**SGS-CSTC Standards Technical Services Co., Ltd.**
**Shenzhen Branch**

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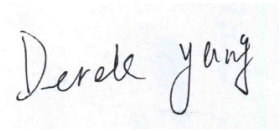
# FCC REPORT

| | |
|---|---|
| **Application No:** | SZEM1612010750RG |
| **Applicant:** | LG Electronics Mobile Comm USA |
| **Manufacturer:** | Huaqin Telecom Technology Co. Ltd. |
| **Factory:** | Dong Guan Huabel Electronic Technology Co.,Ltd |
| **Product Name:** | Mobile Handset |
| **Model No.(EUT):** | LG-X230ds |
| **Trade Mark:** | LG |
| **FCC ID:** | ZNFX230DS |
| **Standards:** | 47 CFR Part 2(2015)<br>47 CFR Part 22 subpart H(2015)<br>47 CFR Part 24 subpart E(2015)<br>47 CFR Part 27 subpart C(2015) |
| **Test Method:** | FCC KDB 971168 D01 Power Meas License Digital Systems v02r02<br>TIA-603-D 2010 |
| **Date of Receipt:** | 2016-12-18 |
| **Date of Test:** | 2016-12-20 to 2016-12-28 |
| **Date of Issue:** | 2017-01-06 |
| **Test Result:** | **PASS *** |

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:



Derek Yang
Wireless Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

# 2 Version

| Revision Record | | | | |
|---|---|---|---|---|
| **Version** | **Chapter** | **Date** | **Modifier** | **Remark** |
| 00 | | 2017-01-06 | | Original |
| | | | | |
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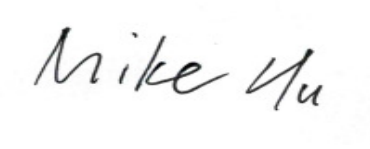
|---|---|---|---|---|
| **Authorized for issue by:** | | | | |
| **Tested By** | |  **(Mike Hu) /Project Engineer** | | 2017-01-06 **Date** |
| **Checked By** | |  **(Jim Huang) /Reviewer** | | 2017-01-06 **Date** |

# 3 Test Summary

| Test Item | FCC Rule No. | Requirements | Test Result | Verdict |
|---|---|---|---|---|
| Effective (Isotropic) Radiated Power Output Data | §2.1046, §22.913, §24.232 §27.50 | FCC: ERP ≤7 W. EIRP ≤ 2 W. | Section 1 of Appendix B | PASS |
| Peak-Average Ratio | §24.232 §27.50 | ≤13dB | Section 2 of Appendix B | PASS |
| Modulation Characteristics | §2.1047 | Digital modulation | Section 3 of Appendix B | PASS |
| Bandwidth | §2.1049(h), §22.917, §24.238 §27.53 | OBW:No limit EBW: No limit | Section 4 of Appendix B | PASS |
| Band Edge Compliance | §2.1051, §22.917, §24.238 §27.53 | ≤ -13dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. | Section 5 of Appendix B | PASS |
| Spurious emissions at antenna terminals | §2.1051, §22.917, §24.238 §27.53 | FCC: ≤ -13dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. | Section 6 of Appendix B | PASS |
| Field strength of spurious radiation | §2.1051, §22.917, §24.238 §27.53 | FCC: ≤ -13dBm/100 kHz, | Section 7 of Appendix B | PASS |
| Frequency stability | §2.1055, §22.355, §24.235 §27.54 | ≤ ±2.5ppm. | Section 8 of Appendix B | PASS |

# 4 Content

# 5 General Information

## 5.1 Client Information

| | |
|---|---|
| Applicant: | LG Electronics Mobile Comm USA |
| Address of Applicant: | 1000 Sylvan Avenue Englewood Cliffs, NJ 07632 |
| Manufacturer: | Huaqin Telecom Technology Co. Ltd. |
| Address of Manufacturer: | No.1 Building,399 Keyuan Road ,Zhangjiang Hi-Tech Park, Pudong New Area, Shanghai, China |
| Factory: | Dong Guan Huabel Electronic Technology Co., Ltd |
| Address of Factory: | No.9 Industrial Northern Road, National High-Tech Industrial Development Zone, SongShan Lake, Dong Guan |

## 5.2 General Description of EUT

| | |
|---|---|
| Product Name: | Mobile Handset |
| Model No.: | LG-X230ds |
| Trade Mark: | LG |
| Sample Type: | Portable production |
| Antenna Type: | Loop Antenna |
| Antenna Gain: | GSM850: 0.11dBi; GSM1900: 2.23dBi<br>WCDMA B5: 0.11dB<br>LTE B7: 0.49dBi |

## 5.3 Test Mode

| Test Mode | Test Modes Description |
|---|---|
| GSM/TM1 | GSM system, GSM/GPRS/EGPRS, GMSK modulation |
| GSM/TM2 | GSM system, EGPRS, 8PSK modulation |
| UMTS/TM1 | UMTS system, WCDMA, QPSK modulation |
| UMTS/TM2 | UMTS system, WCDMA, 16QAM modulation |
| LTE/TM1 | LTE system, QPSK modulation |
| LTE/TM2 | LTE system, 16QAM modulation |

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

## 5.4 Test Environment

| Environment Parameter | Selected Values During Tests | |
|---|---|---|
| Relative Humidity | 52% | |
| Atmospheric Pressure: | 1015Pa | |
| Temperature | TN | 25 ℃ |
| Voltage : | VL | 3.4V |
| | VN | 3.85V |
| | VH | 4.4V |

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

## 5.5 Test Frequency

| Test Mode | TX / RX | RF Channel | | |
|---|---|---|---|---|
| | | Low (L) | Middle (M) | High (H) |
| GSM850 | TX | Channel 128 | Channel 190 | Channel 251 |
| | | 824.2MHz | 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 |
| | | 1850.2MHz | 1880.0 MHz | 1909.8 MHz |
| | RX | Channel 512 | Channel 661 | Channel 810 |
| | | 1930.2 MHz | 1960.0 MHz | 1989.8 MHz |
| Test Mode | TX / RX | RF Channel | | |
| | | Low (L) | Middle (M) | High (H) |
| WCDMA850 | TX | Channel 4132 | Channel 4182 | Channel 4233 |
| | | 826.4MHz | 836.4 MHz | 846.6 MHz |
| | RX | Channel 4357 | Channel 4407 | Channel 4458 |
| | | 871.4 MHz | 881.4 MHz | 891.6 MHz |
| Test Mode | TX / RX | RF Channel | | |
| | | Low (L) | Middle (M) | High (H) |
| LTE BAND 7 5MHz | TX | Channel 20775 | Channel 21100 | Channel 21425 |
| | | 2502.5 MHz | 2535 MHz | 2567.5 MHz |
| | RX | Channel 2775 | Channel 3100 | Channel 5825 |
| | | 2622.5 MHz | 2655 MHz | 2687.5 MHz |
| Test Mode | TX / RX | RF Channel | | |
| | | Low (L) | Middle (M) | High (H) |
| LTE BAND 7 10MHz | TX | Channel 20800 | Channel 21100 | Channel 21400 |
| | | 2505 MHz | 2535 MHz | 2565 MHz |
| | RX | Channel 2800 | Channel 3100 | Channel 3400 |
| | | 2625 MHz | 2655 MHz | 2685 MHz |
| Test Mode | TX / RX | RF Channel | | |
| | | Low (L) | Middle (M) | High (H) |
| LTE BAND 7 15MHz | TX | Channel 20825 | Channel 21100 | Channel 21375 |
| | | 2507.5 MHz | 2535 MHz | 2562.5 MHz |
| | RX | Channel 2825 | Channel 3100 | Channel 3375 |
| | | 2627.5 MHz | 2655 MHz | 2682.5 MHz |

| Test Mode | TX / RX | RF Channel | | |
|---|---|---|---|---|
| | | Low (L) | Middle (M) | High (H) |
| LTE BAND 7 20MHz | TX | Channel 20850 | Channel 21100 | Channel 21350 |
| | | 2510 MHz | 2535 MHz | 2560 MHz |
| | RX | Channel 2850 | Channel 3100 | Channel 3350 |
| | | 2630 MHz | 2655 MHz | 2680 MHz |

## 5.6 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

## 5.7 Test Facility

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

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

• **FCC – Registration No.: 556682**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 556682.

• **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

## 5.8 Deviation from Standards

None.

## 5.9 Abnormalities from Standard Conditions

None.

## 5.10Other Information Requested by the Customer

None.

## 5.11 Technical Specification

| Characteristics | Description | |
|---|---|---|
| Radio System Type | ☒ GSM | |
| | ☒ UMTS | |
| | ☒ LTE | |
| Supported Frequency Range | GSM850 | Transmission (TX): 824 to 849 MHz |
| | | Receiving (RX): 869 to 894 MHz |
| | GSM1900 | Transmission (TX): 1850 to 1910 MHz |
| | | Receiving (RX): 1930 to 1990 MHz |
| | UMTS band 5 | Transmission (TX): 824 to 849 MHz |
| | | Receiving (RX): 869 to 894 MHz |
| | LTE band 7 | Transmission (TX): 2500 to 2570 MHz |
| | | Receiving (RX): 2620 to 2690 MHz |
| Target TX Output Power | GSM850:32.5 dBm<br>GSM1900: 30dBm<br>UMTS band 5: 23dBm<br>LTE band 7: 23.2dBm | |
| Supported Channel Bandwidth | GSM system: | ☒0.2 MHz |
| | UMTS system: | ☒5 MHz |
| | LTE system | ☒ 5 MHz;10 MHz;15 MHz;20 MHz |

| Characteristics | Description | |
|---|---|---|
| Designation of Emissions<br>(Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.) | GSM850 | 245KGXW; 238KG7W |
| | GSM1900 | 244KGXW; 241KG7W |
| | UMTS band 5 | 4M23F9W; 4M25W7D; |
| | LTE band7 | 4M50G7D;4M50W7D;<br>8M97G7D;8M95W7D;<br>13M6G7D;13M5W7D;<br>18M0G7D;18M0W7D; |

# 6 Description of Tests

## 6.1 Conducted Output Power

Measurement Procedure: FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

The transmitter output was connected to a calibrated coaxial cable, attenuator and power meter, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The power output at the transmitter antenna port was determined by adding the value of the cable insertion loss to the power reading. The tests were performed at three frequencies (low channel, middle channel and high channel) and on the highest power levels, which can be setup on the transmitters.

**Note: Reference test setup 1**

## 6.2 Effective (Isotropic) Radiated Power of Transmitter

Measurement Procedure: FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

**Below 1GHz test procedure as below:**

1). The EUT was powered ON and placed on a 0.8m high table in the chamber. The antenna of the transmitter was extended to its maximum length.

2). The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.

3). Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.

4). The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.

5). A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2) is obtained for this set of conditions.

6). The output power into the substitution antenna was then measured.

7). Steps 5) and 6) were repeated with both antennas polarized.

8). Calculate power in dBm by the following formula:

ERP (dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd)

Where:

Pg is the generator output power into the substitution antenna.

**Above 1GHz test procedure as below:**

1). Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber

2). Calculate power in dBm by the following formula:

EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)

EIRP=ERP+2.15dB

Where:

Pg is the generator output power into the substitution antenna.

3). Test the EUT in the lowest channel, the middle channel the Highest channel

4). The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, Only the test worst case mode is recorded in the report.

5). Repeat above procedures until all frequencies measured was complete.

**Note: Reference test setup 2**

## 6.3 Occupied Bandwidth

Measurement Procedure: FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyser, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at three frequencies (low channel, middle channel and high channel).The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1 percent of the selected span as is possible without being below 1 percent. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual. The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 percent of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

**Note: Reference test setup 1**

## 6.4 Band Edge at Antenna Terminals

Measurement Procedure: FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyser, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at three frequencies (low channel and high channel).in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of 100kHz or 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed. The EUT emission bandwidth is measured as the width of the signal between two points, outside of which all emission are attenuated at least 26dB below the transmitter power. The video bandwidth of the spectrum analyzer was set at thrice the resolution bandwidth. Detector Mode was set to peak or peak hold power.

**Note: Reference test setup 1**

## 6.5 Spurious And Harmonic Emissions at Antenna Terminal

Measurement Procedure: FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyzer, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at three frequencies (low channel and high channel).The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

**Note: Reference test setup 1**

## 6.6 Peak-Average Ratio

Measurement Procedure: FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

A peak to average ratio measurement is performed at the conducted port of the EUT. For WCDMA signals, the spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level. For GSM signals, an average and a peak trace are used on a spectrum analyzer to determine the largest deviation between the average and the peak power of the EUT in a bandwidth greater than the emission bandwidth. The traces are generated with the spectrum analyzer set to zero span mode.

**Note: Reference test setup 1**

## 6.7 Field Strength of Spurious Radiation

Measurement Procedure: FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

**Below 1GHz test procedure as below:**

1). The EUT was powered ON and placed on a 80cm high table in the chamber. The antenna of the transmitter was extended to its maximum length.

2). The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.

3). Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.

4). The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.

5). A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2) is obtained for this set of conditions.

6). The output power into the substitution antenna was then measured.

7). Steps 5) and 6) were repeated with both antennas polarized.

8) Calculate power in dBm by the following formula:

ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd)

Where:

Pd is the dipole equivalent power, Pg is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to Pg [dBm] – cable loss [dB]. The calculated Pd levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of 43 + 10log10(Power [Watts]).

**Above 1GHz test procedure as below:**

1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber

2) Calculate power in dBm by the following formula:

EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)

EIRP=ERP+2.15dB

Where:

Pg is the generator output power into the substitution antenna.

3. Test the EUT in the lowest channel, the middle channel the Highest channel

4. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, Only the test worst case mode is recorded in the report.

5. Repeat above procedures until all frequencies measured was complete

**Note: Reference test setup 3**

## 6.8 Frequency Stability / Temperature Variation

Measurement Procedure:

Frequency stability testing is performed in accordance with the guidelines of FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

. The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30℃ to +50℃ in 10℃ increments using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Specification – The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within

±0.00025% (±2.5 ppm ) of the center frequency.

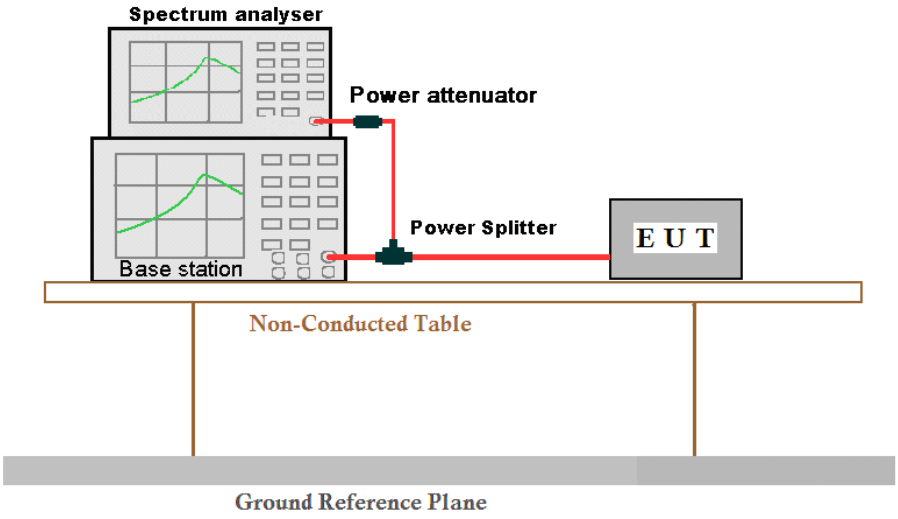
**Time Period and Procedure:**

1. The carrier frequency of the transmitter is measured at room temperature (20℃ to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10℃ intervals ranging from -30℃ to +50℃. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

**Note: Reference test setup 4**

## 6.9 Test Setups

### 6.9.1 Test Setup 1



## 6.9.2 Test Setup 2

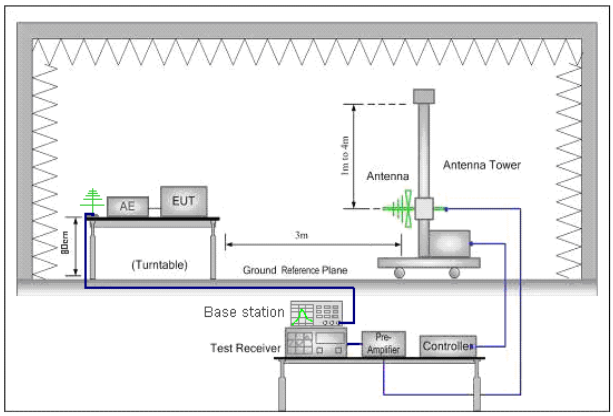



Figure 1. 30MHz to 1GHz

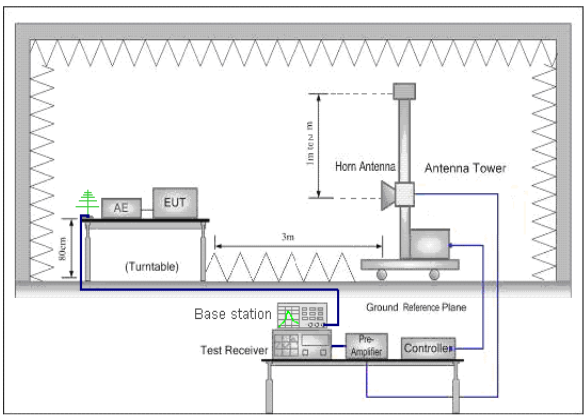



Figure 2. above 1GHz

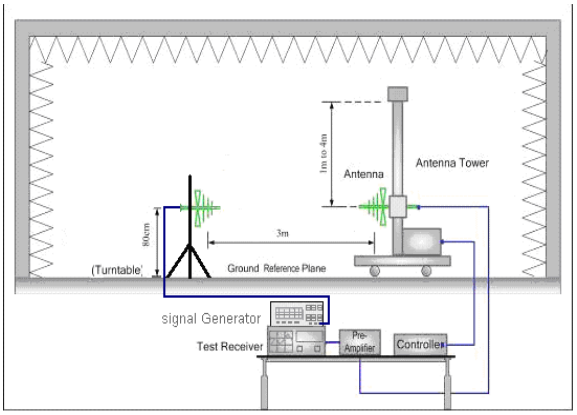



Figure 1. 30MHz to 1GHz

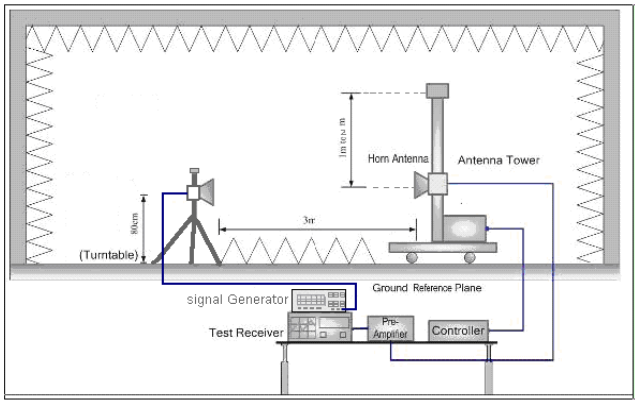



Figure 2. above 1GHz

### 6.9.3 Test Setup 3

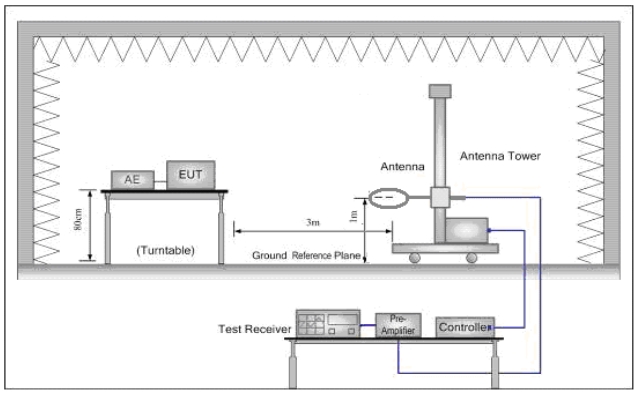



Figure 1. Below 30MHz

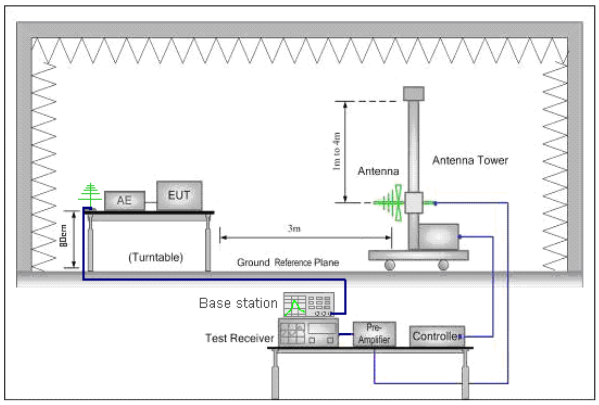



Figure 2. 30MHz to 1GHz

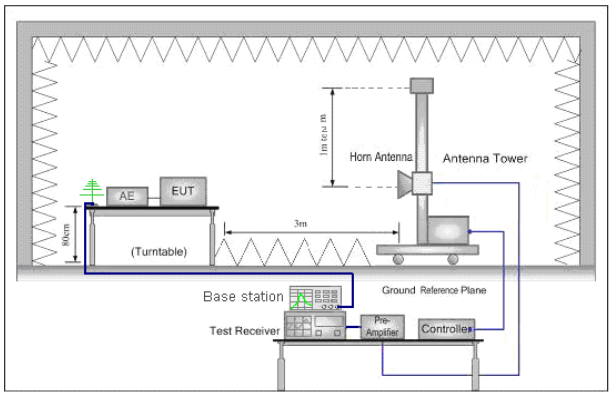



Figure 3. above 1GHz

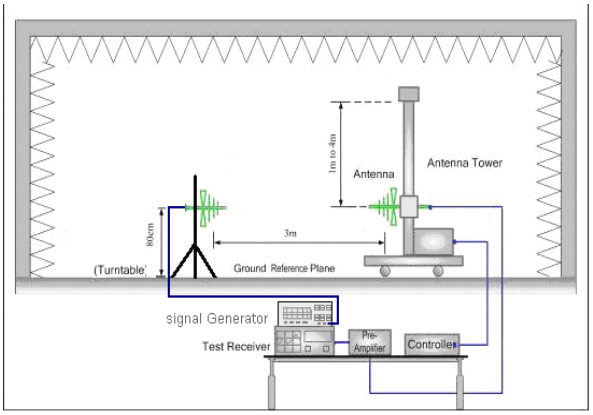



Figure 2. 30MHz to 1GHz

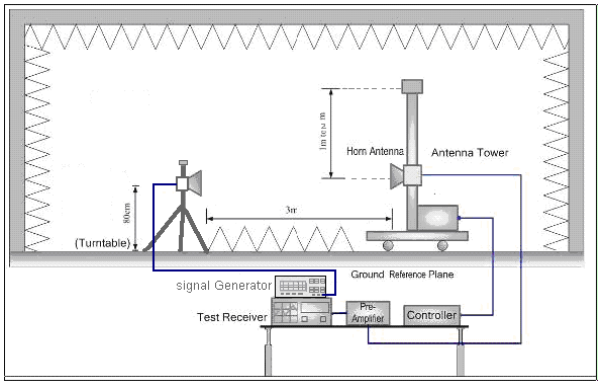
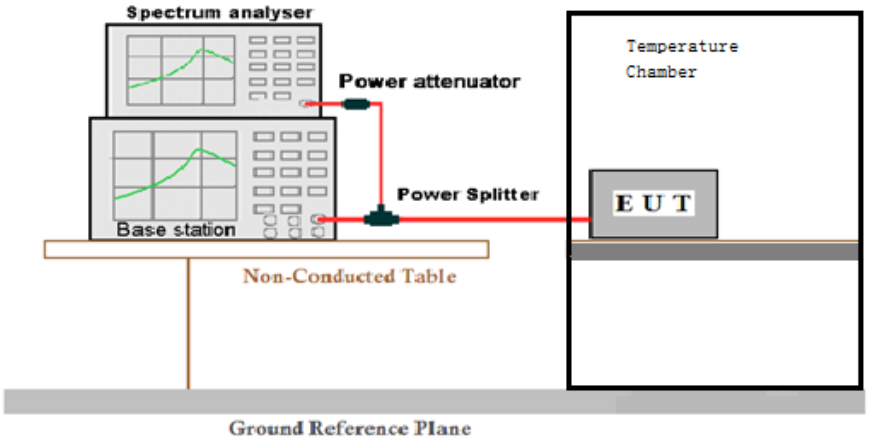



Figure 3. above 1GHz

### 6.9.4 Test Setup 4



## 6.10 Test Conditions

| Test Case | | Test Conditions | |
|---|---|---|---|
| Transmit Output Power Data | Average Power, Total | Test Environment | Ambient Climate & Rated Voltage |
| | | Test Setup | Test Setup 1 |
| | | RF Channels (TX) | L, M, H<br>(L= low channel, M= middle channel, H= high channel ) |
| | | Test Mode | GSM/TM1;GSM/TM2;UMTS/TM1;<br>UMTS/TM2;LTE/TM1;LTE/TM2 |
| | Average Power, Spectral Density (if required) | Test Environment | Ambient Climate & Rated Voltage |
| | | Test Setup | Test Setup 1 |
| | | RF Channels (TX) | L, M, H<br>(L= low channel, M= middle channel, H= high channel ) |
| | | Test Mode | GSM/TM1;GSM/TM2;UMTS/TM1;<br>UMTS/TM2;LTE/TM1;LTE/TM2 |
| Peak-to-Average Ratio (if required) | | Test Environment | Ambient Climate & Rated Voltage |
| | | Test Setup | Test Setup 1 |
| | | RF Channels (TX) | L, M, H<br>(L= low channel, M= middle channel, H= high channel ) |
| | | Test Mode | GSM/TM1;GSM/TM2;UMTS/TM1;<br>UMTS/TM2;LTE/TM1;LTE/TM2 |
| Modulation Characteristics | | Test Environment | Ambient Climate & Rated Voltage |
| | | Test Setup | Test Setup 1 |
| | | RF Channels (TX) | M<br>(M= middle channe ) |
| | | Test Mode | GSM/TM1;GSM/TM2;UMTS/TM1;<br>UMTS/TM2;LTE/TM1;LTE/TM2 |
| Bandwidth | Occupied Bandwidth | Test Environment | Ambient Climate & Rated Voltage |
| | | Test Setup | Test Setup 1 |
| | | RF Channels (TX) | L, M, H<br>(L= low channel, M= middle channel, H= high channel ) |
| | | Test Mode | GSM/TM1;GSM/TM2;UMTS/TM1;<br>UMTS/TM2;LTE/TM1;LTE/TM2 |
| | Emission Bandwidth (if required) | Test Environment | Ambient Climate & Rated Voltage |
| | | Test Setup | Test Setup 1 |
| | | RF Channels (TX) | L, M, H<br>(L= low channel, M= middle channel, H= high channel ) |
| | | Test Mode | GSM/TM1;GSM/TM2;UMTS/TM1;<br>UMTS/TM2;LTE/TM1;LTE/TM2 |
| Band Edges Compliance | | Test Environment | Ambient Climate & Rated Voltage |
| | | Test Setup | Test Setup 1 |
| | | RF Channels (TX) | L, H |

| | | |
|---|---|---|
| | | (L= low channel, H= high channel ) |
| | Test Mode | GSM/TM1;GSM/TM2;UMTS/TM1; UMTS/TM2;LTE/TM1;LTE/TM2 |
| Spurious Emission at Antenna Terminals | Test Environment | Ambient Climate & Rated Voltage |
| | Test Setup | Test Setup 1 |
| | RF Channels (TX) | L,M, H<br>(L= low channel, M= middle channel, H= high channel ) |
| | Test Mode | GSM/TM1;UMTS/TM1;LTE/TM1 |
| Field Strength of Spurious Radiation | Test Environment | Ambient Climate & Rated Voltage |
| | Test Setup | Test Setup 2 |
| | Test Mode | GSM/TM1; GSM/TM2;UMTS/TM1; UMTS/TM2;LTE/TM1; LTE/TM2; NOTE: If applicable, the EUT conf. that has maximum power density (based on the equivalent power level) is selected. |
| | RF Channels (TX) | L, M, H<br>(L= low channel, M= middle channel, H= high channel ) |
| Frequency Stability | Test Env. | (1) -30 ℃ to +50 ℃ with step 10 ℃ at Rated Voltage;<br>(2) VL, VN and VH of Rated Voltage at Ambient Climate. |
| | Test Setup | Test Setup 4 |
| | RF Channels (TX) | L, M, H<br>(L= low channel, M= middle channel, H= high channel ) |
| | Test Mode | GSM/TM1;GSM/TM2;UMTS/TM1; UMTS/TM2;LTE/TM1;LTE/TM2 |

# 7 Main Test Instruments

| RE in Chamber | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal. date (yyyy-mm-dd)** | **Cal.Due date (yyyy-mm-dd)** |
| 1 | 3m Semi-Anechoic Chamber | ETS-LINDGREN | N/A | SEM001-01 | 2016-05-13 | 2017-05-13 |
| 2 | EMI Test Receiver | Agilent Technologies | N9038A | SEM004-05 | 2017-09-16 | 2017-09-16 |
| 3 | BiConiLog Antenna (26-3000MHz) | ETS-LINDGREN | 3142C | SEM003-02 | 2014-11-15 | 2017-11-15 |
| 4 | Double-ridged horn (1-18GHz) | ETS-LINDGREN | 3117 | SEM003-11 | 2015-10-17 | 2018-10-17 |
| 5 | Horn Antenna (18-26GHz) | ETS-LINDGREN | 3160 | SEM003-12 | 2014-11-24 | 2017-11-24 |
| 6 | Pre-amplifier (0.1-1300MHz) | Agilent Technologies | 8447D | SEM005-01 | 2016-04-25 | 2017-04-25 |
| 7 | Pre-Amplifier (0.1-26.5GHz) | Compliance Directions Systems Inc. | PAP-0126 | SEM004-10 | 2016-10-17 | 2017-10-17 |
| 8 | Band filter | Amindeon | 82346 | SEM023-01 | N/A | N/A |
| 9 | Universal radio communication tester | Rohde & Schwarz | CMU200 | SEM010-01 | 2016-10-23 | 2017-10-23 |
| 10 | Universal radio communication tester | Rohde & Schwarz | CMW500 | SEM010-03 | 2016-10-23 | 2017-10-23 |
| 11 | DC Power Supply | Zhao Xin | RXN-305D | SEM011-02 | 2016-10-09 | 2017-10-09 |
| 12 | BiConiLog Antenna (30MHz-3GHz) | Schwarzbeck | VULB9163 | SEM003-05 | 2015-10-17 | 2018-10-17 |
| 13 | Horn Antenna (800MHz-18GHz) | Rohde & Schwarz | HF907 | SEM003-06 | 2015-06-14 | 2018-06-14 |

| RF connected test | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal. date (yyyy-mm-dd)** | **Cal.Due date (yyyy-mm-dd)** |
| 1 | Humi/ Temp Indicator | MingGao | TH101B | W006-09 | 2016-03-09 | 2017-03-09 |
| 2 | Spectrum Analyzer | Rohde & Schwarz | FSP | SEL0154 | 2016-10-17 | 2017-10-17 |
| 3 | MXA Signal Analyzer | Agilent | N9020A | W025-01 | 2016-07-18 | 2017-07-18 |
| 4 | Barometer | ChangChun | DYM3 | SEL0088 | 2016-05-24 | 2017-05-24 |
| 5 | Dual Output Mobile Communication DC Source | Agilent Technologies Inc | 66319D | W009-02 | 2016-07-23 | 2017-07-23 |
| 6 | Digital Multimeter | Fluke | 15B+ | W055-01 | 2016-03-09 | 2017-03-09 |
| 7 | Wireless Communications Test Set | Rohde & Schwarz | CMW500 | W005-03 | 2016-03-08 | 2017-03-08 |
| 8 | Universal Radio Communication Tester | R&S | CMU200 | W005-01 | 2016-10-23 | 2017-10-23 |

# 8 Measurement Uncertainty

For a 95% confidence level (k = 2), the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

| Test Item | Extended Uncertainty | Data |
|---|---|---|
| Transmit Output Power Data | Power [dBm] | U = 0.37 dB |
| Bandwidth | Magnitude [%] | U = 0.2% |
| Band Edge Compliance | Disturbance Power [dBm] | U = 2.0 dB |
| Spurious Emissions, Conducted | Disturbance Power [dBm] | U = 2.0 dB |
| Field Strength of Spurious Radiation | ERP [dBm] | For 3 m Chamber:<br>U = 4.5 dB (30 MHz to 1GHz)<br>U = 3.3 dB (above 1 GHz)<br>For 10 m Chamber:<br>U = 4.5 dB (30 MHz to 1GHz)<br>U = 3.2 dB (above 1 GHz) |
| Frequency Stability | Frequency Accuracy [ppm] | U = 0.24 ppm |

# 9 Photographs - EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for SZEM1612010750RG.

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The End