9 %                  |
| 10  | Conducted spurious emissions            | ± 2.7 dB                 |
| 11  | DC Supply Voltages                      | ± 0.68 %                 |
| 12  | AC Supply Voltages                      | ± 1.2 %                  |
| 13  | Radio Frequency                         | ± 6.5 x 10 <sup>-8</sup> |
| 14  | RF Power, Conducted                     | ± 0.9 dB                 |

## 2. TEST SUMMARY

| FCC 47 CFR Part 22 Subpart H Test Cases |                                                       |                                         |        |
|-----------------------------------------|-------------------------------------------------------|-----------------------------------------|--------|
| Test Item                               | Test Requirement                                      | Test Method                             | Result |
| Effective Radiated Power (ERP)          | FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a) | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS   |
| Conducted Output Power                  | FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a) | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS   |
| Peak-to-average ratio                   | FCC 47 CFR Part 22.913(a)                             | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS   |
| 99%&26dB Bandwidth                      | FCC 47 CFR Part 2.1049(h)                             | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS   |
| Band Edge at antenna terminals          | FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)    | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS   |
| Spurious emissions at antenna terminals | FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)(b) | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS   |
| Field strength of spurious radiation    | FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 22.917(a)(b) | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS   |
| Frequency stability                     | FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 22.355       | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS   |

| FCC 47 CFR Part 24 Subpart E Test Cases    |                                                       |                                         |        |
|--------------------------------------------|-------------------------------------------------------|-----------------------------------------|--------|
| Test Item                                  | Test Requirement                                      | Test Method                             | Result |
| Equivalent Isotropic Radiated Power (EIRP) | FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c) | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS   |
| Conducted Output Power                     | FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c) | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS   |
| Peak-to-average ratio                      | FCC 47 CFR Part 24.232(d)                             | KDB 971168 D01v03r01                    | PASS   |
| 99%&26dB Bandwidth                         | FCC 47 CFR Part 2.1049(h) & FCC 47 CFR Part 24.238(b) | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS   |
| Band Edge at antenna terminals             | FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)    | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS   |
| Spurious emissions at antenna terminals    | FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)(b) | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS   |
| Field strength of spurious radiation       | FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 24.238(a)(b) | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS   |
| Frequency stability                        | FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 24.235       | ANSI C63.26-2015 & KDB 971168 D01v03r01 | PASS   |

### 3. EQUIPMENT LIST

| Radiated Emission Test Equipment List |                                   |              |            |                            |                         |                             |
|---------------------------------------|-----------------------------------|--------------|------------|----------------------------|-------------------------|-----------------------------|
| Used                                  | Equipment                         | Manufacturer | Model No.  | Serial Number              | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
| <input checked="" type="checkbox"/>   | 3M Chamber & Accessory Equipment  | ETS-LINDGREN | 3M         | N/A                        | Dec. 03, 2018           | Dec. 03, 2021               |
| <input checked="" type="checkbox"/>   | Receiver                          | R&S          | ESIB26     | 100114                     | Nov. 24, 2019           | Nov. 23, 2020               |
| <input type="checkbox"/>              | Loop Antenna                      | ETS-LINDGREN | 6502       | 00202525                   | Nov. 24, 2019           | Nov. 23, 2020               |
| <input checked="" type="checkbox"/>   | Broadband Antenna                 | ETS-LINDGREN | 3142E      | 00201566                   | Nov. 16, 2019           | Nov. 15, 2020               |
| <input checked="" type="checkbox"/>   | 6dB Attenuator                    | Talent       | RA6A5-N-18 | 18103001                   | Nov. 16, 2019           | Nov. 15, 2020               |
| <input checked="" type="checkbox"/>   | Preamplifier                      | HP           | 8447F      | 2805A02960                 | Nov. 16, 2019           | Nov. 15, 2020               |
| <input type="checkbox"/>              | Broadband Antenna (Pre-amplifier) | ETS-LINDGREN | 3142E-PA   | 00201891                   | Nov. 24, 2019           | Nov. 23, 2020               |
| <input type="checkbox"/>              | 6dB Attenuator                    | Talent       | RA6A5-N-18 | 18103002                   | Nov. 24, 2019           | Nov. 23, 2020               |
| <input type="checkbox"/>              | Horn Antenna                      | ETS-LINDGREN | 3117       | 00164202                   | Nov. 24, 2019           | Nov. 23, 2020               |
| <input checked="" type="checkbox"/>   | Horn Antenna (Pre-amplifier)      | ETS-LINDGREN | 3117-PA    | 00201874                   | Nov. 16, 2019           | Nov. 15, 2020               |
| <input type="checkbox"/>              | Horn Antenna                      | ETS-LINDGREN | 3116C      | 00200180                   | May 18, 2019            | May 18, 2020                |
| <input checked="" type="checkbox"/>   | Horn Antenna (Pre-amplifier)      | ETS-LINDGREN | 3116C-PA   | 00202652                   | Jun. 23, 2019           | Jun. 23, 2020               |
| <input checked="" type="checkbox"/>   | Multi device Controller           | ETS-LINDGREN | 7006-001   | 00160105                   | N/A                     | N/A                         |
| <input checked="" type="checkbox"/>   | Test Software                     | Audix        | e3         | Software Version: 9.160323 |                         |                             |

| RF Test Equipment List              |                                      |              |               |                        |                         |                             |
|-------------------------------------|--------------------------------------|--------------|---------------|------------------------|-------------------------|-----------------------------|
| Used                                | Equipment                            | Manufacturer | Model No.     | Serial Number          | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
| <input checked="" type="checkbox"/> | Receiver                             | R&S          | ESR7          | 1316.3003K07-101181-K3 | Nov. 24, 2019           | Nov. 23, 2020               |
| <input checked="" type="checkbox"/> | EXA Spectrum Analyzer                | KEYSIGHT     | N9010A        | MY51440197             | Nov. 24, 2019           | Nov. 23, 2020               |
| <input checked="" type="checkbox"/> | Wideband Radio Communication Tester  | R&S          | CMW500        | 120932                 | Jul. 19, 2019           | Jul. 19, 2020               |
| <input type="checkbox"/>            | Wideband Radio Communication Tester  | R&S          | CMW500        | 119583                 | Jul. 31, 2019           | Jul. 31, 2020               |
| <input checked="" type="checkbox"/> | Universal Radio Communication Tester | R&S          | CMU200        | 114713                 | Nov. 24, 2019           | Nov. 23, 2020               |
| <input checked="" type="checkbox"/> | DC Source                            | KIKUSUI      | PWR400L       | LK003024               | Sep. 09, 2019           | Sep. 08, 2020               |
| <input type="checkbox"/>            | Temp & Humidity chamber              | Espec        | GL(U)04K A(W) | 16921H201P3            | Sep. 09, 2019           | Sep. 08, 2020               |
| <input checked="" type="checkbox"/> | Temp & Humidity chamber              | Votisch      | VT4002        | 58566133290020         | Jun. 05, 2018           | Jun. 05, 2020               |

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## 4. TEST CONFIGURATION

### 4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

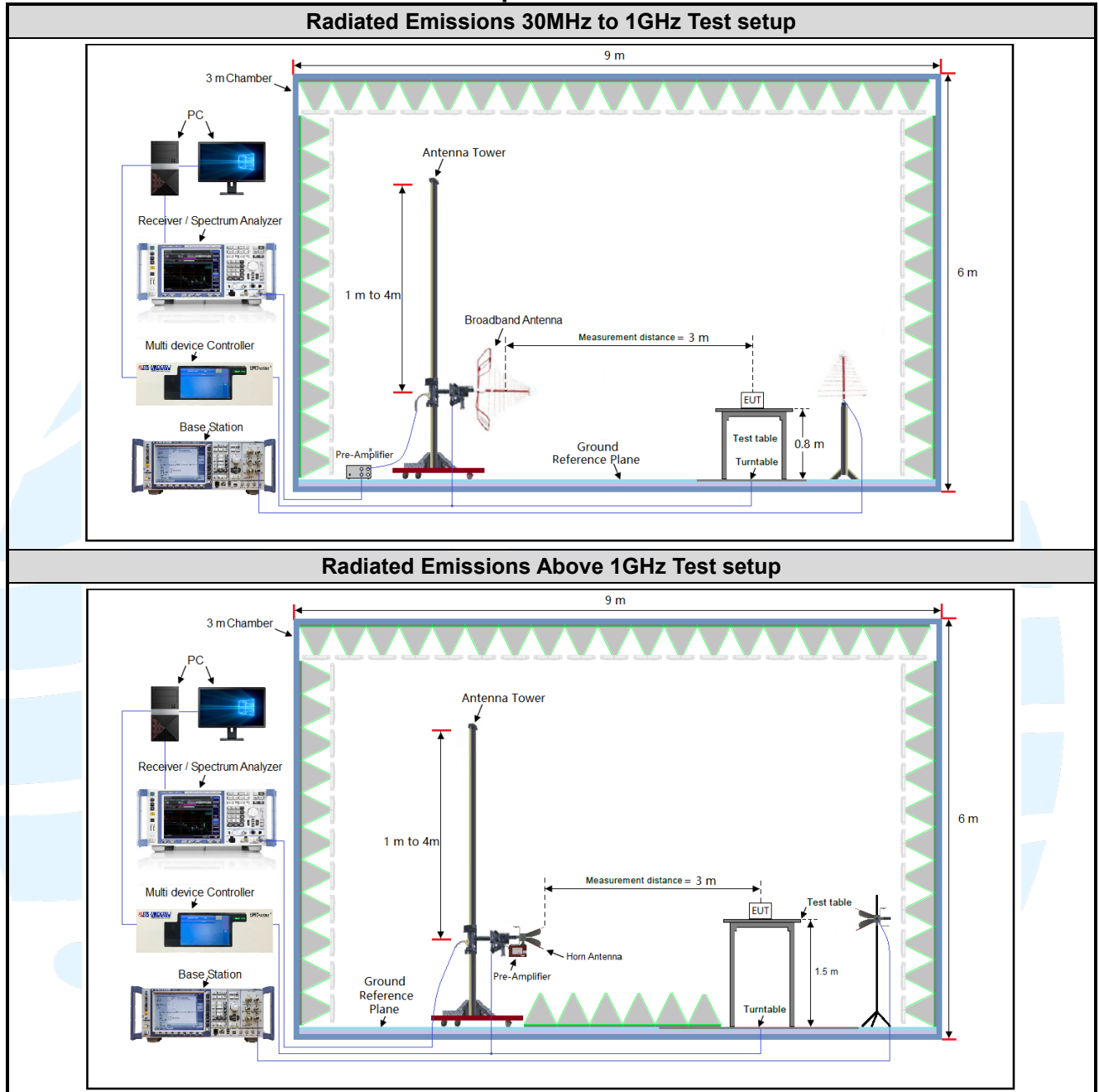
| Test Environment | Selected Values During Tests |             |                       |
|------------------|------------------------------|-------------|-----------------------|
| Test Condition   | Ambient                      |             |                       |
|                  | Temperature (°C)             | Voltage (V) | Relative Humidity (%) |
| TN/VN            | +15 to +35                   | 3.7         | 20 to 75              |
| TL/VL            | -30                          | 3.5         | 20 to 75              |
| TH/VL            | +50                          | 3.5         | 20 to 75              |
| TL/VH            | -30                          | 4.25        | 20 to 75              |
| TH/VH            | +50                          | 4.25        | 20 to 75              |

**Remark:**

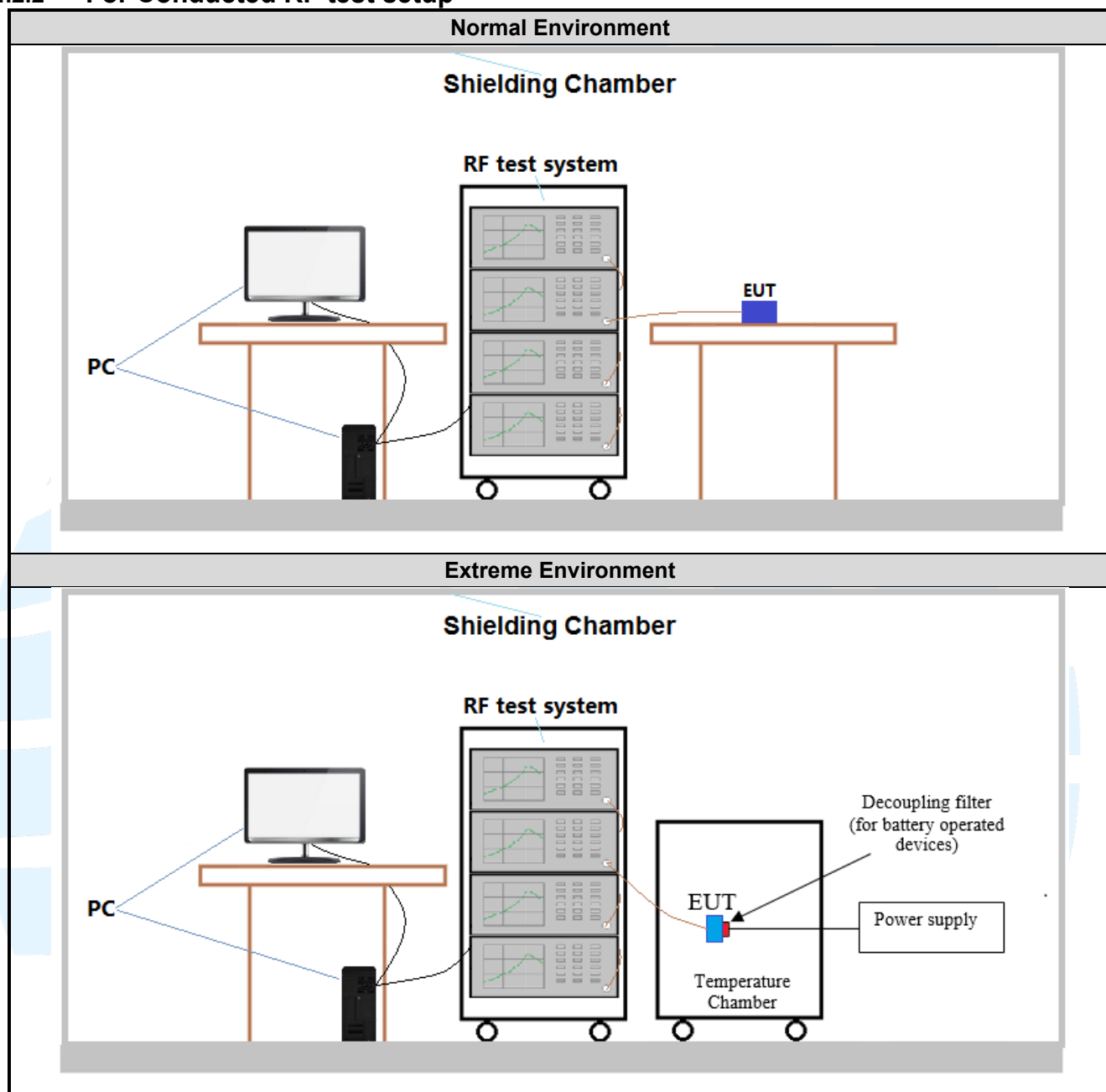
- 1) The EUT just work in such extreme temperature of -30 °C to +50 °C and the extreme voltage of 3.5 V to 4.25 V, so here the EUT is tested in the temperature of -30 °C to +50 °C and the voltage of 3.5 V to 4.25 V.
- 2) VN: Normal Voltage; TN: Normal Temperature;  
TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;  
VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.

## 4.2 TEST SETUP

### 4.2.1 For Radiated Emissions test setup



#### 4.2.2 For Conducted RF test setup



### 4.3 TEST CHANNELS

| Bands            | Tx/Rx Frequency           | RF Channel   |              |              |
|------------------|---------------------------|--------------|--------------|--------------|
|                  |                           | Low(L)       | Middle(M)    | High(H)      |
| GSM/GPRS/<br>850 | Tx<br>(824 MHz ~ 849 MHz) | Channel 128  | Channel 190  | Channel 251  |
|                  |                           | 824.2 MHz    | 836.6 MHz    | 848.8 MHz    |
| WCDMA band V     | Tx<br>(824 MHz ~ 849 MHz) | Channel 4132 | Channel 4182 | Channel 4233 |
|                  |                           | 826.4 MHz    | 836.4 MHz    | 846.6 MHz    |

| Bands             | Tx/Rx Frequency           | RF Channel   |              |              |
|-------------------|---------------------------|--------------|--------------|--------------|
|                   |                           | Low(L)       | Middle(M)    | High(H)      |
| GSM/GPRS/<br>1900 | Tx<br>(1850 MHz-1910 MHz) | Channel 512  | Channel 661  | Channel 810  |
|                   |                           | 1850.2 MHz   | 1880.0 MHz   | 1909.8 MHz   |
| WCDMA Band II     | Tx<br>(1850 MHz-1910 MHz) | Channel 9262 | Channel 9400 | Channel 9538 |
|                   |                           | 1852.4 MHz   | 1880.0 MHz   | 1907.6 MHz   |

## 4.4 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by a 3.7Vdc rechargeable Li-on battery. Only the worst case data were recorded in this test report.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, X/Y/Z axis, and antenna ports.

The worst case was found when positioned as the table below.

| Bands         | Mode | Antenna Port | Worst-case axis positioning |
|---------------|------|--------------|-----------------------------|
| GSM 850       | 1TX  | Chain 0      | Y axis                      |
| PCS 1900      | 1TX  | Chain 0      | Y axis                      |
| WCDMA Band II | 1TX  | Chain 0      | Y axis                      |
| WCDMA Band V  | 1TX  | Chain 0      | Y axis                      |

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

## 4.5 PRE-SCAN

**Pre-scan under all rate at lowest middle and highest channel, find the transmitter power as below:**

SIM 1 Card Conducted transmitter power measurement result.

| GSM 850 Maximum Average Power (dBm) |           |           |           |
|-------------------------------------|-----------|-----------|-----------|
| Channel                             | 128       | 190       | 251       |
| Frequency(MHz)                      | 824.2 MHz | 836.6 MHz | 848.8 MHz |
| GSM (GMSK, 1Tx-slot)                | 33.45     | 33.54     | 33.57     |
| GPRS (GMSK, 1Tx-slot)               | 33.40     | 33.50     | 33.48     |
| GPRS (GMSK, 2Tx-slot)               | 31.44     | 31.40     | 31.44     |
| GPRS (GMSK, 3Tx-slot)               | 29.57     | 29.67     | 29.71     |
| GPRS (GMSK, 4Tx-slot)               | 27.87     | 28.00     | 28.06     |

| PCS 1900 Maximum Average Power (dBm) |            |            |            |
|--------------------------------------|------------|------------|------------|
| Channel                              | 512        | 661        | 810        |
| Frequency(MHz)                       | 1850.2 MHz | 1880.0 MHz | 1909.8 MHz |
| GSM (GMSK, 1Tx-slot)                 | 30.57      | 30.41      | 30.45      |
| GPRS (GMSK, 1Tx-slot)                | 29.96      | 30.39      | 30.50      |
| GPRS (GMSK, 2Tx-slot)                | 27.48      | 28.15      | 28.81      |
| GPRS (GMSK, 3Tx-slot)                | 26.05      | 26.67      | 27.42      |
| GPRS (GMSK, 4Tx-slot)                | 24.29      | 24.92      | 25.67      |

| WCDMA Band II Maximum Average Power (dBm) |            |            |            |
|-------------------------------------------|------------|------------|------------|
| Channel                                   | 9262       | 9400       | 9538       |
| Frequency(MHz)                            | 1852.4 MHz | 1880.0 MHz | 1907.6 MHz |
| RMC 12.2kbps                              | 24.07      | 23.62      | 23.74      |
| HSDPA Subtest-1                           | 22.42      | 22.53      | 22.66      |
| HSDPA Subtest-2                           | 21.69      | 21.59      | 21.88      |
| HSDPA Subtest-3                           | 21.87      | 21.75      | 21.98      |
| HSDPA Subtest-4                           | 21.85      | 21.72      | 22.01      |
| HSUPA Subtest-1                           | 21.61      | 21.52      | 21.83      |
| HSUPA Subtest-2                           | 19.32      | 19.65      | 19.68      |
| HSUPA Subtest-3                           | 19.25      | 19.35      | 19.42      |
| HSUPA Subtest-4                           | 19.68      | 19.98      | 20.01      |
| HSUPA Subtest-5                           | 22.21      | 22.14      | 22.11      |
| DC-HSDPA Subtest-1                        | 22.09      | 21.74      | 22.19      |
| DC-HSDPA Subtest-2                        | 21.82      | 21.58      | 21.83      |
| DC-HSDPA Subtest-3                        | 21.33      | 21.05      | 21.39      |
| DC-HSDPA Subtest-4                        | 21.33      | 21.13      | 21.41      |

| WCDMA Band V Maximum Average Power (dBm) |           |           |           |
|------------------------------------------|-----------|-----------|-----------|
| Channel                                  | 4132      | 4182      | 4233      |
| Frequency(MHz)                           | 826.4 MHz | 836.4 MHz | 846.6 MHz |
| RMC 12.2kbps                             | 23.77     | 23.80     | 23.89     |
| HSDPA Subtest-1                          | 22.78     | 22.71     | 23.00     |
| HSDPA Subtest-2                          | 23.11     | 22.98     | 23.17     |
| HSDPA Subtest-3                          | 22.43     | 22.24     | 22.39     |
| HSDPA Subtest-4                          | 22.42     | 22.27     | 22.39     |
| HSUPA Subtest-1                          | 22.26     | 22.12     | 22.27     |
| HSUPA Subtest-2                          | 19.52     | 19.48     | 19.45     |
| HSUPA Subtest-3                          | 19.70     | 19.66     | 19.64     |
| HSUPA Subtest-4                          | 19.80     | 19.77     | 19.74     |
| HSUPA Subtest-5                          | 22.66     | 22.59     | 22.69     |
| DC-HSDPA Subtest-1                       | 21.95     | 21.51     | 21.02     |
| DC-HSDPA Subtest-2                       | 22.13     | 21.84     | 22.17     |
| DC-HSDPA Subtest-3                       | 21.45     | 21.15     | 21.41     |
| DC-HSDPA Subtest-4                       | 21.46     | 21.20     | 21.42     |

Pre-scan all bandwidth and RB, find worse case mode are chosen to the report, the worse mode applicability and tested channel detail as below:

| Band                  | Radiated                                                      | Conducted                                                    |
|-----------------------|---------------------------------------------------------------|--------------------------------------------------------------|
| GSM/GPRS/<br>850/1900 | 1) GSM (GMSK, 1Tx-slot) Link<br>2) GPRS (GMSK, 1Tx-slot) Link | 1) GSM (GMSK,1Tx-slot) Link<br>2) GPRS (GMSK, 1Tx-slot) Link |
| WCDMA Band II/V       | RMC 12.2kbps Link                                             | RMC 12.2kbps Link                                            |

## 5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

### 5.1 REFERENCE DOCUMENTS FOR TESTING

| No. | Identity           | Document Title                                                                                    |
|-----|--------------------|---------------------------------------------------------------------------------------------------|
| 1   | FCC 47 CFR Part 2  | Frequency allocations and radio treaty matters; general rules and regulations                     |
| 2   | FCC 47 CFR Part 22 | Public Mobile Services                                                                            |
| 4   | FCC 47 CFR Part 24 | Personal Communications Services                                                                  |
| 5   | ANSI C63.26-2015   | American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services |
| 6   | KDB 971168 D01     | KDB 971168 D01 Power Meas License Digital Systems v03r01                                          |

### 5.2 MAXIMUM ERP/EIRP

**Test Requirement:** FCC 47 CFR Part 2.1046(a),  
FCC 47 CFR Part 22.913(a),  
FCC 47 CFR Part 24.232(c),

**Test Method:** KDB 971168 D01v03r01 Section 5.6 & ANSI C63.26-2015

**Limit:**

**FCC 47 CFR Part 22.913(a)**

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

**FCC 47 CFR Part 24.232(c)**

Mobile and portable stations are limited to 2 watts EIRP.

**Test Procedure:**

$$\text{ERP or EIRP} = P_{\text{Meas}} + G_T - L_C$$

where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively  
(expressed in the same units as P<sub>Meas</sub>, typically dBW or dBm);

P<sub>Meas</sub> = measured transmitter output power or PSD, in dBm or dBW;

G<sub>T</sub> = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

L<sub>C</sub> = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

**Test Setup:** Refer to section 4.2.1 for details.

**Instruments Used:** Refer to section 3 for details

**Test Mode:** Link mode

**Test Results:** Pass

**Test Data:** See table below

| Bands                         | Modulation   | Max. Conducted Avg. Power | Ant. Gain | Limit | ERP   |          | Result |
|-------------------------------|--------------|---------------------------|-----------|-------|-------|----------|--------|
|                               |              | (dBm)                     | (dBi)     | (W)   | (dBm) | (W)      |        |
| GSM 850<br>(824-849 MHz)      | GSM          | 33.57                     | 0.50      | 7.0   | 34.07 | 2.552701 | Pass   |
|                               | GPRS         | 33.50                     | 0.50      | 7.0   | 34.00 | 2.511886 | Pass   |
| WCDMA Band V<br>(824-849 MHz) | RMC 12.2kbps | 23.89                     | 1.00      | 7.0   | 24.89 | 0.308319 | Pass   |
|                               | HSUPA        | 22.69                     | 1.00      |       | 23.69 | 0.233884 | Pass   |
|                               | HSDPA        | 23.17                     | 1.00      |       | 24.17 | 0.261216 | Pass   |
|                               | DC-HSDPA     | 22.17                     | 1.00      |       | 23.17 | 0.207491 | Pass   |

| Bands                            | Modulation   | Max. Conducted Avg. Power | Ant. Gain | Limit | EIRP  |          | Result |
|----------------------------------|--------------|---------------------------|-----------|-------|-------|----------|--------|
|                                  |              | (dBm)                     | (dBi)     | (W)   | (dBm) | (W)      |        |
| PCS 1900<br>(1850-1910 MHz)      | GSM          | 30.57                     | 1.00      | 2.0   | 31.57 | 1.435489 | Pass   |
|                                  | GPRS         | 30.50                     | 1.00      |       | 31.50 | 1.412538 | Pass   |
| WCDMA Band II<br>(1850-1910 MHz) | RMC 12.2kbps | 24.07                     | 1.00      | 2.0   | 25.07 | 0.321366 | Pass   |
|                                  | HSUPA        | 22.53                     | 1.00      |       | 23.53 | 0.225424 | Pass   |
|                                  | HSDPA        | 22.21                     | 1.00      |       | 23.21 | 0.209411 | Pass   |
|                                  | DC-HSDPA     | 22.19                     | 1.00      |       | 22.19 | 0.165577 | Pass   |

### 5.3 CONDUCTED OUTPUT POWER

**Test Requirement:** FCC 47 CFR Part 2.1046(a),  
FCC 47 CFR Part 22.913(a),  
FCC 47 CFR Part 24.232(c),

**Test Method:** KDB 971168 D01v03r01 & ANSI C63.26-2015

**Limit:**

**FCC 47 CFR Part 22.913(a)**

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

**FCC 47 CFR Part 24.232(c)**

Mobile and portable stations are limited to 2 watts EIRP.

**Test Procedure:**

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA, CDMA2000, and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

**Test Setup:** Refer to section 4.2.2 for details.

**Instruments Used:** Refer to section 3 for details

**Test Mode:** Link mode

**Test Results:** Pass

**Test Data:** The full result refer to section 4.5 for details.

## 5.4 PEAK-TO-AVERAGE RATIO

**Test Requirement:** FCC 47 CFR Part 22.913(a),  
FCC 47 CFR Part 24.232(c),

**Test Method:** KDB 971168 D01v03r01 Section 5.7

**Limit:** In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB

**Test Procedure:**

The EUT was connected to Spectrum Analyzer and Base Station via power divider. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Some regulatory requirements specify a PAPR limit when the output power limits are specified in terms of average power. If it becomes necessary to provide measurement data to demonstrate compliance to a PAPR limit, then the appropriate procedure from those provided in 5.2.3 shall be utilized to determine the peak power (or peak PSD) and the appropriate procedure from those provided in 5.2.4 shall be used to determine the average power (or average PSD). The data from these measurements is then used in Equation (2) to determine the PAPR of a narrowband CW-like signal. See 5.2.3.4 for guidance on determining the PAPR of a broadband noise-like signal.

$$\text{PAPR (dB)} = \text{PPk (dBm or dBW)} - \text{PAvg (dBm or dBW)}$$

where:

PAPR peak-to-average power ratio, in dB;

PPk measured peak power or peak PSD level, in dBm or dBW;

PAvg measured average power or average PSD level, in dBm or dBW.

OR

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.

- Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth
- Set the number of counts to a value that stabilizes the measured CCDF curve
- Record the maximum PAPR level associated with a probability of 0.1 %

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

**Test Setup:** Refer to section 4.2.2 for details.

**Instruments Used:** Refer to section 3 for details

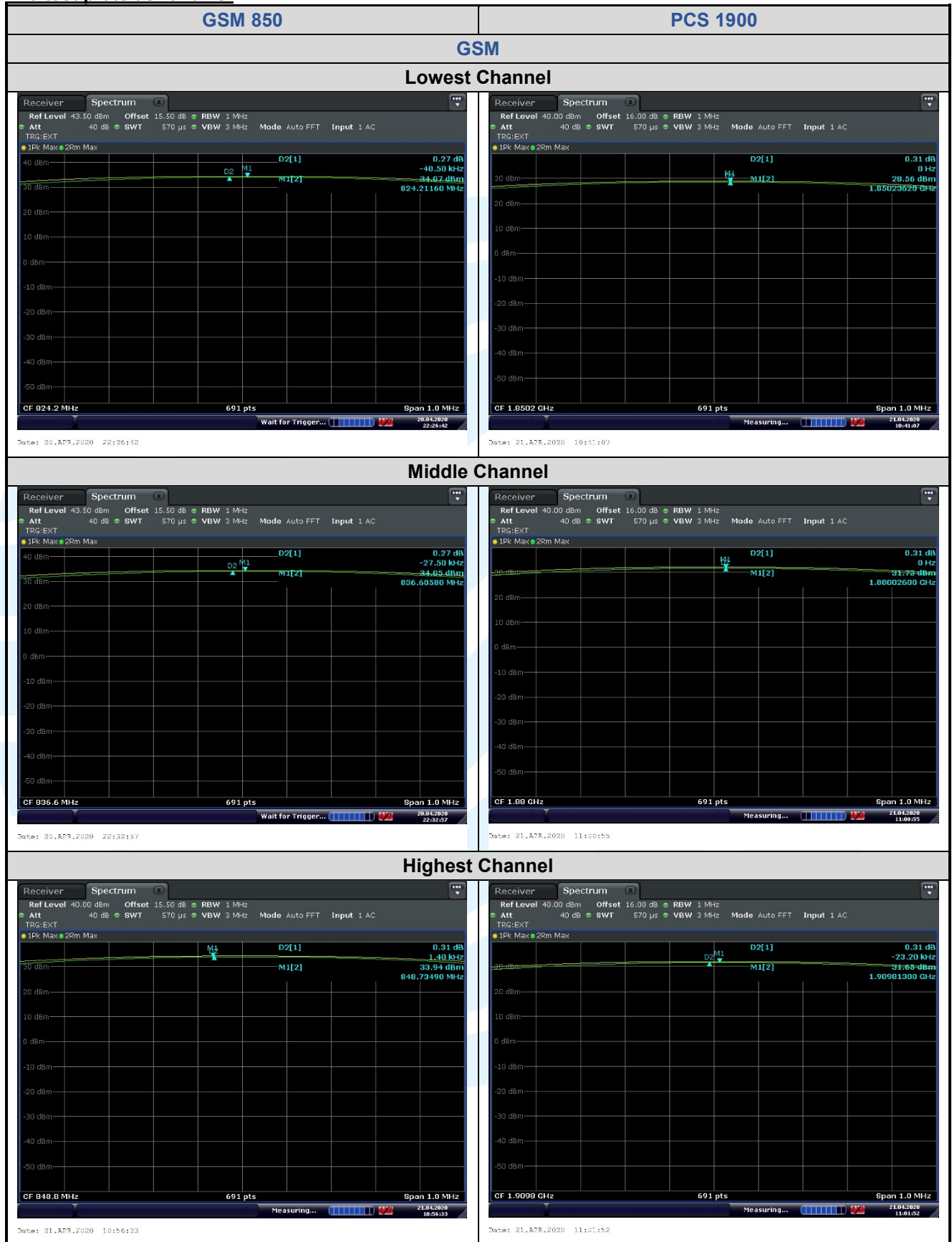
**Test Mode:** Link mode

**Test Results:** Pass

**Test Data:** See table below

| Bands         | Modulation   | Peak-to-average ratio (dB) |        |         | Limit (dBm) | Result |
|---------------|--------------|----------------------------|--------|---------|-------------|--------|
|               |              | Lowest                     | Middle | Highest |             |        |
| GSM 850       | GSM          | 0.27                       | 0.27   | 0.31    | 13          | Pass   |
| PCS 1900      | GSM          | 0.31                       | 0.31   | 0.31    | 13          | Pass   |
| WCDMA Band II | RMC 12.2kbps | 3.83                       | 3.80   | 3.77    | 13          | Pass   |
| WCDMA Band V  | RMC 12.2kbps | 3.74                       | 3.65   | 3.68    | 13          | Pass   |

The test plots as follows:



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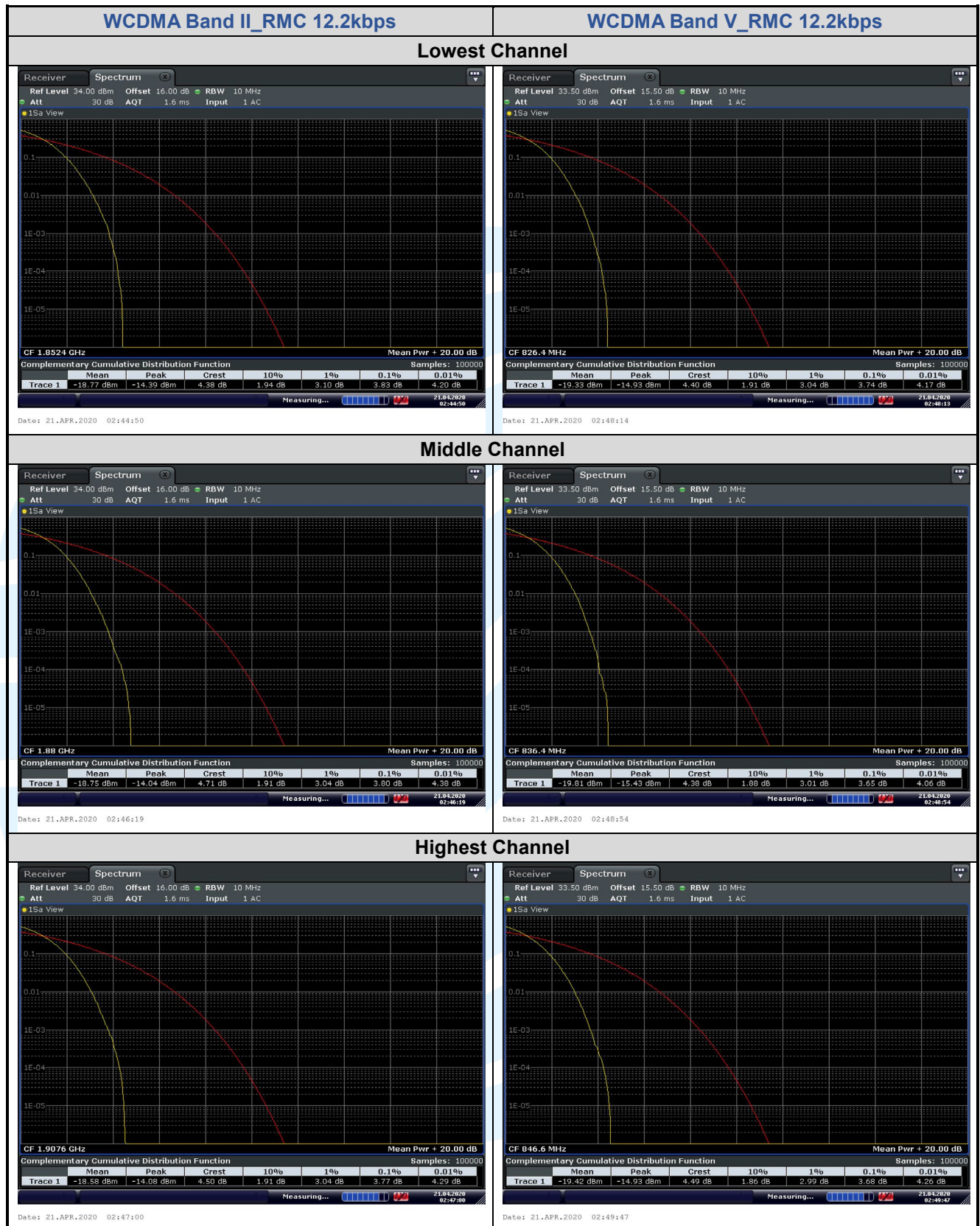
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## 5.599%&26DB BANDWIDTH

**Test Requirement:** FCC 47 CFR Part 2.1049(h),  
FCC 47 CFR Part 22.917(b),  
FCC 47 CFR Part 24.238(b),

**Test Method:** ANSI C63.26-2015 & KDB 971168 D01v03r01 Section 4

**Limit:** No Limit, for reporting purposes only.

### Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

**Test Setup:** Refer to section 4.2.2 for details.

**Instruments Used:** Refer to section 3 for details

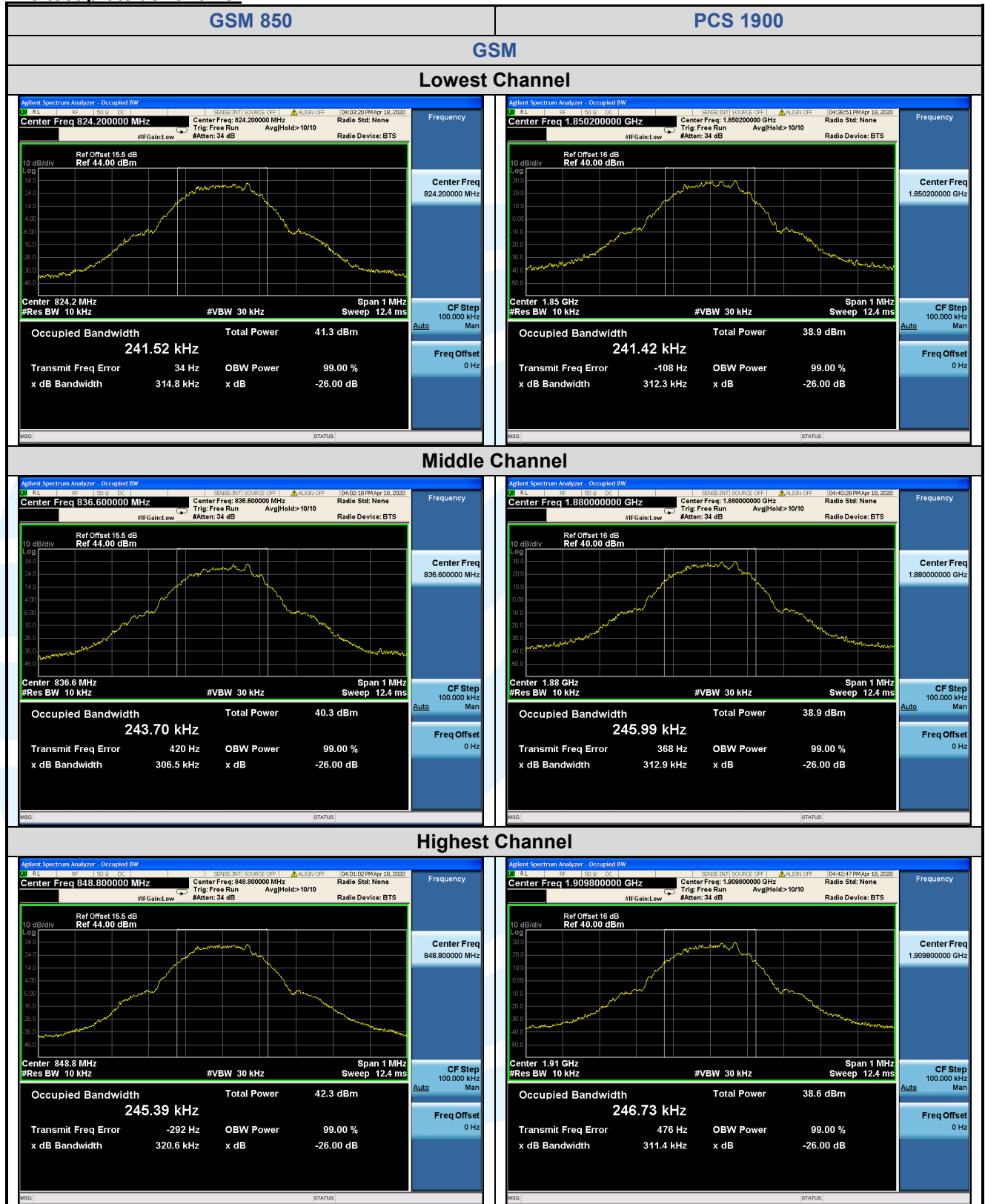
**Test Mode:** Link mode

**Test Results:** Pass

**Test Data:** See table below

| Bands         | Modulation   | Channel | Frequency (MHz) | 26 dB BW (kHz) | 99% BW (kHz) |
|---------------|--------------|---------|-----------------|----------------|--------------|
| GSM 850       | GSM          | 128     | 824.2           | 314.8          | 241.52       |
|               |              | 190     | 836.6           | 306.5          | 243.70       |
|               |              | 251     | 848.8           | 320.6          | 245.39       |
| PCS 1900      | GSM          | 512     | 1850.2          | 312.3          | 241.42       |
|               |              | 661     | 1880.0          | 312.9          | 245.99       |
|               |              | 810     | 1909.8          | 311.4          | 246.73       |
| WCDMA Band II | RMC 12.2kbps | 9262    | 1852.4          | 4.695          | 4.1549       |
|               |              | 9400    | 1880.0          | 4.737          | 4.1714       |
|               |              | 9538    | 1907.6          | 4.752          | 4.1872       |
| WCDMA Band V  | RMC 12.2kbps | 4132    | 826.4           | 4.675          | 4.1452       |
|               |              | 4182    | 836.4           | 4.670          | 4.1483       |
|               |              | 4233    | 846.6           | 4.703          | 4.1498       |

The test plots as follows:



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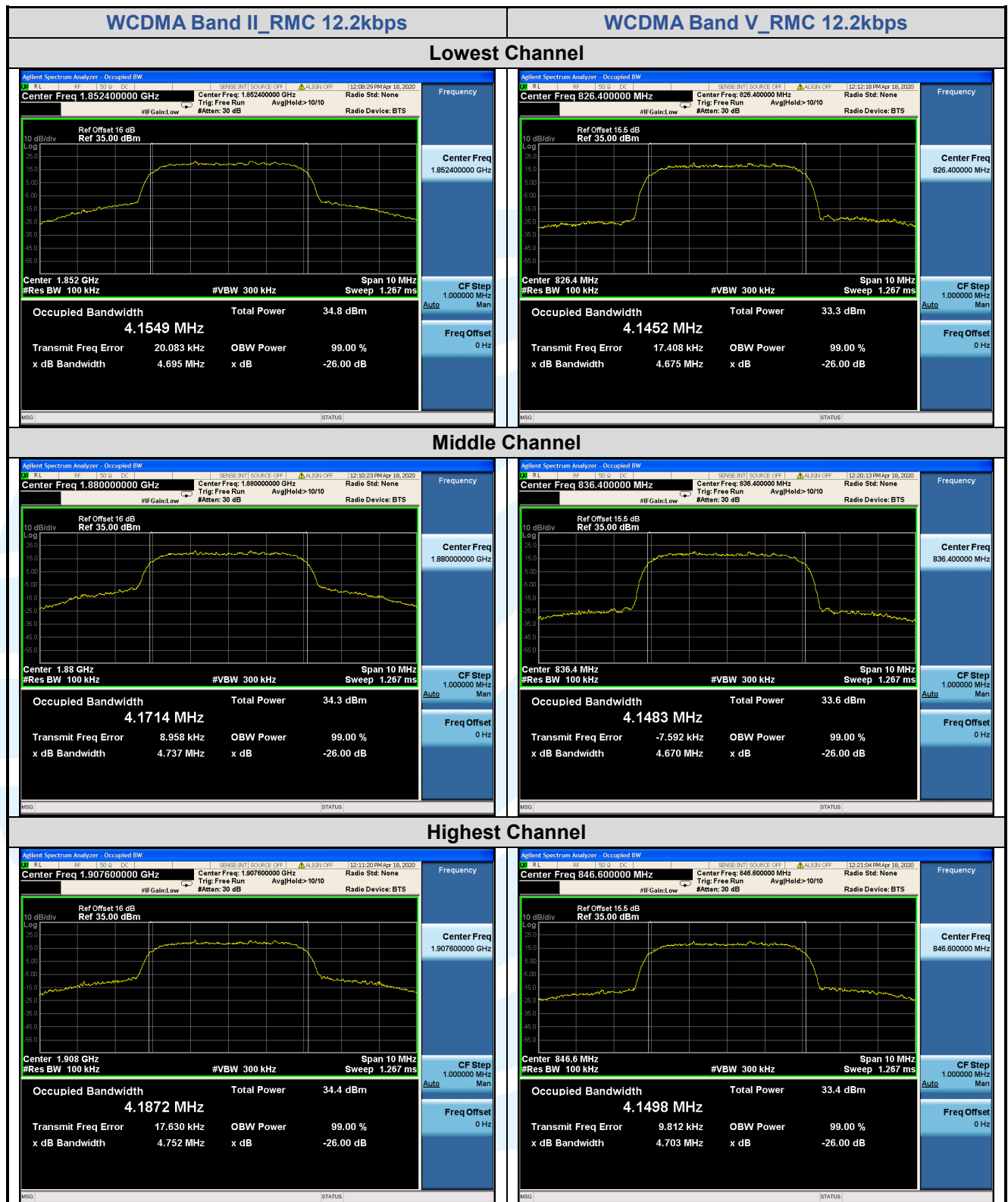
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## 5.6 BAND EDGE AT ANTENNA TERMINALS

**Test Requirement:** FCC 47 CFR Part 2.1051,  
FCC 47 CFR Part 22.917(a),  
FCC 47 CFR Part 24.238(a),  
**Test Method:** ANSI C63.26-2015 & KDB 971168 D01v03r01

**Limit:**

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

**Test Procedure:**

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.

For each band edge measurement:

- 1) Set the spectrum analyzer span to include the block edge frequency.
- 2) Set a marker to point the corresponding band edge frequency in each test case.
- 3) Set display line at -13 dBm
- 4) Set resolution bandwidth to at least 1% of emission bandwidth.
- 5) Set spectrum analyzer with RMS detector.
- 6) Record the max trace plot into the test report

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

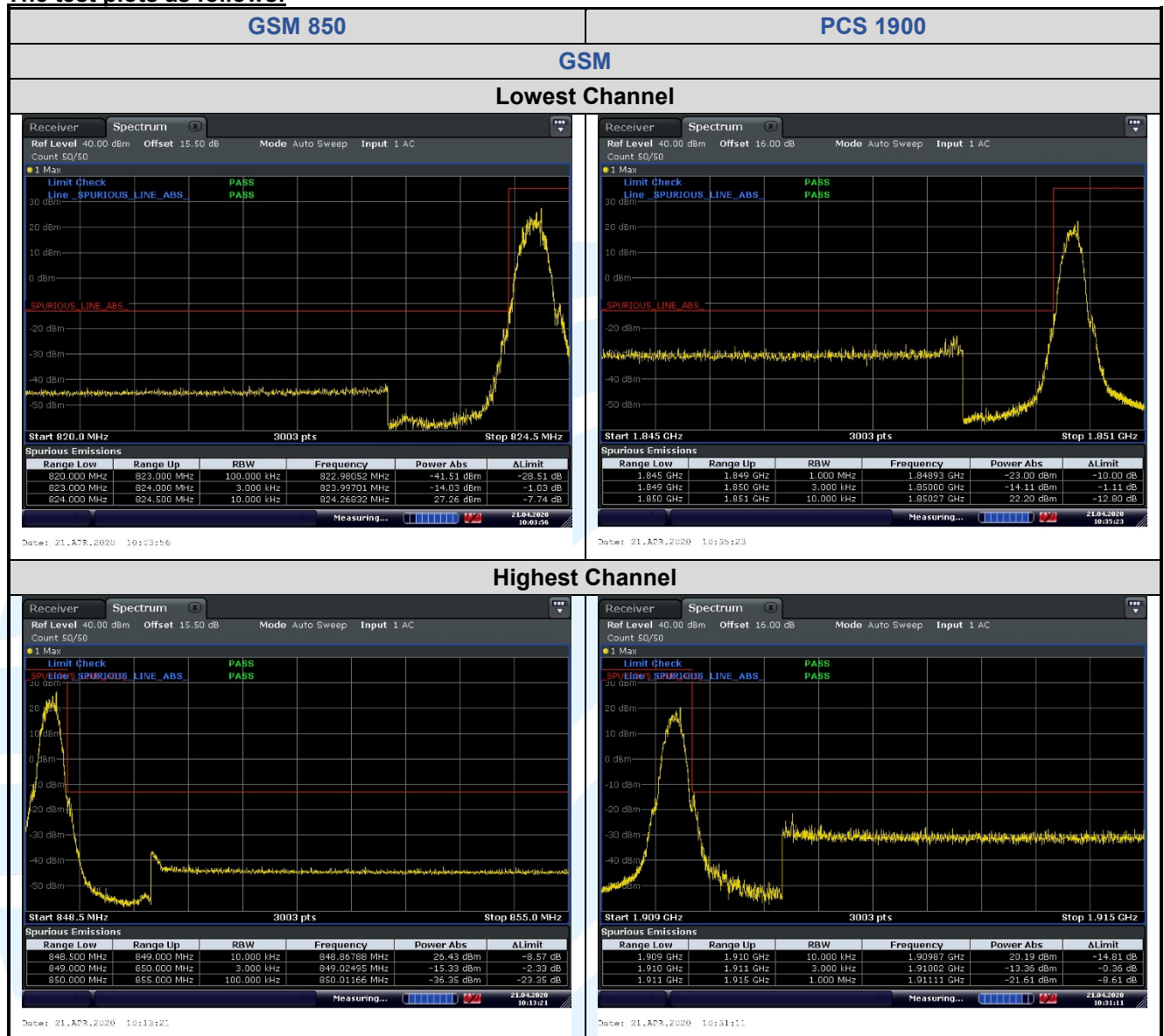
**Test Setup:** Refer to section 4.2.2 for details.

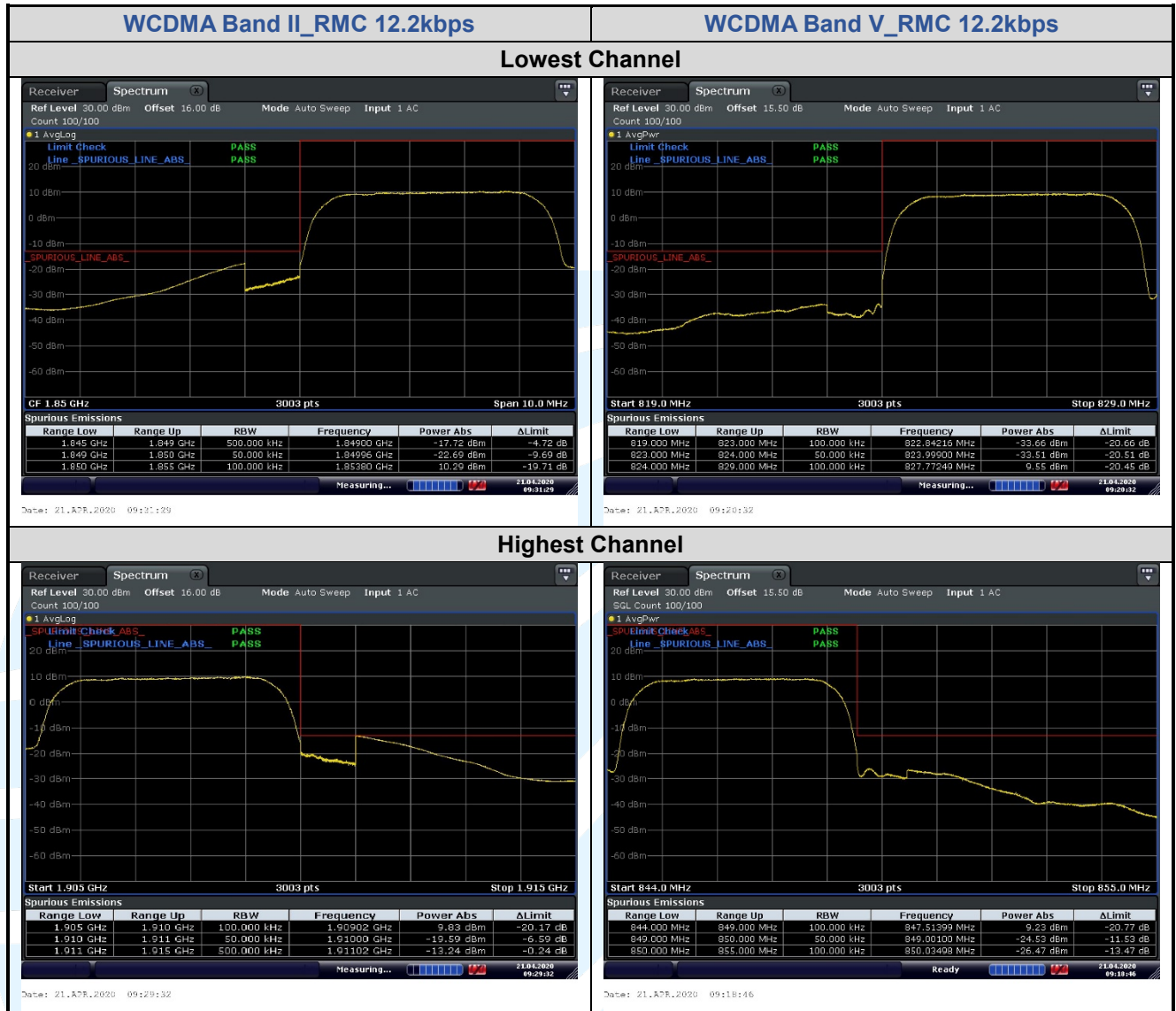
**Instruments Used:** Refer to section 3 for details

**Test Mode:** Link mode

**Test Results:** Pass

The test plots as follows:





## 5.7 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

**Test Requirement:** FCC 47 CFR Part 2.1051,  
FCC 47 CFR Part 22.917(a)(b),  
FCC 47 CFR Part 24.238(a)(b),  
**Test Method:** ANSI C63.26-2015 & KDB 971168 D01v03r01

**Limit:**

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

**Test Procedure:**

The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range. b. Measuring frequency range is from 30 MHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

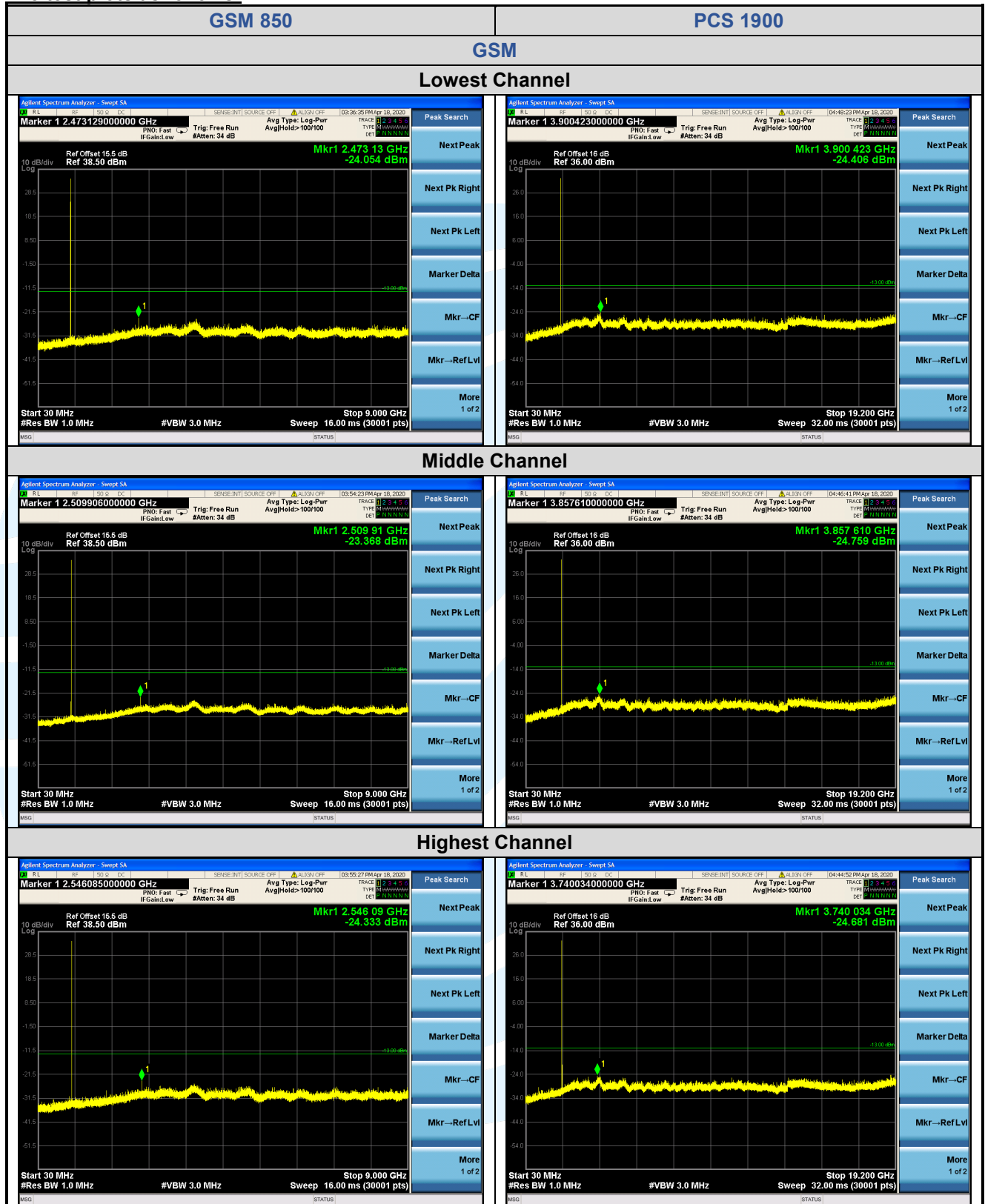
**Test Setup:** Refer to section 4.2.2 for details.

**Instruments Used:** Refer to section 3 for details

**Test Mode:** Link mode

**Test Results:** Pass

The test plots as follows:



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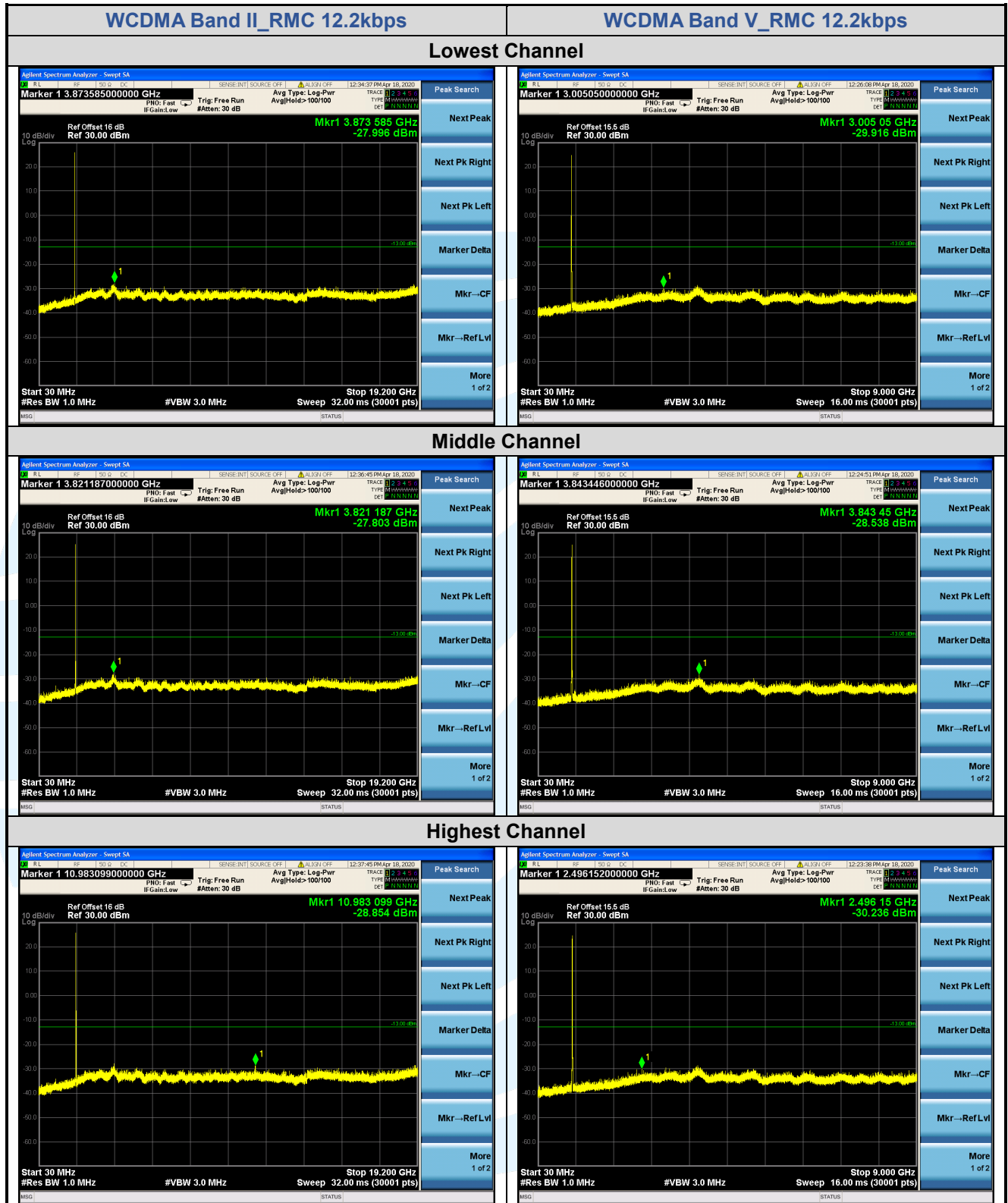
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**Remark:**

1) All the above radiation data, the fundamental frequency is not marked, it may exceed the limit, please ignore it.

## 5.8 FIELD STRENGTH OF SPURIOUS RADIATION

**Test Requirement:** FCC 47 CFR Part 2.1053,  
FCC 47 CFR Part 22.917(a)(b),  
FCC 47 CFR Part 24.238(a)(b),

**Test Method:** ANSI C63.26-2015 & KDB 971168 D01v03r01 Section 7

**Limits:**

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

**Test Setup:** Refer to section 4.2.1 for details.

**Test Procedures:** KDB 971168 D01v03r01 Section 7

**Equipment Used:** Refer to section 3 for details.

**Test Result:** Pass

**The measurement data as follows:**

| GSM 850_Below 1G    |                    |                        |                                |                         |                |                |            |
|---------------------|--------------------|------------------------|--------------------------------|-------------------------|----------------|----------------|------------|
| No.                 | Frequency<br>(MHz) | SA<br>Reading<br>(dBm) | Correction<br>factor<br>(dB/m) | EIRP<br>Result<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Ant. Pol.  |
| GSM_Lowest Channel  |                    |                        |                                |                         |                |                |            |
| 1                   | 33.335             | -91.90                 | 37.32                          | -54.58                  | -13.00         | -41.58         | Horizontal |
| 2                   | 104.798            | -89.47                 | 32.03                          | -57.44                  | -13.00         | -44.44         | Horizontal |
| 3                   | 679.435            | -88.45                 | 47.35                          | -41.10                  | -13.00         | -28.10         | Horizontal |
| 4                   | 31.073             | -90.40                 | 38.65                          | -51.75                  | -13.00         | -38.75         | Vertical   |
| 5                   | 114.822            | -89.04                 | 31.83                          | -57.21                  | -13.00         | -44.21         | Vertical   |
| 6                   | 546.437            | -87.61                 | 44.56                          | -43.05                  | -13.00         | -30.05         | Vertical   |
| GSM_Middle Channel  |                    |                        |                                |                         |                |                |            |
| 1                   | 35.263             | -91.40                 | 36.34                          | -55.06                  | -13.00         | -42.06         | Horizontal |
| 2                   | 103.335            | -88.51                 | 32.05                          | -56.46                  | -13.00         | -43.46         | Horizontal |
| 3                   | 793.028            | -87.10                 | 48.23                          | -38.87                  | -13.00         | -25.87         | Horizontal |
| 4                   | 32.640             | -92.62                 | 37.64                          | -54.98                  | -13.00         | -41.98         | Vertical   |
| 5                   | 254.031            | -89.38                 | 36.47                          | -52.91                  | -13.00         | -39.91         | Vertical   |
| 6                   | 693.910            | -89.02                 | 46.38                          | -42.64                  | -13.00         | -29.64         | Vertical   |
| GSM_Highest Channel |                    |                        |                                |                         |                |                |            |
| 1                   | 31.073             | -91.04                 | 38.49                          | -52.55                  | -13.00         | -39.55         | Horizontal |
| 2                   | 162.020            | -89.64                 | 33.70                          | -55.94                  | -13.00         | -42.94         | Horizontal |
| 3                   | 793.028            | -87.63                 | 48.23                          | -39.40                  | -13.00         | -26.40         | Horizontal |
| 4                   | 33.807             | -91.42                 | 36.88                          | -54.54                  | -13.00         | -41.54         | Vertical   |
| 5                   | 290.317            | -88.44                 | 37.27                          | -51.17                  | -13.00         | -38.17         | Vertical   |
| 6                   | 821.387            | -87.35                 | 48.05                          | -39.30                  | -13.00         | -26.30         | Vertical   |

| GSM 850_Above 1G     |           |            |                   |             |        |        |            |
|----------------------|-----------|------------|-------------------|-------------|--------|--------|------------|
| No.                  | Frequency | SA Reading | Correction factor | EIRP Result | Limit  | Margin | Ant. Pol.  |
|                      | (MHz)     | (dBm)      | (dB/m)            | (dBm)       | (dBm)  | (dB)   |            |
| GSM_ Lowest Channel  |           |            |                   |             |        |        |            |
| 1                    | 1648.400  | -38.35     | 3.17              | -35.18      | -13.00 | -22.18 | Horizontal |
| 2                    | 2472.600  | -61.74     | 11.44             | -50.30      | -13.00 | -37.30 | Horizontal |
| 3                    | 1648.400  | -53.56     | 3.25              | -50.31      | -13.00 | -37.31 | Vertical   |
| 4                    | 2472.600  | -66.34     | 11.24             | -55.10      | -13.00 | -42.10 | Vertical   |
| GSM_ Middle Channel  |           |            |                   |             |        |        |            |
| 1                    | 1673.200  | -42.78     | 3.44              | -39.34      | -13.00 | -26.34 | Horizontal |
| 2                    | 2509.800  | -63.34     | 11.46             | -51.88      | -13.00 | -38.88 | Horizontal |
| 3                    | 1673.200  | -48.86     | 3.50              | -45.36      | -13.00 | -32.36 | Vertical   |
| 4                    | 2509.800  | -66.27     | 11.26             | -55.01      | -13.00 | -42.01 | Vertical   |
| GSM_ Highest Channel |           |            |                   |             |        |        |            |
| 1                    | 1697.600  | -45.08     | 3.71              | -41.37      | -13.00 | -28.37 | Horizontal |
| 2                    | 2546.400  | -59.84     | 11.46             | -48.38      | -13.00 | -35.38 | Horizontal |
| 3                    | 1697.600  | -49.11     | 3.75              | -45.36      | -13.00 | -32.36 | Vertical   |
| 4                    | 2546.400  | -61.46     | 11.25             | -50.21      | -13.00 | -37.21 | Vertical   |

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| PCS 1900_Below 1G    |           |            |                   |             |        |        |            |
|----------------------|-----------|------------|-------------------|-------------|--------|--------|------------|
| No.                  | Frequency | SA Reading | Correction factor | EIRP Result | Limit  | Margin | Ant. Pol.  |
|                      | (MHz)     | (dBm)      | (dB/m)            | (dBm)       | (dBm)  | (dB)   |            |
| GSM_ Lowest Channel  |           |            |                   |             |        |        |            |
| 1                    | 35.016    | -69.08     | 1.55              | -67.53      | -13.00 | -54.53 | Horizontal |
| 2                    | 250.486   | -73.78     | 2.23              | -71.55      | -13.00 | -58.55 | Horizontal |
| 3                    | 945.334   | -75.30     | 16.76             | -58.54      | -13.00 | -45.54 | Horizontal |
| 4                    | 35.016    | -70.41     | 1.20              | -69.21      | -13.00 | -56.21 | Vertical   |
| 5                    | 264.971   | -75.81     | 2.59              | -73.22      | -13.00 | -60.22 | Vertical   |
| 6                    | 958.714   | -76.99     | 15.81             | -61.18      | -13.00 | -48.18 | Vertical   |
| GSM_ Middle Channel  |           |            |                   |             |        |        |            |
| 1                    | 34.285    | -76.29     | 7.81              | -68.48      | -13.00 | -55.48 | Horizontal |
| 2                    | 53.756    | -71.70     | 0.84              | -70.86      | -13.00 | -57.86 | Horizontal |
| 3                    | 102.612   | -76.78     | 3.28              | -73.50      | -13.00 | -60.50 | Horizontal |
| 4                    | 34.045    | -72.66     | 1.81              | -70.85      | -13.00 | -57.85 | Vertical   |
| 5                    | 280.294   | -77.78     | 2.98              | -74.80      | -13.00 | -61.80 | Vertical   |
| 6                    | 875.013   | -77.35     | 13.25             | -64.10      | -13.00 | -51.10 | Vertical   |
| GSM_ Highest Channel |           |            |                   |             |        |        |            |
| 1                    | 34.527    | -76.91     | 7.68              | -69.23      | -13.00 | -56.23 | Horizontal |
| 2                    | 54.135    | -71.85     | 0.82              | -71.03      | -13.00 | -58.03 | Horizontal |
| 3                    | 104.798   | -76.58     | 3.25              | -73.33      | -13.00 | -60.33 | Horizontal |
| 4                    | 34.285    | -77.08     | 7.55              | -69.53      | -13.00 | -56.53 | Vertical   |
| 5                    | 164.313   | -79.55     | 4.56              | -74.99      | -13.00 | -61.99 | Vertical   |
| 6                    | 938.714   | -81.59     | 21.17             | -60.42      | -13.00 | -47.42 | Vertical   |

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| PCS 1900 _Above 1G   |           |            |                   |             |        |        |            |
|----------------------|-----------|------------|-------------------|-------------|--------|--------|------------|
| No.                  | Frequency | SA Reading | Correction factor | EIRP Result | Limit  | Margin | Ant. Pol.  |
|                      | (MHz)     | (dBm)      | (dB/m)            | (dBm)       | (dBm)  | (dB)   |            |
| GSM_ Lowest Channel  |           |            |                   |             |        |        |            |
| 1                    | 3700.400  | -67.22     | 15.35             | -51.87      | -13.00 | -38.87 | Horizontal |
| 2                    | 9251.000  | -59.72     | 20.72             | -39.00      | -13.00 | -26.00 | Horizontal |
| 3                    | 3700.400  | -64.46     | 15.09             | -49.37      | -13.00 | -36.37 | Vertical   |
| 4                    | 9251.000  | -56.55     | 20.62             | -35.93      | -13.00 | -22.93 | Vertical   |
| GSM_ Middle Channel  |           |            |                   |             |        |        |            |
| 1                    | 3760.000  | -66.09     | 15.54             | -50.55      | -13.00 | -37.55 | Horizontal |
| 2                    | 9400.000  | -65.84     | 20.81             | -45.03      | -13.00 | -32.03 | Horizontal |
| 3                    | 3760.000  | -65.07     | 15.29             | -49.78      | -13.00 | -36.78 | Vertical   |
| 4                    | 9400.000  | -62.97     | 20.71             | -42.26      | -13.00 | -29.26 | Vertical   |
| GSM_ Highest Channel |           |            |                   |             |        |        |            |
| 1                    | 3819.600  | -65.04     | 15.73             | -49.31      | -13.00 | -36.31 | Horizontal |
| 2                    | 9549.000  | -67.06     | 20.65             | -46.41      | -13.00 | -33.41 | Horizontal |
| 3                    | 3819.600  | -60.97     | 15.49             | -45.48      | -13.00 | -32.48 | Vertical   |
| 4                    | 9549.000  | -60.72     | 20.55             | -40.17      | -13.00 | -27.17 | Vertical   |

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| WCDMA Band II _Below 1G       |           |            |                   |             |        |        |            |
|-------------------------------|-----------|------------|-------------------|-------------|--------|--------|------------|
| No.                           | Frequency | SA Reading | Correction factor | EIRP Result | Limit  | Margin | Ant. Pol.  |
|                               | (MHz)     | (dBm)      | (dB/m)            | (dBm)       | (dBm)  | (dB)   |            |
| RMC 12.2kbps_ Lowest Channel  |           |            |                   |             |        |        |            |
| 1                             | 54.135    | -71.68     | 0.82              | -70.86      | -13.00 | -57.86 | Horizontal |
| 2                             | 103.335   | -77.70     | 3.26              | -74.44      | -13.00 | -61.44 | Horizontal |
| 3                             | 952.000   | -83.04     | 22.97             | -60.07      | -13.00 | -47.07 | Horizontal |
| 4                             | 34.285    | -76.96     | 7.55              | -69.41      | -13.00 | -56.41 | Vertical   |
| 5                             | 363.523   | -81.30     | 11.03             | -70.27      | -13.00 | -57.27 | Vertical   |
| 6                             | 979.139   | -83.04     | 22.36             | -60.68      | -13.00 | -47.68 | Vertical   |
| RMC 12.2kbps_ Middle Channel  |           |            |                   |             |        |        |            |
| 1                             | 34.285    | -78.52     | 7.81              | -70.71      | -13.00 | -57.71 | Horizontal |
| 2                             | 54.135    | -72.80     | 0.82              | -71.98      | -13.00 | -58.98 | Horizontal |
| 3                             | 958.714   | -82.51     | 23.01             | -59.50      | -13.00 | -46.50 | Horizontal |
| 4                             | 34.045    | -78.41     | 7.71              | -70.70      | -13.00 | -57.70 | Vertical   |
| 5                             | 250.486   | -80.72     | 8.13              | -72.59      | -13.00 | -59.59 | Vertical   |
| 6                             | 833.013   | -81.54     | 18.72             | -62.82      | -13.00 | -49.82 | Vertical   |
| RMC 12.2kbps_ Highest Channel |           |            |                   |             |        |        |            |
| 1                             | 55.678    | -71.73     | 0.71              | -71.02      | -13.00 | -58.02 | Horizontal |
| 2                             | 101.893   | -76.92     | 3.29              | -73.63      | -13.00 | -60.63 | Horizontal |
| 3                             | 945.334   | -82.70     | 22.67             | -60.03      | -13.00 | -47.03 | Horizontal |
| 4                             | 34.527    | -78.76     | 7.39              | -71.37      | -13.00 | -58.37 | Vertical   |
| 5                             | 213.103   | -81.14     | 6.14              | -75.00      | -13.00 | -62.00 | Vertical   |
| 6                             | 945.334   | -82.60     | 21.34             | -61.26      | -13.00 | -48.26 | Vertical   |

| WCDMA Band II_ Above 1G       |           |            |                   |             |        |        |            |
|-------------------------------|-----------|------------|-------------------|-------------|--------|--------|------------|
| No.                           | Frequency | SA Reading | Correction factor | EIRP Result | Limit  | Margin | Ant. Pol.  |
|                               | (MHz)     | (dBm)      | (dB/m)            | (dBm)       | (dBm)  | (dB)   |            |
| RMC 12.2kbps_ Lowest Channel  |           |            |                   |             |        |        |            |
| 1                             | 3704.800  | -70.79     | 15.37             | -55.42      | -13.00 | -42.42 | Horizontal |
| 2                             | 5557.200  | -70.22     | 17.05             | -53.17      | -13.00 | -40.17 | Horizontal |
| 3                             | 3704.800  | -70.64     | 15.11             | -55.53      | -13.00 | -42.53 | Vertical   |
| 4                             | 5557.200  | -69.52     | 16.85             | -52.67      | -13.00 | -39.67 | Vertical   |
| RMC 12.2kbps_ Middle Channel  |           |            |                   |             |        |        |            |
| 1                             | 3760.000  | -65.77     | 15.54             | -50.23      | -13.00 | -37.23 | Horizontal |
| 2                             | 5640.000  | -66.40     | 17.18             | -49.22      | -13.00 | -36.22 | Horizontal |
| 3                             | 3760.000  | -70.98     | 15.29             | -55.69      | -13.00 | -42.69 | Vertical   |
| 4                             | 5640.000  | -68.55     | 16.98             | -51.57      | -13.00 | -38.57 | Vertical   |
| RMC 12.2kbps_ Highest Channel |           |            |                   |             |        |        |            |
| 1                             | 3815.200  | -64.88     | 15.72             | -49.16      | -13.00 | -36.16 | Horizontal |
| 2                             | 5722.800  | -67.88     | 17.48             | -50.40      | -13.00 | -37.40 | Horizontal |
| 3                             | 3815.200  | -67.58     | 15.48             | -52.10      | -13.00 | -39.10 | Vertical   |
| 4                             | 5722.800  | -67.48     | 17.28             | -50.20      | -13.00 | -37.20 | Vertical   |

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| WCDMA Band V _Below 1G        |           |            |                   |             |        |        |            |
|-------------------------------|-----------|------------|-------------------|-------------|--------|--------|------------|
| No.                           | Frequency | SA Reading | Correction factor | EIRP Result | Limit  | Margin | Ant. Pol.  |
|                               | (MHz)     | (dBm)      | (dB/m)            | (dBm)       | (dBm)  | (dB)   |            |
| RMC 12.2kbps_ Lowest Channel  |           |            |                   |             |        |        |            |
| 1                             | 31.513    | -91.45     | 38.27             | -53.18      | -13.00 | -40.18 | Horizontal |
| 2                             | 106.281   | -89.27     | 32.01             | -57.26      | -13.00 | -44.26 | Horizontal |
| 3                             | 698.804   | -89.08     | 47.79             | -41.29      | -13.00 | -28.29 | Horizontal |
| 4                             | 31.292    | -92.59     | 38.52             | -54.07      | -13.00 | -41.07 | Vertical   |
| 5                             | 155.331   | -89.98     | 33.05             | -56.93      | -13.00 | -43.93 | Vertical   |
| 6                             | 565.978   | -89.80     | 45.03             | -44.77      | -13.00 | -31.77 | Vertical   |
| RMC 12.2kbps_ Middle Channel  |           |            |                   |             |        |        |            |
| 1                             | 30.855    | -92.07     | 38.61             | -53.46      | -13.00 | -40.46 | Horizontal |
| 2                             | 101.180   | -89.52     | 32.10             | -57.42      | -13.00 | -44.42 | Horizontal |
| 3                             | 781.961   | -87.57     | 48.00             | -39.57      | -13.00 | -26.57 | Horizontal |
| 4                             | 31.735    | -91.47     | 38.23             | -53.24      | -13.00 | -40.24 | Vertical   |
| 5                             | 156.426   | -89.13     | 33.07             | -56.06      | -13.00 | -43.06 | Vertical   |
| 6                             | 986.044   | -87.27     | 51.52             | -35.75      | -13.00 | -22.75 | Vertical   |
| RMC 12.2kbps_ Highest Channel |           |            |                   |             |        |        |            |
| 1                             | 30.639    | -93.66     | 38.72             | -54.94      | -13.00 | -41.94 | Horizontal |
| 2                             | 95.649    | -88.93     | 31.63             | -57.30      | -13.00 | -44.30 | Horizontal |
| 3                             | 703.731   | -88.36     | 47.73             | -40.63      | -13.00 | -27.63 | Horizontal |
| 4                             | 30.425    | -91.28     | 39.08             | -52.20      | -13.00 | -39.20 | Vertical   |
| 5                             | 140.777   | -88.51     | 32.05             | -56.46      | -13.00 | -43.46 | Vertical   |
| 6                             | 703.731   | -89.01     | 46.68             | -42.33      | -13.00 | -29.33 | Vertical   |

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| WCDMA Band V _Above 1G        |           |            |                   |             |        |        |            |
|-------------------------------|-----------|------------|-------------------|-------------|--------|--------|------------|
| No.                           | Frequency | SA Reading | Correction factor | EIRP Result | Limit  | Margin | Ant. Pol.  |
|                               | (MHz)     | (dBm)      | (dB/m)            | (dBm)       | (dBm)  | (dB)   |            |
| RMC 12.2kbps_ Lowest Channel  |           |            |                   |             |        |        |            |
| 1                             | 1652.800  | -57.46     | 3.22              | -54.24      | -13.00 | -41.24 | Horizontal |
| 2                             | 2479.200  | -68.49     | 11.45             | -57.04      | -13.00 | -44.04 | Horizontal |
| 3                             | 1652.800  | -62.82     | 3.30              | -59.52      | -13.00 | -46.52 | Vertical   |
| 4                             | 2479.200  | -66.76     | 11.25             | -55.51      | -13.00 | -42.51 | Vertical   |
| RMC 12.2kbps_ Middle Channel  |           |            |                   |             |        |        |            |
| 1                             | 1672.800  | -59.46     | 3.44              | -56.02      | -13.00 | -43.02 | Horizontal |
| 2                             | 2509.200  | -70.15     | 11.46             | -58.69      | -13.00 | -45.69 | Horizontal |
| 3                             | 1672.800  | -65.06     | 3.50              | -61.56      | -13.00 | -48.56 | Vertical   |
| 4                             | 2509.200  | -70.93     | 11.26             | -59.67      | -13.00 | -46.67 | Vertical   |
| RMC 12.2kbps_ Highest Channel |           |            |                   |             |        |        |            |
| 1                             | 1693.200  | -54.39     | 3.66              | -50.73      | -13.00 | -37.73 | Horizontal |
| 2                             | 2539.800  | -62.61     | 11.46             | -51.15      | -13.00 | -38.15 | Horizontal |
| 3                             | 1693.200  | -56.98     | 3.71              | -53.27      | -13.00 | -40.27 | Vertical   |
| 4                             | 2539.800  | -62.59     | 11.25             | -51.34      | -13.00 | -38.34 | Vertical   |

#### Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit

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## 5.9 FREQUENCY STABILITY

**Test Requirement:** FCC 47 CFR Part 2.1055 &  
FCC 47 CFR Part 22.355 &  
FCC 47 CFR Part 24.235 &  
**Test Method:** ANSI C63.26-2015 & KDB 971168 D01v03r01

**Limits:**

**FCC 47 CFR Part 22.355,**

The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations.

**FCC 47 CFR Part 24.235,**

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

**Test Setup:** Refer to section 4.2.2 for details.

**Test Procedures:**

- 1) Use CMW 500 with Frequency Error measurement capability.
  - a) Temp. =  $-30^{\circ}$  to  $+50^{\circ}\text{C}$
  - b) Voltage = low voltage, 3.5 Vdc, Normal, 3.7 Vdc and High voltage, 4.25 Vdc.

2) Frequency Stability vs Temperature:

The EUT is placed inside a temperature chamber. The temperature is set to  $20^{\circ}\text{C}$  and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until  $+50^{\circ}\text{C}$  is reached.

3) Frequency Stability vs Voltage:

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

**Equipment Used:** Refer to section 3 for details.

**Test Result:** Pass

| Modulation | Channel/<br>Frequency<br>(MHz) | Voltage<br>(Vdc) | Temperature<br>( $^{\circ}\text{C}$ ) | Deviation<br>(Hz) | Deviation<br>(ppm) | Limit<br>(ppm) | Result |
|------------|--------------------------------|------------------|---------------------------------------|-------------------|--------------------|----------------|--------|
| GSM 850    |                                |                  |                                       |                   |                    |                |        |
| GMSK       | 190 / 836.6                    | VL               | TN                                    | 34                | 0.0406             | $\pm 2.5$      | Pass   |
|            |                                | VN               |                                       | 41                | 0.0490             | $\pm 2.5$      | Pass   |
|            |                                | VH               |                                       | 33                | 0.0394             | $\pm 2.5$      | Pass   |
|            |                                | VN               | 50                                    | 36                | 0.0430             | $\pm 2.5$      | Pass   |
|            |                                |                  | 40                                    | 41                | 0.0490             | $\pm 2.5$      | Pass   |
|            |                                |                  | 30                                    | 37                | 0.0442             | $\pm 2.5$      | Pass   |
|            |                                |                  | 20                                    | 35                | 0.0418             | $\pm 2.5$      | Pass   |
|            |                                |                  | 10                                    | 45                | 0.0538             | $\pm 2.5$      | Pass   |
|            |                                |                  | 0                                     | 32                | 0.0383             | $\pm 2.5$      | Pass   |
|            |                                |                  | -10                                   | 41                | 0.0490             | $\pm 2.5$      | Pass   |
|            |                                |                  | -20                                   | 29                | 0.0347             | $\pm 2.5$      | Pass   |
|            |                                |                  | -30                                   | 43                | 0.0514             | $\pm 2.5$      | Pass   |

| Modulation | Channel/<br>Frequency<br>(MHz) | Voltage<br>(Vdc) | Temperature<br>(°C) | Deviation<br>(Hz) | Deviation<br>(ppm) | Limit<br>(ppm) | Result |
|------------|--------------------------------|------------------|---------------------|-------------------|--------------------|----------------|--------|
| PCS 1900   |                                |                  |                     |                   |                    |                |        |
| GMSK       | 661 / 1880.0                   | VL               | TN                  | 34                | 0.0181             | N/A            | Pass   |
|            |                                | VN               |                     | 37                | 0.0197             |                | Pass   |
|            |                                | VH               |                     | 32                | 0.0170             |                | Pass   |
|            |                                | VN               | 50                  | 36                | 0.0191             |                | Pass   |
|            |                                |                  | 40                  | 41                | 0.0218             |                | Pass   |
|            |                                |                  | 30                  | 33                | 0.0176             |                | Pass   |
|            |                                |                  | 20                  | 35                | 0.0186             |                | Pass   |
|            |                                |                  | 10                  | 35                | 0.0186             |                | Pass   |
|            |                                |                  | 0                   | 36                | 0.0191             |                | Pass   |
|            |                                |                  | -10                 | 31                | 0.0165             |                | Pass   |
|            |                                |                  | -20                 | 34                | 0.0181             |                | Pass   |
|            |                                |                  | -30                 | 33                | 0.0176             |                | Pass   |

| Modulation    | Channel/<br>Frequency<br>(MHz) | Voltage<br>(Vdc) | Temperature<br>(°C) | Deviation<br>(Hz) | Deviation<br>(ppm) | Limit<br>(ppm) | Result |
|---------------|--------------------------------|------------------|---------------------|-------------------|--------------------|----------------|--------|
| WCDMA Band II |                                |                  |                     |                   |                    |                |        |
| RMC 12.2kbps  | 9400 / 1880.0                  | VL               | TN                  | -32               | -0.0170            | N/A            | Pass   |
|               |                                | VN               |                     | -27               | -0.0144            |                | Pass   |
|               |                                | VH               |                     | -31               | -0.0165            |                | Pass   |
|               |                                | VN               | 50                  | -29               | -0.0154            |                | Pass   |
|               |                                |                  | 40                  | -29               | -0.0154            |                | Pass   |
|               |                                |                  | 30                  | -31               | -0.0165            |                | Pass   |
|               |                                |                  | 20                  | -31               | -0.0165            |                | Pass   |
|               |                                |                  | 10                  | -33               | -0.0176            |                | Pass   |
|               |                                |                  | 0                   | -29               | -0.0154            |                | Pass   |
|               |                                |                  | -10                 | -29               | -0.0154            |                | Pass   |
|               |                                |                  | -20                 | -34               | -0.0181            |                | Pass   |
|               |                                |                  | -30                 | -33               | -0.0176            |                | Pass   |

| Modulation   | Channel/<br>Frequency<br>(MHz) | Voltage<br>(Vdc) | Temperature<br>(°C) | Deviation<br>(Hz) | Deviation<br>(ppm) | Limit<br>(ppm) | Result |
|--------------|--------------------------------|------------------|---------------------|-------------------|--------------------|----------------|--------|
| WCDMA Band V |                                |                  |                     |                   |                    |                |        |
| RMC 12.2kbps | 4182 / 836.4                   | VL               | TN                  | -29               | -0.0347            | ± 2.5          | Pass   |
|              |                                | VN               |                     | -26               | -0.0311            | ± 2.5          | Pass   |
|              |                                | VH               |                     | -31               | -0.0371            | ± 2.5          | Pass   |
|              |                                | VN               | 50                  | -21               | -0.0251            | ± 2.5          | Pass   |
|              |                                |                  | 40                  | -29               | -0.0347            | ± 2.5          | Pass   |
|              |                                |                  | 30                  | -33               | -0.0395            | ± 2.5          | Pass   |
|              |                                |                  | 20                  | -31               | -0.0371            | ± 2.5          | Pass   |
|              |                                |                  | 10                  | -33               | -0.0395            | ± 2.5          | Pass   |
|              |                                |                  | 0                   | -25               | -0.0299            | ± 2.5          | Pass   |
|              |                                |                  | -10                 | -29               | -0.0347            | ± 2.5          | Pass   |
|              |                                |                  | -20                 | -31               | -0.0371            | ± 2.5          | Pass   |
|              |                                |                  | -30                 | -35               | -0.0418            | ± 2.5          | Pass   |

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## APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

## APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

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

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