
FCC Test Report

Report No.: AGC00653170504FE02

FCC ID : 2AFD9MINIELITEII
APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : MOBILE PHONE
BRAND NAME : ZOOM
MODEL NAME : mini ELITE II
CLIENT : MOVEON TECHNOLOGY LIMITED
DATE OF ISSUE : June 12, 2017
STANDARD(S) : FCC Part 22H & 24E Rules
REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd.



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REPORT REVISE RECORD

| Report Version | Revise Time | Issued Date | Valid Version | Notes |
|-----------------------|--------------------|--------------------|----------------------|-----------------|
| V1.0 | / | June 12, 2017 | Valid | Original Report |

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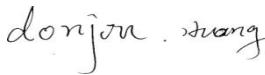
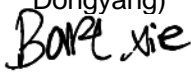

1. VERIFICATION OF COMPLIANCE

| | |
|---------------------------------|--|
| Applicant | MOVEON TECHNOLOGY LIMITED |
| Address | World Trade Plaza-A block#3201-3202 Fuhong Road, Futian, Shenzhen, China |
| Manufacturer | MOVEON TECHNOLOGY LIMITED |
| Address | World Trade Plaza-A block#3201-3202 Fuhong Road, Futian, Shenzhen, China |
| Product Designation | MOBILE PHONE |
| Brand Name | ZOOM |
| Test Model | mini ELITE II |
| Date of test | June 06, 2017~June 12, 2017 |
| Deviation | None |
| Condition of Test Sample | Normal |

We hereby certify that:

The above equipment was tested by Dongguan Precise Testing Service Co., Ltd. The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI/TIA- 603-D-2010. The sample tested as described in this report is in compliance with the FCC Rules Part 22H and 24E.

The test results of this report relate only to the tested sample identified in this report.

| | | |
|-------------|---|---------------|
| Tested By |  | |
| | _____ Donjon Huang(Huang Dongyang) | June 12, 2017 |
| Reviewed By |  | |
| | _____ Bart Xie(Xie Xiaobin) | June 12, 2017 |
| Approved By |  | |
| | _____ Solger Zhang(Zhang Hongyi) Authorized Officer | June 12, 2017 |

2. GENERAL INFORMATION

2.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

| | |
|--|--|
| Product Designation: | MOBILE PHONE |
| Hardware version: | SG029_MB_V1.0 |
| Software version: | SG029_OQ_K38_ZOOM_F4_V05_T01_20170512.rar-- |
| Frequency Bands: | <input checked="" type="checkbox"/> GSM 850 <input checked="" type="checkbox"/> PCS 1900 (U.S. Bands) <input checked="" type="checkbox"/> GSM 900 <input checked="" type="checkbox"/> DCS 1800 (Non-U.S. Bands) |
| Antenna: | PIFA Antenna |
| Type of Modulation | GSM / GPRS : GMSK |
| Antenna gain(GSM): | 0.9dBi |
| Power Supply: | DC 3.7V by battery |
| Battery parameter: | DC 3.7V/600mAh |
| Adapter Input: | AC100-240V, 50-60Hz, 0.15A |
| Adapter Output: | DC5V,500mA |
| Dual Card: | GSM Card Slot |
| GPRS Class | 12 |
| Extreme Vol. Limits: | DC3.4 V to 4.2V (Normal: DC3.7 V) |
| Extreme Temp. Tolerance | -10°C to +50°C |
| <p>*** Note: The High Voltage DC4.3V and Low Voltage DC3.4V were declared by manufacturer, The EUT couldn't be operating normally with higher or lower voltage.</p> <p>Other functions have been performed according to verification procedure except for Bluetooth and MS function. Card 1 can't transmit with Card 2 simultaneously.</p> | |

- *** **Note:** 1.The maximum power levels are GSM for MCS-4: GMSK link, and RMC 12.2kbps mode, only these modes were used for all tests.
2. We found out the test mode with the highest power level after we analyze all the data rates. So we chose the worst case as a representative.

GSM Card Slot 1:

| | Maximum ERP/EIRP (dBm) | Max. Conducted Power (dBm) | Max. Average Burst Power (dBm) |
|----------|---------------------------|-------------------------------|-----------------------------------|
| GSM 850 | 30.41 | 32.32 | 31.71 |
| PCS 1900 | 28.26 | 28.94 | 28.33 |

GSM Card Slot 2:

| | Maximum ERP/EIRP (dBm) | Max. Conducted Power (dBm) | Max. Average Burst Power (dBm) |
|----------|---------------------------|-------------------------------|-----------------------------------|
| GSM 850 | 30.36 | 32.24 | 31.62 |
| PCS 1900 | 28.18 | 28.88 | 28.27 |

2.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AFD9MINIELITEII**, filing to comply with the FCC Part 22H&24E requirements.

2.3 TEST METHODOLOGY

The radiated emission testing was performed according to the procedures of ANSI/TIA-603-D-2010, and FCC CFR 47 Rules of 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057.
KDB 971168 D01 Power Meas License Digital Systems v02r02

2.4 TEST FACILITY

| | |
|-----------------------------|---|
| Site | Dongguan Precise Testing Service Co., Ltd. |
| Location | Building D, Baoding Technology Park, Guangming Road2, Dongcheng District, Dongguan, Guangdong, China, |
| FCC Registration No. | 371540 |
| Description | The test site is constructed and calibrated to meet the FCC requirements in documents of ANSI/TIA-603-D-2010. |

2.5 MEASUREMENT INSTRUMENTS

| Name of Equipment | Manufacturer | Model Number | Serial Number | Last Calibration | Due Calibration |
|--|-----------------|--------------|---------------|------------------|-----------------|
| EMI Test Receiver | Rohde & Schwarz | ESCI | 101417 | July 3, 2016 | July 2, 2017 |
| Trilog Broadband Antenna (25M-1GHz) | SCHWARZBECK | VULB9168 | D69250 | Mar 1, 2016 | Feb 28, 2018 |
| Trilog Broadband Antenna(substituted antenna) (25M-1GHz) | SCHWARZBECK | VULB9160 | 9160-3355 | July 3, 2016 | July 2, 2018 |
| Signal Amplifier | SCHWARZBECK | BBV 9475 | 9745-0013 | July 3, 2016 | July 2, 2017 |
| RF Cable | SCHWARZBECK | AK9515E | 96221 | July 3, 2016 | July 2, 2017 |
| 3m Anechoic Chamber | CHENGYU | 966 | PTS-001 | June 2, 2017 | June 1, 2018 |
| MULTI-DEVICE Positioning Controller | Max-Full | MF-7802 | MF780208339 | N/A | N/A |
| Active loop antenna (9K-30MHz) | Schwarzbeck | FMZB1519 | 1519-038 | June 2, 2017 | June 1, 2018 |
| Spectrum analyzer | Agilent | E4407B | MY46185649 | June 2, 2017 | June 1, 2018 |
| Horn Antenna (1G-18GHz) | SCHWARZBECK | BBHA9120D | 9120D-1246 | July 10, 2016 | July 9, 2018 |
| Horn Antenna(substituted antenna) (1G-18GHz) | ETS LINDGREN | 3117 | 00034609 | June 2, 2017 | June 1, 2018 |

| | | | | | |
|---|-------------|-----------|------------|--------------|---------------|
| Spectrum Analyzer | Agilent | E4411B | MY4511453 | July 3, 2016 | July 2, 2017 |
| Signal Amplifier | SCHWARZBECK | BBV 9718 | 9718-269 | July 6, 2016 | July 5, 2017 |
| RF Cable | SCHWARZBECK | AK9515H | 96220 | July 7, 2016 | July 6, 2017 |
| Horn Ant (18G-40GHz) | Schwarzbeck | BBHA 9170 | 9170-181 | June 2, 2017 | June 1, 2018 |
| Artificial Mains Network | Narda | L2-16B | 000WX31025 | July 7, 2016 | July 6, 2017 |
| Artificial Mains Network (AUX) | Narda | L2-16B | 000WX31026 | July 7, 2016 | July 6, 2017 |
| RF Cable | SCHWARZBECK | AK9515E | 96222 | July 3, 2016 | July 2, 2017 |
| Shielded Room | CHENGYU | 843 | PTS-002 | June 2, 2017 | June 1, 2018 |
| COMMUNICATION TESTER | AGILENT | 8960 | GB46490550 | July 24,2016 | July 23, 2017 |
| RF attenuator | N/A | RFA20db | 68 | N/A | N/A |
| Signal Generator | AGILENT | N5182A | MY50140530 | Oct 10,2016 | Oct 09,2017 |
| Signal Generator(substituted equipment) | AGILENT | E8257D | MY45141029 | Oct 10,2016 | Oct 09,2017 |

2.6 SPECIAL ACCESSORIES

The battery and the charger, earphone supplied by the applicant were used as accessories and being tested with EUT intended for FCC grant together.

2.7 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. SYSTEM TEST CONFIGURATION

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission’s requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The Transmitter was operated in the maximum output power mode through Communication Tester. The TX frequency was fixed which was for the purpose of the measurements.

3.3 GENERAL TECHNICAL REQUIREMENTS

| Item Number | Item Description | | FCC Rules |
|-------------|--------------------------|-----------------------------|--------------------------------------|
| 1 | Output Power | Conducted output power | 2.1046/22.913(a) (2) / 24.232 (c) |
| | | Radiated output power | |
| 2 | Peak-to-Average Ratio | Peak-to-Average Ratio | 24.232(d) |
| 3 | Spurious Emission | Conducted spurious emission | 2.1051 / 22.917 / 24.238 |
| | | Radiated spurious emission | |
| 4 | Mains Conducted Emission | | 15.107 / 15.207 |
| 5 | Frequency Stability | | 2.1055/22.355 /24.235 |
| 6 | Occupied Bandwidth | | 2.1049 (h)(i) |
| 7 | Emission Bandwidth | | 22.917(a)/24.238(a) |
| 8 | Band Edge | | 22.917(a)/24.238(a) |

3.4 CONFIGURATION OF EUT SYSTEM

Fig. 2-1 Configuration of EUT System



Table 2-1 Equipment Used in EUT System

| Item | Equipment | Model No. | ID or Specification | Note |
|------|--------------|---------------|---------------------|-----------|
| 1 | MOBILE PHONE | mini ELITE II | 2AFD9MINIELITEII | EUT |
| 2 | Adapter | mini ELITE II | DC5V /500mA | Accessory |
| 3 | Battery | mini ELITE II | DC3.7V/600mAh | Accessory |
| 4 | Earphone | N/A | N/A | Accessory |

***Note: All the accessories have been used during the test. The following “EUT” in setup diagram means EUT system.

4. SUMMARY OF TEST RESULTS

| Item Number | Item Description | | FCC Rules | Result |
|-------------|--------------------------|-----------------------------|--------------------------------------|--------|
| 1 | Output Power | Conducted Output Power | 2.1046/22.913(a) (2) / 24.232 (c) | Pass |
| | | Radiated Output Power | | |
| 2 | Peak-to-Average Ratio | Peak-to-Average Ratio | 24.232(d) | Pass |
| 3 | Spurious Emission | Conducted Spurious Emission | 2.1051 / 22.917 / 24.238 | Pass |
| | | Radiated Spurious Emission | | |
| 4 | Mains Conducted Emission | | 15.107 / 15.207 | Pass |
| 5 | Frequency Stability | | 2.1055/22.355 /24.235 | Pass |
| 6 | Occupied Bandwidth | | 2.1049 (h)(i) | Pass |
| 7 | Emission Bandwidth | | 22.917(a)/24.238(a) | Pass |
| 8 | Band Edge | | 22.917(a)/24.238(a) | Pass |

5. DESCRIPTION OF TEST MODES

During the testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication Tester (CMU 200) to ensure max power transmission and proper modulation. Three channels (The top channel, the middle channel and the bottom channel) were chosen for testing on both GSM and PCS frequency band.

*****Note:** 1.GSM/GPRS 850, GSM/GPRS 1900, mode have been tested during the test.

2. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions
3. All antenna port conducted emissions testing was performed on a test bench with the antenna Port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

6. OUTPUT POWER

6.1 CONDUCTED OUTPUT POWER

6.1.1 MEASUREMENT METHOD

The transmitter output port was connected to base station.

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.

Measure the maximum burst average power and average power for other modulation signal.

The EUT was setup for the max output power with pseudo random data modulation. Power was measured with Spectrum Analyzer. The measurements were performed on all modes (GSM/GPRS850, GSM/GPRS1900) at 3 typical channels (the Top Channel, the Middle Channel and the Bottom Channel) for each band.

6.1.2 MEASUREMENT RESULT

| Conducted Output Power Limits for GSM850 | | |
|--|---------------------------|----------------------|
| Mode | Nominal Peak Power | Tolerance(dB) |
| GSM | 33 dBm (2W) | - 2 |
| GPRS | 33 dBm (2W) | - 2 |
| Conducted Output Power Limits for PCS1900 | | |
| Mode | Nominal Peak Power | Tolerance(dB) |
| GSM | 30 dBm (1W) | - 2 |
| GPRS | 30 dBm (1W) | - 2 |

GSM 850:

| Mode | Frequency (MHz) | Reference Power | Peak Power | Tolerance | Avg.Burst Power | Duty cycle Factor(dB) | Frame Power(dBm) |
|---------------------|-----------------|-----------------|------------|-----------|-----------------|-----------------------|------------------|
| GSM850 | 824.2 | 33 | 32.32 | -0.68 | 31.71 | -9 | 22.71 |
| | 836.6 | 33 | 32.28 | -0.72 | 31.62 | -9 | 22.62 |
| | 848.8 | 33 | 32.24 | -0.76 | 31.66 | -9 | 22.66 |
| GPRS850 (1 Slot) | 824.2 | 33 | 31.76 | -1.24 | 31.12 | -9 | 22.12 |
| | 836.6 | 33 | 31.53 | -1.47 | 30.96 | -9 | 21.96 |
| | 848.8 | 33 | 31.56 | -1.44 | 30.92 | -9 | 21.92 |
| GPRS850 (2 Slot) | 824.2 | 30 | 28.70 | -1.30 | 28.22 | -6 | 22.22 |
| | 836.6 | 30 | 28.78 | -1.22 | 28.12 | -6 | 22.12 |
| | 848.8 | 30 | 28.52 | -1.48 | 28.02 | -6 | 22.02 |
| GPRS850 (3 Slot) | 824.2 | 28.23 | 27.11 | -1.12 | 26.54 | -4.26 | 22.28 |
| | 836.6 | 28.23 | 27.10 | -1.13 | 26.58 | -4.26 | 22.32 |
| | 848.8 | 28.23 | 27.22 | -1.01 | 26.63 | -4.26 | 22.37 |
| GPRS850 (4 Slot) | 824.2 | 27 | 25.76 | -1.24 | 25.09 | -3 | 22.09 |
| | 836.6 | 27 | 25.43 | -1.57 | 24.87 | -3 | 21.87 |
| | 848.8 | 27 | 25.56 | -1.44 | 24.86 | -3 | 21.86 |

PCS 1900:

| Mode | Frequency (MHz) | Reference Power | Peak Power | Tolerance | Avg.Burst Power | Duty cycle Factor(dB) | Frame Power(dBm) |
|----------------------|-----------------|-----------------|--------------|-----------|-----------------|-----------------------|------------------|
| GSM1900 | 1850.2 | 30 | 28.80 | -1.20 | 28.23 | -9 | 19.23 |
| | 1880 | 30 | 28.71 | -1.29 | 28.12 | -9 | 19.12 |
| | 1909.8 | 30 | 28.94 | -1.06 | 28.33 | -9 | 19.33 |
| GPRS1900 (1 Slot) | 1850.2 | 30 | 28.71 | -1.29 | 28.06 | -9 | 19.06 |
| | 1880 | 30 | 28.41 | -1.59 | 27.80 | -9 | 18.80 |
| | 1909.8 | 30 | 28.75 | -1.25 | 28.14 | -9 | 19.14 |
| GPRS1900 (2 Slot) | 1850.2 | 27 | 25.62 | -1.38 | 25.01 | -6 | 19.01 |
| | 1880 | 27 | 25.31 | -1.69 | 24.76 | -6 | 18.76 |
| | 1909.8 | 27 | 25.69 | -1.31 | 24.04 | -6 | 18.04 |
| GPRS1900 (3 Slot) | 1850.2 | 25.23 | 23.26 | -1.97 | 22.62 | -4.26 | 18.36 |
| | 1880 | 25.23 | 23.57 | -1.66 | 22.89 | -4.26 | 18.63 |
| | 1909.8 | 25.23 | 23.70 | -1.53 | 23.05 | -4.26 | 18.79 |
| GPRS1900 (4 Slot) | 1850.2 | 24 | 22.77 | -1.23 | 22.13 | -3 | 19.13 |
| | 1880 | 24 | 22.53 | -1.47 | 22.05 | -3 | 19.05 |
| | 1909.8 | 24 | 22.91 | -1.09 | 22.25 | -3 | 19.25 |

6.2 RADIATED OUTPUT POWER

6.2.1 MEASUREMENT METHOD

The measurements procedures specified in ANSI/TIA-603-D-2010 were applied.

1. Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 with the EUT transmitting into an integral antenna. Measurements on signal operating below 1GHz are performed using dipole antennas. Measurements on signals operating above 1GHz are performed using broadband horn antennas. All measurements are performed as RMS average measurements while the EUT operating at its maximum duty cycle, at maximum power, and at the approximate frequencies.
2. In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference centre of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power (P_{in}) is applied to the input of the dipole, and the power received (P_r) at the chamber's probe antenna is recorded.
3. The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established as $AR_{pl} = P_{in} + 2.15 - P_r$. The AR_{pl} is the attenuation of "reference path loss", and including the gain of receive antenna, the cable loss and the air loss. The measurement results are obtained as described below: $Power = P_{Mea} + AR_{pl}$
4. The EUT is substituted for the dipole at the reference centre of the chamber and a scan is performed to obtain the radiation pattern.
5. From the radiation pattern, the co-ordinates where the maximum antenna gain occurs are identified.
6. The EUT is then put into continuously transmitting mode at its maximum power level.
7. Power mode measurements are performed with the receiving antenna placed at the coordinates determined in Step 3 to determine the output power as defined in Rule 24.232 (b) and (c). The "reference path loss" from Step1 is added to this result.
8. This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.15 dBi) and known input power (P_{in}).
9. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15dBi...$

6.2.2 PROVISIONS APPLICABLE

This is the test for the maximum radiated power from the EUT. Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) 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 "Maximum ERP. The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."

| Mode | Nominal Peak Power |
|-------------|---------------------------|
| GSM 850 | <=38.45 dBm (7W) |
| GPRS 850 | <=38.45 dBm (7W) |
| PCS 1900 | <=33 dBm (2W) |
| GPRS 1900 | <=33 dBm (2W) |

6.2.3 MEASUREMENT RESULT

| Radiated Power (ERP) for GSM 850 | | | | |
|----------------------------------|-----------|---------------------|--------------------------|------------|
| Mode | Frequency | Result | | Conclusion |
| | | Max. Peak ERP (dBm) | Polarization Of Max. ERP | |
| GSM 850 | 824.2 | 30.22 | Horizontal | Pass |
| | 836.6 | 30.15 | Horizontal | Pass |
| | 848.8 | 30.41 | Horizontal | Pass |
| | 824.2 | 28.48 | Vertical | Pass |
| | 836.6 | 28.11 | Vertical | Pass |
| | 848.8 | 28.56 | Vertical | Pass |

| Radiated Power (E.I.R.P) for PCS 1900 | | | | |
|---------------------------------------|-----------|-------------------------|-------------------------------|------------|
| Mode | Frequency | Result | | Conclusion |
| | | Max. Peak E.I.R.P.(dBm) | Polarization Of Max. E.I.R.P. | |
| GSM 1900 | 1850.2 | 28.13 | Horizontal | Pass |
| | 1880.0 | 28.26 | Horizontal | Pass |
| | 1909.8 | 28.10 | Horizontal | Pass |
| | 1850.2 | 26.24 | Vertical | Pass |
| | 1880.0 | 26.11 | Vertical | Pass |
| | 1909.8 | 26.02 | Vertical | Pass |

Note: Above is the worst mode data.

6.3. PEAK-TO-AVERAGE RATIO

6.3.1 MEASUREMENT METHOD

Use one of the procedures presented in 4.1 to measure the total peak power and record as PPk. Use one of the applicable procedures presented 4.2 to measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

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

6.3.2 PROVISIONS APPLICABLE

This is the test for the Peak-to-Average Ratio from the EUT.

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

6.3.3 MEASUREMENT RESULT

| Modes | GSM850(GSM) | | |
|---------------------------------------|--------------------|--------------|---------------|
| Channel | 128 | 190 | 251 |
| | (Low) | (Mid) | (High) |
| Frequency (MHz) | 824.2 | 836.6 | 848.8 |
| Peak-To-Average Ratio (dB)/GSM | 0.62 | 0.65 | 0.61 |

| Modes | PCS 1900 (GSM) | | |
|---------------------------------------|-----------------------|--------------|---------------|
| Channel | 512 | 661 | 810 |
| | (Low) | (Mid) | (High) |
| Frequency (MHz) | 1850.2 | 1880 | 1909.8 |
| Peak-To-Average Ratio (dB)/GSM | 0.57 | 0.56 | 0.59 |

7. OCCUPIED BANDWIDTH

7.1 TEST OVERVIEW

1. The Occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper Frequency limits, the mean power radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.
2. RBW=1~5% of the expected OBW, VBW>=3 x RBW, Detector=Peak, Trace mode=max hold, Sweep=auto couple, and the trace was allowed to stabilize.

7.2 PROVISIONS APPLICABLE

The emission bandwidth is defined as two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power

7.3 Measurement Result

APPENDIX A: BANDWIDTH

Test Results

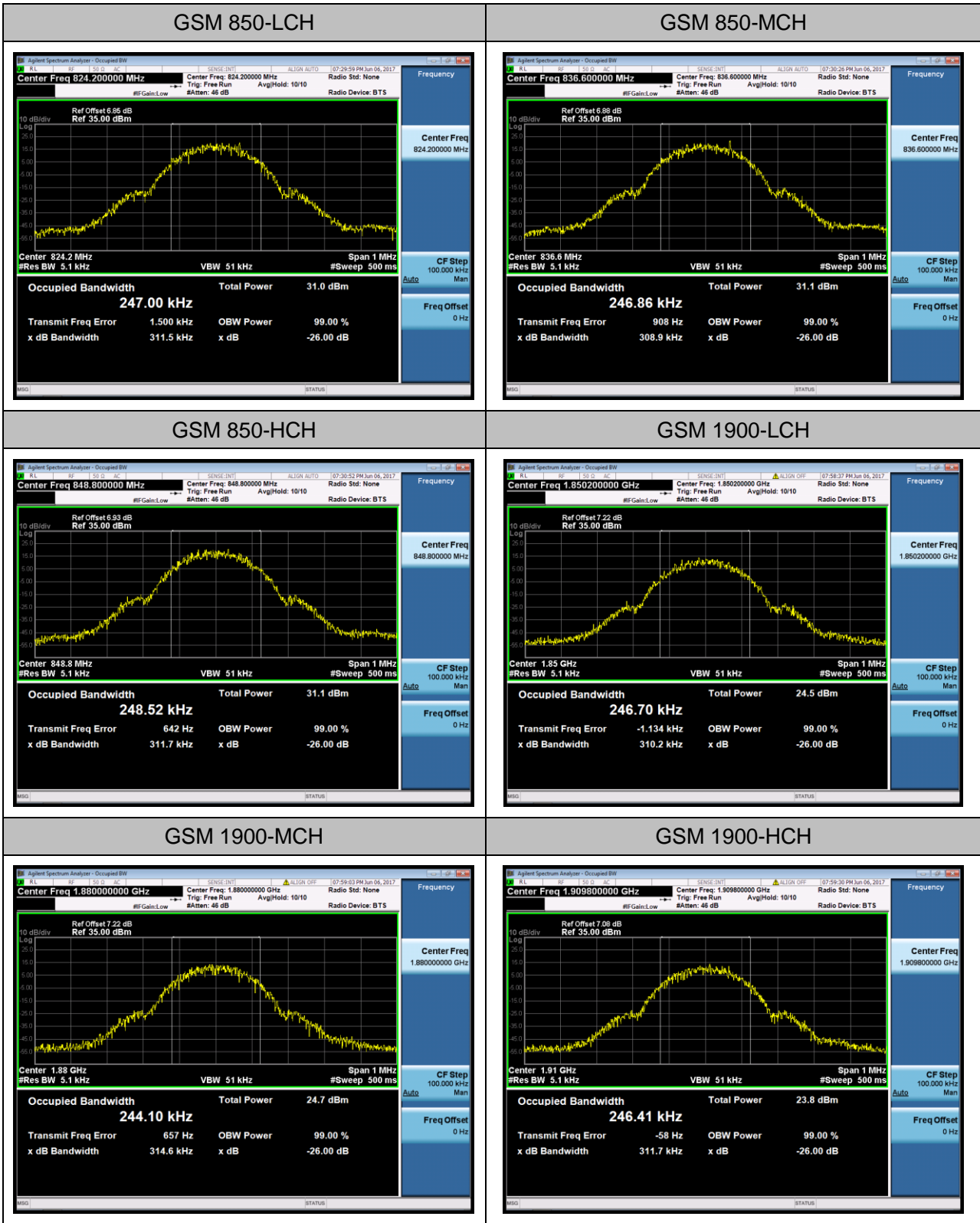
| Test Band | Test Mode | Test Channel | Occupied Bandwidth (KHZ) | Emission Bandwidth (KHZ) | Verdict |
|-----------|-----------|--------------|--------------------------|--------------------------|---------|
| GSM850 | GSM | LCH | 247.00 | 307.07 | PASS |
| | | MCH | 246.86 | 312.18 | PASS |
| | | HCH | 248.52 | 310.25 | PASS |

| Test Band | Test Mode | Test Channel | Occupied Bandwidth (KHZ) | Emission Bandwidth (KHZ) | Verdict |
|-----------|-----------|--------------|--------------------------|--------------------------|---------|
| GSM1900 | GSM | LCH | 246.70 | 310.17 | PASS |
| | | MCH | 244.10 | 314.59 | PASS |
| | | HCH | 246.41 | 311.72 | PASS |

For GSM

Test Band=GSM850/GSM1900

Test Mode=GSM



8. BAND EDGE

8.1 measurement method

1. All out of band emissions are measured with an analyzer spectrum connected to the antenna terminal of the EUT while the EUT at its maximum duty cycle, at maximum power, and at the approximate frequencies. All data rates were investigated to determine the worst case configuration
2. The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.
3. Start and stop frequency were set such that the band edge would be placed in the center of the plot.
4. Span was set large enough so as to capture all out of band emissions near the band edge.
5. RBW>1% of the emission bandwidth, VBW >=3 x RBW, Detector=RMS, Number of points>=2 x Span/RBW, Trace mode=max hold, Sweep time=auto couple, and the trace was allowed to stabilize

8.2 PROVISIONS APPLICABLE

As Specified in FCC rules of 22.917(a) and 24.238(a) and KDB 971168 V02r02

8.3 Measurement Result

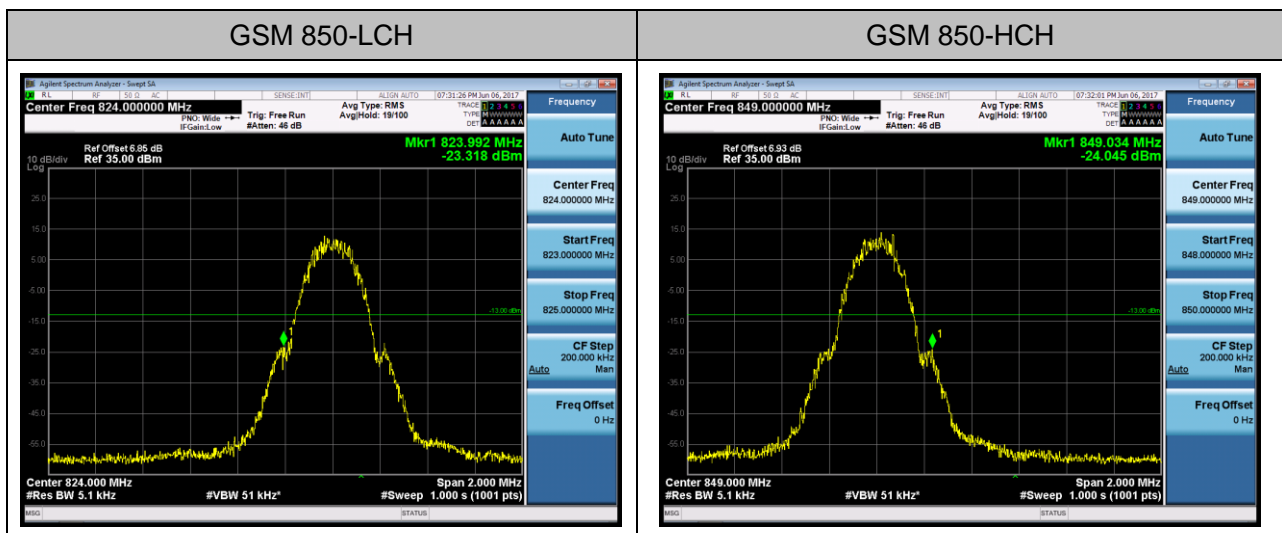
APPENDIX B: BAND EDGES COMPLIANCE

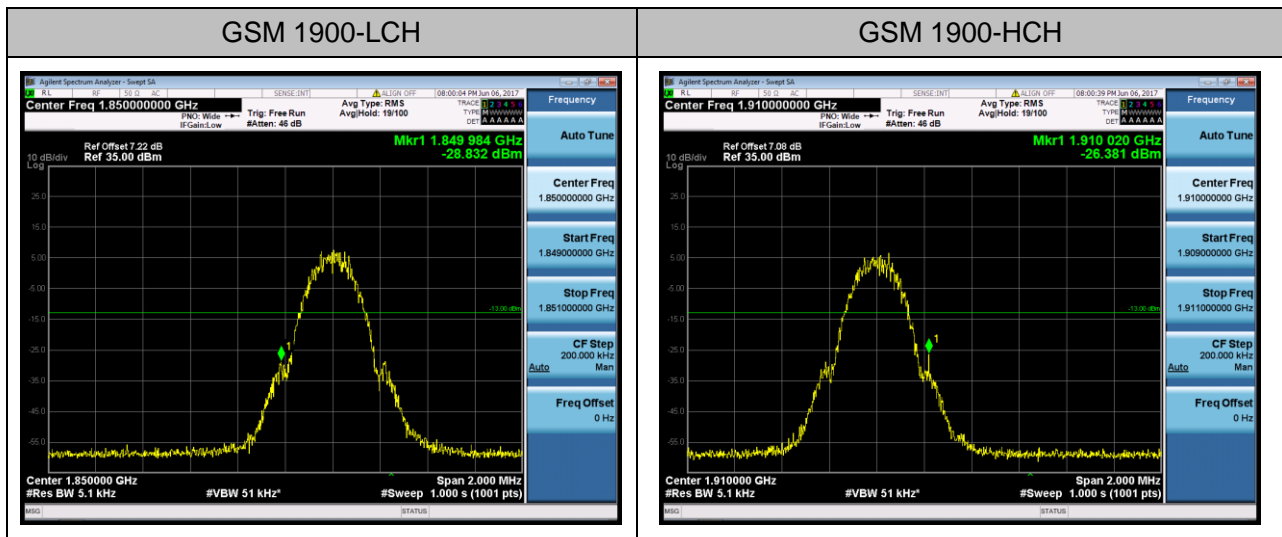
Test Results

For GSM

Test Band=GSM850/GSM1900

Test Mode=GSM





9. SPURIOUS EMISSION

9.1 CONDUCTED SPURIOUS EMISSION

9.1.1 MEASUREMENT METHOD

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

1. The level of the carrier and the various conducted spurious and harmonic frequency 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. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the approximate frequencies. All data rates were investigated to determine the worst case configuration.

2. 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 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz. For GSM 850, data taken from 30 MHz to 9 GHz.

3. Determine EUT transmit frequencies: the following typical channels were chosen to conducted emissions testing.

| Typical Channels for testing of GSM 850 | |
|---|-----------------|
| Channel | Frequency (MHz) |
| 128 | 824.2 |
| 190 | 836.6 |
| 251 | 848.8 |

| Typical Channels for testing of PCS 1900 |
|--|
|--|

| Channel | Frequency (MHz) |
|---------|-----------------|
| 512 | 1850.2 |
| 661 | 1880.0 |
| 810 | 1909.8 |

9.1.2 PROVISIONS APPLICABLE

On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least $43+10\log(P)$ dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

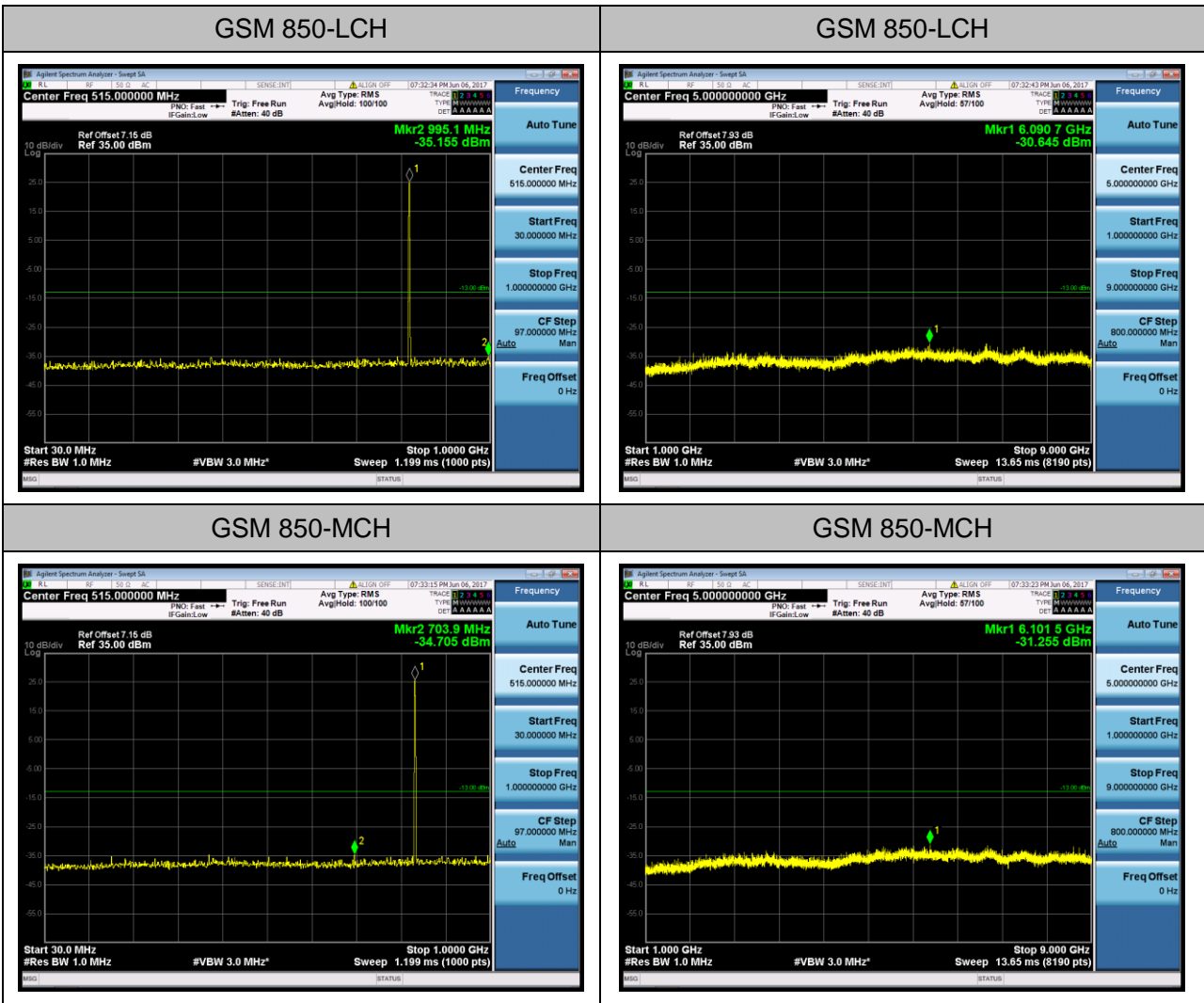
9.1.3 MEASUREMENT RESULT

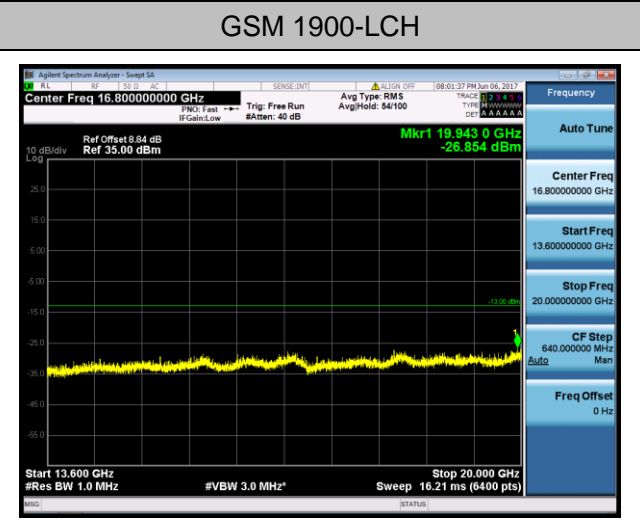
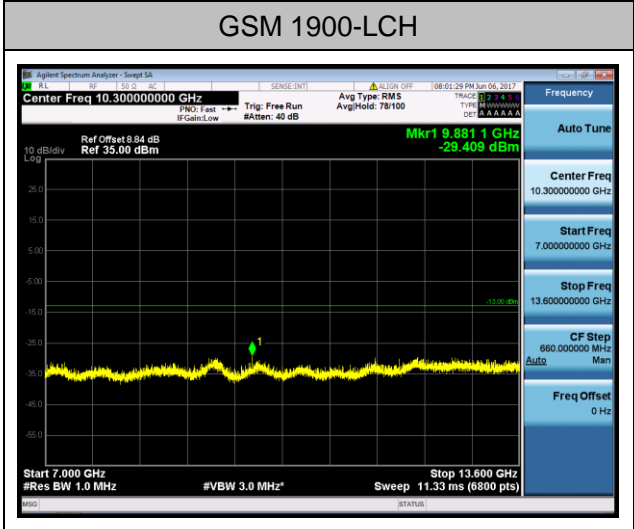
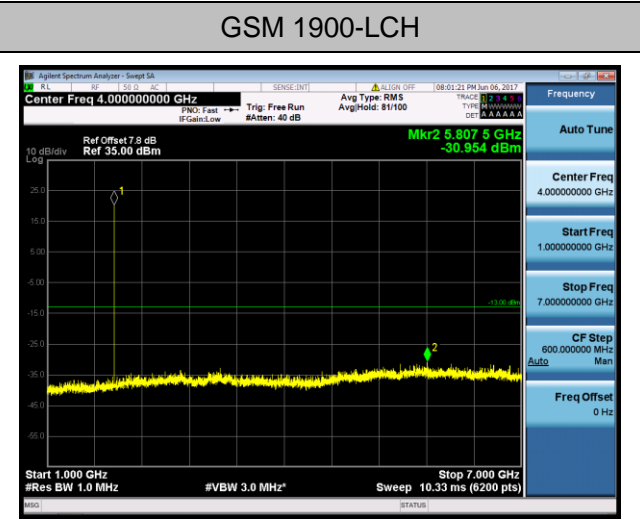
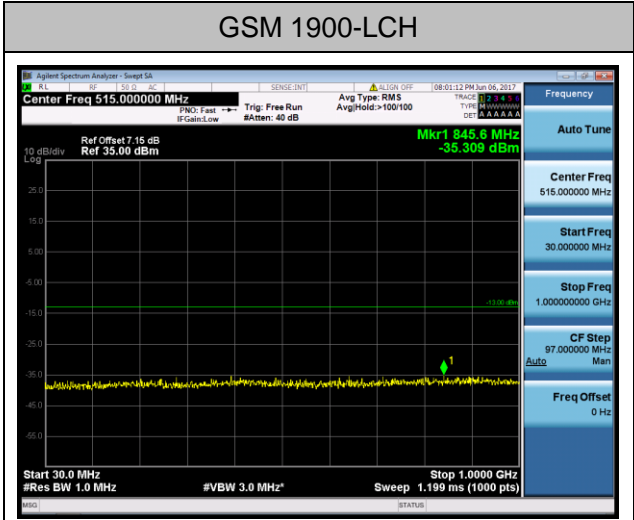
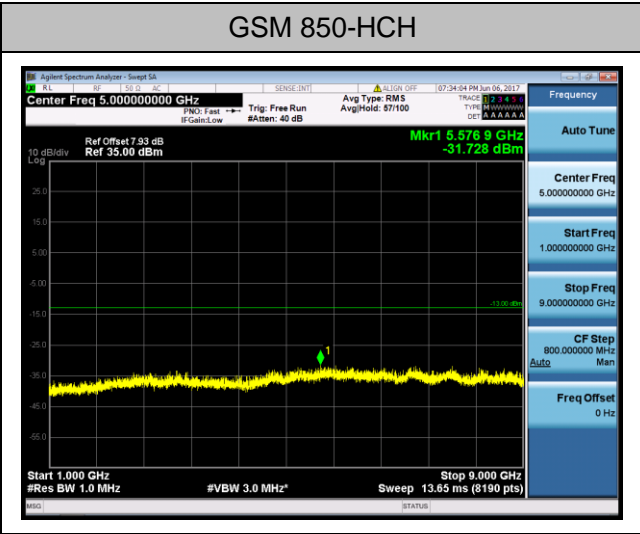
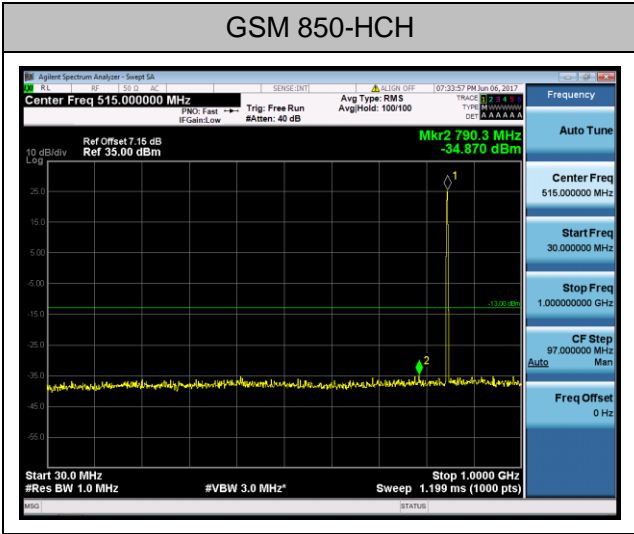
APPENDIX C: SPURIOUS EMISSION AT ANTENNA TERMINAL

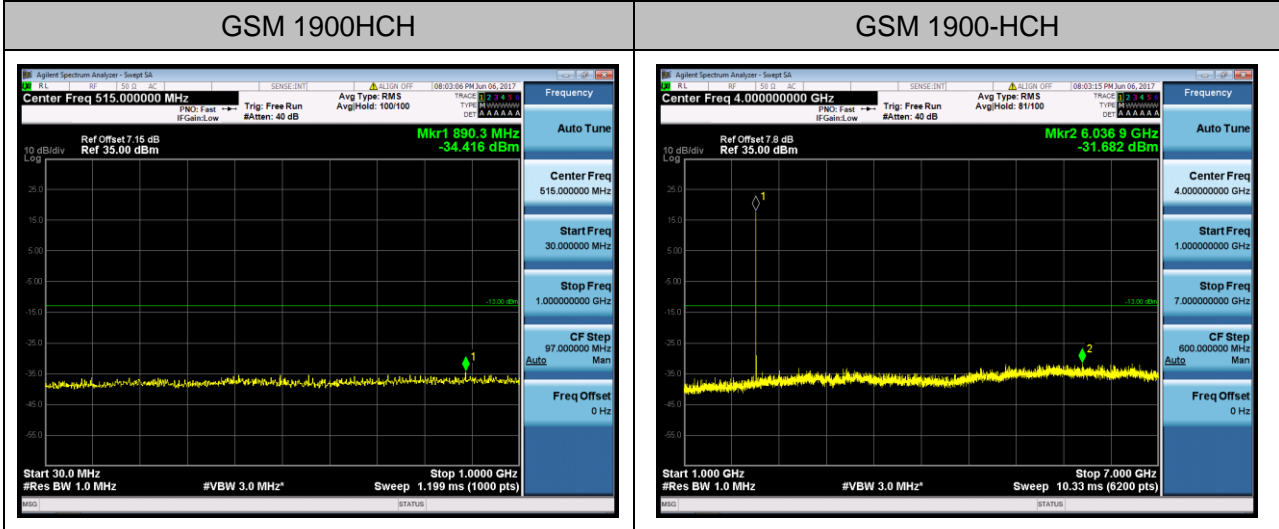
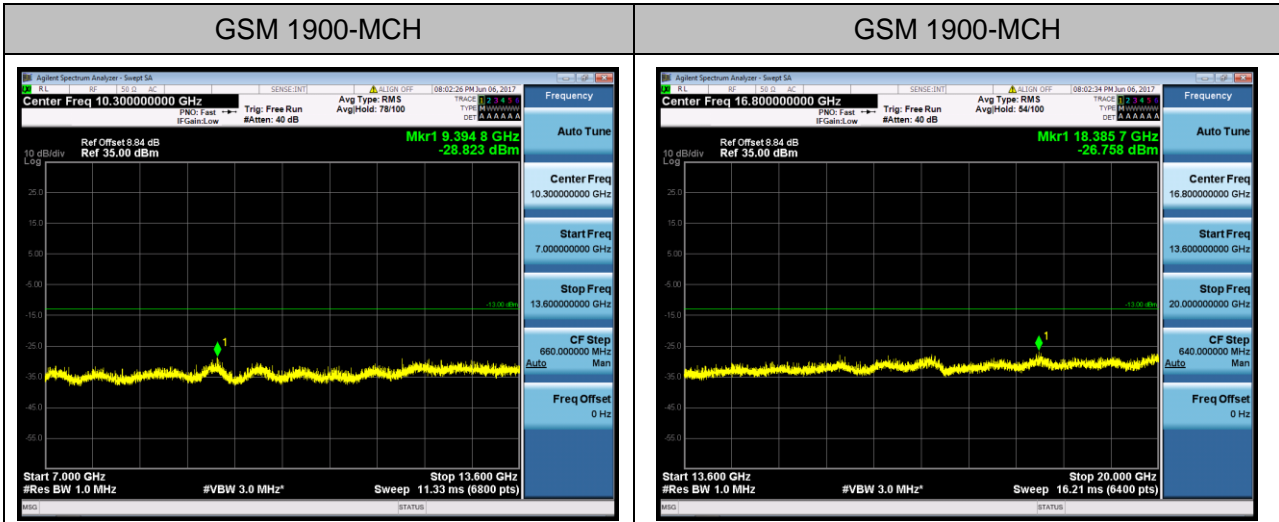
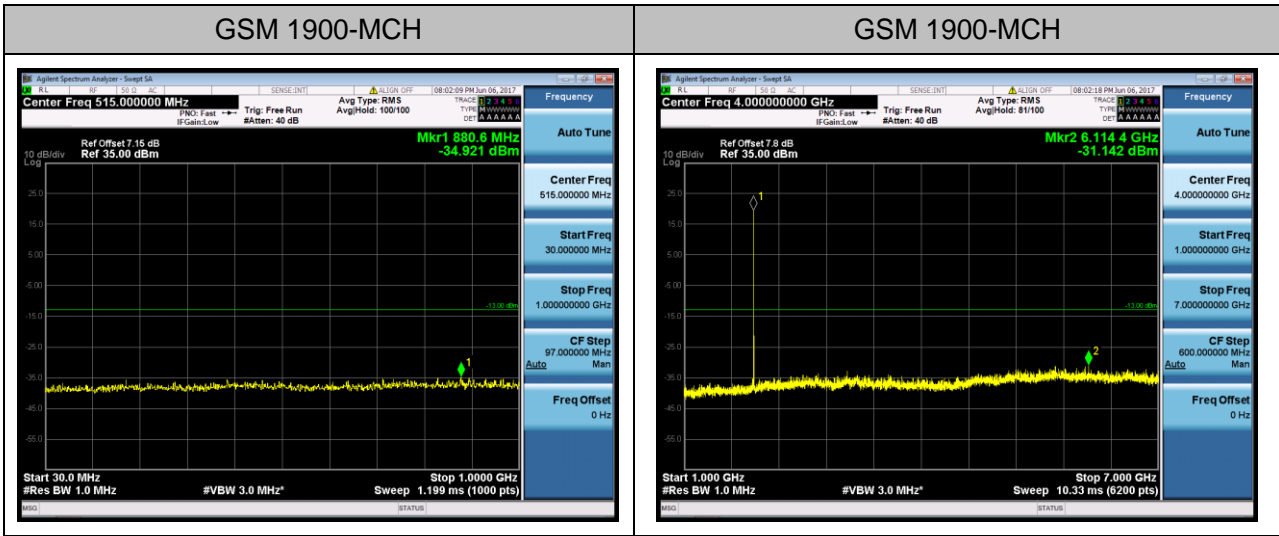
Test Results

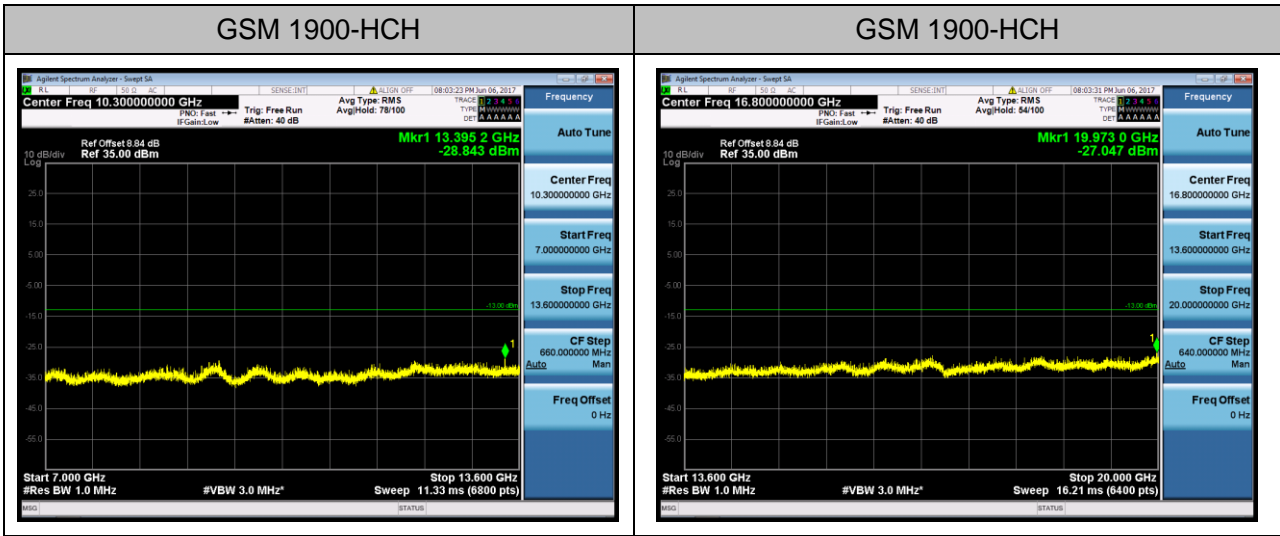
Test Band=GSM850/GSM1900

Test Mode=GSM









- Note:**
1. Below 30MHz no Spurious found and The GSM modes is the worst condition.
 2. As no emission found in standby or receive mode, no recording in this report.

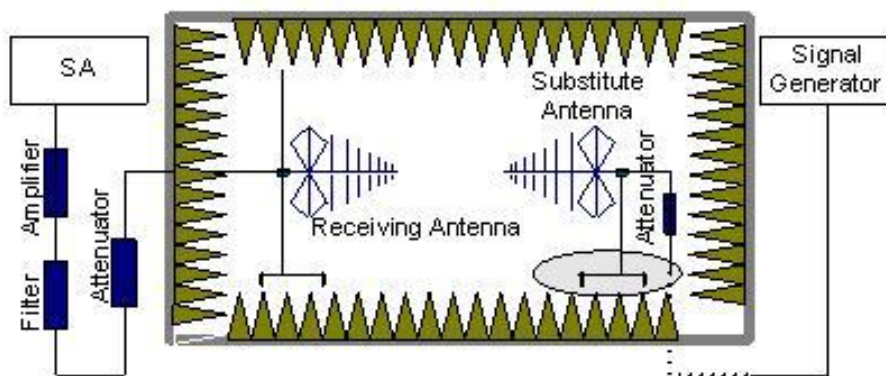
9.2 RADIATED SPURIOUS EMISSION

9.2.1 MEASUREMENT METHOD

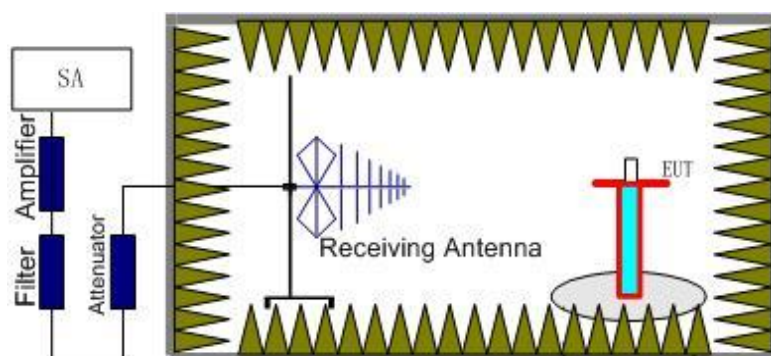
The measurements procedures specified in TIA-603-D-2010 were used for testing. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set 1MHz as outlined in Part 24.238. The measurements were performed on all modes(GPRS 850, GPRS 1900) at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for each band.

The procedure of radiated spurious emissions is as follows:

a) Pre-calibration With pre-calibration method, the Radiated Spurious Emissions(RSE) is calculated as, $RSE = R_x (\text{dBuV}) + CL (\text{dB}) + SA (\text{dB}) + \text{Gain} (\text{dBi}) - 107 (\text{dBuV to dBm})$ The SA is calibrated using following setup.



b) EUT was placed on a 0.8 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 test item for emission measurements. The height of receiving antenna is 0.8m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the test item and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1MHz bandwidth.



Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the PCS 1900 band (1850.2 MHz, 1880 MHz and 1909.8 MHz), GSM850 band (824.2MHz, 836.6MHz, 848.8MHz). It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of any band into any of the other blocks.

The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established and the A_{Rpl} is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss and the air loss. The measurement results are obtained as described below: $Power = P_{Mea} + A_{Rpl}$

9.2.2 PROVISIONS APPLICABLE

(a) On any frequency outside a licensee's frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by 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.

Note: only result the worst condition of each test mode:

9.2.3 MEASUREMENT RESULT

GSM 850:

| The Worst Test Results for Channel 251/848.8 MHz | | | | | |
|--|------------|------------|-----------|-------------|------------|
| Frequency(MHz) | Power(dBm) | ARpl (dBm) | PMea(dBm) | Limit (dBm) | Polarity |
| 1687.34 | -44.64 | -5.01 | -49.65 | -13.00 | Horizontal |
| 2459.52 | -43.17 | -2.18 | -45.35 | -13.00 | Vertical |
| 3644.51 | -44.21 | 3.46 | -40.75 | -13.00 | Vertical |
| 4542.86 | -43.23 | 2.79 | -40.44 | -13.00 | Horizontal |

PCS 1900:

| The Worst Test Results for Channel 810/1909.8MHz | | | | | |
|--|------------|------------|-----------|-------------|------------|
| Frequency(MHz) | Power(dBm) | ARpl (dBm) | PMea(dBm) | Limit (dBm) | Polarity |
| 1431.25 | -46.96 | -3.22 | -50.18 | -13.00 | Vertical |
| 2568.41 | -48.08 | -0.24 | -48.32 | -13.00 | Vertical |
| 3647.15 | -44.24 | 3.98 | -40.26 | -13.00 | Horizontal |
| 4569.41 | -44.52 | 11.56 | -32.96 | -13.00 | Vertical |
| 5686.34 | -45.62 | 17.89 | -27.73 | -13.00 | Horizontal |

Note: ARpl= Factor=Antenna Factor+ Cable loss-Amplifier gain.

The "Factor" value can be calculated automatically by software of measurement system.

Below 30MHZ no Spurious found and The GSM modes is the worst condition.

10. MAINS CONDUCTED EMISSION

10.1 MEASUREMENT METHOD

The measurement procedure specified in ANSI/TIA-603-D-2010 was used for testing. Conducted Emission was measured with travel charger.

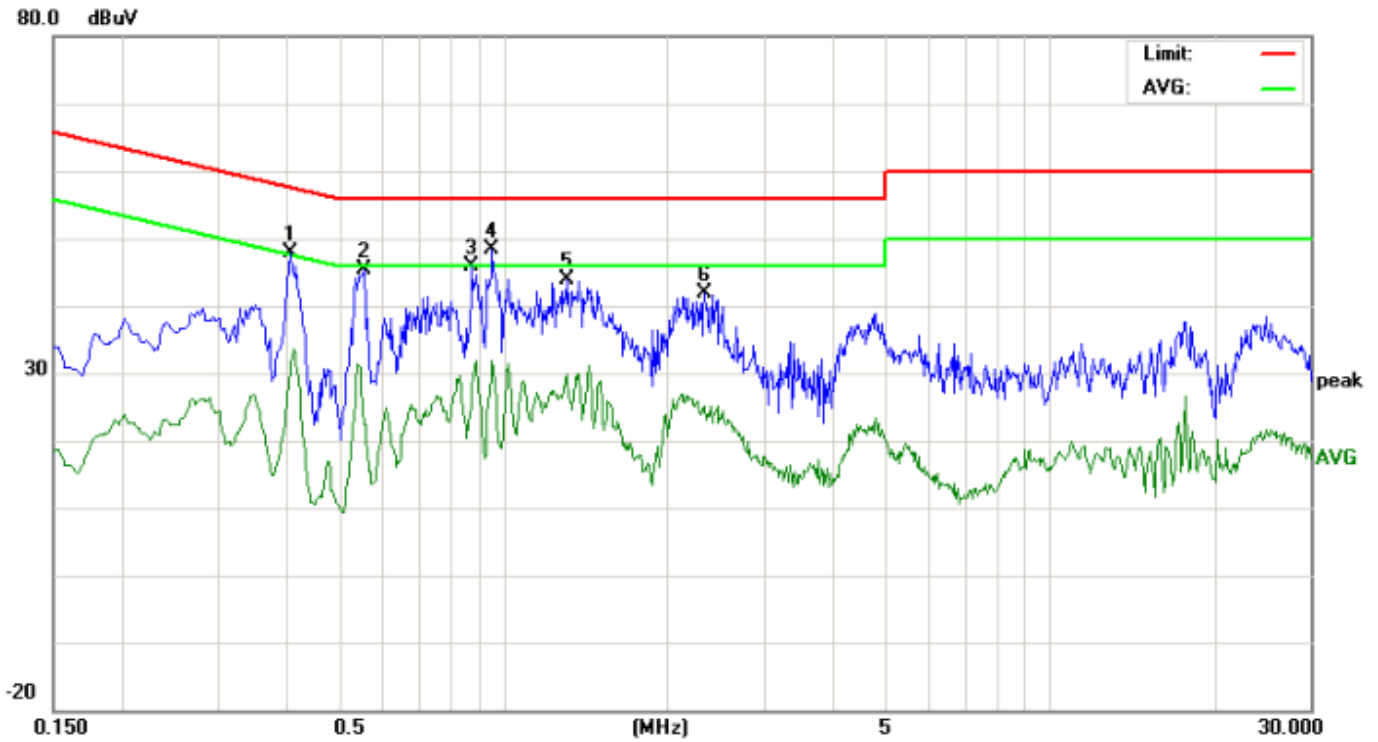
10.2 PROVISIONS APPLICABLE

| Frequency of Emission (MHz) | Conducted Limit(dBuV) | |
|--|-----------------------|------------|
| | Quasi-Peak | Average |
| 0.15 – 0.5 | 66 to 56 * | 56 to 46 * |
| 0.5 – 5 | 56 | 46 |
| 5 – 30 | 60 | 50 |
| *Decreases with the logarithm of the frequency. *The lower limit shall apply at the transition frequency. | | |

Note: The GSM850 mode is the worst condition and the test result as following:

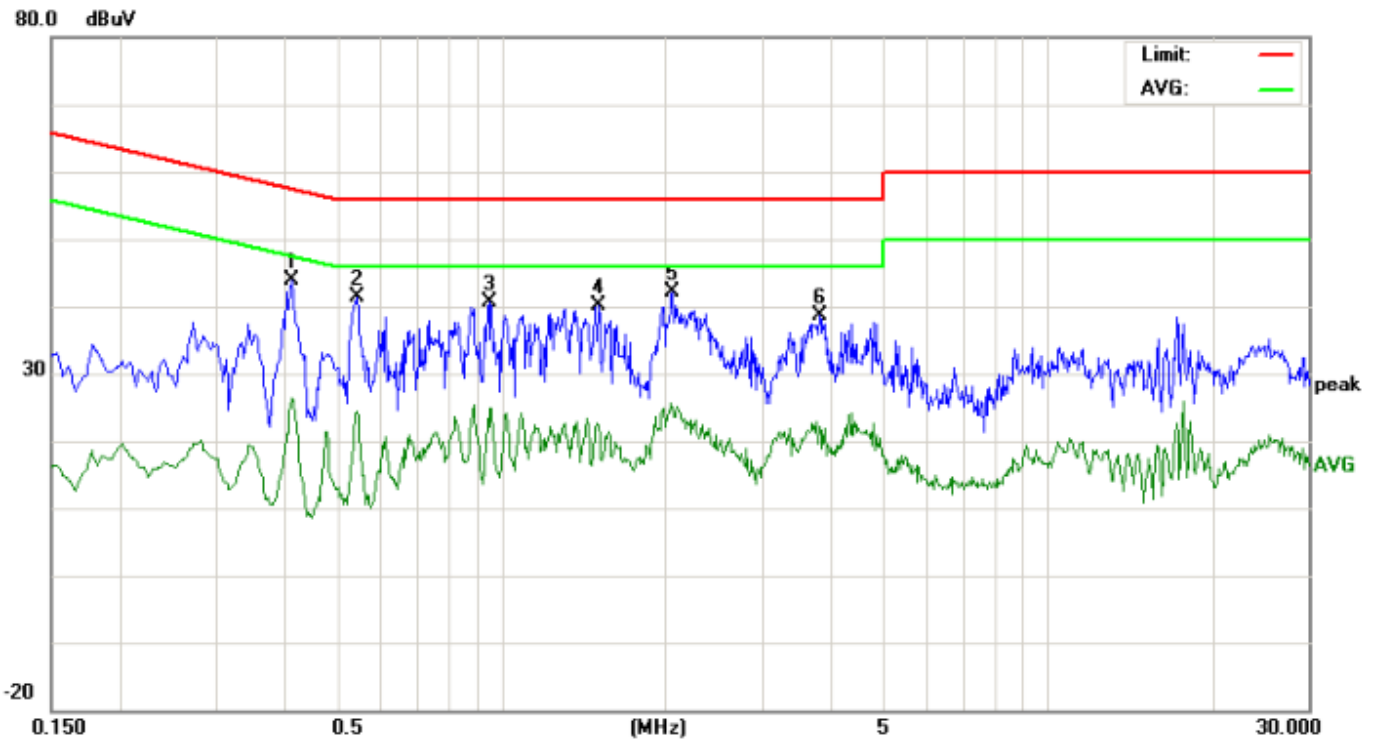
10.3 MEASUREMENT RESULT

LINE CONDUCTED EMISSION – L



| No. | Freq. (MHz) | Reading_Level (dBuV) | | | Correct Factor (dB) | Measurement (dBuV) | | | Limit (dBuV) | | Margin (dB) | | P/F | Comment |
|-----|-------------|----------------------|----|-------|---------------------|--------------------|----|-------|--------------|-------|-------------|--------|-----|---------|
| | | Peak | QP | AVG | | Peak | QP | AVG | QP | AVG | QP | AVG | | |
| 1 | 0.4099 | 37.64 | | 21.57 | 10.34 | 47.98 | | 31.91 | 57.65 | 47.65 | -9.67 | -15.74 | P | |
| 2 | 0.5580 | 34.95 | | 12.02 | 10.35 | 45.30 | | 22.37 | 56.00 | 46.00 | -10.70 | -23.63 | P | |
| 3 | 0.8780 | 35.51 | | 17.39 | 10.38 | 45.89 | | 27.77 | 56.00 | 46.00 | -10.11 | -18.23 | P | |
| 4 | 0.9579 | 37.93 | | 21.39 | 10.39 | 48.32 | | 31.78 | 56.00 | 46.00 | -7.68 | -14.22 | P | |
| 5 | 1.3060 | 33.57 | | 19.59 | 10.38 | 43.95 | | 29.97 | 56.00 | 46.00 | -12.05 | -16.03 | P | |
| 6 | 2.3380 | 31.60 | | 14.88 | 10.36 | 41.96 | | 25.24 | 56.00 | 46.00 | -14.04 | -20.76 | P | |

LINE CONDUCTED EMISSION – N



| No. | Freq. (MHz) | Reading_Level (dBuV) | | | Correct Factor (dB) | Measurement (dBuV) | | | Limit (dBuV) | | Margin (dB) | | P/F | Comment |
|-----|-------------|----------------------|----|-------|---------------------|--------------------|----|-------|--------------|-------|-------------|--------|-----|---------|
| | | Peak | QP | AVG | | Peak | QP | AVG | QP | AVG | QP | AVG | | |
| 1 | 0.4139 | 33.66 | | 15.94 | 10.34 | 44.00 | | 26.28 | 57.57 | 47.57 | -13.57 | -21.29 | P | |
| 2 | 0.5460 | 30.92 | | 13.98 | 10.36 | 41.28 | | 24.34 | 56.00 | 46.00 | -14.72 | -21.66 | P | |
| 3 | 0.9579 | 30.22 | | 14.43 | 10.39 | 40.61 | | 24.82 | 56.00 | 46.00 | -15.39 | -21.18 | P | |
| 4 | 1.5060 | 29.68 | | 12.01 | 10.38 | 40.06 | | 22.39 | 56.00 | 46.00 | -15.94 | -23.61 | P | |
| 5 | 2.0579 | 31.85 | | 14.53 | 10.24 | 42.09 | | 24.77 | 56.00 | 46.00 | -13.91 | -21.23 | P | |
| 6 | 3.8380 | 28.22 | | 11.61 | 10.46 | 38.68 | | 22.07 | 56.00 | 46.00 | -17.32 | -23.93 | P | |

Note: The GSM850 mode is the worst condition.

11. FREQUENCY STABILITY

11.1 MEASUREMENT METHOD

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 -10°C.
3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on channel 661 for PCS 1900 band, channel 190 for GSM 850 band, channel 9400 for UMTS band II and channel 4175 for UMTS band V 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°C increments from -10°C to +55°C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +55°C.
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°C increments from +55°C to -10°C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

11.2 PROVISIONS APPLICABLE

11.2.1 For Hand carried battery powered equipment

According to the ANSI/TIA-603-D-2010, 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 3.4V DC and 4.2V DC, with a nominal voltage of 4.2 DC V. 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.

11.2.2 For equipment powered by primary supply voltage

According to the ANSI/TIA-603-D-2010, 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, the normal environment temperature is 20°C.

11.3 MEASUREMENT RESULT

Appendix D:Frequency Stability

Test Results

Frequency Error vs. Voltage:

| Test Band | Test Mode | Test Channel | Test Temp. | Test Volt.(V) | Freq.Error (Hz) | Freq.vs.rated (ppm) | Limit (ppm) | Verdict |
|-----------|-----------|--------------|------------|---------------|-----------------|---------------------|-------------|---------|
| GSM850 | GSM | LCH | TN | 3.4 | -2.97 | 0.00 | ±2.5 | PASS |
| | | | TN | 3.7 | -3.62 | 0.00 | ±2.5 | PASS |
| | | | TN | 4.2 | -2.71 | 0.00 | ±2.5 | PASS |
| | | MCH | TN | 3.4 | -10.33 | -0.01 | ±2.5 | PASS |
| | | | TN | 3.7 | -8.07 | -0.01 | ±2.5 | PASS |
| | | | TN | 4.2 | -7.49 | -0.01 | ±2.5 | PASS |
| | | HCH | TN | 3.4 | -1.03 | 0.00 | ±2.5 | PASS |
| | | | TN | 3.7 | -5.42 | -0.01 | ±2.5 | PASS |
| | | | TN | 4.2 | -6.52 | -0.01 | ±2.5 | PASS |

| Test Band | Test Mode | Test Channel | Test Temp. | Test Volt. (V) | Freq.Error (Hz) | Freq.vs.rated (ppm) | Limit (ppm) | Verdict |
|-----------|-----------|--------------|------------|----------------|-----------------|---------------------|-------------|---------|
| GSM1900 | GSM | LCH | TN | 3.4 | -4.91 | 0.00 | ±2.5 | PASS |
| | | | TN | 3.7 | -4.33 | 0.00 | ±2.5 | PASS |
| | | | TN | 4.2 | 0.26 | 0.00 | ±2.5 | PASS |
| | | MCH | TN | 3.4 | -9.36 | 0.00 | ±2.5 | PASS |
| | | | TN | 3.7 | -7.23 | 0.00 | ±2.5 | PASS |
| | | | TN | 4.2 | -10.46 | -0.01 | ±2.5 | PASS |
| | | HCH | TN | 3.4 | -21.24 | -0.01 | ±2.5 | PASS |
| | | | TN | 3.7 | -22.08 | -0.01 | ±2.5 | PASS |
| | | | TN | 4.2 | -21.70 | -0.01 | ±2.5 | PASS |

Frequency Error vs. Temperature:

| Test Band | Test Mode | Test Channel | Test Volt. | Test Temp. | Freq.Error (Hz) | Freq.vs.rated (ppm) | Limit (ppm) | Verdict |
|-----------|-----------|--------------|------------|------------|-----------------|---------------------|-------------|---------|
| GSM850 | GSM | LCH | VN | -10 | -3.10 | 0.00 | ±2.5 | PASS |
| | | | VN | 0 | -4.71 | -0.01 | ±2.5 | PASS |
| | | | VN | 10 | -0.77 | 0.00 | ±2.5 | PASS |
| | | | VN | 20 | 0.77 | 0.00 | ±2.5 | PASS |
| | | | VN | 30 | -7.81 | -0.01 | ±2.5 | PASS |
| | | | VN | 40 | -4.97 | -0.01 | ±2.5 | PASS |
| | | | VN | 50 | -1.03 | 0.00 | ±2.5 | PASS |
| GSM850 | GSM | MCH | VN | -10 | -8.98 | -0.01 | ±2.5 | PASS |
| | | | VN | 0 | -10.91 | -0.01 | ±2.5 | PASS |
| | | | VN | 10 | -14.72 | -0.02 | ±2.5 | PASS |
| | | | VN | 20 | -9.04 | -0.01 | ±2.5 | PASS |
| | | | VN | 30 | -11.04 | -0.01 | ±2.5 | PASS |
| | | | VN | 40 | -13.11 | -0.02 | ±2.5 | PASS |
| | | | VN | 50 | -9.10 | -0.01 | ±2.5 | PASS |
| GSM850 | GSM | HCH | VN | -10 | -2.45 | 0.00 | ±2.5 | PASS |
| | | | VN | 0 | -4.52 | -0.01 | ±2.5 | PASS |
| | | | VN | 10 | -5.81 | -0.01 | ±2.5 | PASS |
| | | | VN | 20 | -6.01 | -0.01 | ±2.5 | PASS |
| | | | VN | 30 | -4.46 | -0.01 | ±2.5 | PASS |
| | | | VN | 40 | -2.45 | 0.00 | ±2.5 | PASS |
| | | | VN | 50 | -3.68 | 0.00 | ±2.5 | PASS |

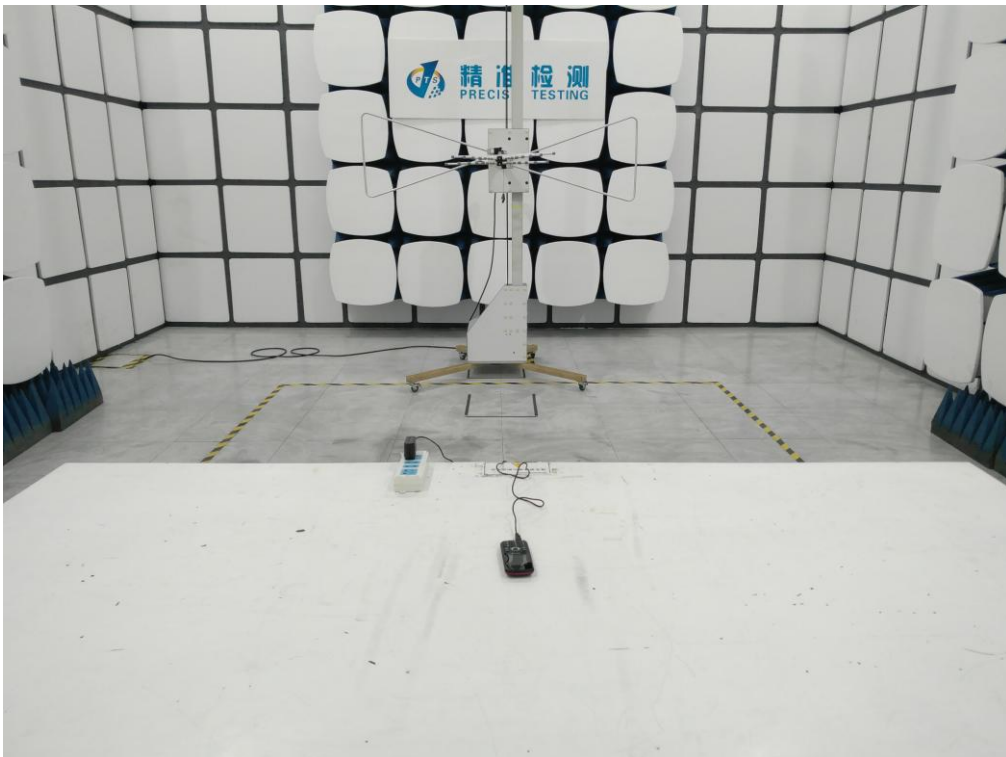
| Test Band | Test Mode | Test Channel | Test Volt. | Test Temp. | Freq.Error (Hz) | Freq.vs.rated (ppm) | Limit (ppm) | Verdict |
|-----------|-----------|--------------|------------|------------|-----------------|---------------------|-------------|---------|
| GSM1900 | GSM | LCH | VN | -10 | -1.74 | 0.00 | ±2.5 | PASS |
| | | | VN | 0 | -1.55 | 0.00 | ±2.5 | PASS |
| | | | VN | 10 | 0.06 | 0.00 | ±2.5 | PASS |
| | | | VN | 20 | 0.58 | 0.00 | ±2.5 | PASS |
| | | | VN | 30 | -0.39 | 0.00 | ±2.5 | PASS |
| | | | VN | 40 | 2.45 | 0.00 | ±2.5 | PASS |
| | | | VN | 50 | -2.32 | 0.00 | ±2.5 | PASS |
| GSM1900 | GSM | MCH | VN | -10 | -6.20 | 0.00 | ±2.5 | PASS |
| | | | VN | 0 | -8.39 | 0.00 | ±2.5 | PASS |
| | | | VN | 10 | -10.65 | -0.01 | ±2.5 | PASS |
| | | | VN | 20 | -13.11 | -0.01 | ±2.5 | PASS |
| | | | VN | 30 | -9.30 | 0.00 | ±2.5 | PASS |
| | | | VN | 40 | -5.75 | 0.00 | ±2.5 | PASS |
| | | | VN | 50 | -9.17 | 0.00 | ±2.5 | PASS |
| GSM1900 | GSM | HCH | VN | -10 | -22.92 | -0.01 | ±2.5 | PASS |
| | | | VN | 0 | -22.79 | -0.01 | ±2.5 | PASS |
| | | | VN | 10 | -27.70 | -0.01 | ±2.5 | PASS |
| | | | VN | 20 | -24.28 | -0.01 | ±2.5 | PASS |
| | | | VN | 30 | -19.11 | -0.01 | ±2.5 | PASS |
| | | | VN | 40 | -24.80 | -0.01 | ±2.5 | PASS |
| | | | VN | 50 | -23.63 | -0.01 | ±2.5 | PASS |

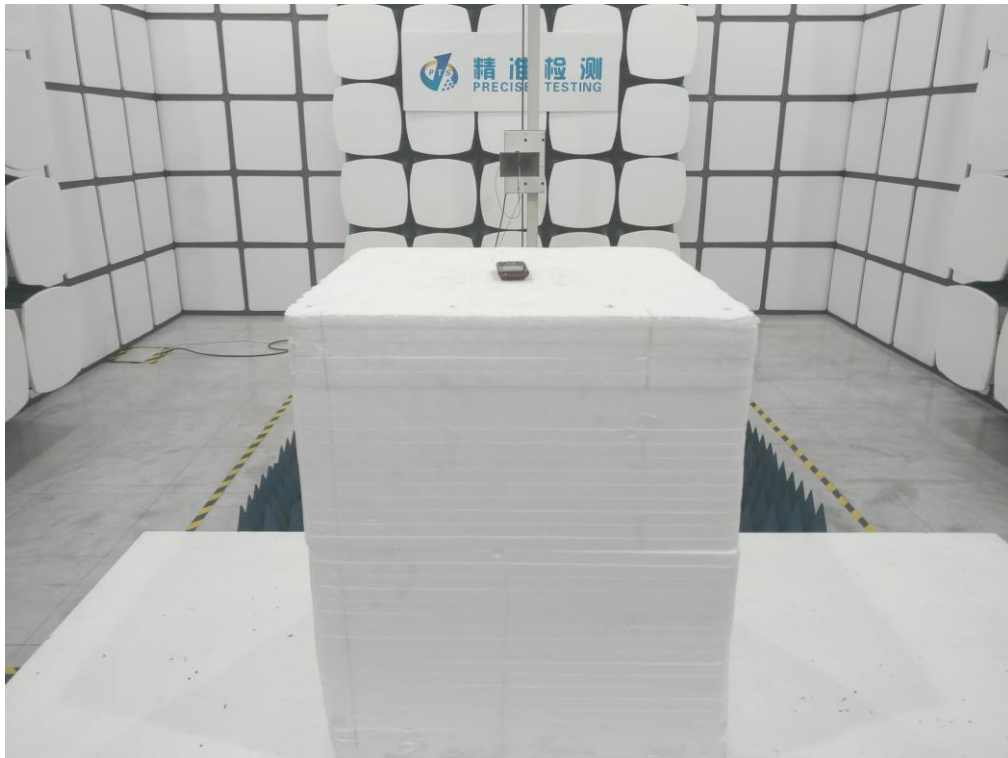
PHOTOGRAPHS OF TEST SETUP

CONDUCTED EMISSION



RADIATED SPURIOUS EMISSION





CONDUCTED MEASUREMENTS



----END OF REPORT----