FCC RF TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

Mobile Phone

ISSUED TO
Collage Investments LLC.

11437 NW 34 STREET, DORAL, FL 33178, United States

Report No.:	BL-SZ17A0272-602
EUT Name:	Mobile Phone
Model Name:	SNAP MAX
Brand Name:	SMOOTH
Test Standard:	47 CFR Part 2 (10-1-16 Edition)
	47 CFR Part 24 (10-1-16 Edition)
FCC ID:	GAO-SSMAX
Test Conclusion:	Pass
Test Date:	Oct. 20, 2017 ~ Oct. 25, 2017
Date of Issue:	Nov. 15, 2017

Tested by: Hu Chao
Hu Chao
(Engineer)
Date Nov. 15, 2017

Approved by:
Liao Jianming
(Technical Director)
Date Nov. 15. 2017

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Revision History

Version	Issue Date	Revisions Content
Rev. 01	Nov. 13, 2017	Initial Issue
Rev. 02	Nov. 15, 2017	Added GSM 850 test data.

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China.
Phone Number	+86 755 6685 0100
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location 1	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China.
Accreditation Certificate1	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory is a testing organization accredited by FCC as an accredited testing laboratory. The designation number is CN1196. The laboratory is a testing organization accredited by American Association for Laboratory Accreditation(A2LA) according to ISO/IEC 17025. The accreditation certificate number is 4344.01. The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Test Environment Condition

Ambient Temperature	20 to 35 °C
Ambient Relative Humidity	30 to 60 %
Ambient Pressure	98 to 102KPa

1.4 Announce

(1) The test report reference to the report template version v4.2.
(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
(3) The test report is invalid if there is any evidence and/or falsification.
(4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
(5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.
(6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Collage Investments LLC.
Address	11437 NW 34 STREET, DORAL, FL 33178, United States

2.2 Manufacturer Information

Manufacturer	Collage Investments LLC.
Address	11437 NW 34 STREET, DORAL, FL 33178, United States

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	Mobile Phone
Model Name	SNAP MAX
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	E05 V1.1
Software Version	TIANCHI_X02-T_V01_01-11-2017
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A
Network and Wireless connectivity	GSM 850/900/1800/1900 Bluetooth v3.0+EDR
About the Product	The equipment is Mobile Phone, intended for used with information technology equipment.

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	N/A
	Model No.	N/A
	Serial No.	N/A
	Capacity	1200 mAh
	Rated Voltage	3.7 V
Ancillary Equipment 2	Charger	
	Brand Name	N/A
	Model Name	HLS-001A
	Rated Input	100-240 V ~, 50/60 Hz
	Rated Output	5.0 V ⎓ 500±50 A

2.6 Technical Information

The requirement for the following technical information of the EUT was tested in this report:

Frequency Bands	GSM/GPRS 850/1900	
Modulation Type	GSM/GPRS	GMSK
TX Frequency Range	GSM/GPRS 850: 824 – 849 MHz GSM/GPRS 1900: 1850 - 1910 MHz	
Rx Frequency Range	GSM/GPRS 850: 869-894 MHz GSM/GPRS 1900 1930 - 1990 MHz	
Power Class	GSM/GPRS 850/1900: 1	
Multislot Class	GPRS: 12	
Antenna Type	Internal Permanent Antenna	
Antenna Gain	GSM/GPRS 850: 0.6 dBi; 1900:1.3 dBi	

Note 1: The EUT information are declared by manufacturer. For more detailed features description, please refer to the manufacturer's specifications or user's manual.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 2 (10－1－16 Edition)	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 24 (10－1－16 Edition)	Personal Communications Services
3	ANSI/TIA-603-E-2016	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
4	KDB 971168 D01 v03	Measurement Guidance for Certification of Licensed Digital Transmitters

3.2 Test Verdict

No.	Description	FCC Part No.	Test Result	Verdict
1	Conducted RF Output Power	2.1046	Reporting only (ANNEX A.1)	N/A
2	Effective (Isotropic) Radiated Power	2.1046 22.913 24.232	ANNEX A.1	N/A
3	Peak to average radio	2.1046 24.232(d)	ANNEX A.2	N/A
4	Occupied Bandwidth	2.1049 22.917	ANNEX A.3	N/A
5	Frequency Stability	2.1055 22.355 24.235	ANNEX A.4	N/A
6	Spurious Emission at Antenna Terminals	2.1051 22.917 24.238	ANNEX A.5	Pass
7	Band Edge	2.1051 22.917 24.238	ANNEX A.6	N/A
8	Field Strength of Spurious Radiation	2.1053 22.917 24.238	ANNEX A.7	Pass
Note: Only the frequency between 18 GHz-40 GHz is reflected in this report, so only the Spurious Emission at Antenna Terminals and Field Strength of Spurious Radiation is tested in this report.				

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

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

Relative Humidity	45% - 55%	
Atmospheric Pressure	100 kPa - 102 kPa	
Temperature	NT (Normal Temperature)	+22℃ to +25℃
Working Voltage of the EUT	NV (Normal Voltage)	3.7 V

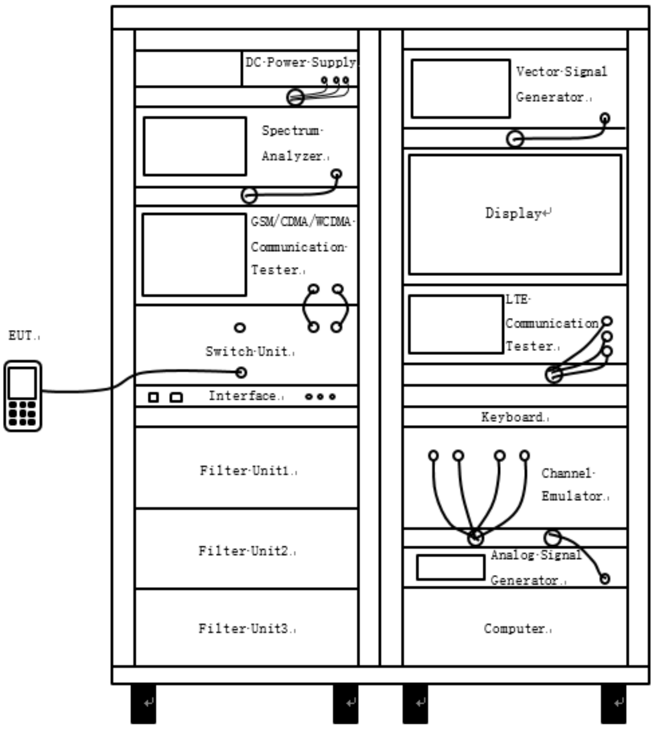
4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Software /Firmware Version	Cal. Date	Cal. Due
Wireless Communications Test Set	R&S	CMW 500	142028	V3.2.73	2017.06.12	2018.06.11
Power Splitter	KMW	DCPD-LDC	1305003215	N/A	N/A	N/A
Attenuator (20 dB)	KMW	ZA-S1-201	110617091	N/A	N/A	N/A
Attenuator (6 dB)	KMW	ZA-S1-61	1305003189	N/A	N/A	N/A
Spectrum Analyzer	R&S	FSV-40	101544	2.30.SP4	2017.06.12	2018.06.11
DC Power Supply	R&S	IT6863A	6000140106 87210020	N/A	2017.06.12	2018.06.11
Temperature Chamber	AHK	SP20	1412	N/A	2017.07.12	2018.07.11
Test Antenna-Horn (18-40 GHz)	A-INFO	LB-180400KF	J211060273	N/A	2017.01.06	2018.01.05
Anechoic Chamber	EMC Electronic Co., Ltd	20.10m*11.60m*7.35m	N/A	N/A	2016.08.09	2018.08.08
Shielded Enclosure	ChangNing	CN-130701	130703	N/A	N/A	N/A
Test Software	BALUN	BL410_E	N/A	V16.921	N/A	N/A

Test Mode	UL Channel	UL Channel No.	UL Frequency (MHz)
GSM/GPRS/EGPRS 1900	LCH	512	1850.2
	MCH	661	1880.0
	HCH	810	1909.8

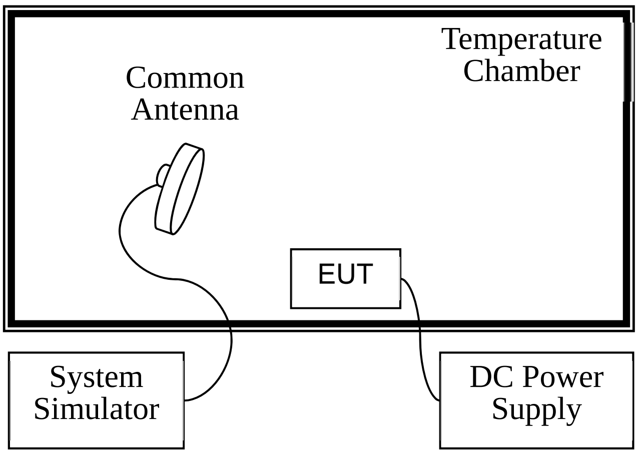
4.3 Test Setup

4.3.1 For Antenna Port Test



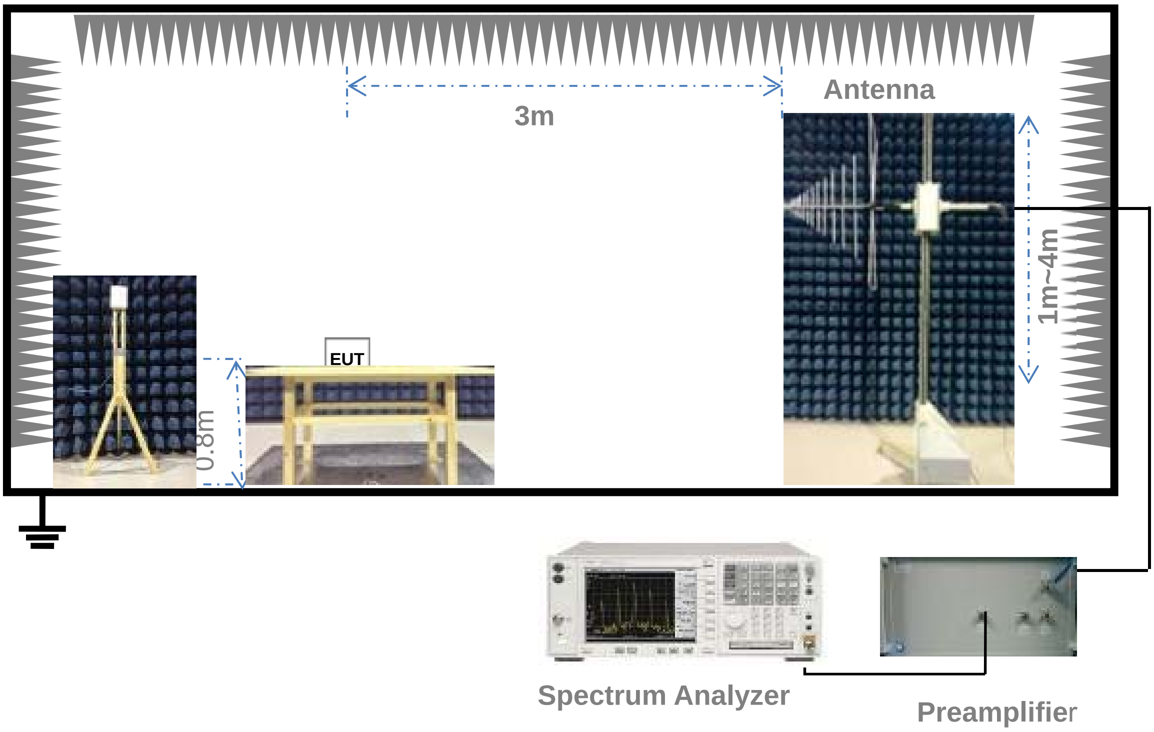
(Diagram 1)

4.3.2 For Frequency Stability Test



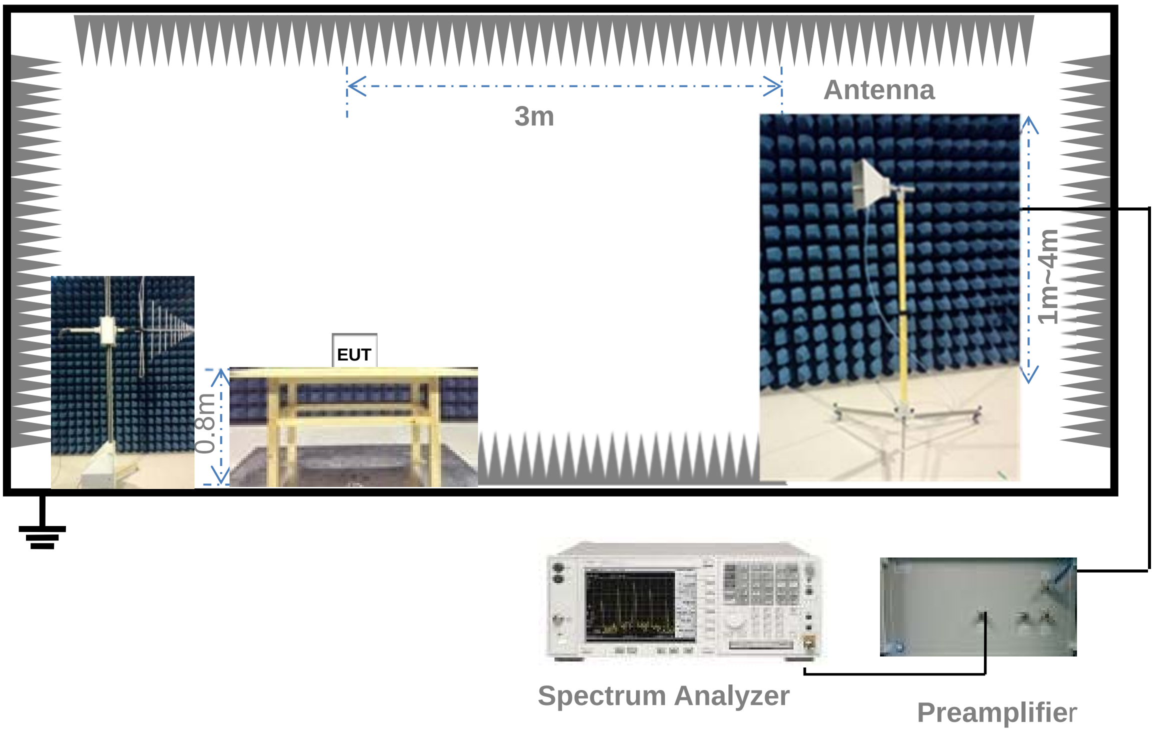
(Diagram 2)

4.3.3 For Radiated Test (30 MHz-1 GHz)



(Diagram 3)

4.3.4 For Radiated Test (Above 1 GHz)



(Diagram 4)

5 TEST ITEMS

5.1 Transmitter Radiated Power (EIRP/ERP)

5.1.1 Limit

FCC § 2.1046(a) & 22.913 & 24.232

According to FCC section 22.913, the Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

According to FCC section 24.232, 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.

5.1.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.3 Test Procedure

Description of the Conducted Output Power Measurement

The EUT is coupled to the SS with attenuator through power splitter; the RF load attached to EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. A system simulator was used to establish communication with the EUT, Its parameters were set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

Note: Reference test setup 4.4.1 (Diagram 1)

The relevant equation for determining the conducted measured value is:
Conducted Power Value (dBm) = Measurement Value (dBm) + Path Loss (dB)

where:
Conducted Power Value = Final conducted measured value in the conducted power test, in dBm;
Measurement Value = measured conducted power received by spectrum analyzer or power meter, in dBm;
Path Loss = signal attenuation in the connecting cable between the transmitter and spectrum analyzer or power meter, including external cable loss, in dB;

During the test, the data of Path Loss (dB) is added in the spectrum analyzer or power meter, so Measurement Value (dBm) is the final values which contains the data of Path Loss (dB).

For example:
In the conducted output power test, when measurement value for GSM850 is 24.7 dBm, and path loss is 8.5 dB, then final conducted output power value is:
Conducted Power Value (dBm) = 24.7 dBm + 8.5 dB = 33.2 dBm

Description of the Transmitter Radiated Power Measurement

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).

Final measurement calculation as below:

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.

For example:
In the ERP test, when P_{Meas} value for GSM850 is 33.2 dBm, LC is 0.6 dB, and GT is -3.4 dB, then final ERP value is:
ERP for GSM 850 = 33.2 dBm - 3.4 dBi -0.6 dB = 39.2 dBm

Note: Reference test setup 4.4.1 (Diagram 1)

The relevant equation for determining the ERP/EIRP from the radiated RF output power is:

ERP/EIRP (dBm) = SA Read Value (dBm) + Correction Factor (dB)

where:
ERP/EIRP = effective or equivalent radiated power, in dBm;
SA Read Value = measured transmitter power received by EMI receiver or spectrum analyzer, in dBm;
Correction Factor = total correction factor including cable loss, in dB;

During the test, the data of Correction Factor (dB) is added in the EMI receiver or spectrum analyzer, so SA Read Value (dBm) is the final values which contains the data of Correction Factor (dB).

For example:
In the ERP test, when SA read value for GSM850 is 21dBm, and correction factor is 8dB, then final ERP value for GSM850 is:
ERP (dBm) = 21dBm + 8dB = 29dBm
Note: Reference test setup 4.4.3 and 4.4.4 (Diagram 3, 4)

5.1.4 Test Result

Please refer to ANNEX A.1.

5.2 Peak to average ratio

5.2.1 Limit

FCC § 2.1046 & 24.232(d)

In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

According to FCC section 24.232(d), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with 24.232 (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of § 24.51. 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.

For FCC section 24.232(e), peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

5.2.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.2.3 Test Procedure

Here the lowest, middle and highest channels are selected to perform testing to verify the peak-to-average ratio.

CCDF procedure for PAPR:

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%.

Alternate procedure for PAPR:

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

PAPR (dB) = P_{Pk} (dBm) - P_{Avg} (dBm).

Note: Reference test setup 4.4.1 (Diagram 1).

5.2.4 Test Result

Please refer to ANNEX A.2.

5.3 Occupied Bandwidth

5.3.1 Limit

FCC § 2.1049

The occupied bandwidth 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.

Many of the individual rule parts specify a relative OBW in lieu of the 99% OBW. In such cases, the OBW is defined as the width of the signal between two points, one below the carrier center frequency and on above the carrier center frequency, outside of which all emissions are attenuated by at least X dB below the transmitter power, where the value of X is typically specified as 26.

5.3.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.3.3 Test Procedure

The following procedure shall be used for measuring (99%) power bandwidth.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the anticipated OBW).

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

d) NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.

e) For -26 dB OBW, the dynamic range of the spectrum analyzer at the selected RBW shall be at least 10dB below the target “-X dB down” requirement, e.g. -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be 36dB below the reference value.

f) Set the detection mode to peak, and the trace mode to max hold.

g) For 99% OBW, use the 99 % power bandwidth function of the spectrum analyzer (if available) and report the measured bandwidth.

If the instrument does not have a 99 % power bandwidth function, the trace data points are to be recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99 % power bandwidth is the difference between these two frequencies.

h) For -26 dB OBW, determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

Determine the “-X dB down amplitude” as equal to (reference value -X). Alternatively, this calculation can be performed by the analyzer by using the marker-delta function.

Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below “-X dB down amplitude” determined in step g). If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.

i) The OBW shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

j) Change variable modulations, coding, or channel bandwidth settings, then repeat above test procedures.

Note: Reference test setup 4.4.1 (Diagram 1).

5.3.4 Test Result

Please refer to ANNEX A.3.

5.4 Frequency Stability

5.4.1 Limit

FCC § 2.1055 & 22.355 & 24.235

FCC § 2.1055

The frequency stability shall be measured with variation of ambient temperature as follows:

(1) The temperature is varied from -30°C to +50°C.

(2) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10°C through the range.

The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating and point which shall be specified by the manufacture.

(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

FCC § 22.355
Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section.

Table C-1—Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Base, fixed (ppm)	Mobile > 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10.0	n/a	n/a

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

5.4.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.4.3 Test Procedure

1. The test is performed in a Temperature Chamber.
2. The EUT is configured as MS + DC Power Supply.

Note: Reference test setup 4.4.2 (Diagram 2).

5.4.4 Test Result

Please refer to ANNEX A.4.

5.5 Spurious Emission at Antenna Terminals

5.5.1 Limit

FCC § 2.1051 & 22.917(a) & 24.238(a)

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10*log(P) dB. This is calculated to be -13 dBm.

5.5.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.5.3 Test Procedure

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 blocks 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 emissions are attenuated at least 26 dB below the transmitter power.

1. The EUT is coupled to the system simulator and spectrum analyzer; the RF load attached to EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

2. CMW500 was used to establish communication with the EUT, Its parameters were set to force the EUT transmitting at maximum output power.

3. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

4. Spurious emissions were tested with 0.001MHz RBW for frequency less than 150kHz, 0.01MHz RBW for frequency less than 30MHz, 0.1MHz RBW for frequency less than 1GHz, and 1MHz RBW for frequency above 1GHz. And sweep point number were at least 401, referring to following formula.

   Sweep point number = Span/RBW

   VBW=3RBW

   Detector Mode=mean or average power

5. Record the frequencies and levels of spurious emissions.

Note: Reference test setup 4.4.1 (Diagram 1).

5.5.4 Test Result

Please refer to ANNEX A.5.

5.6 Band Edge

5.6.1 Limit

FCC § 2.1051 & 22.917 & 24.238

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 emissions are attenuated at least 26 dB below the transmitter power.
FCC § 22.917 & 24.238

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10*log(P) dB. This is calculated to be -13 dBm.

5.6.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.6.3 Test Procedure

The EUT, which is powered by the Battery, is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50 Ohm; the path loss as the factor is calibrated to correct the reading.

1.The EUT is coupled to the system simulator and spectrum analyzer; the RF load attached to EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

2. CMW500 was used to establish communication with the EUT, and its parameters were set to force the EUT transmitting at maximum output power.

3. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient Attenuation.
4. The center of the spectrum analyzer was set to block edge frequency.

5. Band edge were tested with 1% cBW (RBW), and sweep point number referred to following formula.

Sweep point number = 2*Span/RBW

VBW=3RBW

6. Record the frequencies and levels of spurious emissions.

Note: Reference test setup 4.4.1 (Diagram 1).

5.6.4 Test Result

Please refer to ANNEX A.6.

5.7 Field Strength of Spurious Radiation

5.7.1 Limit

FCC § 2.1053 & 22.917(a) & 24.238(a)

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10*log(P) dB. This is calculated to be -13 dBm.

5.7.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.7.3 Test Procedure

1. On a test site, the EUT shall be placed at 80cm height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. During the measurement of the EUT, the resolution bandwidth was to 1 MHz and the average bandwidth was set to 1 MHz.
5. The transmitter shall be switched on; the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. The test antenna shall be raised and lowered through the specified range of height until the maximum signal level is detected by the measuring receiver.
7. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. The EUT was replaced by half-wave dipole (824 ~ 849 MHz) or horn antenna (1 850 ~ 1 910 MHz) connected to a signal generator.
11. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
12. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
13. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring received, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
14. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
15. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

Final measurement calculation as below:

The relevant equation for determining the ERP/EIRP from the radiated RF output power is:
ERP/EIRP (dBm) = SA Read Value (dBm) + Correction Factor (dB)

where:
ERP/EIRP = effective or equivalent radiated power, in dBm;
SA Read Value = measured transmitter power received by EMI receiver or spectrum analyzer, in dBm;
Correction Factor = total correction factor including cable loss, in dB;

During the test, the data of Correction Factor (dB) is added in the EMI receiver or spectrum analyzer, so SA Read Value (dBm) is the final values which contains the data of Correction Factor (dB).

For example:
In the ERP test, when SA read value for GSM850 is 21dBm, and correction factor is 8dB, then final ERP value for GSM850 is:
ERP (dBm) = 21dBm + 8dB = 29dBm
Note: Reference test setup 4.4.3 and 4.4.4 (Diagram 3, 4)

5.7.4 Test Result

Please refer to ANNEX A.7.

ANNEX A TEST RESULTS

A.1 Transmitter Radiated Power (EIRP/ERP)

Note: Not applicable.

A.2 Peak to Average Ratio

Note: Not applicable.

A.3 Occupied Bandwidth

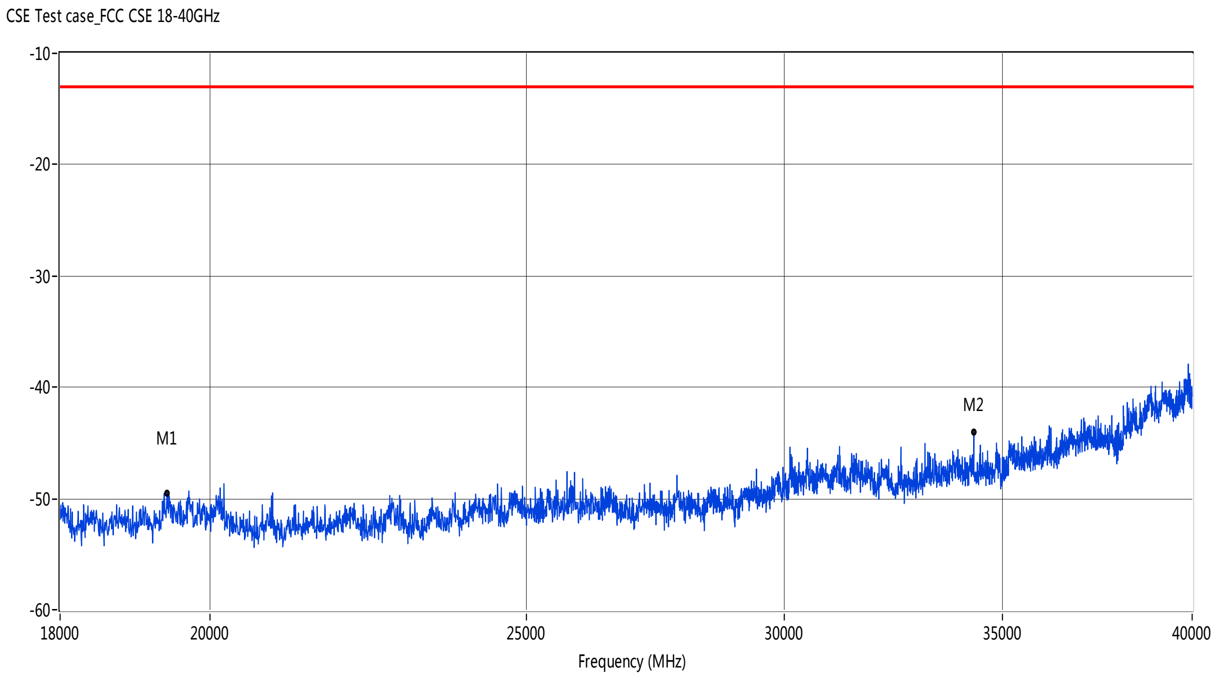
Note: Not applicable.

A.4 Frequency Stability

Note: Not applicable.

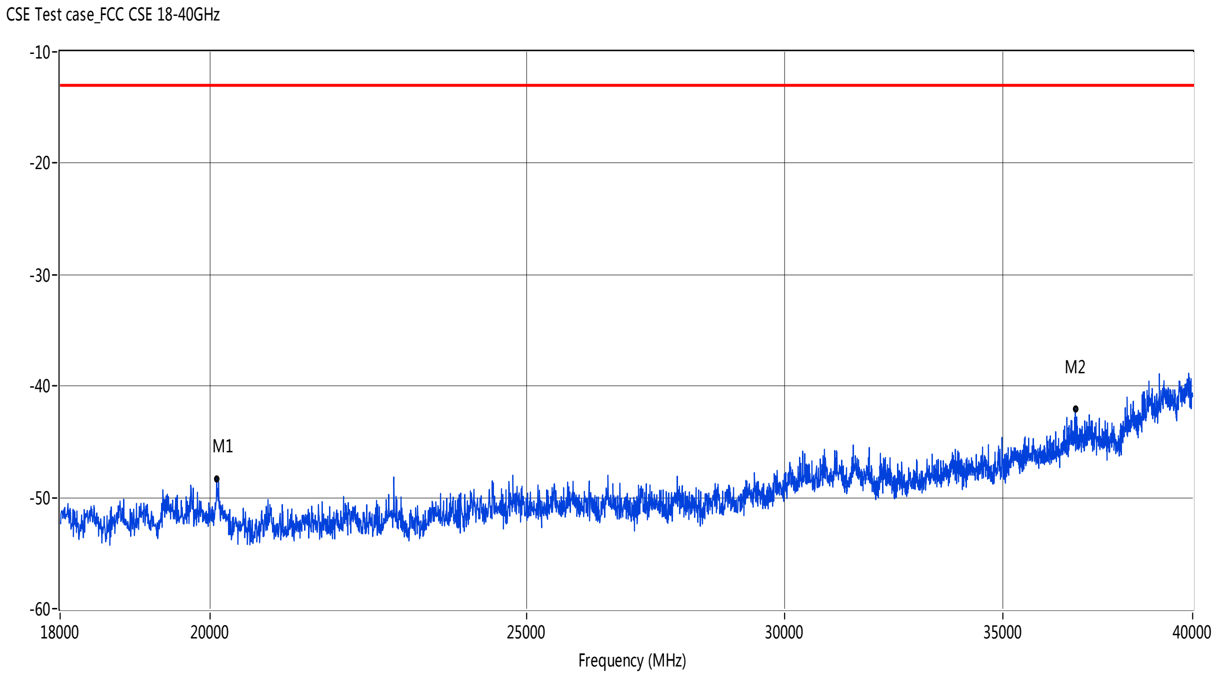
A.5 Spurious Emission at Antenna Terminals

GSM 850 Low Channel 18 GHz to 40 GHz



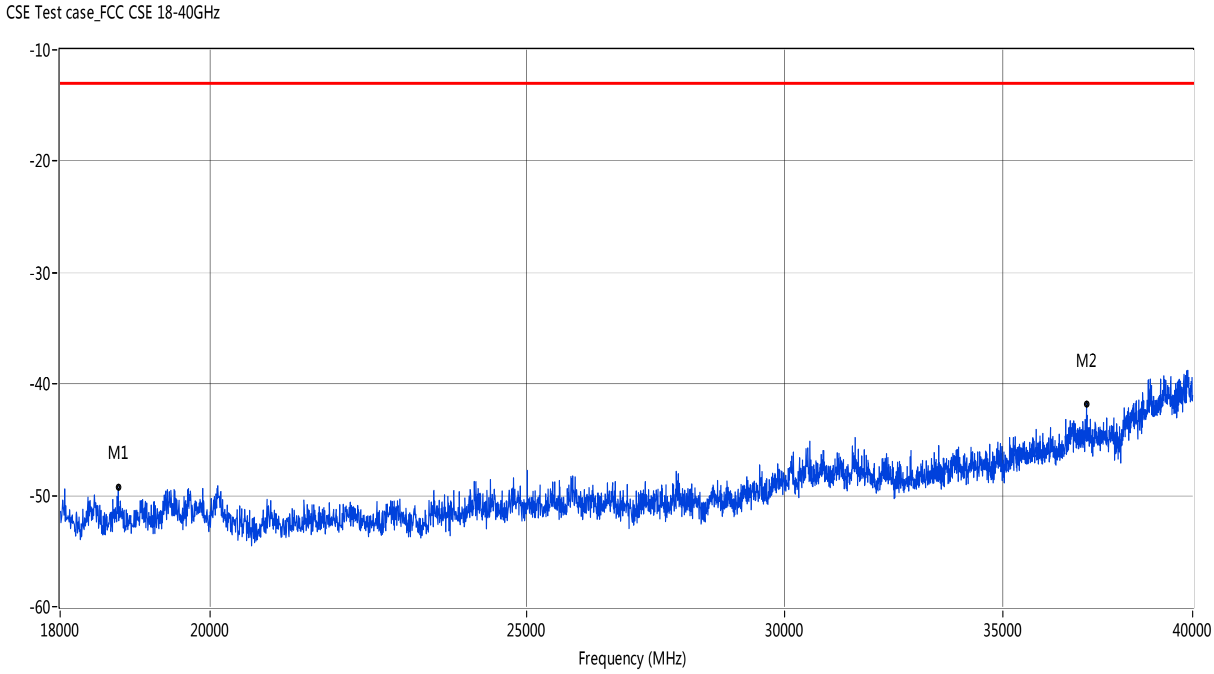
No.	Frequency (MHz)	Results (dBm)	Factor (dB)	Limit (dBm)	Margin (dB)	Detector	Verdict
1	19407.999	-49.56	10.20	-13.0	36.56	Peak	Pass
2	34290.999	-44.06	13.67	-13.0	31.06	Peak	Pass

GSM 850 Middle Channel 18 GHz to 40 GHz



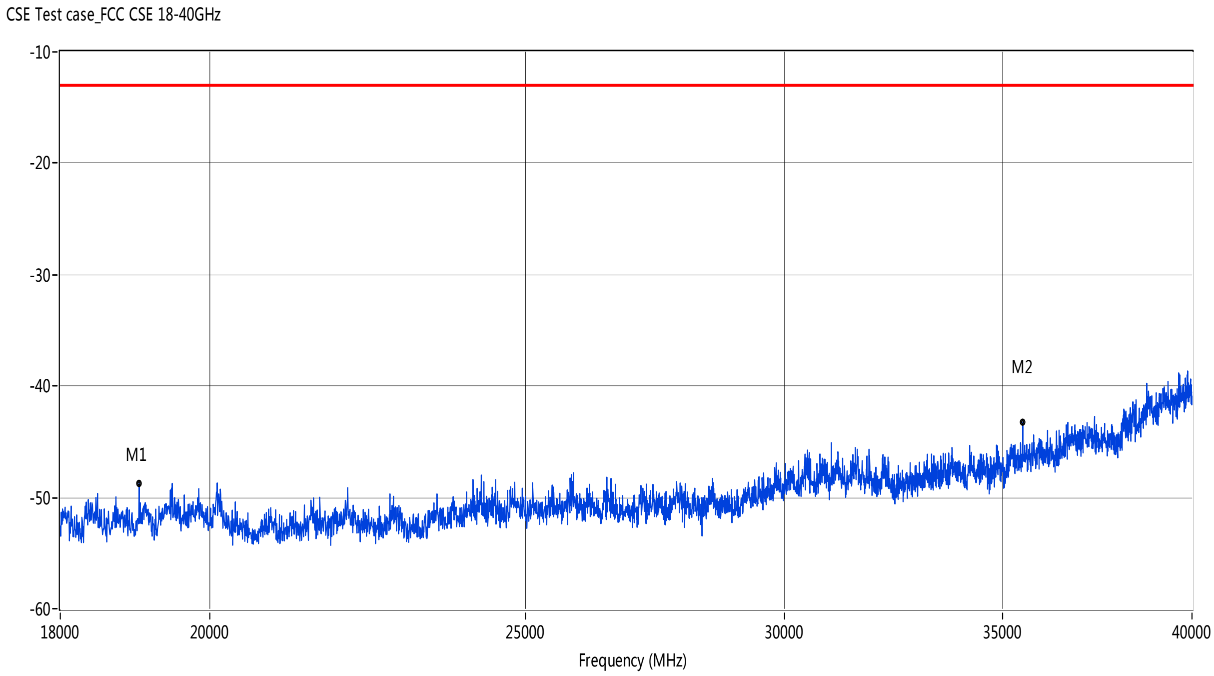
No.	Frequency (MHz)	Results (dBm)	Factor (dB)	Limit (dBm)	Margin (dB)	Detector	Verdict
1	20100.999	-48.30	10.36	-13.0	35.30	Peak	Pass
2	36826.501	-42.06	14.26	-13.0	29.06	Peak	Pass

GSM 850 High Channel 18 GHz to 40 GHz



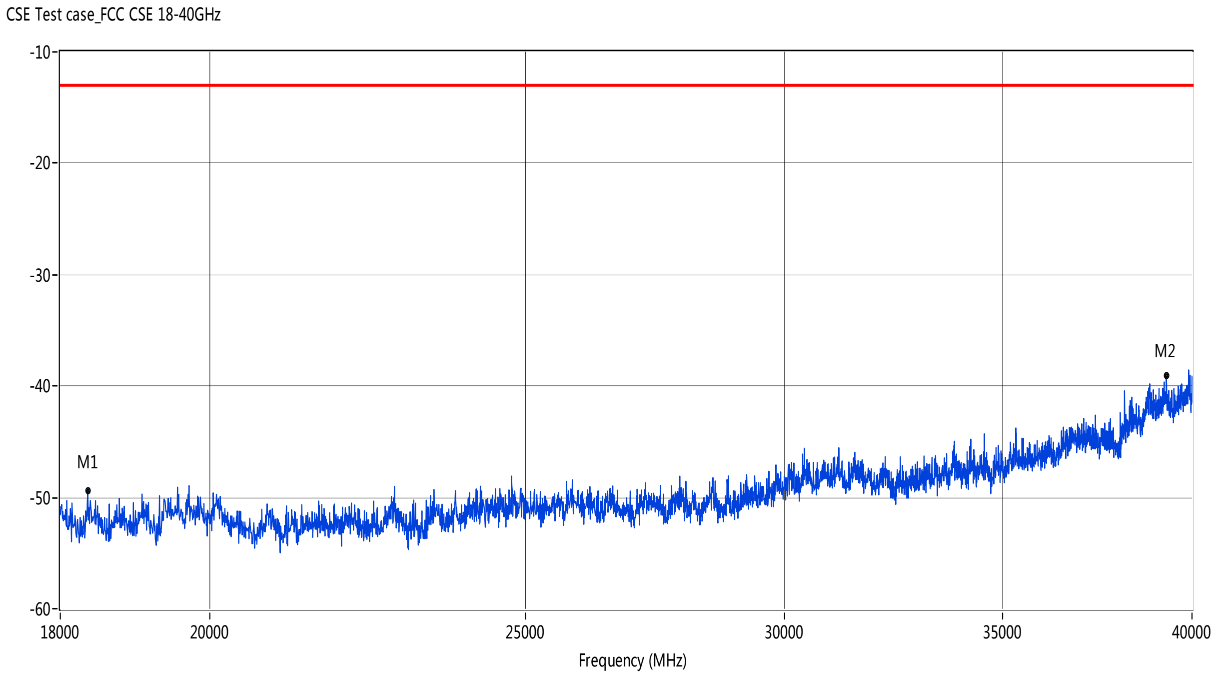
No.	Frequency (MHz)	Results (dBm)	Factor (dB)	Limit (dBm)	Margin (dB)	Detector	Verdict
1	18753.499	-49.33	10.04	-13.0	36.33	Peak	Pass
2	37118.001	-41.77	14.33	-13.0	28.77	Peak	Pass

GSM 1900 Low Channel 18 GHz to 40 GHz



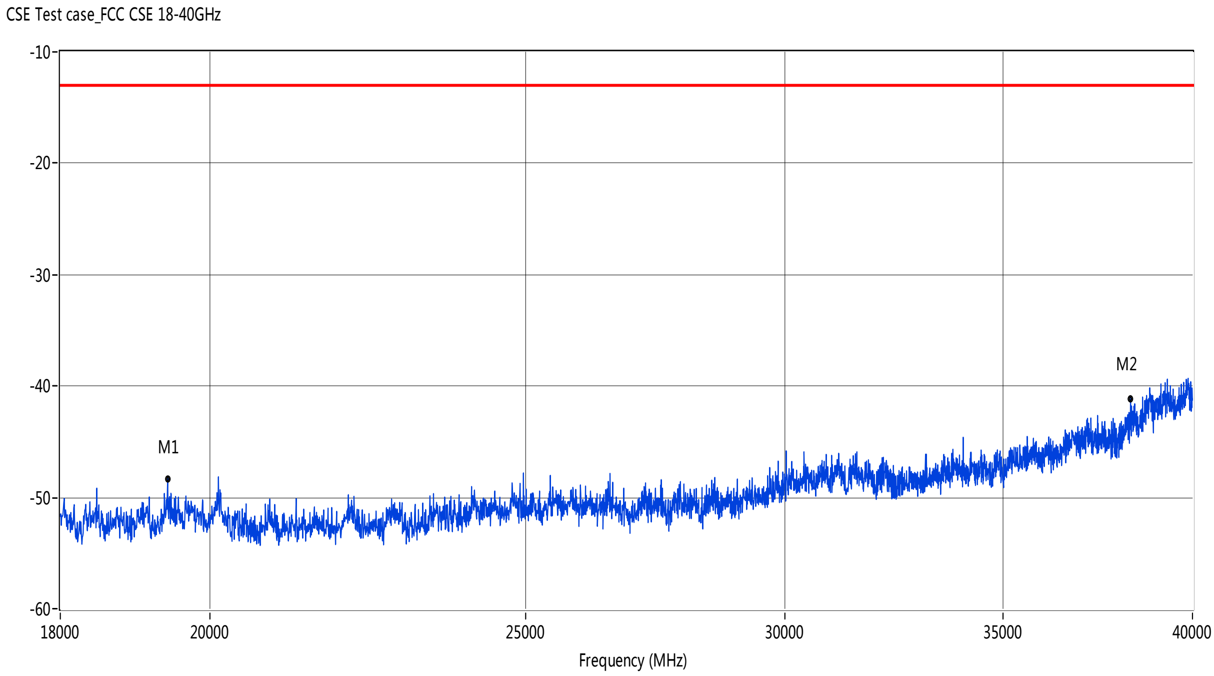
No.	Frequency (MHz)	Results (dBm)	Factor (dB)	Limit (dBm)	Margin (dB)	Detector	Verdict
1	19028.500	-48.78	10.11	-13.0	35.78	Peak	Pass
2	35495.502	-43.29	13.95	-13.0	30.29	Peak	Pass

GSM 1900 Middle Channel 18 GHz to 40 GHz



No.	Frequency (MHz)	Results (dBm)	Factor (dB)	Limit (dBm)	Margin (dB)	Detector	Verdict
1	18352.001	-49.35	9.95	-13.0	36.35	Peak	Pass
2	39279.501	-39.03	14.83	-13.0	26.03	Peak	Pass

GSM 1900 High Channel 18 GHz to 40 GHz



No.	Frequency (MHz)	Results (dBm)	Factor (dB)	Limit (dBm)	Margin (dB)	Detector	Verdict
1	19413.500	-48.32	10.20	-13.0	35.32	Peak	Pass
2	38289.498	-41.13	14.60	-13.0	28.13	Peak	Pass

A.6 Band Edge

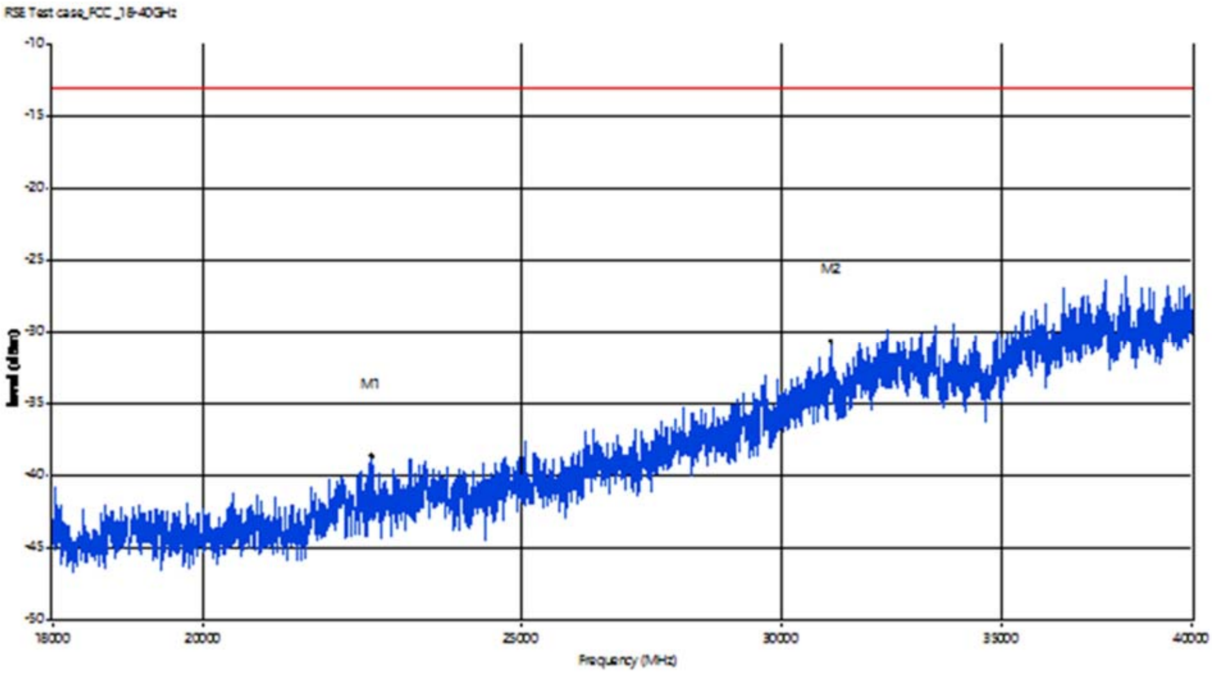
Note: Not applicable.

A.7 Field Strength of Spurious Radiation

Note 1: All configuration were tested, include Horizontal & Vertical direction of the test antenna, and Low\Middle\High channels of the EUT. But only the worst case was shown in this report.

Note 2: Below are the worst case data for GSM 850(High channel and Horizontal).

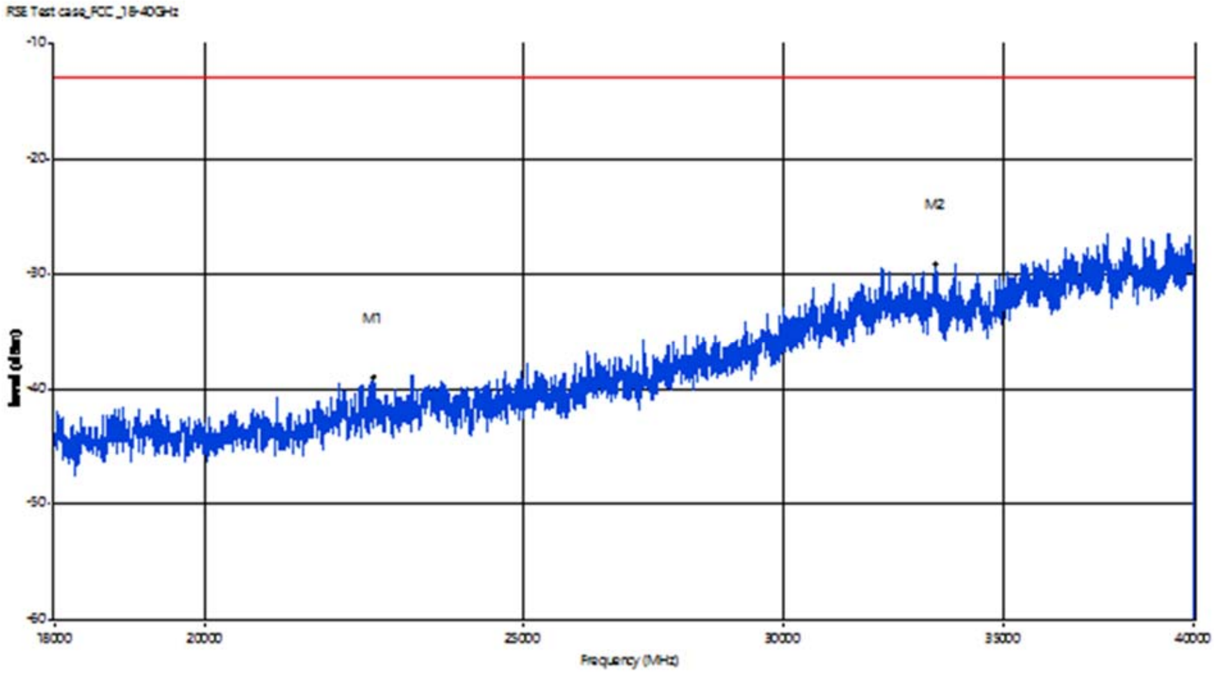
GSM 850 18 GHz to 40 GHz



No.	Frequency (MHz)	Results (dBm)	Factor (dB)	Limit (dBm)	Margin (dB)	Detector	Table (o)	ANT	EUT	Verdict
1	22510.000	-41.59	25.16	-13.0	28.59	Peak	1.00	Horizontal	Horizontal	Pass
2	31051.500	-34.58	27.29	-13.0	21.58	Peak	9.00	Horizontal	Horizontal	Pass

Note 1: Below are the worst case data for GSM 1900(High channel and Horizontal).

GSM 1900 18 GHz to 40 GHz



No.	Frequency (MHz)	Results (dBm)	Factor (dB)	Limit (dBm)	Margin (dB)	Detector	Table (o)	ANT	EUT	Verdict
1	22510.000	-41.59	25.16	-13.0	28.59	Peak	1.00	Horizontal	Horizontal	Pass
2	33389.001	-32.84	29.00	-13.0	19.84	Peak	7.00	Horizontal	Horizontal	Pass

ANNEX B TEST SETUP PHOTOS

Please refer to the document “BL-SZ17A0272-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer to the document “BL- SZ17A0272-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer to the document “BL- SZ17A0272-AI.PDF”.

-END OF REPORT--