# FCC Test Report (PART 22)

| | |
|---|---|
| **Report No.:** | RF190516E08-5 |
| **FCC ID:** | MQT-AT170R18U |
| **Test Model:** | xCL_AT-170-R-18U |
| **Received Date:** | May 16, 2019 |
| **Test Date:** | June 19 to 28, 2019 |
| **Issued Date:** | July 11, 2019 |
| **Applicant:** | XAC AUTOMATION CORP. |
| **Address:** | 4F, No. 30, INDUSTRY E. RD. IX, SCIENCE-BASED INDUSTRIAL PARK,HSINCHU,TAIWAN |
| **Issued By:** | Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory |
| **Lab Address:** | E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C. |
| **Test Location:** | E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C. |
| **FCC Registration / Designation Number:** | 723255 / TW2022 |

Testing Laboratory
2022

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## Release Control Record

| Issue No. | Description | Date Issued |
|---|---|---|
| RF190516E08-5 | Original release. | July 11, 2019 |

## 1 Certificate of Conformity

| | |
|---|---|
| **Product:** | Terminal |
| **Brand:** | XAC |
| **Test Model:** | xCL_AT-170-R-18U |
| **Sample Status:** | ENGINEERING SAMPLE |
| **Applicant:** | XAC AUTOMATION CORP. |
| **Test Date:** | June 19 to 28, 2019 |
| **Standards:** | FCC Part 22, Subpart H |

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :** _____ , **Date:** July 11, 2019

Claire Kuan / Specialist

**Approved by :** _____ , **Date:** July 11, 2019

May Chen / Manager

## 2 Summary of Test Results

| Applied Standard: FCC Part 22 & Part 2 | | | |
|---|---|---|---|
| FCC Clause | Test Item | Result | Remarks |
| 2.1046<br>22.913 (a) | Effective radiated power | PASS | Meet the requirement of limit. |
| --- | Peak to Average Ratio | PASS | Meet the requirement of limit. |
| 2.1047 | Modulation characteristics | PASS | Meet the requirement |
| 2.1055<br>22.355 | Frequency Stability | PASS | Meet the requirement of limit. |
| 2.1049 | Occupied Bandwidth | PASS | Meet the requirement of limit. |
| 22.917 | Band Edge Measurements | PASS | Meet the requirement of limit. |
| 2.1051<br>22.917 | Conducted Spurious Emissions | PASS | Meet the requirement of limit. |
| 2.1053<br>22.917 | Radiated Spurious Emissions | PASS | Meet the requirement of limit.<br>Minimum passing margin is -35.38dB at 3305.6MHz. |

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| Measurement | Frequency | Expanded Uncertainty (k=2) (±) |
|---|---|---|
| Radiated Emissions up to 1 GHz | 30MHz ~ 1GHz | 4.9 dB |
| Radiated Emissions above 1 GHz | 1GHz ~ 6GHz | 5.1 dB |
| | 6GHz ~ 18GHz | 4.9 dB |
| | 18GHz ~ 40GHz | 5.2 dB |

## 2.2 Test Site and Instruments

**For radiated spurious emissions test:**

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| Test Receiver Keysight | N9038A | MY54450088 | July 05, 2018 | July 04, 2019 |
| Pre-Amplifier EMCI | EMC001340 | 980142 | Jan. 25, 2019 | Jan. 24, 2020 |
| Loop Antenna Electro-Metrics | EM-6879 | 269 | Sep. 07, 2018 | Sep. 06, 2019 |
| RF Cable | NA | LOOPCAB-001 | Jan. 14, 2019 | Jan. 13, 2020 |
| RF Cable | NA | LOOPCAB-002 | Jan. 14, 2019 | Jan. 13, 2020 |
| Pre-Amplifier Mini-Circuits | ZFL-1000VH2B | AMP-ZFL-01 | Oct. 30, 2018 | Oct. 29, 2019 |
| Trilog Broadband Antenna SCHWARZBECK | VULB 9168 | 9168-406 | Nov. 22, 2018 | Nov. 21, 2019 |
| RF Cable | 8D | 966-4-1 | Mar. 19, 2019 | Mar. 18, 2020 |
| RF Cable | 8D | 966-4-2 | Mar. 19, 2019 | Mar. 18, 2020 |
| RF Cable | 8D | 966-4-3 | Mar. 19, 2019 | Mar. 18, 2020 |
| Fixed attenuator Mini-Circuits | UNAT-5+ | PAD-3m-4-01 | Sep. 27, 2018 | Sep. 26, 2019 |
| Horn_Antenna SCHWARZBECK | BBHA 9120D | 9120D-783 | Nov. 25, 2018 | Nov. 24, 2019 |
| Pre-Amplifier EMCI | EMC12630SE | 980385 | Aug. 16, 2018 | Aug. 15, 2019 |
| RF Cable | EMC104-SM-SM-1 | 160923 | Jan. 28, 2019 | Jan. 27, 2020 |
| RF Cable | 104 RF cable | 131215 | Jan. 10, 2019 | Jan. 09, 2020 |
| RF Cable | EMC104-SM-SM-6000 | 180418 | May 03, 2019 | May 02, 2020 |
| Pre-Amplifier EMCI | EMC184045SE | 980387 | Jan. 28, 2019 | Jan. 27, 2020 |
| Horn_Antenna SCHWARZBECK | BBHA 9170 | BBHA9170519 | Nov. 25, 2018 | Nov. 24, 2019 |
| RF Cable | EMC102-KM-KM-1200 | 160924 | Jan. 28, 2019 | Jan. 27, 2020 |
| RF Cable | EMC102-KM-KM-1200 | 160925 | Jan. 28, 2019 | Jan. 27, 2020 |
| Software | ADT_Radiated_V8.7.08 | NA | NA | NA |
| Boresight Antenna Tower & Turn Table Max-Full | MF-7802BS | MF780208530 | NA | NA |

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 4.
3. Loop antenna was used for all emissions below 30 MHz.
4. Tested Date: June 19, 2019

**For other test items:**

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| Spectrum Analyzer R&S | FSV40 | 100964 | June 04, 2019 | June 03, 2020 |
| Spectrum Analyzer Agilent | E4446A | MY48250253 | Aug. 01, 2018 | July 31, 2019 |
| Power meter Anritsu | ML2495A | 1014008 | May 13, 2019 | May 12, 2020 |
| Power sensor Anritsu | MA2411B | 0917122 | May 13, 2019 | May 12, 2020 |
| Fixed Attenuator Mini-Circuits | MDCS18N-10 | MDCS18N-10-01 | Apr. 15, 2019 | Apr. 14, 2020 |
| AC Power Source Extech Electronics | 6205 | 1440452 | NA | NA |
| DC Power Supply Topward | 6603D | 795558 | NA | NA |
| Temperature & Humidity Chamber Giant Force | GTH-150-40-SP-AR | MAA0812-008 | Jan. 09, 2019 | Jan. 08, 2020 |
| True RMS Clamp Meter FLUKE | 325 | 31130711WS | May 21, 2019 | May 20, 2020 |
| ESG Vector signal generator Agilent | E4438C | MY45094468/005 506 602 UK6 UNJ | Nov. 19, 2018 | Nov. 18, 2019 |
| Mech Switch Absorptive Mini-Circuits | MSP4TA-18+ | 0140 | Feb. 11, 2019 | Feb. 10, 2020 |
| FXD ATTEN Mini-Circuits | BW-S3W2+ | MN71981 | Feb. 11, 2019 | Feb. 10, 2020 |
| Software | ADT_RF Test Software V6.6.5.4 | NA | NA | NA |
| Universal Radio Communication Tester R&S | CMU200 | 121040 | Apr. 17, 2019 | Apr. 16, 2020 |
| LTE Wireless Communication Test Set Keysight | E7515A | MY55340229 | May 29, 2019 | May 30, 2020 |

**NOTE:** 1. The test was performed in Oven room 2.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: June 28, 2019

## 3 General Information

### 3.1 General Description of EUT

| | | |
|---|---|---|
| Product | Terminal | |
| Brand | XAC | |
| Test Model | xCL_AT-170-R-18U | |
| Status of EUT | ENGINEERING SAMPLE | |
| Power Supply Rating | DC 3.8V from battery or DC 5V from USB adapter | |
| Modulation Type | WCDMA, HSDPA, HSUPA | BPSK |
| Operating Frequency | WCDMA, HSDPA, HSUPA | 826.4MHz ~846.6MHz |
| Max. ERP Power | WCDMA Band 5 | 25.35dBm |
| Emission Designator | WCDMA Band 5 | 4M15F9W |
| Antenna Type | Refer to Note | |
| Antenna Connector | Refer to Note | |
| Accessory Device | Battery x1 (option), Adapter x 1 (option) | |
| Data Cable Supplied | NA | |

Note:

1. The EUT has below radios as following table:

| **Radio 1** | **Radio 2** | **Radio 3** |
|---|---|---|
| WLAN+Bluetooth | WWAN | NFC |

2. Simultaneously transmission condition.

| Condition | Technology | |
|---|---|---|
| 1 | WWAN | NFC |
| 2 | WWAN | Bluetooth |
| 3 | WLAN 2.4GHz | NFC |
| 4 | WLAN 5GHz | NFC |
| 5 | Bluetooth | NFC |
| Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found. | | |

3. The EUT must be supplied with a power adapter or a battery as following table:

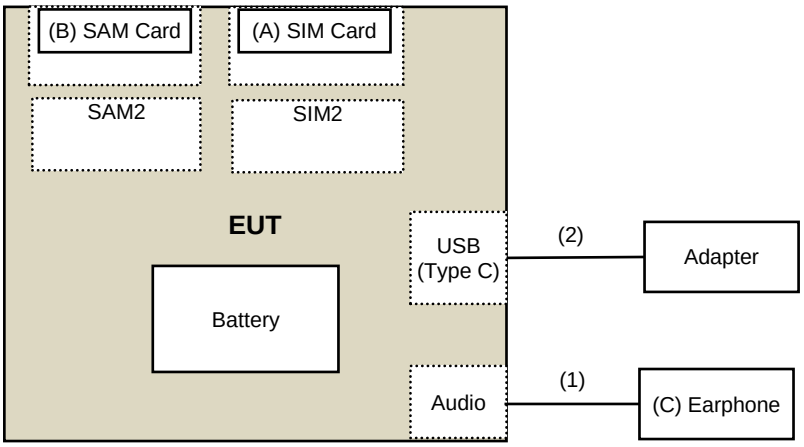
| Adapter | | |
|---|---|---|
| Brand | Model No. | Spec. |
| MASS POWER | NBS10B050200VUU | Input: 100-240Vac, 0.3A, 50~60Hz<br>Output: 5Vdc, 2A<br>DC output cable: Shielded, 1.2 m |
| **Battery** | | |
| Brand | Model No. | Spec. |
| Shenzhen Rishengzhi Electronics Technology Co., Ltd. | J601 | 3.8Vdc, 5200mAh, 19.76Wh |
| Note: From the above adapter and battery, the worst radiated emission test was found in **Adapter**. Therefore only the test data of the modes were recorded in this report. | | |

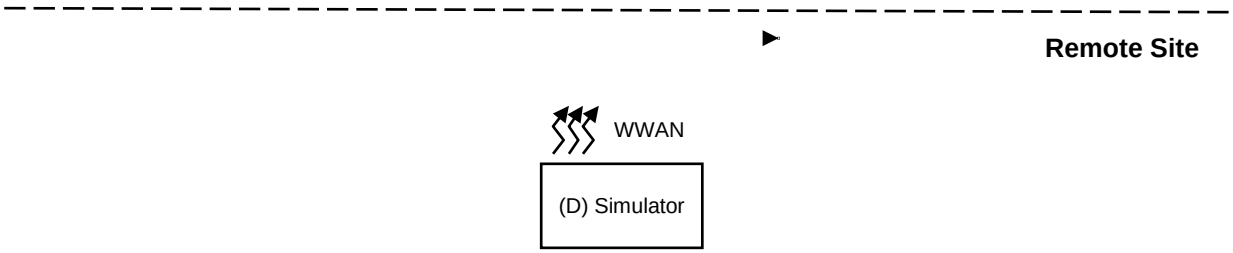
4. The antennas provided to the EUT, please refer to the following table:

| Ant. No. | RF Chain No. | Brand | Model | Ant. Net Gain (dBi) | Frequency Range | Antenna Type | Connector Type |
|---|---|---|---|---|---|---|---|
| Wi-Fi + BT | Main | awan-ant | AYF6P-100000 | 2.34 | 2.4~2.4835 GHz | FPCB | i-pex(MHF) |
| | | | | 4.48 | 5.15~5.85 GHz | FPCB | i-pex(MHF) |
| 3G/LTE | Main | awan-ant | AXF6P-100002 | 3.44 | 699~2690 MHz | FPCB | i-pex(MHF) |
| 3G/LTE | Aux | awan-ant | AXF6P-100003 | 3.75 | 699~2690 MHz | FPCB | i-pex(MHF) |
| NFC | Main | XAC | RTOS | 13 | 13.56 MHz | Wire | None |

5. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

## 3.2 Configuration of System under Test



### 3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks |
|---|---|---|---|---|---|---|
| A. | SIM Card | NA | NA | NA | NA | Provided by Lab |
| B. | SAM Card | NA | NA | NA | NA | Supplied by client |
| C. | Earphone | Sony | NA | NA | NA | Provided by Lab |
| D. | Simulator | Anritsu | MT8820C | 6201127458 | NA | Provided by Lab |

Note:

1. All power cords of the above support units are non-shielded (1.8m).

| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks |
|---|---|---|---|---|---|---|
| 1. | Audio Cable | 1 | 0.6 | No | 0 | Provided by Lab |
| 2. | USB Type C Cable | 1 | 1.2 | Yes | 0 | Supplied by client |

### 3.3 Test Mode Applicability and Tested Channel Detail

**WCDMA 5 MODE**

| Test Item | Available Channel | Tested Channel | Mode |
|---|---|---|---|
| ERP | 4132 to 4233 | 4132, 4182, 4233 | WCDMA |
| Frequency Stability | 4132 to 4233 | 4182 | WCDMA |
| Occupied Bandwidth | 4132 to 4233 | 4132, 4182, 4233 | WCDMA |
| Peak to Average Ratio | 4132 to 4233 | 4132, 4182, 4233 | WCDMA |
| Band Edge | 4132 to 4233 | 4132, 4233 | WCDMA |
| Conducted Emission | 4132 to 4233 | 4132, 4182, 4233 | WCDMA |
| Radiated Emission Below 1GHz | 4132 to 4233 | 4132, 4182, 4233 | WCDMA |
| Radiated Emission Above 1GHz | 4132 to 4233 | 4132, 4182, 4233 | WCDMA |

**Test Condition:**

| Test Item | Environmental Conditions | Input Power | Tested By |
|---|---|---|---|
| ERP | 25deg. C, 63%RH | 120Vac, 60Hz | Jyunchun Lin |
| Frequency Stability | 25deg. C, 63%RH | 3.8Vdc | Jyunchun Lin |
| Occupied Bandwidth | 25deg. C, 63%RH | 120Vac, 60Hz | Jyunchun Lin |
| Band Edge | 25deg. C, 63%RH | 120Vac, 60Hz | Jyunchun Lin |
| Peak to Average Ratio | 25deg. C, 63%RH | 120Vac, 60Hz | Jyunchun Lin |
| Condcudeted Emission | 25deg. C, 63%RH | 120Vac, 60Hz | Jyunchun Lin |
| Radiated Emission Below 1GHz | 25deg. C, 75%RH | 120Vac, 60Hz | Robert Cheng |
| Radiated Emission Above 1GHz | 25deg. C, 75%RH | 120Vac, 60Hz | Robert Cheng |

### 3.4 EUT Operating Conditions

The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

### 3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC 47 CFR Part 2**

**FCC 47 CFR Part 22, Subpart H**

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

**ANSI/TIA/EIA-603-E 2016**

**ANSI 63.26-2015**

**NOTE:** All test items have been performed and recorded as per the above standards.

# 4 Test Types and Results

## 4.1 Output Power Measurement

### 4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 7 watts e.r.p.

### 4.1.2 Test Procedures

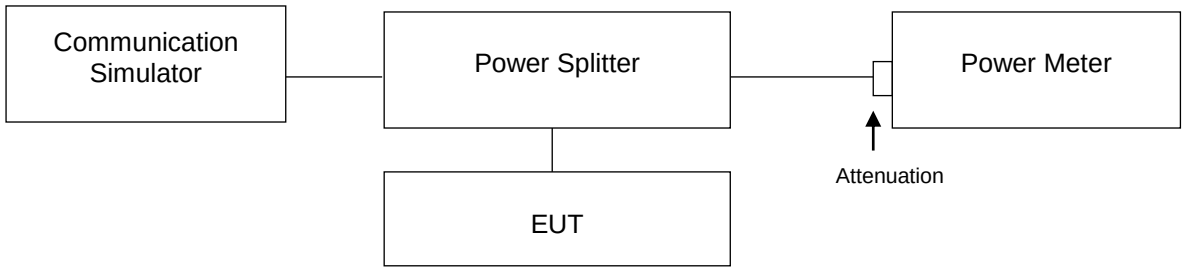
**Conducted Power Measurement:**

The EUT was set up for the maximum power with WCDMA link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and difference RB size/ RB offset for difference bandwidth record the power level shown on power meter.

**EIRP / ERP Measurement:**

a. EIRP = Conducted Output power level + Antenna gain.
b. ERP power can be calculated form EIRP power by subtracting the gain of dipole, ERP power = EIPR power - 2.15dBi.
c. ERP = Conducted Output power level + Antenna gain (dBi) - Isotropically Factor (2.15dB).

### 4.1.3 Test Setup




For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.4 Test Results

## CONDUCTED OUTPUT POWER (dBm)

### WCDMA Band 5

| Band | WCDMA V | | |
|---|---|---|---|
| Channel | 4132 | 4182 | 4233 |
| Frequency (MHz) | 826.4 | 836.4 | 846.6 |
| RMC | 23.94 | 24.24 | 24.06 |
| HSDPA Subtest-1 | 23.83 | 23.93 | 23.90 |
| HSDPA Subtest-2 | 23.83 | 23.87 | 23.86 |
| HSDPA Subtest-3 | 23.40 | 23.48 | 23.44 |
| HSDPA Subtest-4 | 23.39 | 23.46 | 23.44 |
| HSUPA Subtest-1 | 23.63 | 23.72 | 23.67 |
| HSUPA Subtest-2 | 21.89 | 22.43 | 21.94 |
| HSUPA Subtest-3 | 22.90 | 22.95 | 22.92 |
| HSUPA Subtest-4 | 22.41 | 22.48 | 22.44 |
| HSUPA Subtest-5 | 23.80 | 23.80 | 23.80 |

## ERP POWER

### WCDMA

| Band | WCDMA V | | |
|---|---|---|---|
| Channel | 4132 | 4182 | 4233 |
| Frequency (MHz) | 826.4 | 836.4 | 846.6 |
| RMC 12.2K | 23.94 | 24.24 | 24.06 |
| Gain (dBi) | 3.44 | 3.44 | 3.44 |
| Isotropically Factor (dB) | 2.15 | 2.15 | 2.15 |
| Max ERP Power (dBm) | 25.23 | 25.53 | 25.35 |

## 4.2 Modulation characteristics Measurement

### 4.2.1 Limits of Modulation characteristics

N/A

### 4.2.2 Test Procedure

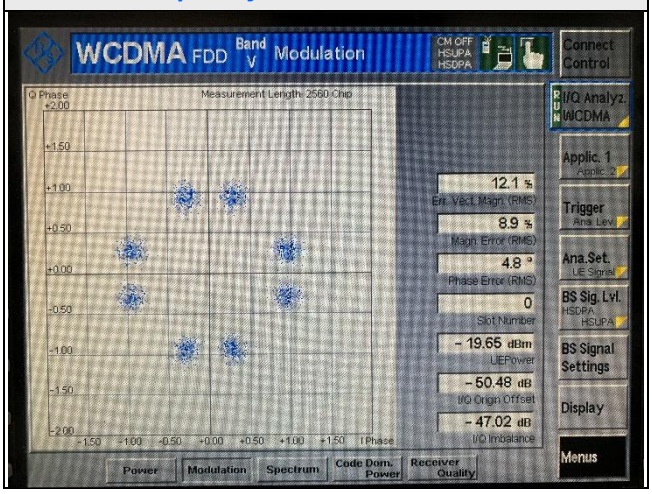
Connect the EUT to Communication Simulator via the antenna connector, The frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

### 4.2.3 Test Setup

4.2.4 Test Results

**WCDMA B5**

**Frequency: 836.4 MHz / Chain 0**



## 4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stabiliity Measurement

1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

4.3.2 Test Procedure

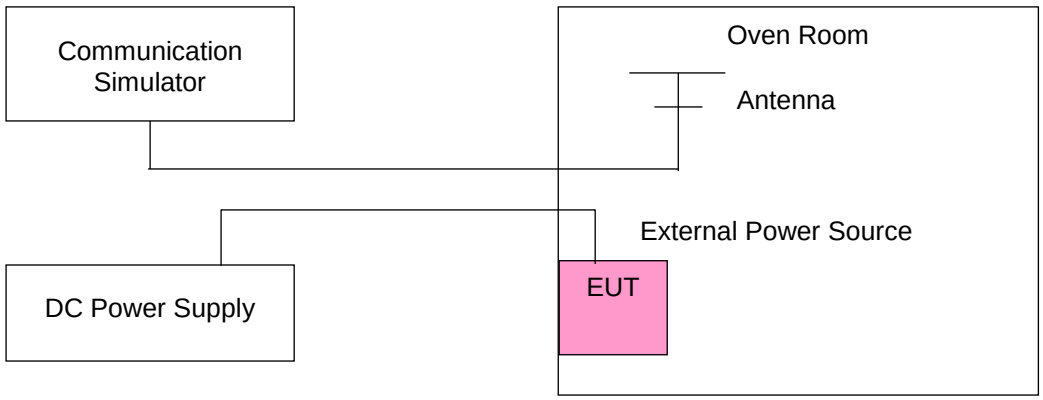
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.

c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5 ℃ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

**NOTE:** The frequency error was recorded frequency error from the communication simulator.

4.3.3 Test Setup



4.3.4 Test Results

**WCDMA**

Frequency Error vs. Voltage

| Voltage (Volts) | Frequency Error (ppm) | Limit (ppm) |
|---|---|---|
| | WCDMA B5 | |
| 4.37 | 0.038 | 2.5 |
| 3.23 | 0.049 | 2.5 |

Frequency Error vs.Temperature.

| TEMP. (℃) | Frequency Error (ppm) | Limit (ppm) |
|---|---|---|
| | WCDMA B5 | |
| 50 | 0.041 | 2.5 |
| 40 | 0.044 | 2.5 |
| 30 | 0.049 | 2.5 |
| 20 | 0.029 | 2.5 |
| 10 | 0.029 | 2.5 |
| 0 | 0.054 | 2.5 |
| -10 | 0.037 | 2.5 |
| -20 | 0.035 | 2.5 |
| -30 | 0.039 | 2.5 |

## 4.4 Occupied Bandwidth Measurement

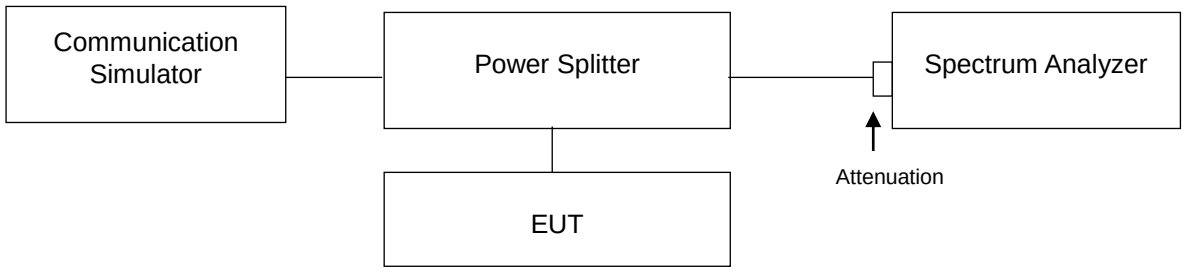
### 4.4.1 Test Procedure

All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW≥1% x OBW and VBW≥3 x VBW.

**Occupied Bandwdith Measurement:**
Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

**26dB Bandwidth Measurement:**
The emission bandwidth is defined as the width of the signal between two points,one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26dB below the transmitter power.

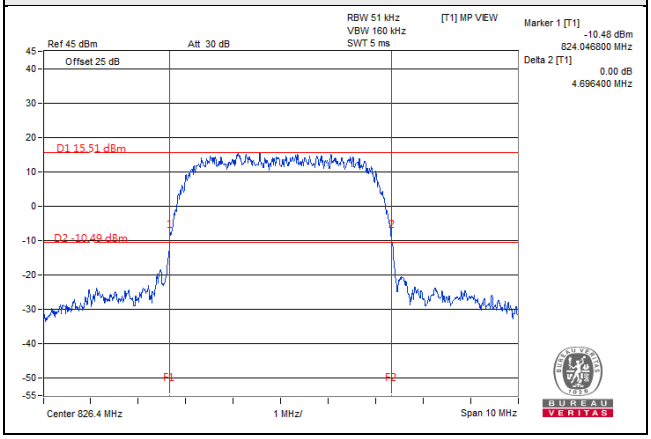
### 4.4.2 Test Setup



## 4.4.3 Test Result (-26dB Bandwidth)

| Channel | Freq. (MHz) | -26dB Bandwidth (MHz) |
|---|---|---|
| | | WCDMA B5 |
| 4132 | 826.4 | 4.69 |
| 4182 | 836.4 | 4.69 |
| 4233 | 846.6 | 4.69 |

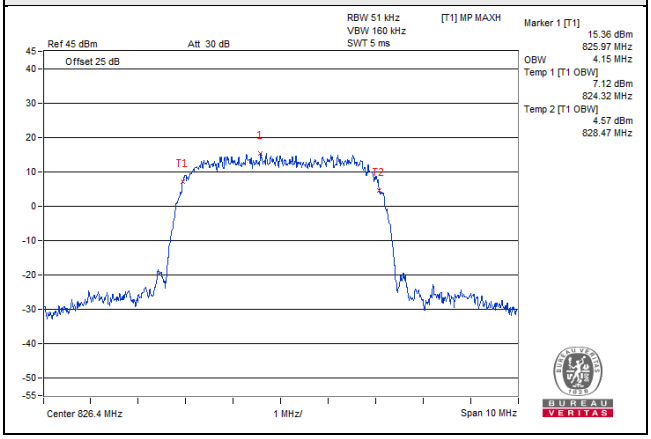
| Spectrum Plot of Worst Value |
|---|
| WCDMA |



## 4.4.4 Test Result (Occupied Bandwidth)

| Channel | Freq. (MHz) | 99% Occupied Bandwidth (MHz) |
|---|---|---|
| | | WCDMA |
| 4132 | 826.4 | 4.15 |
| 4182 | 836.4 | 4.14 |
| 4233 | 846.6 | 4.14 |

| Spectrum Plot of Worst Value |
|---|
| WCDMA |

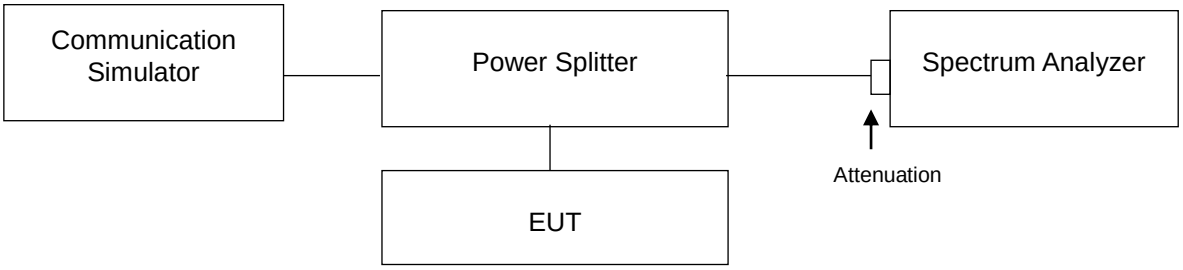


## 4.5 Band Edge Measurement

### 4.5.1 Limits of Band Edge Measurement

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. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

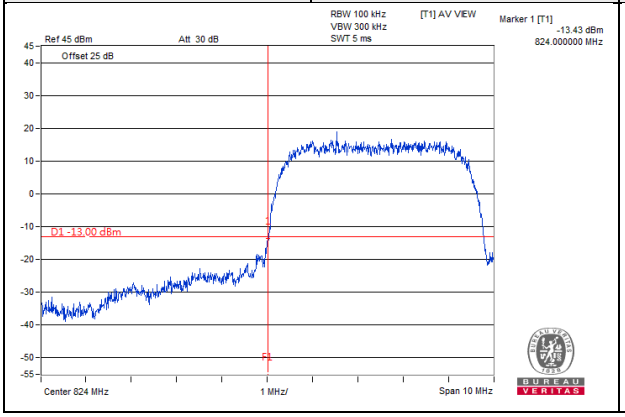
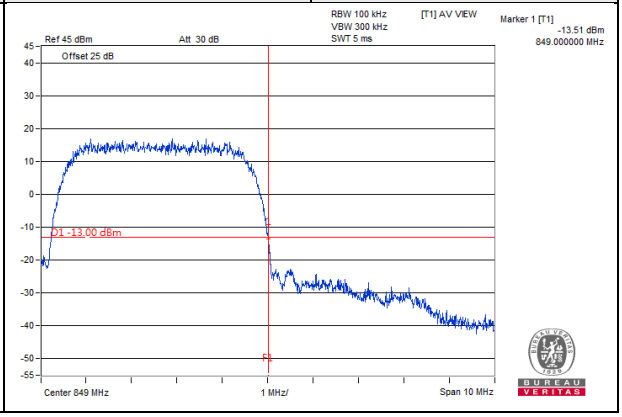
### 4.5.2 Test Setup




### 4.5.3 Test Procedures

a. All measurements were done at low and high operational frequency range.
b. The center frequency of spectrum is the band edge frequency and RB of the spectrum is >1% Emission Bandwidth and VB of the spectrum is ≧ 3*RB.
c. Record the max trace plot into the test report.

## 4.5.4 Test Results

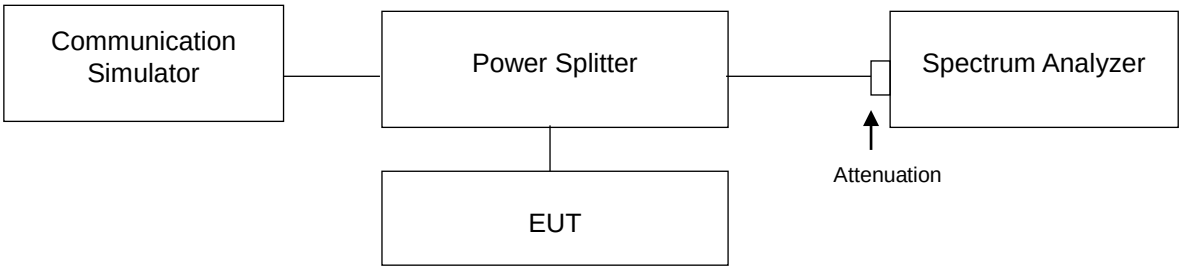
| WCDMA | | | |
|---|---|---|---|
| Channel | 4132 | Channel | 4233 |
|  | |  | |

## 4.6 Peak to Average Ratio

### 4.5.1 Limits of Peak to Average Ratio Measurement

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

### 4.5.2 Test Setup



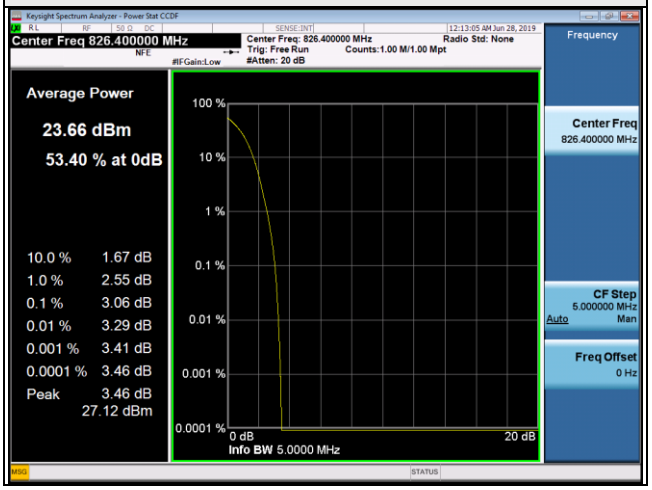

### 4.5.3 Test Procedures

1. Set resolution measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.

4.5.4 Test Results

| Channel | Freq. (MHz) | Peak to Average Ratio (dB) |
|---|---|---|
| | | WCDMA |
| 4132 | 826.4 | 3.06 |
| 4183 | 836.4 | 3.01 |
| 4233 | 846.6 | 2.99 |

| Spectrum Plot of Worst Value |
|---|
| WCDMA |

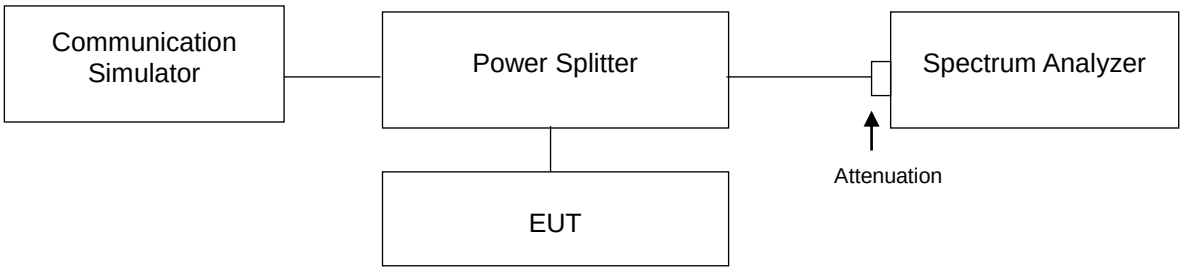


## 4.7 Conducted Spurious Emissions

### 4.7.1 Limits of Conducted Spurious Emissions Measurement

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 –13dBm.

### 4.7.2 Test Setup

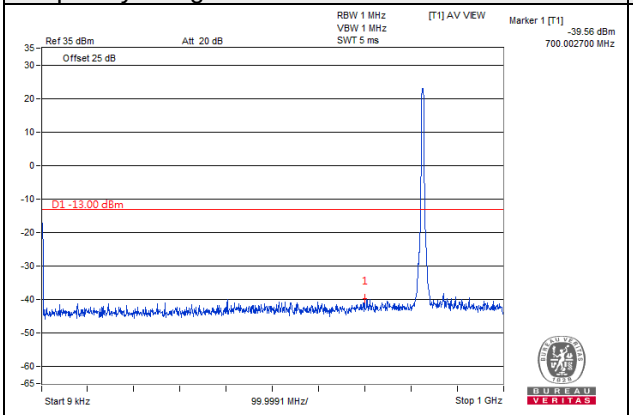
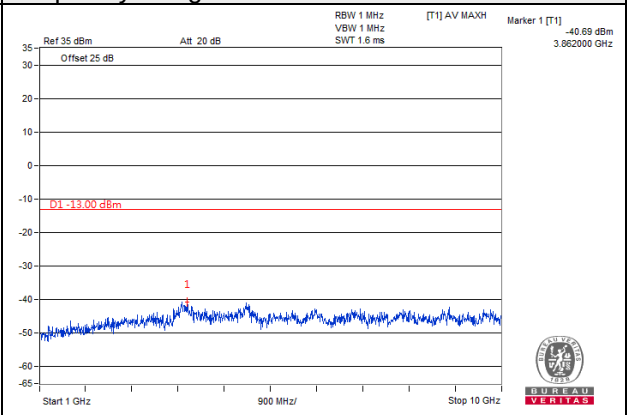
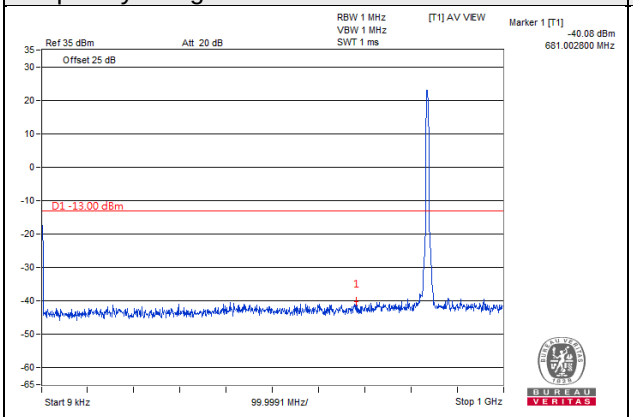
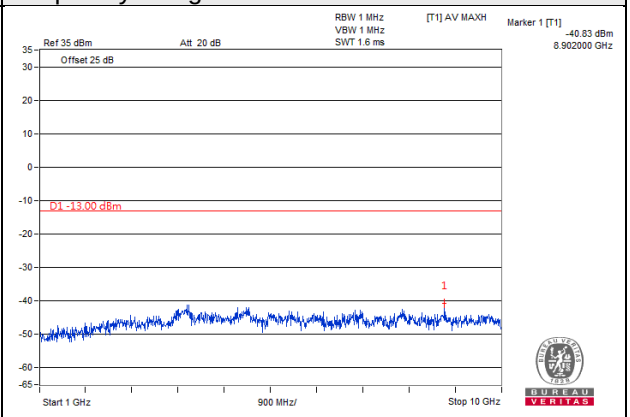
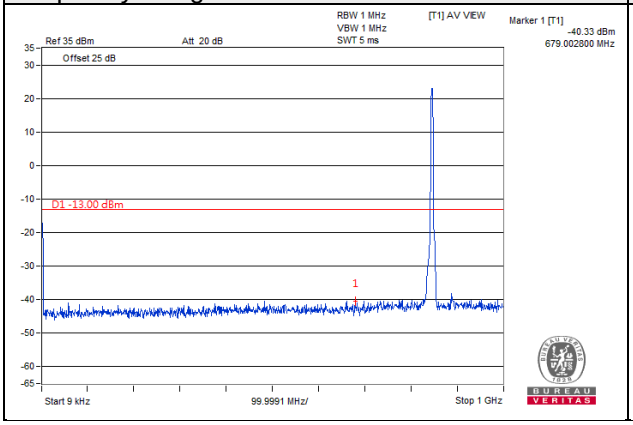
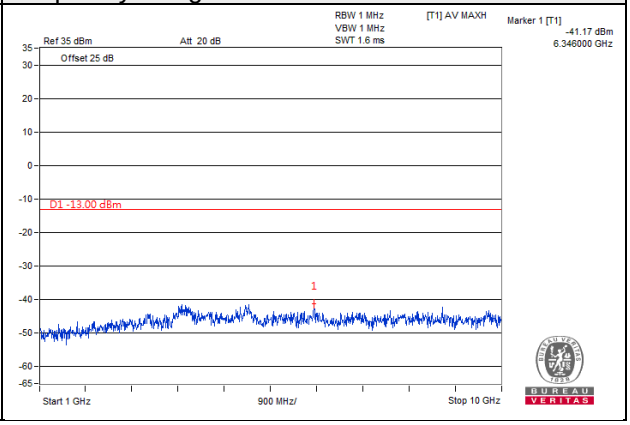



### 4.7.3 Test Procedure

a. All measurements were done at 3 channels: low, middle and high operational frequency range.

b. When the spectrum scanned from 9 kHz to the tenth harmonic of the highest fundamental frequency, it shall be connected to the 20dB pad attenuated the carried frequency.

## 4.7.4 Test Results

| WCDMA B5 | |
|---|---|
| Channel 4132 | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Channel 4182 | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Channel 4233 | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |

## 4.8 Radiated Emission Measurement

### 4.8.1 Limits of Radiated Emission Measurement

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 –13dBm.

### 4.8.2 Test Procedure

a. The power was measured with Spectrum Analyzer.

b. Substitution method is used for EIRP measurement. In the semi-anechoic chamber, EUT placed on the 0.8m/1.5m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

c. Follow ANSI 63.26 section 5.2.7 d), EIRP Value (dBm) = Read Value (dBμV/m) - Correction Factor @ 3m

d. Correction Factor (dB) @ 3M = 20log(D) − 104.8; where D is the measurement distance @3m =-95.26dB

e. ERP power can be calculated form EIRP power by subtracting the gain of dipole, ERP power = EIRP power - 2.15dBi.

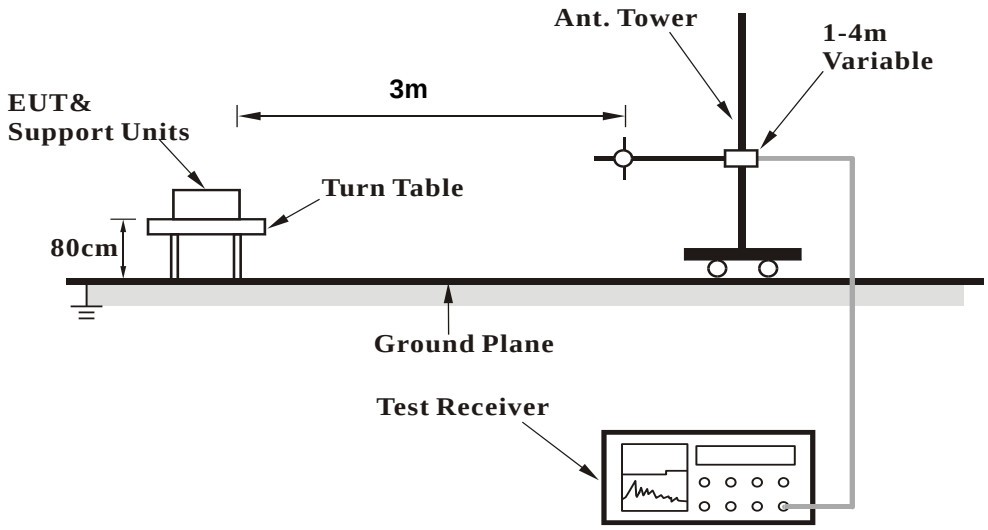
**NOTE:** The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

### 4.8.3 Deviation from Test Standard

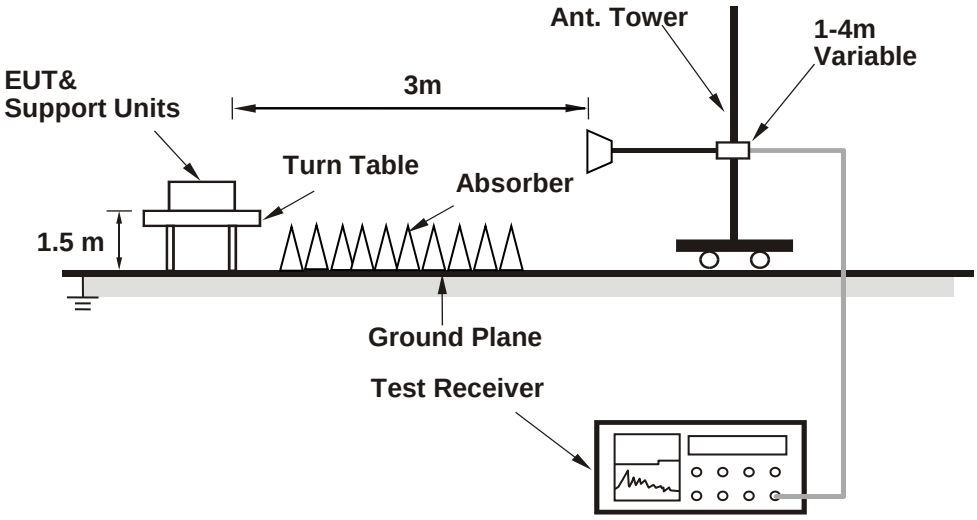
No deviation.

4.8.4 Test Setup

**For Below 1GHz**




**For Above 1GHz:**




For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.8.5 Test Results

BELOW 1GHz

**WCDMA:**

| Mode | TX channel 4132 | Frequency Range | Below 1000 MHz |
|---|---|---|---|

| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | |
|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Reading (dBμV/m) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 42.3 | 34.78 | -95.26 | -60.48 | -13 | -47.48 |
| 2 | 102.57 | 36.02 | -95.26 | -59.24 | -13 | -46.24 |
| 3 | 158.23 | 28.18 | -95.26 | -67.08 | -13 | -54.08 |
| 4 | 184.22 | 34.24 | -95.26 | -61.02 | -13 | -48.02 |
| 5 | 316.01 | 31.55 | -95.26 | -63.71 | -13 | -50.71 |
| 6 | 439.41 | 30.72 | -95.26 | -64.54 | -13 | -51.54 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | |
| No. | Freq. (MHz) | Reading (dBμV/m) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 45.07 | 35.02 | -95.26 | -60.24 | -13 | -47.24 |
| 2 | 95.68 | 35.96 | -95.26 | -59.30 | -13 | -46.30 |
| 3 | 136.73 | 31.23 | -95.26 | -64.03 | -13 | -51.03 |
| 4 | 175.79 | 25.76 | -95.26 | -69.50 | -13 | -56.50 |
| 5 | 321.47 | 33.53 | -95.26 | -61.73 | -13 | -48.73 |
| 6 | 553.52 | 32.25 | -95.26 | -63.01 | -13 | -50.01 |

Remarks:

1. Follow ANSI 63.26 section 5.2.7 d), EIRP Value (dBm) = E (dBμV/m) - Correction Factor @ 3m.
2. Correction Factor (dB) = 20log(D) − 104.8; where D is the measurement distance @3m.

| Mode | TX channel 4182 | Frequency Range | Below 1000 MHz |
|---|---|---|---|

| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | |
|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Reading (dBμV/m) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 42.65 | 34.62 | -95.26 | -60.64 | -13 | -47.64 |
| 2 | 98.63 | 36.33 | -95.26 | -58.93 | -13 | -45.93 |
| 3 | 156.14 | 28.38 | -95.26 | -66.88 | -13 | -53.88 |
| 4 | 184.31 | 33.68 | -95.26 | -61.58 | -13 | -48.58 |
| 5 | 319.89 | 30.81 | -95.26 | -64.45 | -13 | -51.45 |
| 6 | 440.82 | 30.17 | -95.26 | -65.09 | -13 | -52.09 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | |
| No. | Freq. (MHz) | Reading (dBμV/m) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 42.19 | 34.65 | -95.26 | -60.61 | -13 | -47.61 |
| 2 | 89.05 | 35.69 | -95.26 | -59.57 | -13 | -46.57 |
| 3 | 132.41 | 30.53 | -95.26 | -64.73 | -13 | -51.73 |
| 4 | 177.92 | 26.06 | -95.26 | -69.20 | -13 | -56.20 |
| 5 | 324.97 | 33.38 | -95.26 | -61.88 | -13 | -48.88 |
| 6 | 557.58 | 31.91 | -95.26 | -63.35 | -13 | -50.35 |

Remarks:

1. Follow ANSI 63.26 section 5.2.7 d), EIRP Value (dBm) = E (dBμV/m) - Correction Factor @ 3m.
2. Correction Factor (dB) = 20log(D) − 104.8; where D is the measurement distance @3m.

| Mode | TX channel 4233 | Frequency Range | Below 1000 MHz |
|---|---|---|---|

| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | |
|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Reading (dBμV/m) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 41.77 | 34.06 | -95.26 | -61.20 | -13 | -48.20 |
| 2 | 103.16 | 33.9 | -95.26 | -61.36 | -13 | -48.36 |
| 3 | 150.99 | 30.14 | -95.26 | -65.12 | -13 | -52.12 |
| 4 | 182.68 | 30.23 | -95.26 | -65.03 | -13 | -52.03 |
| 5 | 315.01 | 32.71 | -95.26 | -62.55 | -13 | -49.55 |
| 6 | 446.72 | 30.03 | -95.26 | -65.23 | -13 | -52.23 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | |
| No. | Freq. (MHz) | Reading (dBμV/m) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 45.66 | 26.23 | -95.26 | -69.03 | -13 | -56.03 |
| 2 | 91.2 | 35.71 | -95.26 | -59.55 | -13 | -46.55 |
| 3 | 130.74 | 31.15 | -95.26 | -64.11 | -13 | -51.11 |
| 4 | 182.57 | 26.13 | -95.26 | -69.13 | -13 | -56.13 |
| 5 | 323.99 | 33.26 | -95.26 | -62.00 | -13 | -49.00 |
| 6 | 556.1 | 32.16 | -95.26 | -63.10 | -13 | -50.10 |

Remarks:

1. Follow ANSI 63.26 section 5.2.7 d), EIRP Value (dBm) = E (dBμV/m) - Correction Factor @ 3m.
2. Correction Factor (dB) = 20log(D) − 104.8; where D is the measurement distance @3m.

ABOVE 1GHz

**WCDMA:**

| Mode | TX channel 4132 | Frequency Range | Above 1000 MHz |
|---|---|---|---|

| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | |
|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Reading (dBμV/m) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 1652.8 | 31.96 | -95.26 | -63.30 | -13 | -50.30 |
| 2 | 2479.2 | 44.75 | -95.26 | -50.51 | -13 | -37.51 |
| **3** | **3305.6** | **46.88** | **-95.26** | **-48.38** | **-13** | **-35.38** |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | |
| No. | Freq. (MHz) | Reading (dBμV/m) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 1652.8 | 32.58 | -95.26 | -62.68 | -13 | -49.68 |
| 2 | 2479.2 | 43.82 | -95.26 | -51.44 | -13 | -38.44 |
| 3 | 3305.6 | 46.19 | -95.26 | -49.07 | -13 | -36.07 |

Remarks:

1. Follow ANSI 63.26 section 5.2.7 d), EIRP Value (dBm) = E (dBμV/m) - Correction Factor @ 3m.
2. Correction Factor (dB) = 20log(D) − 104.8; where D is the measurement distance @3m.

| Mode | TX channel 4182 | Frequency Range | Above 1000 MHz |
|---|---|---|---|

| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | |
|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Reading (dB $\mu$ V/m) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 1672.8 | 32.08 | -95.26 | -63.18 | -13 | -50.18 |
| 2 | 2509.2 | 44.9 | -95.26 | -50.36 | -13 | -37.36 |
| 3 | 3345.6 | 46.37 | -95.26 | -48.89 | -13 | -35.89 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | |
| No. | Freq. (MHz) | Reading (dB $\mu$ V/m) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 1672.8 | 32.7 | -95.26 | -62.56 | -13 | -49.56 |
| 2 | 2509.2 | 43.66 | -95.26 | -51.60 | -13 | -38.60 |
| 3 | 3345.6 | 45.64 | -95.26 | -49.62 | -13 | -36.62 |

Remarks:

1. Follow ANSI 63.26 section 5.2.7 d), EIRP Value (dBm) = E (dBμV/m) - Correction Factor @ 3m.
2. Correction Factor (dB) = 20log(D) − 104.8; where D is the measurement distance @3m.

| Mode | TX channel 4233 | Frequency Range | Above 1000 MHz |
|---|---|---|---|

| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | |
|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Reading (dB $\mu$ V/m) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 1693.2 | 31.38 | -95.26 | -63.88 | -13 | -50.88 |
| 2 | 2539.8 | 45.12 | -95.26 | -50.14 | -13 | -37.14 |
| 3 | 3386.4 | 46.02 | -95.26 | -49.24 | -13 | -36.24 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | |
| No. | Freq. (MHz) | Reading (dB $\mu$ V/m) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 1693.2 | 32.11 | -95.26 | -63.15 | -13 | -50.15 |
| 2 | 2539.8 | 43.38 | -95.26 | -51.88 | -13 | -38.88 |
| 3 | 3386.4 | 46.21 | -95.26 | -49.05 | -13 | -36.05 |

Remarks:

1. Follow ANSI 63.26 section 5.2.7 d), EIRP Value (dBm) = E (dBμV/m) - Correction Factor @ 3m.
2. Correction Factor (dB) = 20log(D) − 104.8; where D is the measurement distance @3m.

## 5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

**Appendix – Information of the Testing Laboratories**

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following: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The address and road map of all our labs can be found in our web site also.

**--- END ---**