# Test Report

FCC ID: 2AP26LITE

Date of issue: June 11, 2018

| | |
|---|---|
| Report Number: | MTi180611E042 |
| Sample Description: | Intelligent Vehicle Terminal |
| Model(s): | GID LITE+ |
| Applicant: | Jiangsu Digital DiNA Technology Co., LTD |
| Address: | No.40, Gongjianfang, Qinhuai District, Nanjing, Jiangsu Province |
| Date of Test: | June 04, 2018 to June 11, 2018 |

Shenzhen Microtest Co., Ltd.
http://www.mtitest.com

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# Test Result Certification

| | |
|---|---|
| Applicant's name: | Jiangsu Digital DiNA Technology Co., LTD |
| Address: | No.40, Gongjianfang, Qinhuai District, Nanjing, Jiangsu Province |
| Manufacture's Name: | Jiangsu Digital DiNA Technology Co., LTD |
| Address: | No.40, Gongjianfang, Qinhuai District, Nanjing, Jiangsu Province |
| Product name: | Intelligent Vehicle Terminal |
| Trademark: | DashPal |
| Model name: | GID LITE+ |
| Standards: | FCC Part 22 Subpart H<br>FCC Part 24 Subpart E |
| Test Procedure: | FCC Part 2<br>ANSI TIA-603-D: 2010<br>KDB 971168 D01 v02r02 |

*This device described above has been tested by Shenzhen Microtest Co., Ltd. and the test results show that the equipment under test (EUT) compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.*

| | | |
|---|---|---|
| Tested by: | Leo Su | |
| | Leo Su | June 11,2018 |
| Reviewed by: | Blue.Zheng | |
| | Blue Zheng | June 11,2018 |
| Approved by: | Smith Chen | |
| | Smith Chen | June 11,2018 |

# 1 General description

## 1.1 Feature of equipment under test (EUT)

| | |
|---|---|
| Product name: | Intelligent Vehicle Terminal |
| Trade Name | DashPal |
| Model Name: | GID LITE+ |
| Model Difference | N/A |
| Frequency range: | GSM 850:<br>TX824.2MHz~848.8MHz,RX869.2MHz~893.8MHz<br>GSM 1900:<br>TX1850.2MHz~1909.8MHzRX1930.2MHz~1989.8MHz |
| Modulation type: | GSM 850/1900:GMSK for GPRS |
| Power Class | GSM 850: 5 / GPRS 850:3 / EGPRS 850: E2 |
| Multislot Class | GPRS: 12 |
| Antenna Type | FPCB Antenna |
| Antenna Gain | Gain: 0.32dBi |
| Hardware Version | LITE_MAIN 17.01.19 V3.81 |
| Software Version | V1.0 |
| Power Supply: | DC 3.7V from battery or DC14V from DC power supply |
| Battery: | DC 3.7V/140mAh |
| Adapter information: | N/A |

## 1.2 Test frequency channel

| Frequency Band | Frequency | Channel | Frequency(MHz) |
|---|---|---|---|
| GSM 850 | Low | 128 | 824.2 |
| | Middle | 190 | 836.6 |
| | High | 251 | 848.8 |
| GSM 1900 | Low | 512 | 1850.2 |
| | Middle | 661 | 1880 |
| | High | 810 | 1909.8 |

## 1.3 EUT operation mode

During testing, RF test program provided by the manufacture to control the Tx operation followed the test requirement. The EUT is configured to transmit continuously (duty cycle > 98 %) at the maximum power control level.

## 1.4 Test conditions

During the measurement the environmental conditions were within the listed ranges:
- Temperature: 20ºC~30ºC
- Humidity: 30%~70%
- Atmospheric pressure: 98kPa~101kPa

## 1.5 Testing site

| | |
|---|---|
| Test Site | Shenzhen Microtest Co., Ltd. |
| Test Site Location | No.102A & 302A, East Block, Hengfang Industrial Park, Xingye Road, Xixiang, Bao'an District, Shenzhen, Guangdong, China |
| FCC Registration No.: | 448573 |

## 1.6 Ancillary equipment list

| Equipment | Model | S/N | Manufacturer | Certificate type |
|---|---|---|---|---|
| DC power supply | QJ3020E | 015170 | QJE | / |

## 1.7 Measurement uncertainty

Measurement Uncertainty for a Level of Confidence of 95 %, U=2xUc(y)

| | |
|---|---|
| RF frequency | 1 x 10-7 |
| RF power, conducted | ± 1 dB |
| Conducted emission(150kHz~30MHz) | ± 2.5 dB |
| Radiated emission(30MHz~1GHz) | ± 4.2 dB |
| Radiated emission (above 1GHz) | ± 4.3 dB |
| Temperature | ±1 degree |
| Humidity | ± 5 % |

## 2 Summary of Test Result

| Item | FCC Part No. | Description of Test | Result |
|---|---|---|---|
| 1 | 2.1046, 22.913(a); 24.232(c) | Maximum output power | Pass |
| 2 | 2.1046, 22.913(a); 24.232(c) | Peak to average power radio(PAPR) | Pass |
| 3 | 2.1046, 22.913(a); 24.232(c) | Transmitter Radiated Power (EIRP/ERP) | Pass |
| 4 | 2.1049; 22.917(b); 24.238(b) | Occupied Bandwidth | Pass |
| 5 | 2.1051; 22.917(a); 24.238(a) | Conducted spurious emissions | Pass |
| 6 | 2.1051; 22.917(b); 24.238(b) | Spurious emissions at band edge | Pass |
| 7 | 2.1053; 22.917(a); 24.238(a) | Radiated spurious emissions | Pass |
| 8 | 2.1055; 22.355; 24.235 | Frequency Stability | Pass |

# 3 Test facilities and accreditations

## 3.1 Test laboratory

| | |
|---|---|
| Test Laboratory | Shenzhen Microtest Co., Ltd |
| Location | No.102A & 302A, East Block, Hengfang Industrial Park, Xingye Road, Xixiang, Bao'an District, Shenzhen, Guangdong, China |
| FCC Registration No.: | FCC Registration No.: 448573 |

## 3.2 Environmental conditions

| | |
|---|---|
| Temperature: | 20ºC~30ºC |
| Humidity | 30%~70% |
| Atmospheric pressure | 98kPa~101kPa |

## 3.3 Measurement uncertainty

Measurement Uncertainty for a Level of Confidence of 95 %, U=2xUc(y)

| | |
|---|---|
| RF frequency | 1 x 10-7 |
| RF power, conducted | ± 1 dB |
| Conducted emission(150kHz~30MHz) | ± 2.5 dB |
| Radiated emission(30MHz~1GHz) | ± 4.2 dB |
| Radiated emission (above 1GHz) | ± 4.3 dB |
| Temperature | ±1 degree |
| Humidity | ± 5 % |

## 3.4 Test software

| Software Name | Manufacturer | Model | Version |
|---|---|---|---|
| RF Test System | Farad | LZ-RF | Lz_Rf 3A3 |

# 4 List of test equipment

| Equipment No. | Equipment Name | Manufacturer | Model | Serial No. | Calibration date | Due date |
|---|---|---|---|---|---|---|
| MTI-E001 | Spectrum Analyzer | Agilent | E4407B | MY41441082 | 2017/09/18 | 2018/09/17 |
| MTI-E002 | CMU 200 universal radio communication tester | Rohde&schwarz | CMU 200 | 114587 | 2017/09/18 | 2018/09/17 |
| MTI-E004 | EMI Test Receiver | Rohde&schwarz | ESPI | 1000314 | 2017/09/18 | 2018/09/17 |
| MTI-E006 | Broadband antenna | schwarabeck | VULB9163 | 872 | 2017/09/18 | 2018/09/17 |
| MTI-E007 | Horn antenna | schwarabeck | BBHA9120D | 1201 | 2017/09/18 | 2018/09/17 |
| MTI-E014 | amplifier | America | 8447D | 3113A06150 | 2017/09/18 | 2018/09/17 |
| MTI-E015 | Conduction Immunity Signal Generator | Schloder | CDG6000 | 126A1343/2015 | 2017/09/18 | 2018/09/17 |
| MTI-E016 | Coupled decoupling network | Schloder | CDA M2/M3 | A2210332/2015 | 2017/09/18 | 2018/09/17 |
| MTI-E032 | Comprehensive test instrument | Rohde&schwarz | CMW500 | 124192 | 2017/09/13 | 2018/09/12 |
| MTI-E034 | amplifier | Agilent | 8449B | 3008A02400 | 2017/08/22 | 2018/08/21 |
| MTI-E040 | Spectrum analyzer | Agilent | N9020A | MY49100060 | 2017/09/05 | 2018/09/04 |
| MTI-E041 | Signal generator | Agilent | N5182A | MY49060455 | 2017/09/23 | 2018/09/22 |
| MTI-E042 | Analog signal generator | Agilent | E4421B | GB40051240 | 2017/09/23 | 2018/09/22 |
| MTI-E043 | Power probe | Dare Instruments | RPR3006W | 16I00054SNO16 | 2017/09/29 | 2018/09/28 |
| MTI-E047 | 10dB attenuator | Mini-Circuits | UNAT-10+ | 15542 | 2017/09/24 | 2018/09/23 |
| MTI-E049 | spectrum analyzer | Rohde&schwarz | FSP-38 | 100019 | 2017/09/18 | 2018/09/17 |
| MTI-E050 | PSG Signal generator | Agilent | E8257D | MY46520873 | 2017/09/24 | 2018/09/23 |
| MTI-E051 | Active Loop Antenna 9kHz - 30MHz | Schwarzbeek | FMZB 1519 B | 00044 | 2017/09/26 | 2018/09/25 |
| MTI-E052 | 18-40GHz amplifier | Chengdu step Micro Technology | ZLNA-18-40G-21 | 1608001 | 2017/09/18 | 2018/09/17 |
| MTI-E053 | 15-40G Antenna | Schwarzbeek | BBHA9170 | BBHA9170582 | 2017/09/18 | 2018/09/17 |
| MTI-B046 | DC power supply | QJE | QJ3020E | 015170 | 2017/09/18 | 2018/09/17 |

Note: the calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

# 5 Test Result

## 5.1 Maximum output power and peak to average ratio

### 5.1.1 Limit

For FCC 22.913: The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

For FCC 24.234: Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

### 5.1.2 Test method

For Conducted output power:

1.Use a universal radio communication tester, the output power of EUT was measured at the antenna terminal. The path loss was calibrated and entered as an offset into the test equipment.

2. The EUT was configured to transmit on maximum power by the radio communication tester.

3. Measured the peak and average powers.

For EIRP & ERP:

1.In many cases, the RF output power limits for licensed digital transmission devices is specified in terms of effective radiated power (ERP) or equivalent isotropic radiated power (EIRP). Typically, ERP is specified when the operating frequency is less than or equal to 1 GHz and EIRP is specified when the operating frequency is greater than 1 GHz. Both are determined by adding the transmit antenna gain to the conducted RF output power with the primary difference between the two being that when determining the ERP, the transmit antenna gain is referenced to a dipole antenna (i.e., dBd) whereas when determining the EIRP, the transmit antenna gain is referenced to an isotropic antenna (dBi).

2.The relevant equation for determining the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

ERP/EIRP = $P_{Meas}$ + GT − LC

where:

ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as $P_{Meas}$, typically dBW or dBm);

PMeas = measured transmitter output power or PSD, in dBm or dBW;

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

dBd (ERP)=dBi (EIRP) -2.15 dB

LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

5.1.3 Test Result

For Conducted output power:

Output Power for GSM850

| Mode | Frequency(MHz) | Maximum Burst average Power |
|---|---|---|
| GPRS850 (1 Slot) | 824.2 | 32.24 |
| | 836.6 | 32.16 |
| | 848.8 | 32.15 |
| GPRS850 (2 Slot) | 824.2 | 31.53 |
| | 836.6 | 31.49 |
| | 848.8 | 31.56 |
| GPRS850 (3 Slot) | 824.2 | 29.81 |
| | 836.6 | 29.74 |
| | 848.8 | 29.73 |
| GPRS850 (4 Slot) | 824.2 | 28.66 |
| | 836.6 | 28.59 |
| | 848.8 | 28.47 |

Output Power for PCS1900

| Mode | Frequency(MHz) | Maximum conducted Power |
|---|---|---|
| GPRS1900 (1 Slot) | 1850.2 | 30.35 |
| | 1880 | 30.26 |
| | 1909.8 | 30.14 |
| GPRS1900 (2 Slot) | 1850.2 | 29.49 |
| | 1880 | 29.42 |
| | 1909.8 | 29.19 |
| GPRS1900 (3 Slot) | 1850.2 | 27.74 |
| | 1880 | 27.63 |
| | 1909.8 | 27.35 |
| GPRS1900 (4 Slot) | 1850.2 | 26.81 |
| | 1880 | 26.80 |
| | 1909.8 | 26.74 |

For EIRP & ERP:

For GSM 850

| Frequency | Polarization | SG Level | Pcl | Ga Antenna Gain | Correction | ERP | ERP |
|---|---|---|---|---|---|---|---|
| (MHz) | | (dBm) | (dB) | (dB) | (dB) | (dBm) | (W) |
| 824.2 | H | 23.48 | 1.33 | 7.53 | 2.15 | 27.53 | 0.56624 |
| 836.6 | H | 23.52 | 1.4 | 7.48 | 2.15 | 27.45 | 0.55590 |
| 848.8 | H | 23.94 | 1.39 | 7.57 | 2.15 | 27.97 | 0.62661 |
| 824.2 | V | 23.69 | 1.33 | 7.53 | 2.15 | 27.74 | 0.59429 |
| 836.6 | V | 23.62 | 1.4 | 7.48 | 2.15 | 27.55 | 0.56885 |
| 848.8 | V | 23.81 | 1.39 | 7.57 | 2.15 | 27.84 | 0.60814 |

For GSM 1900

| Frequency | Polarization | SG Level | Pcl | Ga Antenna Gain | EIRP | EIRP |
|---|---|---|---|---|---|---|
| (MHz) | | (dBm) | (dB) | (dB) | (dBm) | (W) |
| 1850.2 | H | 17.76 | 2.33 | 10.05 | 25.48 | 0.35318 |
| 1880 | H | 17.14 | 2.37 | 10.24 | 25.01 | 0.31696 |
| 1909.8 | H | 17.68 | 2.39 | 10.32 | 25.61 | 0.36392 |
| 1850.2 | V | 17.69 | 2.33 | 10.05 | 25.41 | 0.34754 |
| 1880 | V | 17.72 | 2.37 | 10.24 | 25.59 | 0.36224 |
| 1909.8 | V | 17.69 | 2.39 | 10.32 | 25.62 | 0.36475 |

## 5.2 Peak to average power ratio(PAPR)

### 5.2.1 Limit

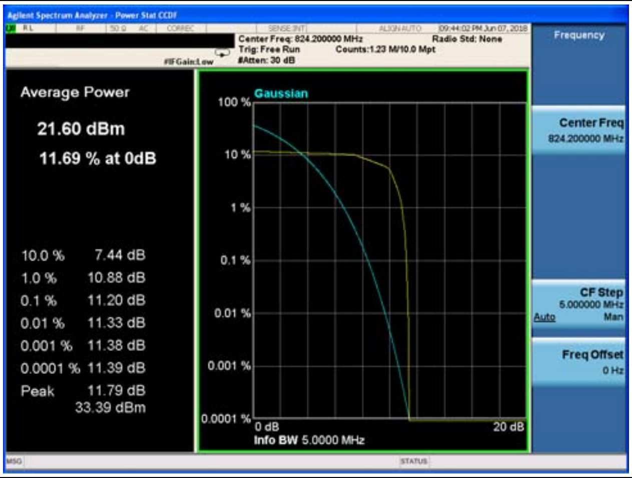
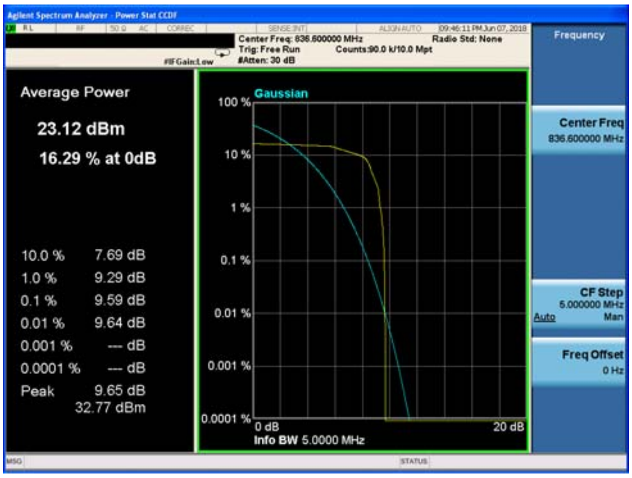
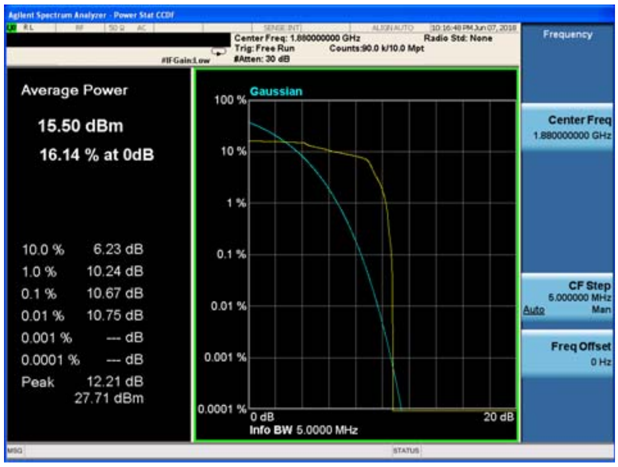
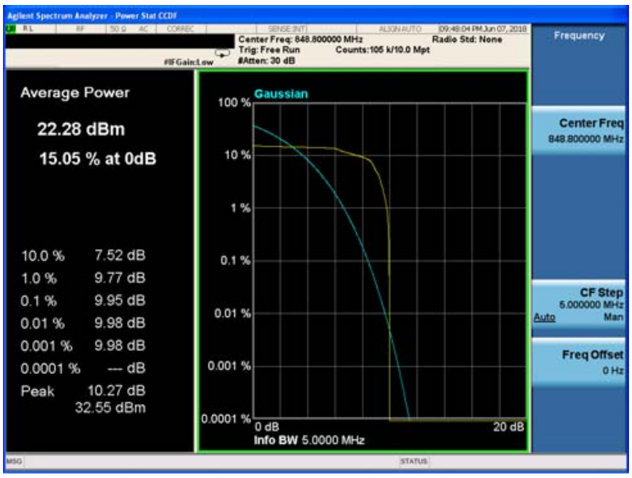
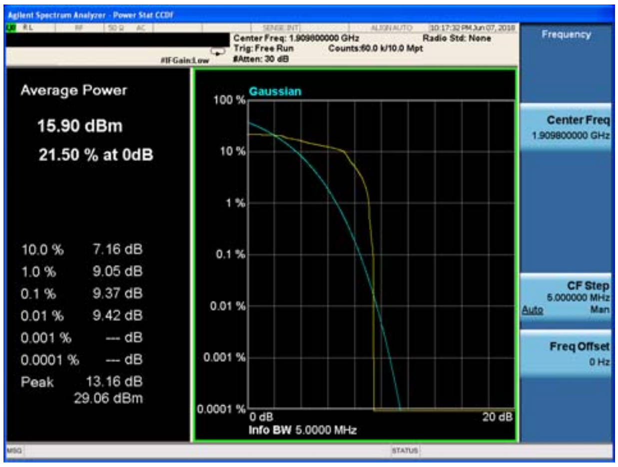
The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

### 5.2.2 Test method

The EUT was connected to Spectrum Analyzer and Base Station via power divider.
The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
Set the number of counts to a value that stabilizes the measured CCDF curve.
Set the measurement interval to 1 ms.
Record the maximum PAPR level associated with a probability of 0.1%.
a) Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
b) Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
c) Set the number of counts to a value that stabilizes the measured CCDF curve;
d) Set the measurement interval as follows:
1) for continuous transmissions, set to 1 ms,
2) for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
e) Record the maximum PAPR level associated with a probability of 0.1%.

5.2.3 Test Result

| Cellular Band | | | | | | |
|---|---|---|---|---|---|---|
| Modes | GPRS850 | | | GPRS1900 | | |
| Channel | 128 (Low) | 190 (Mid) | 251 (High) | 512 (Low) | 661 (Mid) | 810 (High) |
| Frequency(MHz) | 824.2 | 836.6 | 848.8 | 1850.2 | 1880 | 1909.8 |
| Peak-to-Average Ratio (dB) | 8.74 | 9.51 | 9.59 | 8.47 | 8.49 | 8.28 |

<table>
<tr><th colspan="2">Test plot</th></tr>
<tr><td>(GPRS850)</td><td>(GPRS1900)</td></tr>
<tr><td>Peak-to-Average Ratio on channel 128</td><td>Peak-to-Average Ratio on channel 512</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>Peak-to-Average Ratio on channel 190</td><td>Peak-to-Average Ratio on channel 661</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>Peak-to-Average Ratio on channel 251</td><td>Peak-to-Average Ratio on channel 810</td></tr>
<tr><td>
</td><td>
</td></tr>
</table>

## 5.3 Occupied bandwidth

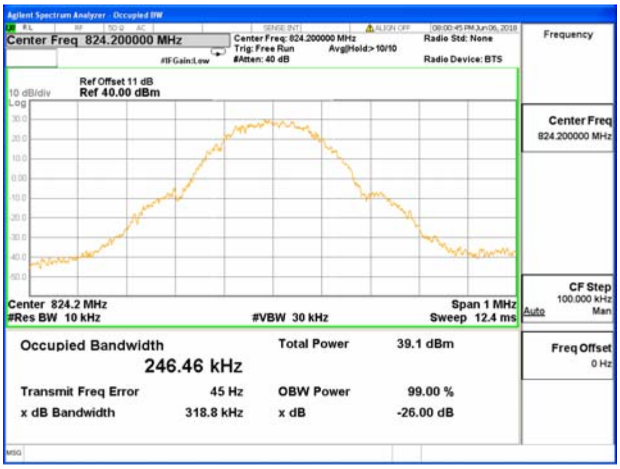
### 5.3.1 Test method

1. The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.
2. The resolution bandwidth of the Spectrum Analyzer is set to at least 1% of the occupied bandwidth.
3. The low, middle and the high channels are selected to perform tests respectively.
4. Set the frequency range of the Spectrum Analyzer suitably to capture the waveform; search peak; make a line whose value is 26dB lower than the peak; mark two points which the line intersected the waveform at; finally record the delta of the two points as the occupied bandwidth and the plot.
5. Set the Spectrum Analyzer Occupied bandwidth function to measure the 99% occupied bandwidth.

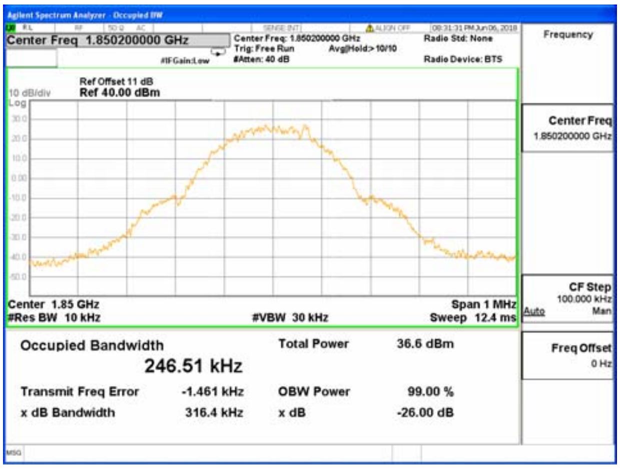
### 5.3.2 **Test result**

| Channel | Channel Frequency (MHz) | 26dB emission bandwidth (KHz) | 99% occupied bandwidth (KHz) |
|---|---|---|---|
| GSM 850 | | | |
| 128 | 824.2 | 318.8 | 246.46 |
| 190 | 836.6 | 315.5 | 247.37 |
| 251 | 848.8 | 317.7 | 246.45 |
| GSM 1900 | | | |
| 512 | 1850.2 | 316.4 | 246.51 |
| 661 | 1880 | 315.5 | 245.45 |
| 810 | 1909.8 | 312.2 | 249.34 |

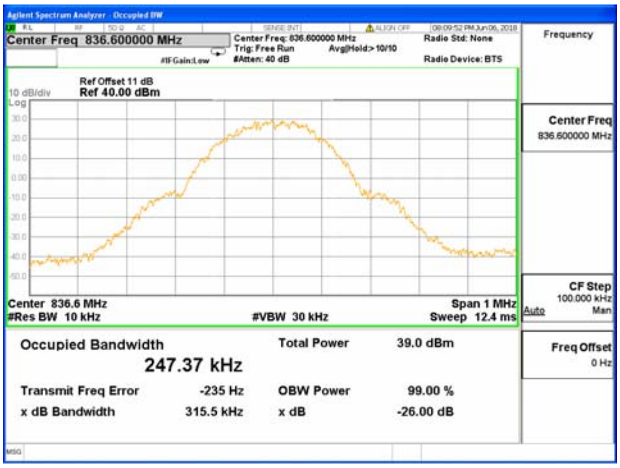
GSM 850 – 824.2MHz



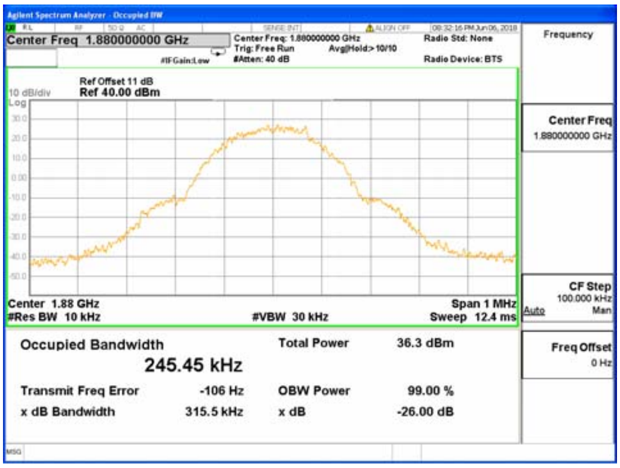

GSM 1900 - 1850MHz



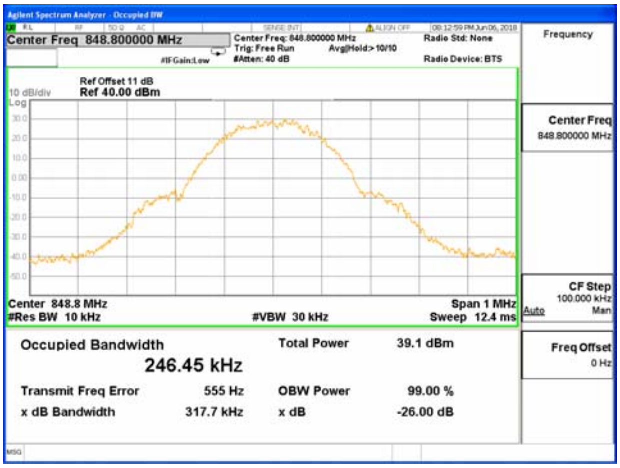

GSM 850 – 836.6MHz



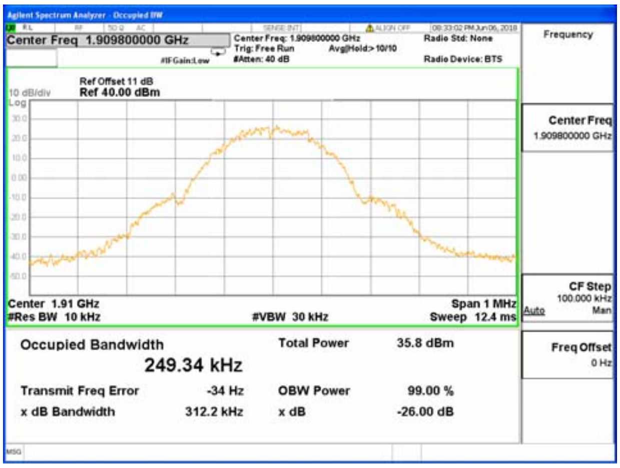

GSM 1900 - 1880MHz




GSM 850 –848.8MHz




GSM 1900 - 1909.8MHz



## 5.4 Conducted spurious emissions

### 5.4.1 Limits

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10log (P) dB

### 5.4.2 Test method

1, The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.

2, Spectrum Setting:

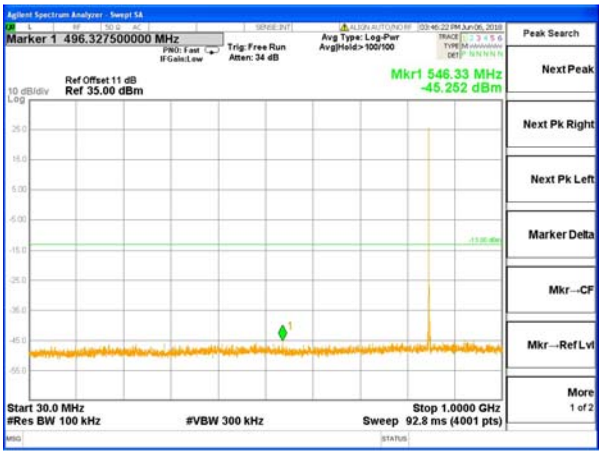
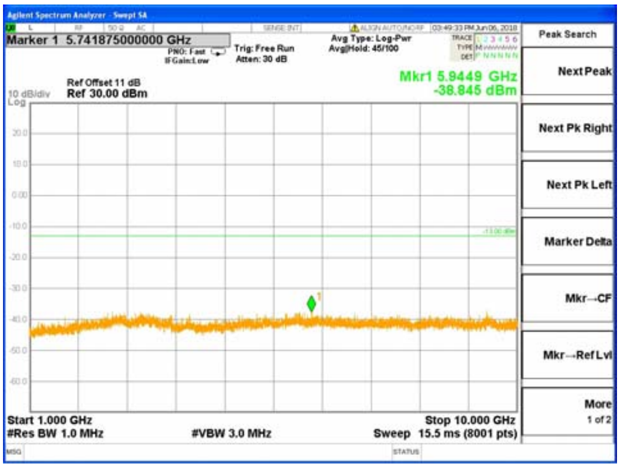
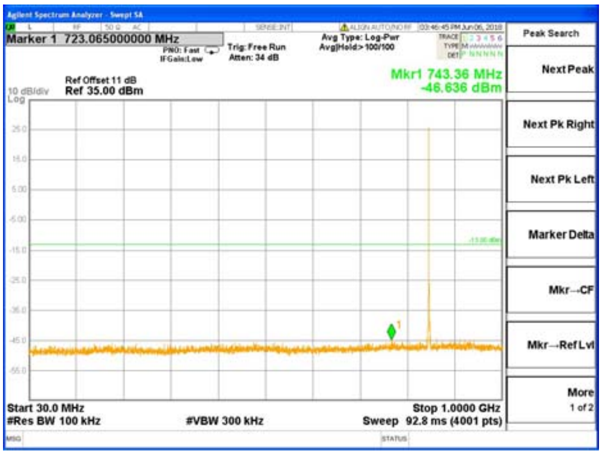
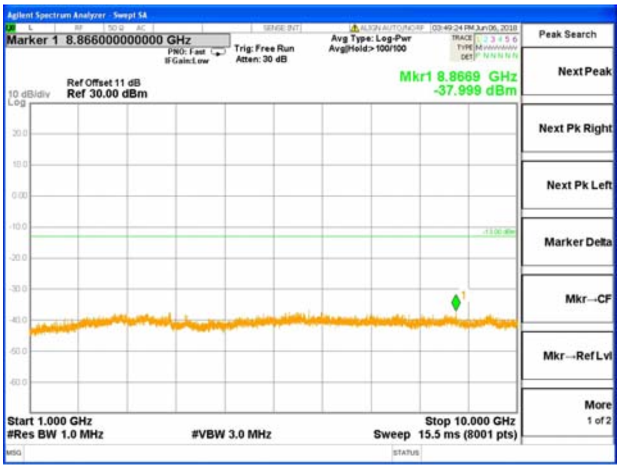
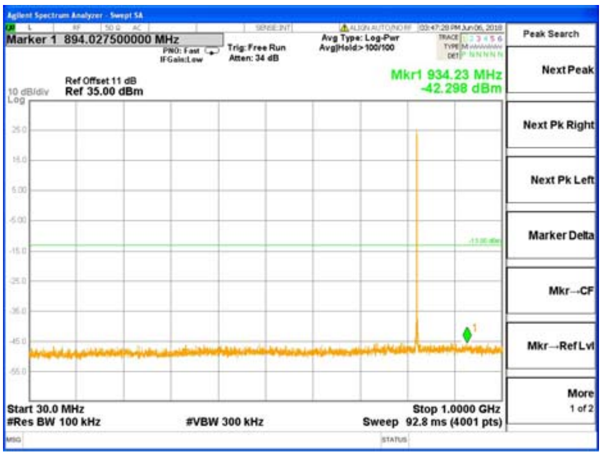
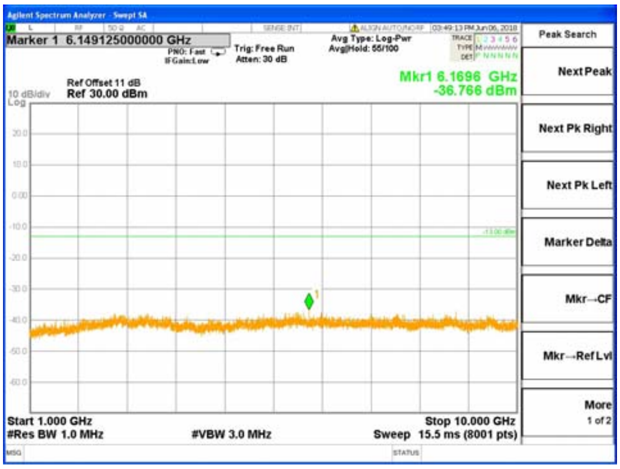
Frequency bellow 1 GHz: RBW=100 kHz, VBW=300 kHz.

Frequency above 1 GHz: RBW=1 MHz, VBW=3 MHz.

3, The low, middle and high channels of each band and mode's spurious emissions for 30 MHz to $10^{th}$ Harmonic were measured by Spectrum analyzer.

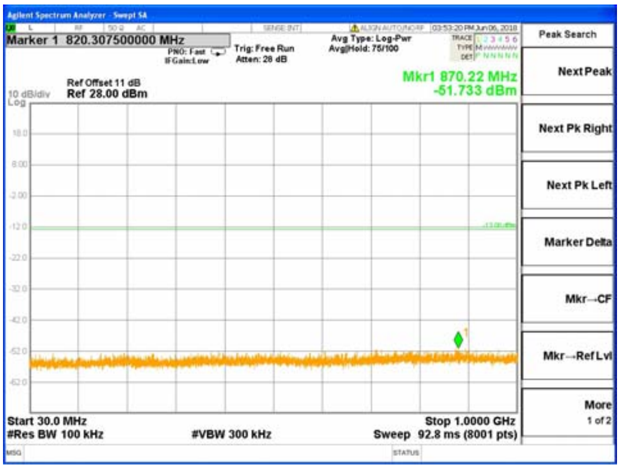
### 5.4.3 Test result

GSM 850

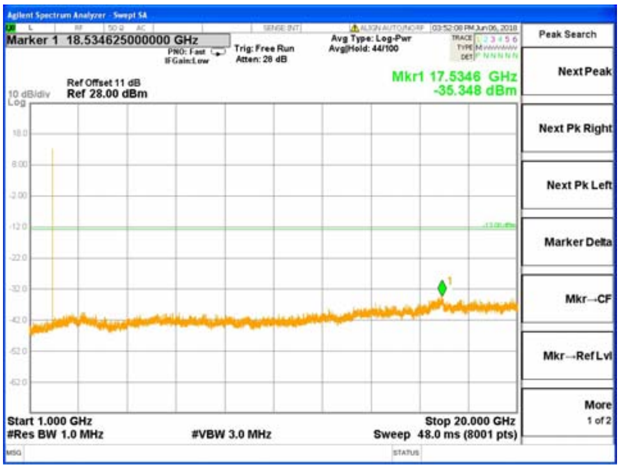
<table>
<tr><td>Low Channel – 30MHz-1GHz</td><td>Low Channel –1GHz - 10GHz</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>Middle Channel–30MHz-1GHz</td><td>Middle Channel–1GHz - 10GHz</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>High Channel–30MHz-1GHz</td><td>High Channel–1GHz - 10GHz</td></tr>
<tr><td>
</td><td>
</td></tr>
</table>

GSM 1900

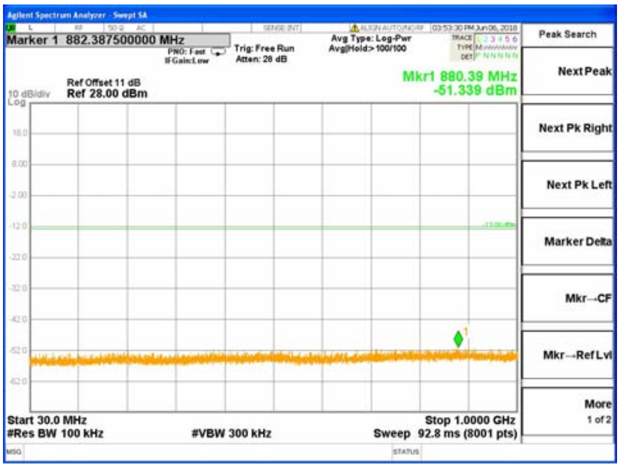
Low Channel – 30MHz-1GHz



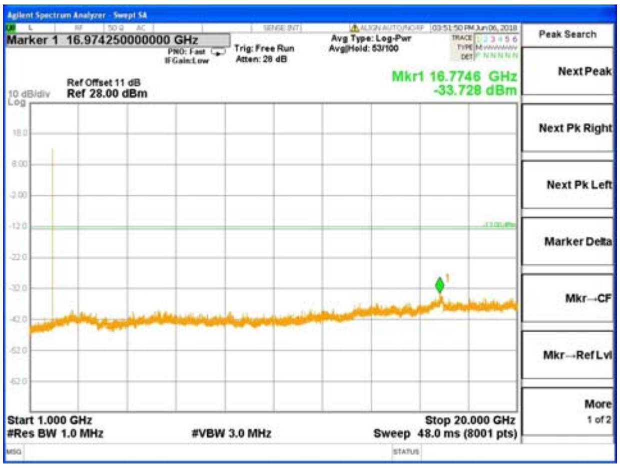

Low Channel –1GHz - 20GHz



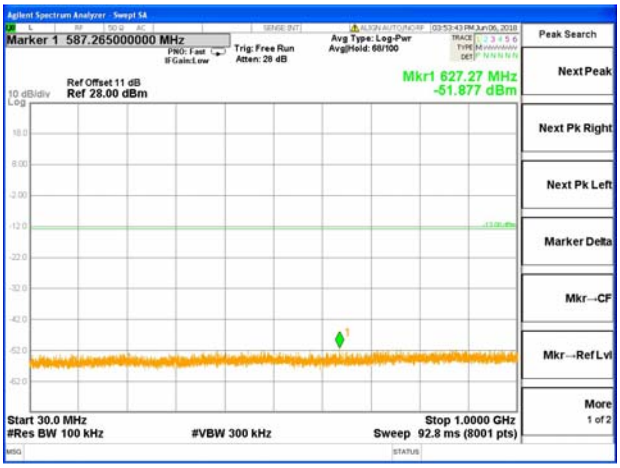

Middle Channel– 30MHz-1GHz



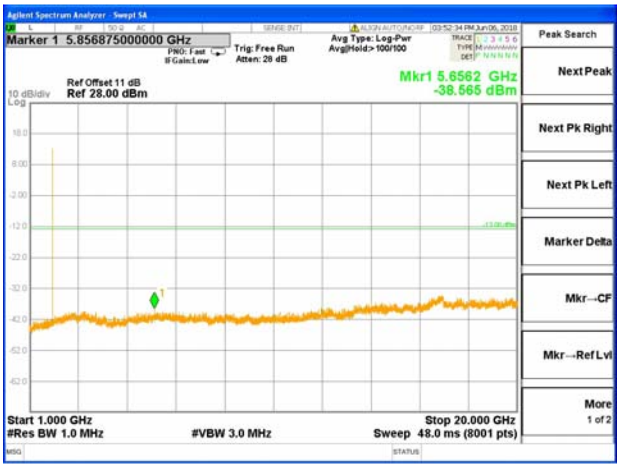

Middle Channel–1GHz - 20GHz




High Channel– 30MHz-1GHz




High Channel–1GHz - 20GHz



## 5.5 Band edge

### 5.5.1 Limits

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10log (P) dB, for all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm

### 5.5.2 Test method

1. The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.
2. Spectrum Setting:

For GSM system:

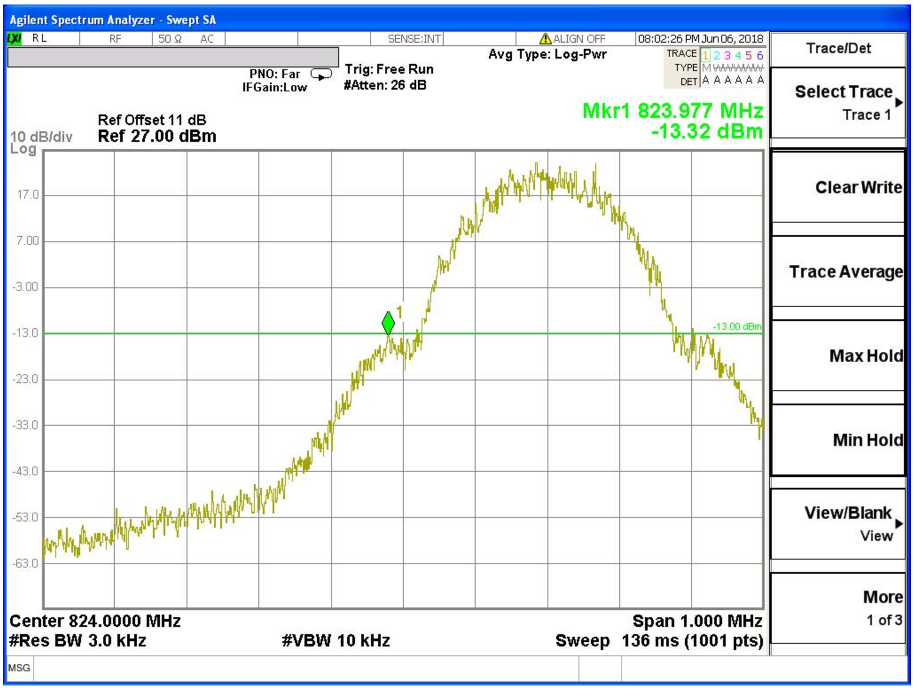
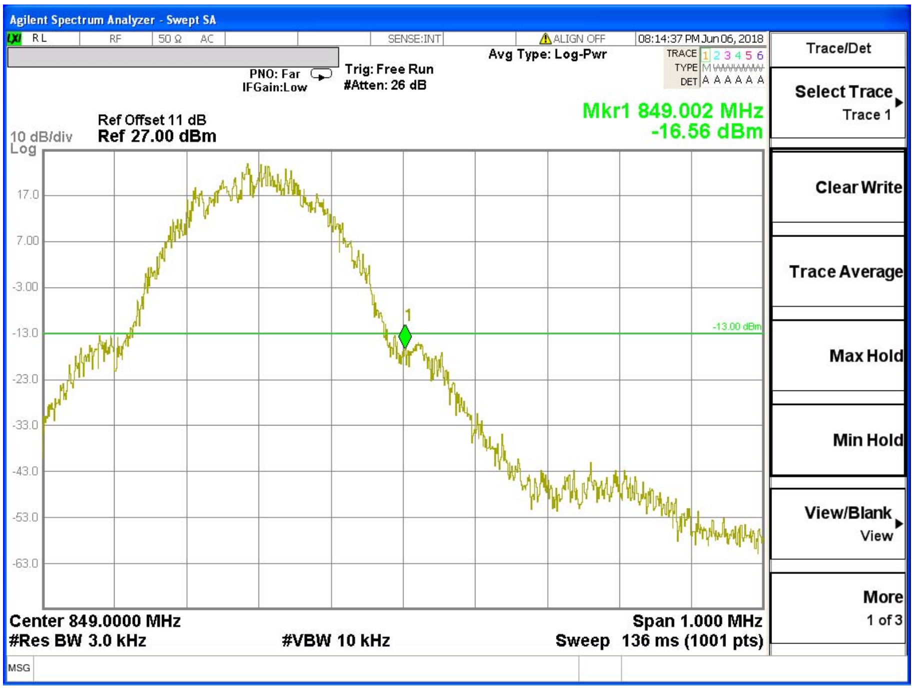
RBW=3 kHz
VBW=10 kHz
Span 1 MHz
Detector: Peak Mode

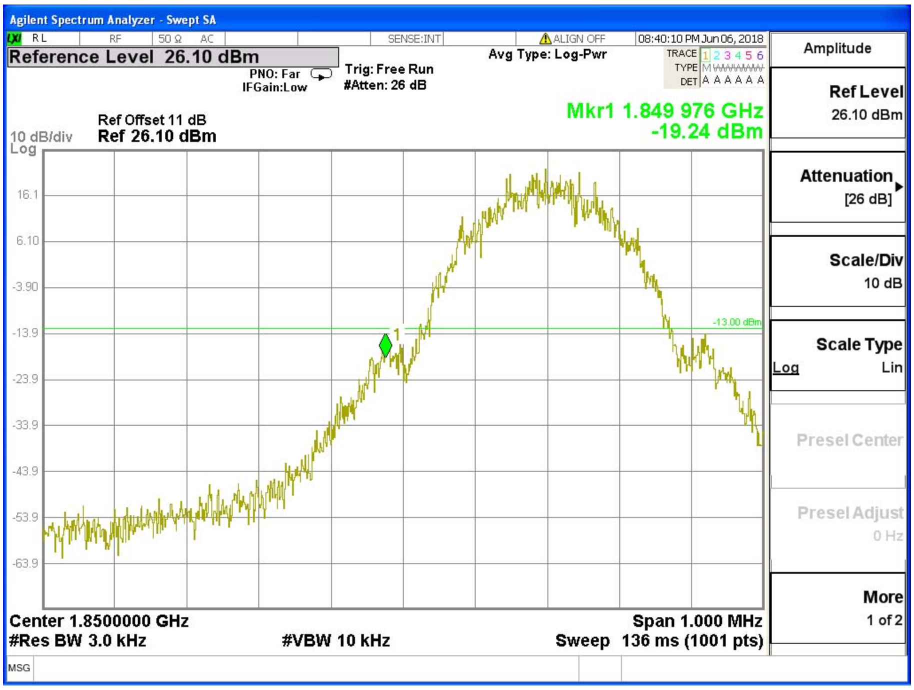
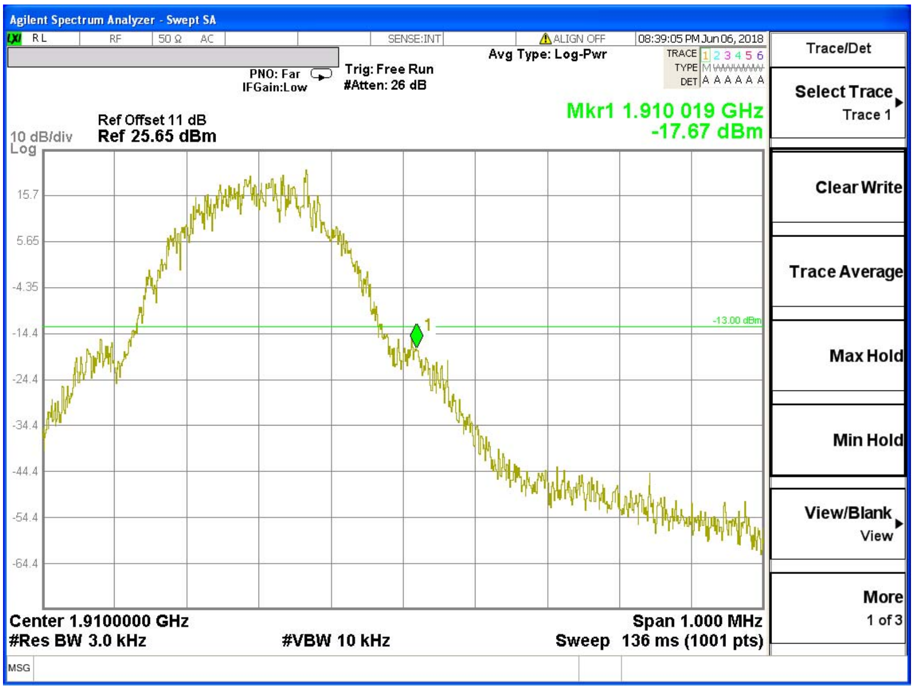
For WCDMA:

RBW=100 kHz
VBW=300 kHz
Span 5 MHz
Detector: Peak Mode

3. The band edges of low and high channels for the highest RF powers were measured.

### 5.5.3 Test result

| GSM 850 – Left band |
| --- |
|  |
| GSM 850 – Right band |
|  |

| GSM 1900 – Left band |
|---|
|  |
| GSM 1900 – Right band |
|  |

## 5.6 Radiated spurious emission

### 5.6.1 Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10log (P) dB

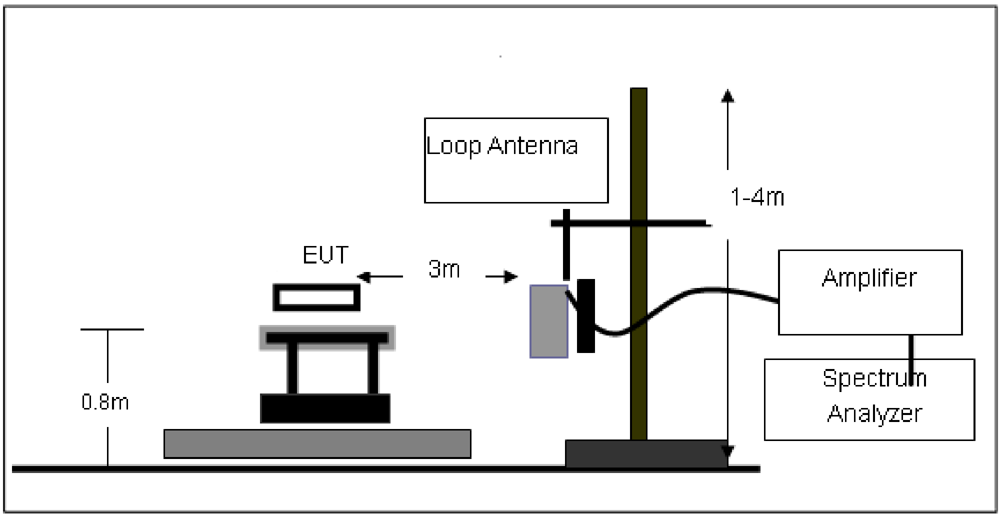
### 5.6.2 Test method

1. The test system setup as show in the block diagram above.
2. The EUT was placed on an non-conductive rotating platform in an anechoic chamber. The radiated spurious emissions from 30MHz to $10^{th}$ harmonious of fundamental frequency were measured at 3 m with a test antenna and a spectrum analyzer with RBW=1 MHz, VBW=1 MHz, peak detector settings.
3. During the measurement, the EUT was enforced in maximum power and linked with a base station. All the spurious emissions at 3m were measured by rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
4. When found the maximum level of emissions from the EUT. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

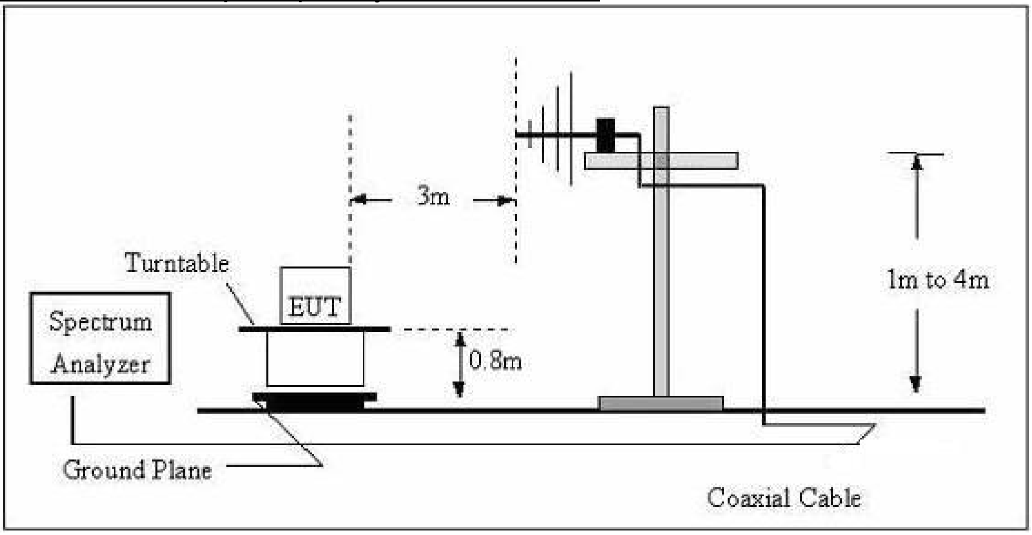
Spurious emissions in dB=10 log(TX power in Watts/0.001)-the absolute level
Spurious attenuation limit in dB=43+10 log(power out in Watts).

### 5.6.3 Test setup

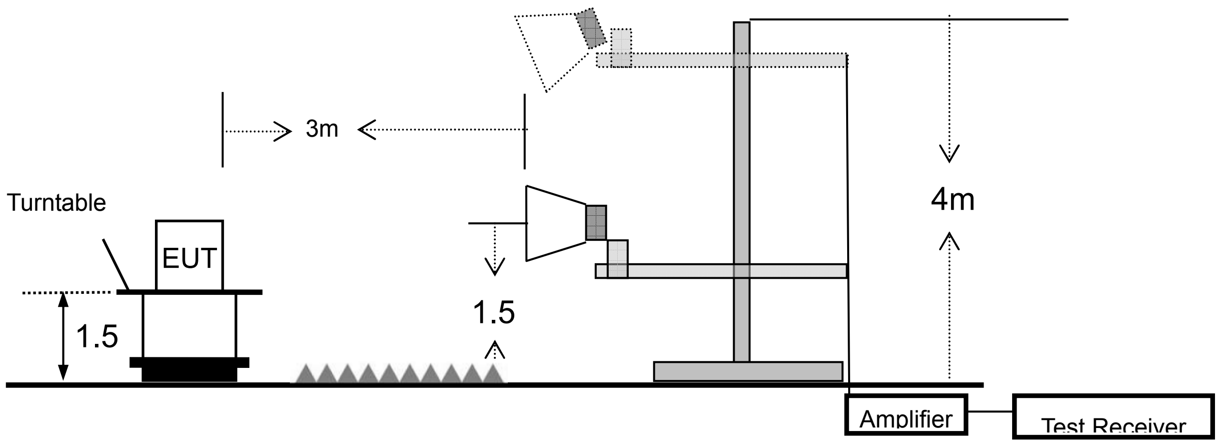
Radiated emission test-up frequency below 30MHz



Radiated emission test-up frequency 30MHz~1GHz




Radiated emission test-up frequency above 1GHz



5.6.4 Test Result

*Note: All the configuration was tested and only the worse case was reported*

**For GSM850(30MHz – 9GHz)**

**Low Channel**

| No. | Frequency (MHz) | Meter Reading (dBuV) | Factor dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Polar (H) |
|---|---|---|---|---|---|---|---|
| 1 | 76.1616 | -68.14 | 20.34 | -47.80 | -13 | -34.80 | Horizontal |
| 2 | 116.0968 | -68.00 | 22.89 | -45.11 | -13 | -32.11 | Horizontal |
| 3 | 260.8535 | -68.96 | 24.8 | -44.16 | -13 | -31.16 | Horizontal |
| 4 | 4175.160 | -50.26 | 8.56 | -41.70 | -13 | -28.70 | Horizontal |
| 5 | 5817.566 | -52.04 | 4.55 | -47.49 | -13 | -34.49 | Horizontal |
| 6 | 72167.138 | -51.67 | 10.08 | -41.59 | -13 | -28.59 | Horizontal |

| No. | Frequency (MHz) | Meter Reading (dBuV) | Factor dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Polar (V) |
|---|---|---|---|---|---|---|---|
| 1 | 74.0493 | -69.50 | 22.04 | -47.46 | -13 | -34.46 | Vertical |
| 2 | 221.3898 | -68.94 | 24.5 | -44.44 | -13 | -31.44 | Vertical |
| 3 | 358.0759 | -68.91 | 27.9 | -41.01 | -13 | -28.01 | Vertical |
| 4 | 6014.282 | -48.96 | 3.3 | -45.66 | -13 | -32.66 | Vertical |
| 5 | 7494.831 | -49.45 | 8.71 | -40.74 | -13 | -27.74 | Vertical |
| 6 | 8017.428 | -49.98 | 9.93 | -40.05 | -13 | -27.05 | Vertical |

**Middle Channel**

| No. | Frequency (MHz) | Meter Reading (dBuV) | Factor dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Polar (H) |
|---|---|---|---|---|---|---|---|
| 1 | 145.4627 | -69.98 | 19.85 | -50.13 | -13 | -37.13 | Horizontal |
| 2 | 222.7346 | -69.45 | 23.83 | -45.62 | -13 | -32.62 | Horizontal |
| 3 | 249.1505 | -66.44 | 24.71 | -41.73 | -13 | -28.73 | Horizontal |
| 4 | 6069.633 | -50.24 | 5.4 | -44.84 | -13 | -31.84 | Horizontal |
| 5 | 7422.626 | -50.21 | 10.16 | -40.05 | -13 | -27.05 | Horizontal |
| 6 | 8793.253 | -51.72 | 10.05 | -41.67 | -13 | -28.67 | Horizontal |

| No. | Frequency (MHz) | Meter Reading (dBuV) | Factor dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Polar (V) |
|---|---|---|---|---|---|---|---|
| 1 | 137.9576 | -71.32 | 21.36 | -49.96 | -13 | -36.96 | Vertical |
| 2 | 194.0193 | -72.17 | 24.05 | -48.12 | -13 | -35.12 | Vertical |
| 3 | 277.0258 | -72.13 | 26.34 | -45.79 | -13 | -32.79 | Vertical |
| 4 | 6429.656 | -48.68 | 5.36 | -43.32 | -13 | -30.32 | Vertical |
| 5 | 7403.501 | -48.76 | 8.51 | -40.25 | -13 | -27.25 | Vertical |
| 6 | 8106.285 | -48.61 | 9.79 | -38.82 | -13 | -25.82 | Vertical |

**Hihg Channel**

| No. | Frequency (MHz) | Meter Reading (dBuV) | Factor dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Polar (H) |
|---|---|---|---|---|---|---|---|
| 1 | 67.7339 | -69.83 | 22.52 | -47.31 | -13 | -34.31 | Horizontal |
| 2 | 136.5856 | -70.33 | 19.76 | -50.57 | -13 | -37.57 | Horizontal |
| 3 | 167.6642 | -68.88 | 20.41 | -48.47 | -13 | -35.47 | Horizontal |
| 4 | 5906.222 | -51.45 | 4.83 | -46.62 | -13 | -33.62 | Horizontal |
| 5 | 6682.572 | -50.23 | 8.01 | -42.22 | -13 | -29.22 | Horizontal |
| 6 | 8162.309 | -51.18 | 11.26 | -39.92 | -13 | -26.92 | Horizontal |

| No. | Frequency (MHz) | Meter Reading (dBuV) | Factor dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Polar (V) |
|---|---|---|---|---|---|---|---|
| 1 | 179.3074 | -74.74 | 22.81 | -51.93 | -13 | -38.93 | Vertical |
| 2 | 213.8968 | -71.08 | 24.24 | -46.84 | -13 | -33.84 | Vertical |
| 3 | 264.2487 | -69.91 | 24.54 | -45.37 | -13 | -32.37 | Vertical |
| 4 | 6088.197 | -48.44 | 3.66 | -44.78 | -13 | -31.78 | Vertical |
| 5 | 7386.891 | -48.46 | 8.48 | -39.98 | -13 | -26.98 | Vertical |
| 6 | 7836.132 | -48.69 | 9.53 | -39.16 | -13 | -26.16 | Vertical |

**For GSM1900(30MHz – 20GHz)**

**Low Channel**

| No. | Frequency (MHz) | Meter Reading (dBuV) | Factor dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Polar (H) |
|---|---|---|---|---|---|---|---|
| 1 | 128.8337 | -65.98 | 11.76 | -54.22 | -13 | -41.22 | Horizontal |
| 2 | 278.1066 | -63.44 | 16.13 | -47.31 | -13 | -34.31 | Horizontal |
| 3 | 410.8839 | -64.53 | 19.5 | -45.03 | -13 | -32.03 | Horizontal |
| 4 | 12504.024 | -63.01 | 21.6 | -41.41 | -13 | -28.41 | Horizontal |
| 5 | 15179.624 | -50.47 | 4.26 | -46.21 | -13 | -33.21 | Horizontal |
| 6 | 17055.365 | -60.07 | 8.17 | -51.90 | -13 | -38.90 | Horizontal |

| No. | Frequency (MHz) | Meter Reading (dBuV) | Factor dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Polar (V) |
|---|---|---|---|---|---|---|---|
| 1 | 101.3550 | -63.36 | 14.67 | -48.69 | -13 | -35.69 | Vertical |
| 2 | 149.6548 | -64.41 | 12.37 | -52.04 | -13 | -39.04 | Vertical |
| 3 | 479.5294 | -62.31 | 20.86 | -41.45 | -13 | -28.45 | Vertical |
| 4 | 14955.056 | -58.13 | 16.17 | -41.96 | -13 | -28.96 | Vertical |
| 5 | 16510.869 | -59.36 | 6.49 | -52.87 | -13 | -39.87 | Vertical |
| 6 | 17777.431 | -57.14 | 12.85 | -44.29 | -13 | -31.29 | Vertical |

**Middle Channel**

| No. | Frequency (MHz) | Meter Reading (dBuV) | Factor dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Polar (H) |
|---|---|---|---|---|---|---|---|
| 1 | 53.4392 | -62.48 | 16.15 | -46.33 | -13 | -33.33 | Horizontal |
| 2 | 106.5761 | -62.18 | 14.64 | -47.54 | -13 | -34.54 | Horizontal |
| 3 | 122.1255 | -64.85 | 13.91 | -50.94 | -13 | -37.94 | Horizontal |
| 4 | 13623.371 | -58.80 | 16.01 | -42.79 | -13 | -29.79 | Horizontal |
| 5 | 14170.075 | -56.84 | 17.22 | -39.62 | -13 | -26.62 | Horizontal |
| 6 | 14474.212 | -56.78 | 16.66 | -40.12 | -13 | -27.12 | Horizontal |

| No. | Frequency (MHz) | Meter Reading (dBuV) | Factor dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Polar (V) |
|---|---|---|---|---|---|---|---|
| 1 | 37.3308 | -63.87 | 16.01 | -47.86 | -13 | -34.86 | Vertical |
| 2 | 55.0287 | -64.56 | 16.12 | -48.44 | -13 | -35.44 | Vertical |
| 3 | 117.5564 | -64.94 | 13.62 | -51.32 | -13 | -38.32 | Vertical |
| 4 | 12102.443 | -62.06 | 14.34 | -47.72 | -13 | -34.72 | Vertical |
| 5 | 15002.034 | -46.97 | 4.71 | -42.26 | -13 | -29.26 | Vertical |
| 6 | 17248.286 | -60.13 | 9.63 | -50.50 | -13 | -37.50 | Vertical |

**Hihg Channel**

| No. | Frequency (MHz) | Meter Reading (dBuV) | Factor dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Polar (H) |
|---|---|---|---|---|---|---|---|
| 1 | 39.0529 | -64.01 | 15.78 | -48.23 | -13 | -35.23 | Horizontal |
| 2 | 90.2444 | -64.11 | 12.93 | -51.18 | -13 | -38.18 | Horizontal |
| 3 | 136.4074 | -62.46 | 11.28 | -51.18 | -13 | -38.18 | Horizontal |
| 4 | 14970.137 | -57.48 | 16.62 | -40.86 | -13 | -27.86 | Horizontal |
| 5 | 15837.555 | -58.72 | 2.66 | -56.06 | -13 | -43.06 | Horizontal |
| 6 | 16605.905 | -58.25 | 5.41 | -52.84 | -13 | -39.84 | Horizontal |

| No. | Frequency (MHz) | Meter Reading (dBuV) | Factor dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Polar (V) |
|---|---|---|---|---|---|---|---|
| 1 | 90.7632 | -63.28 | 12.77 | -50.51 | -13 | -37.51 | Vertical |
| 2 | 126.6338 | -64.68 | 13.03 | -51.65 | -13 | -38.65 | Vertical |
| 3 | 211.7785 | -65.27 | 15.3 | -49.97 | -13 | -36.97 | Vertical |
| 4 | 13447.716 | -58.98 | 15.32 | -43.66 | -13 | -30.66 | Vertical |
| 5 | 14234.592 | -57.46 | 17.11 | -40.35 | -13 | -27.35 | Vertical |
| 6 | 14907.246 | -58.61 | 16.21 | -42.40 | -13 | -29.40 | Vertical |

## 5.7 Frequency stability

### 5.7.1 **Limit**

For FCC part 22.355: the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances 2.5ppm for mobile ≤ 3W condition.

For FCC part 24.235: The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

### 5.7.2 **Test method**

**Test Procedures for Temperature Variation:**

1, The EUT was set up in the thermal chamber and connected with the base station.
2, With power off, the temperature was decreased to -30℃ and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.
3, With power off, the temperature was raised in 10℃ set up to 50℃ and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.
4, measure the carrier frequency error.

**Test Procedures for Voltage Variation:**

1, The EUT was placed in a temperature chamber at 25±5℃ and connected with the base station.
2, Reduce the primary supply voltage to the battery operating end point.
3, measure the carrier frequency error.

### 5.7.3 **Test Result**

| Band | Voltage (V) | Frequency Error (Hz) | Frequency Error (ppm) |
|---|---|---|---|
| GSM 850 | 4.26 | 15 | 0.0179 |
| | 3.7 | 18 | 0.0215 |
| | 3.15 | 16 | 0.0191 |

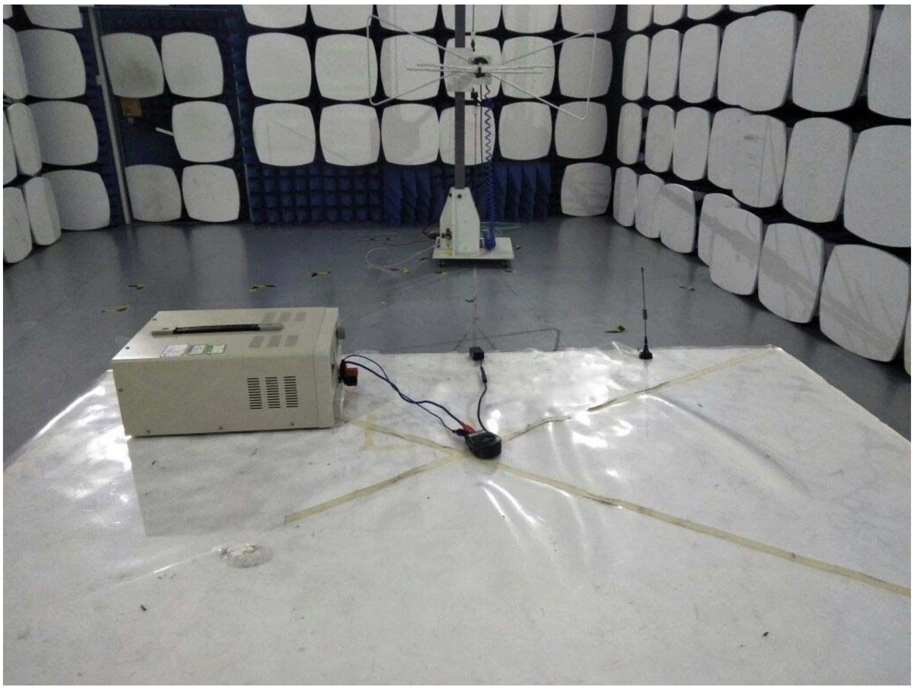
| Band | Temperature (℃) | Frequency Error (Hz) | Frequency Error (ppm) |
|---|---|---|---|
| GSM 850 | -30 | 26 | 0.0311 |
| | -20 | 18 | 0.0215 |
| | -10 | 17 | 0.0203 |
| | 0 | 21 | 0.0251 |
| | 10 | 15 | 0.0179 |
| | 20 | 14 | 0.0167 |
| | 30 | 12 | 0.0143 |
| | 40 | 21 | 0.0251 |
| | 50 | 25 | 0.0299 |

| Band | Voltage (V) | Frequency Error (Hz) | Frequency Error (ppm) |
|---|---|---|---|
| GSM 1900 | 4.26 | 28 | 0.0149 |
| | 3.7 | 24 | 0.0128 |
| | 3.15 | 22 | 0.0117 |

| Band | Temperature (℃) | Frequency Error (Hz) | Frequency Error (ppm) |
|---|---|---|---|
| GSM 1900 | -30 | 27 | 0.0144 |
| | -20 | 23 | 0.0122 |
| | -10 | 14 | 0.0074 |
| | 0 | 15 | 0.0080 |
| | 10 | 17 | 0.0090 |
| | 20 | 21 | 0.0112 |
| | 30 | 16 | 0.0085 |
| | 40 | 14 | 0.0074 |
| | 50 | 12 | 0.0064 |

Note:
1. Normal Voltage = 3.7V; Battery End Point (BEP) = 3.15V; Maximum Voltage =4.26V

## Photographs of the Test Setup

| Radiated emission |
| --- |
|  |
|  |

**----END OF REPORT----**