FCC RF TEST REPORT

Issued to

ZTE Corporation

For

GSM Dual-Band GPRS Wireless Data Terminal

Model Name	:	MG2639
Trade Name	:	ZTE 中兴
Brand Name	:	ZTE 中兴
FCC ID	:	Q78- MG2639
Standard	:	47 CFR Part 2
		47 CFR Part 22 Subpart H
		47 CFR Part 24 Subpart E
Test date	:	2012-2-1 to 2012-3-1
Issue date	:	2012-3-2

Shenzhen MORLAB Communication Technology Co., Ltd.

Tested by	*Approved by*	*Review by*
Zhang Yan	Wu Xuewen	Peng Huarui
Date 2012.3.2	*Date* 2012.3.2	*Date* 2012.3.2

DIRECTORY

Change History		
Issue	Date	Reason for change
1.0	Mar 2, 2012	First edition

1. General Information

1.1. EUT Description

EUT Type ..... :	GSM Dual-Band GPRS Wireless Data Terminal
Serial No..... :	(n.a, marked #1 by test site)
Hardware Version ..... :	QB7211AV1BMB_D
Software Version ..... :	QB7211_31_Z0_C_TSECD313A_05
Applicant ..... :	ZTE Corporation ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, P.R.China
Manufacturer ..... :	ZTE Corporation ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, P.R.China
Frequency Range..... :	GSM 850MHz: Tx: 824.20 - 848.80MHz (at intervals of 200kHz); Rx: 869.20 - 893.80MHz (at intervals of 200kHz) GSM 1900MHz: Tx: 1850.20 - 1909.80MHz (at intervals of 200kHz); Rx: 1930.20 - 1989.80MHz (at intervals of 200kHz)
Modulation Type ..... :	GMSK
Multislot Class..... :	GPRS: Multislot Class12
Emission Designators..... :	253KGXW

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<=n<=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<=n<=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: Note 4: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.2. 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 (10-1-09 Edition)	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 22 (10-1-09 Edition)	Public Mobile Services
3	47 CFR Part 24 (10-1-09 Edition)	Personal Communications Services

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

No.	Section	Description	Result
1	2.1046	Conducted RF Output Power	PASS
2	2.1049	20dB Occupied Bandwidth	PASS
3	2.1055 22.355 24.235	Frequency Stability	PASS
4	2.1051 2.1057 22.917 24.238	Conducted Out of Band Emissions	PASS
5	2.1051 2.1057 22.917 24.238	Band Edge	PASS
6	22.913 24.232	Transmitter Radiated Power (EIPR/ERP)	PASS
7	2.1053 2.1057 22.917 24.238	Radiated Out of Band Emissions	PASS

Note: Measurement method according to ANSI/TIA-603-D 2010.

1.3. Facilities and Accreditations

1.3.1. Facilities

Shenzhen Morlab Communications Technology Co., Ltd. Morlab 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 L3572.

All measurement facilities used to collect the measurement data are located at 3/F, Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22; the FCC registration number is 741109.

1.3.2. Test Environment 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

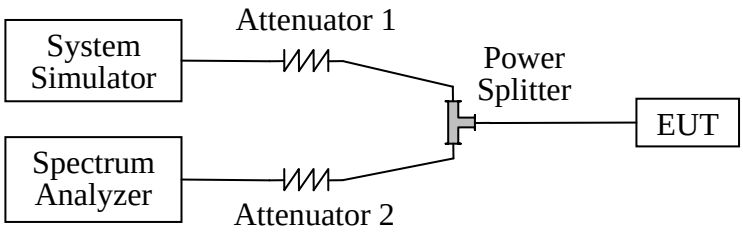
2.1. Conducted RF Output Power

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

A. Test Setup:



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 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.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date
System Simulator	Agilent	E5515C	GB43130131	2011.05
Spectrum Analyzer	Agilent	E7405A	US44210471	2011.05
Power Splitter	Weinschel	1506A	NW521	(n.a.)
Attenuator 1	Resnet	20dB	(n.a.)	(n.a.)
Attenuator 2	Resnet	3dB	(n.a.)	(n.a.)

2.1.3. Test Result

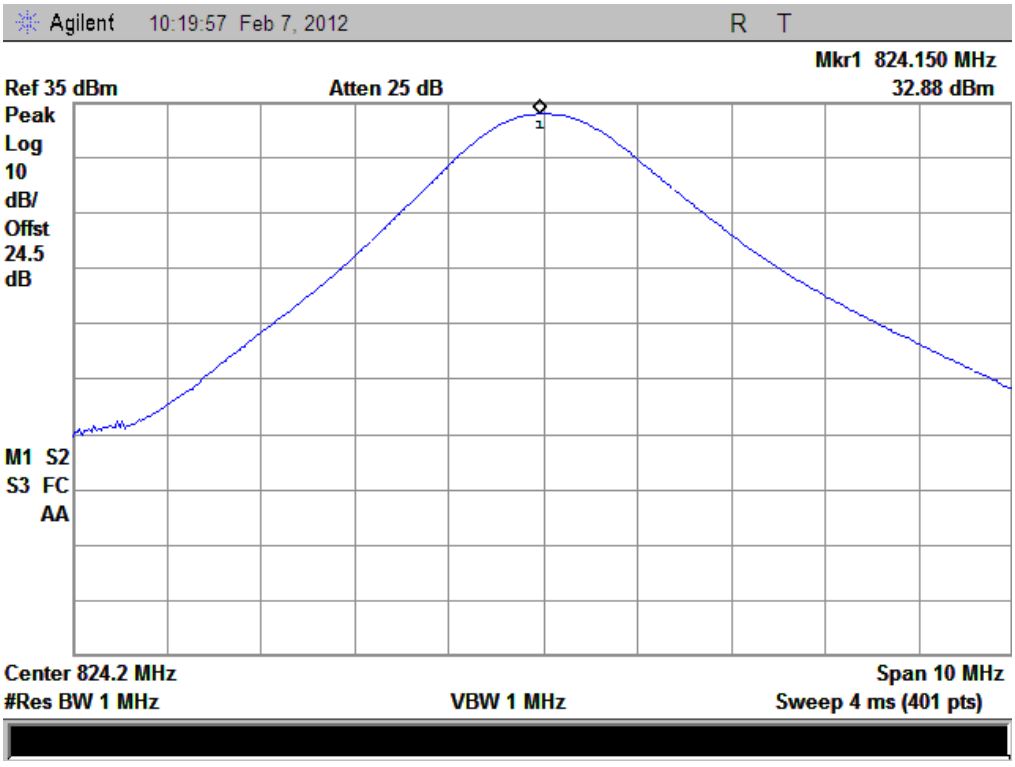
Here the lowest, middle and highest channels are selected to perform testing to verify the conducted RF output power of the EUT. For the GSM 850MHz operates at PCL=5 (where Power Class is 4), the rated conducted RF output power is 33dBm, and For the GSM 1900MHz operates at PCL=0 (where Power Class is 1), the rated conducted RF output power is 30dBm.

A. Test Verdict:

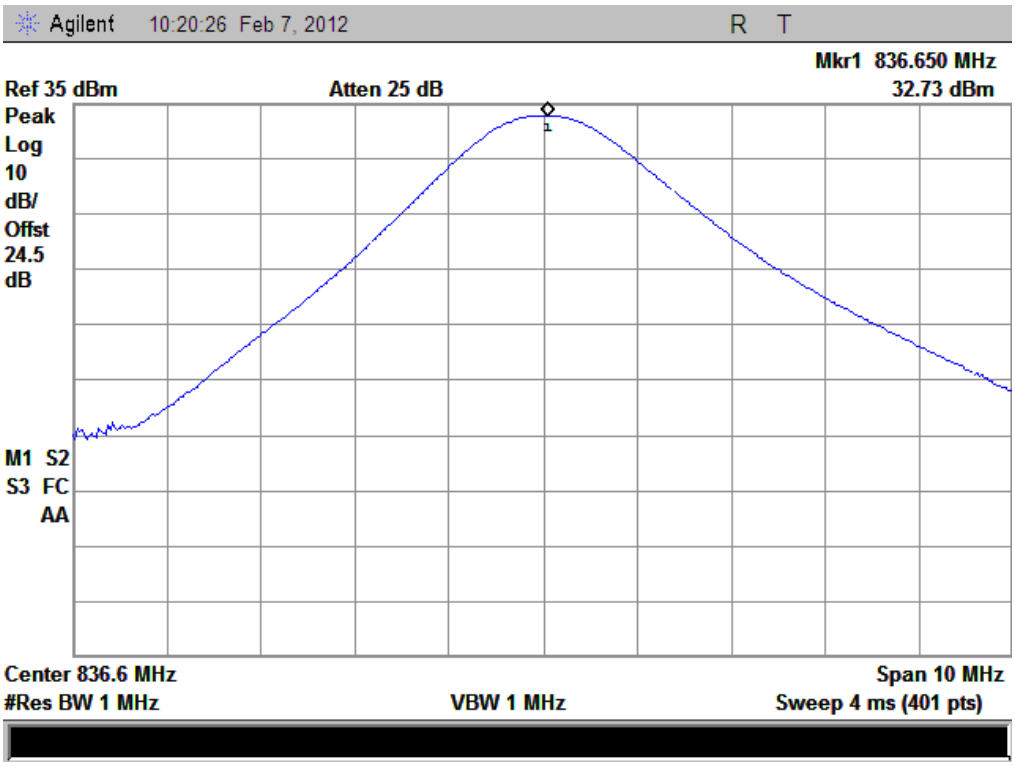
Band	Channel	Frequency (MHz)	Measured Output Power		Limit	Verdict
			dBm	Refer to Plot	dBm	
GSM 850MHz	128	824.2	32.88	Plot A1 to A3	35	PASS
	190	836.6	32.73			PASS
	251	848.8	32.78			PASS
GSM 1900MHz	512	1850.2	28.21	Plot B1 to B3	32	PASS
	661	1880.0	27.87			PASS
	810	1909.8	27.79			PASS
GPRS 850MHz	128	824.2	32.04	Plot C1 to C3[Note 1]	35	PASS
	190	836.6	31.92			PASS
	251	848.8	32.01			PASS
GPRS 1900MHz	512	1850.2	27.92	Plot D1 to D3[Note 1]	32	PASS
	661	1880.0	27.06			PASS
	810	1909.8	27.32			PASS

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

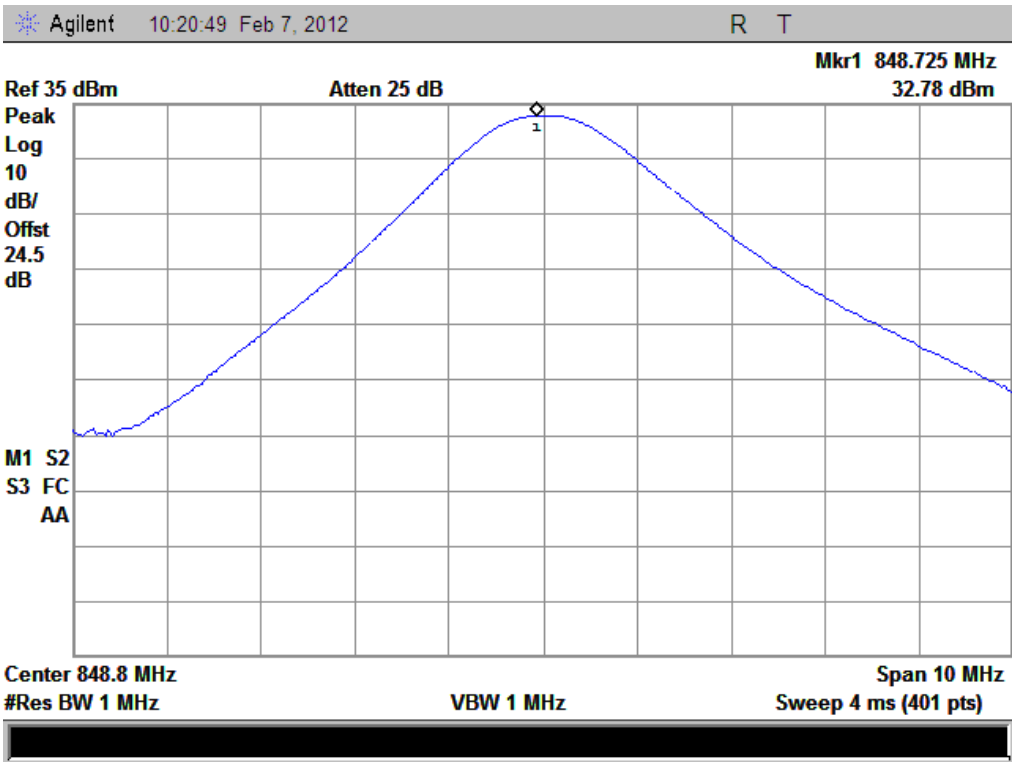
B. Test Plots:



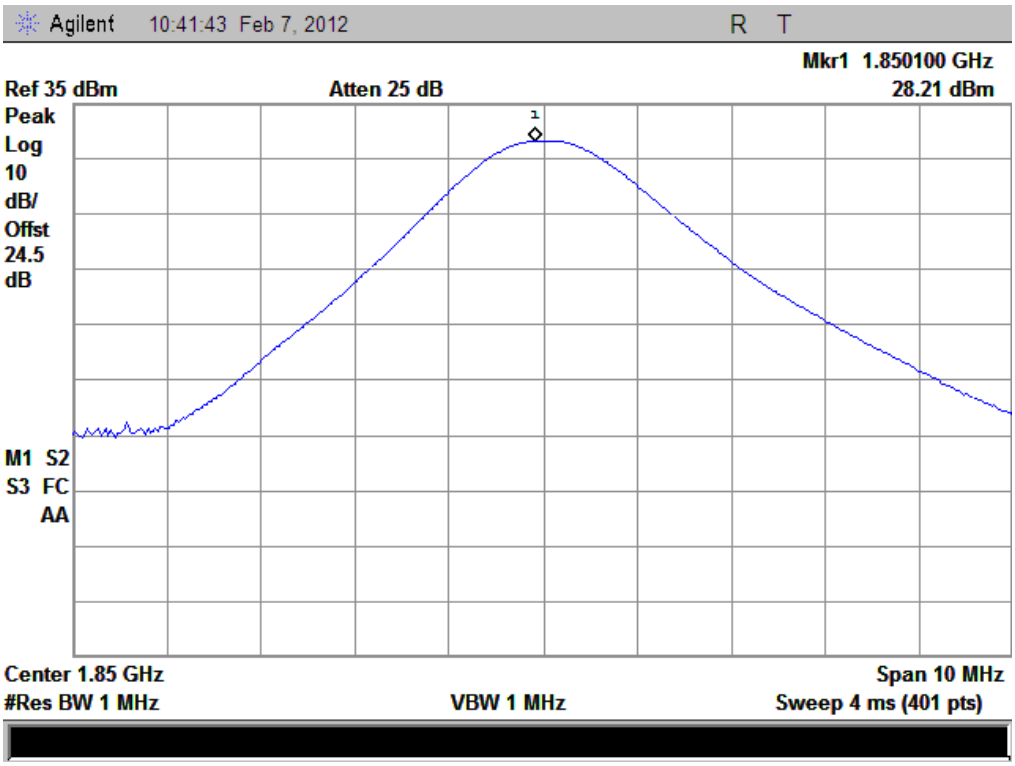
Plot A1: GSM 850MHz Channel = 128



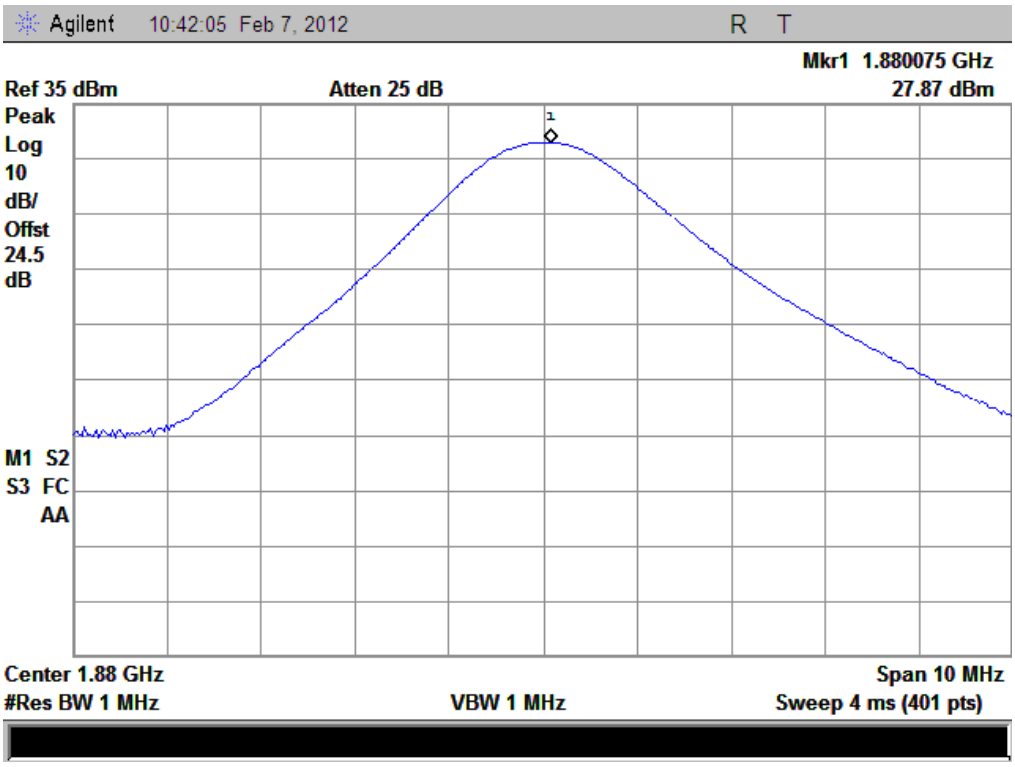
Plot A2: GSM 850MHz Channel = 190



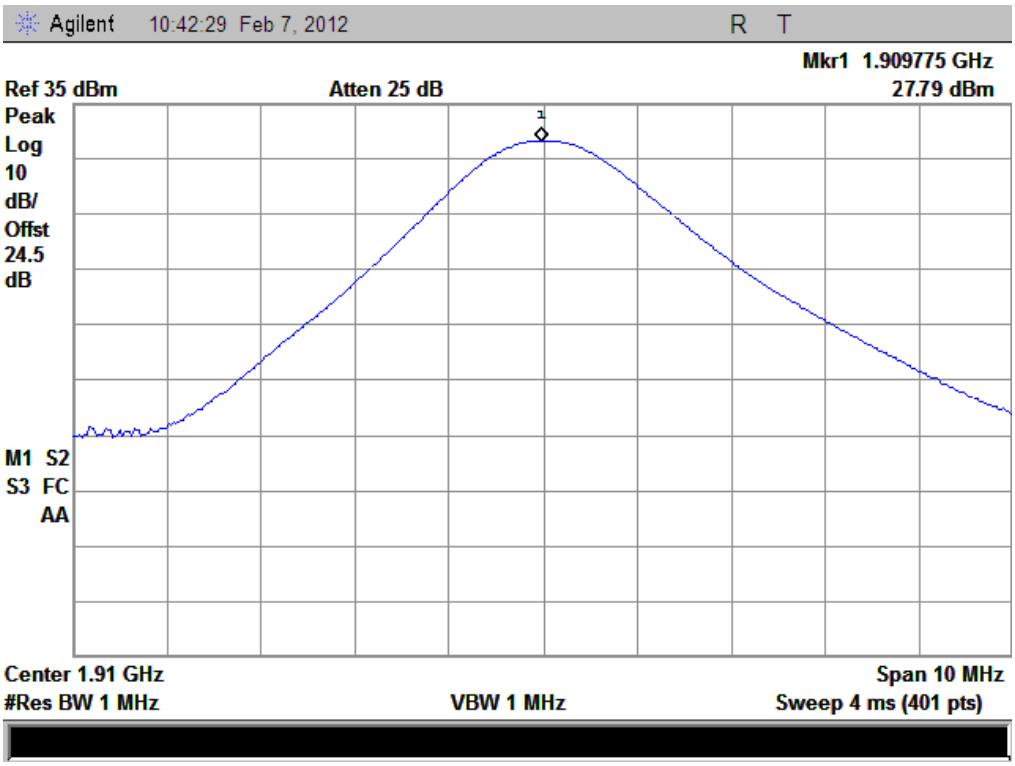
Plot A3: GSM 850MHz Channel = 251



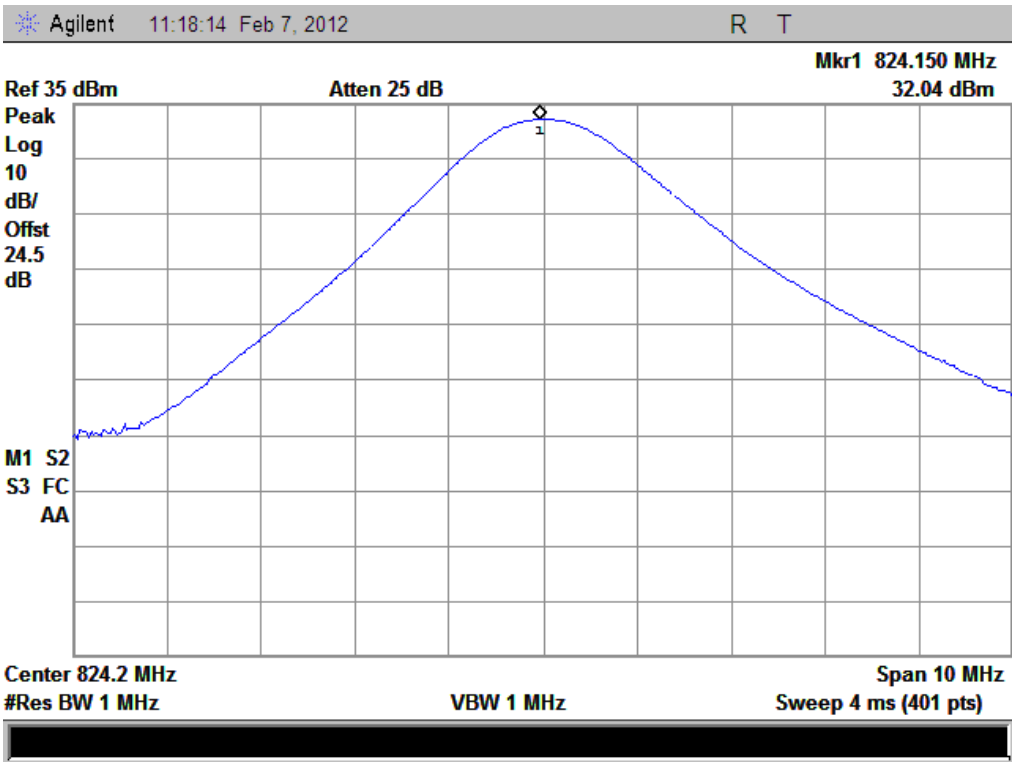
Plot B1: GSM 1900MHz Channel = 512



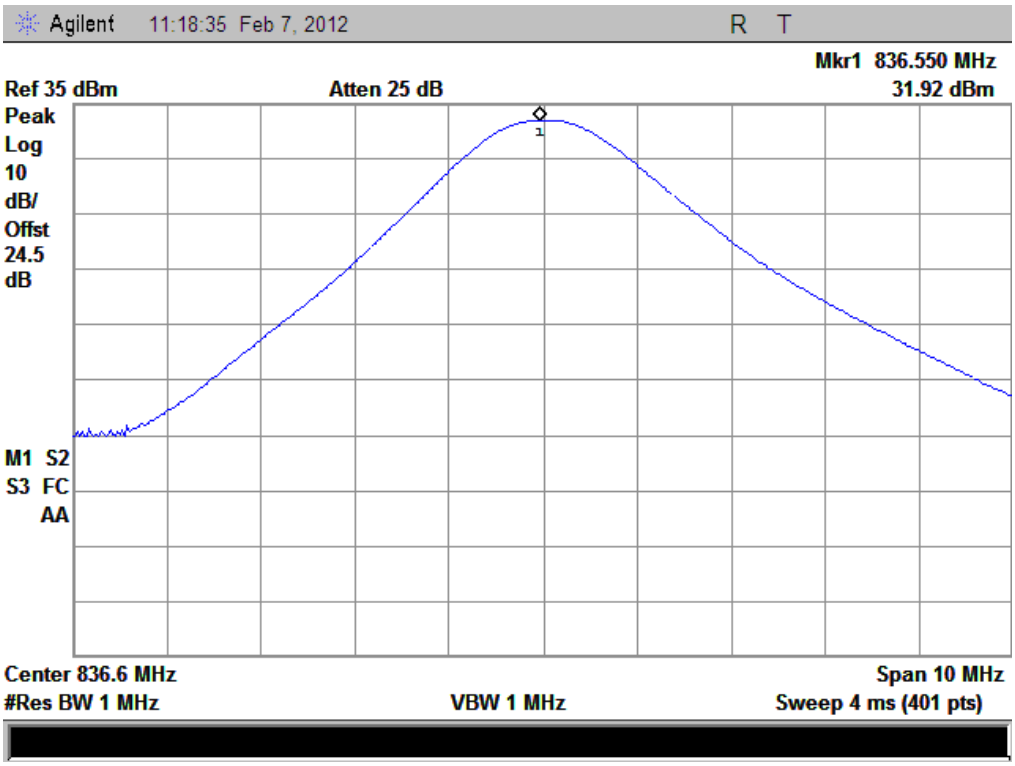
Plot B2: GSM 1900MHz Channel = 661



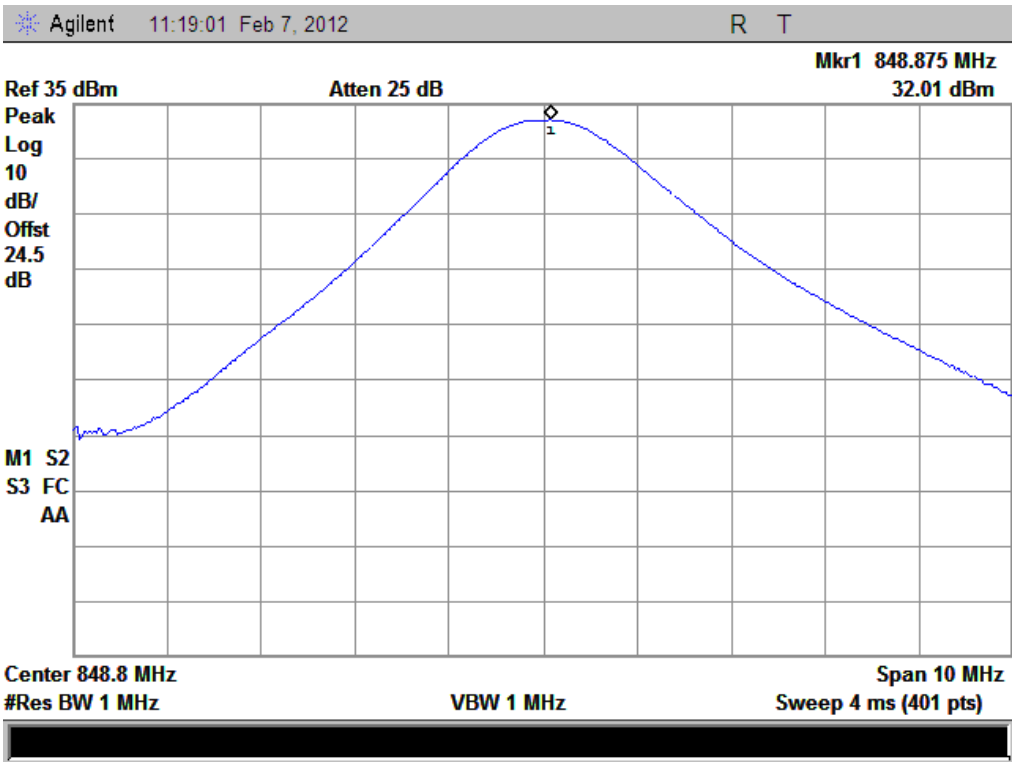
Plot B3: GSM 1900MHz Channel = 810



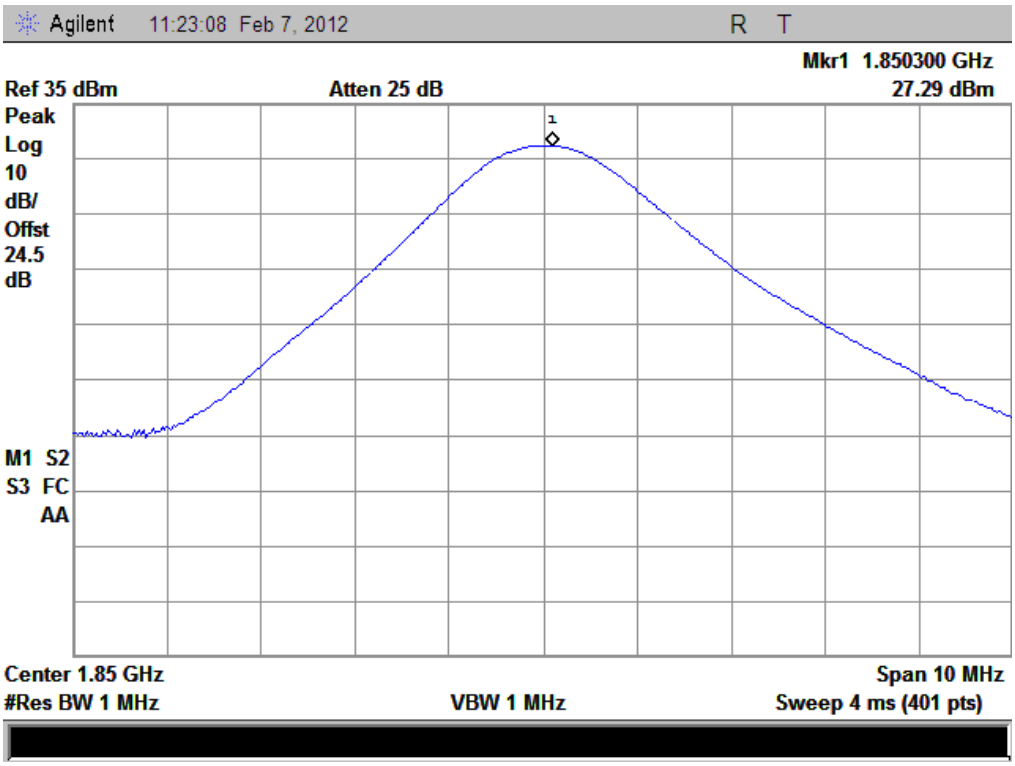
Plot C1: GPRS 850MHz Channel = 128 -1down link 4up link



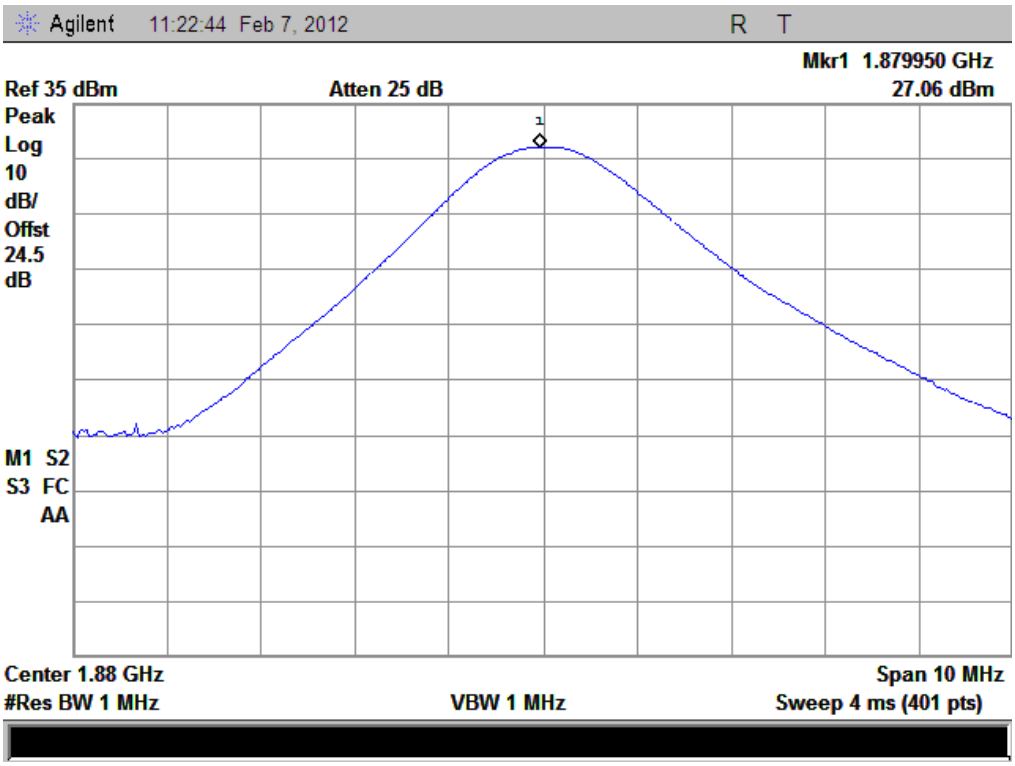
Plot C2: GPRS 850MHz Channel = 190 -1down link 4up link



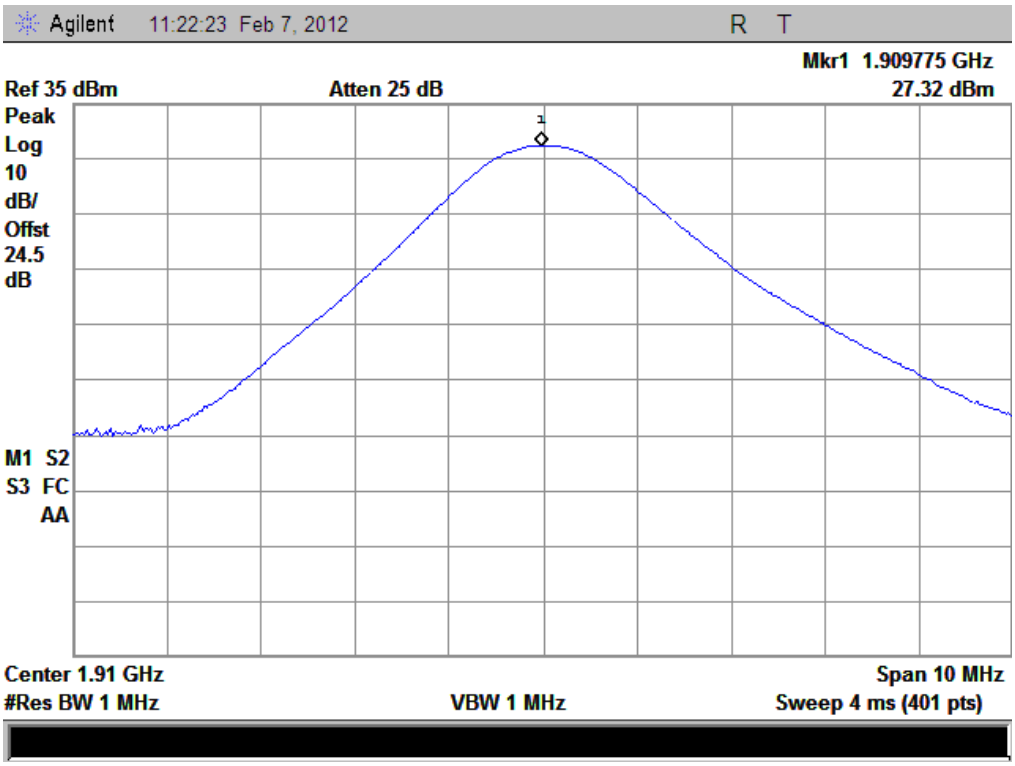
Plot C3: GPRS850MHz Channel = 251 -1down link 4up link



Plot D1: GPRS 1900MHz Channel = 512 -1down link 4up link



Plot D2: GPRS1900MHz Channel = 661 -1down link 4up link



Plot D3: GPRS 1900MHz Channel = 810 -1down link 4up link

2.2. 99% Occupied Bandwidth

2.2.1. Definition

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.

2.2.2. Test Description

See section 2.1.2 of this report.

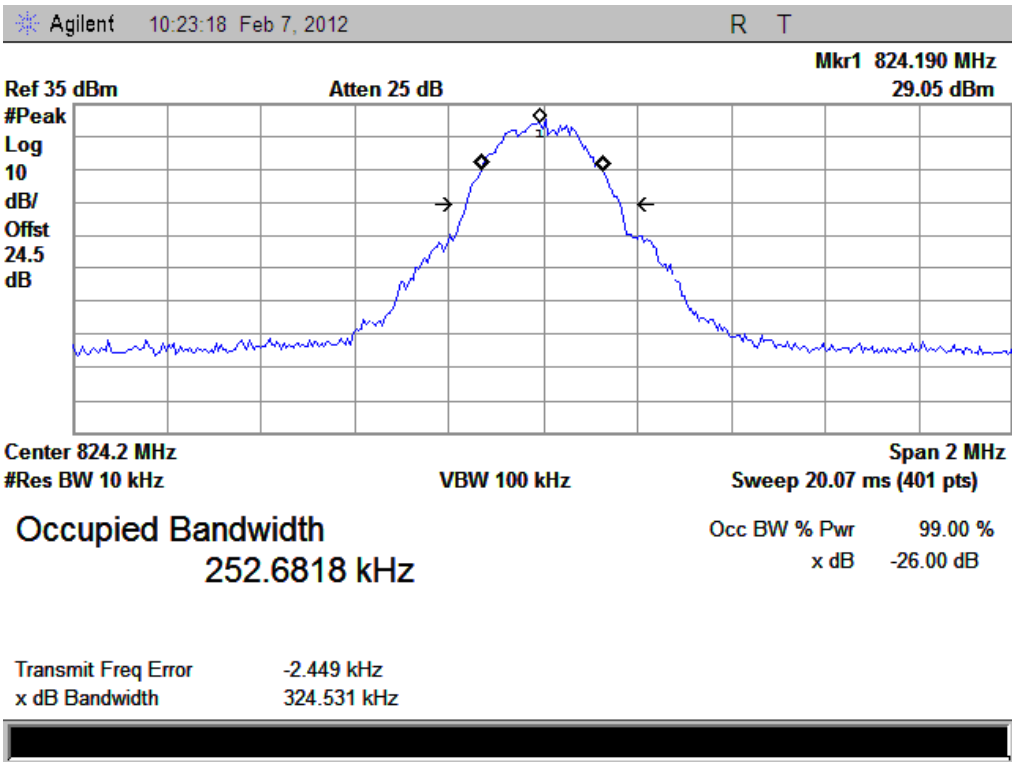
2.2.3. Test Verdict

Here the lowest, middle and highest channels are tested to record the 99% occupied bandwidth

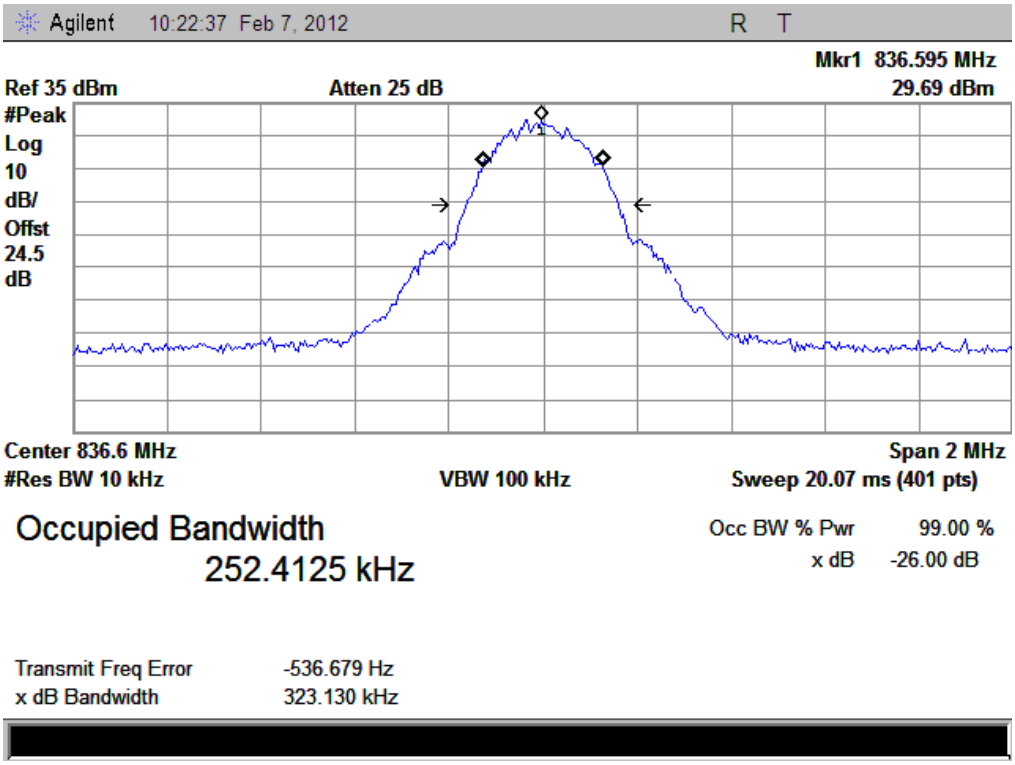
A. Test Verdict:

Band	Channel	Frequency (MHz)	Measured 99% Occupied Bandwidth (kHz)	Refer to Plot
GSM 850MHz	128	824.2	252.6818	Plot A
	190	836.6	252.4125	Plot B
	251	848.8	253.2679	Plot C
GSM 1900MHz	512	1850.2	252.6559	Plot D
	661	1880.0	248.1564	Plot E
	810	1909.8	244.6668	Plot F

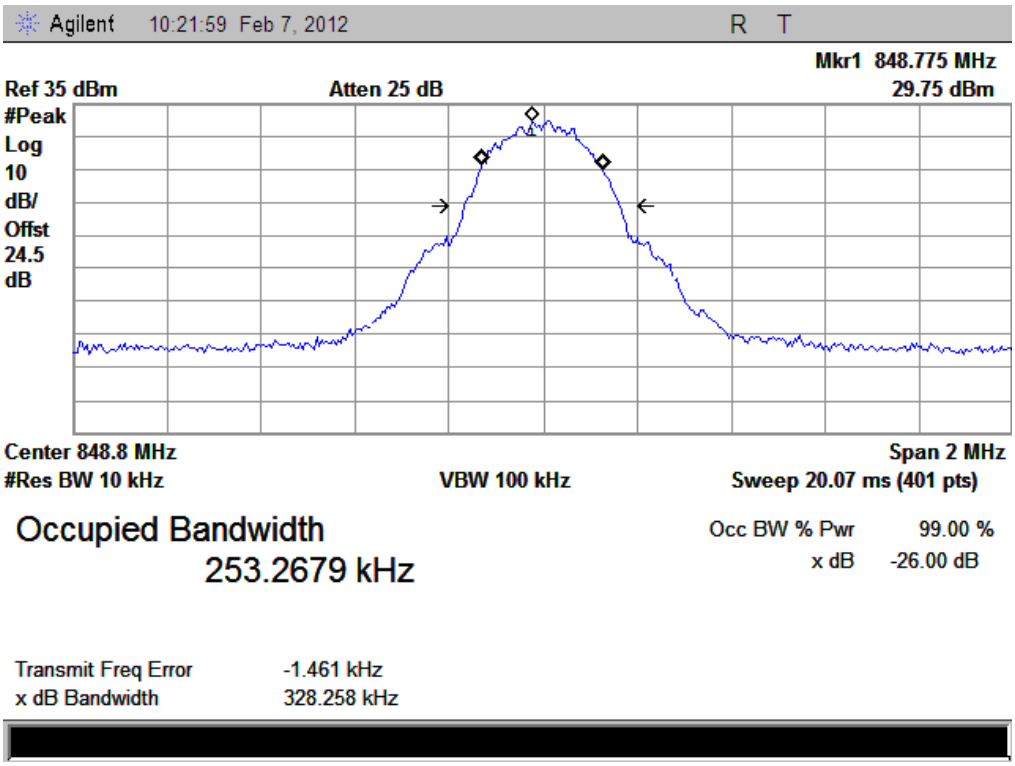
B. Test Plots:



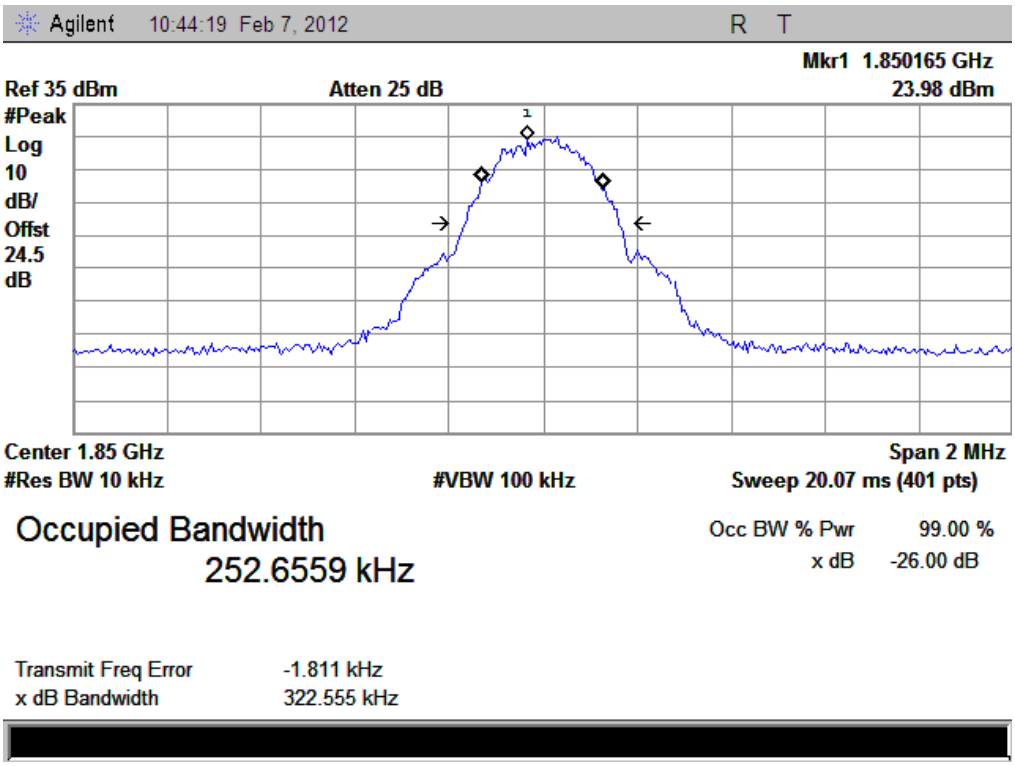
(Plot A: GSM 850MHz Channel = 128)



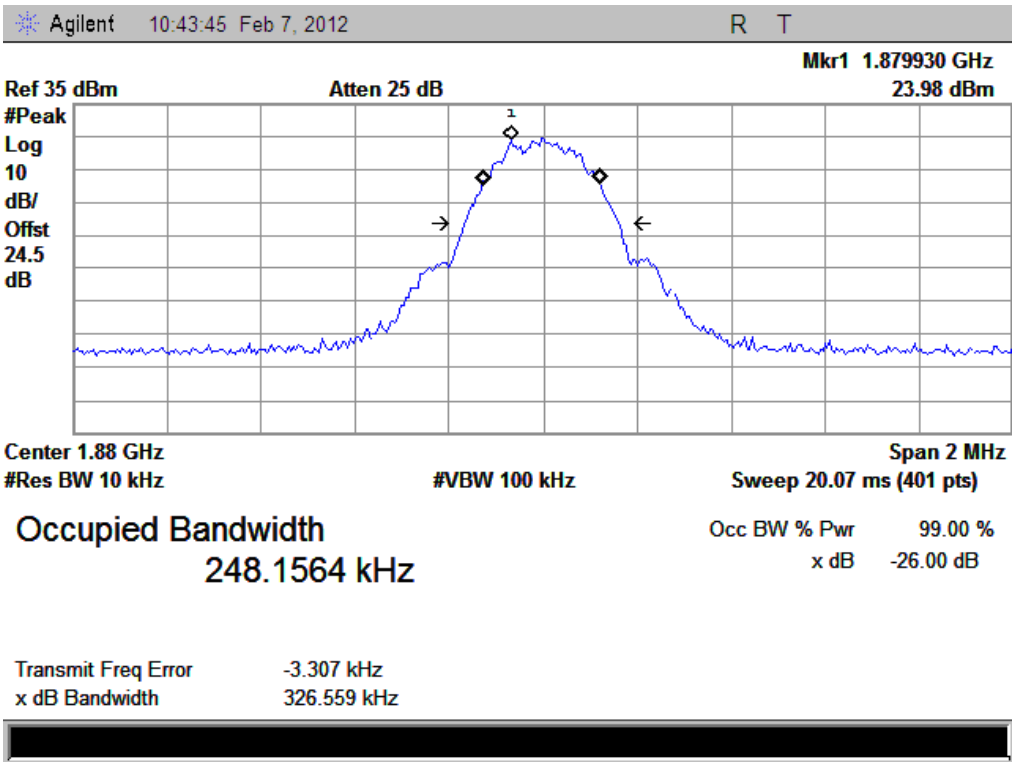
(Plot B: GSM 850MHz Channel = 190)



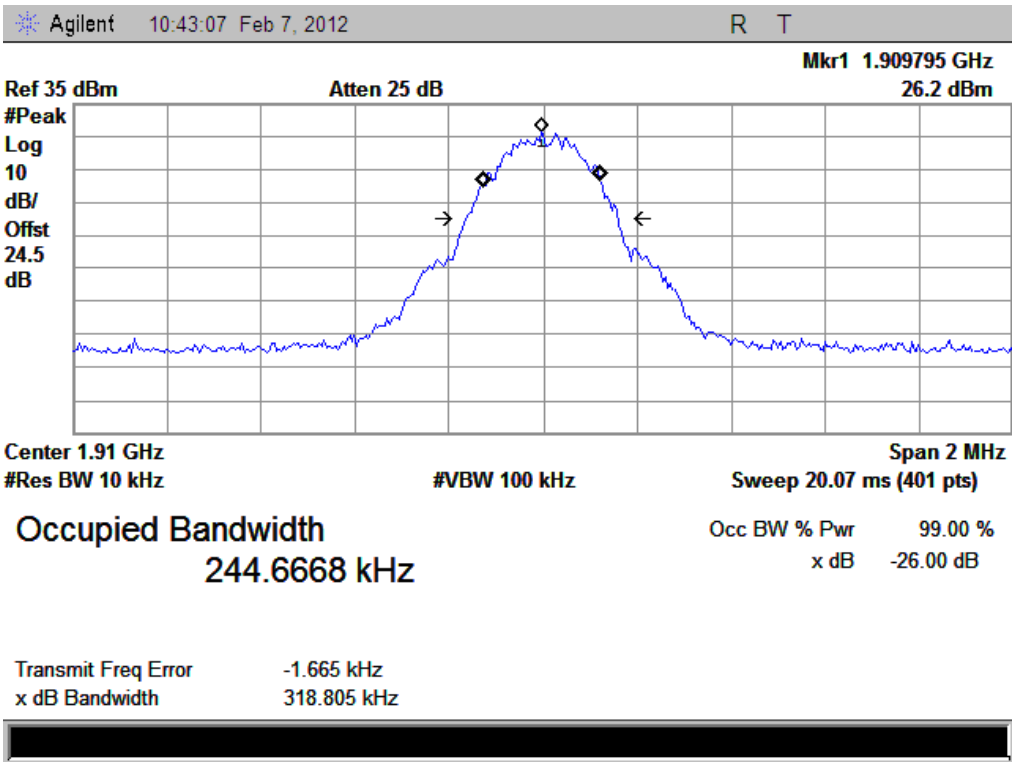
(Plot C: GSM 850MHz Channel = 251)



(Plot D: GSM 1900MHz Channel = 512)



(Plot E: GSM 1900MHz Channel = 661)



(Plot F: GSM 1900MHz Channel = 810)

2.3. Frequency Stability

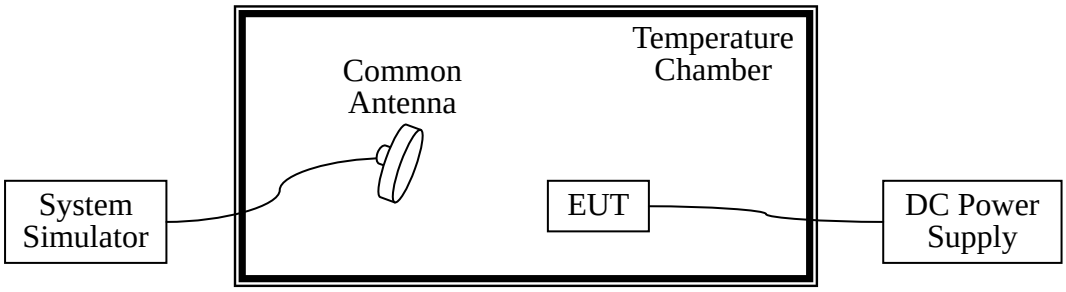
2.3.1. Requirement

According to FCC section 22.355 and FCC section 24.235, 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°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.

2.3.2. Test Description

A. 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.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date
System Simulator	Agilent	E5515C	GB43130131	2011.05
DC Power Supply	Good Will	GPS-3030DD	EF920938	2011.05
Temperature Chamber	YinHe Experimental Equip.	HL4003T	(n.a.)	2011.05

2.3.3. Test Verdict

The nominal, highest and lowest extreme voltages are separately 3.7VDC, 4.2VDC and 3.6VDC, which are specified by the applicant; the normal temperature here used is 25°C. The frequency deviation limit of GSM 850MHz band is ±2.5ppm, and GSM 1900MHz is ±1ppm

Band	Test Conditions		Frequency Deviation						Verdict
	Power (VDC)	Temperature (°C)	Channel = 128 (824.2MHz)		Channel = 190 (836.6MHz)		Channel = 251 (848.8MHz)		
			Hz	Limits	Hz	Limits	Hz	Limits	
GSM 850MHz	3.7	-30	25.23	±2060.5	27.82	±2091.5	25.74	±2122	PASS
		-20	23.83		29.70		25.74		
		-10	23.28		28.12		31.14		
		0	25.11		21.06		25.15		
		+10	-23.13		17.07		25.47		
		+20	-10.39		-12.76		-7.61		
		+30	17.75		-2.05		6.09		
		+40	5.31		-33.77		13.49		
		+50	-12.19		5.39		10.19		
	4.2	+25	20.74		19.65		8.71		
	3.6	+25	-27.28		-21.96		-15.27		

Band	Test Conditions		Frequency Deviation						Verdict
	Power (VDC)	Temperature (°C)	Channel = 512 (1850.2MHz)		Channel = 661 (1880.0MHz)		Channel = 810 (1909.8MHz)		
			Hz	Limits	Hz	Limits	Hz	Limits	
GSM 1900MHz	3.7	-30	29.30	±1850.2	29.82	±1880.0	29.17	±1909.8	PASS
		-20	29.22		29.45		29.30		
		-10	25.19		28.17		27.12		
		0	20.37		-3.20		11.82		
		+10	13.87		20.04		19.77		
		+20	22.62		-14.29		-22.73		
		+30	18.57		-27.62		-22.22		
		+40	-19.93		-17.97		22.21		
		+50	23.76		-18.23		-22.22		
	4.2	+25	-21.20		27.16		22.63		
	3.6	+25	-19.17		-15.31		-15.15		

2.4. Conducted Out of Band Emissions

2.4.1. Requirement

According to FCC section 22.917(a) and FCC section 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 calculated to be -13dBm.

2.4.2. Test Description

See section 2.1.2 of this report.

2.4.3. Test Result

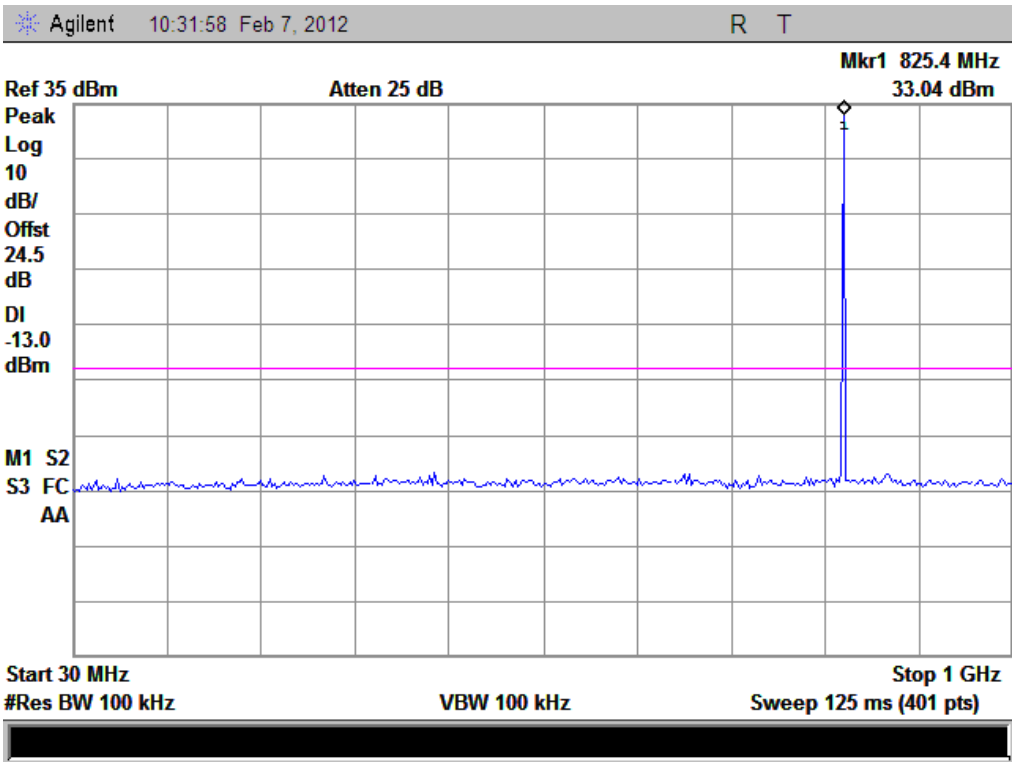
The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.

Test Verdict:

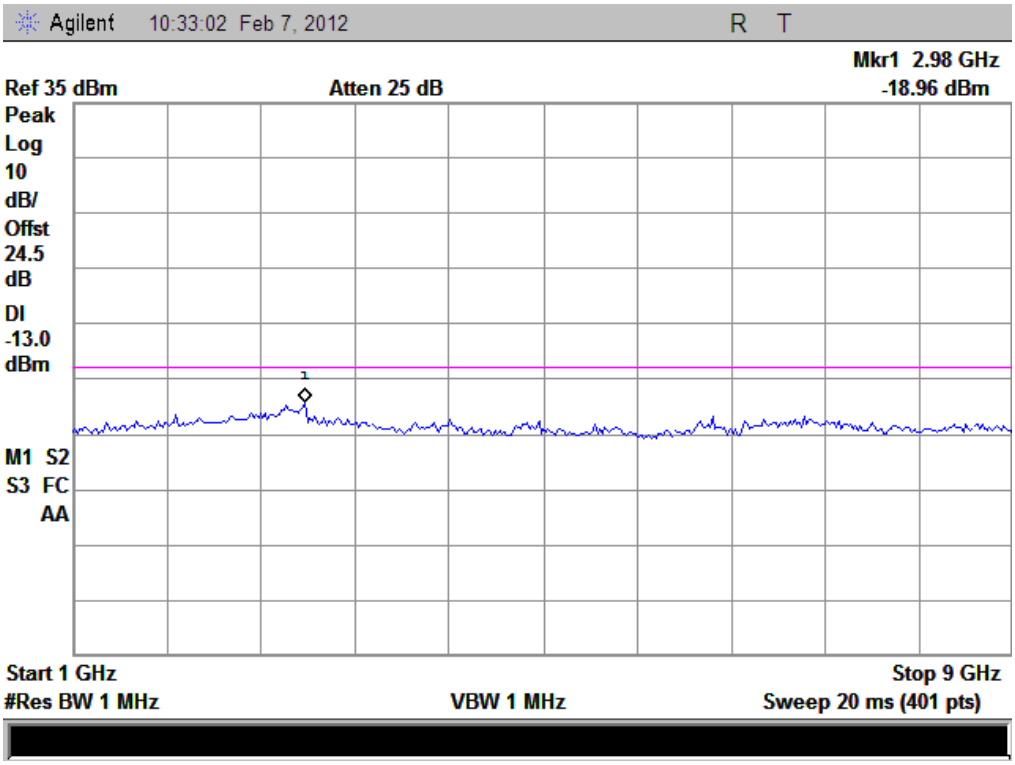
Band	Channel	Frequency (MHz)	Measured Max. Spurious Emission (dBm)	Refer to Plot	Limit (dBm)	Verdict
GSM 850MHz	128	824.2	-18.96	Plot A	-13	PASS
	190	836.6	-18.81	Plot B		PASS
	251	848.8	-20.10	Plot C		PASS
GSM 1900MHz	512	1850.2	<-25	Plot D	-13	PASS
	661	1880.0	<-25	Plot E		PASS
	810	1909.8	<-25	Plot F		PASS

Test Plots for the Whole Measurement Frequency Range:

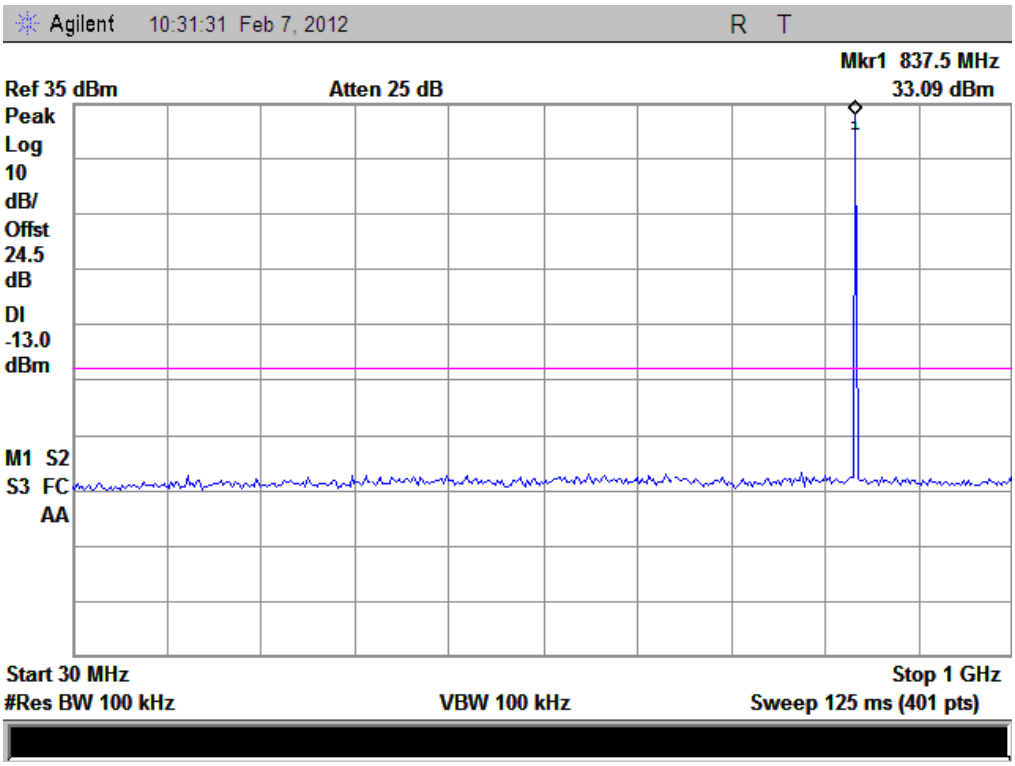
Note: the power of the EUT transmitting frequency should be ignored.



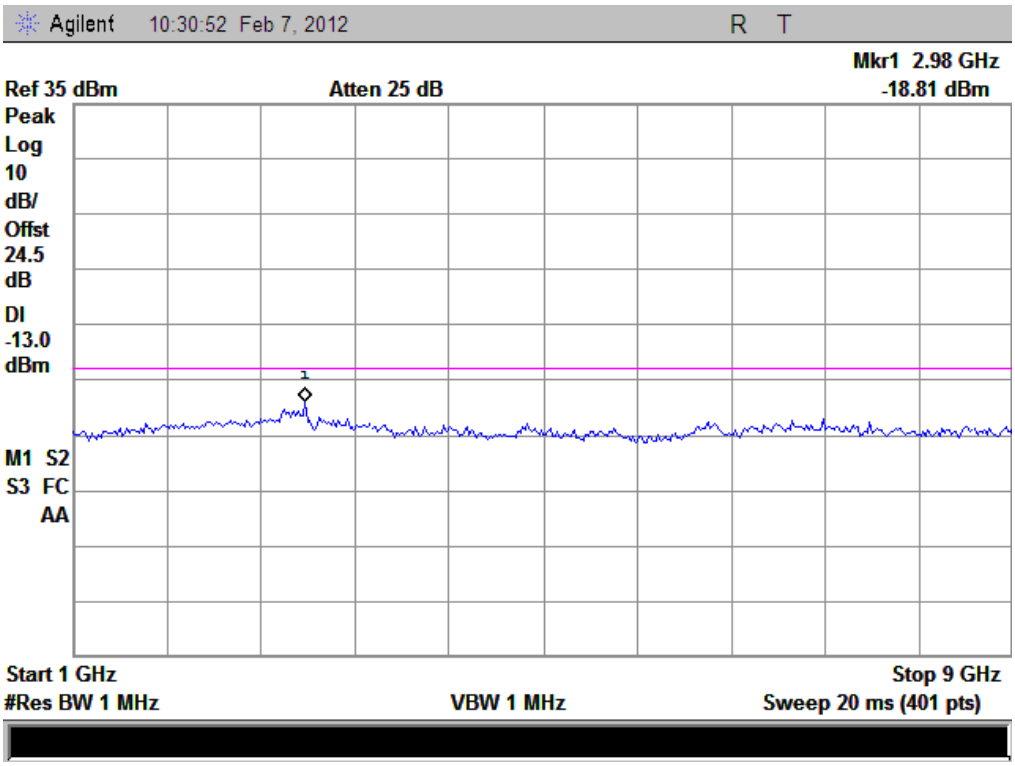
(Plot A: GSM 850MHz Channel = 128,30Hz to 1GHz)



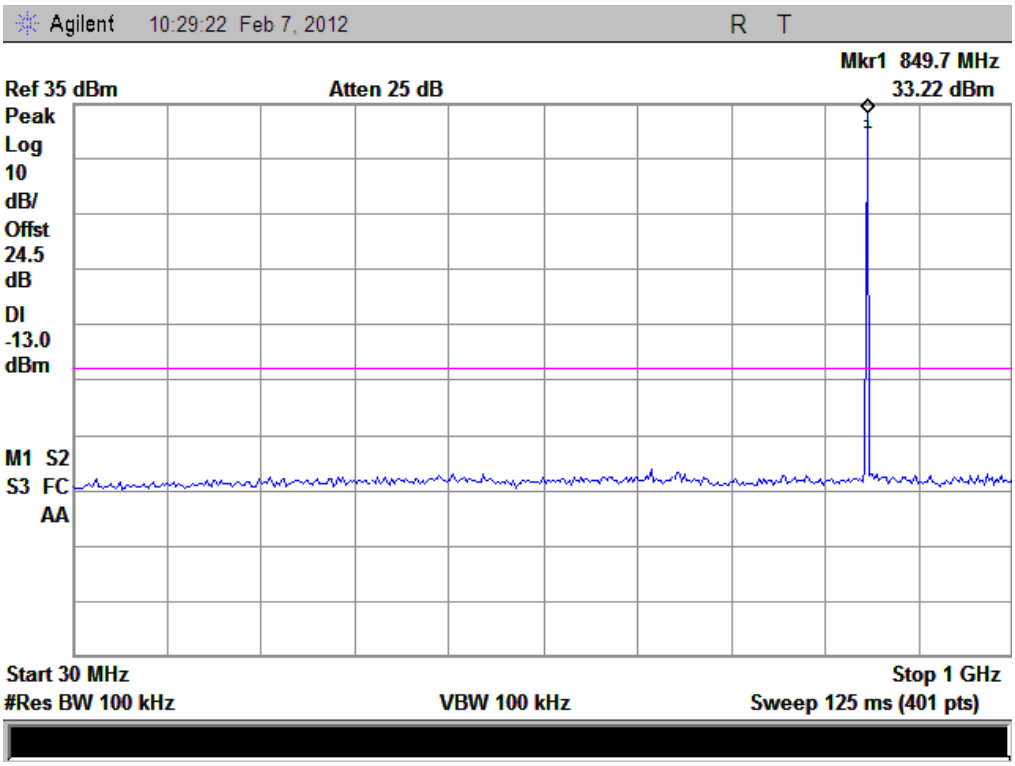
(Plot A: GSM 850MHz Channel = 128, 1GHz to 9GHz)



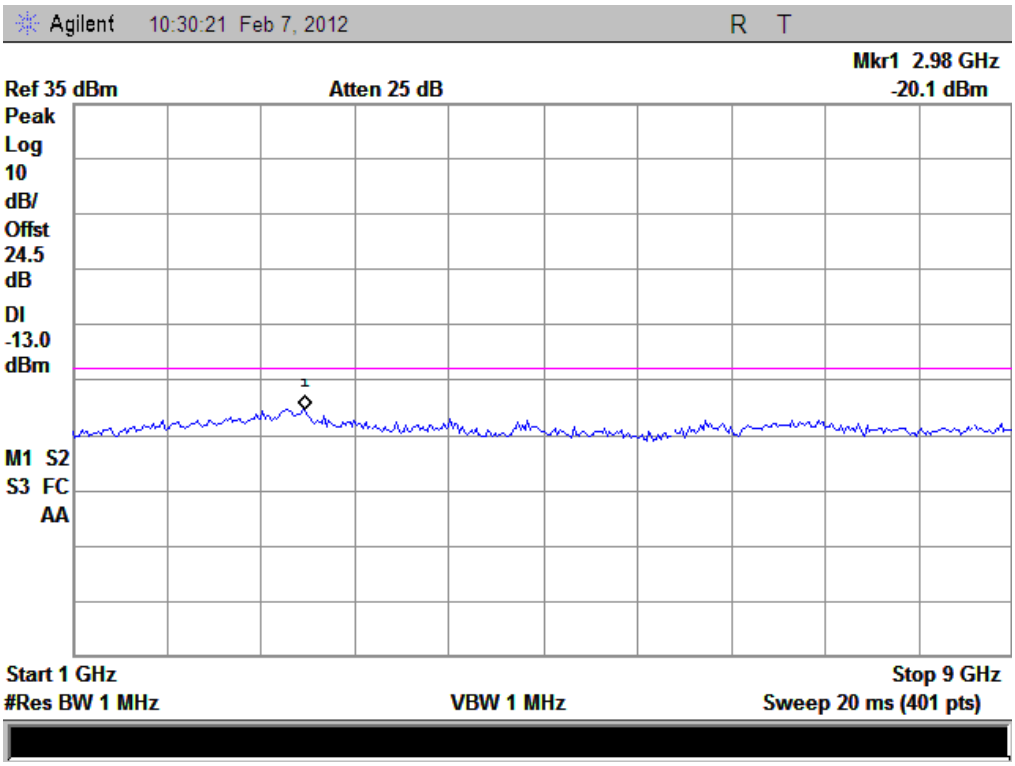
(Plot B: GSM 850MHz Channel = 190, 30MHz to 1GHz)



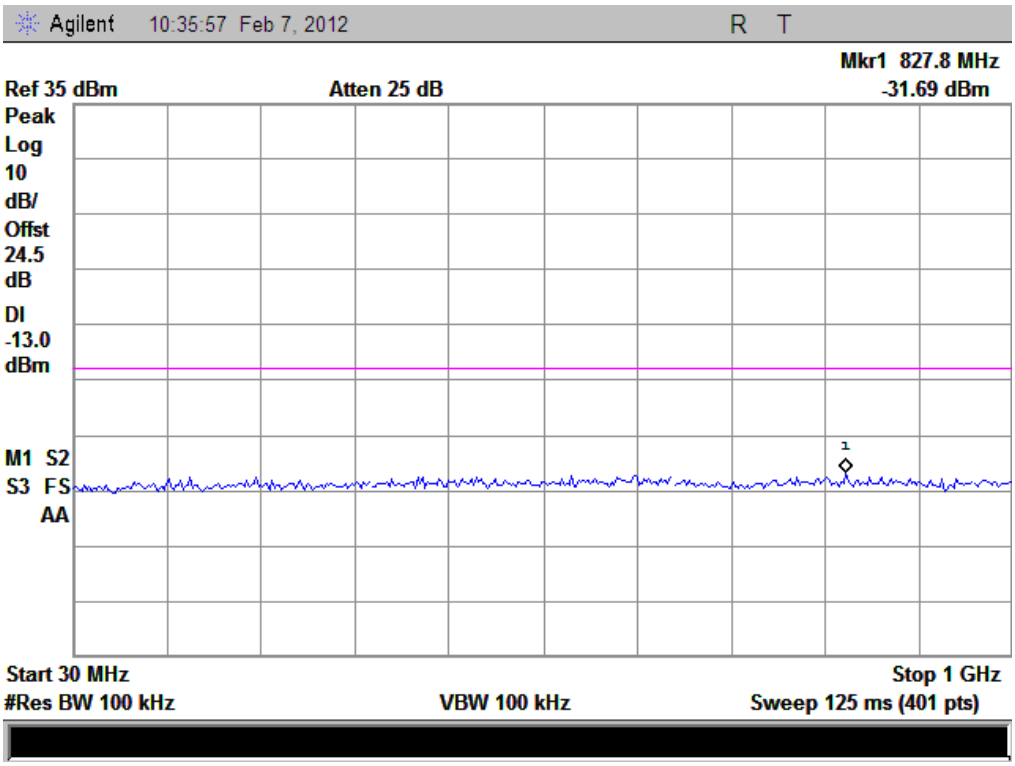
(Plot B: GSM 850MHz Channel = 190, 1GHz to 9GHz)



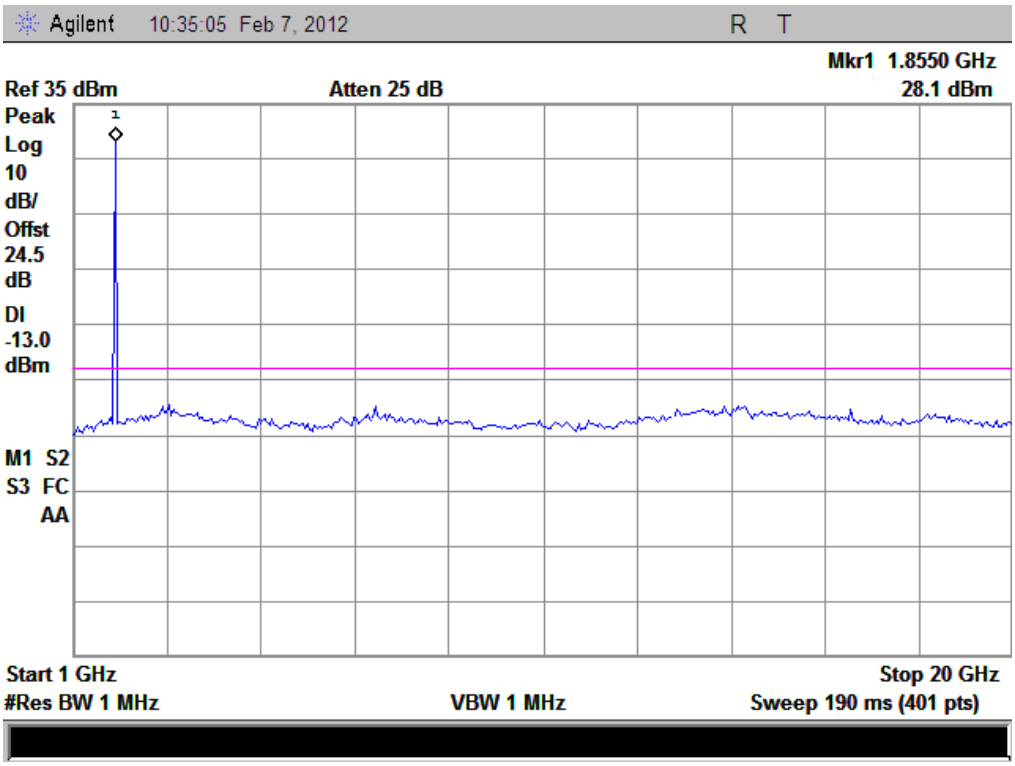
(Plot C: GSM 850 MHz Channel = 251, 30MHz to 1GHz)



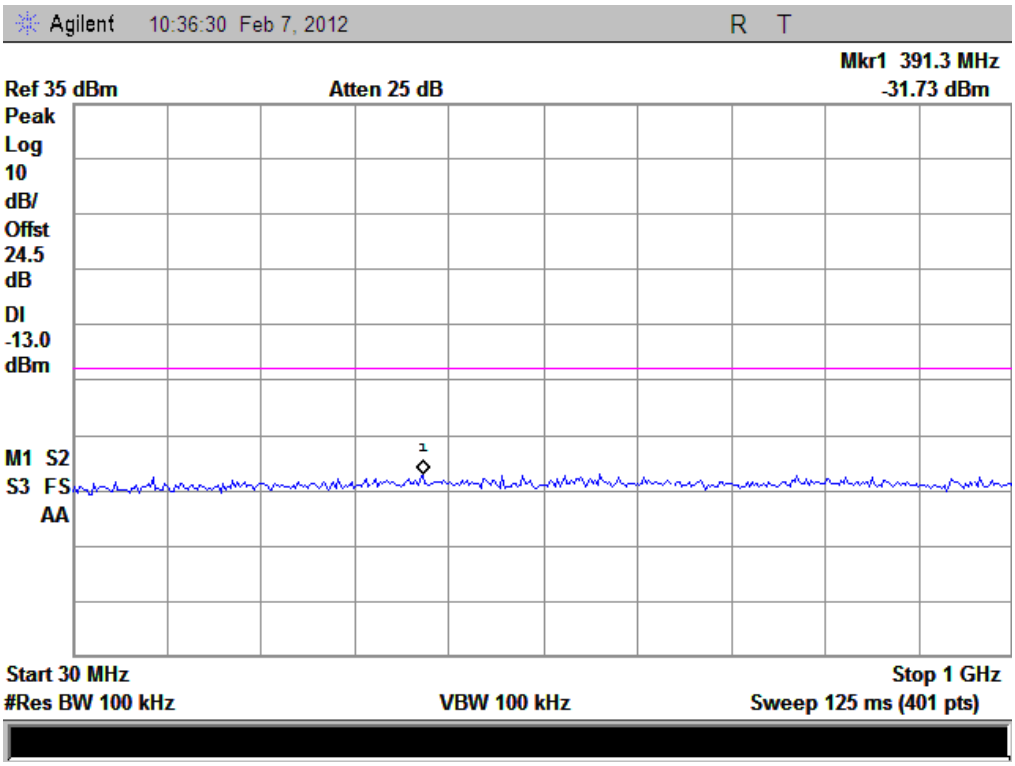
(Plot C: GSM 850MHz Channel = 251, 1GHz to 9GHz)



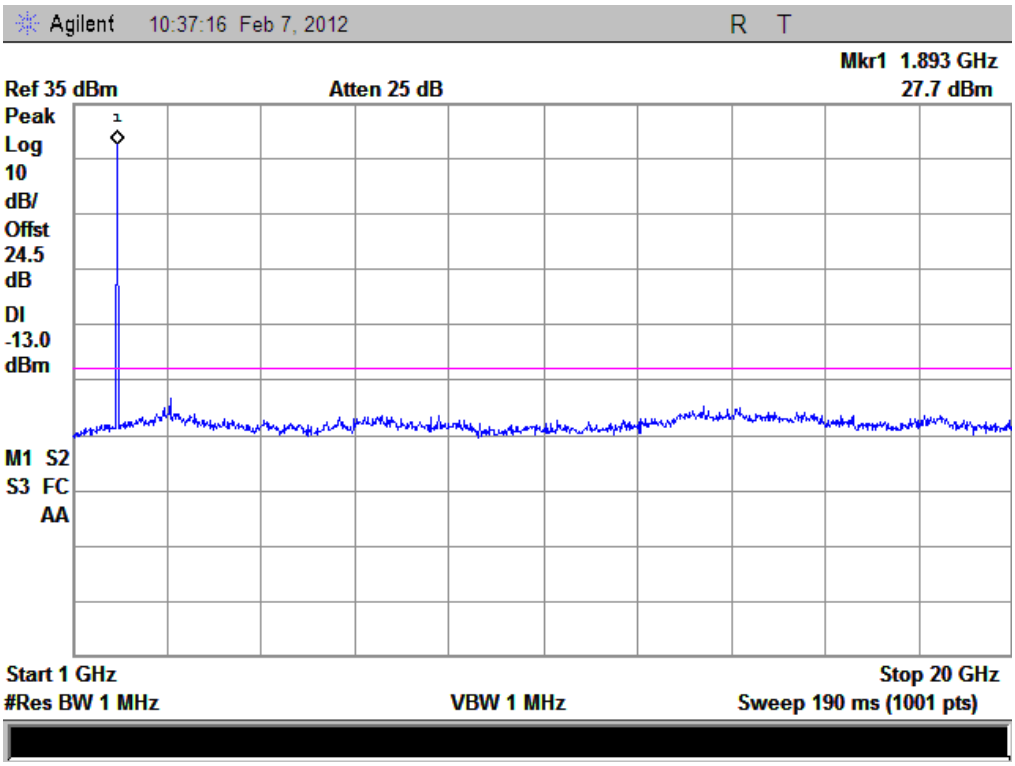
(Plot D: GSM 1900MHz Channel = 512, 30MHz to 1GHz)



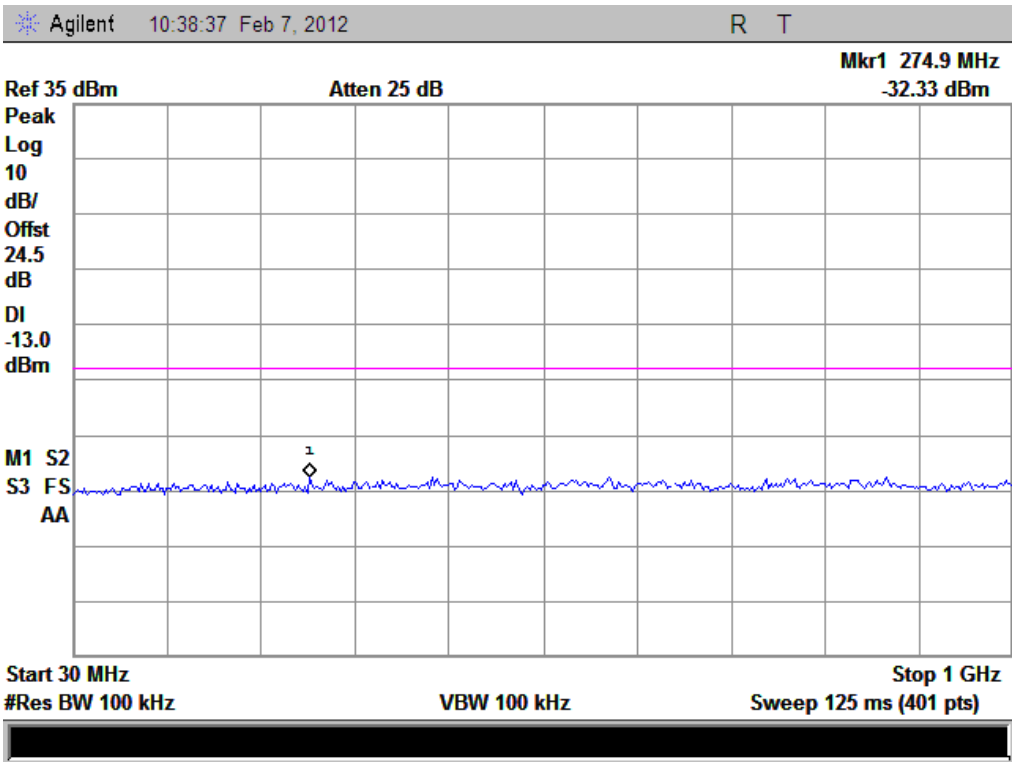
(Plot D: GSM 1900MHz Channel = 512, 1GHz to 20GHz)



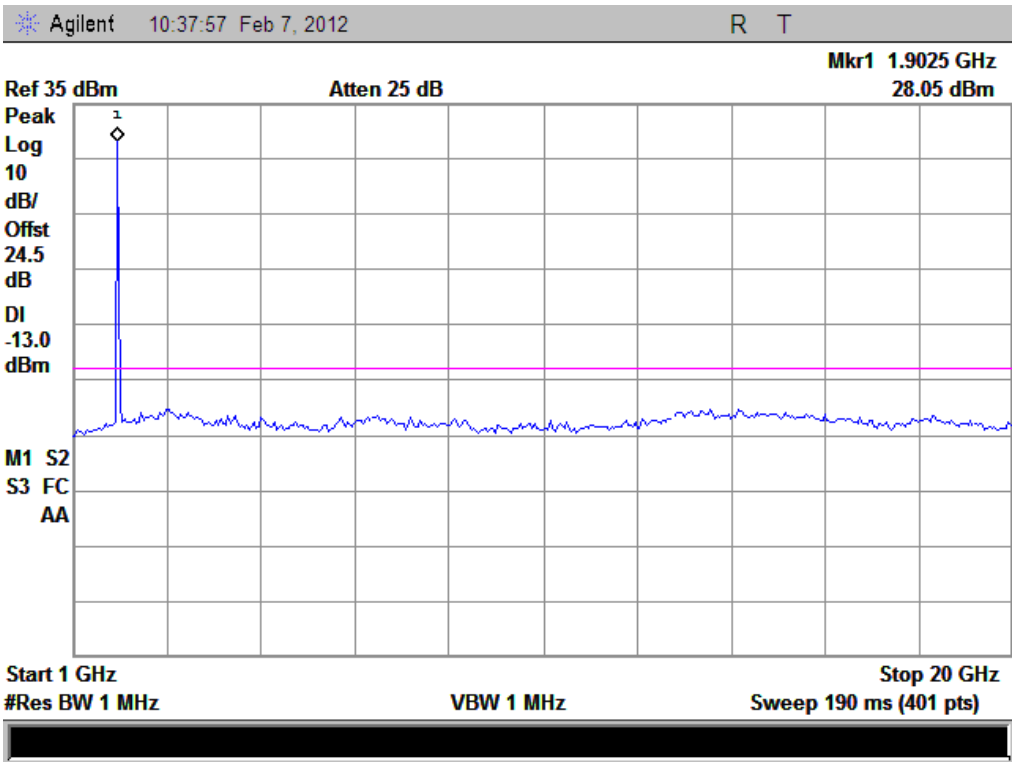
(Plot E: GSM 1900MHz Channel = 661, 30MHz to 1GHz)



(Plot E: GSM 1900MHz Channel = 661, 1GHz to 20GHz)



(Plot F: GSM 1900MHz Channel = 810, 30MHz to 1GHz)



(Plot F: GSM 1900MHz Channel = 810, 1GHz to 20GHz)

2.5. Band Edge

2.5.1. Requirement

According to FCC section 22.917(b) and FCC section 24.238(b), 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.

2.5.2. Test Description

See section 2.1.2 of this report.

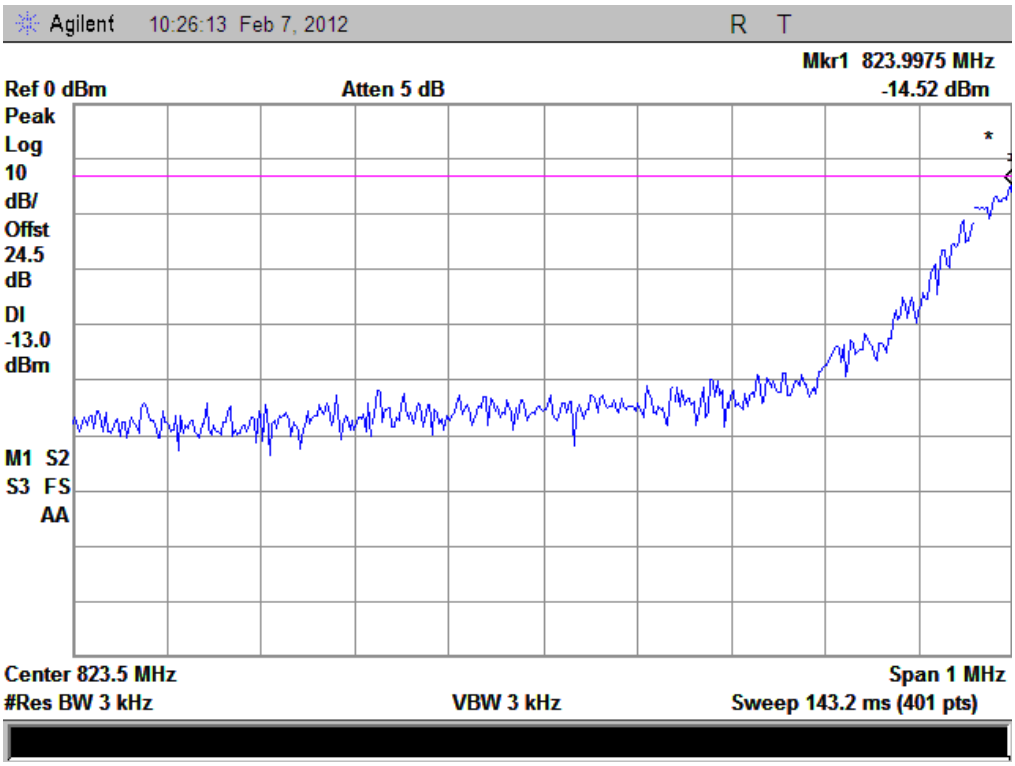
2.5.3. Test Result

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

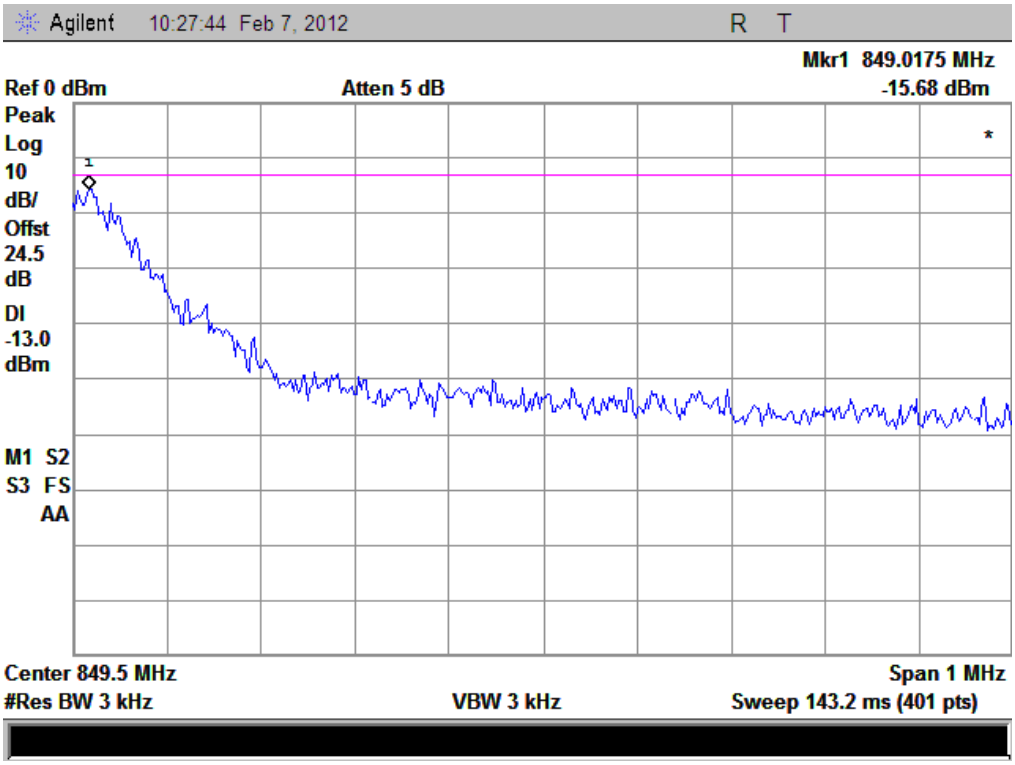
A. Test Verdict:

Band	Channel	Frequency (MHz)	Measured Max. Band Edge Emission (dBm)	Refer to Plot	Limit (dBm)	Verdict
GSM 850MHz	128	824.2	-14.52	Plat A	-13	PASS
	251	848.8	-15.68	Plot B		PASS
GSM 1900MHz	512	1850.2	-16.74	Plat C	-13	PASS
	810	1909.8	-15.98	Plot D		PASS

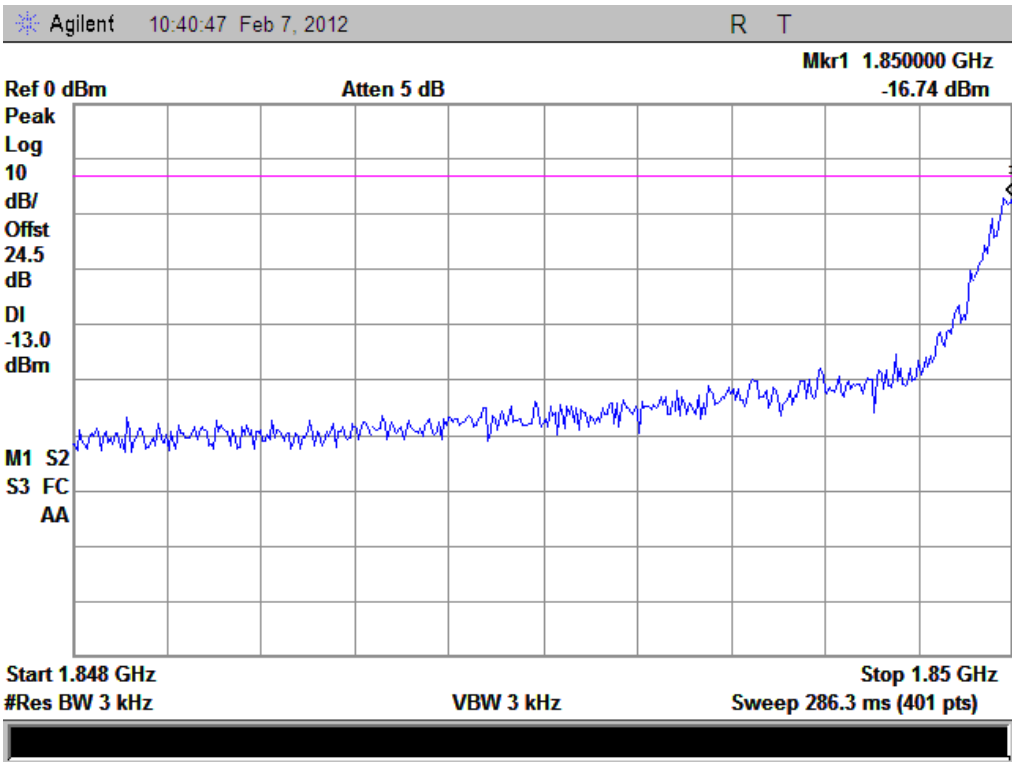
B. Test Plots:



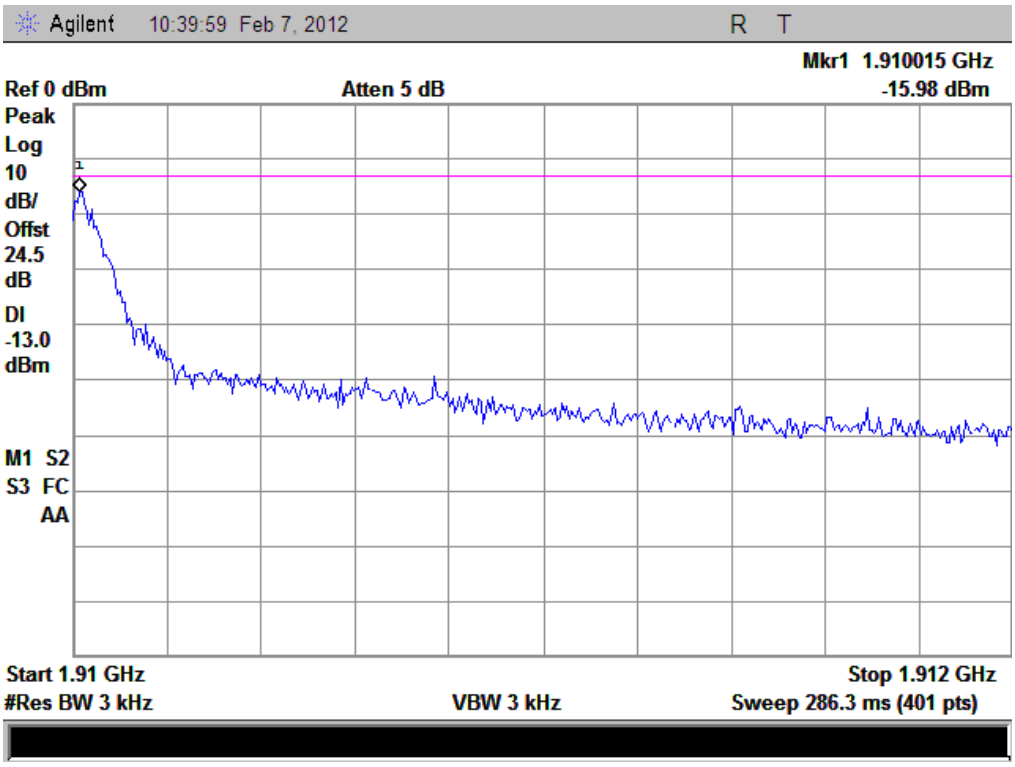
(Plot A: Channel = 128)



(Plot B: Channel = 251)



(Plot C: Channel = 512)



(Plot D: Channel = 810)

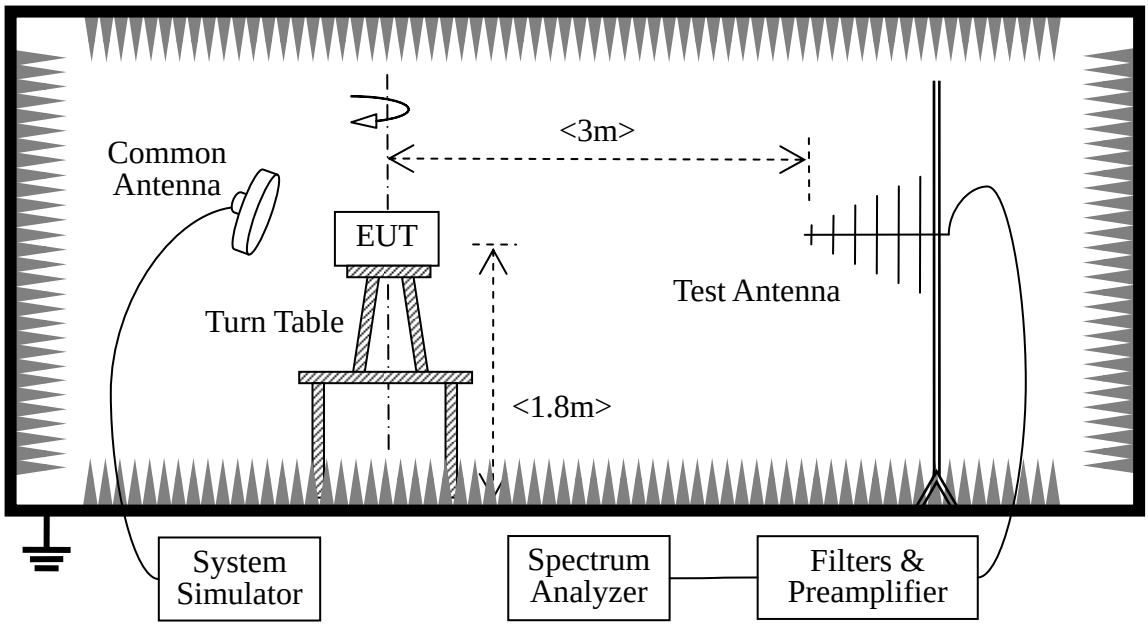
2.6. Transmitter Radiated Power (EIRP/ERP)

2.6.1. Requirement

According to FCC section 22.913, the Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7Watts, and FCC section 24.232, the broadband PCS mobile station is limited to 2Watts e.i.r.p. peak power.

2.6.2. Test Description

A. Test Setup:



The EUT, which is powered by the Battery charged with the AC Adapter, 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.

-Maximum RF output power: GSM850 31.82dBm, GSM 1900 29.26dBm, Please refer to section 2.1.3 of this report.

- Step size (dB): 3dB

- Minimum RF power: GSM850 -4.2dBm, GSM 1900 -10.16dBm

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

Filter.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date
System Simulator	Agilent	E5515C	GB43130131	2011.05
Spectrum Analyzer	Agilent	E7405A	US44210471	2011.05
Full-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2011.05
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2011.05
Test Antenna - Horn	Schwarzbeck	BBHA 9120C	9120C-384	2011.05

2.6.3. 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:

$A_{SUBST} = P_{SUBST\_TX} - P_{SUBST\_RX} - L_{SUBST\_CABLES} + G_{SUBST\_TX\_ANT}$

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

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

P_{SUBST_TX} is signal generator level,

P_{SUBST_RX} is receiver level,

L_{SUBST_CABLES} is cable losses including TX cable,

$G_{SUBST\_TX\_ANT}$ 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}.

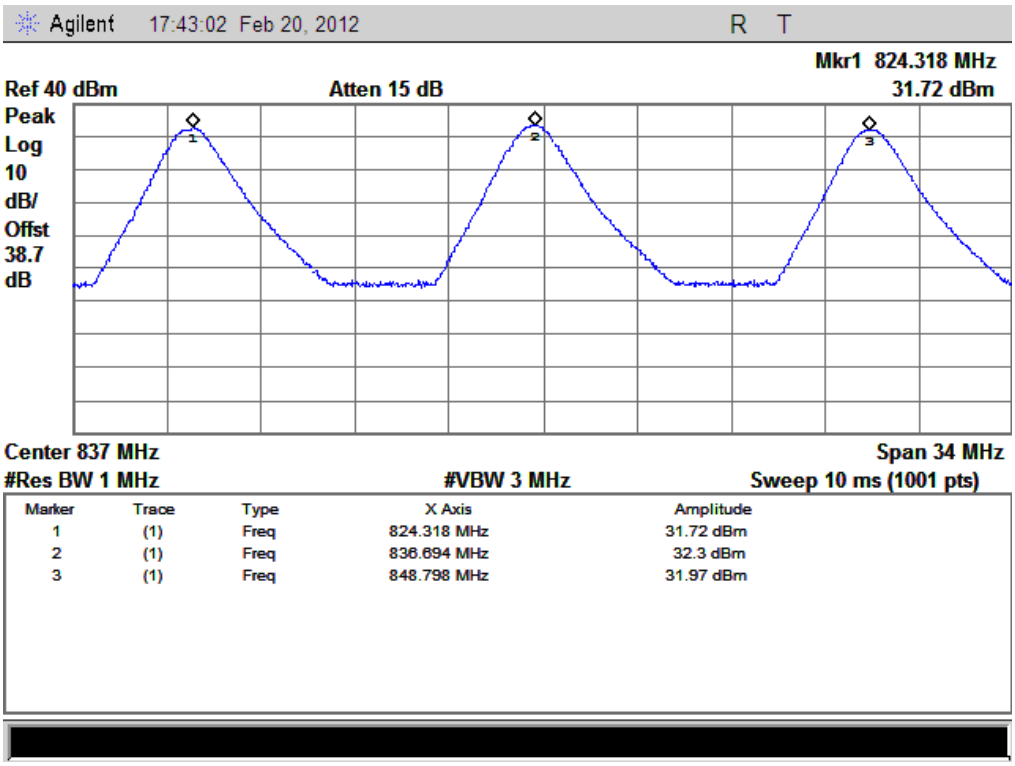
A. Test Verdict:

Band	Channel	Frequency (MHz)	PCL	Measured ERP			Limit		Verdict
				dBm	W	Refer to Plot	dBm	W	
GSM 850MHz	128	824.20	5	31.72	1.485936	Plot A	38.45	7	PASS
	190	836.60	5	32.30	1.698244				PASS
	251	848.80	5	31.97	1.573983				PASS
GPRS 850MHz	128	824.20	5	32.41	1.741807	Plot B Note 1	38.45	7	PASS
	190	836.60	5	33.59	2.285599				PASS
	251	848.80	5	33.09	2.037042				PASS

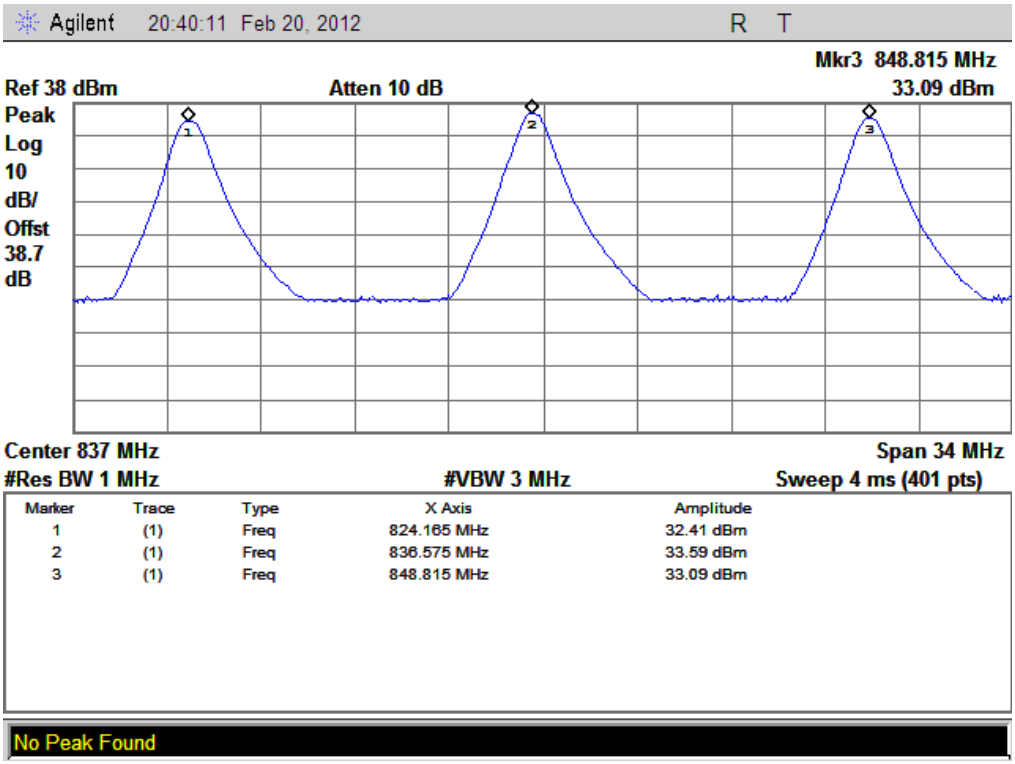
Band	Channel	Frequency (MHz)	PCL	Measured EIRP			Limit		Verdict
				dBm	W	Refer to Plot	dBm	W	
GSM 1900MHz	512	1850.2	0	29.77	0.948418	Plot C	33	2	PASS
	661	1880.0	0	28.54	0.714496				PASS
	810	1909.8	0	28.01	0.632412				PASS
GPRS 1900MHz	512	1850.2	0	30.70	1.174898	Plot D Note 1	33	2	PASS
	661	1880.0	0	29.77	0.948418				PASS
	810	1909.8	0	27.37	0.545758				PASS

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

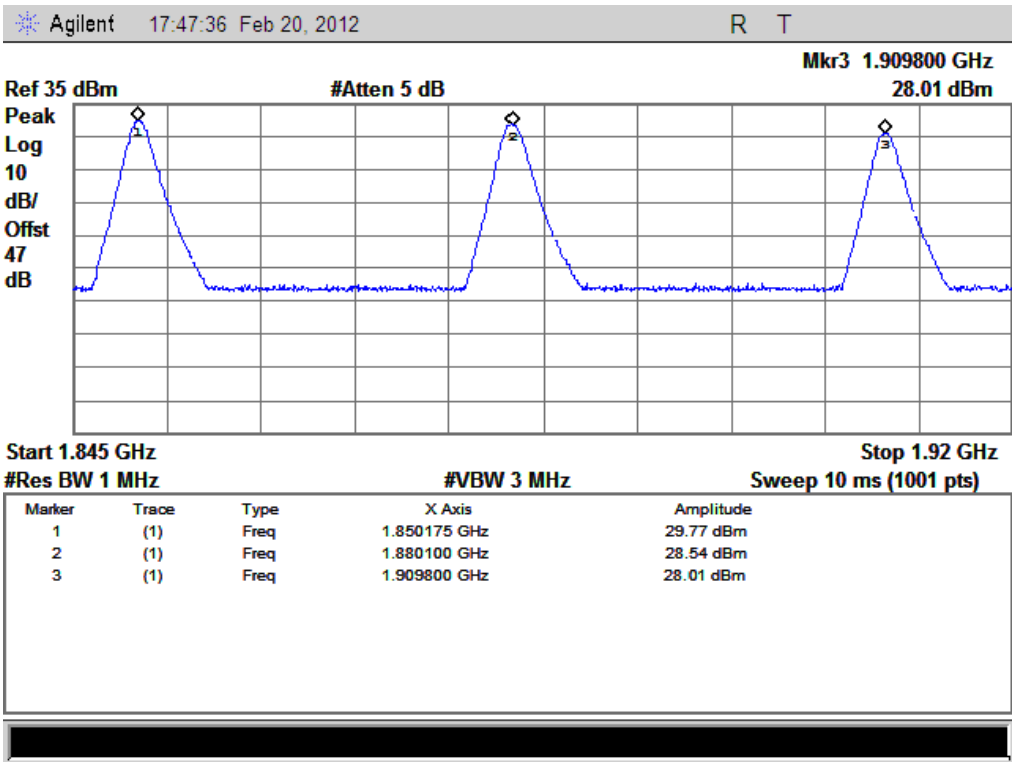
B. Test Plots:



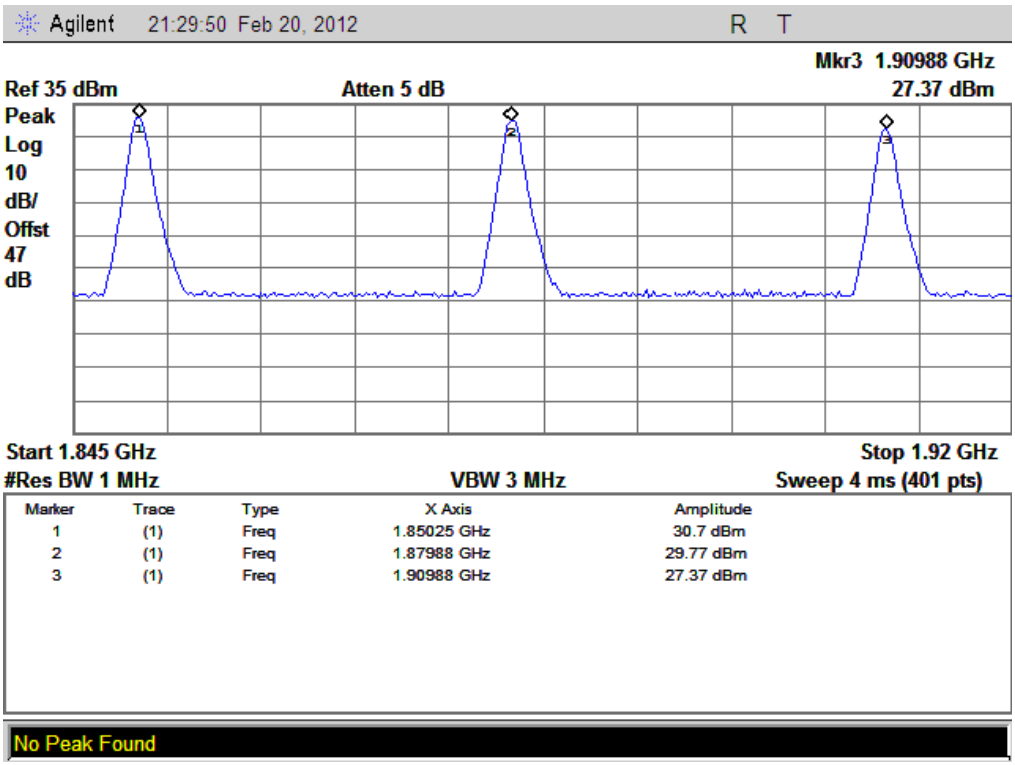
(Plot A: GSM 850MHz Channel = 128,190,251)



(Plot C: GPRS 850MHz Channel = 128,190,251)



(Plot B: GSM 1900MHz Channel = 512, 661, 810)



(Plot D: GPRS 1900MHz Channel = 512, 661, 810)

2.7. Radiated Out of Band Emissions

2.7.1. Requirement

According to FCC section 22.917(a) and section 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 calculated to be -13dBm.

2.7.2. Test Description

See section 2.6.2 of this report.

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

2.7.3. Test Result

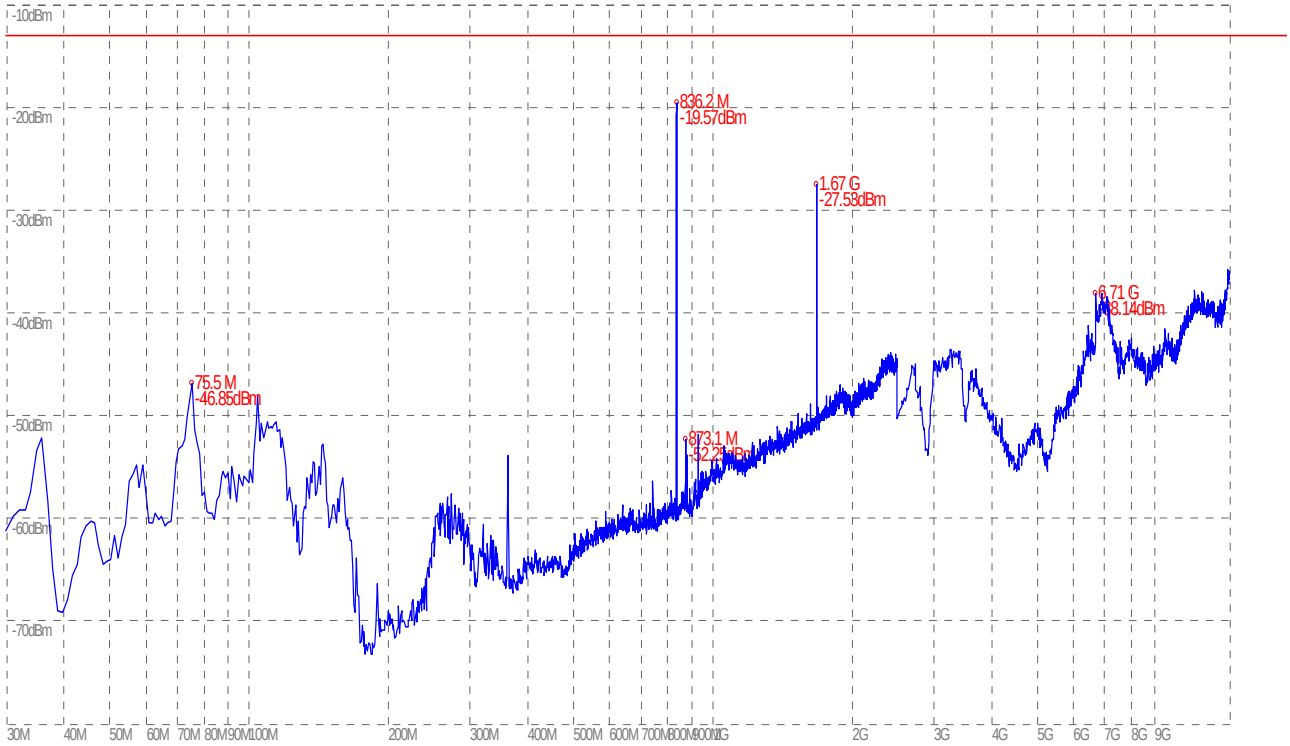
The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. The lowest, middle and highest channels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

A. Test Verdict:

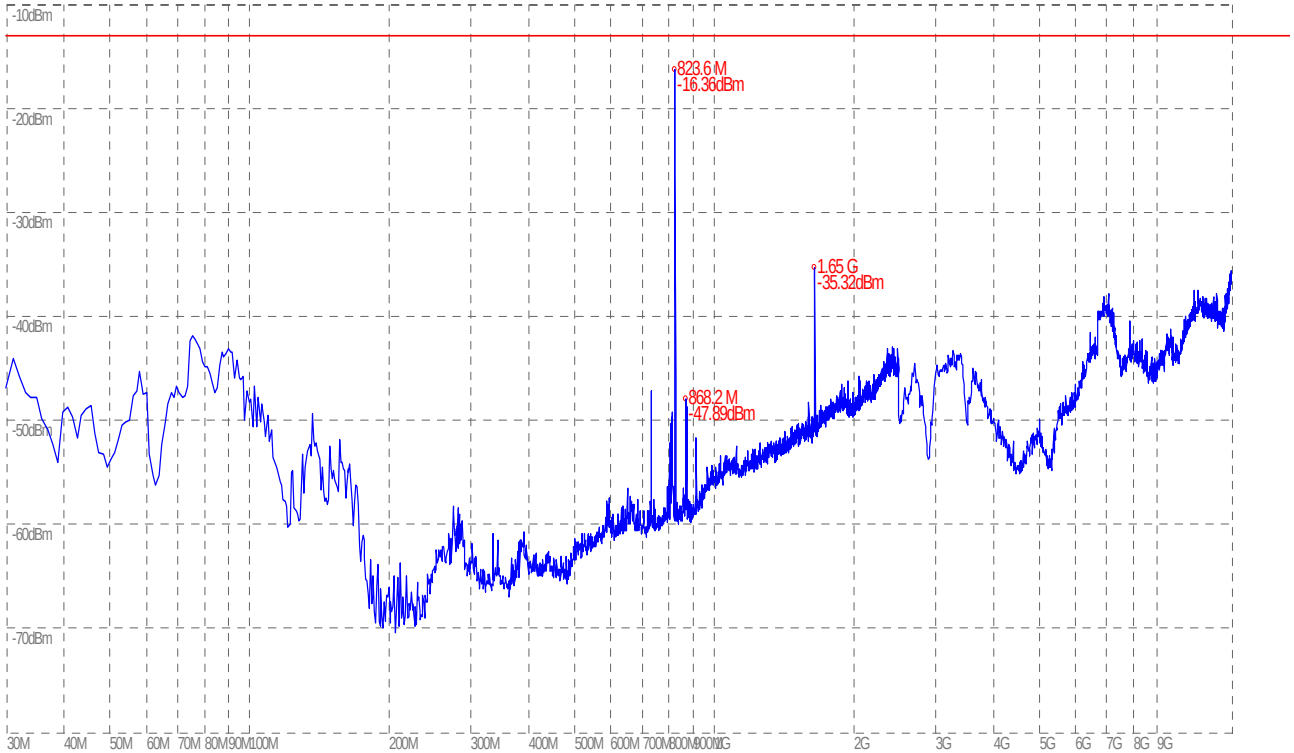
Band	Channel	Frequency (MHz)	Measured Max. Spurious Emission (dBm)		Refer to Plot	Limit (dBm)	Verdict
			Test Antenna Horizontal	Test Antenna Vertical			
GSM 850MHz	128	824.2	<-25	<-25	Plot A.1/A.2	-13	PASS
	190	836.6	<-25	<-25	Plot B.1/B.2		PASS
	251	848.8	<-25	<-25	Plot C.1/C.2		PASS
GSM 1900MHz	512	1850.2	<-25	<-25	Plot D.1/D.2	-13	PASS
	661	1880.0	<-25	<-25	Plot E.1/E.2		PASS
	810	1909.8	<-25	<-25	Plot F.1/F.2		PASS

B. Test Plots for the Whole Measurement Frequency Range:

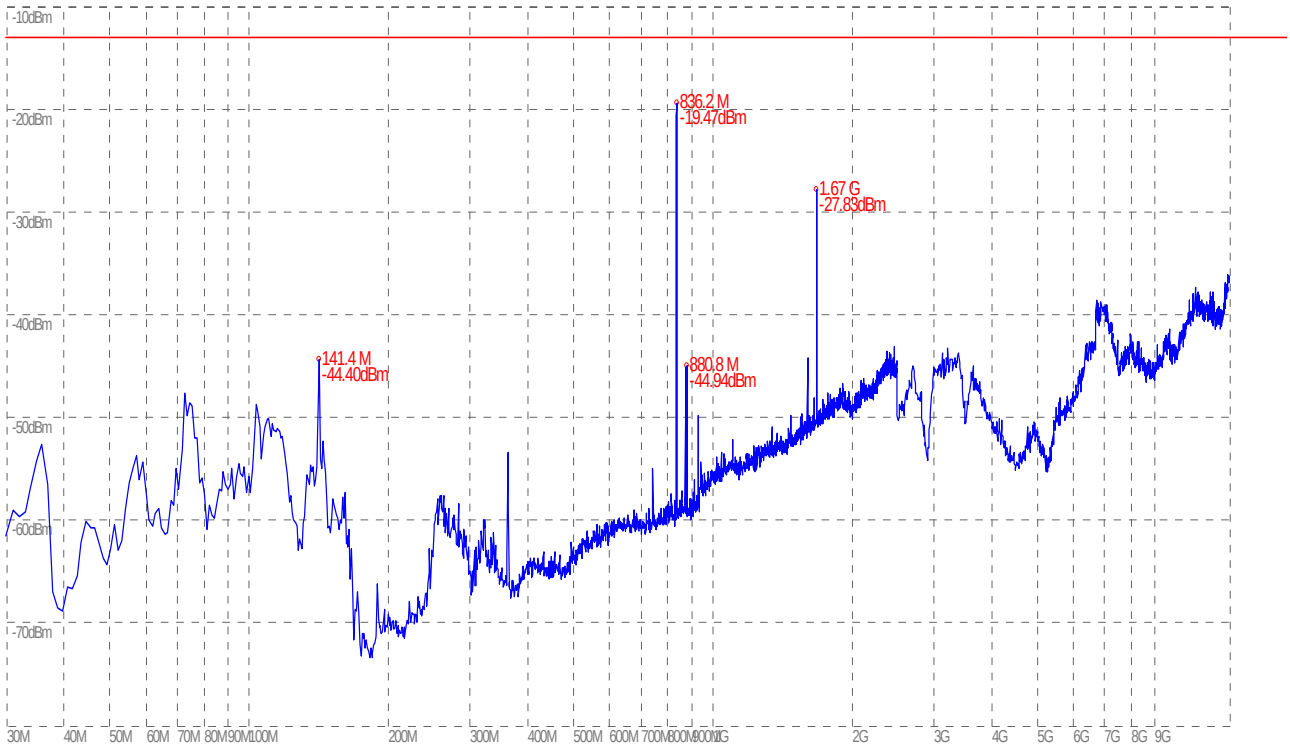
Note: the power of the EUT transmitting frequency should be ignored.



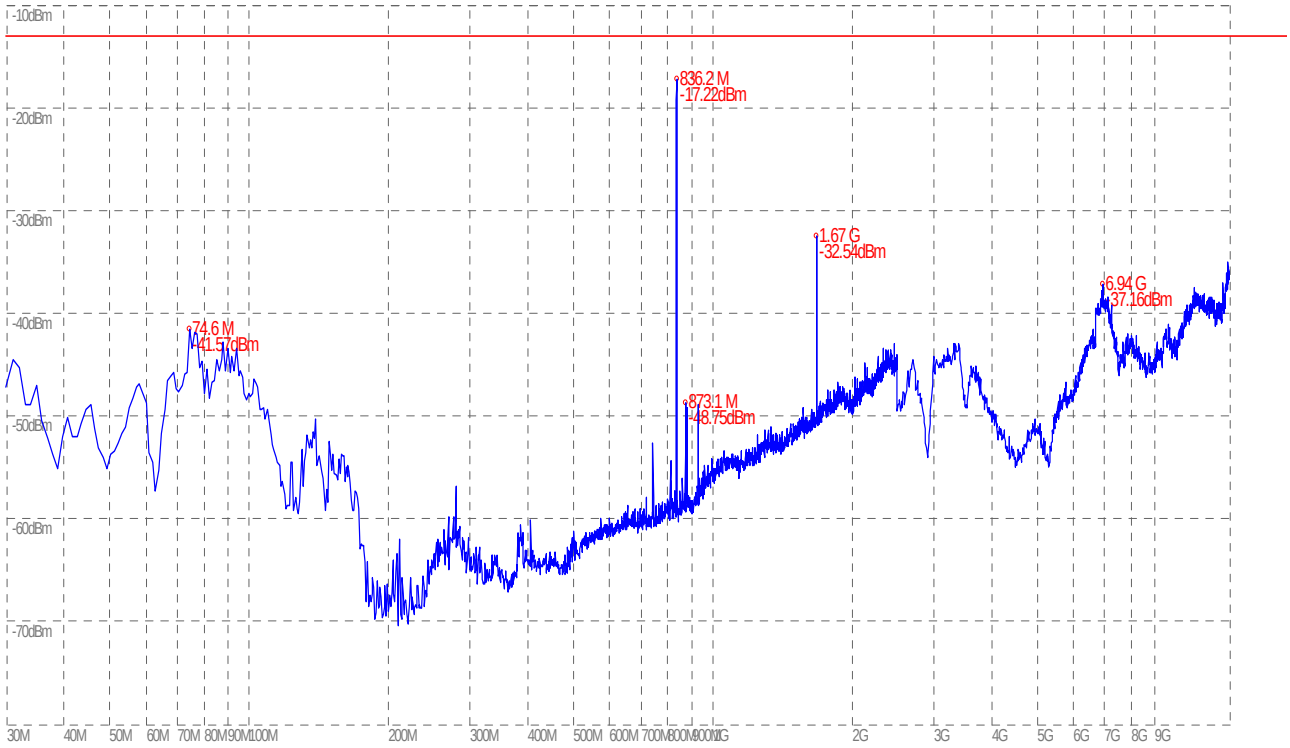
(Plot A.1: GSM 850MHz Channel = 128, Test Antenna Horizontal)



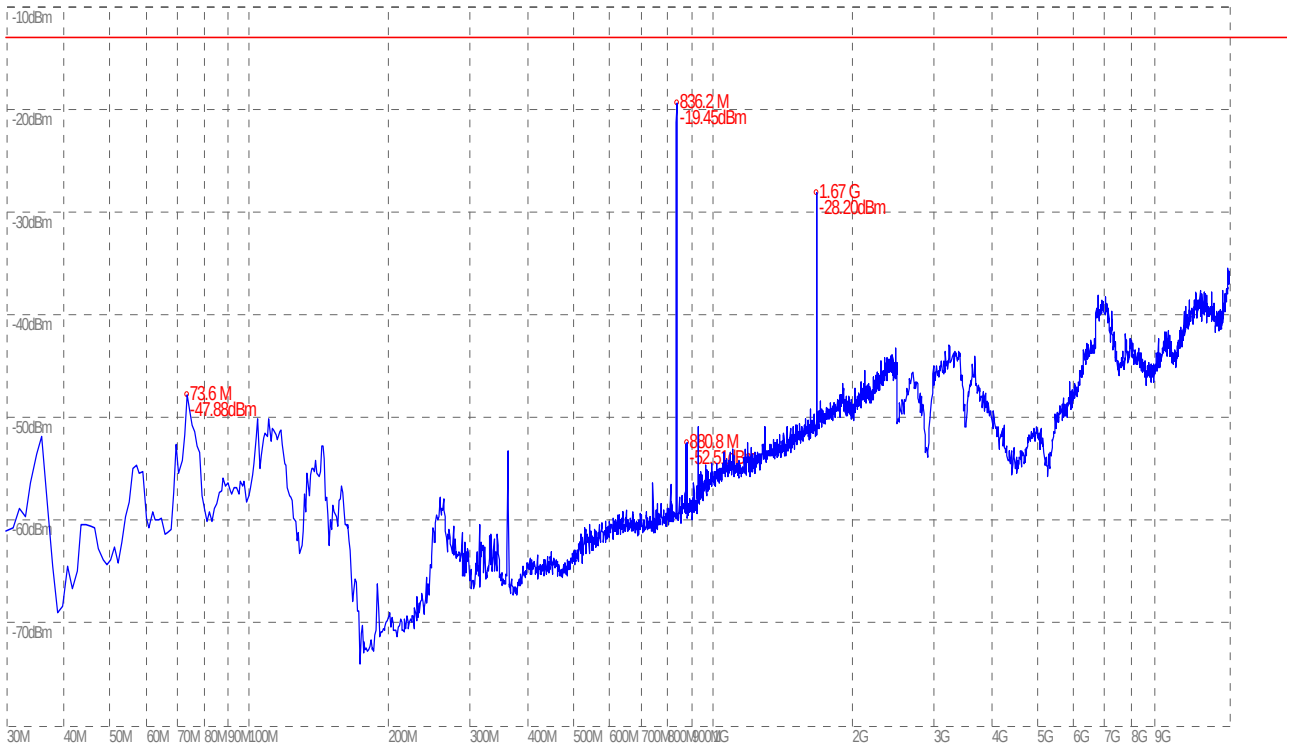
(Plot A.2: GSM 850MHz Channel = 128, Test Antenna Vertical)



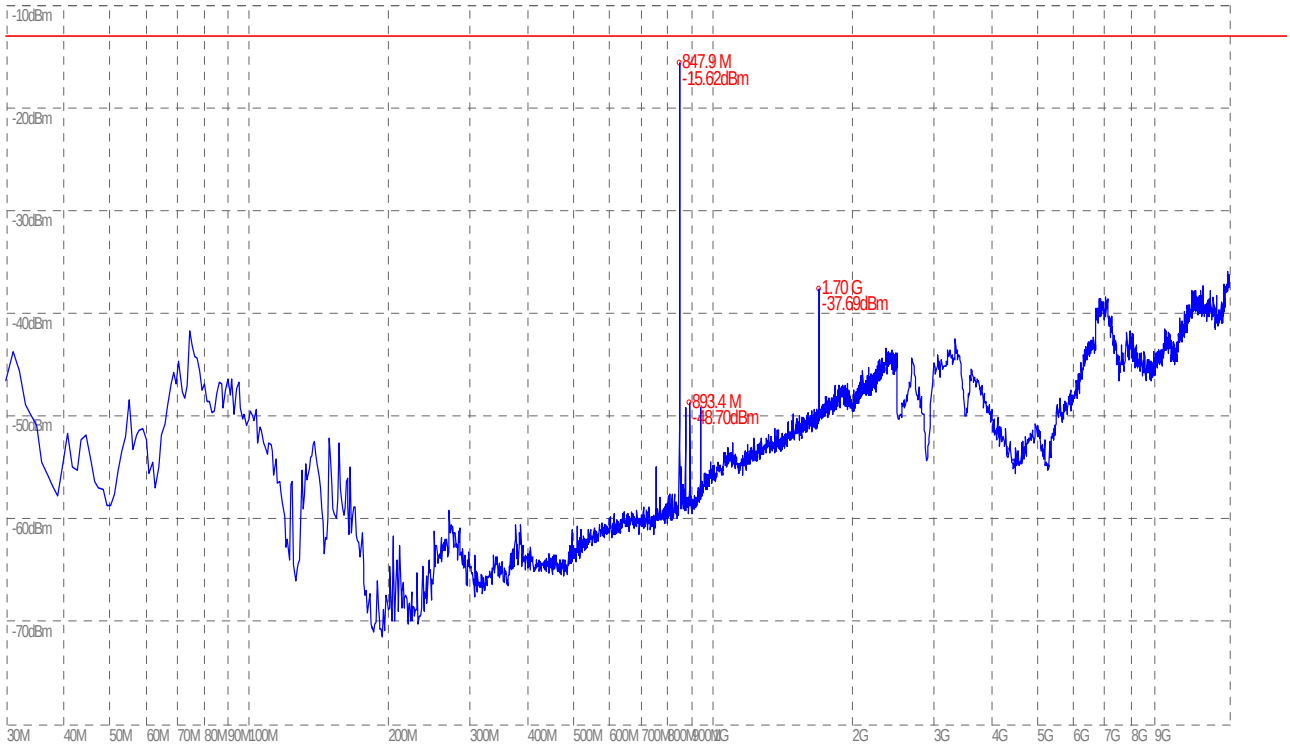
(Plot B.1: GSM 850MHz Channel = 190, Test Antenna Horizontal)



(Plot B.2: GSM 850MHz Channel = 190, Test Antenna Vertical)



(Plot C.1: GSM 850MHz Channel = 251, Test Antenna Horizontal)

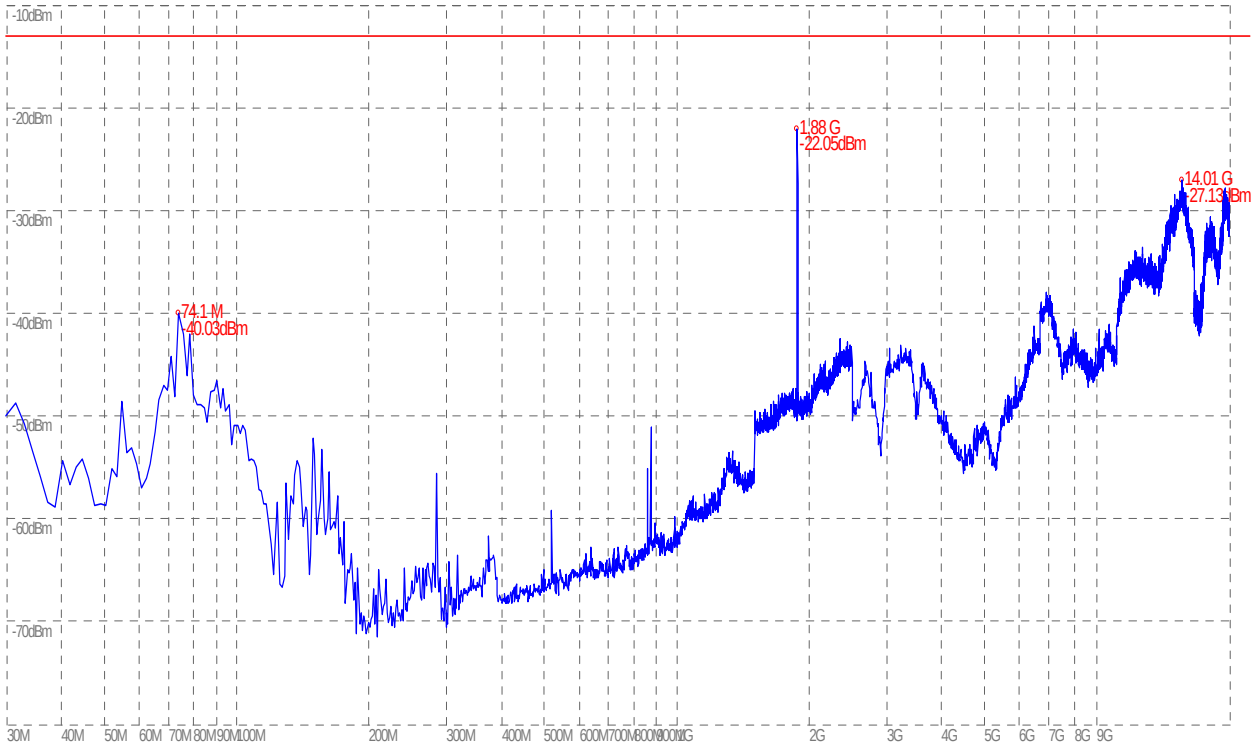


(Plot C.2: GSM 850MHz Channel = 251, Test Antenna Vertical)

(Plot D.1: GSM 1900MHz Channel = 512, Test Antenna Horizontal)

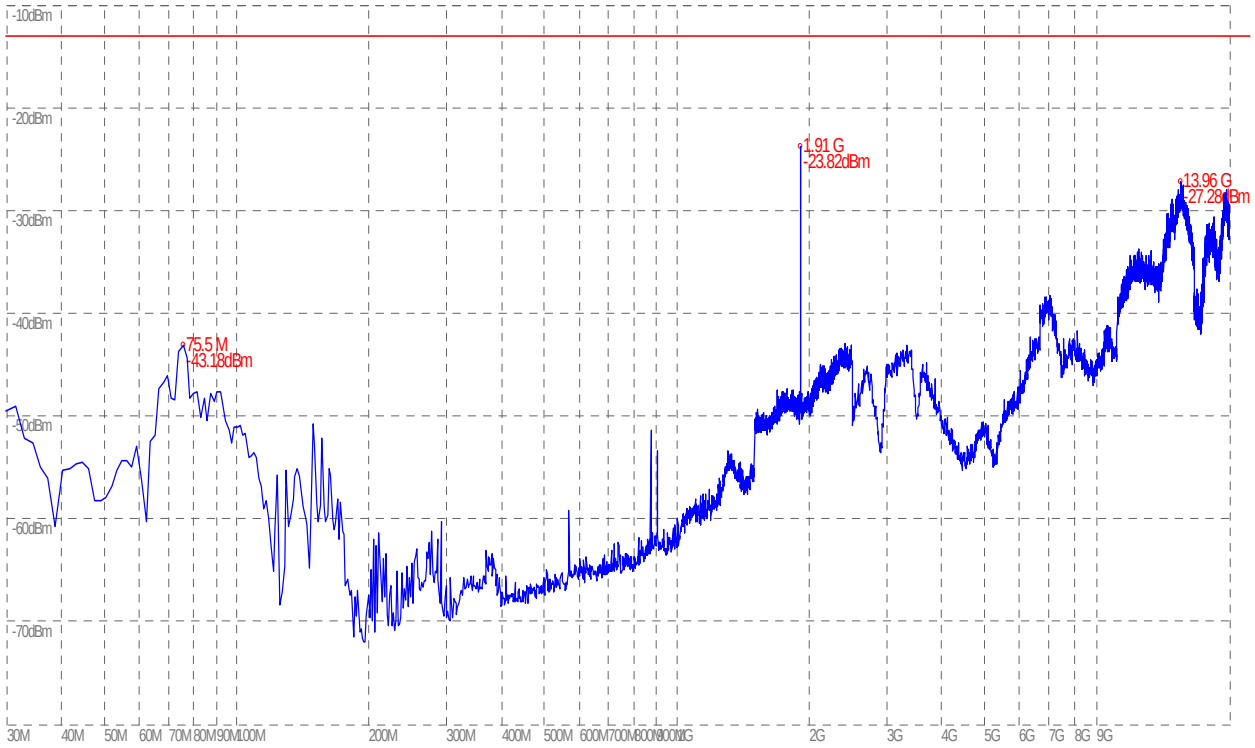
(Plot D.2: GSM 1900MHz Channel = 512, Test Antenna Vertical)

(Plot E.1: GSM 1900MHz Channel = 661, Test Antenna Horizontal)



(Plot E.2: GSM 1900MHz Channel = 661, Test Antenna Vertical)

(Plot F.1: GSM 1900MHz Channel = 810, Test Antenna Horizontal)



(Plot F.2: GSM 1900MHz Channel = 810, Test Antenna Vertical)

** END OF REPORT **