# FCC PART 22/24 TEST REPORT
## FCC Part 22 /Part 24

| | |
|---|---|
| Report Reference No.: | HK2203070920-6E |
| FCC ID: | **2AUIK-VK801W** |
| Compiled by ( position+printed name+signature)..: | File administrators Gary Qian |
| Supervised by ( position+printed name+signature)..: | Technique principal Eden Hu |
| Approved by ( position+printed name+signature)..: | Manager Jason Zhou |
| Date of issue.....: | Mar. 14, 2022 |
| **Testing Laboratory Name** .....: | **Shenzhen HUAK Testing Technology Co., Ltd.** |
| Address.....: | 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China |
| **Applicant's name**.....: | **Shenzhen Vitek Electronics Co.,Ltd** |
| Address.....: | Room 801-805, Jiangnan Building, Yongxiang Road, Bantian, Longgang, Shenzhen, Guangdong, China |
| **Test specification** .....: | |
| Standard .....: | **FCC Part 22: PUBLIC MOBILE SERVICES**<br>**FCC Part 24: PERSONAL COMMUNICATIONS SERVICES** |

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| | |
|---|---|
| **Test item description .....:** | 8 inch Tablet PC |
| Trade Mark .....: | VTEX, VTEX by Vitek, ORAAKO |
| Model/Type reference.....: | VK801W |
| Listed Models .....: | VK800W, VK802W, VK803W, VK804W, VK805W, VK806W, VK807W, VK808W, VK801A, V801RG, MT8768, VK8XX, VK8XXY (X stands for 0 to 9, Y stands for A to Z) |
| Ratings.....: | DC 3.85V from battery or DC 5V from Adapter |
| Modulation .....: | GMSK/8PSK |
| GPRS..... | Supported |
| Hardware version .....: | V2.0 |
| Software version .....: | V2.0 |
| Frequency..... | GSM 850MHz; PCS 1900MHz; |
| Result.....: | **PASS** |

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# TEST REPORT

| Test Report No. : | HK2203070920-6E | Mar. 14, 2022<br>Date of issue |
|---|---|---|

| | | |
|---|---|---|
| Equipment under Test | : | 8 inch Tablet PC |
| Model /Type | : | VK801W |
| Listed Models | : | VK800W, VK802W, VK803W, VK804W, VK805W, VK806W, VK807W, VK808W, VK801A, V801RG, MT8768, VK8XX, VK8XXY (X stands for 0 to 9, Y stands for A to Z) |
| **Applicant** | : | **Shenzhen Vitek Electronics Co.,Ltd** |
| Address | : | Room 801-805, Jiangnan Building, Yongxiang Road, Bantian, Longgang, Shenzhen, Guangdong, China |
| **Manufacturer** | : | **Shenzhen Vitek Electronics Co.,Ltd** |
| Address | : | Room 801-805, Jiangnan Building, Yongxiang Road, Bantian, Longgang, Shenzhen, Guangdong, China |

| **Test Result**: | **PASS** |
|---|---|

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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# ** Modified History **

| Revision | Description | Issued Data | Remark |
|---|---|---|---|
| Revision 1.0 | Initial Test Report Release | Mar. 14, 2022 | Jason Zhou |
| | | | |
| | | | |

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# 1 TEST STANDARDS

The tests were performed according to following standards:

FCC Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS.

FCC Part 22 Subpart H: PRIVATE LAND MOBILE RADIO SERVICES.

FCC Part 24 Subpart E: PUBLIC MOBILE SERVICES.

ANSI/TIA-603-E-2016: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

ANSI C63.26-2015: IEEE/ANSI Standard for Compliance Testing of Transmitters Used in Licensed Radio Services.

FCCKDB971168D01 Power Meas License Digital Systems.

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# 2 SUMMARY

## 2.1 General Remarks

| | | |
|---|---|---|
| Date of receipt of test sample | : | Mar. 01, 2022 |
| | | |
| | | |
| Testing commenced on | : | Mar. 01, 2022 |
| | | |
| | | |
| Testing concluded on | : | Mar. 14, 2022 |

## 2.2 Product Description

| | |
|---|---|
| Product Name: | 8 inch Tablet PC |
| Model/Type reference: | VK801W |
| List Model: | VK800W, VK802W, VK803W, VK804W, VK805W, VK806W, VK807W, VK808W, VK801A, V801RG, MT8768, VK8XX, VK8XXY (X stands for 0 to 9, Y stands for A to Z) |
| Power supply: | DC 3.85V from battery or DC 5V from Adapter |
| Adapter Information: | Input: 100-240Vac, 50/60Hz, 0.5A, Output: 5V, 2A 10.0W |
| Modilation Type: | GMSK/8PSK |
| Antenna Type: | Internal antenna |
| GSM/EDGE/GPRS: | Supported EGPRS/GPRS/GSM |
| GSM/GPRS Power Class: | GSM850:Power Class 4/ PCS1900:Power Class 1 |
| GSM/GPRS Operation Frequency: | GSM850:824.2MHz-848.8MHz/PCS1900:1850.2MHz-1909.8MHz |
| GPRS Operation Frequency Band: | GPRS850/GPRS1900 |
| GPRS/EDGE Multislot Class: | EGPRS/GPRS: Multi-slot Class 12 |
| EGPRS Multislot Class: | / |
| Extreme temp. Tolerance: | -30°C to +50°C |
| GPRS operation mode: | Class B |

## 2.3 Equipment Under Test

**Power supply system utilised**

| | | | | | |
|---|---|---|---|---|---|
| Power supply voltage | : | ○ | 120V / 60 Hz | ○ | 230V / 50Hz |
| | | ○ | 12 V DC | ○ | 24 V DC |
| | | ● | Other (specified in blank below) | | |

DC 3.85V from battery or DC 5V from Adapter

**Test frequency list**

| Test Mode | TX/RX | RF Channel | | |
|---|---|---|---|---|
| | | Low(L) | Middle (M) | High (H) |
| GSM850 | TX | Channel 128 | Channel 190 | Channel 251 |
| | | 824.2 MHz | 836.6 MHz | 848.8 MHz |
| | RX | Channel 128 | Channel 190 | Channel 251 |
| | | 869.2 MHz | 881.6 MHz | 893.8 MHz |
| Test Mode | TX/RX | RF Channel | | |
| | | Low(L) | Middle (M) | High (H) |
| GSM1900 | TX | Channel 512 | Channel 661 | Channel 810 |
| | | 1850.2 MHz | 1880.0 MHz | 1909.8 MHz |
| | RX | Channel 512 | Channel 661 | Channel 810 |
| | | 1930.2 MHz | 1960.0 MHz | 1989.8 MHz |

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## 2.4 Short Description of The Equipment Under Test (EUT)

This is a 8 inch Tablet PC.

For more details, refer to the user's manual of the EUT.

## 2.5 EUT Configuration

**The following peripheral devices and interface cables were connected during the measurement:**

● - supplied by the manufacturer

○ - supplied by the lab

| | | | |
|---|---|---|---|
| ○ | / | M/N : | / |
| | | Manufacturer: | / |

## 2.6 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2AUIK-VK801W** filing to comply with FCC Part 22 and Part 24 Rules.

## 2.7 Modifications

No modifications were implemented to meet testing criteria.

## 2.8 General Test Conditions/Configurations

### 2.8.1 Test Modes

NOTE: The test mode(s) are selected according to relevant radio technology specifications.

| | |
|---|---|
| **Test Mode 1** | GPRS |
| **Test Mode 2** | GSM |
| **Test Mode 3** | EGPRS |

### 2.8.2 Test Environment

| Environment Parameter | Selected Values During Tests | |
|---|---|---|
| Relative Humidity | Ambient | |
| Temperature | TN | Ambient |
| Voltage | VL | 3.465V |
| | VN | 3.85V |
| | VH | 4.235V |

NOTE: VL=lower extreme test voltage VN=nominal voltage
VH=upper extreme test voltage TN=normal temperature

## 2.9 Modifications

No modifications were implemented to meet testing criteria.

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# 3 TEST ENVIRONMENT

## 3.1 Information of The Test Laboratory

Shenzhen HUAK Testing Technology Co., Ltd.
Add.: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Testing Laboratory Authorization：

A2LA Accreditation Code is 4781.01.
FCC Designation Number is CN1229.
Canada IC CAB identifier is CN0045.
CNAS Registration Number is L9589.

## 3.2 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

| | |
|---|---|
| Temperature: | 15-35 ° C |
| | |
| Humidity: | 30-60 % |
| | |
| Atmospheric pressure: | 950-1050mbar |

## 3.3 Test Description

### 3.3.1 Cellular Band (824-849MHz paired with 869-894MHz)

| Test Item | FCC Rule No. | Requirements | Verdict |
|---|---|---|---|
| Effective(Isotropic) Radiated Output Power | §2.1046, §22.913 | FCC: ERP ≤ 7W. | Pass |
| Modulation Characteristics | §2.1047 | Digital modulation | N/A |
| Bandwidth | §2.1049 | OBW: No limit.<br>EBW: No limit. | Pass |
| Band Edges Compliance | §2.1051, §22.917 | ≤-13dBm/1%*EBW, in 1MHz bands immediately outside and adjacent to The frequency block. | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §22.917 | FCC: ≤ -13dBm/100kHz, from 9kHz to 10th harmonics but outside authorized operating frequency ranges. | Pass |
| Field Strength of Spurious Radiation | §2.1053, §22.917 | FCC: ≤ -13dBm/100kHz. | Pass |
| Frequency Stability | §2.1055, §22.355 | ≤ ±2.5ppm. | Pass |
| NOTE 1: For the verdict, the “N/A” denotes “not applicable”, the “N/T” de notes “not tested”. | | | |

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### 3.3.2 PCS Band (1850-1915MHz paired with 1930-1995MHz)

| Test Item | FCC Rule No. | Requirements | Verdict |
|---|---|---|---|
| Effective(Isotropic) Radiated Output Power | §2.1046, §24.232 | EIRP ≤ 2W | Pass |
| Peak-Average Ratio | §2.1046, §24.232 | FCC:Limit≤13dB | Pass |
| Modulation Characteristics | §2.1047 | Digital modulation | Pass |
| Bandwidth | §2.1049 | OBW: No limit.<br>EBW: No limit. | Pass |
| Band Edges Compliance | §2.1051, §24.238 | ≤ -13dBm/1%*EBW,<br>In 1MHz bands immediately outside and adjacent to The frequency block. | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §24.238 | ≤-13dBm/1MHz,<br>from 9kHz to10th harmonics but outside authorized Operating frequency ranges. | Pass |
| Field Strength of Spurious Radiation | §2.1053, §24.238 | ≤ -13dBm/1MHz. | Pass |
| Frequency Stability | §2.1055, §24.235 | FCC: within authorized frequency block. | Pass |
| NOTE 1: For the verdict, the “N/A” denotes “not applicable”, the “N/T” de notes “not tested”. | | | |

Remark:

1. The measurement uncertainty is not included in the test result.

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## 3.4 Equipments Used During The Test

| Test Equipment | Manufacturer | Model No. | Serial No. | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| LISN | R&S | ENV216 | HKE-059 | 2021/12/09 | 2022/12/08 |
| LISN | R&S | ENV216 | HKE-002 | 2021/12/09 | 2022/12/08 |
| Receiver | R&S | ESCI 7 | HKE-010 | 2021/12/09 | 2022/12/08 |
| Spectrum analyzer | R&S | FSP40 | HKE-025 | 2021/12/09 | 2022/12/08 |
| Spectrum analyzer | Agilent | N9020A | HKE-048 | 2021/12/09 | 2022/12/08 |
| RF automatic control unit | Tonscend | JS0806-1 | HKE-060 | 2021/12/09 | 2022/12/08 |
| Loop antenna | Schwarzbeck | FMZB 1519 B | HKE-014 | 2021/12/09 | 2022/12/08 |
| Bilog Broadband Antenna | Schwarzbeck | VULB9163 | HKE-012 | 2021/12/09 | 2022/12/08 |
| Horn antenna | Schwarzbeck | 9120D | HKE-013 | 2021/12/09 | 2022/12/08 |
| High gain antenna | Schwarzbeck | LB-180400KF | HKE-054 | 2021/12/09 | 2022/12/08 |
| Preamplifier | EMCI | EMC051845SE | HKE-015 | 2021/12/09 | 2022/12/08 |
| Preamplifier | Agilent | 83051A | HKE-016 | 2021/12/09 | 2022/12/08 |
| Preamplifier | Schwarzbeck | BBV 9743 | HKE-006 | 2021/12/09 | 2022/12/08 |
| Temperature and humidity meter | Boyang | HTC-1 | HKE-075 | 2021/12/09 | 2022/12/08 |
| High-low temperature chamber | Guangke | HT-80L | HKE-118 | 2021/12/09 | 2022/12/08 |
| High pass filter unit | Tonscend | JS0806-F | HKE-055 | 2021/12/09 | 2022/12/08 |
| RF Cable(below1GHz) | Times | 9kHz-1GHz | HKE-117 | 2021/12/09 | 2022/12/08 |
| RF Cable(above 1GHz) | Times | 1-40G | HKE-034 | 2021/12/09 | 2022/12/08 |
| Power meter | Agilent | E4419B | HKE-085 | 2021/12/09 | 2022/12/08 |
| Power Sensor | Agilent | E9300A | HKE-086 | 2021/12/09 | 2022/12/08 |
| Conducted test software | Tonscend | TS+ Rev 2.5.0.0 | HKE-081 | N/A | N/A |
| Radiated test software | Tonscend | TS+ Rev 2.5.0.0 | HKE-082 | N/A | N/A |
| RF test software | Tonscend | JS1120-B Version 2.6 | HKE-083 | N/A | N/A |
| RF test software | Tonscend | JS1120-4 | HKE-113 | N/A | N/A |
| RF test software | Tonscend | JS1120-3 | HKE-114 | N/A | N/A |
| RF test software | Tonscend | JS1120-1 | HKE-115 | N/A | N/A |
| Wireless Communication Test Set | R&S | CMW500 | HKE-026 | 2021/12/09 | 2022/12/08 |
| Wireless Communication Test Set | R&S | CMU200 | HKE-029 | 2021/12/09 | 2022/12/08 |

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# 4 TEST CONDITIONS AND RESULTS

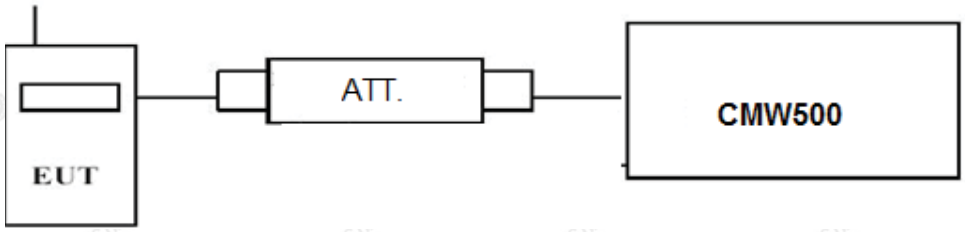
## 4.1 Output Power

**TEST APPLICABLE**

During the process of testing, the EUT was controlled via R&S Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation. This result contains output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.

### 4.1.1 Conducted Output Power

**TEST CONFIGURATION**




**TEST PROCEDURE**

**Conducted Power Measurement:**

a) Place the EUT on a bench and set it in transmitting mode.
b) Connect a low loss RF cable from the antenna port to a CMW500 by an Att.
c) EUT Communicate with CMW500 then selects a channel for testing.
d) Add a correction factor to the display CMW500, and then test.

| GSM850 | | | | |
|---|---|---|---|---|
| **Function** | **Power step** | **Nominal output power (dBm)** | **Power &Multislot class** | **Operation class** |
| GSM | 5 | 33dBm(2W) | 4 | / |
| GPRS | 3 | 33dBm(2W) | 12 | B |
| EDGE | 8 | 27dBm(0.5W) | 12 | B |

| PCS1900 | | | | |
|---|---|---|---|---|
| **Function** | **Power step** | **Nominal output power (dBm)** | **Power &Multislot class** | **Operation class** |
| GSM | 0 | 30dBm(1W) | 1 | / |
| GPRS | 3 | 30dBm(1W) | 12 | B |
| EDGE | 2 | 27dBm(0.5W) | 12 | B |

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**TEST RESULTS**

| GSM 850 | | Burst Average Conducted power (dBm) Channel/Frequency(MHz) | | |
|---|---|---|---|---|
| | | 128/824.2 | 190/836.6 | 251/848.8 |
| GSM | | 33.58 | 33.92 | 33.79 |
| GPRS (GMSK) | 30.64 | 33.66 | 33.71 | 33.65 |
| | 29.96 | 30.5 | 30.56 | 30.5 |
| | 28.21 | 29.43 | 29.49 | 29.44 |
| | 27.11 | 27.11 | 27.19 | 27.17 |
| EGPRS (8PSK) | 28.68 | 25.81 | 26.02 | 25.69 |
| | 27.51 | 25.66 | 25.91 | 25.75 |
| | 25.44 | 24.20 | 24.57 | 24.22 |
| | 24.16 | 21.76 | 22.15 | 21.93 |

| GSM 1900 | | Burst Average Conducted power (dBm) Channel/Frequency(MHz) | | |
|---|---|---|---|---|
| | | 512/1850.2 | 661/1880.0 | 810/1909.8 |
| GSM | | 30.47 | 30.52 | 30.56 |
| GPRS (GMSK) | 32.19 | 30.41 | 30.57 | 30.55 |
| | 31.59 | 28.29 | 28.13 | 27.87 |
| | 30.02 | 26.78 | 26.61 | 26.37 |
| | 29.03 | 25.68 | 25.51 | 25.23 |
| EGPRS (8PSK) | 31.85 | 29.02 | 28.27 | 27.21 |
| | 29.72 | 28.83 | 28.20 | 27.28 |
| | 28.77 | 26.60 | 26.40 | 25.21 |
| | 27.55 | 24.44 | 23.83 | 22.57 |

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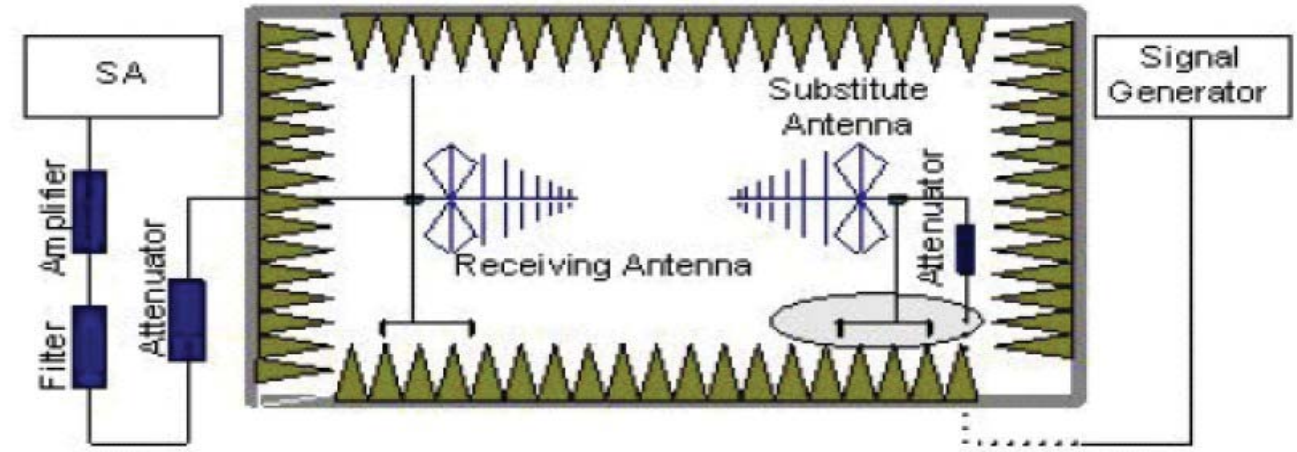
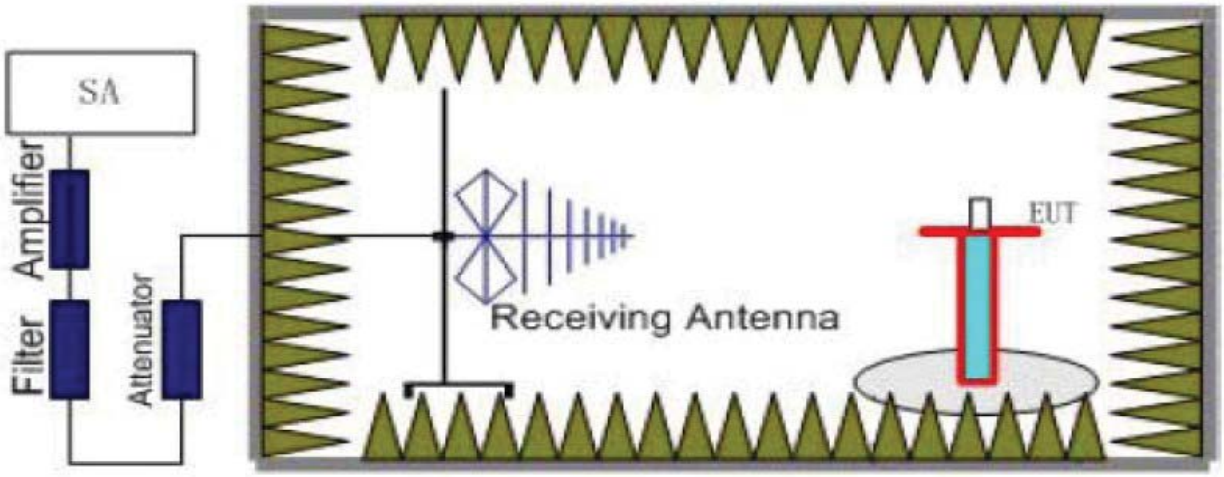
### 4.1.2 Radiated Output Power

**TEST DESCRIPTION**

This is the test for the maximum radiated power from the EUT.
Rule Part 24.232(c) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(e) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage." Rule Part 22.913(a) specifies " The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."

**TEST CONFIGURATION**




**TEST PROCEDURE**

1. EUT was placed on a 0.80 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 0.80m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=1MHz,VBW=3MHz, And the maximum value of the receiver should be recorded as ($P_r$).

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4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power ($P_{Mea}$) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded ($P_r$). The power of signal source ($P_{Mea}$) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss ($P_{cl}$) ,the Substitution Antenna Gain ($G_a$) and the Amplifier Gain ($P_{Ag}$) should be recorded after test.
   The measurement results are obtained as described below:
   Power(EIRP)=$P_{Mea}$- $P_{Ag}$ - $P_{cl}$ + $G_a$
   We used SMF100A micowave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substituation test; The measurement results are amend as described below:
   Power(EIRP)=$P_{Mea}$- $P_{cl}$ + $G_a$
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

**TEST LIMIT**

Note: We test the H direction and V direction, V direction is worse.

According to 22.913(a) and 24.232(c), the ERP should be not exceed following table limits:

| GSM850(GPRS850,EDGE850) | | |
|---|---|---|
| **Function** | **Power Step** | **Burst Peak ERP (dBm)** |
| GSM | 5 | ≤38.45dBm (7W) |
| GPRS | 3 | ≤38.45dBm (7W) |
| EDGE | 8 | ≤38.45dBm (7W) |

| PCS1900(GPRS1900,EDGE1900) | | |
|---|---|---|
| **Function** | **Power Step** | **Burst Peak EIRP (dBm)** |
| GSM | 0 | ≤33dBm (2W) |
| GPRS | 3 | ≤33dBm (2W) |
| EDGE | 5 | ≤33dBm (2W) |

**TEST RESULTS**

Remark:
1. We were tested all Configuration refer 3GPP TS151 010.
2. EIRP=$P_{Mea}$(dBm)-$P_{cl}$(dB)+$P_{Ag}$(dB)+$G_a$(dBi)
3. ERP = EIRP – 2.15dBi as EIRP by subtracting the gain of the dipole.

Note: 1.We tesed Horizontal and Vertical, and Recorded the worst data at the Vertical.

GSM 850

| Frequency (MHz) | $P_{Mea}$ (dBm) | $P_{cl}$ (dB) | $G_a$ Antenna Gain(dB) | Correction (dB) | $P_{Ag}$ (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|---|
| 824.20 | -14.64 | 2.42 | 8.45 | 2.15 | 36.82 | 26.06 | 38.45 | 12.39 | V |
| 836.60 | -12.29 | 2.46 | 8.45 | 2.15 | 36.82 | 28.37 | 38.45 | 10.08 | V |
| 848.80 | -15.09 | 2.53 | 8.36 | 2.15 | 36.82 | 25.41 | 38.45 | 13.04 | V |

GSM 1900

| Frequency (MHz) | $P_{Mea}$ (dBm) | $P_{cl}$ (dB) | $G_a$ Antenna Gain(dB) | $P_{Ag}$ (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1850.20 | -14.96 | 3.41 | 10.24 | 33.6 | 25.47 | 33.01 | 7.54 | V |
| 1880.00 | -16.48 | 3.49 | 10.24 | 33.6 | 23.87 | 33.01 | 9.14 | V |
| 1909.80 | -15.96 | 3.55 | 10.23 | 33.6 | 24.32 | 33.01 | 8.69 | V |

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GPRS 850

| Frequency (MHz) | $P_{Mea}$ (dBm) | $P_{cl}$ (dB) | $G_a$ Antenna Gain(dB) | Correction (dB) | $P_{Ag}$ (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|---|
| 824.20 | -15.26 | 2.42 | 8.45 | 2.15 | 36.82 | 25.44 | 38.45 | 13.01 | V |
| 836.60 | -12.26 | 2.46 | 8.45 | 2.15 | 36.82 | 28.4 | 38.45 | 10.05 | V |
| 848.80 | -15.22 | 2.53 | 8.36 | 2.15 | 36.82 | 25.28 | 38.45 | 13.17 | V |

GPRS 1900

| Frequency (MHz) | $P_{Mea}$ (dBm) | $P_{cl}$ (dB) | $G_a$ Antenna Gain(dB) | $P_{Ag}$ (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1850.20 | -14.62 | 3.41 | 10.24 | 33.6 | 25.81 | 33.01 | 7.2 | V |
| 1880.00 | -14.81 | 3.49 | 10.24 | 33.6 | 25.54 | 33.01 | 7.47 | V |
| 1909.80 | -15.18 | 3.55 | 10.23 | 33.6 | 25.1 | 33.01 | 7.91 | V |

EGPRS 850

| Frequency (MHz) | $P_{Mea}$ (dBm) | $P_{cl}$ (dB) | $G_a$ Antenna Gain(dB) | Correction (dB) | $P_{Ag}$ (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|---|
| 824.20 | -15.13 | 2.42 | 8.45 | 2.15 | 36.82 | 25.57 | 38.45 | 12.88 | V |
| 836.60 | -12.42 | 2.46 | 8.45 | 2.15 | 36.82 | 28.24 | 38.45 | 10.21 | V |
| 848.80 | -15.35 | 2.53 | 8.36 | 2.15 | 36.82 | 25.15 | 38.45 | 13.3 | V |

EGPRS 1900

| Frequency (MHz) | $P_{Mea}$ (dBm) | $P_{cl}$ (dB) | $G_a$ Antenna Gain(dB) | $P_{Ag}$ (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1850.20 | -16.21 | 3.41 | 10.24 | 33.6 | 24.22 | 33.01 | 8.79 | V |
| 1880.00 | -14.97 | 3.49 | 10.24 | 33.6 | 25.38 | 33.01 | 7.63 | V |
| 1909.80 | -16.05 | 3.55 | 10.23 | 33.6 | 24.23 | 33.01 | 8.78 | V |

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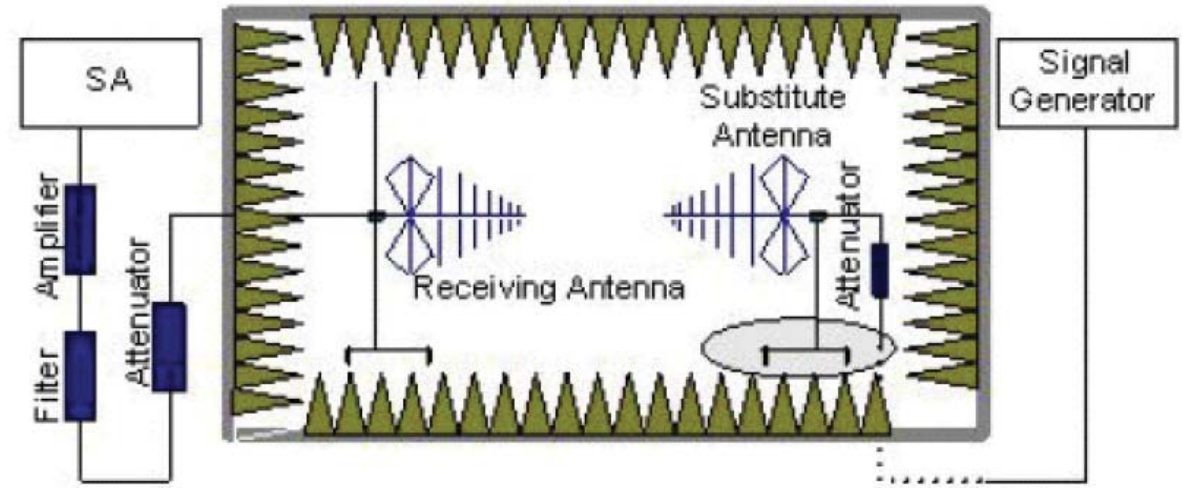
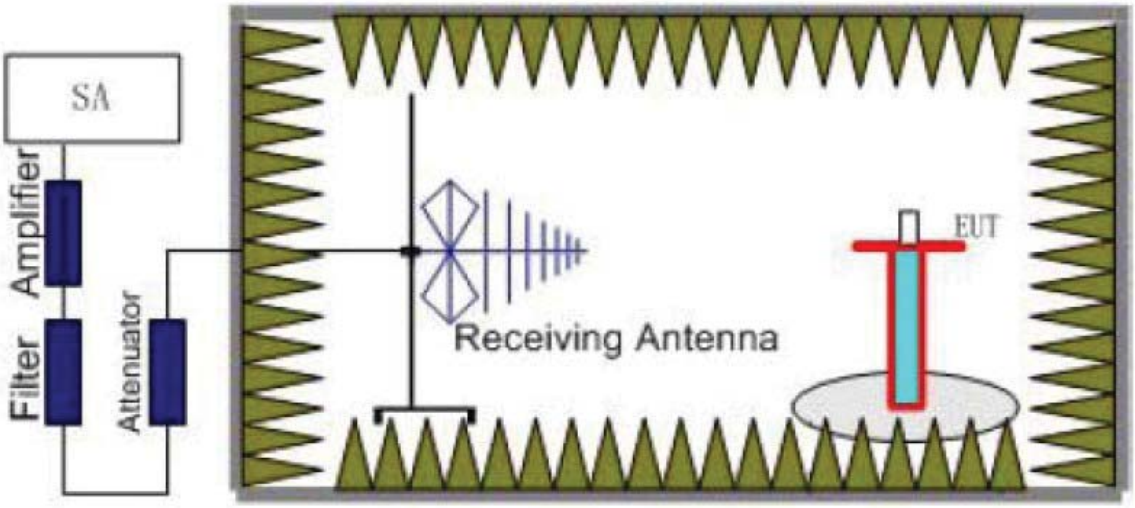
## 4.2 Radiated Spurious Emssion

**TEST APPLICABLE**

According to the TIA/EIA 603D:2010 test method, The Receiver or Spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set as outlined in Part 24.238 and Part 22.917. The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of PCS1900 and GSM850.

**TEST CONFIGURATION**




**TEST PROCEDURE**

1. EUT was placed on a 0.80 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 0.80m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

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3. The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=1MHz,VBW=3MHz, And the maximum value of the receiver should be recorded as ($P_r$).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power ($P_{Mea}$) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded ($P_r$). The power of signal source ($P_{Mea}$) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss ($P_{cl}$) ,the Substitution Antenna Gain ($G_a$) and the Amplifier Gain ($P_{Ag}$) should be recorded after test.
   The measurement results are obtained as described below:
   Power(EIRP)=$P_{Mea}$- $P_{Ag}$ - $P_{cl}$ + $G_a$
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.
8. In order to make sure test results more clearly,we set frequency range and sweep time for difference frequency range as follows table:

| Working Frequency | Subrange (GHz) | RBW | VBW | Sweep time (s) |
|---|---|---|---|---|
| GSM 850 | 0.00009~0.15 | 1KHz | 3KHz | 30 |
| | 0.00015~0.03 | 10KHz | 30KHz | 10 |
| | 0.03~1 | 100KHz | 300KHz | 10 |
| | 1~2 | 1 MHz | 3 MHz | 2 |
| | 2~5 | 1 MHz | 3 MHz | 3 |
| | 5~8 | 1 MHz | 3 MHz | 3 |
| | 8~10 | 1 MHz | 3 MHz | 3 |
| PCS 1900 | 0.00009~0.15 | 1KHz | 3KHz | 30 |
| | 0.00015~0.03 | 10KHz | 30KHz | 10 |
| | 0.03~1 | 100KHz | 300KHz | 10 |
| | 1~2 | 1 MHz | 3 MHz | 2 |
| | 2~5 | 1 MHz | 3 MHz | 3 |
| | 5~8 | 1 MHz | 3 MHz | 3 |
| | 8~11 | 1 MHz | 3 MHz | 3 |
| | 11~14 | 1 MHz | 3 MHz | 3 |
| | 14~18 | 1 MHz | 3 MHz | 3 |
| | 18~20 | 1 MHz | 3 MHz | 2 |

**TEST LIMITS**

According to 24.238 and 22.917 specify that 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 specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

| Frequency | Channel | Frequency Range | Verdict |
|---|---|---|---|
| GSM 850 | Low | 9KHz-10GHz | PASS |
| | Middle | 9KHz -10GHz | PASS |
| | High | 9KHz -10GHz | PASS |
| PCS 1900 | Low | 9KHz -20GHz | PASS |
| | Middle | 9KHz -20GHz | PASS |
| | High | 9KHz -20GHz | PASS |

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**TEST RESULTS**

Remark:

1. We were tested all refer 3GPP TS151 010.
2. EIRP=$P_{Mea}$(dBm)-$P_{cl}$(dB) +$G_a$(dBi)
3. We were not recorded other points as values lower than limits.
4. Margin = Limit - EIRP

*GSM 850_ Low Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1648.4 | -42.69 | 3.00 | 3.00 | 9.58 | -36.11 | -13.00 | 23.11 | H |
| 2472.6 | -43.09 | 3.03 | 3.00 | 10.72 | -35.4 | -13.00 | 22.4 | H |
| 1648.4 | -42.81 | 3.00 | 3.00 | 9.68 | -36.13 | -13.00 | 23.13 | V |
| 2472.6 | -41.57 | 3.03 | 3.00 | 10.72 | -33.88 | -13.00 | 20.88 | V |

*GSM 850_ Middle Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1673.2 | -42.68 | 3.00 | 3.00 | 9.58 | -36.1 | -13.00 | 23.1 | H |
| 2509.8 | -42.29 | 3.03 | 3.00 | 10.72 | -34.6 | -13.00 | 21.6 | H |
| 1673.2 | -43.46 | 3.00 | 3.00 | 9.68 | -36.78 | -13.00 | 23.78 | V |
| 2509.8 | -41.83 | 3.03 | 3.00 | 10.72 | -34.14 | -13.00 | 21.14 | V |

*GSM 850_ High Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1697.6 | -42.12 | 3.00 | 3.00 | 9.58 | -35.54 | -13.00 | 22.54 | H |
| 2546.4 | -42.76 | 3.03 | 3.00 | 10.72 | -35.07 | -13.00 | 22.07 | H |
| 1697.6 | -43.19 | 3.00 | 3.00 | 9.68 | -36.51 | -13.00 | 23.51 | V |
| 2546.4 | -42.11 | 3.03 | 3.00 | 10.72 | -34.42 | -13.00 | 21.42 | V |

*GSM 1900_ Low Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 3700.4 | -44.33 | 4.39 | 3.00 | 12.34 | -36.38 | -13.00 | 23.38 | H |
| 5550.6 | -49.63 | 5.31 | 3.00 | 13.52 | -41.42 | -13.00 | 28.42 | H |
| 3700.4 | -50.5 | 4.39 | 3.00 | 12.34 | -42.55 | -13.00 | 29.55 | V |
| 5550.6 | -54.03 | 5.31 | 3.00 | 13.52 | -45.82 | -13.00 | 32.82 | V |

*GSM 1900_ Middle Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 3760.0 | -46.88 | 4.41 | 3.00 | 12.34 | -38.95 | -13.00 | 25.95 | H |
| 5640.0 | -49.03 | 5.38 | 3.00 | 13.58 | -40.83 | -13.00 | 27.83 | H |
| 3760.0 | -45.29 | 4.41 | 3.00 | 12.34 | -37.36 | -13.00 | 24.36 | V |
| 5640.0 | -45.23 | 5.38 | 3.00 | 13.58 | -37.03 | -13.00 | 24.03 | V |

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*GSM 1900_ High Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 3819.6 | -46.74 | 4.45 | 3.00 | 12.45 | -38.74 | -13.00 | 25.74 | H |
| 5729.4 | -46.31 | 5.47 | 3.00 | 13.66 | -38.12 | -13.00 | 25.12 | H |
| 3819.6 | -45.43 | 4.45 | 3.00 | 12.45 | -37.43 | -13.00 | 24.43 | V |
| 5729.4 | -44.45 | 5.48 | 3.00 | 13.66 | -36.27 | -13.00 | 23.27 | V |

*GPRS 850_ Low Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1648.4 | -42.92 | 3.00 | 3.00 | 9.58 | -36.34 | -13.00 | 23.34 | H |
| 2472.6 | -43.12 | 3.03 | 3.00 | 10.72 | -35.43 | -13.00 | 22.43 | H |
| 1648.4 | -43.33 | 3.00 | 3.00 | 9.68 | -36.65 | -13.00 | 23.65 | V |
| 2472.6 | -41.51 | 3.03 | 3.00 | 10.72 | -33.82 | -13.00 | 20.82 | V |

*GPRS 850_ Middle Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1673.2 | -42.72 | 3.00 | 3.00 | 9.58 | -36.14 | -13.00 | 23.14 | H |
| 2509.8 | -42.52 | 3.03 | 3.00 | 10.72 | -34.83 | -13.00 | 21.83 | H |
| 1673.2 | -42.94 | 3.00 | 3.00 | 9.68 | -36.26 | -13.00 | 23.26 | V |
| 2509.8 | -41.41 | 3.03 | 3.00 | 10.72 | -33.72 | -13.00 | 20.72 | V |

*GPRS 850_ High Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1697.6 | -42.9 | 3.00 | 3.00 | 9.58 | -36.32 | -13.00 | 23.32 | H |
| 2546.4 | -42.47 | 3.03 | 3.00 | 10.72 | -34.78 | -13.00 | 21.78 | H |
| 1697.6 | -42.76 | 3.00 | 3.00 | 9.68 | -36.08 | -13.00 | 23.08 | V |
| 2546.4 | -41.71 | 3.03 | 3.00 | 10.72 | -34.02 | -13.00 | 21.02 | V |

*GPRS 1900_ Low Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 3700.4 | -43.56 | 4.39 | 3.00 | 12.34 | -35.61 | -13.00 | 22.61 | H |
| 5550.6 | -49.71 | 5.31 | 3.00 | 13.52 | -41.5 | -13.00 | 28.5 | H |
| 3700.4 | -50.74 | 4.39 | 3.00 | 12.34 | -42.79 | -13.00 | 29.79 | V |
| 5550.6 | -53.36 | 5.31 | 3.00 | 13.52 | -45.15 | -13.00 | 32.15 | V |

*GPRS 1900_ Middle Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 3760.0 | -46.88 | 4.41 | 3.00 | 12.34 | -38.95 | -13.00 | 25.95 | H |
| 5640.0 | -48.94 | 5.38 | 3.00 | 13.58 | -40.74 | -13.00 | 27.74 | H |
| 3760.0 | -44.89 | 4.41 | 3.00 | 12.34 | -36.96 | -13.00 | 23.96 | V |
| 5640.0 | -44.96 | 5.38 | 3.00 | 13.58 | -36.76 | -13.00 | 23.76 | V |

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*GPRS 1900_ High Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 3819.6 | -46.88 | 4.45 | 3.00 | 12.45 | -38.88 | -13.00 | 25.88 | H |
| 5729.4 | -46 | 5.47 | 3.00 | 13.66 | -37.81 | -13.00 | 24.81 | H |
| 3819.6 | -45.69 | 4.45 | 3.00 | 12.45 | -37.69 | -13.00 | 24.69 | V |
| 5729.4 | -44.27 | 5.48 | 3.00 | 13.66 | -36.09 | -13.00 | 23.09 | V |

*EGPRS 850_ Low Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1648.4 | -42.93 | 3.00 | 3.00 | 9.58 | -36.35 | -13.00 | 23.35 | H |
| 2472.6 | -43.01 | 3.03 | 3.00 | 10.72 | -35.32 | -13.00 | 22.32 | H |
| 1648.4 | -42.49 | 3.00 | 3.00 | 9.68 | -35.81 | -13.00 | 22.81 | V |
| 2472.6 | -41.39 | 3.03 | 3.00 | 10.72 | -33.7 | -13.00 | 20.7 | V |

*EGPRS 850_ Middle Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1673.2 | -42.66 | 3.00 | 3.00 | 9.58 | -36.08 | -13.00 | 23.08 | H |
| 2509.8 | -43.19 | 3.03 | 3.00 | 10.72 | -35.5 | -13.00 | 22.5 | H |
| 1673.2 | -43.18 | 3.00 | 3.00 | 9.68 | -36.5 | -13.00 | 23.5 | V |
| 2509.8 | -41.37 | 3.03 | 3.00 | 10.72 | -33.68 | -13.00 | 20.68 | V |

*EGPRS 850_ High Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1697.6 | -42.86 | 3.00 | 3.00 | 9.58 | -36.28 | -13.00 | 23.28 | H |
| 2546.4 | -42.49 | 3.03 | 3.00 | 10.72 | -34.8 | -13.00 | 21.8 | H |
| 1697.6 | -42.47 | 3.00 | 3.00 | 9.68 | -35.79 | -13.00 | 22.79 | V |
| 2546.4 | -41.9 | 3.03 | 3.00 | 10.72 | -34.21 | -13.00 | 21.21 | V |

*EGPRS 1900_ Low Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 3700.4 | -43.48 | 4.39 | 3.00 | 12.34 | -35.53 | -13.00 | 22.53 | H |
| 5550.6 | -49.85 | 5.31 | 3.00 | 13.52 | -41.64 | -13.00 | 28.64 | H |
| 3700.4 | -50.97 | 4.39 | 3.00 | 12.34 | -43.02 | -13.00 | 30.02 | V |
| 5550.6 | -54.03 | 5.31 | 3.00 | 13.52 | -45.82 | -13.00 | 32.82 | V |

*EGPRS 1900_ Middle Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 3760.0 | -46.93 | 4.41 | 3.00 | 12.34 | -39 | -13.00 | 26 | H |
| 5640.0 | -48.39 | 5.38 | 3.00 | 13.58 | -40.19 | -13.00 | 27.19 | H |
| 3760.0 | -44.77 | 4.41 | 3.00 | 12.34 | -36.84 | -13.00 | 23.84 | V |
| 5640.0 | -44.72 | 5.38 | 3.00 | 13.58 | -36.52 | -13.00 | 23.52 | V |

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*EGPRS 1900_ High Channel*

| Frequency (MHz) | $P_{Mea}$ (dBm) | Pcl (dB) | Diatance | Ga Antenna Gain(dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 3819.6 | -46.15 | 4.45 | 3.00 | 12.45 | -38.15 | -13.00 | 25.15 | H |
| 5729.4 | -45.75 | 5.47 | 3.00 | 13.66 | -37.56 | -13.00 | 24.56 | H |
| 3819.6 | -45.93 | 4.45 | 3.00 | 12.45 | -37.93 | -13.00 | 24.93 | V |
| 5729.4 | -43.85 | 5.48 | 3.00 | 13.66 | -35.67 | -13.00 | 22.67 | V |

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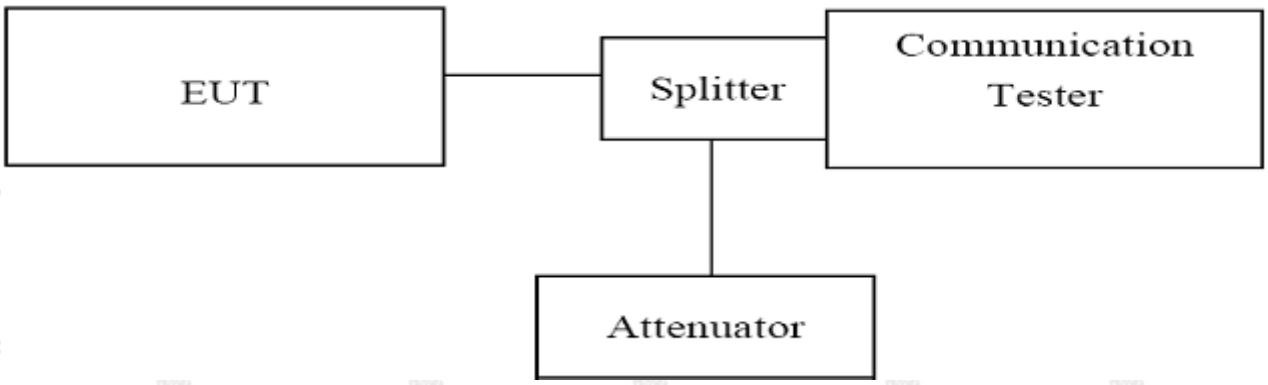
## 4.3 Occupied Bandwidth and Emission Bandwidth

**TEST APPLICABLE**

Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of PCS1900 band and GSM850 band. The table below lists the measured 99% Bandwidth and -26dBc Bandwidth.

**TEST CONFIGURATION**




**TEST PROCEDURE**

1. The EUT was set up for the max output power with pseudo random data modulation;
2. The Occupied bandwidth and Emission Bandwidth were measured with Aglient Spectrum Analyzer N9020A (peak);
3. Set RBW=5.1KHz,VBW=51KHz,Span=1MHz,SWT=500ms;
4. Set SPA Max hold and View, Set 99% Occupied Bandwidth/ Set -26dBc Occupied Bandwidth;
5. These measurements were done at 3 frequencies, 1850.20 MHz, 1880.00 MHz and 1909.80 MHz for PCS1900 band; 824.20MHz, 836.60 MHz and 848.80 MHz for GSM850 band. (Low, middle and high of operational frequency range).

**TEST RESULTS**

| GSM 850 | | | | |
|---|---|---|---|---|
| Channel Number | Frequency (MHz) | Occupied Bandwidth (99% BW) ( kHz) | Emission Bandwidth (26 dBc BW) ( kHz) | Verdict |
| 128 | 824.20 | 242.30 | 311.4 | PASS |
| 190 | 836.60 | 243.08 | 309.1 | PASS |
| 251 | 848.80 | 245.67 | 316.9 | PASS |

| GSM 1900 | | | | |
|---|---|---|---|---|
| Channel Number | Frequency (MHz) | Occupied Bandwidth (99% BW) ( kHz) | Emission Bandwidth (26 dBc BW) ( kHz) | Verdict |
| 512 | 1850.20 | 243.27 | 309.2 | PASS |
| 661 | 1880.00 | 242.08 | 314.9 | PASS |
| 810 | 1909.80 | 244.82 | 312.2 | PASS |

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| GPRS 850 | | | | |
|---|---|---|---|---|
| Channel Number | Frequency (MHz) | Occupied Bandwidth (99% BW) ( kHz) | Emission Bandwidth (26 dBc BW) ( kHz) | Verdict |
| 128 | 824.20 | 241.29 | 313.8 | PASS |
| 190 | 836.60 | 242.19 | 309.2 | PASS |
| 251 | 848.80 | 245.30 | 311.4 | PASS |

| GPRS 1900 | | | | |
|---|---|---|---|---|
| Channel Number | Frequency (MHz) | Occupied Bandwidth (99% BW) ( kHz) | Emission Bandwidth (26 dBc BW) ( kHz) | Verdict |
| 512 | 1850.20 | 243.91 | 313.1 | PASS |
| 661 | 1880.00 | 241.30 | 317.3 | PASS |
| 810 | 1909.80 | 242.24 | 301.9 | PASS |

| EGPRS 850 | | | | |
|---|---|---|---|---|
| Channel Number | Frequency (MHz) | Occupied Bandwidth (99% BW) ( kHz) | Emission Bandwidth (26 dBc BW) ( kHz) | Verdict |
| 128 | 824.20 | 247.25 | 308.0 | PASS |
| 190 | 836.60 | 247.50 | 311.0 | PASS |
| 251 | 848.80 | 248.84 | 310.0 | PASS |

| EGPRS 1900 | | | | |
|---|---|---|---|---|
| Channel Number | Frequency (MHz) | Occupied Bandwidth (99% BW) ( kHz) | Emission Bandwidth (26 dBc BW) ( kHz) | Verdict |
| 512 | 1850.20 | 253.19 | 312.9 | PASS |
| 661 | 1880.00 | 250.47 | 310.4 | PASS |
| 810 | 1909.80 | 243.30 | 305.2 | PASS |

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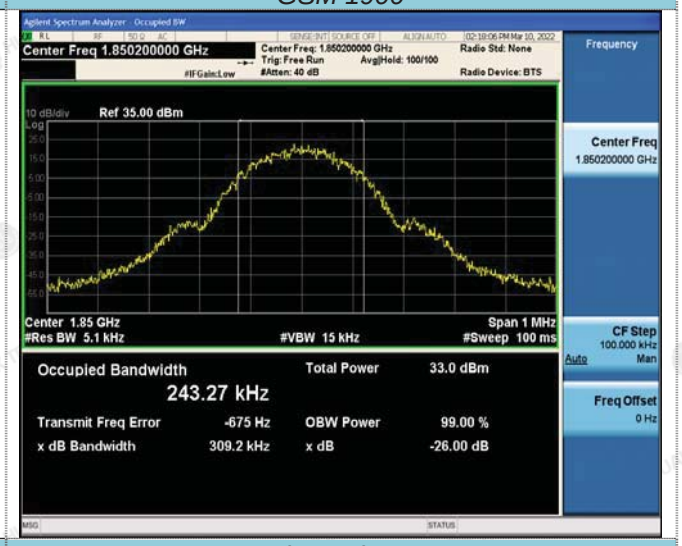
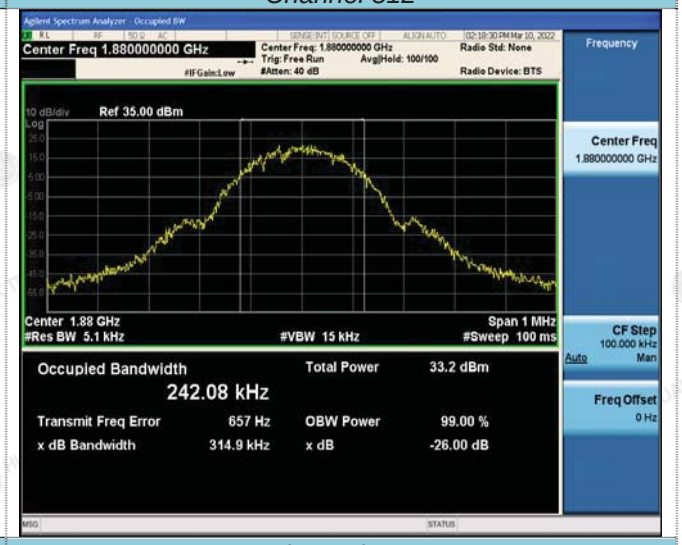
GSM 850

GSM 1900




Channel 128

Channel 512




Channel 190

Channel 661

Channel 251

Channel 810

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GPRS 850

GPRS 1900

Channel 128

Channel 512

Channel 190

Channel 661

Channel 251

Channel 810

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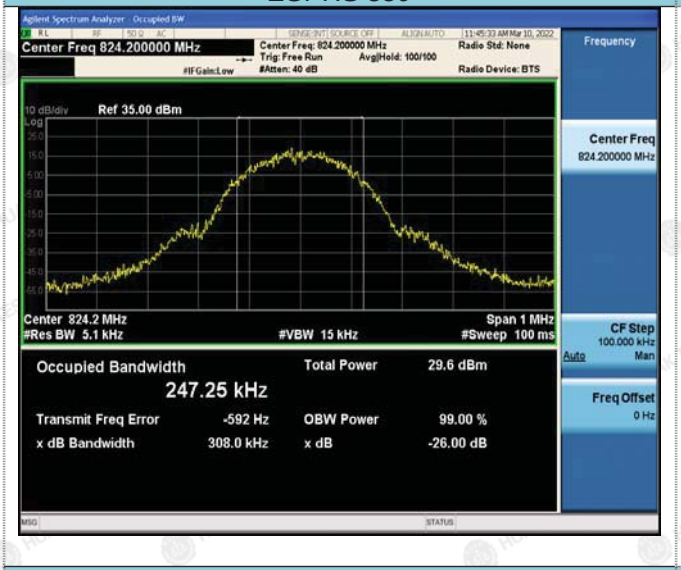
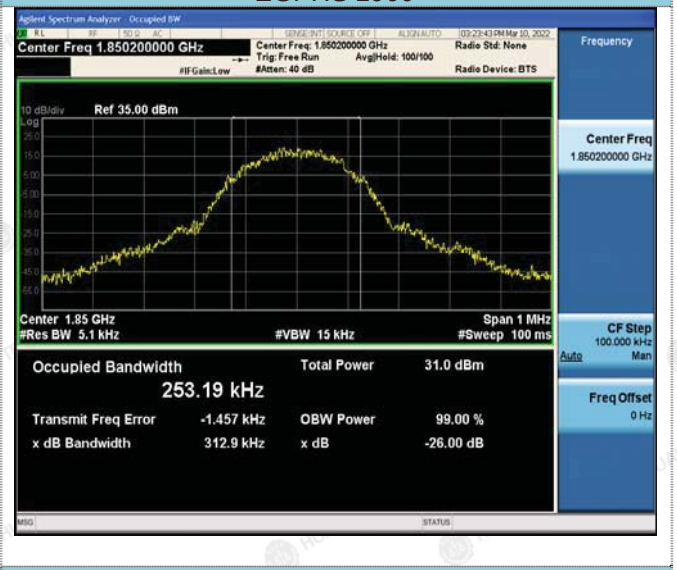
EGPRS 850

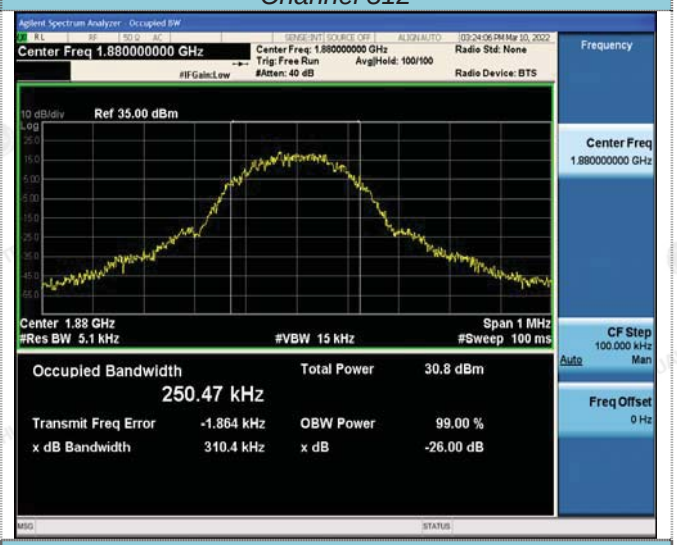



EGPRS 1900



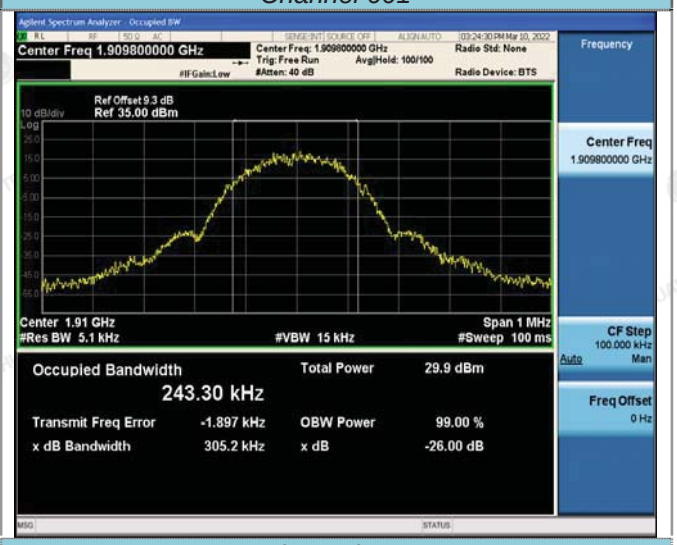

Channel 128

Channel 512




Channel 190

Channel 661




Channel 251

Channel 810

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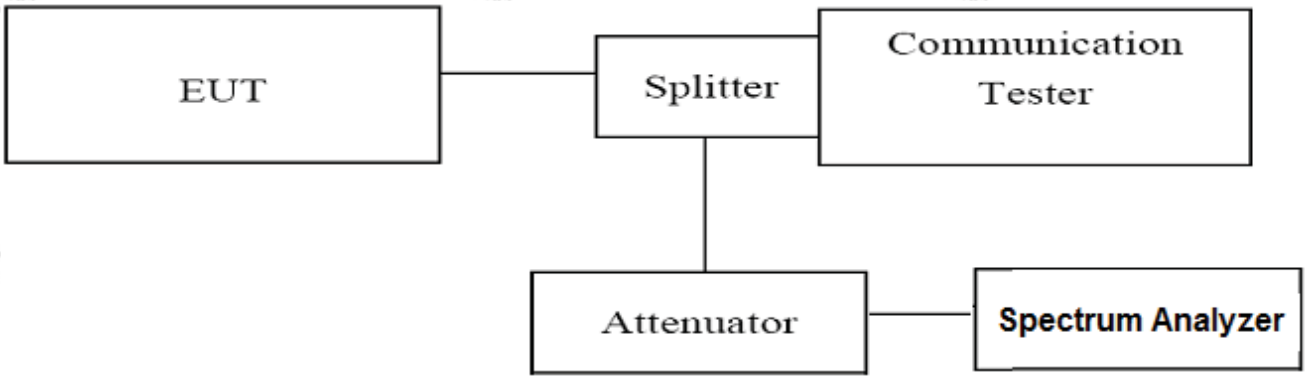
## 4.4 Band Edge Complicance

**TEST APPLICABLE**

During the process of testing, the EUT was controlled via Aglient Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation.

**TEST CONFIGURATION**




**TEST PROCEDURE**

1. The EUT was set up for the max output power with pseudo random data modulation;
2. The power was measured with Aglient Spectrum Analyzer N9020A;
3. Set RBW=5.1KHz,VBW=51KHz,Span=1MHz,SWT=1000ms, Dector: RMS;
4. These measurements were done at 3 frequencies, 1850.20 MHz, 1880.00 MHz and 1909.80 MHz for PCS1900 band; 824.20 MHz, 836.60 MHz and 848.80 MHz for GSM850 band. (bottom, middle and top of operational frequency range).

**TEST RESULTS**

| GSM 850 | | | | | |
|---|---|---|---|---|---|
| Channel Number | Frequency (MHz) | Measurement Results | | Limit (dBm) | Verdict |
| | | Frequency (MHz) | Values (dBm) | | |
| 128 | 824.20 | 823.99 | -26.19 | -13.00 | PASS |
| 251 | 848.80 | 849.02 | -24.48 | -13.00 | PASS |

| GSM 1900 | | | | | |
|---|---|---|---|---|---|
| Channel Number | Frequency (MHz) | Measurement Results | | Limit (dBm) | Verdict |
| | | Frequency (MHz) | Values (dBm) | | |
| 512 | 1850.20 | 1849.99 | -16.50 | -13.00 | PASS |
| 810 | 1909.80 | 1910.02 | -17.26 | -13.00 | PASS |

| GPRS 850 | | | | | |
|---|---|---|---|---|---|
| Channel Number | Frequency (MHz) | Measurement Results | | Limit (dBm) | Verdict |
| | | Frequency (MHz) | Values (dBm) | | |
| 128 | 824.20 | 824.00 | -26.10 | -13.00 | PASS |
| 251 | 848.80 | 849.02 | -27.12 | -13.00 | PASS |

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| GPRS 1900 | | | | | |
|---|---|---|---|---|---|
| Channel Number | Frequency (MHz) | Measurement Results | | Limit (dBm) | Verdict |
| | | Frequency (MHz) | Values (dBm) | | |
| 512 | 1850.20 | 1850.00 | -16.55 | -13.00 | PASS |
| 810 | 1909.80 | 1910.00 | -15.56 | -13.00 | PASS |

| EGPRS 850 | | | | | |
|---|---|---|---|---|---|
| Channel Number | Frequency (MHz) | Measurement Results | | Limit (dBm) | Verdict |
| | | Frequency (MHz) | Values (dBm) | | |
| 128 | 824.20 | 823.99 | -36.27 | -13.00 | PASS |
| 251 | 848.80 | 849.01 | -35.39 | -13.00 | PASS |

| EGPRS 1900 | | | | | |
|---|---|---|---|---|---|
| Channel Number | Frequency (MHz) | Measurement Results | | Limit (dBm) | Verdict |
| | | Frequency (MHz) | Values (dBm) | | |
| 512 | 1850.20 | 1849.99 | -21.76 | -13.00 | PASS |
| 810 | 1909.80 | 1910.00 | -23.13 | -13.00 | PASS |

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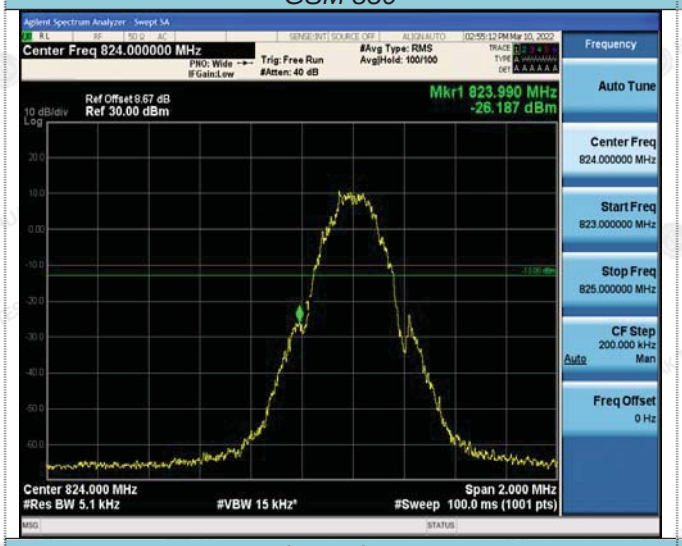
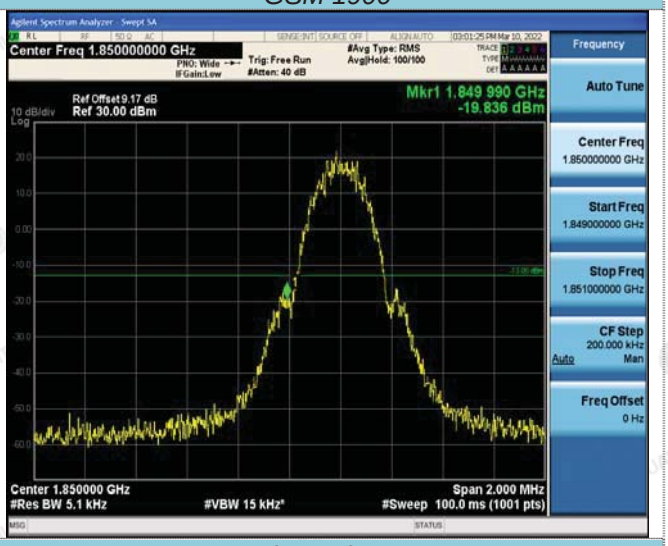
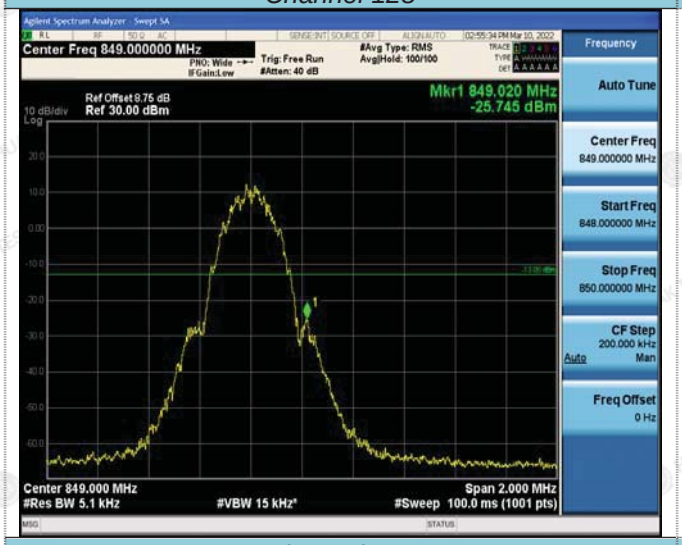
GSM 850



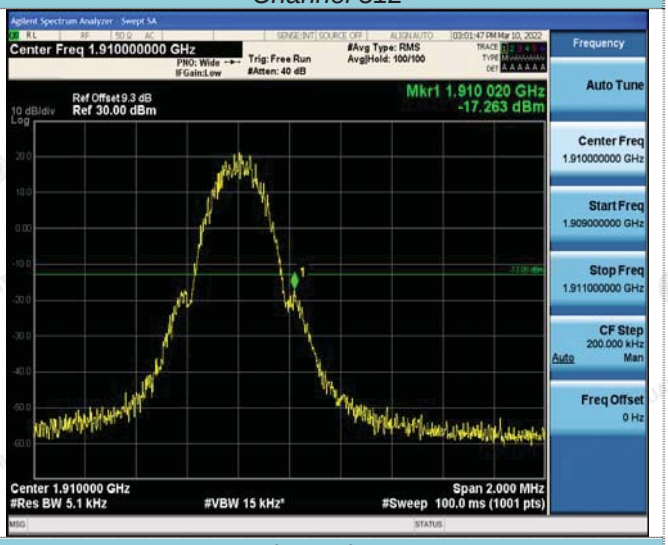

GSM 1900




Channel 128




Channel 512




Channel 251

Channel 810

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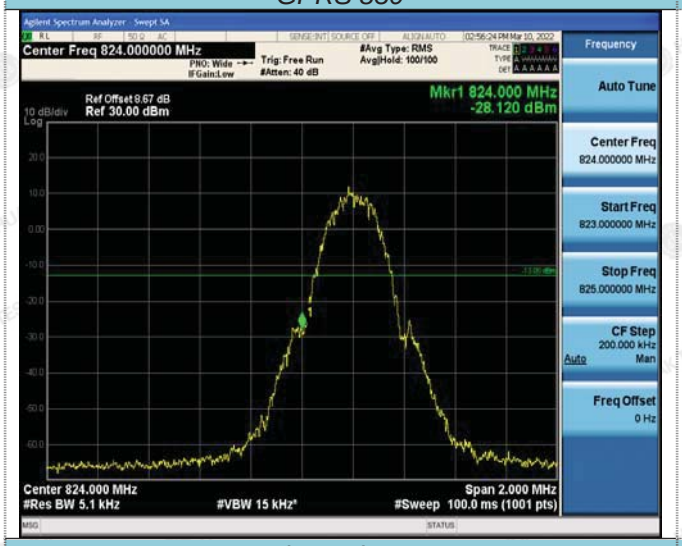
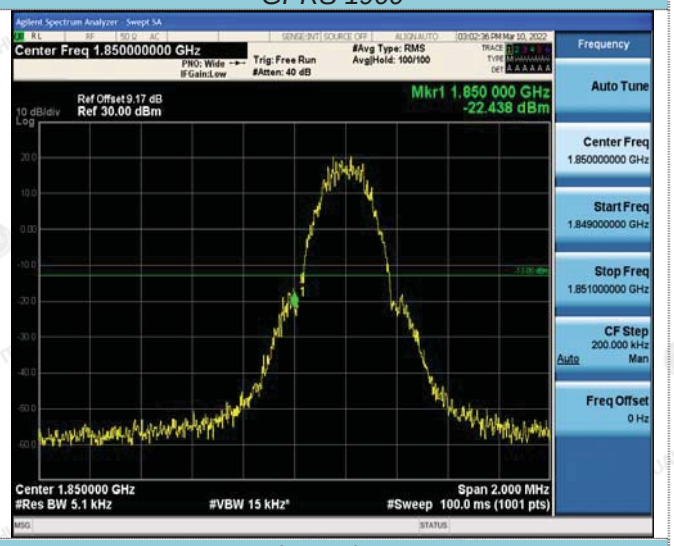
GPRS 850

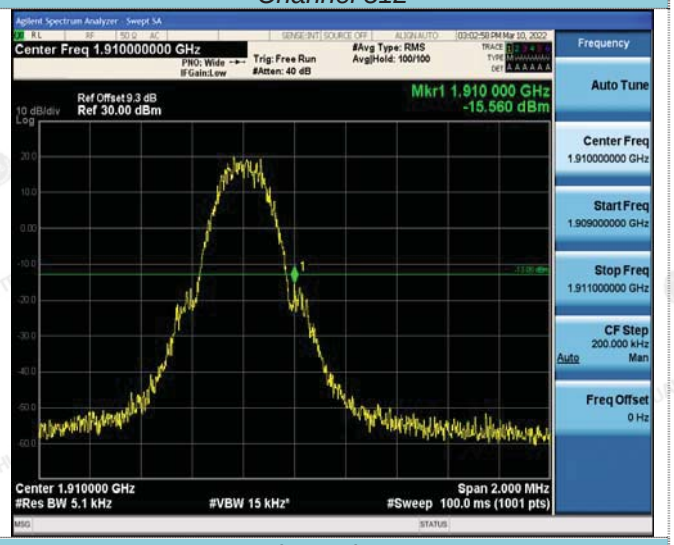



GPRS 1900




Channel 128

Channel 512




Channel 251

Channel 810

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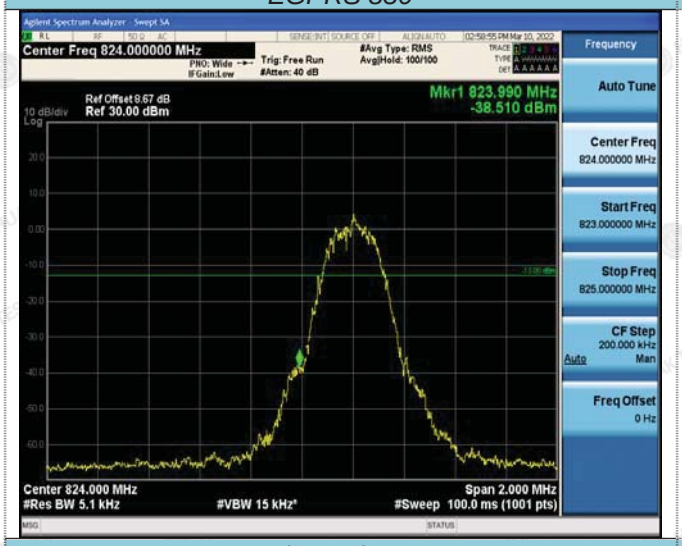
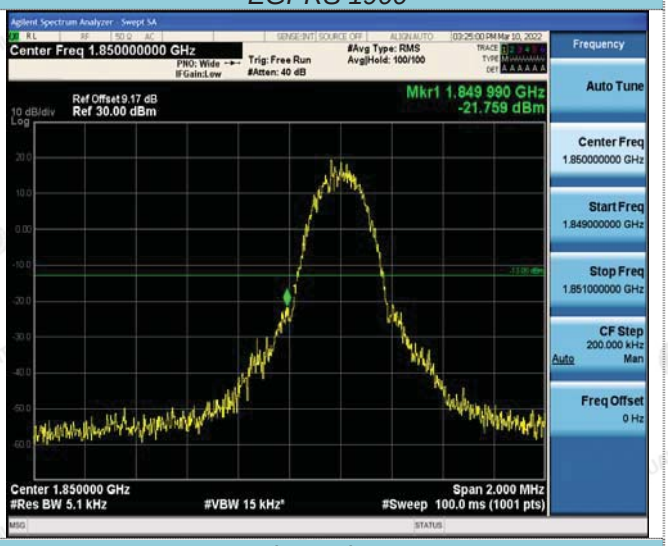
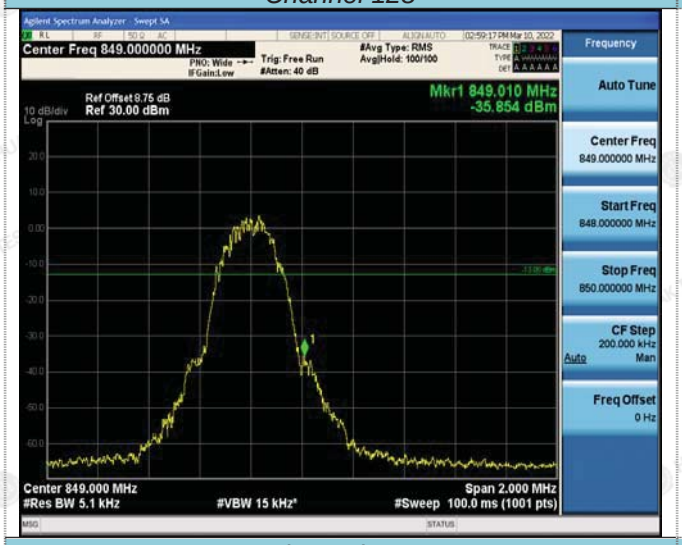
EGPRS 850



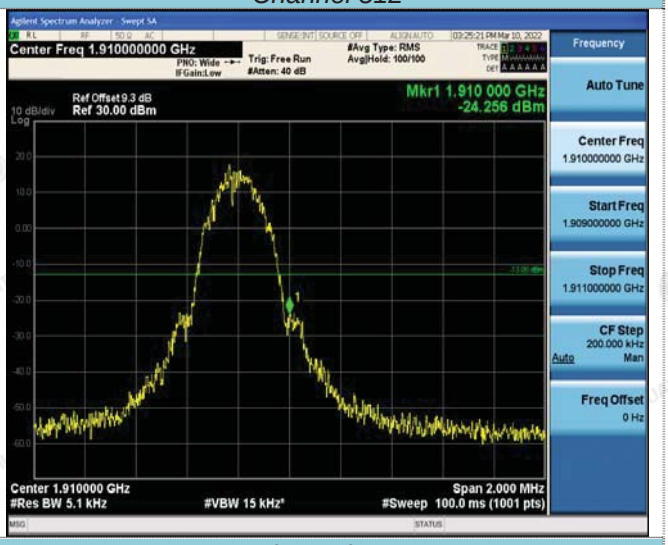

EGPRS 1900




Channel 128




Channel 512




Channel 251

Channel 810

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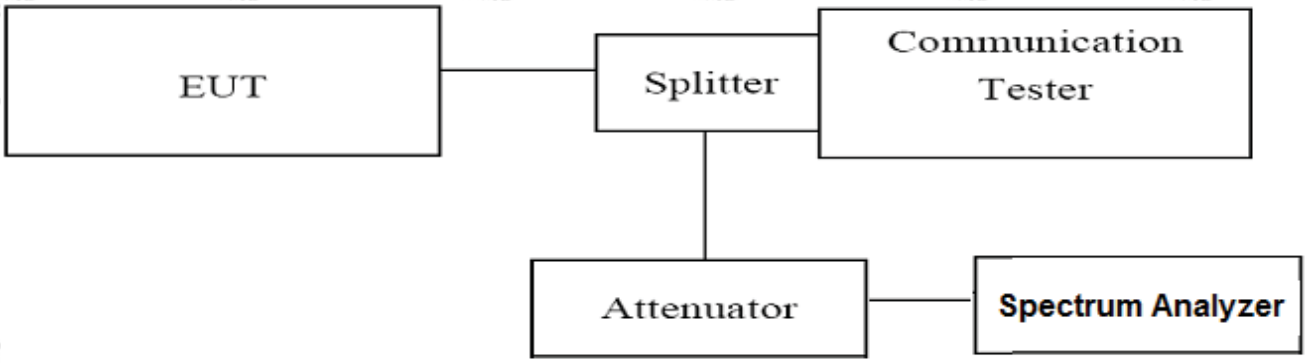
## 4.5 Spurious Emssion on Antenna Port

**TEST APPLICABLE**

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of PCS1900 band, this equates to a frequency range of 9 KHz to 19.1 GHz, data taken from 9 KHz to 25 GHz. For GSM850, data taken from 9 KHz to 9 GHz.
2. The sweep time is set automatically by instrument itself. That should be the optimal sweep time for the span and the RBW. If the sweep time is too short, that is sweep is too fast, the sweep result is not accurate; if the sweep time is too long, that is sweep is too low, some frequency components may be lost. The instrument will give an optimal sweep time according the selected span and RBW.
3. The procedure to get the conducted spurious emission is as follows:
   The trace mode is set to MaxHold to get the highest signal at each frequency;
   Wait 25 seconds;
   Get the result.
4. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

**TEST CONFIGURATION**




**TEST PROCEDURE**

1. The EUT was set up for the max output power with pseudo random data modulation;
2. The power was measured with Agilent Spectrum Analyzer N9020A (peak);
3. These measurements were done at 3 frequencies, 1850.20 MHz, 1880.00 MHz and 1909.80 MHz for PCS1900 band; 824.20 MHz, 836.60 MHz and 848.80 MHz for GSM850 band. (Low, middle and high of operational frequency range).

**TEST LIMIT**

Part 24.238 and Part 22.917 specify that 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 specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

**TEST RESULTS**

**Note:We tested GSM/GPRS/EGPRS mode and recorded the worst case at the GPRS mode.**

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### 4.5.1 For GPRS 850Test Results

A. Test Verdict

| Test Mode/ Channel | Frequency (MHz) | Frequency Range | Limit (dBm) | Verdict |
|---|---|---|---|---|
| GPRS 850 /128 | 824.20 | 150KHz-30MHz | -13.00 | PASS |
| | | 30MHz-5GHz | -13.00 | PASS |
| | | 5GHz-18GHz | -13.00 | PASS |
| GPRS 850 /190 | 836.60 | 150KHz-30MHz | -13.00 | PASS |
| | | 30MHz-5GHz | -13.00 | PASS |
| | | 5GHz-18GHz | -13.00 | PASS |
| GPRS 850 /251 | 848.80 | 150KHz-30MHz | -13.00 | PASS |
| | | 30MHz-5GHz | -13.00 | PASS |
| | | 5GHz-18GHz | -13.00 | PASS |

Note:
1. In general, the worse case attenuation requirement shown above was applied.
2.**"---"** means that the emission level is too low to be measured or at least 20 dB down than the limit.

B. Test Plots

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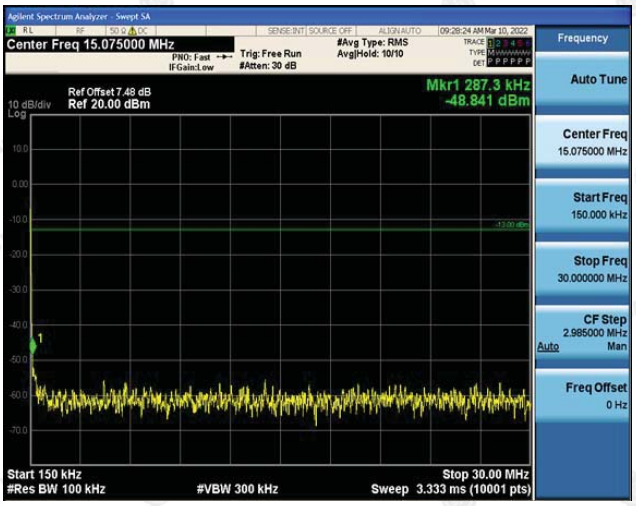
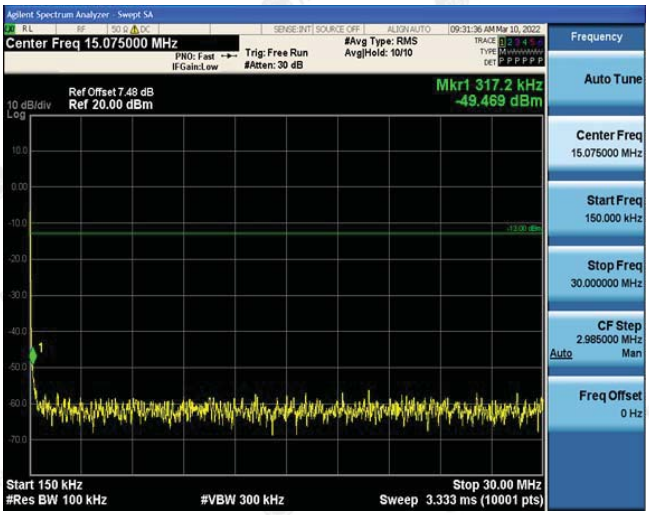
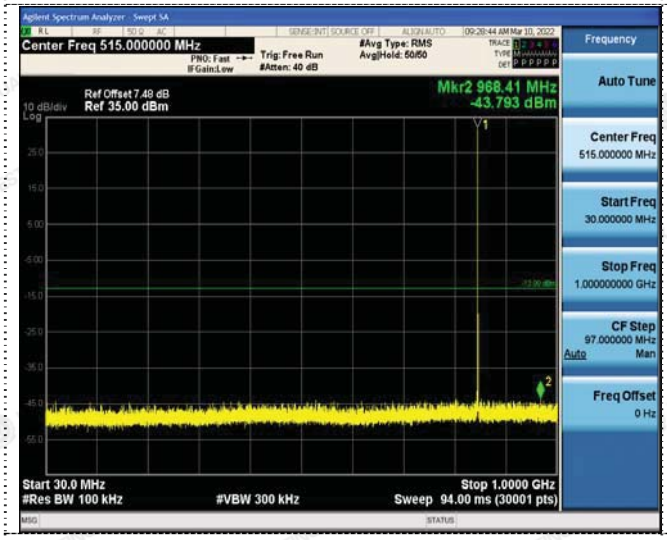
| Test Mode: GPRS | Test channel : 128 | Test Mode: GPRS | Test channel : 190 |
|---|---|---|---|



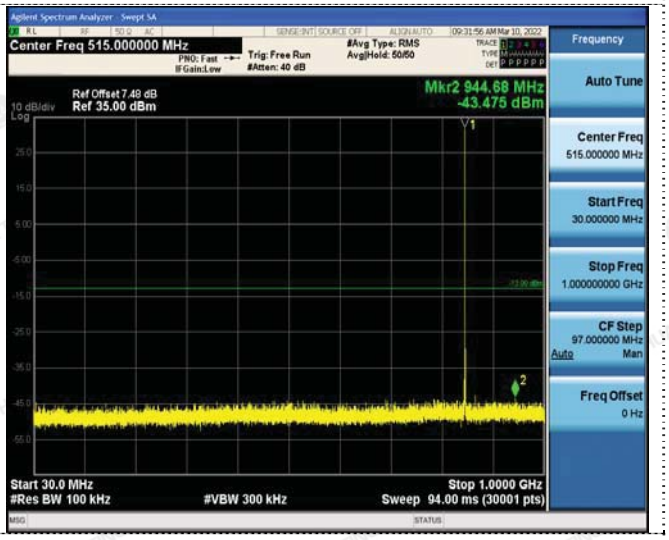

0.15~30MHz



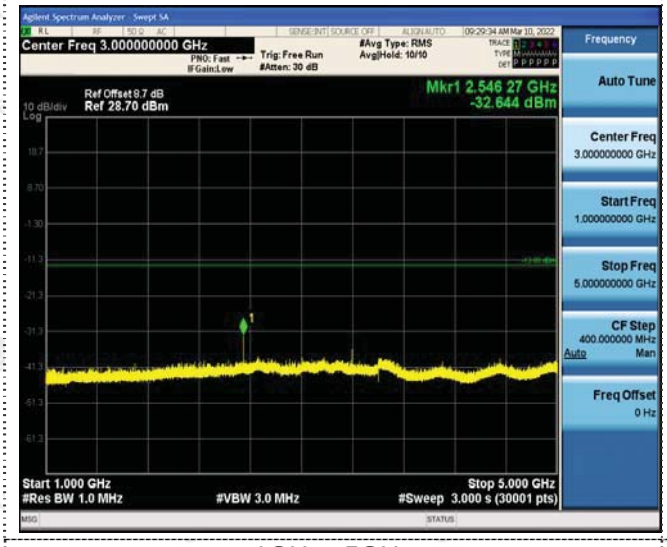

0.15~30MHz




30MHz ~1GHz




30MHz ~1GHz




1GHz ~5GHz

1GHz ~5GHz

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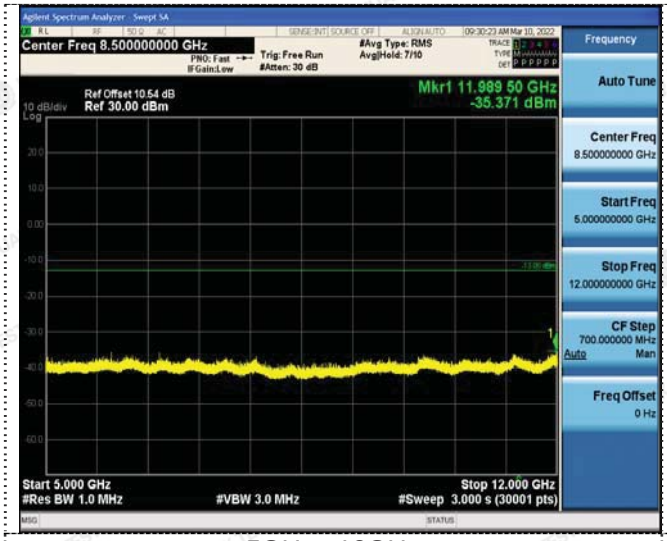
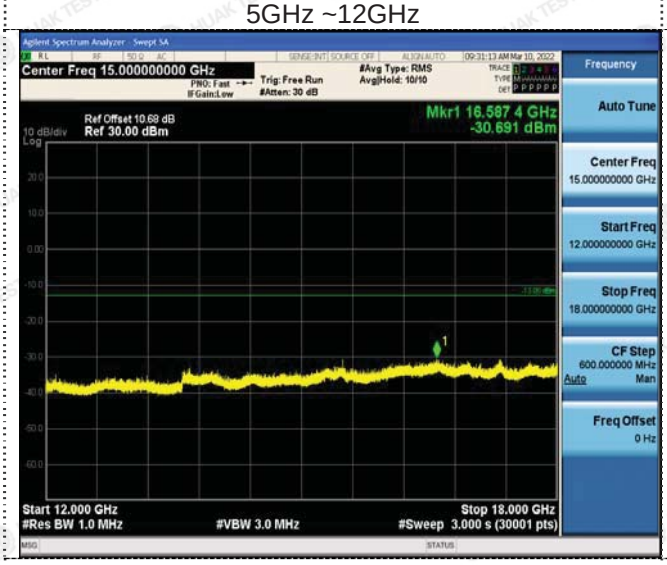
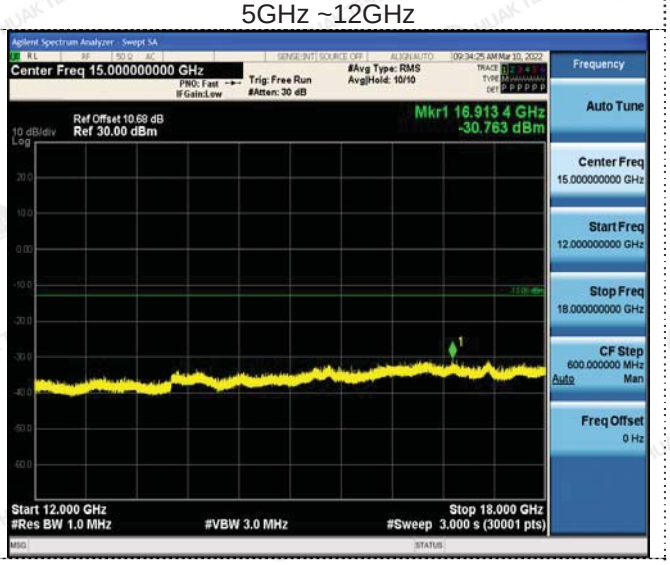



5GHz ~12GHz

5GHz ~12GHz




12GHz ~18GHz




12GHz ~18GHz

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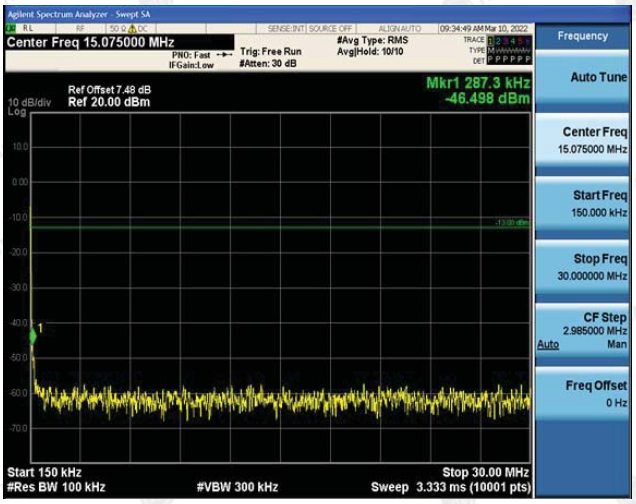
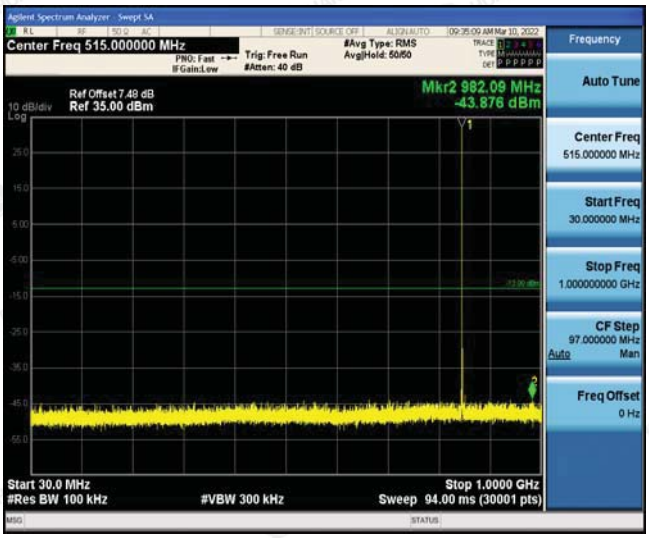
| **Test Mode:** GPRS | **Test channel : 251** | | |
|---|---|---|---|

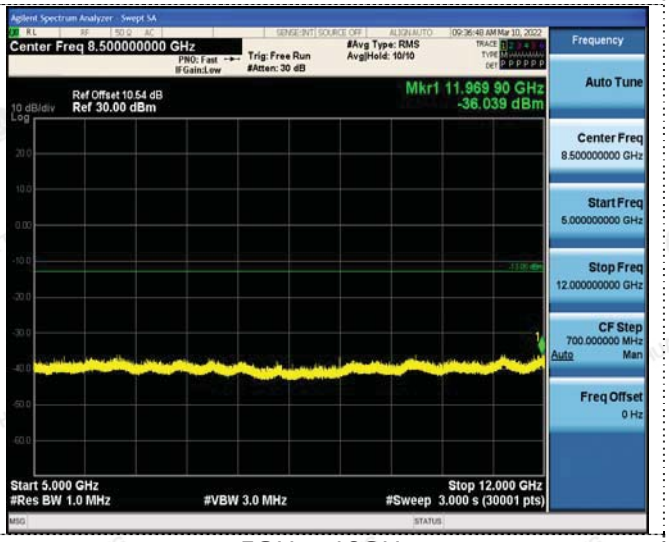



0.15~30MHz




30MHz ~1GHz

1GHz ~5GHz




5GHz ~12GHz

12GHz ~18GHz

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### 4.5.2 For GPRS 1900 Test Results

A. Test Verdict

| Test Mode/ Channel | Frequency (MHz) | Frequency Range | Limit (dBm) | Verdict |
|---|---|---|---|---|
| GPRS 1900 /512 | 1850.20 | 9KHz-150KHz | -13.00 | PASS |
| | | 150KHz-30MHz | -13.00 | PASS |
| | | 30MHz -8GHz | -13.00 | PASS |
| | | 8GHz-26.5GHz | -13.00 | PASS |
| GPRS 1900 /661 | 1880.00 | 9KHz-150KHz | -13.00 | PASS |
| | | 150KHz-30MHz | -13.00 | PASS |
| | | 30MHz -8GHz | -13.00 | PASS |
| | | 8GHz-26.5GHz | -13.00 | PASS |
| GPRS 1900 /810 | 1909.80 | 9KHz-150KHz | -13.00 | PASS |
| | | 150KHz-30MHz | -13.00 | PASS |
| | | 30MHz -8GHz | -13.00 | PASS |
| | | 8GHz-26.5GHz | -13.00 | PASS |

Note:
1. In general, the worse case attenuation requirement shown above was applied.
2.“**---**” means that the emission level is too low to be measured or at least 20 dB down than the limit.

B. Test Plots

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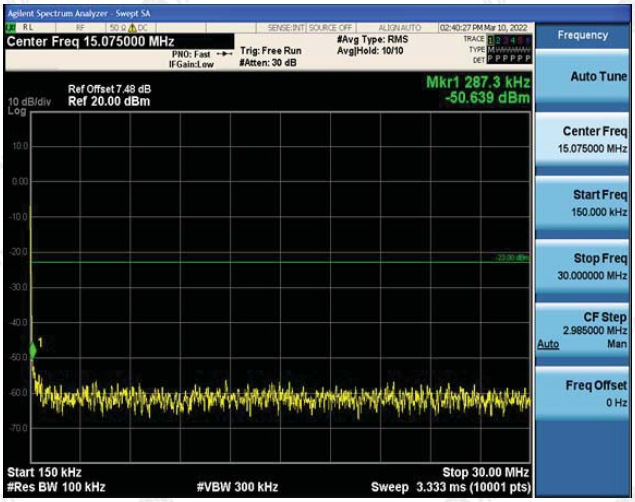
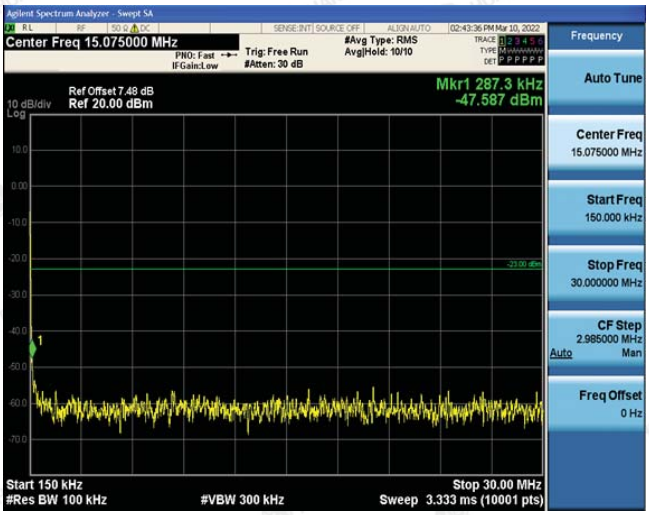
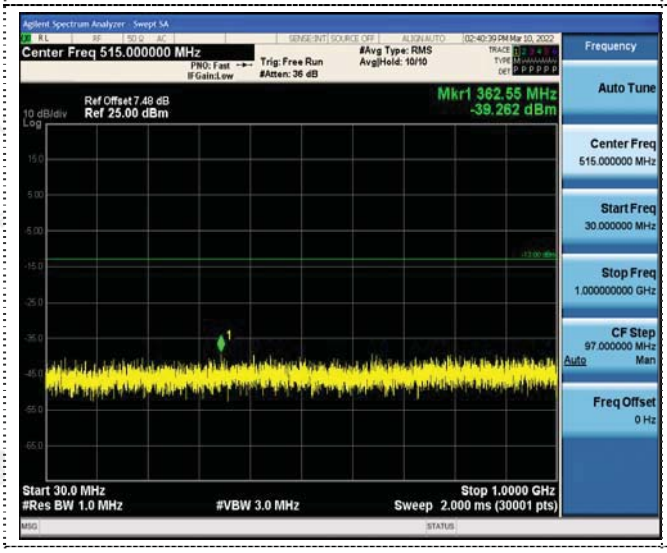
| Test Mode: GPRS | Test channel : 512 | Test Mode: GPRS | Test channel : 661 |
|---|---|---|---|



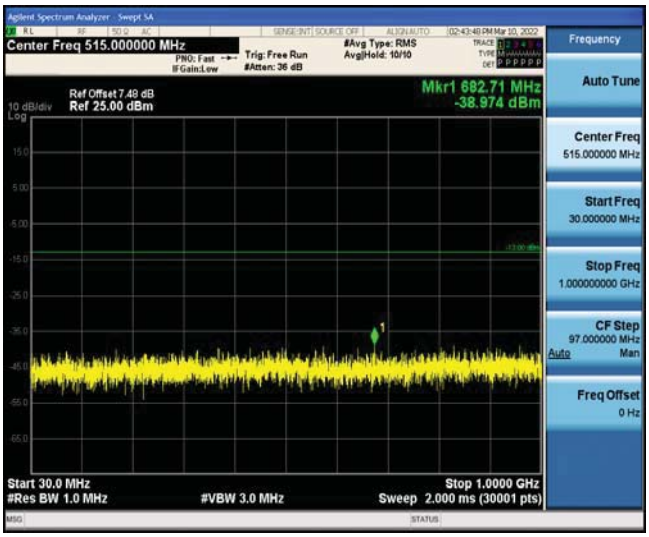

0.15~30MHz




0.15~30MHz

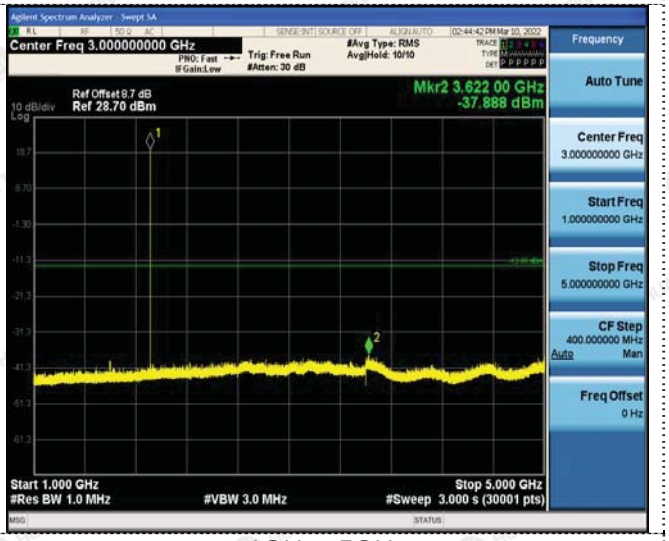



30MHz~1GHz




30MHz~1GHz

1GHz ~5GHz




1GHz ~5GHz

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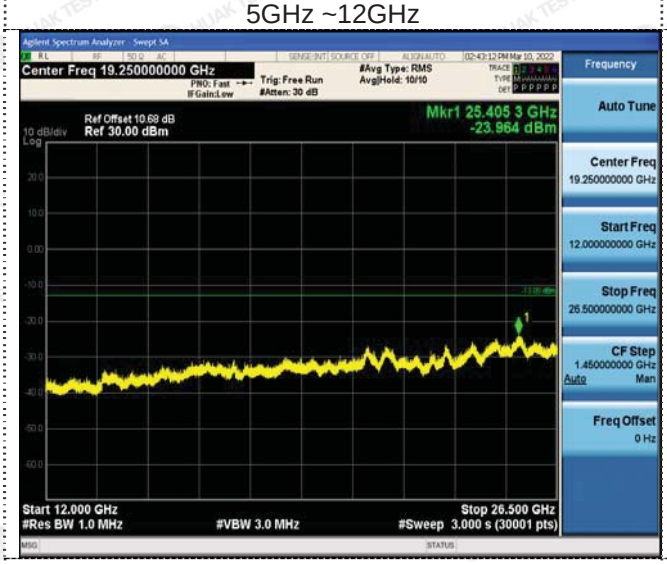
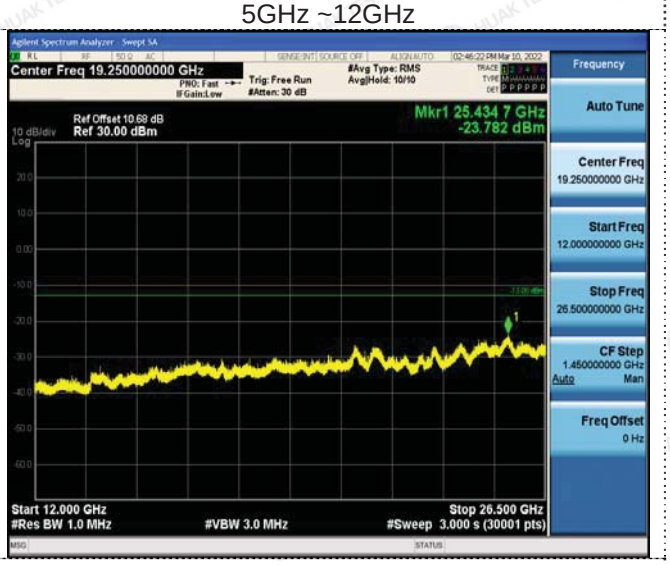
5GHz ~12GHz

5GHz ~12GHz




12GHz ~26.5GHz




12GHz ~26.5GHz

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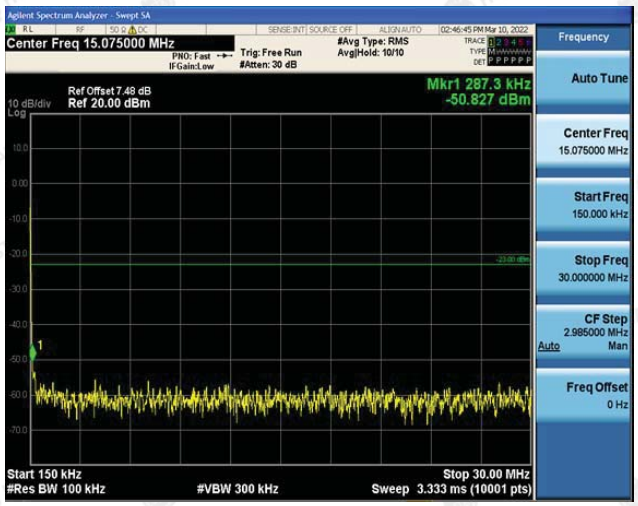
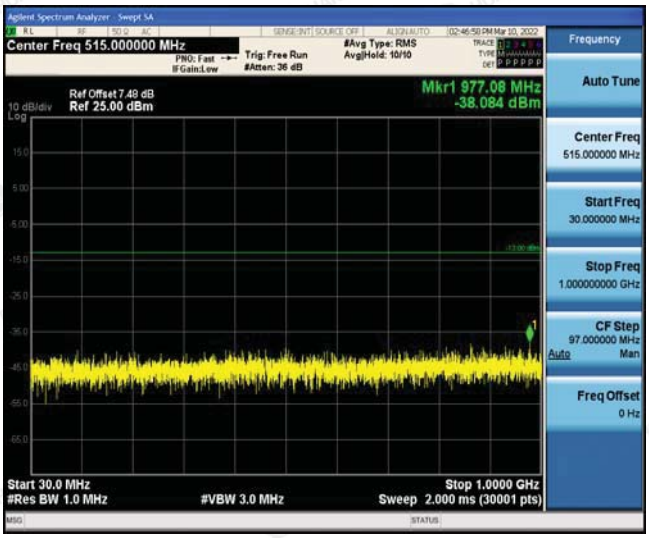
| **Test Mode:** GPRS | **Test channel : 810** | | |
|---|---|---|---|

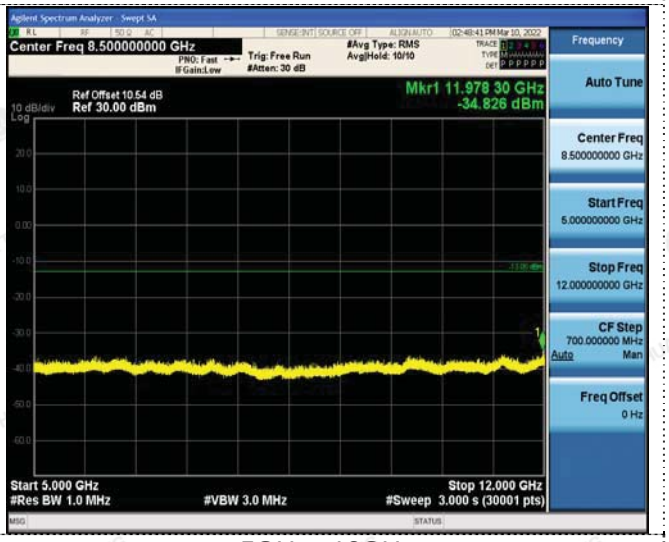



0.15~30MHz

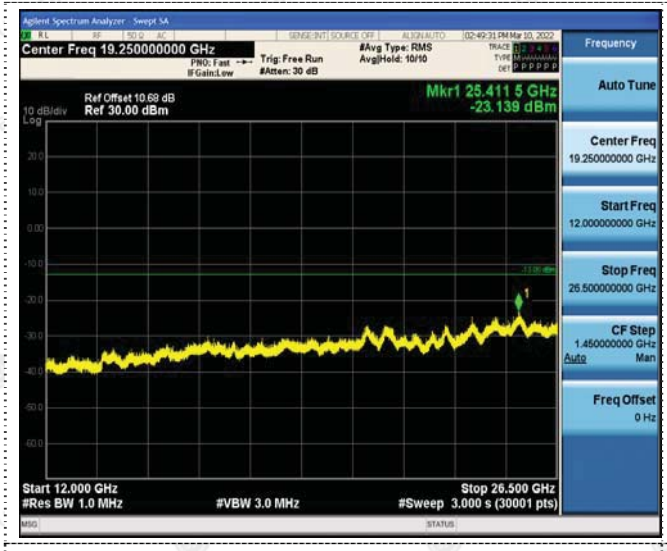



30MHz~1GHz

1GHz ~5GHz




5GHz ~12GHz




12GHz ~26.5GHz

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## 4.6 Frequency Stability Test

**TEST APPLICABLE**

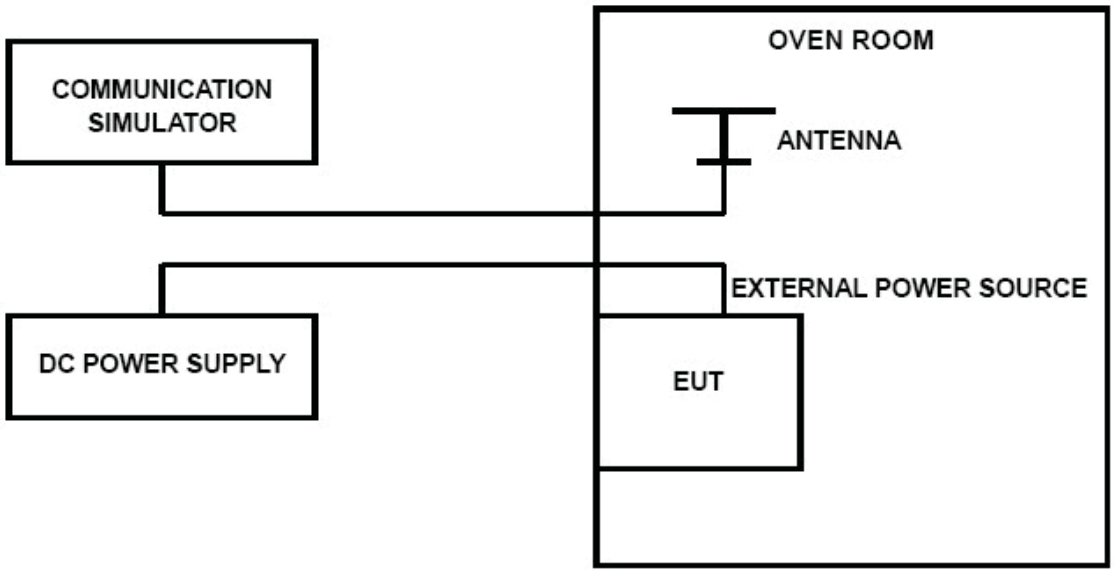
1. According to FCC Part 2 Section 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30℃ to +50℃ centigrade.
2. According to FCC Part 2 Section 2.1055 (E) (2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.
3. Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried voltage equipment and the end voltage point was 10.8V.

**TEST PROCEDURE**

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMU200 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature;
2. Subject the EUT to overnight soak at -30℃;
3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on middle channel of PCS 1900 and GSM850, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming;
4. Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 0.5 hours at each temperature, unpowered, before making measurements;
5. Remeasure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments remeasuring carrier frequency at each voltage. Pause at nominal voltage for 0.5 hours unpowered, to allow any self-heating to stabilize, before continuing;
6. Subject the EUT to overnight soak at +50℃;
7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming;
8. Repeat the above measurements at 10℃ increments from +50℃ to -30℃. Allow at least 0.5 hours at each temperature, unpowered, before making measurements;
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure;

**TEST CONFIGURATION**

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## TEST LIMITS

***For Hand carried battery powered equipment***

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.40VDC and 4.20VDC, with a nominal voltage of 3.80 DC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

***For equipment powered by primary supply voltage***

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

## TEST RESULTS

| GPRS 850 Middle channel=190 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| DC Power | Temperature (℃) | Frequency error(Hz) | Frequency error(ppm) | Limit (ppm) | Verdict |
| 3.23 | 25 | 6.01 | 0.007292 | 2.50 | PASS |
| 3.8 | 25 | 9.23 | 0.011199 | 2.50 | PASS |
| 4.37 | 25 | 2.78 | 0.003373 | 2.50 | PASS |
| 3.8 | -30 | 2.13 | 0.002584 | 2.50 | PASS |
| 3.8 | -20 | 9.23 | 0.011199 | 2.50 | PASS |
| 3.8 | -10 | 10.40 | 0.012618 | 2.50 | PASS |
| 3.8 | 0 | 6.26 | 0.007595 | 2.50 | PASS |
| 3.8 | 10 | 4.97 | 0.006030 | 2.50 | PASS |
| 3.8 | 20 | 2.91 | 0.003531 | 2.50 | PASS |
| 3.8 | 30 | 4.33 | 0.005176 | 2.50 | PASS |
| 3.8 | 40 | 7.75 | 0.009264 | 2.50 | PASS |
| 3.8 | 50 | 3.68 | 0.004399 | 2.50 | PASS |

| GPRS 1900 Middle channel=661 channel=1880MHz | | | | | |
|---|---|---|---|---|---|
| DC Power | Temperature (℃) | Frequency error(Hz) | Frequency error(ppm) | Limit (ppm) | Verdict |
| 3.23 | 25 | 4.13 | 0.002232 | 2.50 | PASS |
| 3.8 | 25 | 4.58 | 0.002475 | 2.50 | PASS |
| 4.37 | 25 | 2.91 | 0.001573 | 2.50 | PASS |
| 3.8 | -30 | 3.55 | 0.001919 | 2.50 | PASS |
| 3.8 | -20 | 7.55 | 0.004016 | 2.50 | PASS |
| 3.8 | -10 | 6.46 | 0.003436 | 2.50 | PASS |
| 3.8 | 0 | 10.33 | 0.005495 | 2.50 | PASS |
| 3.8 | 10 | 13.37 | 0.007112 | 2.50 | PASS |
| 3.8 | 20 | 14.14 | 0.007521 | 2.50 | PASS |
| 3.8 | 30 | 19.44 | 0.010340 | 2.50 | PASS |
| 3.8 | 40 | 18.66 | 0.009926 | 2.50 | PASS |
| 3.8 | 50 | -4.84 | -0.002574 | 2.50 | PASS |

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| GSM 850 Middle channel=190 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| DC Power | Temperature (℃) | Frequency error(Hz) | Frequency error(ppm) | Limit (ppm) | Verdict |
| 3.23 | 25 | 6.84 | 0.008299 | 2.50 | PASS |
| 3.8 | 25 | 5.10 | 0.006188 | 2.50 | PASS |
| 4.37 | 25 | 5.94 | 0.007207 | 2.50 | PASS |
| 3.8 | -30 | 7.36 | 0.008930 | 2.50 | PASS |
| 3.8 | -20 | 5.75 | 0.006976 | 2.50 | PASS |
| 3.8 | -10 | 4.26 | 0.005169 | 2.50 | PASS |
| 3.8 | 0 | 5.88 | 0.007134 | 2.50 | PASS |
| 3.8 | 10 | 7.81 | 0.009476 | 2.50 | PASS |
| 3.8 | 20 | 6.33 | 0.007680 | 2.50 | PASS |
| 3.8 | 30 | 3.29 | 0.003933 | 2.50 | PASS |
| 3.8 | 40 | 4.78 | 0.005714 | 2.50 | PASS |
| 3.8 | 50 | 3.81 | 0.004554 | 2.50 | PASS |

| GSM 1900 Middle channel=661 channel=1880MHz | | | | | |
|---|---|---|---|---|---|
| DC Power | Temperature (℃) | Frequency error(Hz) | Frequency error(ppm) | Limit (ppm) | Verdict |
| 3.23 | 25 | 12.07 | 0.006524 | 2.50 | PASS |
| 3.8 | 25 | 7.68 | 0.004151 | 2.50 | PASS |
| 4.37 | 25 | 15.50 | 0.008377 | 2.50 | PASS |
| 3.8 | -30 | 13.69 | 0.007399 | 2.50 | PASS |
| 3.8 | -20 | 3.62 | 0.001957 | 2.50 | PASS |
| 3.8 | -10 | 15.56 | 0.008410 | 2.50 | PASS |
| 3.8 | 0 | 14.14 | 0.007642 | 2.50 | PASS |
| 3.8 | 10 | 4.58 | 0.002475 | 2.50 | PASS |
| 3.8 | 20 | 17.63 | 0.009529 | 2.50 | PASS |
| 3.8 | 30 | 10.78 | 0.005734 | 2.50 | PASS |
| 3.8 | 40 | 6.07 | 0.003229 | 2.50 | PASS |
| 3.8 | 50 | 16.34 | 0.008691 | 2.50 | PASS |

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| EGPRS 850 Middle channel=190 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| DC Power | Temperature (℃) | Frequency error(Hz) | Frequency error(ppm) | Limit (ppm) | Verdict |
| 4.235 | 25 | -10.11 | -0.012266 | 2.50 | PASS |
| 3.85 | 25 | -2.03 | -0.002463 | 2.50 | PASS |
| 2.465 | 25 | -5.78 | -0.007013 | 2.50 | PASS |
| 3.85 | -30 | -5.91 | -0.007171 | 2.50 | PASS |
| 3.85 | -20 | -3.29 | -0.003992 | 2.50 | PASS |
| 3.85 | -10 | -3.49 | -0.004234 | 2.50 | PASS |
| 3.85 | 0 | -1.65 | -0.002002 | 2.50 | PASS |
| 3.85 | 10 | 3.26 | 0.003955 | 2.50 | PASS |
| 3.85 | 20 | 0.55 | 0.000667 | 2.50 | PASS |
| 3.85 | 30 | -2.10 | -0.002510 | 2.50 | PASS |
| 3.85 | 40 | -1.68 | -0.002008 | 2.50 | PASS |
| 3.85 | 50 | -1.29 | -0.001542 | 2.50 | PASS |

| EGPRS 1900 Middle channel=661 channel=1880MHz | | | | | |
|---|---|---|---|---|---|
| DC Power | Temperature (℃) | Frequency error(Hz) | Frequency error(ppm) | Limit (ppm) | Verdict |
| 4.235 | 25 | -3.84 | -0.002075 | 2.50 | PASS |
| 3.85 | 25 | -6.52 | -0.003524 | 2.50 | PASS |
| 2.465 | 25 | 1.16 | 0.000627 | 2.50 | PASS |
| 3.85 | -30 | 4.00 | 0.002162 | 2.50 | PASS |
| 3.85 | -20 | -8.43 | -0.004484 | 2.50 | PASS |
| 3.85 | -10 | -6.42 | -0.003415 | 2.50 | PASS |
| 3.85 | 0 | -2.45 | -0.001303 | 2.50 | PASS |
| 3.85 | 10 | 0.48 | 0.000255 | 2.50 | PASS |
| 3.85 | 20 | 3.36 | 0.001787 | 2.50 | PASS |
| 3.85 | 30 | 4.10 | 0.002181 | 2.50 | PASS |
| 3.85 | 40 | 5.49 | 0.002920 | 2.50 | PASS |
| 3.85 | 50 | -3.33 | -0.001771 | 2.50 | PASS |

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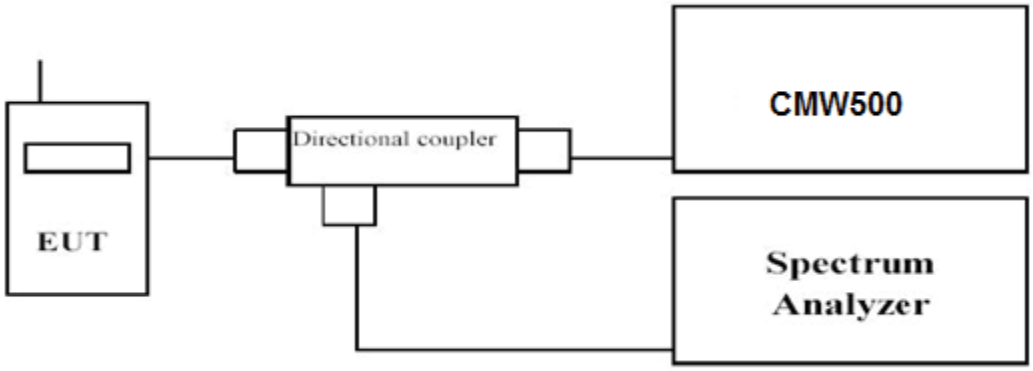
## 4.7 Peak-to-Average Ratio (PAR)

**LIMIT**

The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13 dB.

**TEST CONFIGURATION**




**TEST PROCEDURE**

Use spectrum to measure the total peak power and record as $P_{Pk}$. Use spectrum to measure the total average power and record as $P_{Avg}$. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm).
Determine the PAPR from:
PAPR (dB) = $P_{Pk}$ (dBm) - $P_{Avg}$ (dBm).

**TEST RESULTS**

**Note:We tested EGPRS/GPRS/GSM mode and recorded the worst case at the GPRS mode.**

| | GPRS 850 | | |
|---|---|---|---|
| Frequency (MHz) | Peak power | AV power | Measured (dB) |
| 824.20 | 32.45 | 29.79 | 2.65 |
| 836.60 | 32.60 | 29.95 | 2.64 |
| 848.80 | 32.74 | 30.08 | 2.64 |

| | GPRS 1900 | | |
|---|---|---|---|
| Frequency (MHz) | Peak power | AV power | Measured (dB) |
| 1850.20 | 27.50 | 24.89 | 2.60 |
| 1880.00 | 27.68 | 25.08 | 2.60 |
| 1909.80 | 27.69 | 25.08 | 2.60 |

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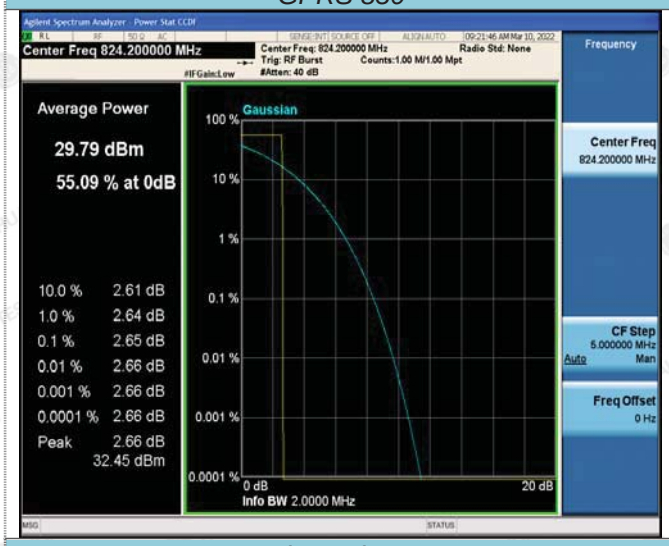
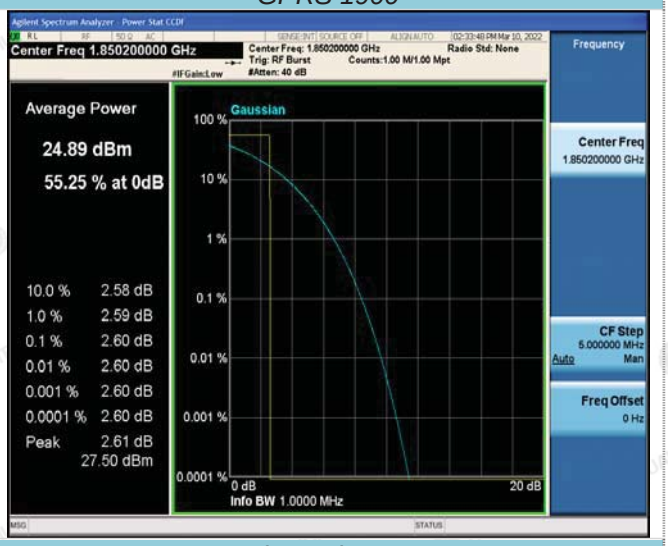
GPRS 850

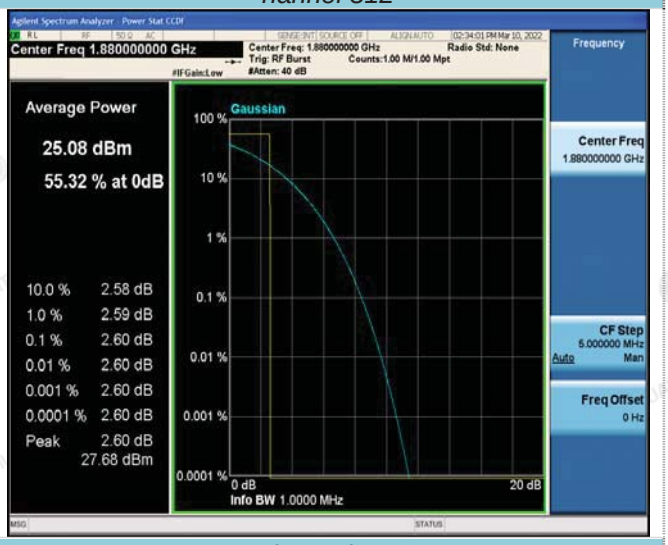



GPRS 1900



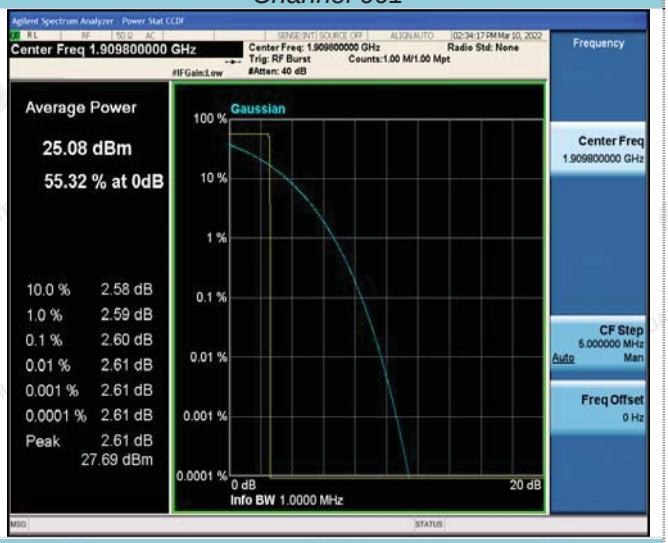

Channel 128

hannel 512




Channel 190

Channel 661




Channel 251

Channel 810

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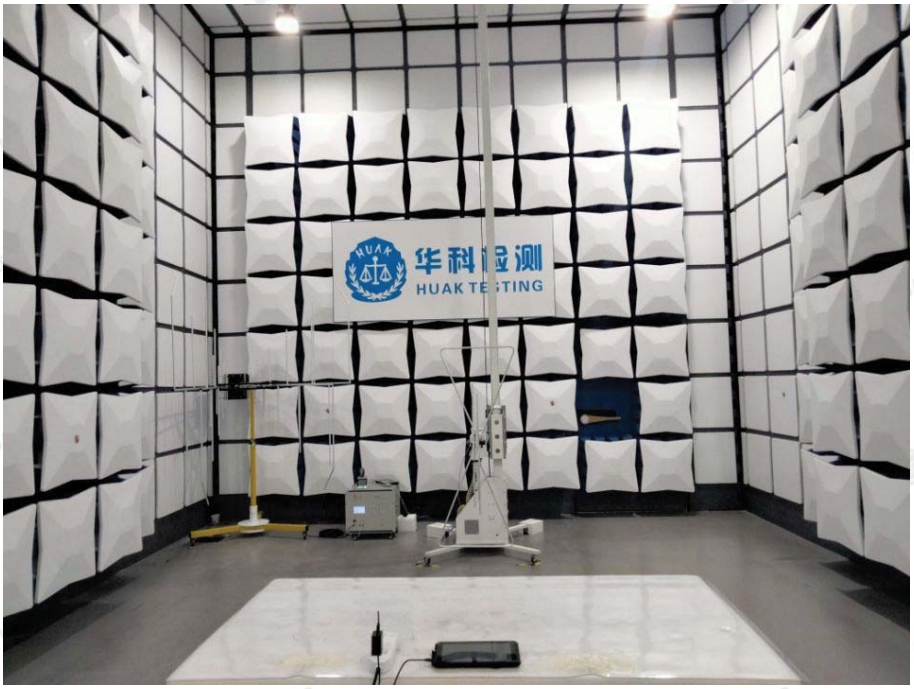
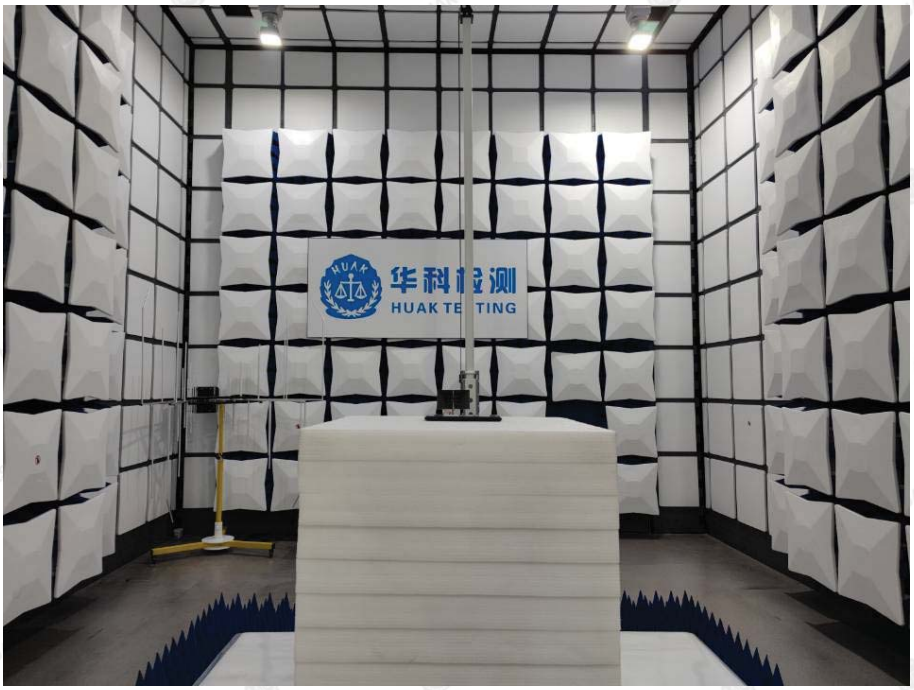
# 5 TEST SETUP PHOTOS OF THE EUT

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# 6 PHOTOS OF THE EUT

Reference to the report: ANNEX A of external photos and ANNEX B of internal photos.

**---------End of test report---------**

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