



TEST REPORT

APPLICANT : LG Electronics USA,Inc.
PRODUCT NAME : Smartphone
MODEL NAME : LM-X440IM
BRAND NAME : LG
FCC ID : ZNFX440IM
STANDARD(S) : 47 CFR Part 22 Subpart H
: 47 CFR Part 24 Subpart E
RECEIPT DATE : 2019-06-06
TEST DATE : 2019-06-06 to 2019-08-09
ISSUE DATE : 2019-08-13

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Change History		
Version	Date	Reason for change
1.0	2019-08-13	Initial Version



1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	LG Electronics USA, Inc.
Applicant Address:	1000 Sylvan Ave. Englewood Cliffs, New Jersey, United States 07632
Manufacturer:	OPTIEMUS ELECTRONICS LIMITED .
Manufacturer Address:	D-348, Sector 63, Gautam Budh Nagar, Noida, Uttar Pradesh 201307 India

1.2. Equipment Under Test (EUT) Description

Product Name:	Smartphone	
Serial No:	(N/A, marked #1 by test site)	
Hardware Version:	V0.10	
Software Version:	LG_IM-X440IM_Software	
Modulation Type:	GSM/GPRS Mode with GMSK Modulation EDGE Mode with 8PSK Modulation	
Operating Frequency Range:	GSM 850MHz: Tx: 824.20 - 848.80MHz Rx: 869.20 - 893.80MHz GSM 1900MHz: Tx: 1850.20 - 1909.80MHz Rx: 1930.20 - 1989.80MHz	
Antenna Type:	Fixed Internal	
Antenna Gain:	GSM 850:	-1.5 dBi
	GSM1900:	-0.5 dBi
Accessory Information:	Battery	
	Brand Name:	LG
	Model No.:	LG4000STCL02
	Serial No.:	(N/A, marked #1 by test site)
	Capacity:	3900mAh
	Rated Voltage:	3.85
	Charge Limit:	4.4V



	AC Adapter Type1	
	Brand Name:	N/A
	Model No.:	TN-050200U4
	Serial No.:	(N/A, marked #1 by test site)
	Rated Input:	100-240V~50/60Hz 0.35A
	Rated Output:	5V= 2A
	AC Adapter Type2	
	Brand Name:	N/A
	Model No.:	LG2AUKPA-1
	Serial No.:	(N/A, marked #1 by test site)
	Rated Input:	100-240V~50/60Hz 0.35A
	Rated Output:	5V= 2A

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	0.744	258KGXW
EDGE850	0.151	246KG7W
GSM1900	0.596	249KGXW
EDGE1900	0.215	246KG7W



1.4. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part 22, Part 24 and Part 27 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
1	2.1046	Conducted RF Output Power	Jun17, 2019	Gao Mingzhou	PASS
2	24.232(d),	Peak -Average Ratio	Jun17, 2019	Gao Mingzhou	PASS
3	2.1049	99% Occupied Bandwidth	Jun17, 2019	Gao Mingzhou	PASS
4	2.1055,22.355, 24.235, 27.54	Frequency Stability	Jul07&08, 2019	Gao Mingzhou	PASS
5	2.1051,22.917(a),2 4.238(a),	Conducted Out of Band Emissions	Jul07&16, 2019	Gao Mingzhou	PASS
6	2.1051,22.917(a),2 4.238(a),	Band Edge	Jul17, 2019	Gao Mingzhou	PASS
7	22.913(a),24.232(a)	Transmitter Radiated Power (EIPR/ERP)	Jul20, 2019	Peng Xuwei	PASS
8	2.1051,22.917(a),2 4.238(a),	Radiated Out of Band Emissions	Jul021, 2019	Peng Xuwei	PASS

Note 1: The tests were performed according to the method of measurements prescribed in KDB 971168 D01 V03R01 (Oct 27, 2017)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&27L Requirements

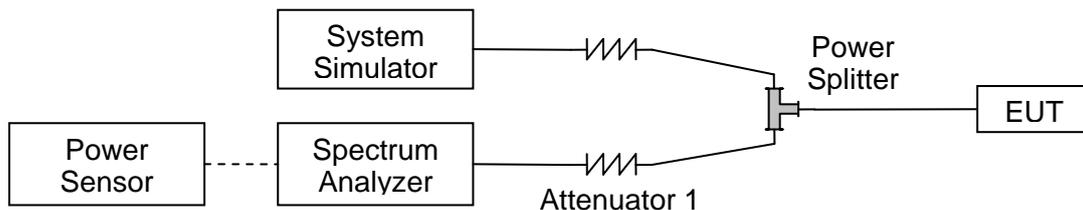
2.1. Conducted RF Output Power

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 50 Ohm; 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	33.04	33.01	33.02
GPRS 1 Tx slot	33.05	33.01	33.04
GPRS 2 Tx slots	32.04	32.15	32.15
GPRS 3 Tx slots	29.97	30.08	30.06
GPRS 4 Tx slots	28.87	28.92	28.93
EDGE 1 Tx slot	26.34	26.24	26.17
EDGE 2 Tx slots	25.33	25.18	25.13
EDGE 3 Tx slots	23.21	23.12	23.08
EDGE 4 Tx slots	22.31	22.14	22.10

GSM1900	Average Power (dBm)		
TX Channel	512	661	810
Frequency (MHz)	1850.2	1880	1909.8
GSM 1 Tx slot	30.15	30.12	30.01
GPRS 1 Tx slot	30.16	30.13	30.04
GPRS 2 Tx slots	29.16	29.14	29.16
GPRS 3 Tx slots	27.12	27.11	27.01
GPRS 4 Tx slots	26.15	26.17	26.05
EDGE 1 Tx slot	25.73	25.68	25.71
EDGE 2 Tx slots	24.72	24.75	24.70
EDGE 3 Tx slots	22.74	22.73	22.78
EDGE 4 Tx slots	21.61	21.65	21.68

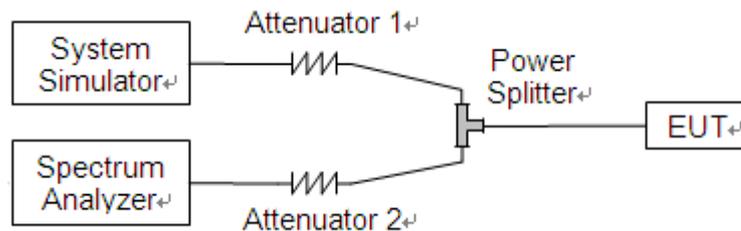
2.2. Peak to Average Ratio

2.2.1. Requirement

According to FCC 24.232(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 50 Ohm; 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:

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

2. For UMTS operating mode:

- a. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
- b. 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	
GSM850M Hz	128	824.2	0.003	13	PASS
	190	836.6	0.003		PASS
	251	848.8	0.002		PASS
GSM 1900MHz	512	1850.2	0.024		PASS
	661	1880.0	0.029		PASS
	810	1909.8	0.027		PASS
GPRS850N Hz	128	824.2	0.607		PASS
	190	836.6	0.003		PASS
	251	848.8	0.009		PASS
GPRS1900 MHz	512	1850.2	0.022		PASS
	661	1880.0	0.016		PASS
	810	1909.8	0.041		PASS
EDGE850 MHz	128	824.2	1.111		PASS
	190	836.6	0.015	PASS	
	251	848.8	0.013	PASS	
EDGE 1900MHz	512	1850.2	0.022	PASS	
	661	1880.0	0.003	PASS	
	810	1909.8	0.003	PASS	



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





GPRS 850MHz CH128 824.2MHz



GPRS 850MHz CH190 836.6MHz



GPRS 850MHz CH251 848.8MHz





GPRS 1900MHz CH512 1850.2MHz



GPRS 850MHz CH661 1880.0MHz



GPRS 850MHz 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



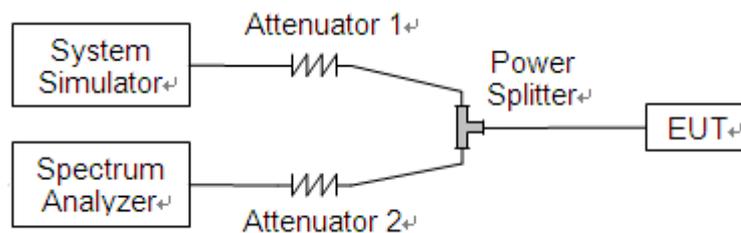
2.3.99% Occupied Bandwidth

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 50 Ohm; 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.

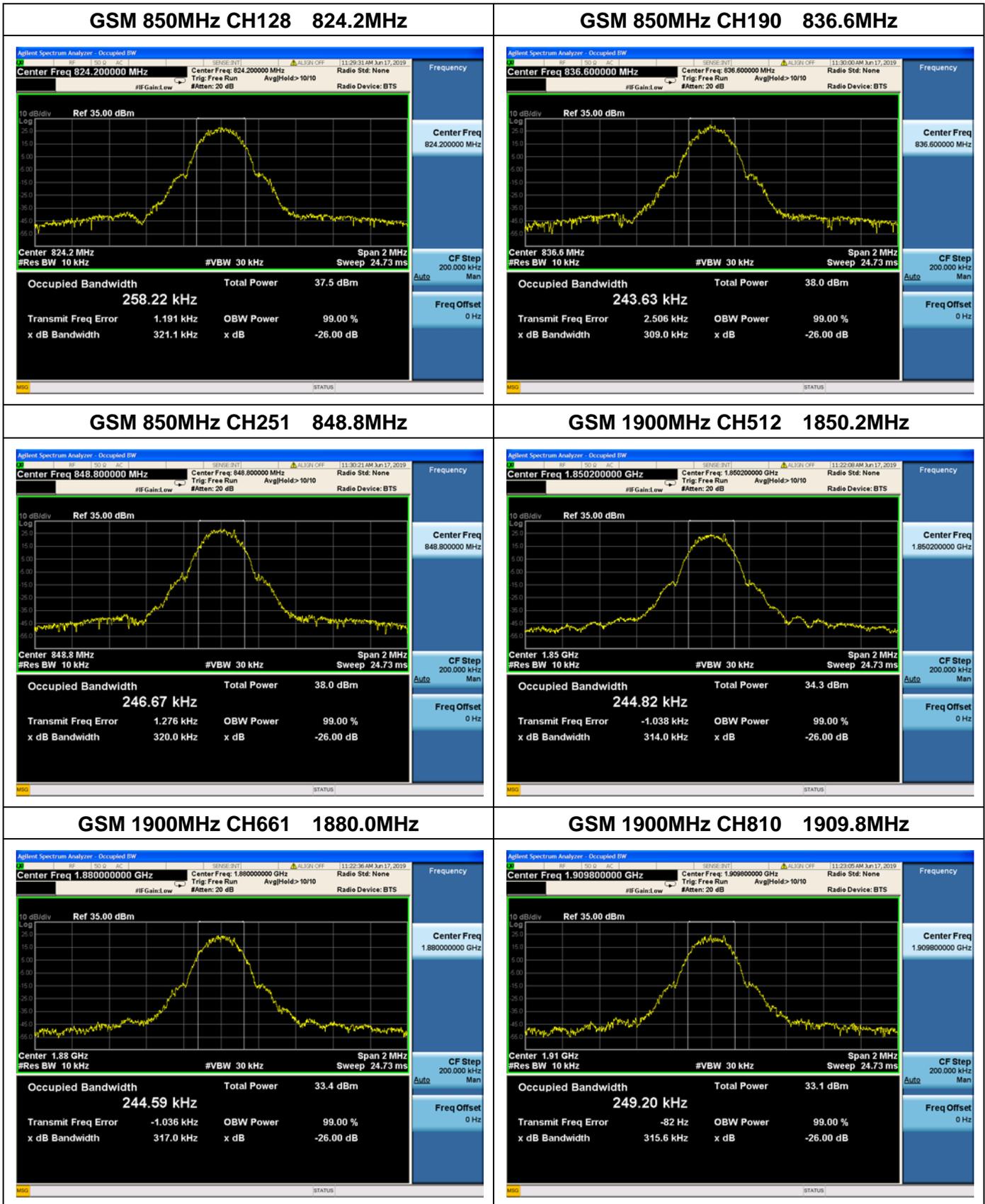


2.3.3. Test Result

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

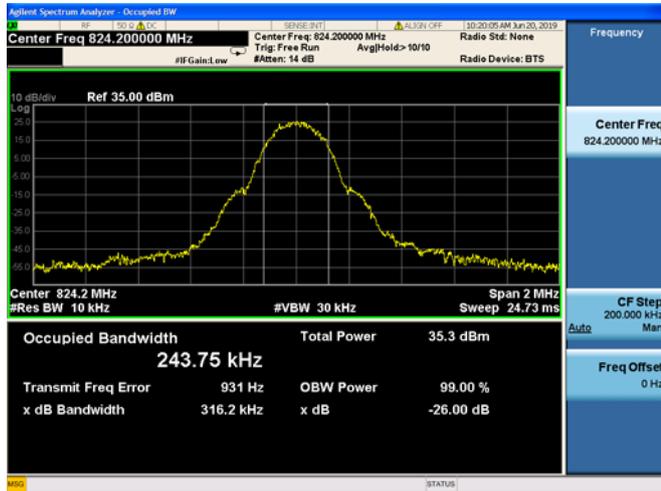
GSM Test Verdict:

Band	Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26dB Bandwidth (kHz)
GSM 850MHz	128	824.2	258.22	321.1
	190	836.6	243.63	309.0
	251	848.8	246.67	320.0
GSM 1900MHz	512	1850.2	244.82	314.0
	661	1880.0	244.59	317.0
	810	1909.8	249.20	315.6
GPRS 850MHz	128	824.2	243.75	316.2
	190	836.6	243.75	317.7
	251	848.8	246.39	316.3
GPRS 1900MHz	512	1850.2	246.59	315.8
	661	1880.0	248.26	317.1
	810	1909.8	244.35	319.1
EDGE 850MHz	128	824.2	245.52	316.8
	190	836.6	246.30	313.6
	251	848.8	243.81	309.6
EDGE 1900MHz	512	1850.2	245.39	319.5
	661	1880.0	246.11	317.3
	810	1909.8	245.46	316.7

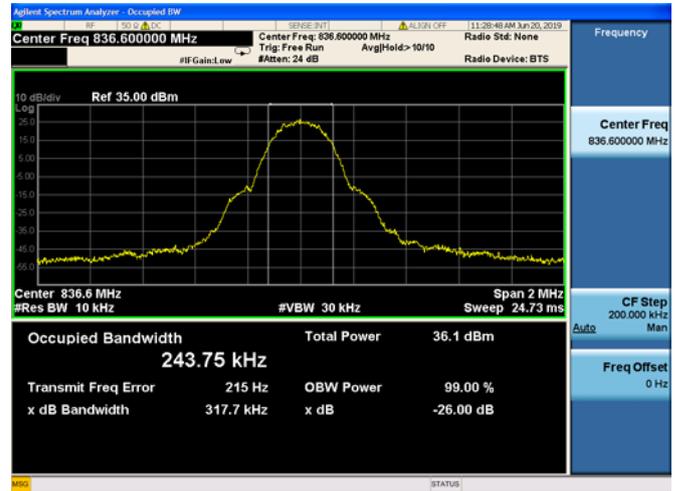




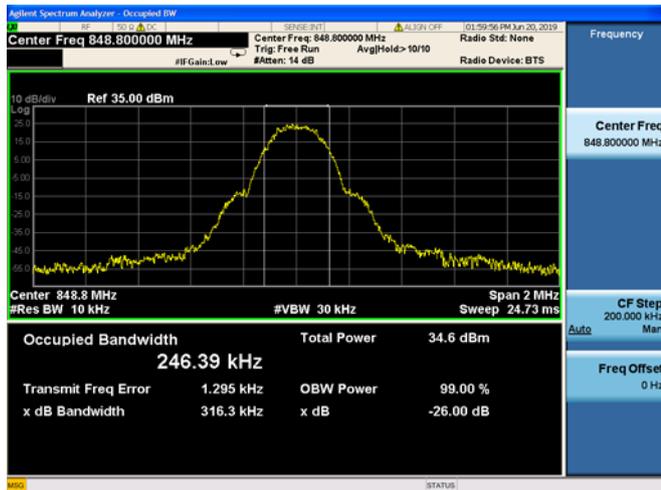
GPRS 850MHz CH128 824.2MHz



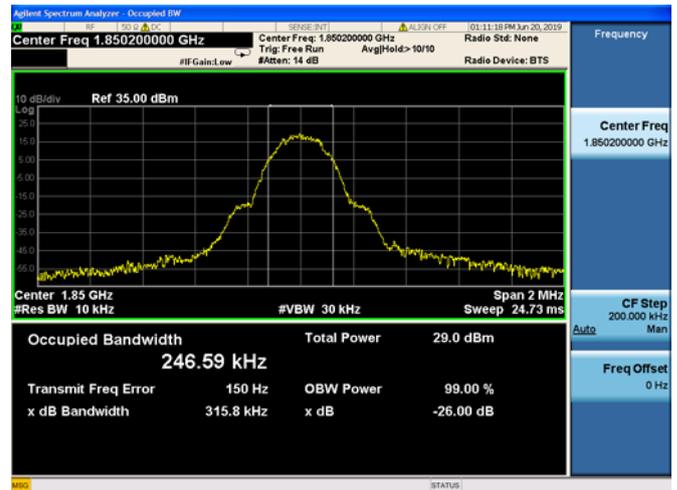
GPRS 850MHz CH190 836.6MHz



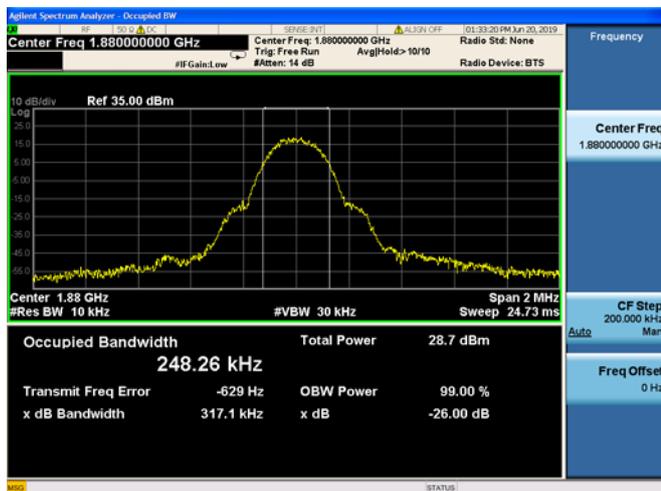
GPRS 850MHz CH251 848.8MHz



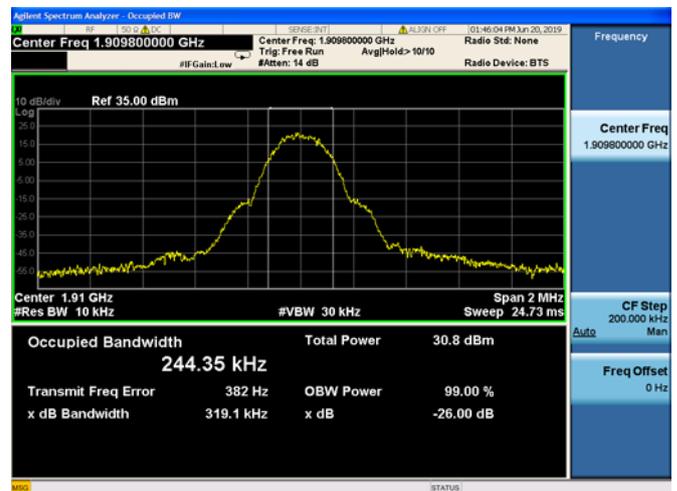
GPRS 1900MHz CH512 1850.2MHz

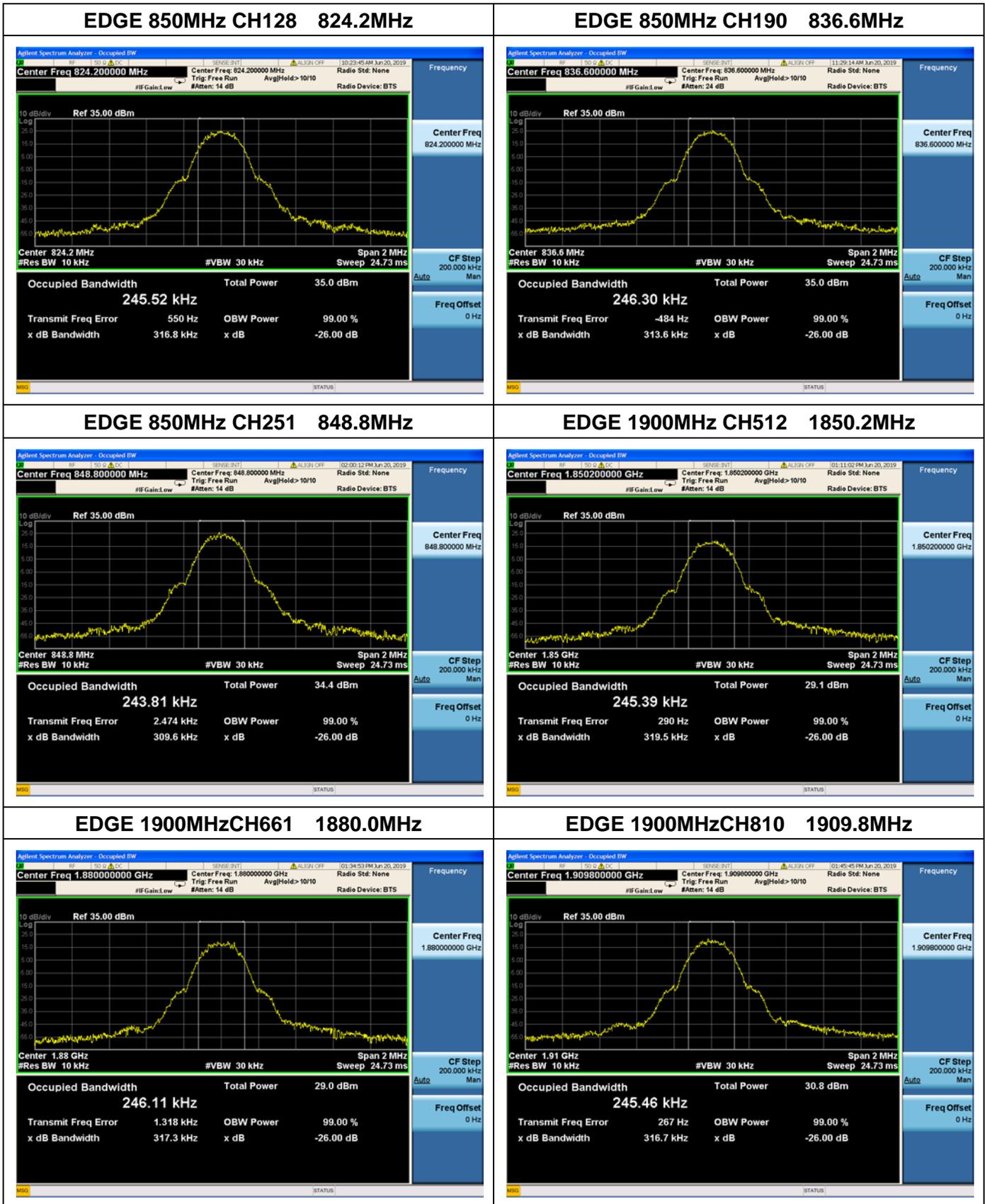


GPRS 1900MHz CH661 1880MHz



GPRS 1900MHz CH810 1909.8MHz





2.4. Frequency Stability

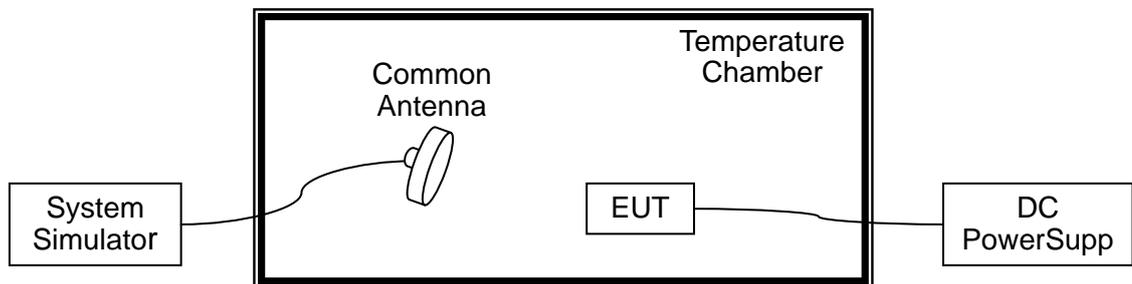
2.4.1. Requirement

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 -30°C to $+50^{\circ}\text{C}$ 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

A. Test Verdict:

GSM 850MHz, Channel 190, Frequency 836.6MHz					
Limit =±2.5ppm					
Voltage(%)	Power(V DC)	Temp(°C)	Fre. Dev. (Hz)	Deviation (ppm)	Result
100	3.8V	+20(Ref)	14	0.017	PASS
100		-30	-5	-0.006	
100		-20	-36	-0.043	
100		-10	-71	-0.085	
100		0	-44	-0.053	
100		+10	26	0.031	
100		+20	41	0.049	
100		+30	96	0.115	
100		+40	27	0.032	
100		+50	37	0.044	
115	4.4V	+20	-16	-0.019	
85	3.5V	+20	-71	-0.085	

GSM 1900MHz, Channel 661, Frequency 1880.0MHz					
Limit =Within Authorized Band					
Voltage(%)	Power(V DC)	Temp(°C)	Fre. Dev. (Hz)	Deviation (ppm)	Result
100	3.8V	+20(Ref)	74	0.039	PASS
100		-30	23	0.012	
100		-20	73	0.039	
100		-10	-74	-0.039	
100		0	-67	-0.036	
100		+10	-44	-0.023	
100		+20	52	0.028	
100		+30	29	0.015	
100		+40	22	0.012	
100		+50	35	0.019	
115	4.4V	+20	35	0.019	
85	3.5V	+20	-49	-0.026	



EDGE 850MHz, Channel 190, Frequency 836.6MHz					
Limit = \pm 2.5ppm					
Voltage(%)	Power(V DC)	Temp($^{\circ}$ C)	Fre. Dev. (Hz)	Deviation (ppm)	Result
100	3.8V	+20(Ref)	15	0.018	PASS
100		-30	-13	-0.016	
100		-20	-25	-0.030	
100		-10	-66	-0.079	
100		0	-37	-0.044	
100		+10	15	0.018	
100		+20	62	0.074	
100		+30	75	0.090	
100		+40	25	0.030	
100		+50	84	0.100	
115	4.4V	+20	-54	-0.065	
85	3.5V	+20	-69	-0.082	

EDGE 1900MHz, Channel 661, Frequency 1880.0MHz					
Limit =Within Authorized Band					
Voltage(%)	Power(V DC)	Temp($^{\circ}$ C)	Fre. Dev. (Hz)	Deviation (ppm)	Result
100	3.8V	+20(Ref)	31	0.016	PASS
100		-30	52	0.028	
100		-20	67	0.036	
100		-10	-64	-0.034	
100		0	-31	-0.016	
100		+10	-53	-0.028	
100		+20	16	0.009	
100		+30	78	0.041	
100		+40	98	0.052	
100		+50	14	0.007	
115	4.4V	+20	75	0.040	
85	3.5V	+20	-85	-0.045	

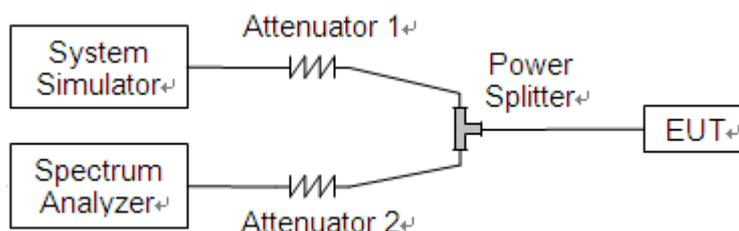
2.5. Conducted Out of Band Emissions

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.

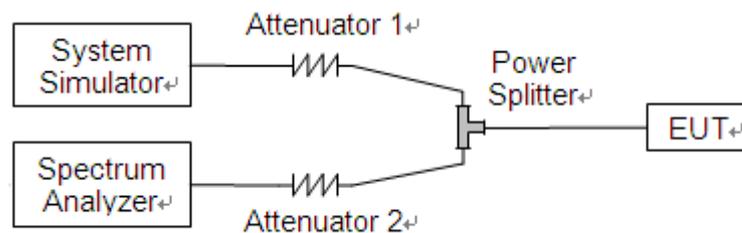
2.6. Band Edge

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:

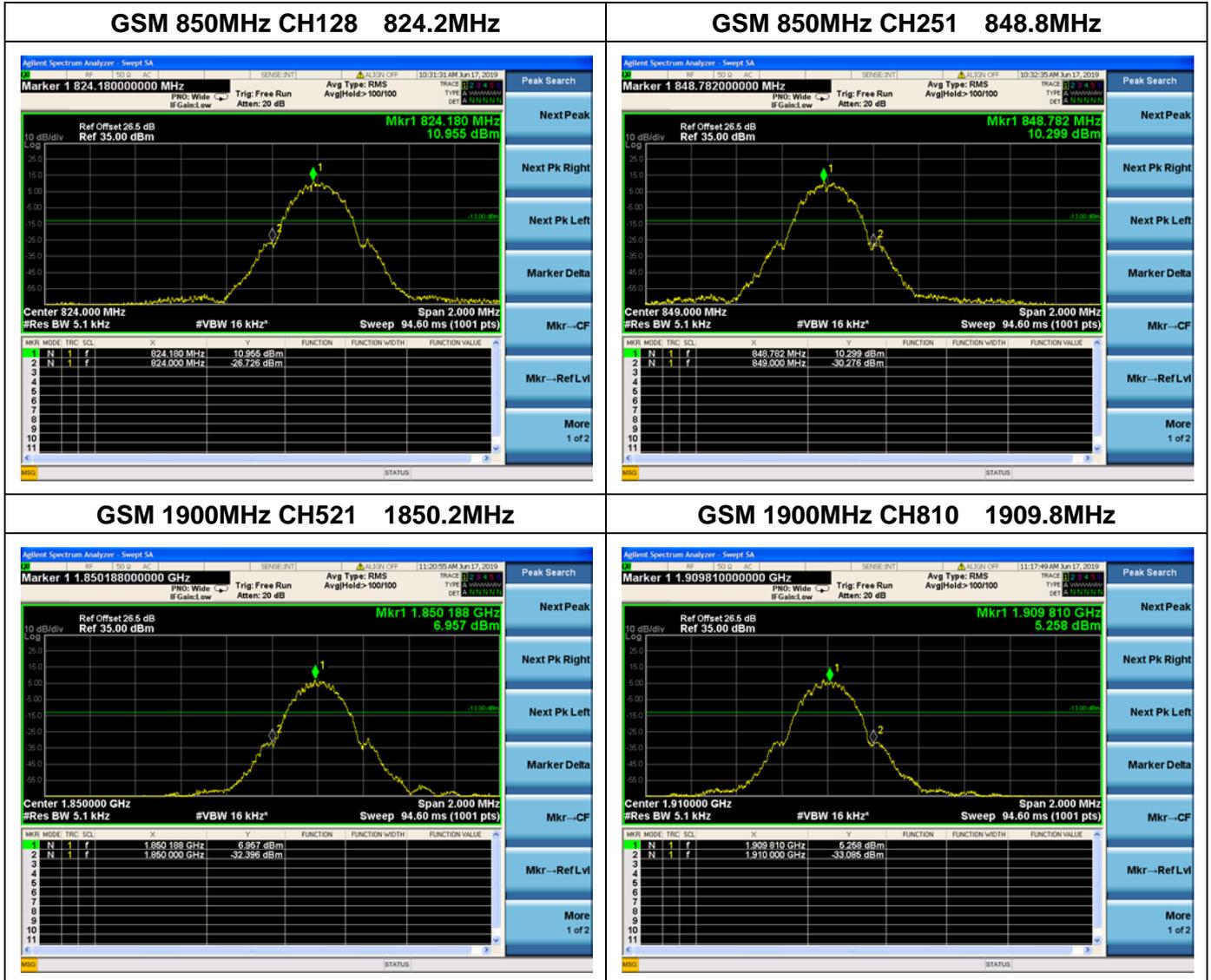


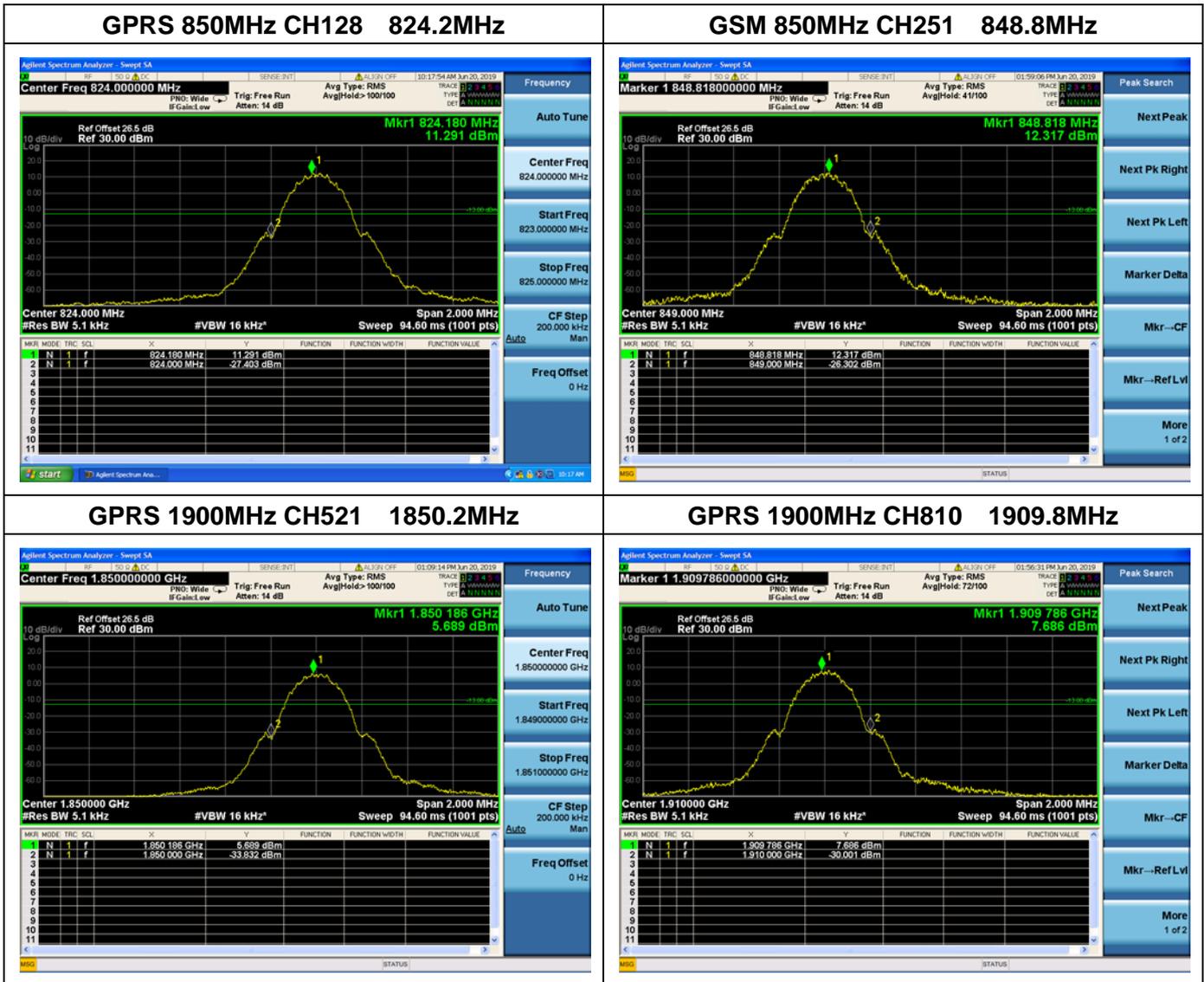
The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50 Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum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

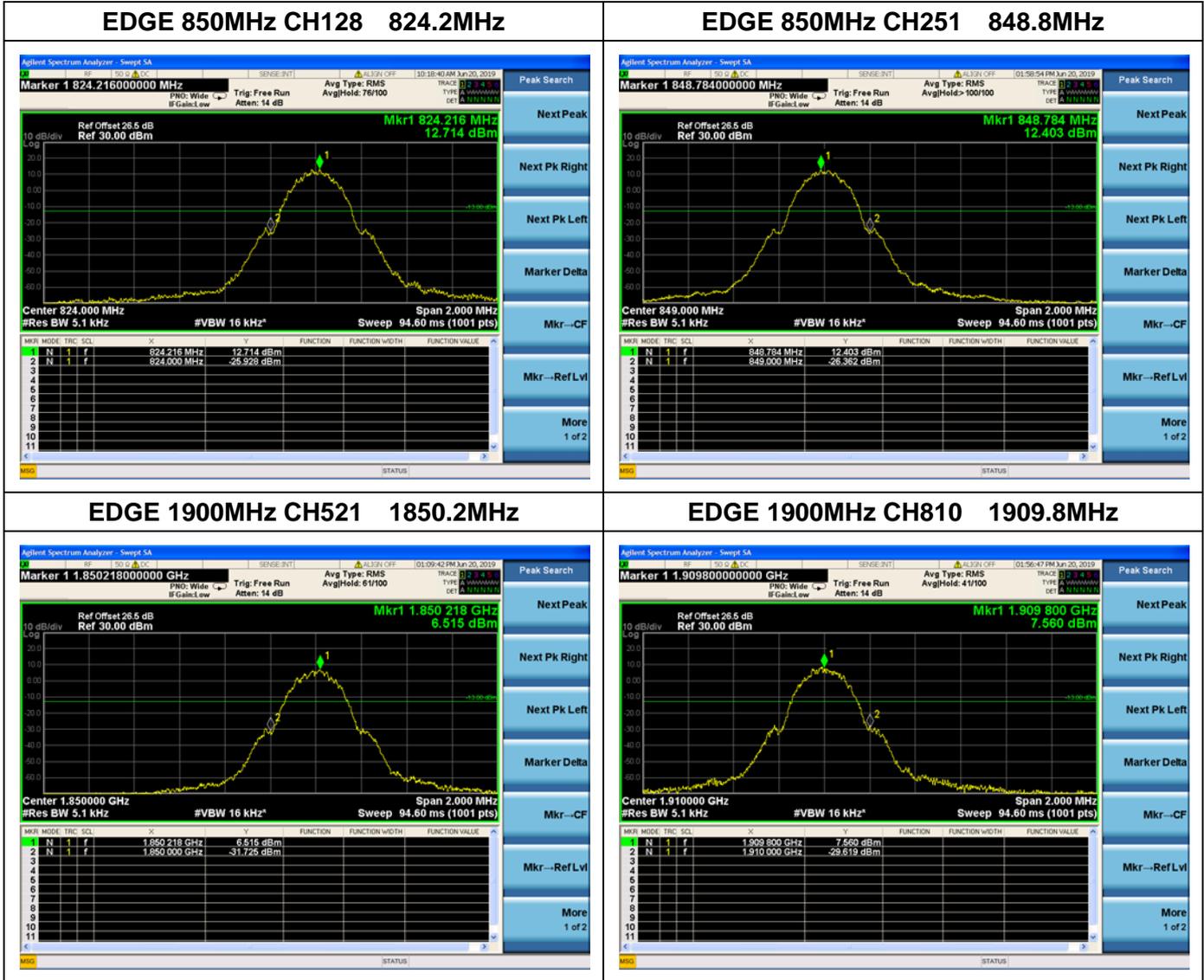


2.6.3. Test Result

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







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 7Watts.

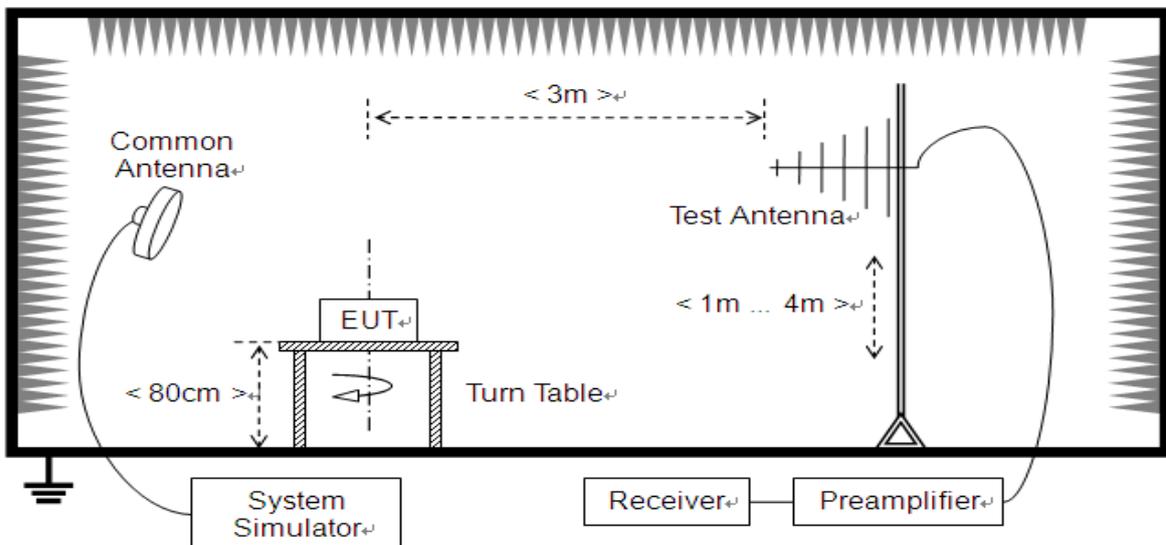
According to FCC section 24.232, the broadband PCS mobile station is limited to 2 Watts e.i.r.p. peak power.

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

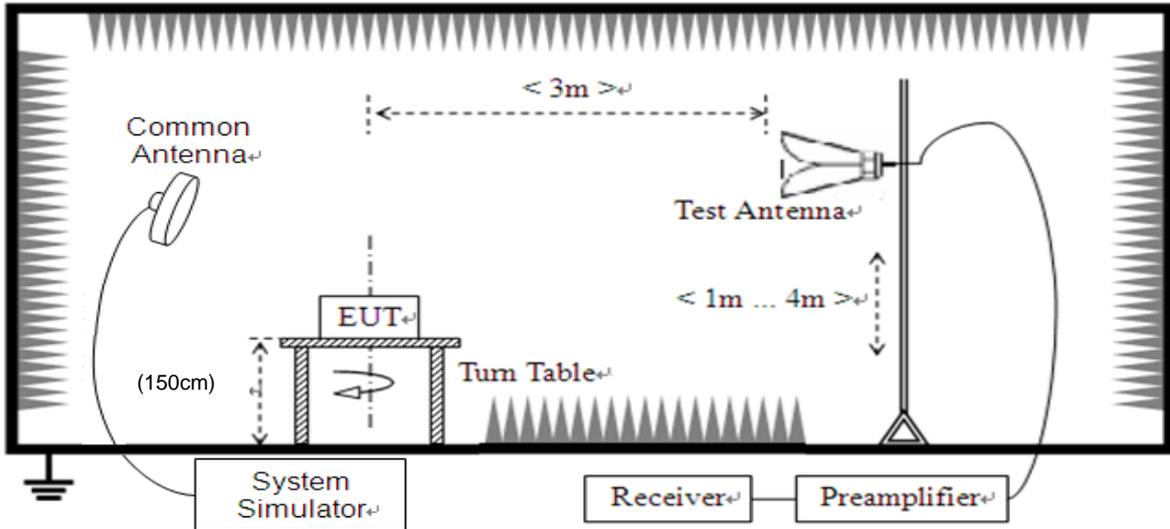
2.7.2. Test Description

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	28.49	0.774	38.5	7	PASS
	190	836.60	5	28.46	0.701			PASS
	251	848.80	5	28.47	0.703			PASS
GPRS 850MHz	128	824.20	5	28.50	0.708	38.5	7	PASS
	190	836.60	5	28.46	0.701			PASS
	251	848.80	5	28.49	0.774			PASS
EDGE 850MHz	128	824.20	5	21.79	0.151	38.5	7	PASS
	190	836.60	5	21.69	0.148			PASS
	251	848.80	5	21.62	0.145			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	27.75	0.596	33	2	PASS
	661	1880.0	0	27.72	0.592			PASS
	810	1909.8	0	27.61	0.585			PASS
GPRS 1900MHz	512	1850.2	0	27.76	0.597	33	2	PASS
	661	1880.0	0	27.73	0.593			PASS
	810	1909.8	0	27.64	0.581			PASS
EDGE 1900MHz	512	1850.2	0	23.33	0.215	33	2	PASS
	661	1880.0	0	23.28	0.213			PASS
	810	1909.8	0	23.31	0.214			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

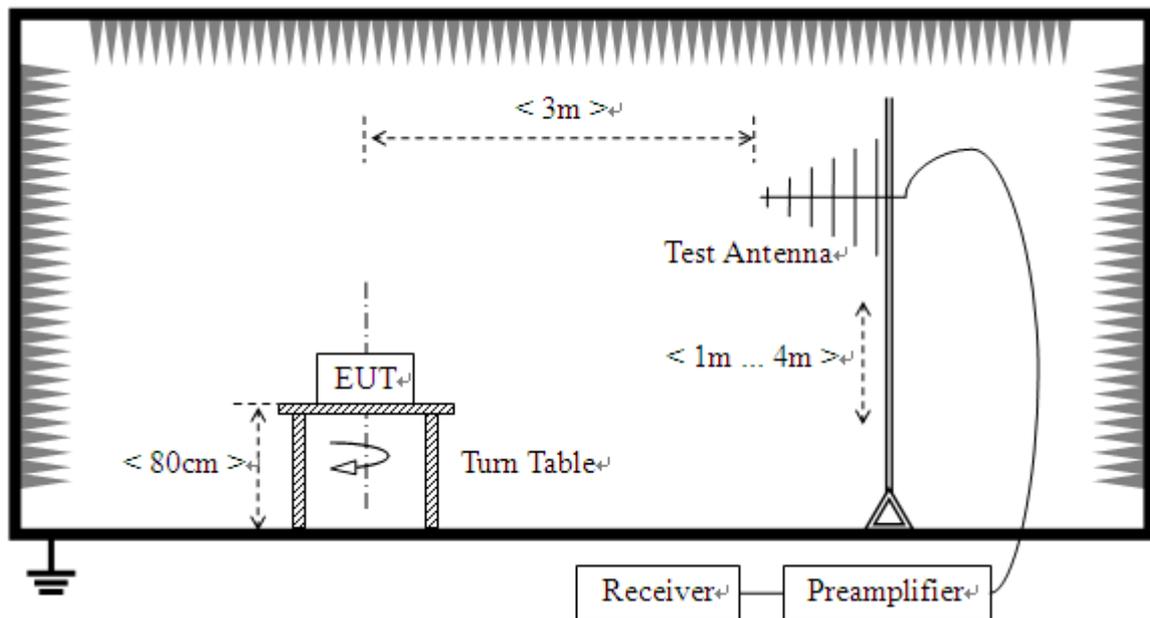
2.8.1. Requirement

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

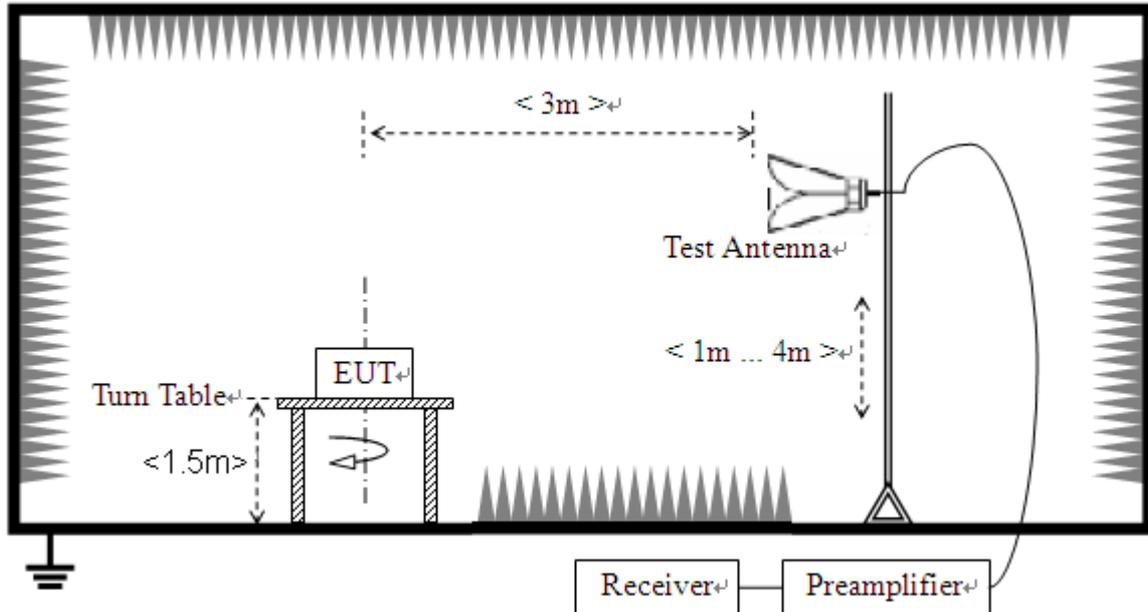
2.8.2. Test Description

Test Setup:

- 1) Below1GHz



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 3GHz), 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.

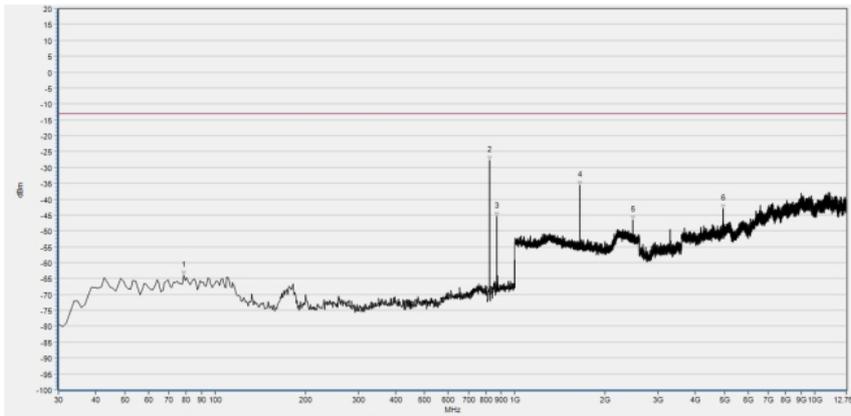
**2.8.3. Test Result**

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

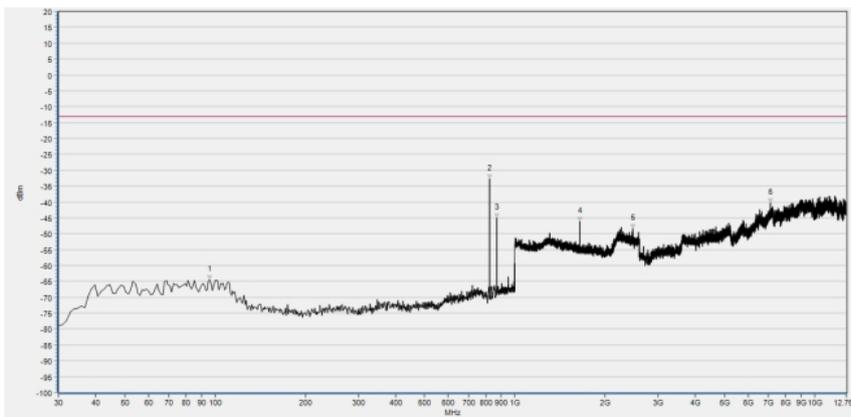
Note 1: All test mode and condition mentioned were considered and evaluated respectively by performing full test, only the worst data were recorded and reported.

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.



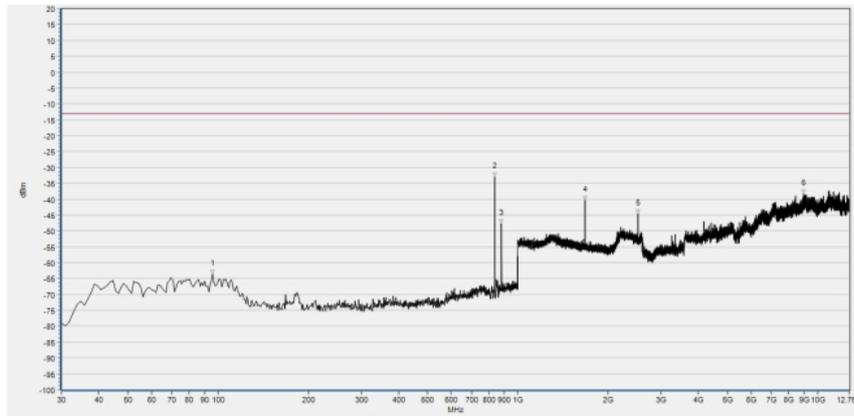
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	66.860	-57.13	-13.00	Horizontal	PASS
2	824.430	-40.99	-13.00	Horizontal	NA
3	869.050	-46.10	-13.00	Horizontal	NA
4	1648.579	-36.12	-13.00	Horizontal	PASS
5	2473.229	-41.15	-13.00	Horizontal	PASS
6	3297.720	-47.78	-13.00	Horizontal	PASS

(GSM 850MHz, Channel = 128, Horizontal)



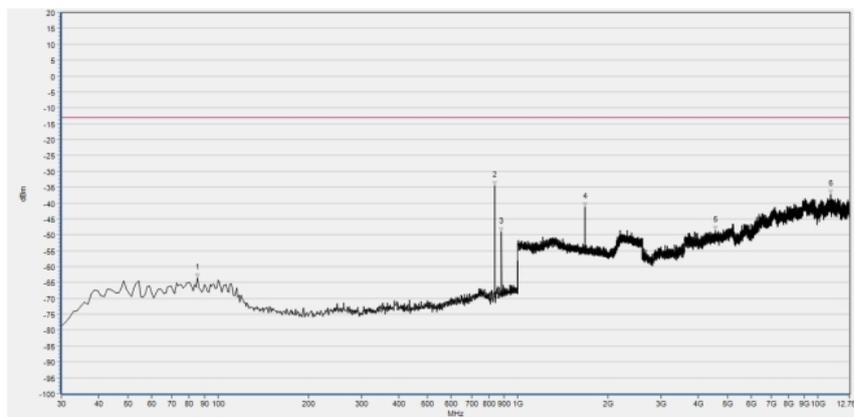
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	63.950	-51.86	-13.00	Vertical	PASS
2	824.430	-36.67	-13.00	Vertical	NA
3	869.050	-44.90	-13.00	Vertical	NA
4	1648.579	-40.01	-13.00	Vertical	PASS
5	2473.229	-40.26	-13.00	Vertical	PASS
6	7264.312	-40.84	-13.00	Vertical	PASS

(GSM 850MHz, Channel = 128, Vertical)



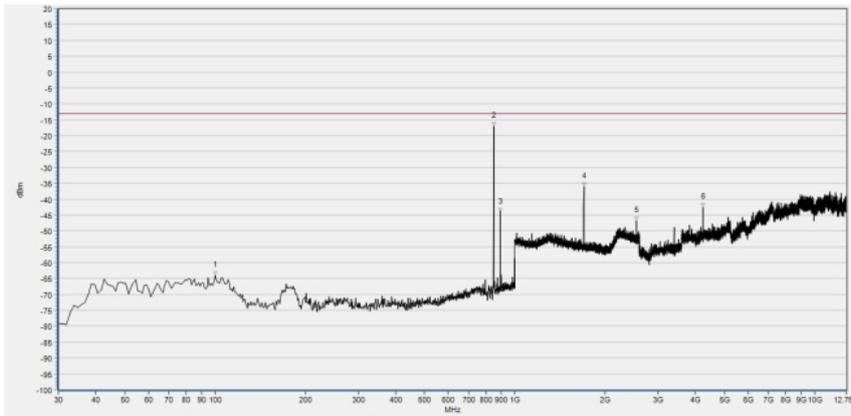
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	62.010	-58.34	-13.00	Horizontal	PASS
2	837.040	-35.83	-13.00	Horizontal	N.A
3	881.660	-46.80	-13.00	Horizontal	N.A
4	1672.909	-45.16	-13.00	Horizontal	PASS
5	2509.724	-42.87	-13.00	Horizontal	PASS
6	9158.092	-38.11	-13.00	Horizontal	PASS

(GSM850MHz, Channel = 190, Horizontal)



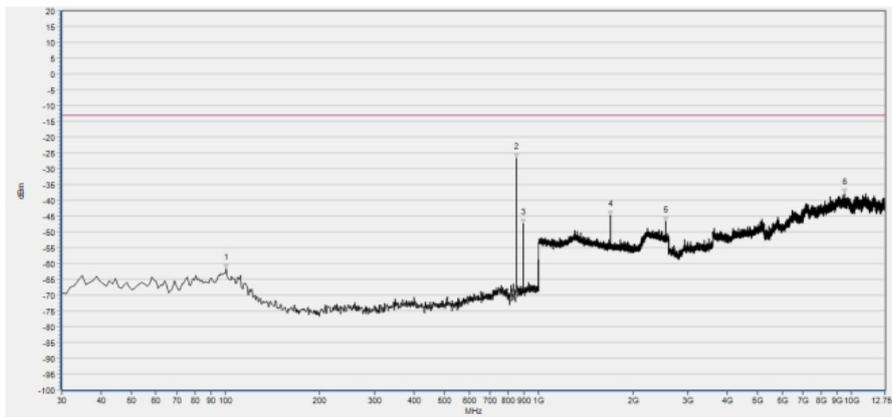
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	63.950	-51.11	-13.00	Vertical	PASS
2	836.070	-35.72	-13.00	Vertical	NA
3	881.660	-45.26	-13.00	Vertical	NA
4	1672.909	-45.71	-13.00	Vertical	PASS
5	2509.724	-42.40	-13.00	Vertical	PASS
6	9051.037	-37.99	-13.00	Vertical	PASS

(GSM 850MHz, Channel = 190, Vertical)



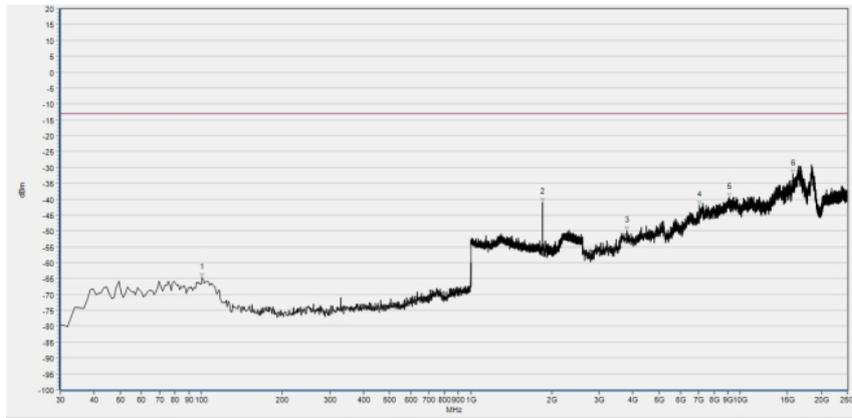
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	101.780	-62.95	101.780	Horizontal	PASS
2	848.680	-20.29	848.680	Horizontal	NA
3	894.270	-47.65	894.270	Horizontal	NA
4	1697.879	-47.35	1697.879	Horizontal	PASS
5	3617.030	-50.05	3617.030	Horizontal	PASS
6	7173.868	-41.26	7173.868	Horizontal	PASS

(GSM 850MHz, Channel = 251,Horizontal)



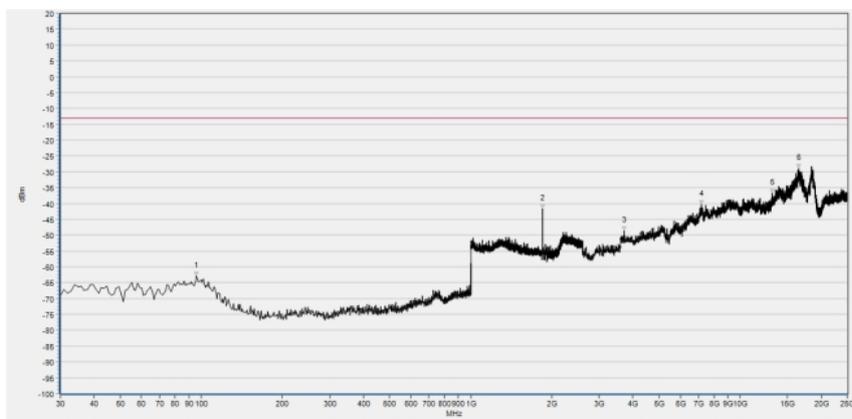
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	100.810	-61.69	-13.00	Vertical	PASS
2	848.680	-26.79	-13.00	Vertical	NA
3	893.300	-47.38	-13.00	Vertical	NA
4	1697.239	-44.86	-13.00	Vertical	PASS
5	2546.218	-46.56	-13.00	Vertical	PASS
6	9479.260	-37.96	-13.00	Vertical	PASS

(GSM 850MHz, Channel = 251, Vertical)



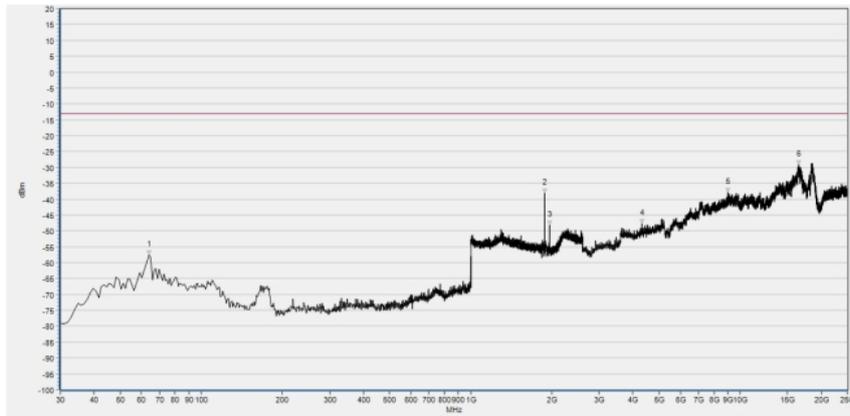
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	100.810	-64.68	-13.00	Horizontal	PASS
2	1850.260	-41.07	-13.00	Horizontal	NA
3	3809.820	-49.98	-13.00	Horizontal	PASS
4	7068.594	-41.96	-13.00	Horizontal	PASS
5	9093.108	-39.52	-13.00	Horizontal	PASS
6	15671.759	-32.12	-13.00	Horizontal	PASS

(GSM 1900MHz, Channel = 512, Horizontal)



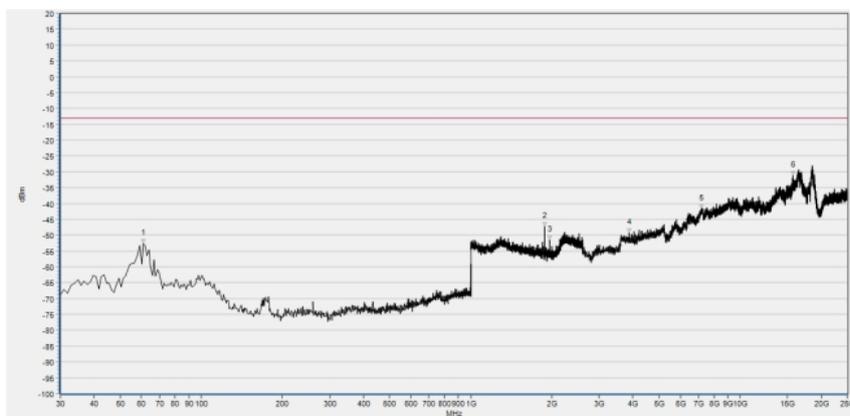
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	95.960	-62.88	-13.00	Vertical	PASS
2	1850.260	-41.64	-13.00	Vertical	NA
3	3720.204	-48.59	-13.00	Vertical	PASS
4	7182.651	-40.28	-13.00	Vertical	PASS
5	13178.796	-36.78	-13.00	Vertical	PASS
6	16506.819	-29.02	-13.00	Vertical	PASS

(GSM 1900MHz, Channel = 512, Vertical)



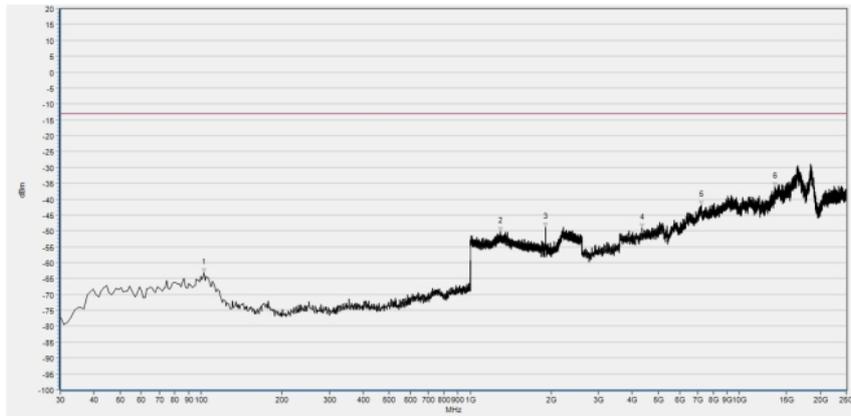
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	63.950	-57.45	-13.00	Horizontal	PASS
2	1879.712	-38.14	-13.00	Horizontal	N.A
3	1959.744	-48.18	-13.00	Horizontal	N.A
4	4331.224	-47.74	-13.00	Horizontal	PASS
5	9019.785	-37.84	-13.00	Horizontal	PASS
6	16527.187	-29.07	-13.00	Horizontal	PASS

(GSM 1900MHz, Channel = 661, Horizontal)



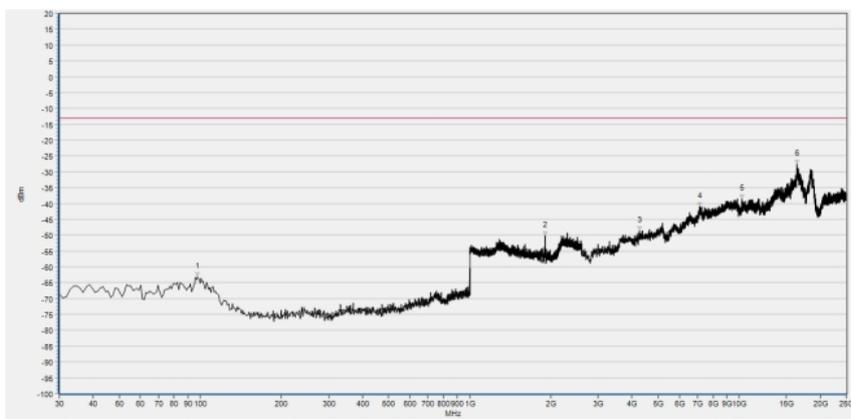
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	61.040	-52.65	-13.00	Vertical	PASS
2	1879.712	-47.19	-13.00	Vertical	NA
3	1959.744	-51.53	-13.00	Vertical	NA
4	3879.069	-49.24	-13.00	Vertical	PASS
5	7194.872	-41.69	-13.00	Vertical	PASS
6	15683.979	-31.17	-13.00	Vertical	PASS

(GSM 1900MHz, Channel = 661, Vertical)



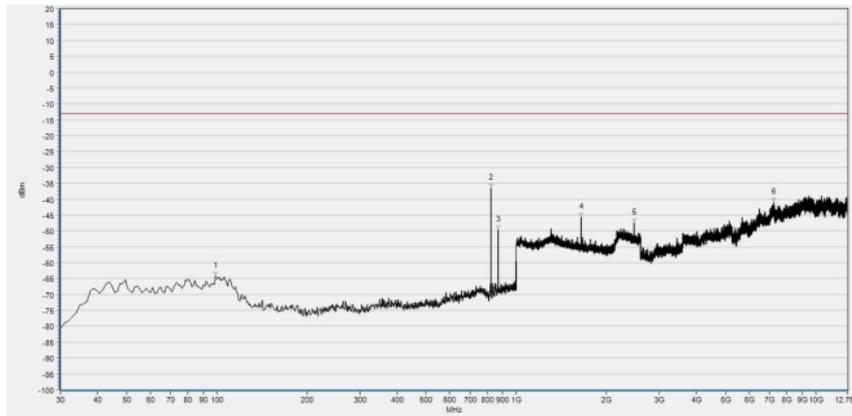
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	102.750	-63.11	-13.00	Horizontal	PASS
2	1296.439	-50.23	-13.00	Horizontal	PASS
3	1909.804	-48.84	-13.00	Horizontal	NA
4	4347.518	-49.06	-13.00	Horizontal	PASS
5	7219.313	-41.86	-13.00	Horizontal	PASS
6	13590.216	-36.16	-13.00	Horizontal	PASS

(GSM 1900MHz, Channel = 810, Horizontal)



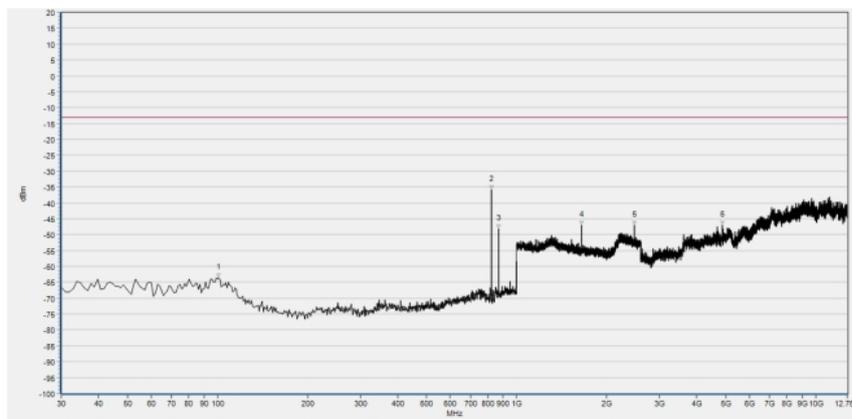
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	97.900	-63.05	-13.00	Vertical	PASS
2	1909.804	-50.27	-13.00	Vertical	NA
3	4270.122	-48.67	-13.00	Vertical	PASS
4	7137.843	-41.05	-13.00	Vertical	PASS
5	10270.340	-38.51	-13.00	Vertical	PASS
6	16413.130	-27.50	-13.00	Vertical	PASS

(GSM 1900MHz, Channel = 810, Vertical)



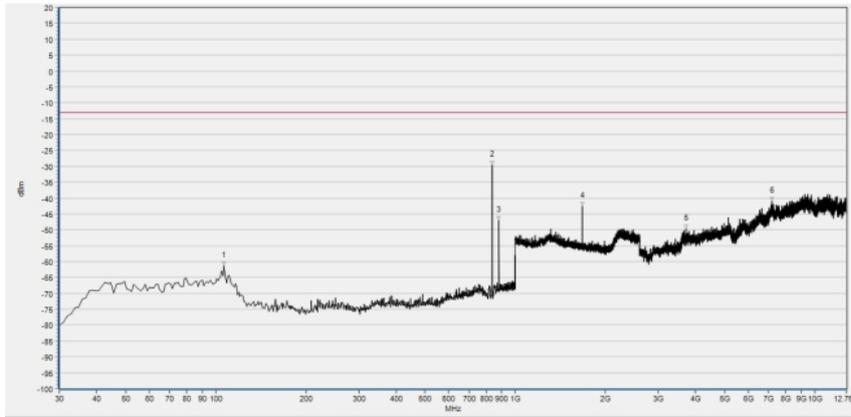
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	98.870	-64.26	-13.00	Horizontal	PASS
2	824.430	-36.58	-13.00	Horizontal	NA
3	869.050	-49.72	-13.00	Horizontal	NA
4	1647.939	-45.71	-13.00	Horizontal	PASS
5	2472.589	-47.40	-13.00	Horizontal	PASS
6	7240.316	-41.09	-13.00	Horizontal	PASS

(EDGE 850MHz, Channel = 128, Horizontal)



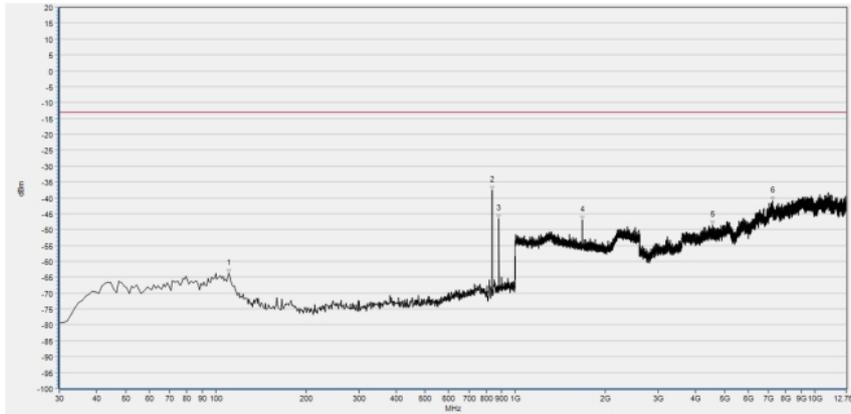
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	100.810	-63.56	-13.00	Vertical	PASS
2	824.430	-35.97	-13.00	Vertical	NA
3	869.050	-48.26	-13.00	Vertical	NA
4	1647.939	-47.06	-13.00	Vertical	PASS
5	2472.589	-47.12	-13.00	Vertical	PASS
6	4857.401	-46.96	-13.00	Vertical	PASS

(EDGE 850MHz, Channel = 128, Vertical)



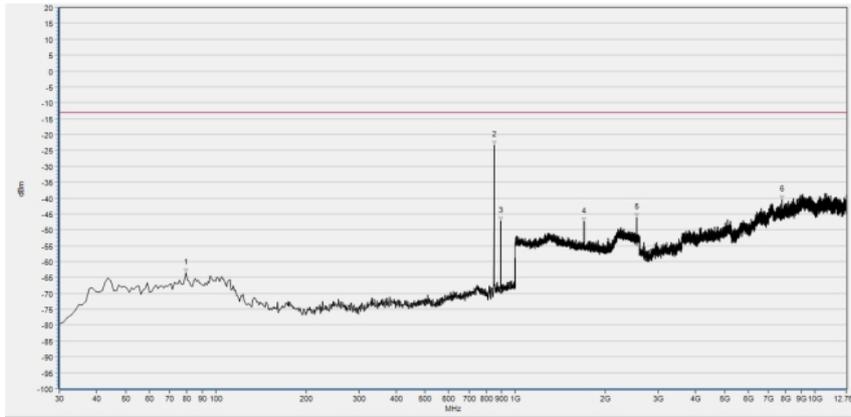
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	106.630	-61.38	-13.00	Horizontal	PASS
2	837.040	-29.61	-13.00	Horizontal	N.A
3	881.660	-47.01	-13.00	Horizontal	N.A
4	1672.909	-42.66	-13.00	Horizontal	PASS
5	3716.703	-49.72	-13.00	Horizontal	PASS
6	7208.938	-40.99	-13.00	Horizontal	PASS

(EDGE 850MHz, Channel = 190, Horizontal)



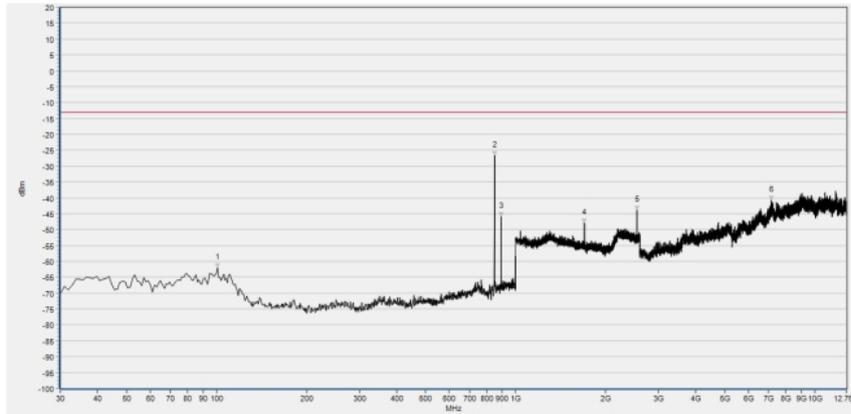
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	110.510	-63.78	-13.00	Vertical	PASS
2	837.040	-37.68	-13.00	Vertical	N.A
3	881.660	-46.61	-13.00	Vertical	N.A
4	1672.909	-47.02	-13.00	Vertical	PASS
5	4560.229	-48.71	-13.00	Vertical	PASS
6	7242.162	-41.11	-13.00	Vertical	PASS

(EDGE 850MHz, Channel = 190, Vertical)



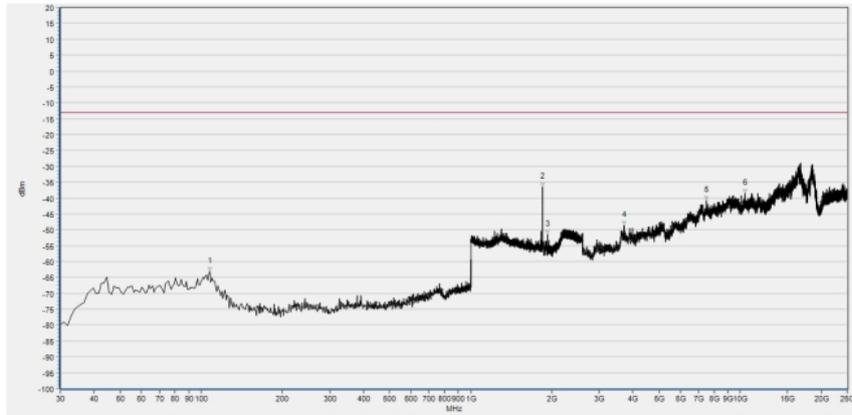
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	79.470	-63.64	-13.00	Horizontal	PASS
2	848.680	-23.36	-13.00	Horizontal	N.A
3	894.270	-47.27	-13.00	Horizontal	N.A
4	1697.239	-47.50	-13.00	Horizontal	PASS
5	2546.218	-46.11	-13.00	Horizontal	PASS
6	7771.904	-40.58	-13.00	Horizontal	PASS

(EDGE 850MHz, Channel = 251, Horizontal)



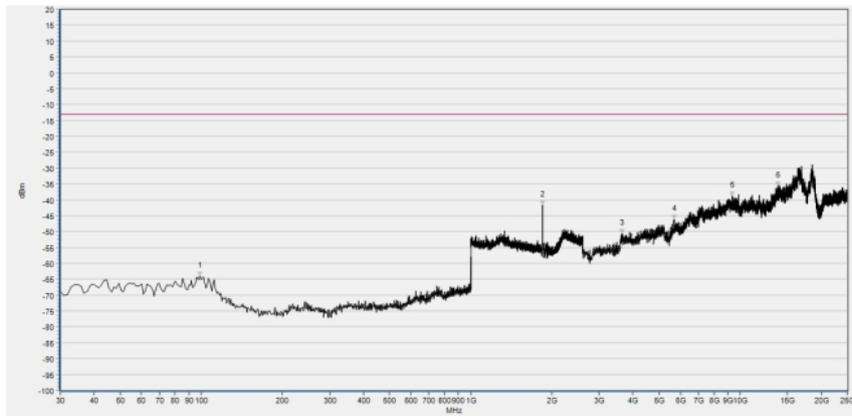
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	100.810	-61.96	-13.00	Vertical	PASS
2	848.680	-26.77	-13.00	Vertical	N/A
3	894.270	-45.94	-13.00	Vertical	N/A
4	1697.239	-47.84	-13.00	Vertical	PASS
5	2546.218	-43.85	-13.00	Vertical	PASS
6	7136.952	-40.72	-13.00	Vertical	PASS

(EDGE 850MHz, Channel = 251, Vertical)



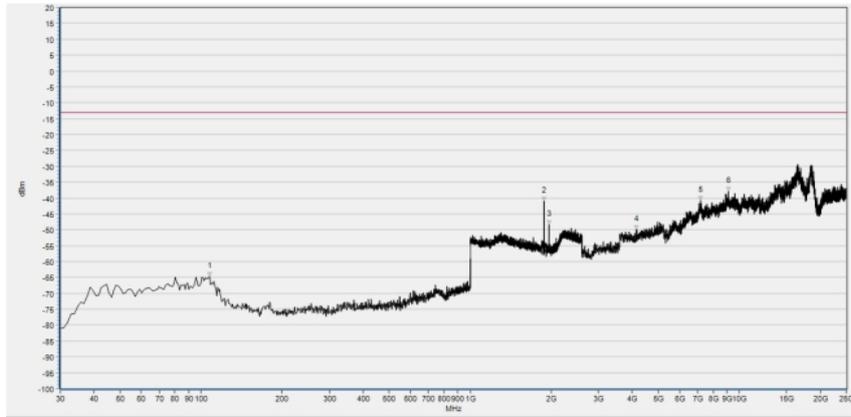
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	107.600	-63.12	-13.00	Horizontal	PASS
2	1850.260	-36.61	-13.00	Horizontal	NA
3	1929.652	-51.53	-13.00	Horizontal	NA
4	3699.836	-48.54	-13.00	Horizontal	PASS
5	7508.529	-40.78	-13.00	Horizontal	PASS
6	10437.352	-38.46	-13.00	Horizontal	PASS

(EDGE 1900MHz, Channel = 512, Horizontal)



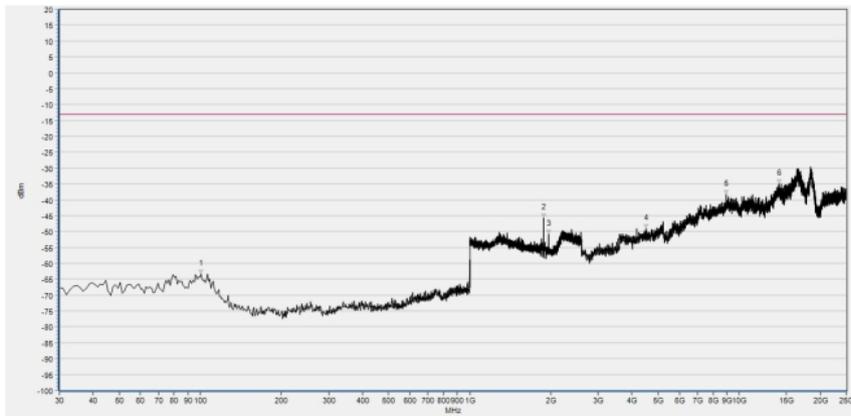
Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	98.870	-63.97	-13.00	Vertical	PASS
2	1850.260	-41.64	-13.00	Vertical	NA
3	3634.661	-50.65	-13.00	Vertical	PASS
4	5687.689	-46.17	-13.00	Vertical	PASS
5	9321.222	-38.84	-13.00	Vertical	PASS
6	13830.551	-35.55	-13.00	Vertical	PASS

(EDGE 1900MHz, Channel = 512, Vertical)



Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	107.600	-64.59	-13.00	Horizontal	PASS
2	1879.712	-40.93	-13.00	Horizontal	NA
3	1959.744	-48.38	-13.00	Horizontal	NA
4	4147.918	-50.00	-13.00	Horizontal	PASS
5	7194.872	-40.88	-13.00	Horizontal	PASS
6	9097.181	-37.79	-13.00	Horizontal	PASS

(EDGE 1900MHz, Channel = 661, Horizontal)



Num	Freq(MHz)	PK	limit PK	Antenna	Verdict
1	100.810	-63.32	-13.00	Vertical	PASS
2	1879.712	-45.65	-13.00	Vertical	NA
3	1959.744	-50.85	-13.00	Vertical	NA
4	4522.677	-49.12	-13.00	Vertical	PASS
5	8966.830	-38.33	-13.00	Vertical	PASS
6	14042.371	-35.04	-13.00	Vertical	PASS

(EDGE 1900MHz, Channel = 661, Vertical)



(EDGE 1900MHz, Channel = 810, Horizontal)



(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	2019.04.17	2020.04.16
Attenuator 1	(N/A.)	10dB	Resnet	2019.04.17	2020.04.16
Attenuator 2	(N/A.)	3dB	Resnet	2019.04.17	2020.04.16
EXA Signal Analyzer	MY53470836	N9010A	Agilent	2018.11.06	2019.11.05
Wireless synthesizer	MY48364176	8960 -E5515C	Agilent	2019.04.17	2020.04.16
RF cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
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	2019.04.17	2020.04.16
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	2018.08.04	2019.08.03
Receiver	MY54130016	N9038A	Agilent	2019.05.08	2020.05.07
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2019.05.08	2020.05.07
Test Antenna - Horn	9170C-531	BBHA9170	Schwarzbeck	2018.08.06	2019.08.05
Test Antenna - Horn	01774	BBHA 9120D	Schwarzbeck	2018.08.02	2019.08.01
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	2019.05.08	2020.05.07
18-26.5GHz pre-Amplifier	MA03	TS-PR18	Rohde& Schwarz	2019.05.08	2020.05.07
Notch Filter	N/A	WRCG-GSM 850	Wainwright	2018.12.01	2019.11.30
Notch Filter	N/A	WRCG-GSM 1900	Wainwright	2018.12.01	2019.11.30
Notch Filter	N/A	WRCGV-W Band V	Wainwright	2018.12.01	2019.11.30
Notch Filter	N/A	WRCGV-W Band II	Wainwright	2018.12.01	2019.11.30
Notch Filter	N/A	WRCGV-W Band IV	Wainwright	2018.12.01	2019.11.30
Anechoic Chamber	N/A	9m*6m*6m	CRT	2017.11.19	2020.11.18

END OF REPORT