



REPORT No. : SZ20060377W01

TEST REPORT

APPLICANT : LG Electronics USA, Inc.

PRODUCT NAME : Smartphone

MODEL NAME : LM-K310IM

BRAND NAME : LG

FCC ID : ZNFK310IM

STANDARD(S) : 47 CFR Part 22 Subpart H
: 47 CFR Part 24 Subpart E

RECEIPT DATE : 2020-07-07

TEST DATE : 2020-07-08 to 2020-07-24

ISSUE DATE : 2020-08-07



Edited by:

Zhou Xiaolong

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Peng Huarui

Peng Huarui (Supervisor)

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Change History		
Version	Date	Reason for change
1.0	2020-08-07	First edition



1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	LG Electronics USA, Inc.
Applicant Address:	111 Sylvan Ave North Building Englewood Cliffs, New Jersey, United States 07632
Manufacturer:	Padget Electronics Private Limited
Manufacturer Address:	B-18, Phase-2, Noida, Uttar Pradesh 201305

1.2. Equipment Under Test (EUT) Description

Product Name:	Smartphone
Hardware Version:	V1.0
Software Version:	LG_LM-K310IM_Software
Modulation Type:	GSM/GPRS Mode with GMSK Modulation EDGE Mode with 8PSK Modulation
Operating Frequency Range:	GSM 850MHz: Tx: 824MHz - 849MHz Rx: 869MHz - 894MHz GSM 1900MHz: Tx: 1850MHz - 1910MHz Rx: 1930MHz - 1990MHz

Antenna Type:	Fixed Internal	
Antenna Gain:	GSM 850:	-2.70dBi
	GSM1900:	0.37dbi
Accessory Information:	Battery	
	Brand Name:	LG
	Model No.:	LG4000STCL02
	Capacity:	3900mAh
	Rated Voltage:	3.85V
	Charge Limit:	4.40V



	Manufacturer:	Ningbo Veken Battery Co., Ltd.
	Manufacturer Address:	No.2, Area 0212, West Zone, Free Trade Zone, Ningbo, Zhejiang Province, China
	AC Adapter	
	Brand Name:	N/A
	Model No.:	TN-050155U3
	Rated Input:	100-240V ~ 50/60Hz 0.25A
	Rated Output:	5V=1.55A
	Manufacturer:	Shenzhen BMT Electronics Co.,Ltd.
	Manufacturer Address:	2/F, 1 Building, Qiyu Industrial Zone, Gongle, Tiezi Road, Xixiang Town, Baoan District, 518102 Shenzhen City, PEOPLE'S REPUBLIC OF CHINA
	USB	
	Model	DA-B0488-BD
	Manufacturer	Guangdong Wivtak Technology Co., Ltd.



- Note 1:** The transmitter (Tx) frequency arrangement of the Cellular 850MHz band used by the EUT can be represented with the formula $F(n)=824.2+0.2*(n-128)$, $128 \leq n \leq 251$; the lowest, middle, highest channel numbers (ARFCHs) used and tested in this report are separately 128 (824.2MHz), 190 (836.6MHz) and 251 (848.8MHz).
- Note 2:** The transmitter (Tx) frequency arrangement of the PCS 1900MHz band used by the EUT can be represented with the formula $F(n)=1850.2+0.2*(n-512)$, $512 \leq n \leq 810$; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 512 (1850.2MHz), 661 (1880.0MHz) and 810 (1909.8MHz).
- Note 3:** All modes and data rates were considered and evaluated respectively by performing full test. Test modes are chosen to be reported as the worst case below:
GPRS mode and EDGE mode for GSM 850;
GPRS mode and EDGE mode for GSM 1900;
- Note 4:** For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.



1.3. Maximum ERP/EIRP and Emission Designator

System	Maximum ERP/EIRP (W)	Emission Designator
GSM850	0.573	260KG3W
EDGE850	0.160	251KG4W
GSM1900	0.955	251KG7W
EDGE1900	0.448	249KG6W



1.4. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part 22, and Part 24 for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 2 (10-1-12 Edition)	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 22 (10-1-12 Edition)	Public Mobile Services
3	47 CFR Part 24 (10-1-12 Edition)	Personal Communications Services



Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Test Date	Test Engineer	Result	Method determination/ Remark
1	2.1046	Conducted RF Output Power	Jul 8 to 24, 2020	Zhou Xiaolong	PASS	No deviation
2	24.232(d)	Peak -Average Ratio	Jul 8 to 24, 2020	Zhou Xiaolong	PASS	No deviation
3	2.1049	99% Occupied Bandwidth	Jul 8 to 24, 2020	Zhou Xiaolong	PASS	No deviation
4	2.1055, 22.355, 24.235, 27.54	Frequency Stability	Jul 8 to 24, 2020	Zhou Xiaolong	PASS	No deviation
5	2.1051, 22.917(a), 24.238(a),	Conducted Out of Band Emissions	Jul 8 to 24, 2020	Zhou Xiaolong	PASS	No deviation
6	2.1051, 22.917(a), 24.238(a),	Band Edge	Jul 8 to 24, 2020	Zhou Xiaolong	PASS	No deviation
7	22.913(a), 24.232(a)	Transmitter Radiated Power (EIPR/ERP)	Jul 9,2020	PengXuewei	PASS	No deviation
8	2.1051, 22.917(a), 24.238(a)	Radiated Out of Band Emissions	Jul 9,2020	PengXuewei	PASS	No deviation

Note 1: The tests were performed according to the method of measurements prescribed in KDB971168 D01 v03 and ANSI/TIA-603-E-2016.

Note 2: The path loss during the RF test is calibrated to correct the results by the offset setting in the test equipments. The ref offset 26.5dB contains two parts that cable loss 16.5dB and Attenuator 10dB.



1.5. Environmental Conditions

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

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106

2.47 CFR Part 2, Part 22H &24E Requirements

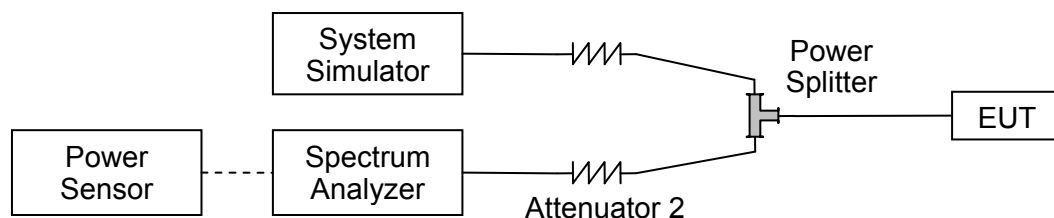
2.1. Conducted RF Output Power

2.1.1. Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

2.1.2. Test Description

Test Setup:



The EUT 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 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.

**2.1.3. Test Results**

GSM850	Average Power (dBm)		
TX Channel	128	190	251
Frequency (MHz)	824.2	836.6	848.8
GSM 1 Tx slot	32.15	32.35	32.12
GPRS 1 Tx slot	32.16	32.43	32.14
GPRS 2 Tx slots	31.42	31.41	31.37
GPRS 3 Tx slots	29.66	29.88	29.62
GPRS 4 Tx slots	28.37	28.70	28.52
EDGE 1 Tx slot	26.73	26.85	26.89
EDGE 2 Tx slots	25.49	25.46	25.57
EDGE 3 Tx slots	23.26	23.44	23.59
EDGE 4 Tx slots	22.83	22.83	22.94

GSM1900	Average Power (dBm)		
TX Channel	512	661	810
Frequency (MHz)	1850.2	1880	1909.8
GSM 1 Tx slot	29.12	29.25	29.43
GPRS 1 Tx slot	29.12	29.22	29.40
GPRS 2 Tx slots	28.29	28.14	28.34
GPRS 3 Tx slots	26.09	26.12	26.29
GPRS 4 Tx slots	24.57	24.60	24.77
EDGE 1 Tx slot	26.07	26.02	26.14
EDGE 2 Tx slots	24.56	24.84	24.90
EDGE 3 Tx slots	22.46	22.24	22.50
EDGE 4 Tx slots	21.70	21.75	21.35

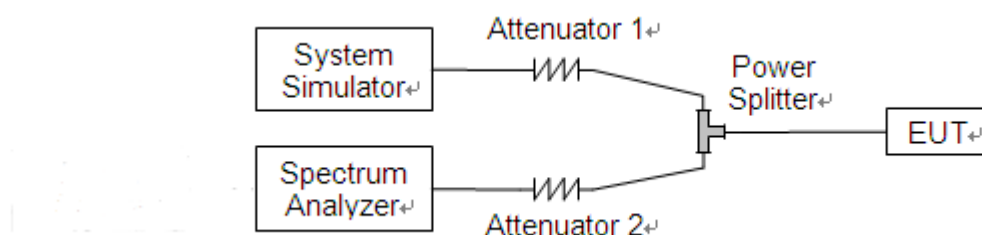
2.2. Peak to Average Ratio

2.2.1. Requirement

According to FCC 24.232(d) and 27.50(d), the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

2.2.2. Test Description

Test Setup:



The EUT 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 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.

2.2.3. Test procedure

1. For GSM/EDGE operating mode:

- Set RBW=1MHz, VBW=3MHz, peak detector in spectrum analyzer.
- Set EUT in maximum output power, and triggered the bust signal.
- Measured respectively the peak level and mean level, and the deviation was recorded as Peak to Average ratio.

2. For UMTS operating mode:

- Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
- The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1%.



2.2.4. Test Result

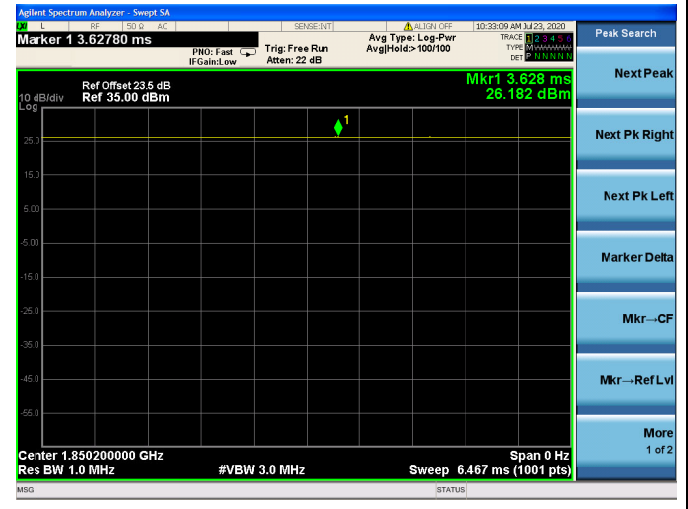
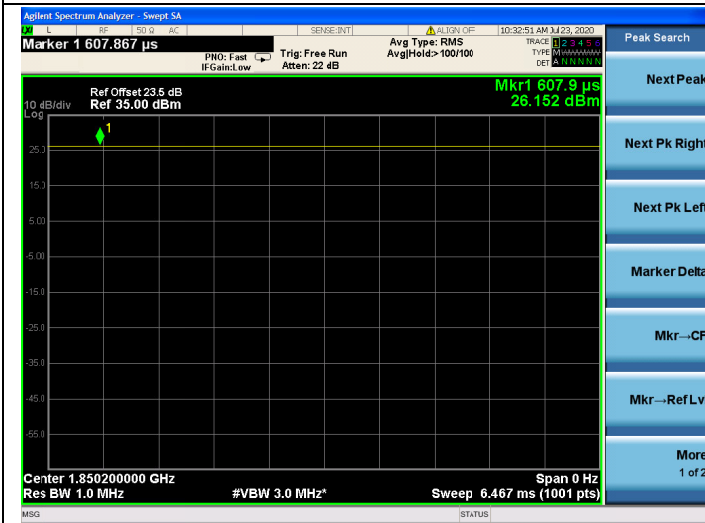
The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

A. Test Verdict:

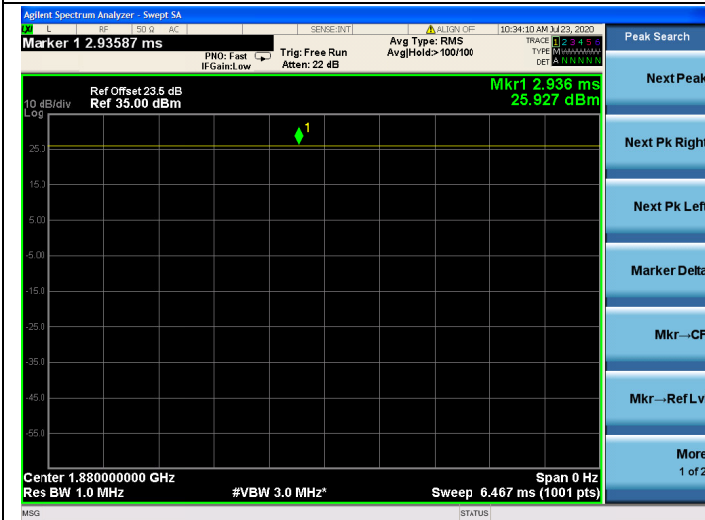
Band	Channel	Frequency (MHz)	Peak to Average ratio	Limit	Verdict
			dB	dB	
GSM 1900MHz	512	1850.2	0.030	13	PASS
	661	1880.0	0.027		PASS
	810	1909.8	0.025		PASS
EDGE 1900MHz	512	1850.2	0.075		PASS
	661	1880.0	0.011		PASS
	810	1909.8	0.005		PASS



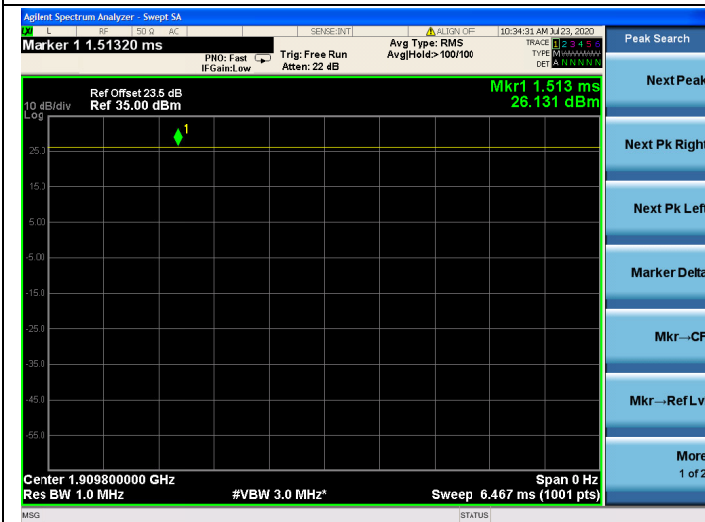
GSM 1900MHz CH512 1850.2MHz



GSM 1900MHz CH661 1880.0MHz

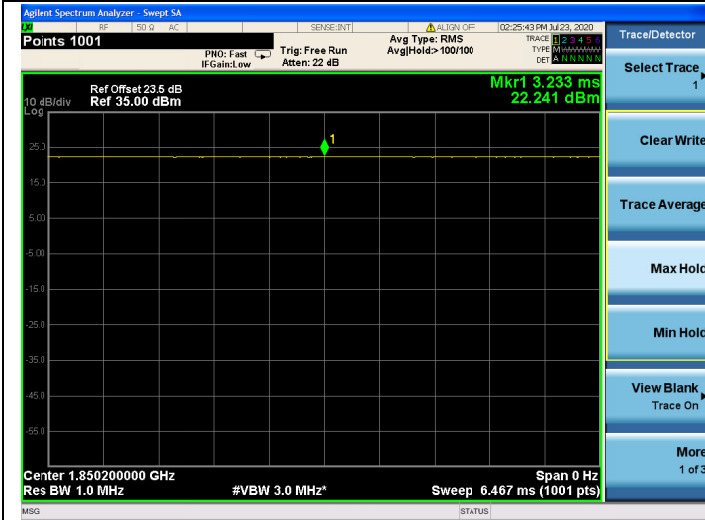


GSM 1900MHz CH810 1909.8MHz

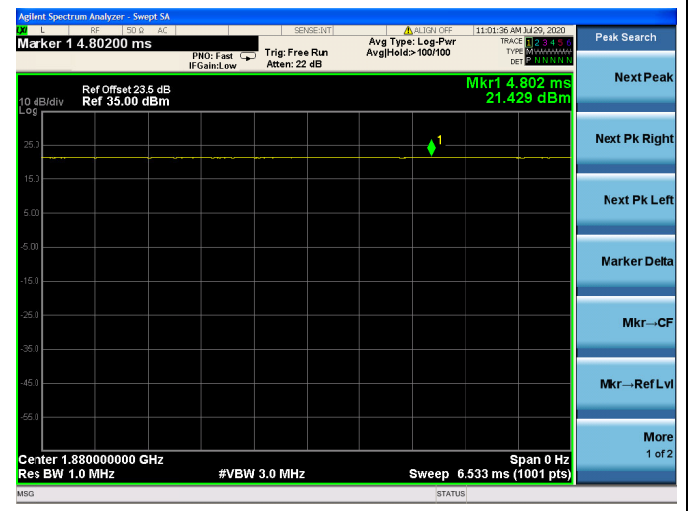
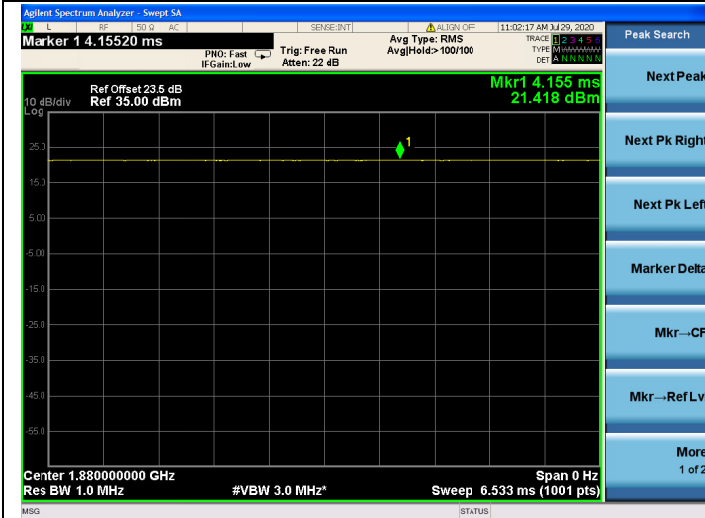




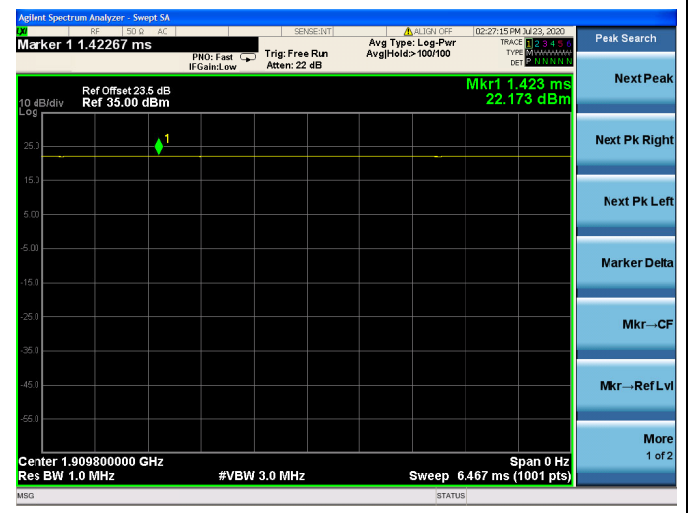
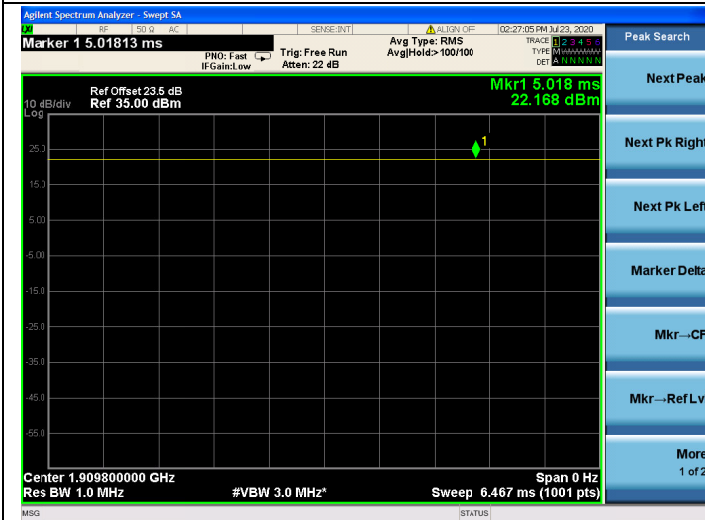
EDGE 1900MHz CH512 1850.2MHz



EDGE 1900MHz CH661 1880.0MHz



EDGE 1900MHz CH810 1909.8MHz



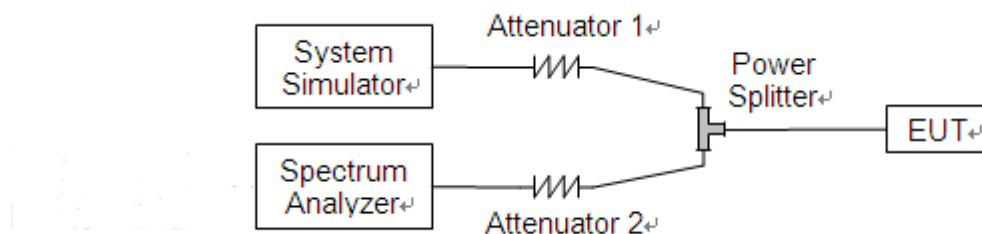
2.3.99% Occupied Bandwidth

2.3.1. Requirement

According to FCC section 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. Occupied bandwidth is also known as the 99% emission bandwidth.

2.3.2. Test Description

Test Setup:



The EUT 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 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.

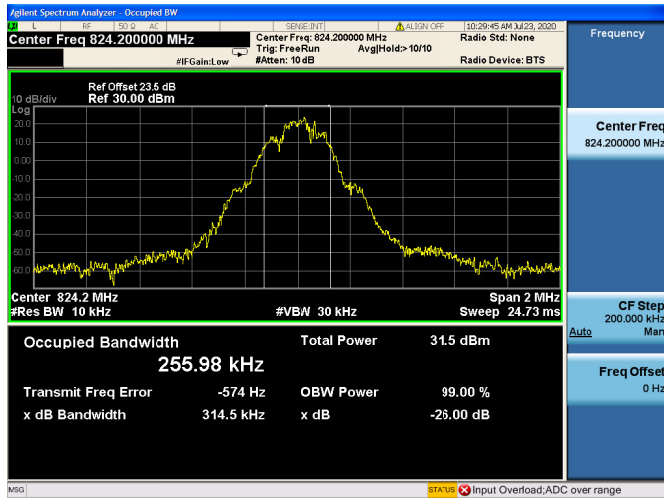
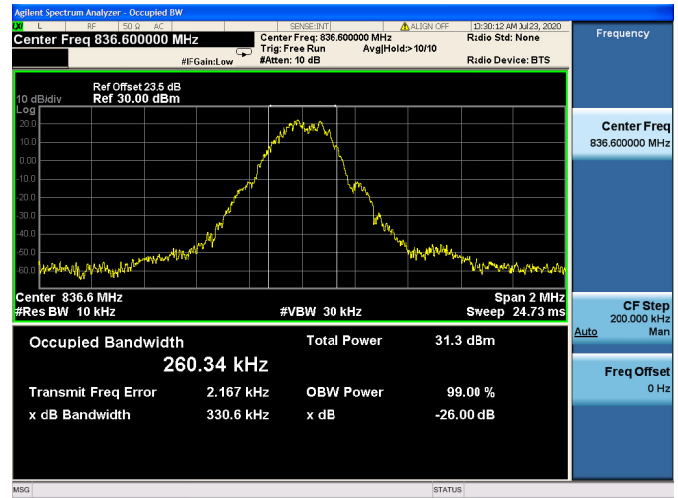
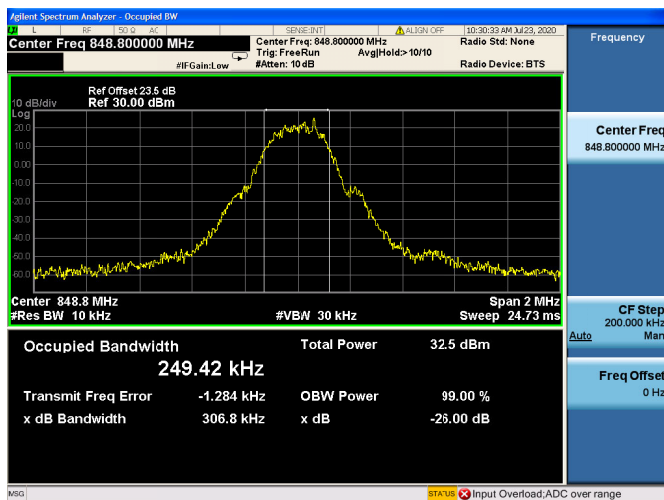
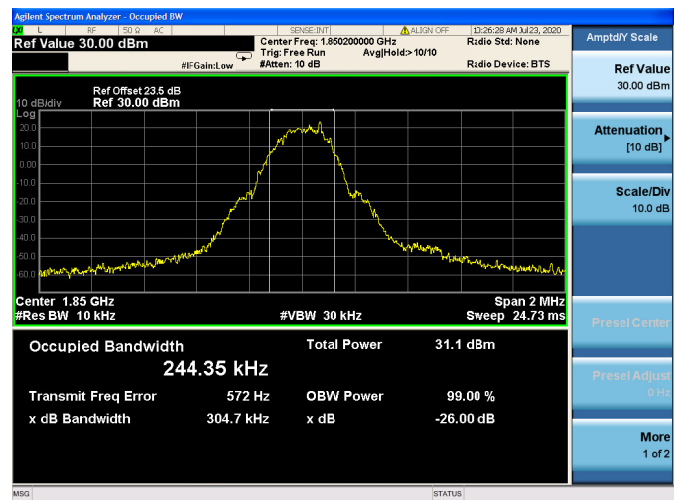
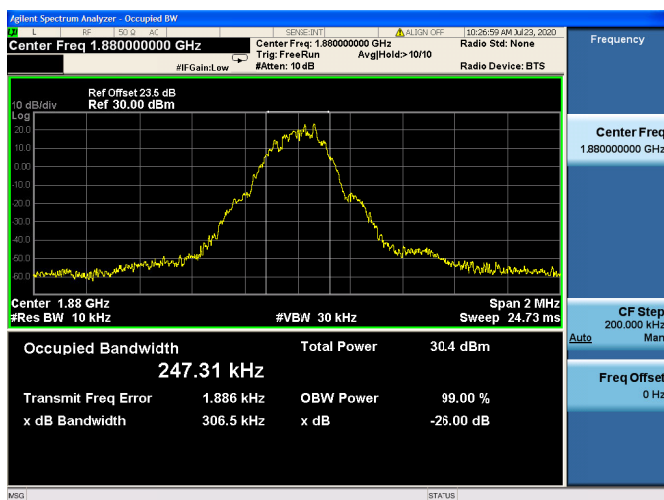
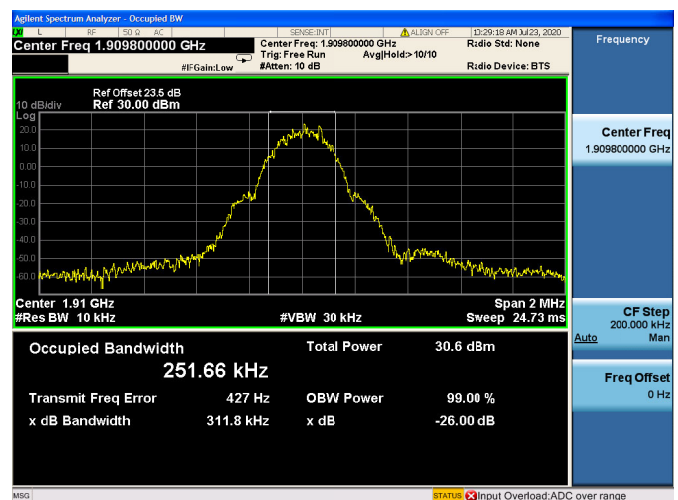


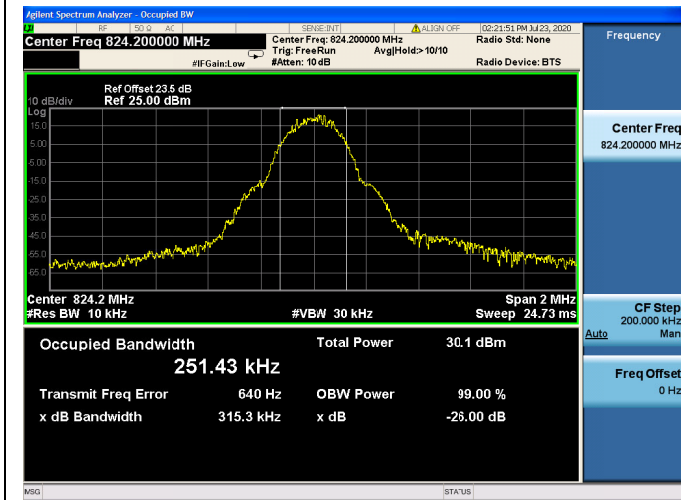
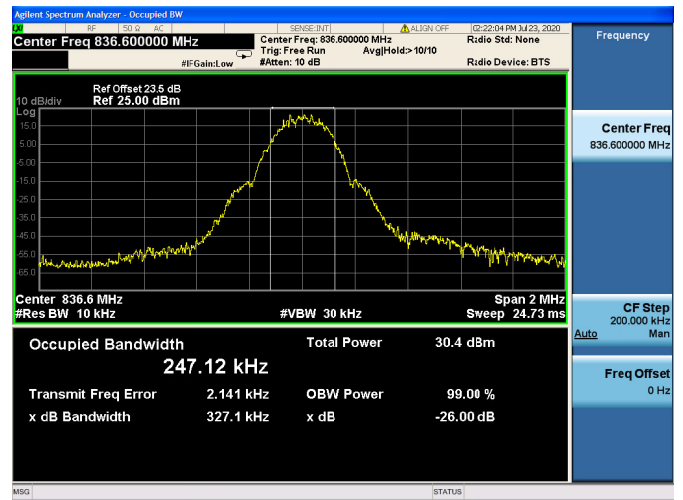
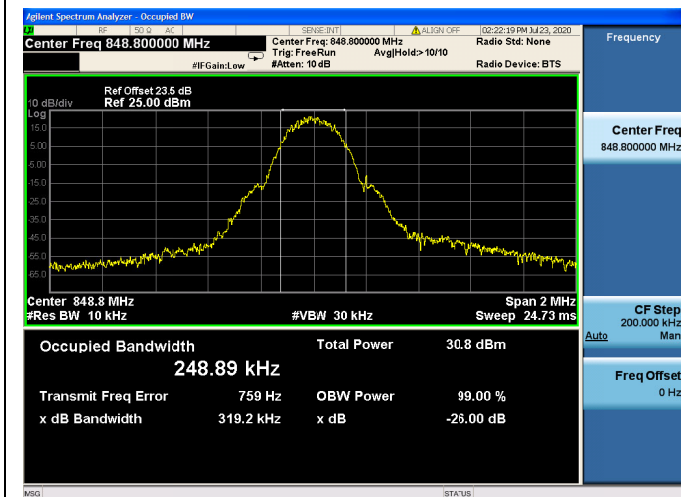
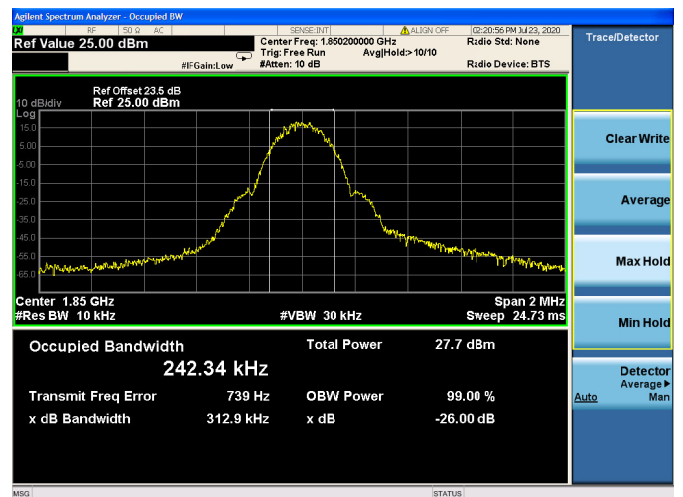
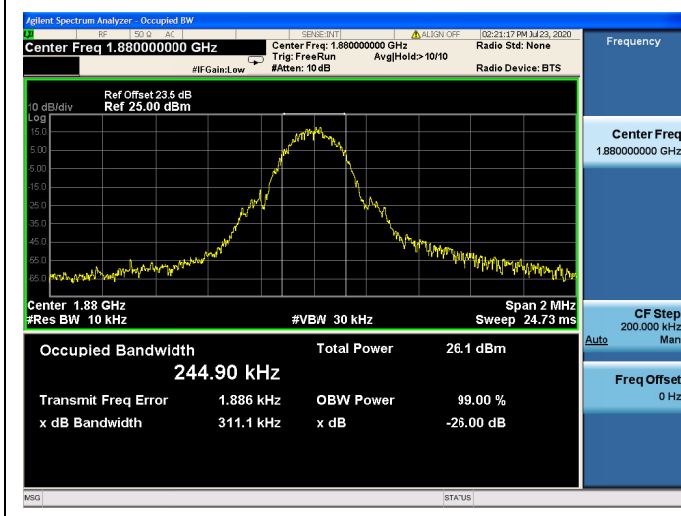
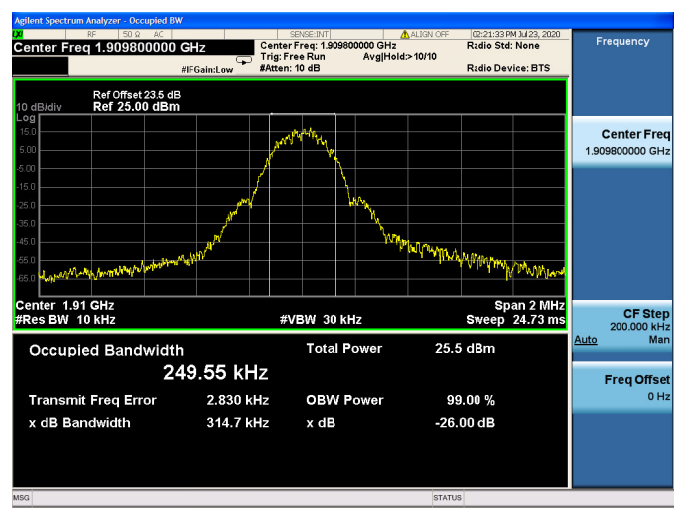
2.3.3. Test Result

The lowest, middle and highest channels are selected to perform testing to record the 99% occupied bandwidth.

GSM Test Verdict:

Band	Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26dB Bandwidth (kHz)
GSM 850MHz	128	824.2	255.98	314.50
	190	836.6	260.34	330.60
	251	848.8	249.42	306.80
GSM 1900MHz	512	1850.2	244.35	304.70
	661	1880.0	247.31	306.50
	810	1909.8	251.66	311.80
EDGE 850MHz	128	824.2	251.43	315.30
	190	836.6	247.12	327.10
	251	848.8	248.89	319.20
EDGE 1900MHz	512	1850.2	242.34	312.90
	661	1880.0	244.90	311.10
	810	1909.8	249.55	314.70

**GSM 850MHz CH128 824.2MHz****GSM 850MHz CH190 836.6MHz****GSM 850MHz CH251 848.8MHz****GSM 1900MHz CH512 1850.2MHz****GSM 1900MHz CH661 1880.0MHz****GSM 1900MHz CH810 1909.8MHz**

**EDGE 850MHz CH128 824.2MHz****EDGE 850MHz CH190 836.6MHz****EDGE 850MHz CH251 848.8MHz****EDGE 1900MHz CH512 1850.2MHz****EDGE 1900MHz CH661 1880.0MHz****EDGE 1900MHz CH810 1909.8MHz**

2.4. Frequency Stability

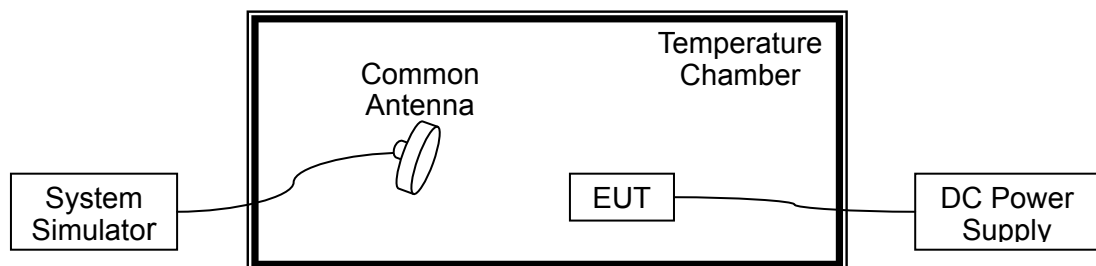
2.4.1. Requirement

According to FCC section 22.355, 24.235 and 27.54 the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

- (a) The temperature is varied from -10°C to $+45^{\circ}\text{C}$ at intervals of not more than 10°C .
- (b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. 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.

2.4.2. Test Description

Test Setup:



The EUT, which is powered by the DC Power Supply directly, is located in the Temperature Chamber. The EUT is commanded by the System Simulator (SS) to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS via a Common Antenna.



2.4.3. Test Result

The nominal, highest and lowest extreme voltages are separately 3.85VDC, 4.40VDC and 3.0VDC, which are specified by the applicant; the normal temperature here used is 20°C.

A. Test Verdict:

GSM 850MHz, Channel 190, Frequency 836.6MHz					
Limit =±2.5ppm					
Voltage (%)	Power (VDC)	Temp (°C)	Fre. Dev. (Hz)	Deviation (ppm)	Result
100	3.85	+20(Ref)	22	0.027	PASS
100		-10	48	0.058	
100		0	-28	-0.031	
100		+10	14	0.017	
100		+20	24	0.029	
100		+30	73	0.012	
100		+45	63	0.076	
115	4.40	+20	-6	-0.008	
85	3.00	+20	-72	-0.086	

GSM 1900MHz, Channel 661, Frequency 1880.0MHz					
Limit =Within Authorized Band					
Voltage (%)	Power (VDC)	Temp (°C)	Fre. Dev. (Hz)	Deviation (ppm)	Result
100	3.85	+20(Ref)	96	0.051	PASS
100		-10	26	0.015	
100		0	-29	-0.014	
100		+10	-52	-0.026	
100		+20	41	0.023	
100		+30	72	0.038	
100		+45	30	0.015	
115	4.40	+20	17	0.011	
85	3.00	+20	-57	-0.033	



EDGE 850MHz, Channel 190, Frequency 836.6MHz					
Limit = ± 2.5 ppm					
Voltage (%)	Power (VDC)	Temp (°C)	Fre. Dev. (Hz)	Deviation (ppm)	Result
100	3.85	+20(Ref)	26	0.031	PASS
100		-10	-73	-0.087	
100		0	-26	-0.032	
100		+10	55	0.064	
100		+20	16	0.017	
100		+30	27	0.032	
100		+45	26	0.029	
115	4.40	+20	-35	-0.041	
85	3.00	+20	-46	-0.055	

EDGE 1900MHz, Channel 661, Frequency 1880.0MHz					
Limit =Within Authorized Band					
Voltage (%)	Power (VDC)	Temp (°C)	Fre. Dev. (Hz)	Deviation (ppm)	Result
100	3.85	+20(Ref)	41	0.023	PASS
100		-10	-25	-0.015	
100		0	-84	-0.046	
100		+10	-83	-0.046	
100		+20	25	0.017	
100		+30	-84	-0.045	
100		+45	17	0.010	
115	4.40	+20	16	0.009	
85	3.00	+20	-24	-0.014	

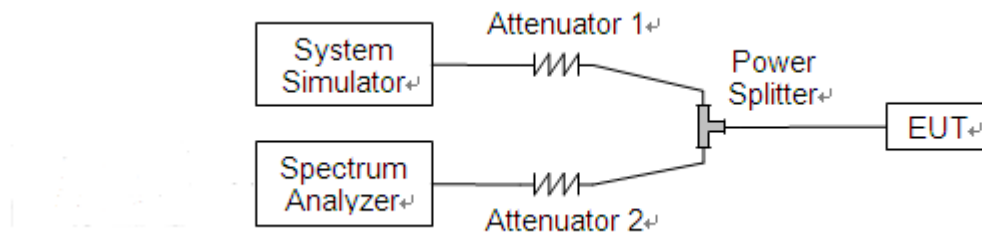
2.5. Conducted Out of Band Emissions

2.5.1. Requirement

According to FCC section 22.917(a), 24.238(a) and 27.53(h) 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 calculated to be -13dBm.

2.5.2. Test Description

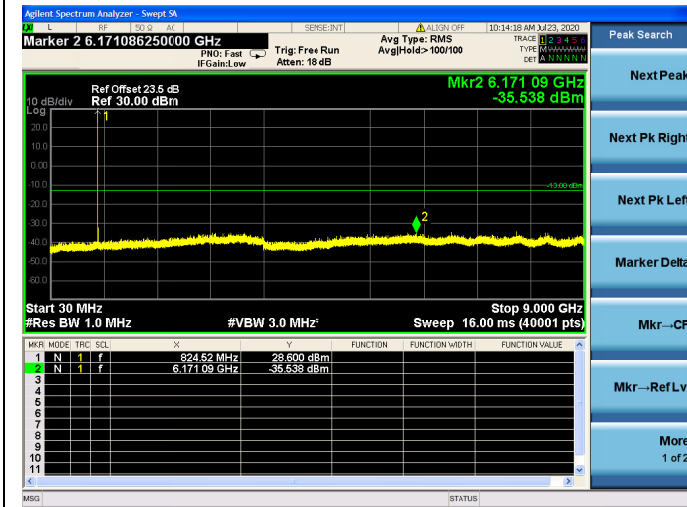
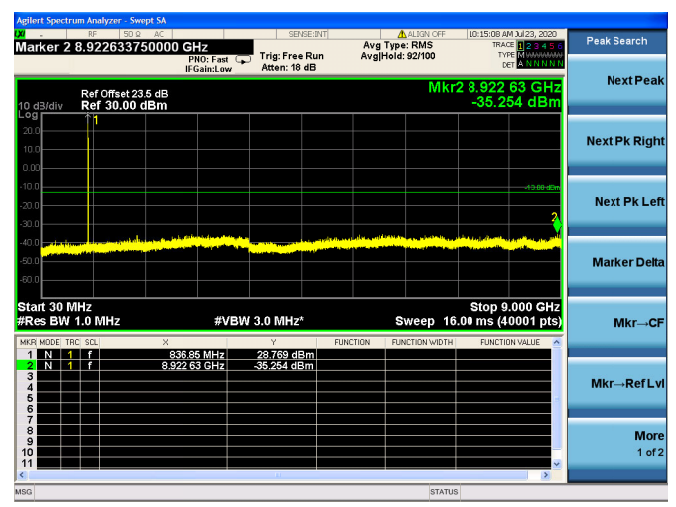
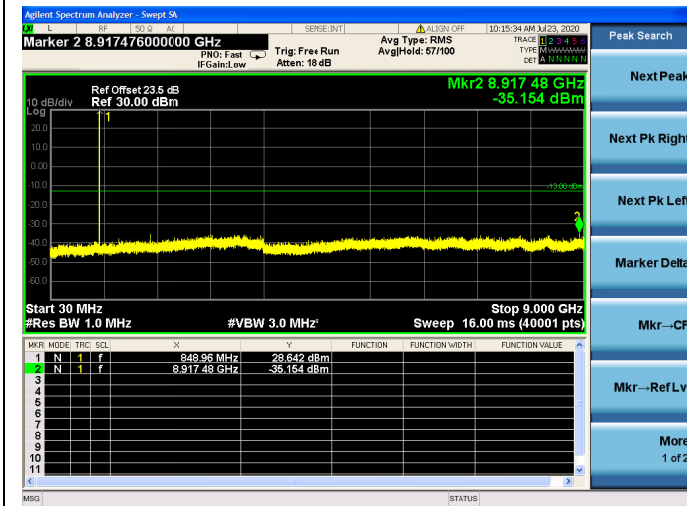
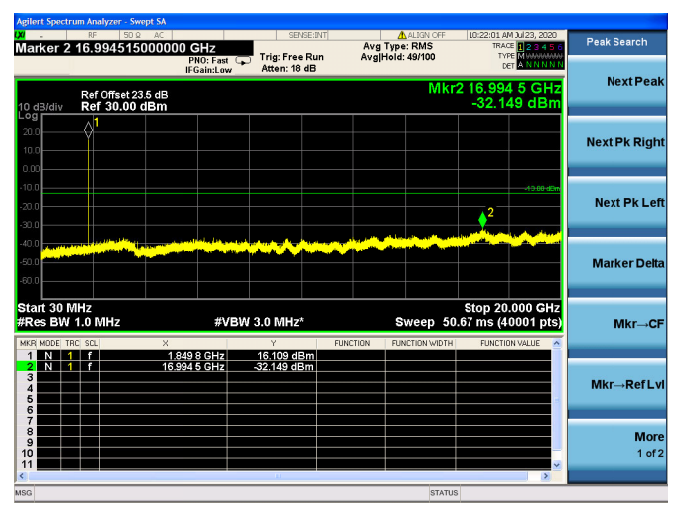
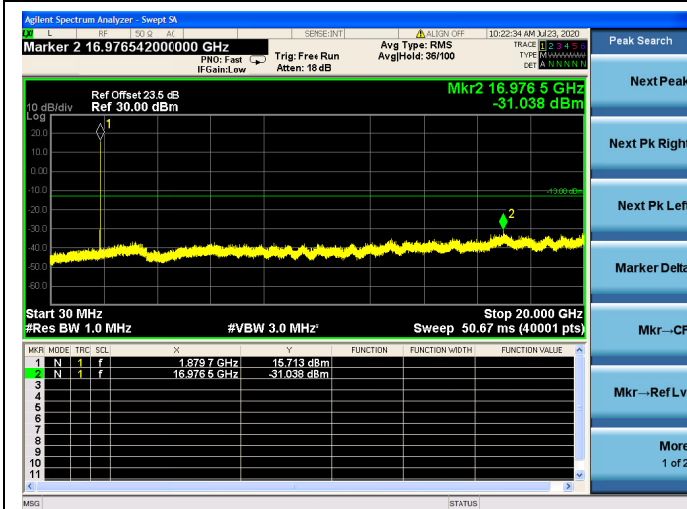
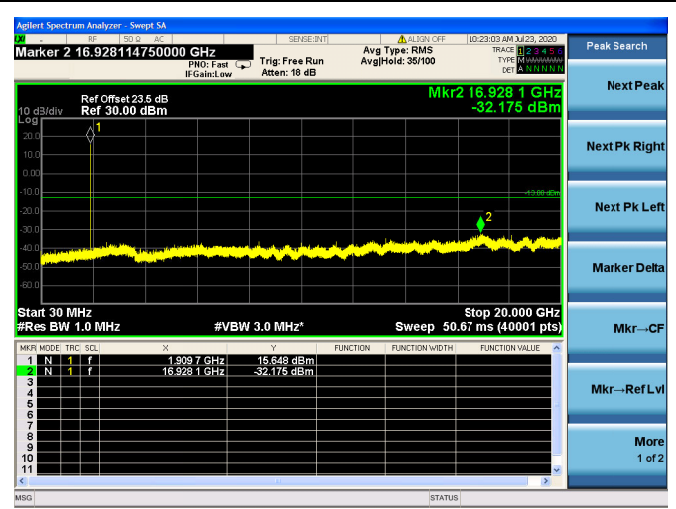
Test Setup:



The EUT 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 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.

2.5.3. Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.

**GSM 850MHz CH128 824.2MHz****GSM 850MHz CH190 836.6MHz****GSM 850MHz CH251 848.8MHz****GSM 1900MHz CH512 1850.2MHz****GSM 1900MHz CH661 1880.0MHz****GSM 1900MHz CH810 1909.8MHz**

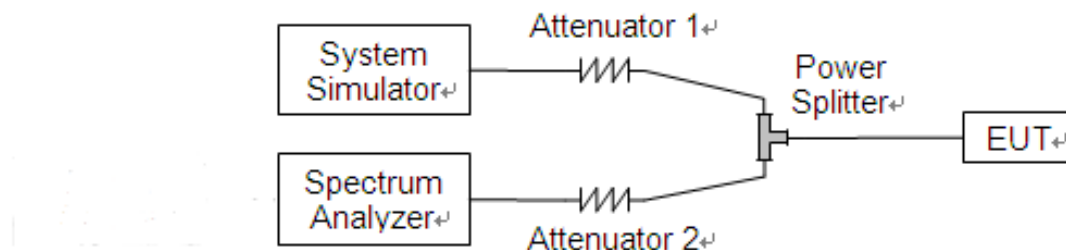
2.6. Band Edge

2.6.1. Requirement

According to FCC section 22.917(b), 24.238(b) and 27.53(h) in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth (26dB emission bandwidth) of the fundamental emission of the transmitter may be employed.

2.6.2. Test Description

Test Setup:

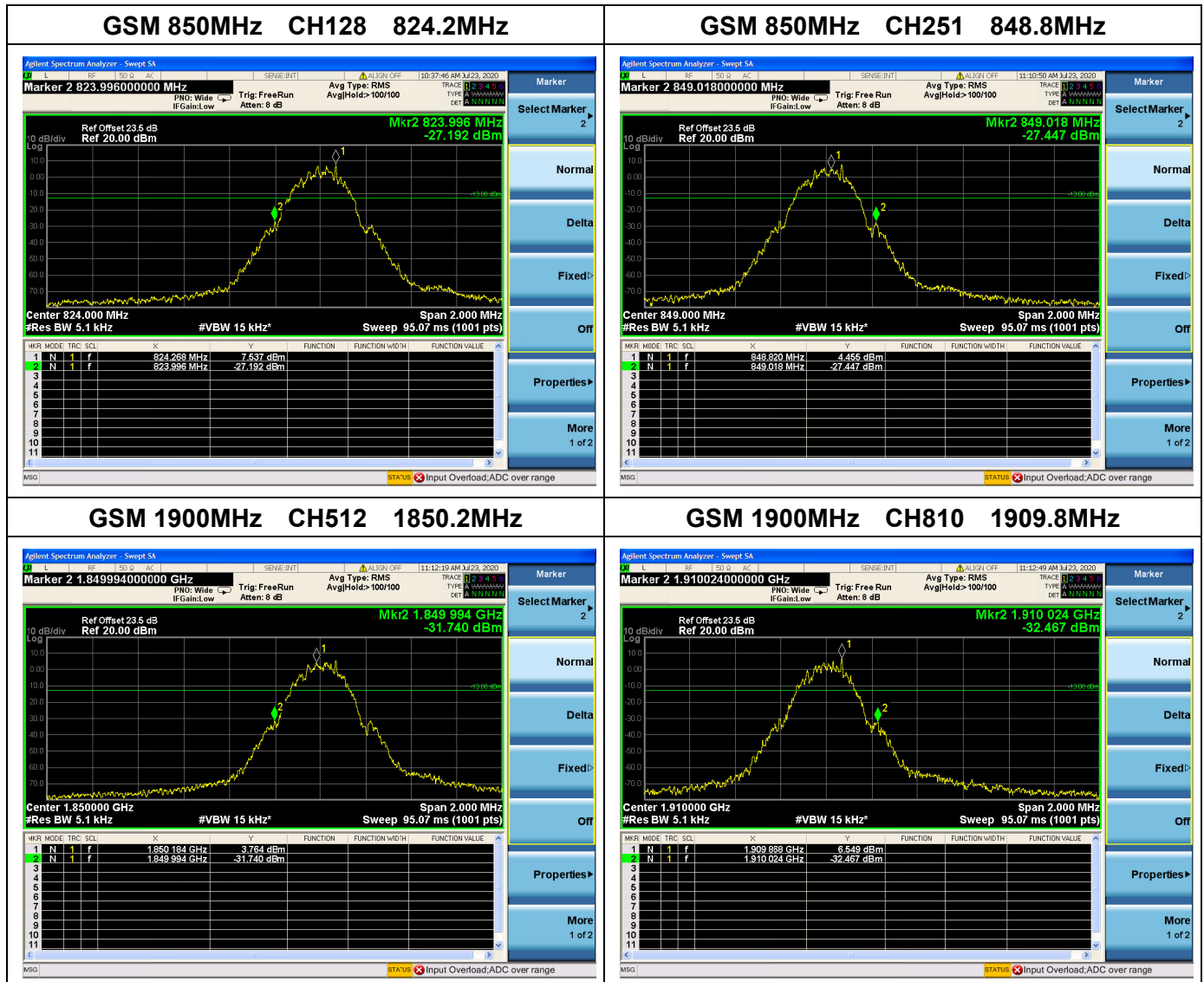


The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.



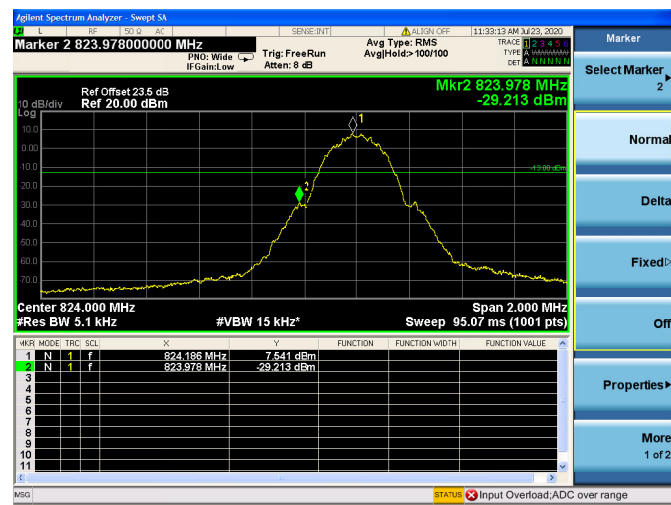
2.6.3. Test Result

The lowest and highest channels are tested to verify the band edge emissions.

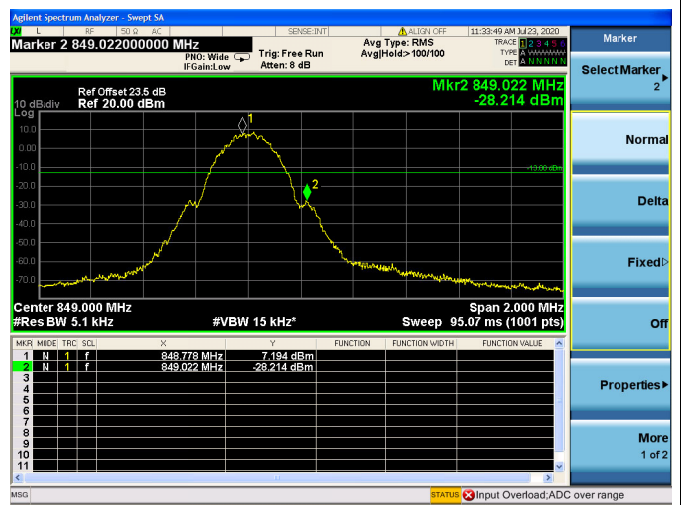




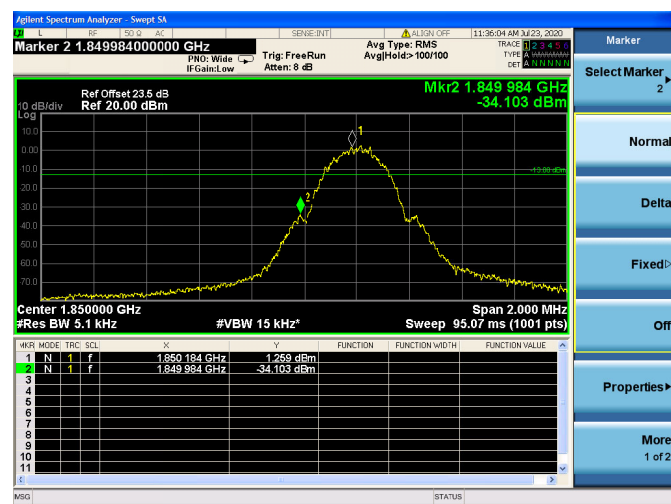
EDGE 850MHz CH128 824.2MHz



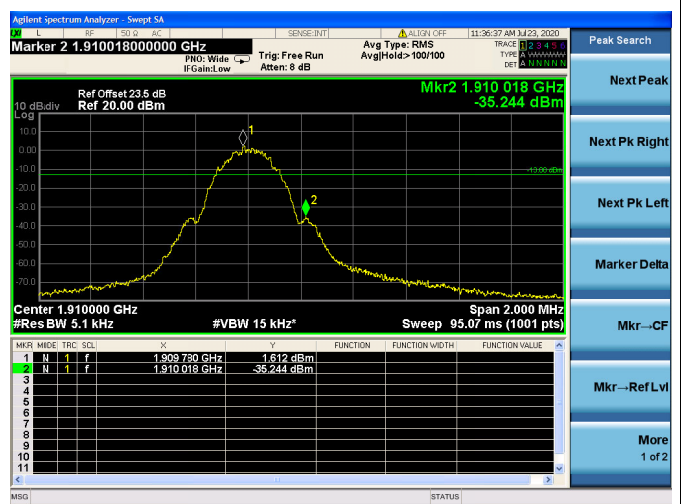
EDGE 850MHz CH251 848.8MHz



EDGE 1900MHz CH512 1850.2MHz



EDGE 1900MHz CH810 1909.8MHz



2.7. Transmitter Radiated Power (EIRP/ERP)

2.7.1. Requirement

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

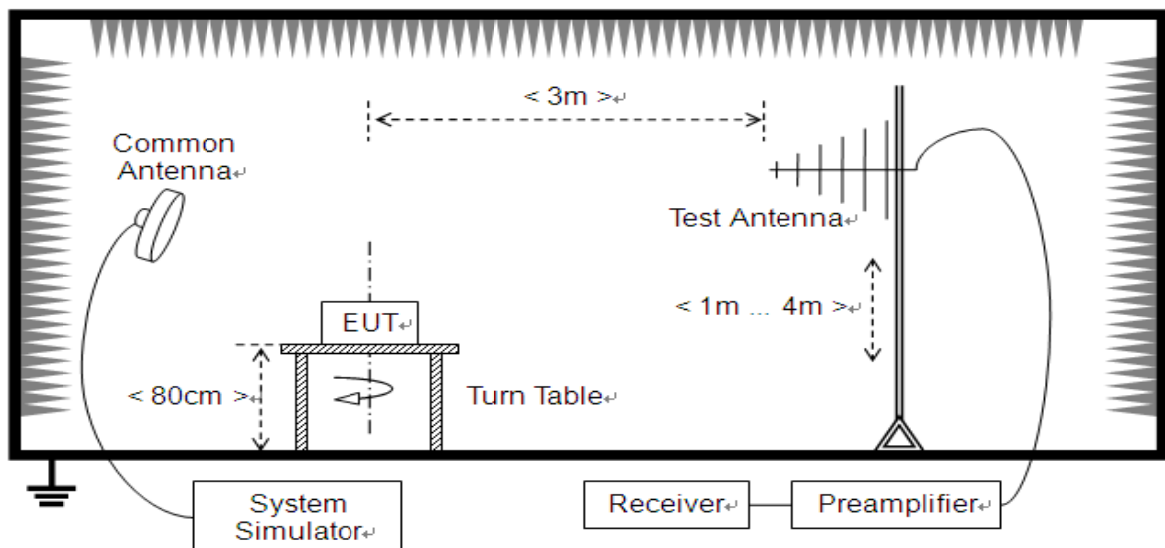
According to FCC section 24.232, the broadband PCS mobile station is limited to 2 Watts e.i.r.p. peak power.

According to FCC section 27.50, mobile, and portable (hand-held) stations is limited to 1 Watts e.i.r.p. peak power.

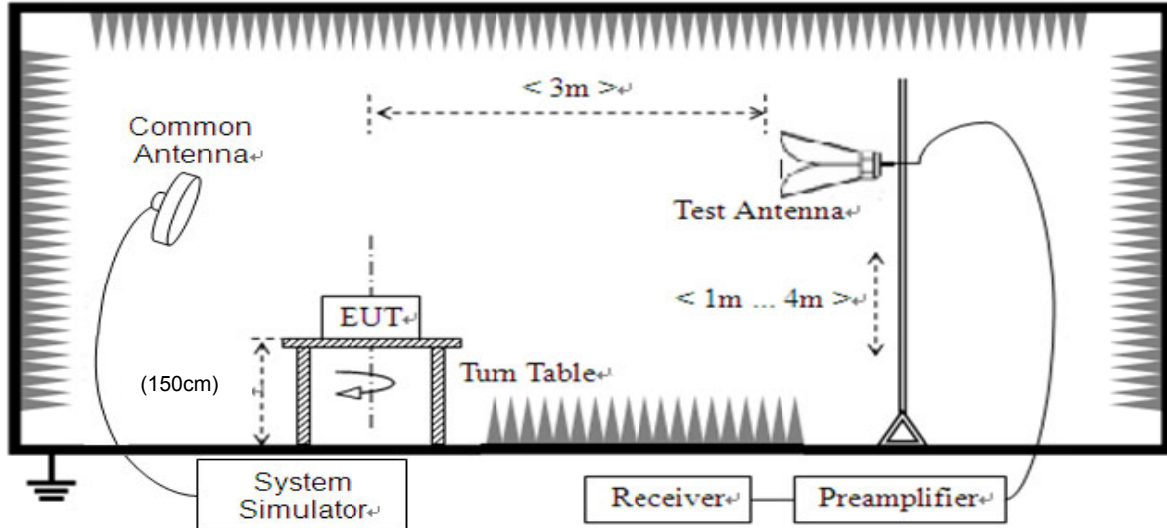
2.7.2. Test Description

Test Setup:

1) Below 1GHz



2) Above 1GHz



The EUT is located in a 3m Full-Anechoic Chamber; the cable loss, air loss and so on of the site as factors are pre-calibrated using the "Substitution" method, and calculated to correct the reading. A call is established between the EUT and the SS via a Common Antenna. The EUT is commanded by the SS to operate at the maximum and minimum output power (i.e. GSM850MHz band Power Control Level (PCL) = 5/19 and Power Class = 4, GSM1900MHz band Power Control Level (PCL) = 0/15 and Power Class = 1), and only the test result of the maximum output power was recorded. Please refer to section 2.1.3 of this report.

- Step size (dB): 3dB

The Test Antenna is a Bi-Log one (used for 30MHz to 1GHz) or a Horn one (used for above 3GHz), it's located at the same height as the EUT. The Filters consists of Notch Filters and High Pass Filter.



2.7.3. Test Result

The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. The lowest, middle and highest channels are tested.

The substitution corrections are obtained as described below:

$$A_{\text{SUBST}} = P_{\text{SUBST_TX}} - P_{\text{SUBST_RX}} - L_{\text{SUBST_CABLES}} + G_{\text{SUBST_TX_ANT}}$$

$$A_{\text{TOT}} = L_{\text{CABLES}} + A_{\text{SUBST}}$$

Where A_{SUBST} is the final substitution correction including receive antenna gain.

$P_{\text{SUBST_TX}}$ is signal generator level,

$P_{\text{SUBST_RX}}$ is receiver level,

$L_{\text{SUBST_CABLES}}$ is cable losses including TX cable,

$G_{\text{SUBST_TX_ANT}}$ is substitution antenna gain.

A_{TOT} is total correction factor including cable loss and substitution correction

During the test, the data of A_{TOT} was added in the Test Spectrum Analyze, so Spectrum Analyze reading is the final values which contain the data of A_{TOT} .

**GSM Test verdict:**

Band	Channel	Frequency (MHz)	PCL	Measured ERP		Limit		Verdict
				dBm	W	dBm	W	
GSM 850MHz	128	824.20	5	27.30	0.537	38.5	7	PASS
	190	836.60	5	27.50	0.562			PASS
	251	848.80	5	27.27	0.533			PASS
GPRS 850MHz	128	824.20	5	27.31	0.538	38.5	7	PASS
	190	836.60	5	27.58	0.573			PASS
	251	848.80	5	27.29	0.536			PASS
EDGE 850MHz	128	824.20	5	21.88	0.154	38.5	7	PASS
	190	836.60	5	22.00	0.158			PASS
	251	848.80	5	22.04	0.160			PASS

Note 1: For the GPRS and EDGE model, all the slots were tested and just the worst data were recorded in this report.

Note 2: Both horizontal and vertical polarizations of the test antenna are evaluated respectively, only the worst data (horizontal) were recorded in this report.

Band	Channel	Frequency (MHz)	PCL	Measured EIRP		Limit		Verdict
				dBm	W	dBm	W	
GSM 1900MHz	512	1850.2	0	29.49	0.889	33	2	PASS
	661	1880.0	0	29.62	0.916			PASS
	810	1909.8	0	29.80	0.955			PASS
GPRS 1900MHz	512	1850.2	0	29.49	0.889	33	2	PASS
	661	1880.0	0	29.59	0.910			PASS
	810	1909.8	0	29.77	0.948			PASS
EDGE 1900MHz	512	1850.2	0	26.44	0.441	33	2	PASS
	661	1880.0	0	26.39	0.436			PASS
	810	1909.8	0	26.51	0.448			PASS

Note 1: For the GPRS and EDGE model, all the slots were tested and just the worst data were recorded in this report.

Note 2: Both horizontal and vertical polarizations of the test antenna are evaluated respectively, only the worst data (horizontal) were recorded in this report.

2.8. Radiated Out of Band Emissions

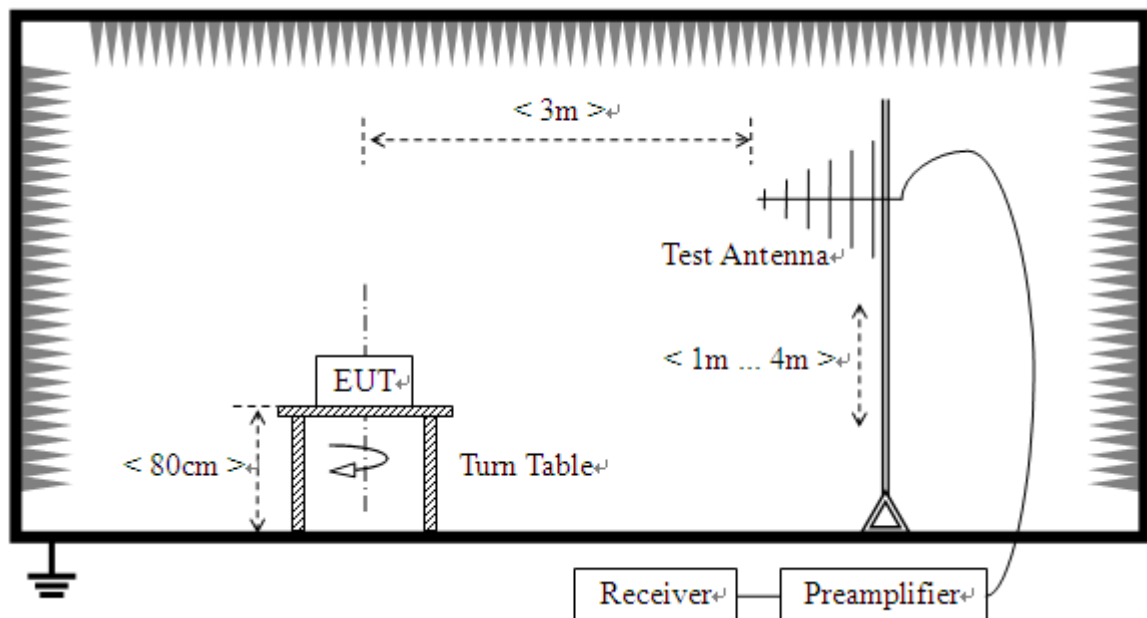
2.8.1. Requirement

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 $43 + 10 \cdot \log(P)$ dB. This calculated to be -13dBm.

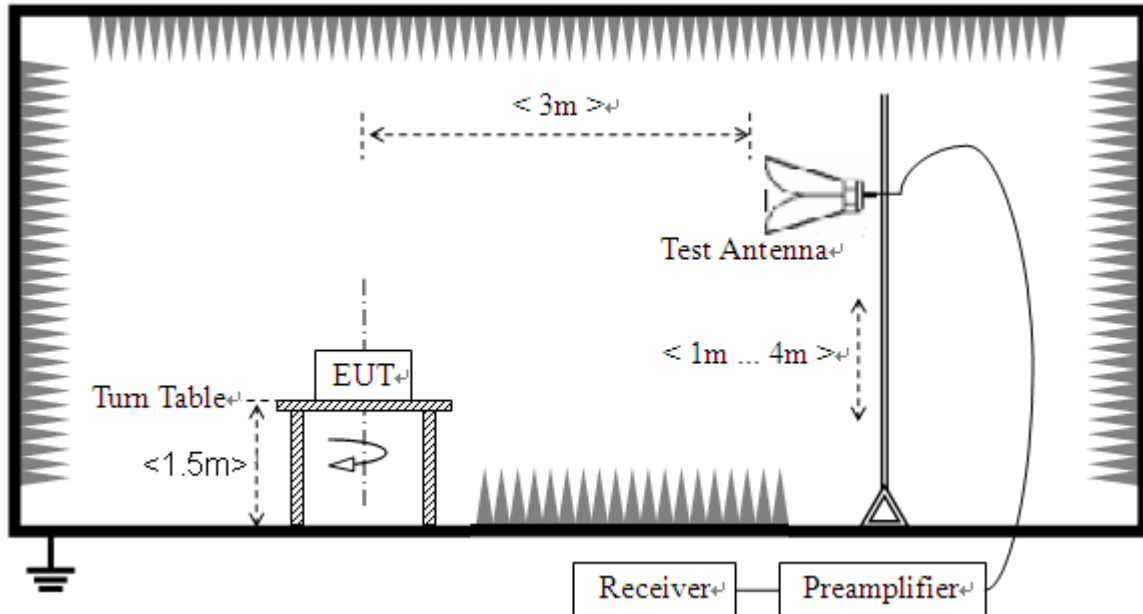
2.8.2. Test Description

Test Setup:

- 1) Below 1GHz



2) Above 1GHz



The EUT is located in a 3m Full-Anechoic Chamber, the cable loss, air loss and so on of the site as factors are pre-calibrated using the "Substitution" method, and calculated to correct the reading. A call is established between the EUT and the SS via a Common Antenna. The EUT is commanded by the SS to operate at the maximum and minimum output power (i.e. GSM850MHz band Power Control Level (PCL) = 5/19 and Power Class = 4, GSM1900MHz band Power Control Level (PCL) = 0/15 and Power Class = 1), and only the test result of the maximum output power was recorded. Please refer to section 2.1.3 of this report.

- Step size (dB): 3dB

The Test Antenna is a Bi-Log one (used for 30MHz to 1GHz) and a Horn one (used for above 3 GHz), it's located at the same height as the EUT. The Filters consists of Notch Filters and High Pass Filter.

Note: when doing measurements above 1GHz, the EUT has been within the 3dB cone width of the horn antenna during horizontal antenna.

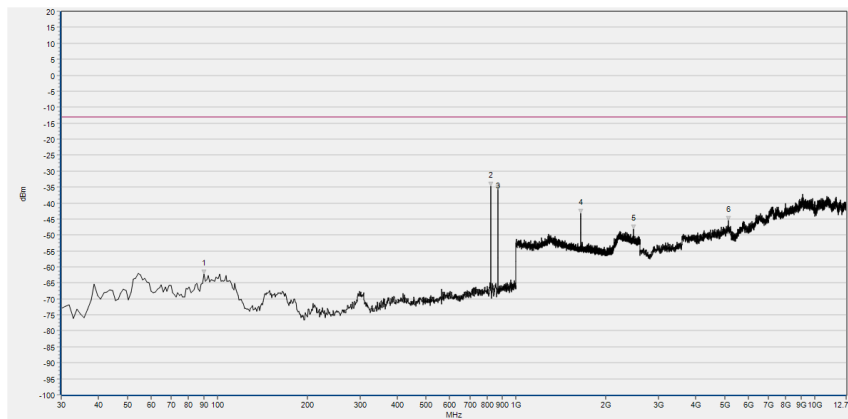
2.8.3. Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. The lowest, middle and highest channels are tested to verify the out of band emissions. The power of the EUT transmitting frequency should be ignored.

Band	Channel	Frequency (MHz)	Measured Max. Spurious Emission (dBm)		Limit (dBm)	Verdict
			Test Antenna Horizontal	Test Antenna Vertical		
GSM 850MHz	128	824.2	< -25	< -25	-13	PASS
	190	836.6	< -25	< -25		PASS
	251	848.8	< -25	< -25		PASS
GSM 1900MHz	512	1850.2	< -25	< -25	-13	PASS
	661	1880.0	< -25	< -25		PASS
	810	1909.8	< -25	< -25		PASS
EDGE 850MHz	128	824.2	< -25	< -25	-13	PASS
	190	836.6	< -25	< -25		PASS
	251	848.8	< -25	< -25		PASS
EDGE 1900MHz	512	1850.2	< -25	< -25	-13	PASS
	661	1880.0	< -25	< -25		PASS
	810	1909.8	< -25	< -25		PASS

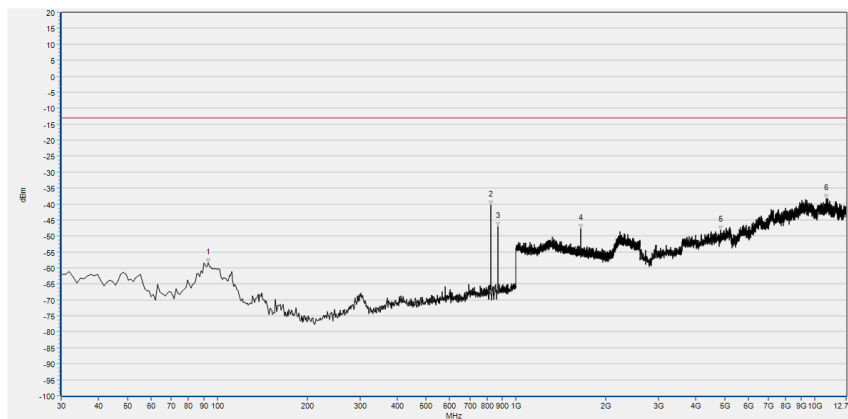
Note 1: All test mode and condition mentioned were considered and evaluated respectively by performing full test, only the worst data were recorded and reported.

Note 2: All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.



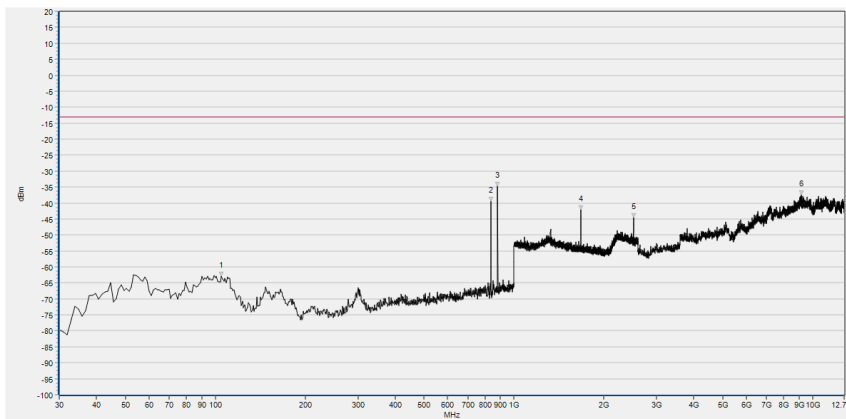
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	90.200	-62.19	-13.00	Horizontal	PASS
2	824.254	-34.69	-13.00	Horizontal	NA
3	868.919	-35.56	-13.00	Horizontal	NA
4	1648.216	-43.26	-13.00	Horizontal	PASS
5	2472.491	-48.08	-13.00	Horizontal	PASS
6	5145.115	-45.58	-13.00	Horizontal	PASS

(GSM 850MHz, Channel = 128, Horizontal)



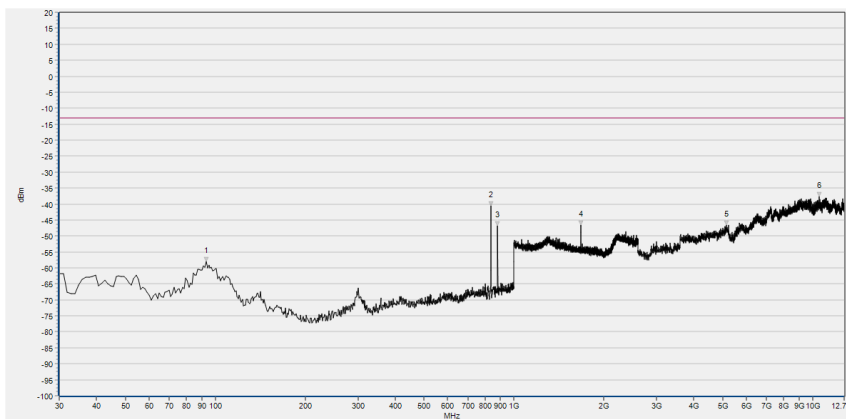
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	93.113	-58.34	-13.00	Vertical	PASS
2	824.254	-40.33	-13.00	Vertical	NA
3	868.919	-46.95	-13.00	Vertical	NA
4	1648.216	-47.61	-13.00	Vertical	PASS
5	4850.667	-48.14	-13.00	Vertical	PASS
6	10959.620	-38.34	-13.00	Vertical	PASS

(GSM 850MHz, Channel = 128, Vertical)



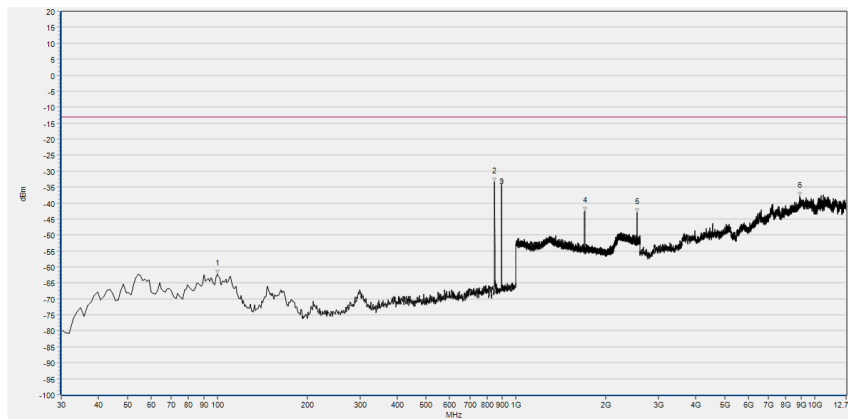
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	104.765	-62.95	-13.00	Horizontal	PASS
2	836.877	-39.52	-13.00	Horizontal	NA
3	881.542	-34.75	-13.00	Horizontal	NA
4	1673.291	-42.14	-13.00	Horizontal	PASS
5	2509.303	-44.53	-13.00	Horizontal	PASS
6	9148.933	-37.51	-13.00	Horizontal	PASS

(GSM850MHz, Channel = 190, Horizontal)



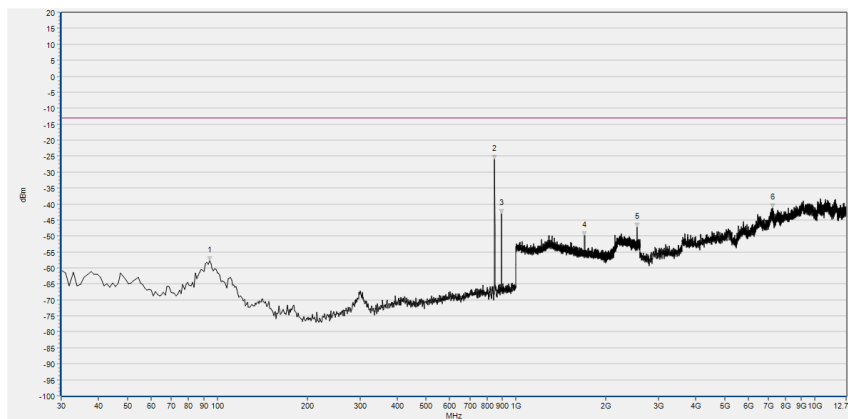
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	93.113	-57.99	-13.00	Vertical	PASS
2	836.877	-40.46	-13.00	Vertical	NA
3	881.542	-46.80	-13.00	Vertical	NA
4	1672.758	-46.62	-13.00	Vertical	PASS
5	5151.884	-46.60	-13.00	Vertical	PASS
6	10526.409	-37.74	-13.00	Vertical	PASS

(GSM 850MHz, Channel = 190, Vertical)



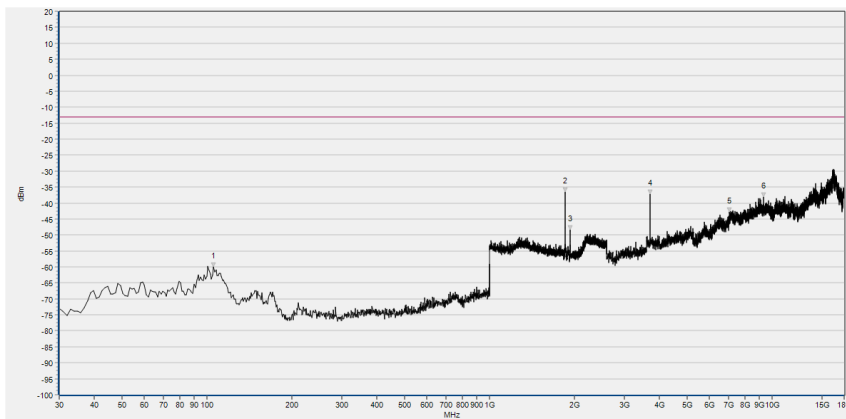
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	99.910	-62.30	-13.00	Horizontal	PASS
2	848.529	-33.46	-13.00	Horizontal	NA
3	894.164	-34.17	-13.00	Horizontal	NA
4	1697.833	-42.56	-13.00	Horizontal	PASS
5	2546.649	-43.10	-13.00	Horizontal	PASS
6	8935.712	-37.82	-13.00	Horizontal	PASS

(GSM 850MHz, Channel = 251, Horizontal)



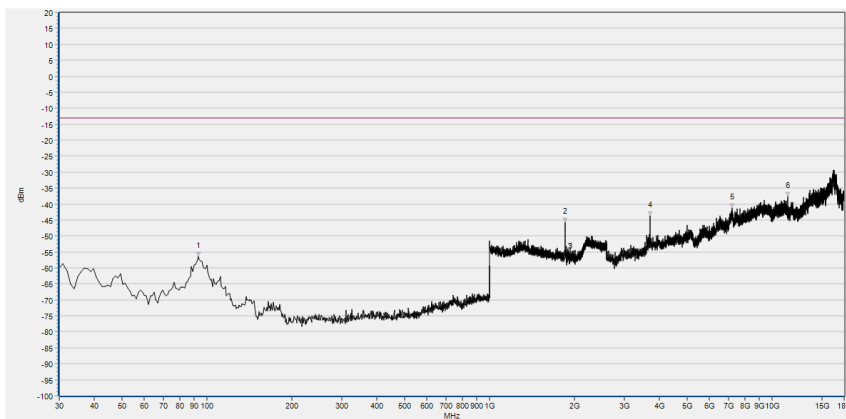
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	94.084	-57.67	-13.00	Vertical	PASS
2	848.529	-25.96	-13.00	Vertical	NA
3	894.164	-43.02	-13.00	Vertical	NA
4	1697.299	-49.94	-13.00	Vertical	PASS
5	2546.115	-47.17	-13.00	Vertical	PASS
6	7240.097	-41.30	-13.00	Vertical	PASS

(GSM 850MHz, Channel = 251, Vertical)



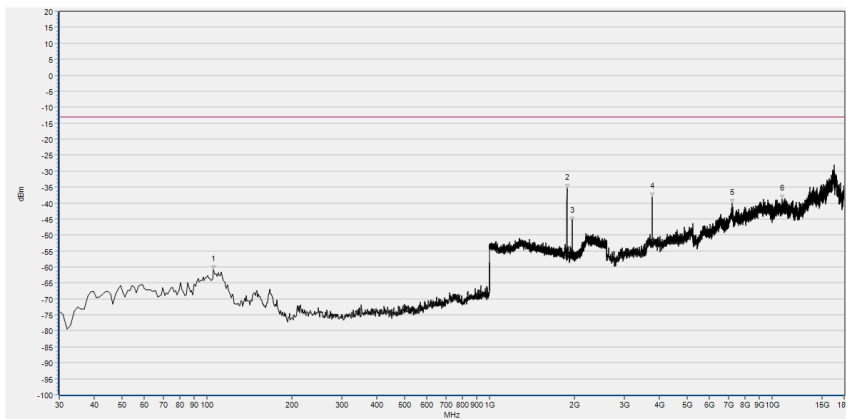
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	105.660	-60.08	-13.00	Horizontal	PASS
2	1850.260	-36.51	-13.00	Horizontal	NA
3	1930.292	-48.44	-13.00	Horizontal	NA
4	3700.600	-37.12	-13.00	Horizontal	PASS
5	7075.214	-42.90	-13.00	Horizontal	PASS
6	9307.219	-38.08	-13.00	Horizontal	PASS

(GSM 1900MHz, Channel = 512, Horizontal)



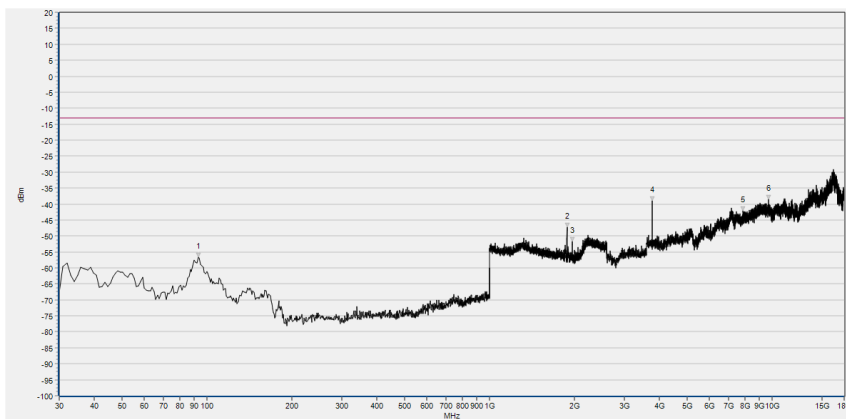
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	93.050	-56.53	-13.00	Vertical	PASS
2	1850.260	-45.70	-13.00	Vertical	NA
3	1930.292	-53.61	-13.00	Vertical	NA
4	3700.600	-43.71	-13.00	Vertical	PASS
5	7220.840	-41.32	-13.00	Vertical	PASS
6	11340.389	-37.69	-13.00	Vertical	PASS

(GSM 1900MHz, Channel = 512, Vertical)



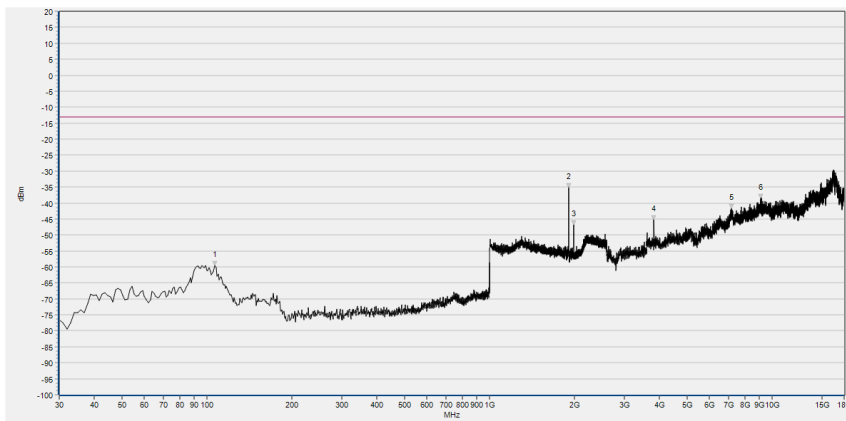
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	105.660	-60.93	-13.00	Horizontal	PASS
2	1879.712	-35.32	-13.00	Horizontal	NA
3	1960.384	-45.80	-13.00	Horizontal	NA
4	3759.411	-38.21	-13.00	Horizontal	PASS
5	7237.643	-40.17	-13.00	Horizontal	PASS
6	10830.696	-38.76	-13.00	Horizontal	PASS

(GSM 1900MHz, Channel = 661, Horizontal)



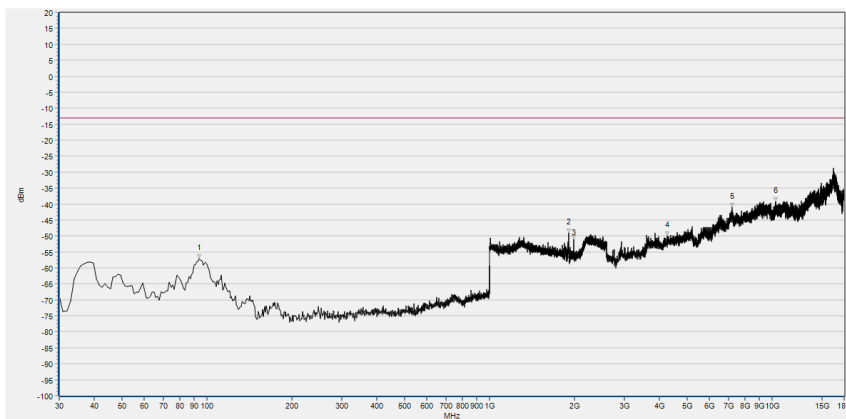
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	93.050	-56.67	-13.00	Vertical	PASS
2	1879.712	-47.21	-13.00	Vertical	NA
3	1959.744	-51.66	-13.00	Vertical	NA
4	3759.411	-39.08	-13.00	Vertical	PASS
5	7904.164	-42.01	-13.00	Vertical	PASS
6	9704.892	-38.64	-13.00	Vertical	PASS

(GSM 1900MHz, Channel = 661, Vertical)



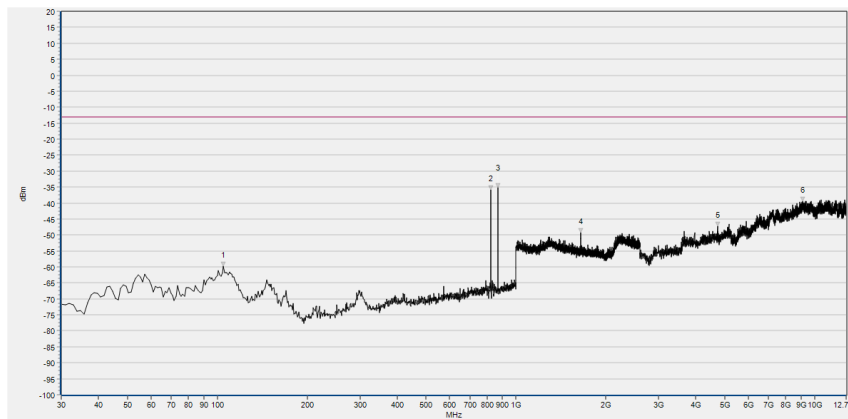
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	106.630	-59.58	-13.00	Horizontal	PASS
2	1909.804	-35.21	-13.00	Horizontal	NA
3	1989.836	-46.84	-13.00	Horizontal	NA
4	3818.221	-45.25	-13.00	Horizontal	PASS
5	7176.032	-41.68	-13.00	Horizontal	PASS
6	9097.181	-38.57	-13.00	Horizontal	PASS

(GSM 1900MHz, Channel = 810, Horizontal)



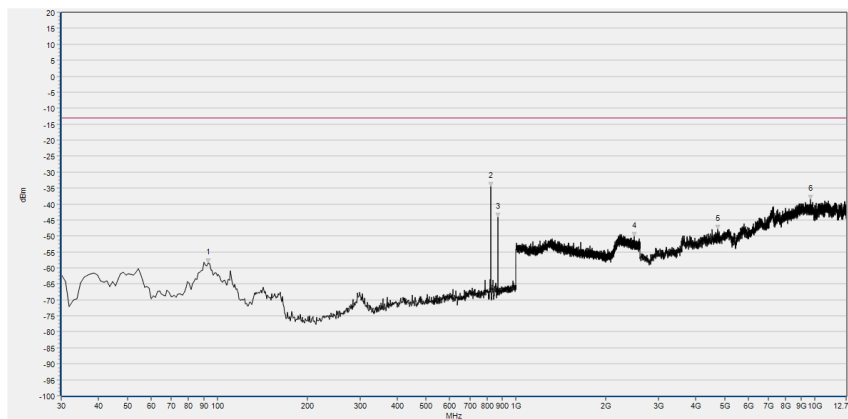
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	94.020	-57.19	-13.00	Vertical	PASS
2	1909.804	-48.94	-13.00	Vertical	NA
3	1989.836	-51.09	-13.00	Vertical	NA
4	4255.101	-49.90	-13.00	Vertical	PASS
5	7226.441	-41.09	-13.00	Vertical	PASS
6	10304.201	-39.22	-13.00	Vertical	PASS

(GSM 1900MHz, Channel = 810, Vertical)



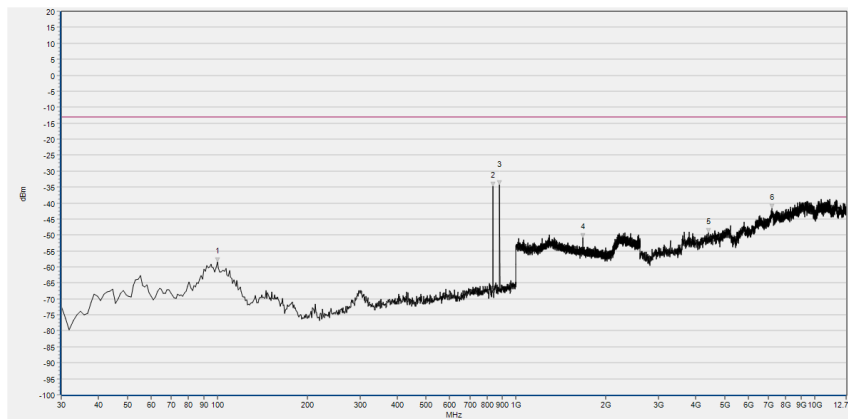
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	104.765	-59.78	-13.00	Horizontal	PASS
2	824.254	-35.97	-13.00	Horizontal	NA
3	868.919	-35.27	-13.00	Horizontal	NA
4	1648.216	-49.27	-13.00	Horizontal	PASS
5	4725.442	-47.36	-13.00	Horizontal	PASS
6	9125.242	-39.41	-13.00	Horizontal	PASS

(EDGE 850MHz, Channel = 128, Horizontal)



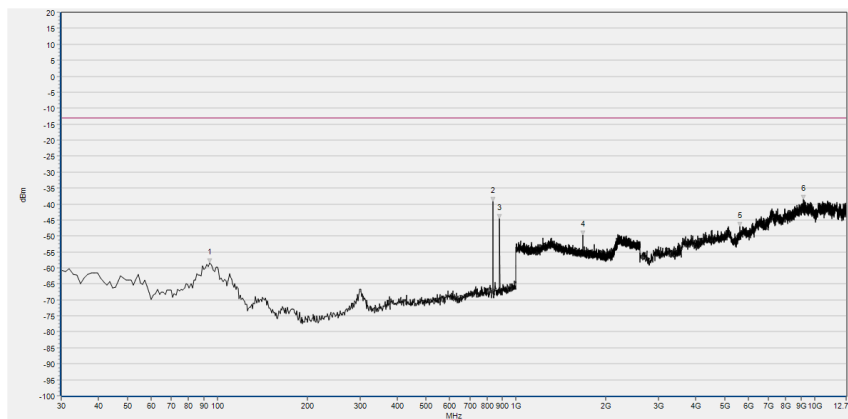
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	93.113	-58.52	-13.00	Vertical	PASS
2	824.254	-34.63	-13.00	Vertical	NA
3	868.919	-44.15	-13.00	Vertical	NA
4	2490.630	-50.26	-13.00	Vertical	PASS
5	4725.442	-47.90	-13.00	Vertical	PASS
6	9687.062	-38.61	-13.00	Vertical	PASS

(EDGE 850MHz, Channel = 128, Vertical)



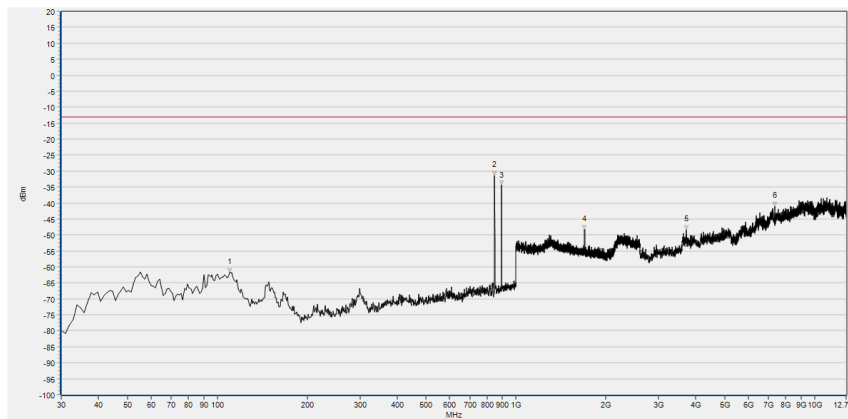
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	99.910	-58.35	-13.00	Horizontal	PASS
2	836.877	-34.74	-13.00	Horizontal	NA
3	881.542	-34.29	-13.00	Horizontal	NA
4	1672.758	-50.94	-13.00	Horizontal	PASS
5	4400.534	-49.35	-13.00	Horizontal	PASS
6	7175.792	-41.57	-13.00	Horizontal	PASS

(EDGE 850MHz, Channel = 190, Horizontal)



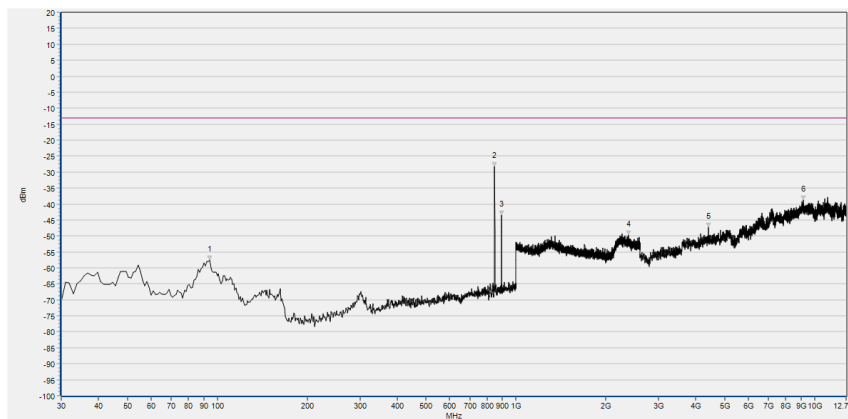
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	94.084	-58.52	-13.00	Vertical	PASS
2	836.877	-39.18	-13.00	Vertical	NA
3	881.542	-44.61	-13.00	Vertical	NA
4	1673.291	-49.79	-13.00	Vertical	PASS
5	5622.324	-47.12	-13.00	Vertical	PASS
6	9148.933	-38.54	-13.00	Vertical	PASS

(EDGE 850MHz, Channel = 190, Vertical)



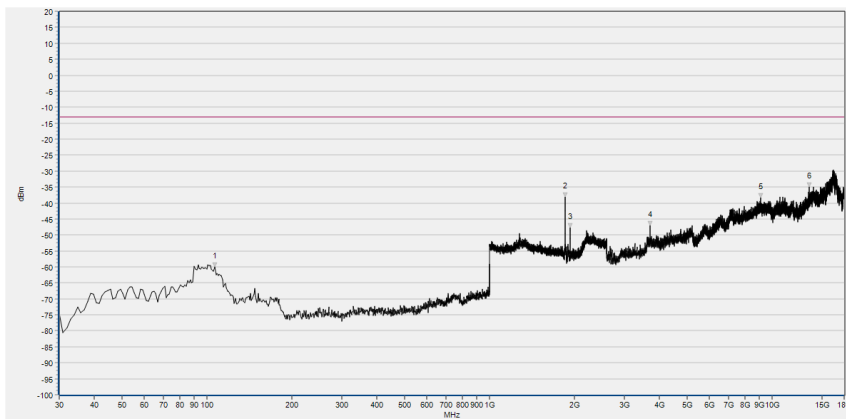
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	109.620	-61.88	-13.00	Horizontal	PASS
2	848.529	-31.32	-13.00	Horizontal	NA
3	894.164	-34.38	-13.00	Horizontal	NA
4	1697.299	-48.30	-13.00	Horizontal	PASS
5	3723.641	-48.37	-13.00	Horizontal	PASS
6	7341.631	-40.94	-13.00	Horizontal	PASS

(EDGE 850MHz, Channel = 251, Horizontal)



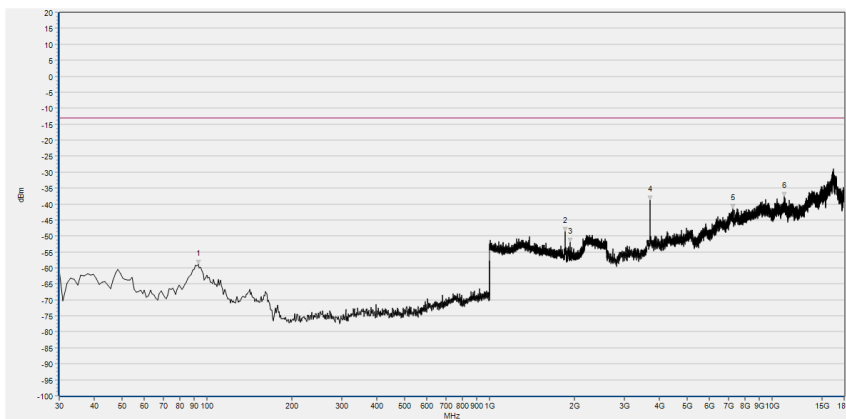
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	94.084	-57.57	-13.00	Vertical	PASS
2	848.529	-28.31	-13.00	Vertical	NA
3	894.164	-43.50	-13.00	Vertical	NA
4	2379.126	-49.79	-13.00	Vertical	PASS
5	4407.302	-47.30	-13.00	Vertical	PASS
6	9165.855	-38.77	-13.00	Vertical	PASS

(EDGE 850MHz, Channel = 251, Vertical)



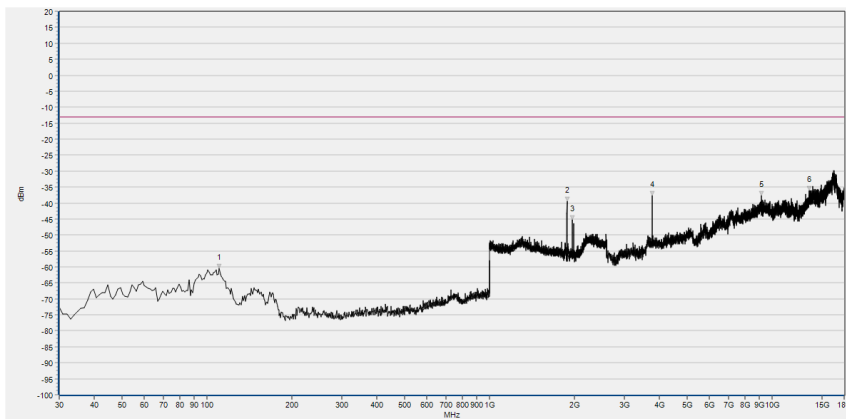
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	106.630	-59.99	-13.00	Horizontal	PASS
2	1850.260	-38.14	-13.00	Horizontal	NA
3	1930.292	-47.79	-13.00	Horizontal	NA
4	3700.600	-47.04	-13.00	Horizontal	PASS
5	9091.580	-38.38	-13.00	Horizontal	PASS
6	13569.594	-34.90	-13.00	Horizontal	PASS

(EDGE 1900MHz, Channel = 512, Horizontal)



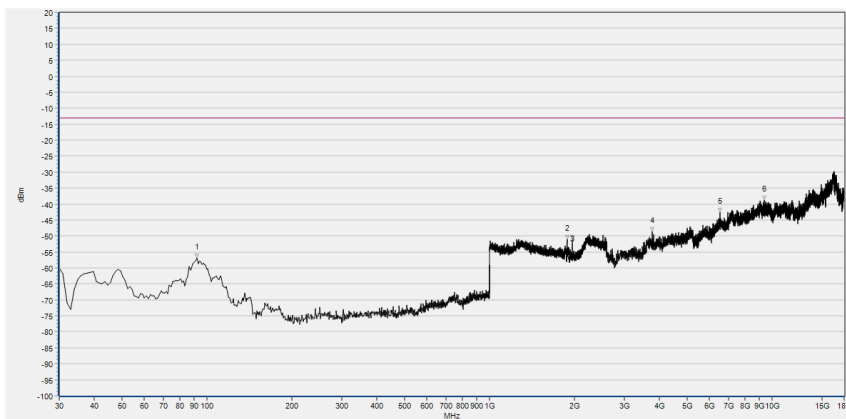
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	93.050	-58.87	-13.00	Vertical	PASS
2	1849.620	-48.70	-13.00	Vertical	NA
3	1930.292	-51.93	-13.00	Vertical	NA
4	3700.600	-38.69	-13.00	Vertical	PASS
5	7268.449	-41.52	-13.00	Vertical	PASS
6	11057.538	-37.68	-13.00	Vertical	PASS

(EDGE 1900MHz, Channel = 512, Vertical)



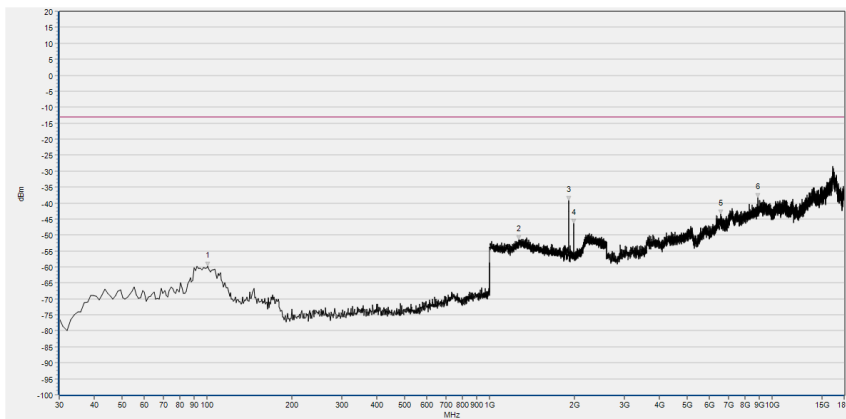
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	110.510	-60.49	-13.00	Horizontal	PASS
2	1879.712	-39.44	-13.00	Horizontal	NA
3	1959.744	-45.18	-13.00	Horizontal	NA
4	3759.411	-37.71	-13.00	Horizontal	PASS
5	9147.590	-37.60	-13.00	Horizontal	PASS
6	13569.594	-36.13	-13.00	Horizontal	PASS

(EDGE 1900MHz, Channel = 661, Horizontal)



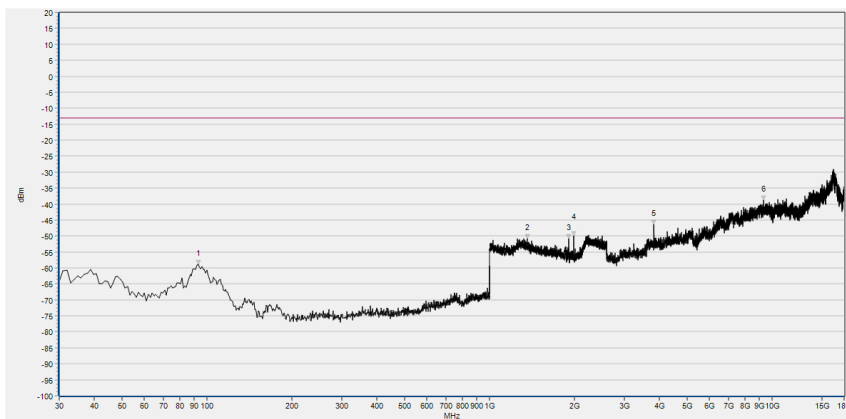
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	92.080	-56.91	-13.00	Vertical	PASS
2	1879.712	-51.13	-13.00	Vertical	NA
3	1959.744	-51.00	-13.00	Vertical	NA
4	3759.411	-48.56	-13.00	Vertical	PASS
5	6531.915	-42.59	-13.00	Vertical	PASS
6	9377.232	-38.78	-13.00	Vertical	PASS

(EDGE 1900MHz, Channel = 661, Vertical)



Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	100.810	-59.82	-13.00	Horizontal	PASS
2	1266.987	-51.52	-13.00	Horizontal	PASS
3	1909.804	-39.18	-13.00	Horizontal	NA
4	1989.836	-46.45	-13.00	Horizontal	NA
5	6565.521	-43.44	-13.00	Horizontal	PASS
6	8912.348	-38.25	-13.00	Horizontal	PASS

(EDGE 1900MHz, Channel = 810, Horizontal)



Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	93.050	-58.89	-13.00	Vertical	PASS
2	1357.263	-50.93	-13.00	Vertical	PASS
3	1909.804	-50.81	-13.00	Vertical	NA
4	1989.836	-50.04	-13.00	Vertical	NA
5	3818.221	-46.37	-13.00	Vertical	PASS
6	9346.427	-38.73	-13.00	Vertical	PASS

(EDGE 1900MHz, Channel = 810, Vertical)



Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Test items	Uncertainty
Output Power	$\pm 2.22\text{dB}$
Bandwidth	$\pm 5\%$
Conducted Spurious Emission	$\pm 2.77\text{ dB}$
Radiated Emission	$\pm 2.95\text{dB}$

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$



Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Laboratory Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, Guangdong Province, P. R. China
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, Guangdong Province, P. R. China

3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.



4. Test Equipments Utilized

4.1 Conducted Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Power Splitter	NW521	1506A	Weinschel	2020.04.15	2021.04.14
Attenuator 1	(N/A.)	10dB	Resnet	2020.04.15	2021.04.14
Attenuator 2	(N/A.)	3dB	Resnet	2020.04.15	2021.04.14
EXA Signal Analyzer	MY53470836	N9010A	Agilent	2020.07.28	2021.07.27
Wireless synthesizer	MY48364176	8960 -E5515C	Agilent	2020.04.15	2021.04.14
RF cable (30MHz-26GHz)	CB01	RF01	Morlab	2020.01.13	2021.01.12
Coaxial cable	CB02	RF02	Morlab	N/A	N/A
SMA connector	CN01	RF03	HUBER-SUHNER	N/A	N/A
Temperature Chamber	(N/A)	HUT705P	CHONGQING HANBA EXPERIMENTAL EQUIPMENT CO.,LTD	N/A	N/A
Computer	T430i	Think Pad	Lenovo	N/A	N/A

**4.2 Radiated Test Equipments**

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
System Simulator	152038	CMW500	R&S	2020.01.13	2021.01.12
Receiver	MY54130016	N9038A	Agilent	2020.07.28	2021.07.27
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2019.05.24	2022.05.23
Test Antenna - Horn	9170C-531	BBHA9170	Schwarzbeck	2019.07.26	2022.07.25
Test Antenna - Horn	01774	BBHA 9120D	Schwarzbeck	2019.05.24	2022.05.23
Coaxial cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
Coaxial cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
Coaxial cable (N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
1-18GHz pre-Amplifier	MA02	TS-PR18	Rohde& Schwarz	2020.07.28	2021.07.27
18-26.5GHz pre-Amplifier	MA03	TS-PR18	Rohde& Schwarz	2020.07.28	2021.07.27
Notch Filter	N/A	WRCG-GSM 850	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCG-GSM 1900	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCGV-W Band V	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCGV-W Band II	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCGV-W Band IV	Wainwright	2019.12.01	2020.11.30
Anechoic Chamber	N/A	9m*6m*6m	CRT	2019.07.13	2022.07.12

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