REPORT No.: SZ15080164W01

FCC RF TEST REPORT

APPLICANT	:	Solnik S.A.
PRODUCT NAME	:	TBW9613A8
MODEL NAME	:	HY2-3169BL
TRADE NAME	:	N.A
BRAND NAME	:	HYUNDAI
FCC ID	:	2AFRUKY23169NE
STANDARD(S)	:	47 CFR Part 22 Subpart H 47 CFR Part 24 Subpart E
ISSUE DATE	:	2015-10-12

SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.

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Change History		
Issue	Date	Reason for change
1.0	2015-10-12	First edition

TEST REPORT DECLARATION

Applicant	Solnik S.A.
Applicant Address	Dr Emilio Ravignani 1724 - C.A.B.A. - República Argentina
Manufacturer	Beijing Benywave Wireless Communication Co. Ltd.,
Manufacturer Address	No 55, Jiachuang second road, Zhongguancun science Park OPTO—Mechatronics Industrial Park, Tongzhou District, Beijing, China 101111
Product Name	TBW9613A8
Model Name	HY2-3169BL
Brand Name	HYUNDAI
HW Version	TBW9613_P2.2_001
SW Version	961315_9783_VXXXX
Test Standards	47 CFR Part 22 Subpart H 47 CFR Part 24 Subpart E
Test Date	2015-8-20 to 2015-09-20
Test Result	PASS

Tested by : Zou Jian
Zou Jian(Test Engineer)

Reviewed by : Qiu Xiaojun
Qiu Xiaojun(RF Manager)

Approved by : Zeng Dexin
Zeng Dexin(Chief Engineer)

1. GENERAL INFORMATION

1.1 EUT Description

EUT Type ..... : TBW9613A8
Serial No. ..... : (n.a, marked #1 by test site)
Hardware Version ..... : TBW9613_P2.2_001
Software Version..... : 961315_9783_VXXXX
Applicant ..... : Solnik S.A.
Dr Emilio Ravignani 1724 - C.A.B.A. - República Argentina
Manufacturer..... : Beijing Benywave Wireless Communication Co. Ltd.,
No 55, Jiachuang second road, Zhongguancun science Park OPTO－Mechatronics Industrial Park,
Tongzhou District, Beijing, China 101111
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)
WCDMA 850MHz
Tx: 826.4 - 846.6MHz (at intervals of 200kHz);
Rx: 871.4 - 891.6MHz (at intervals of 200kHz)
WCDMA 1900MHz
Tx: 1852.4 - 1907.6MHz (at intervals of 200kHz);
Rx: 1932.4 - 1987.6MHz (at intervals of 200kHz)
Modulation Type..... : GSM,GPRS Mode with GMSK Modulation
EDGE Mode with 8PSK Modulation
WCDMA Mode with QPSK Modulation
HSDPA Mode with QPSK Modulation
HSUPA Mode with QPSK Modulation
HSPA+ Mode with QPSK Modulation
Multislot Class..... : GPRS: Multislot Class12; EGPRS: Multislot Class12
Antenna Type..... : PIFA Antenna
Emission Designators ..... : GSM 850:249KGXW,GSM 1900:254KGXW
EGPRS850:252KG7W, EGPRS1900:253KG7W,
WCDMA 850:4M10F9W ,WCDMA1900:4M10F9W

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: The transmitter (Tx) frequency arrangement of the WCDMA 850MHz band used by the EUT can be represented with the formula F(n)=826.4+0.2*(n-4132), 4132<=n<=4233; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 4132 (826.4MHz), 4175(835MHz) and 4233 (846.6MHz).

Note 4: The transmitter (Tx) frequency arrangement of the WCDMA 1900MHz band used by the EUT can be represented with the formula F(n)=1852.4+0.2*(n-9262), 9262<=n<=9538; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 9262 (1852.4MHz), 9400 (1880MHz) and 9538 (1907.6MHz).

Note 5: 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 (10-1-12 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	Result
1	2.1046	Conducted RF Output Power	PASS
2.	24.232(d)	Peak to average radio	PASS
2	2.1049,22.917, 24.238,	99% 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 TIA/EIA 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 FL.1, Building A, FeiYang Science Park, No.8 LongChang Road,Block 67, BaoAn District, ShenZhen, GuangDong Province,P. R. China 518101. The test site is constructed in conformance with the requirements of ANSI C63.7-2009, ANSI C63.4-2009 and CISPR Publication 22:2010; the FCC registration number is 695796.

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

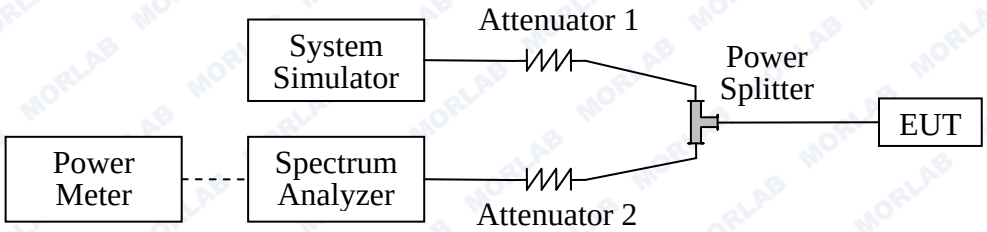
2.1 Conducted RF Output Power

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

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.

The Power Meter was just used for the Conducted RF Output Power test of WCDMA Model.

Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	Agilent	E5515C	GB43130131	2015.02.26	2016.02.25
Spectrum Analyzer	Agilent	E7405A	US44210471	2015.02.26	2016.02.25
Power Meter	Agilent	E4418B	GB43318055	2015.02.26	2016.02.25
Power Sensor	Agilent	8482A	MY41091706	2015.02.26	2016.02.25
Power Splitter	Weinschel	1506A	NW521	2015.02.26	2016.02.25
Attenuator 1	Resnet	20dB	(n.a.)	2015.02.26	2016.02.25
Attenuator 2	Resnet	3dB	(n.a.)	2015.02.26	2016.02.25

2.1.3 Test Results

Here the lowest, middle and highest channels are selected to perform testing to verify the conducted RF output power of the EUT.

GSM Model Test Verdict:

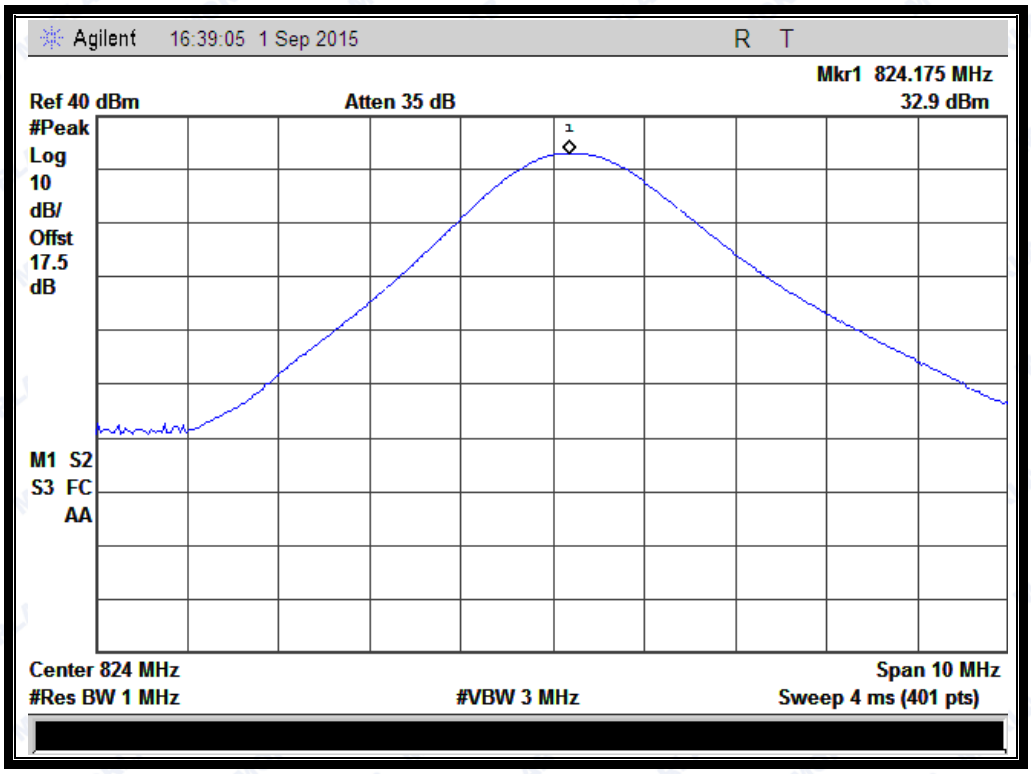
Band	Channel	Frequency (MHz)	Measured Output Power		Limit	Verdict
			dBm	Refer to Plot	dBm	
GSM 850MHz	128	824.2	32.90	Plot A1 to A3	35	PASS
	190	836.6	32.77			PASS
	251	848.8	32.70			PASS
GSM 1900MHz	512	1850.2	29.44	Plot B1 to B3	32	PASS
	661	1880.0	29.55			PASS
	810	1909.8	29.76			PASS
GPRS 850MHz	128	824.2	30.99	Plot C1 to C3[Note 1]	35	PASS
	190	836.6	30.86			PASS
	251	848.8	30.73			PASS
GPRS 1900MHz	512	1850.2	27.01	Plot D1 to D3[Note 1]	32	PASS
	661	1880.0	27.07			PASS
	810	1909.8	27.25			PASS
EGPRS 850MHz	128	824.2	29.02	Plot E1 to E3[Note 1]	35	PASS
	190	836.6	28.90			PASS
	251	848.8	28.81			PASS
EGPRS 1900MHz	512	1850.2	25.38	Plot F1 to F3[Note 1]	32	PASS
	661	1880.0	25.38			PASS
	810	1909.8	25.56			PASS

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

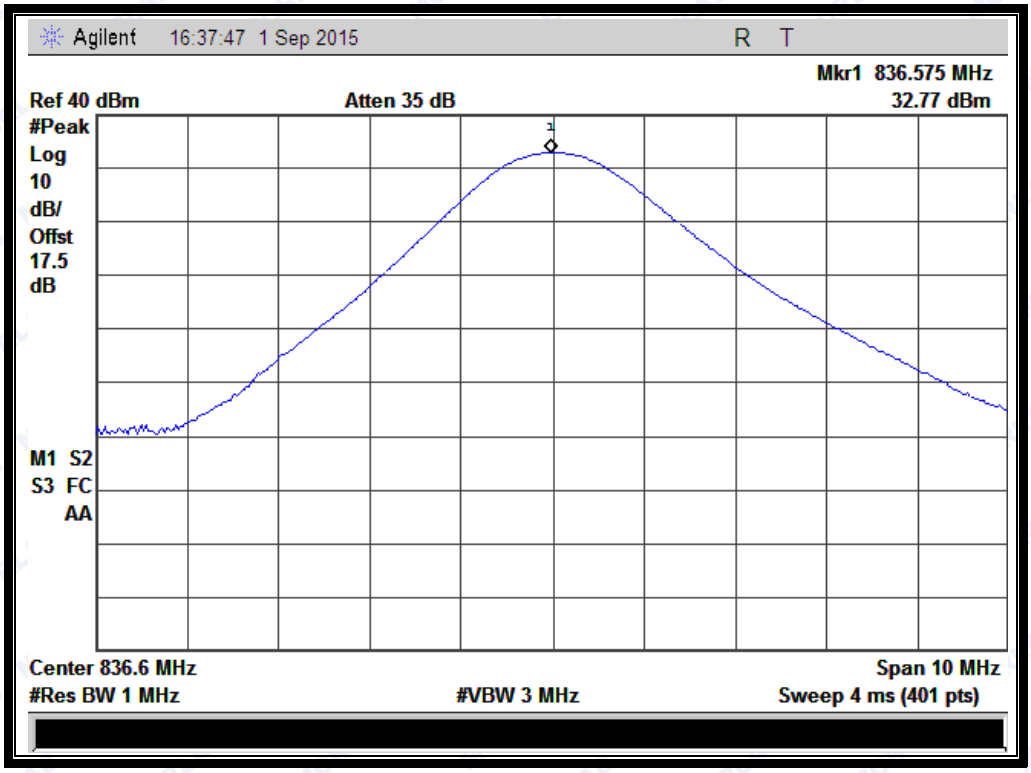
WCDMA Model Test Verdict:

Item	band	WCDMA 850			WCDMA 1900		
	ARFCN	4132	4175	4233	9262	9400	9538
	subtest	dBm			dBm		
5.2(WCDMA)	non	23.75	24.05	23.78	23.44	23.41	23.14
HSDPA	1	23.88	24.23	23.91	23.41	23.38	23.24
	2	23.86	24.25	23.90	23.42	23.36	23.22
	3	23.36	23.72	23.42	22.92	22.86	22.73
	4	23.34	23.73	23.41	22.91	22.87	22.71
HSUPA	1	23.61	23.82	23.81	23.26	23.12	23.10
	2	21.60	21.83	21.80	21.25	21.14	21.12
	3	22.59	22.80	22.79	22.27	22.15	22.09
	4	21.62	21.82	21.82	21.24	21.12	21.11
	5	23.59	23.80	23.79	23.25	23.13	23.09
HSPA+	1	23.82	24.05	23.79	23.26	23.18	22.98
Note: The Conducted RF Output Power test of WCDMA /HSDPA /HSUPA /HSPA+ was tested by power meter.							

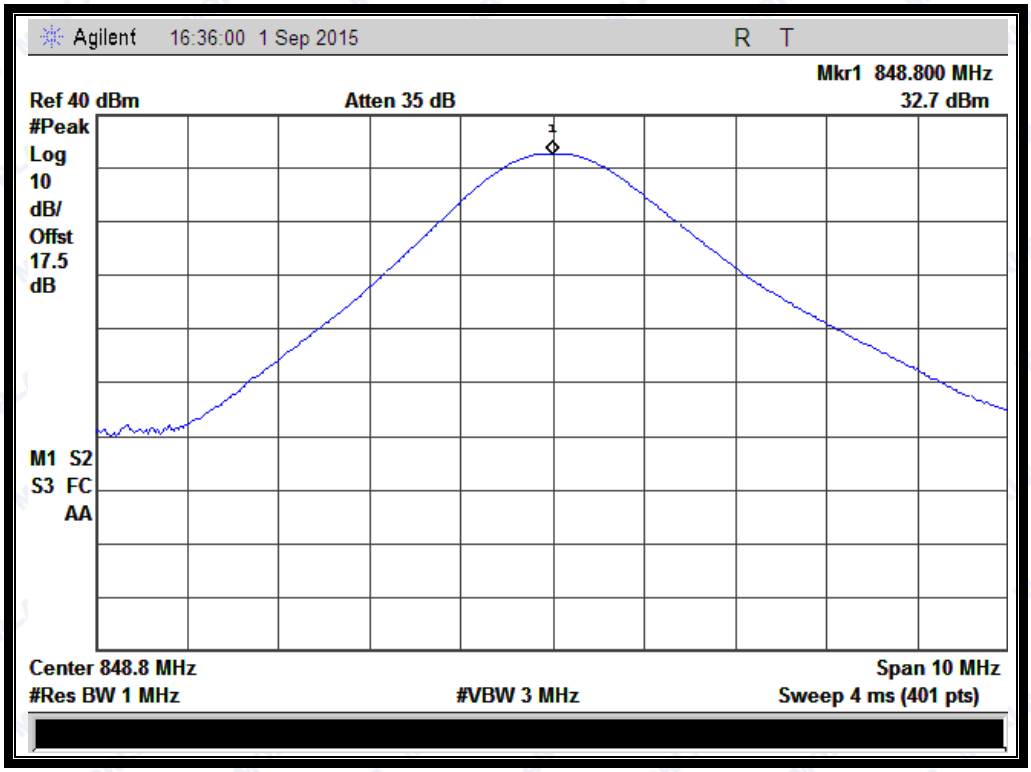
GSM Model Test Plots:



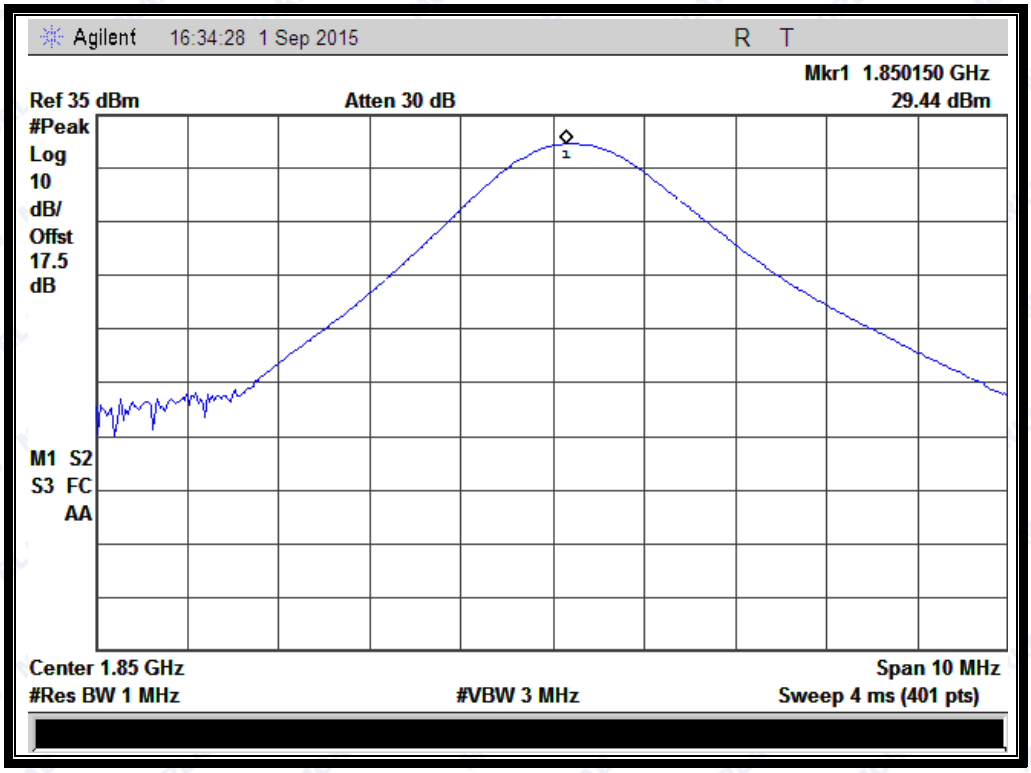
(Plot A1: GSM 850MHz Channel = 128)



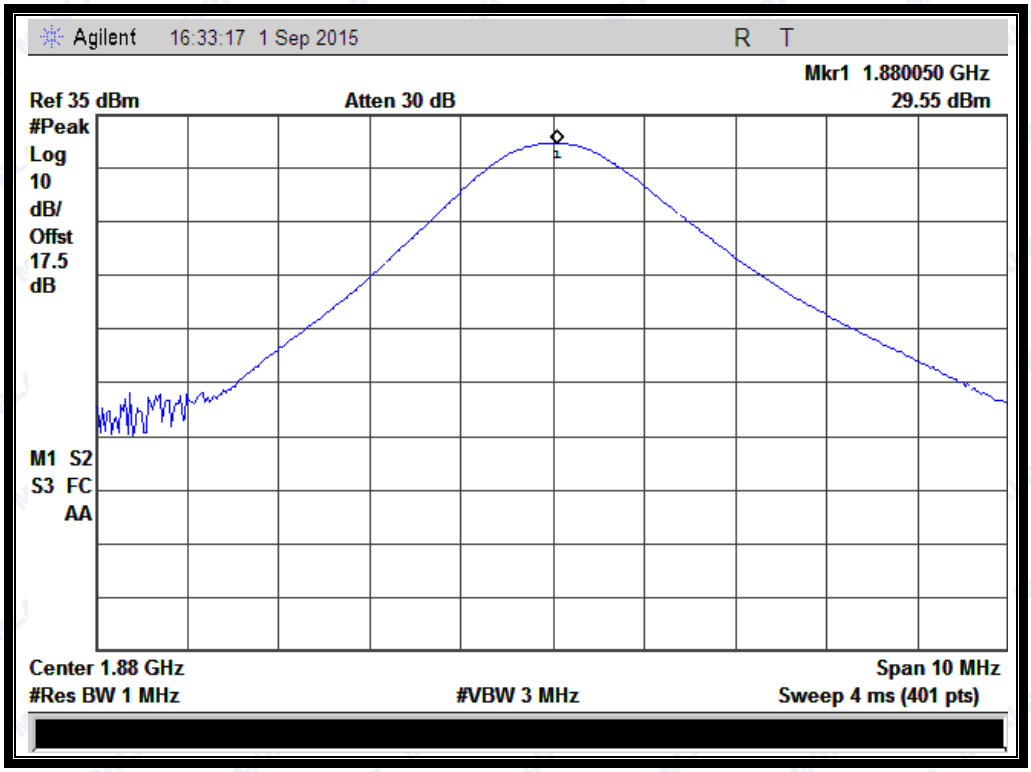
(Plot A2: GSM 850MHz Channel = 190)



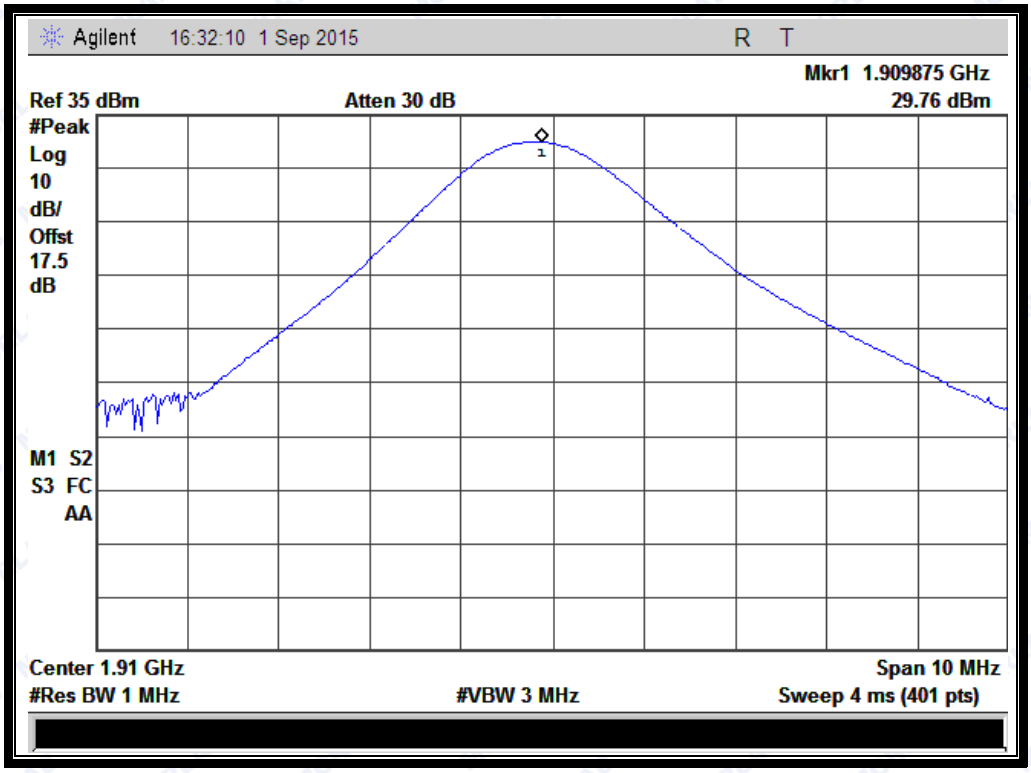
(Plot A3: GSM 850MHz Channel = 251)



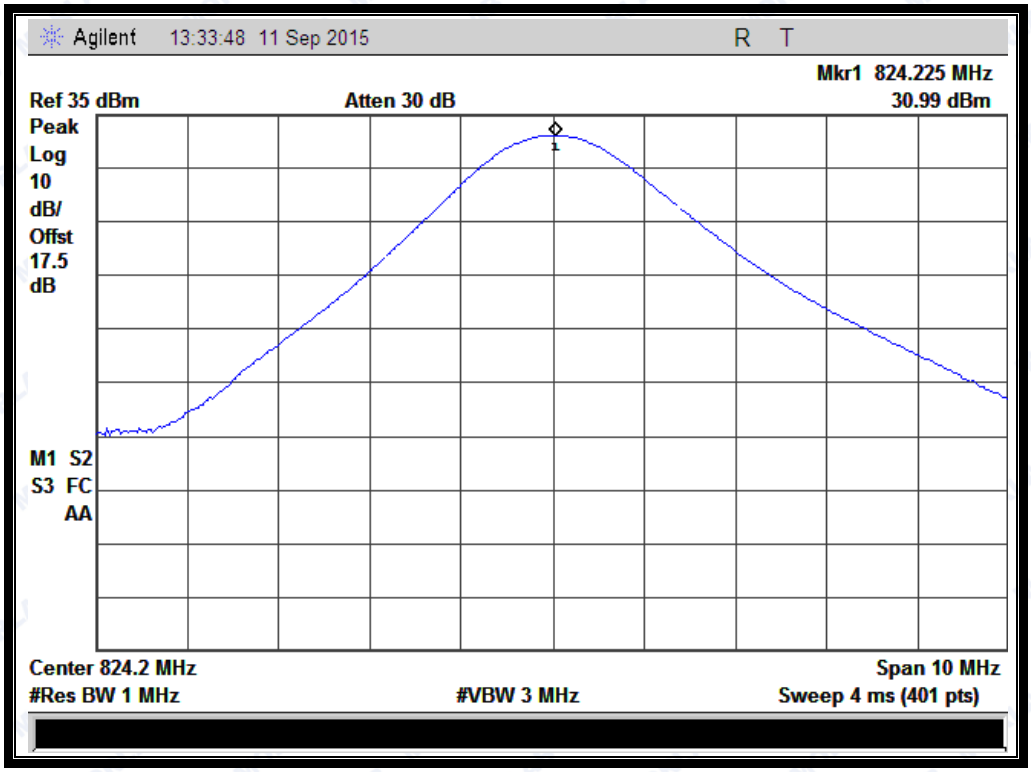
(Plot B1: GSM 1900MHz Channel = 512)



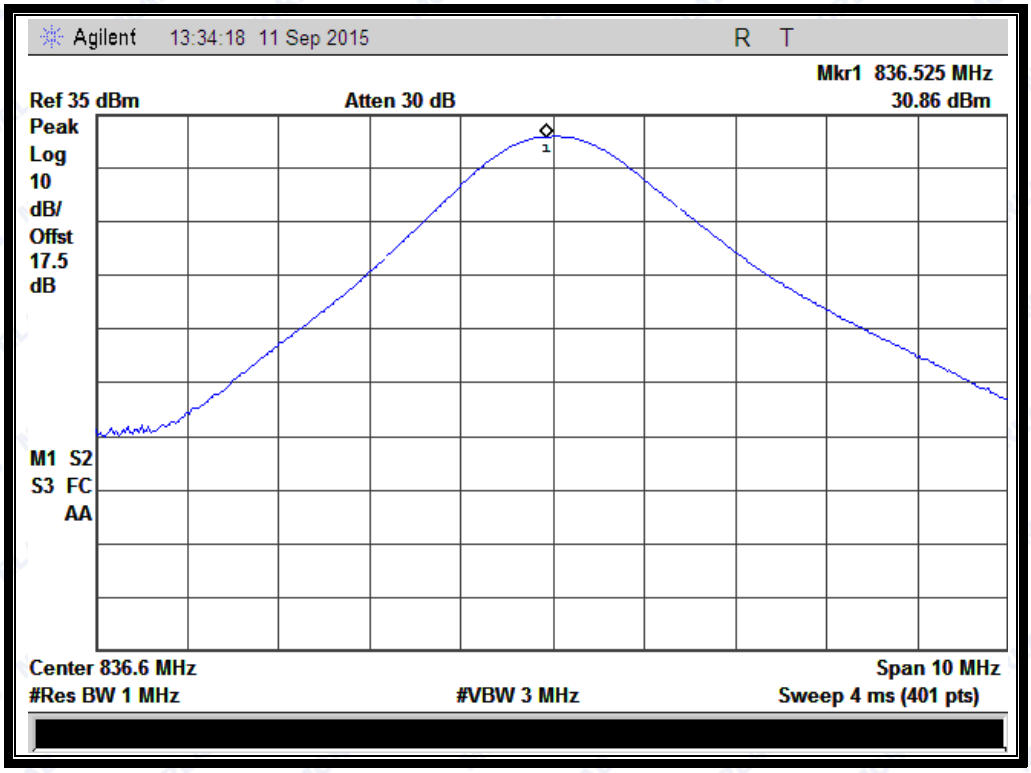
(Plot B2: GSM 1900MHz Channel = 661)



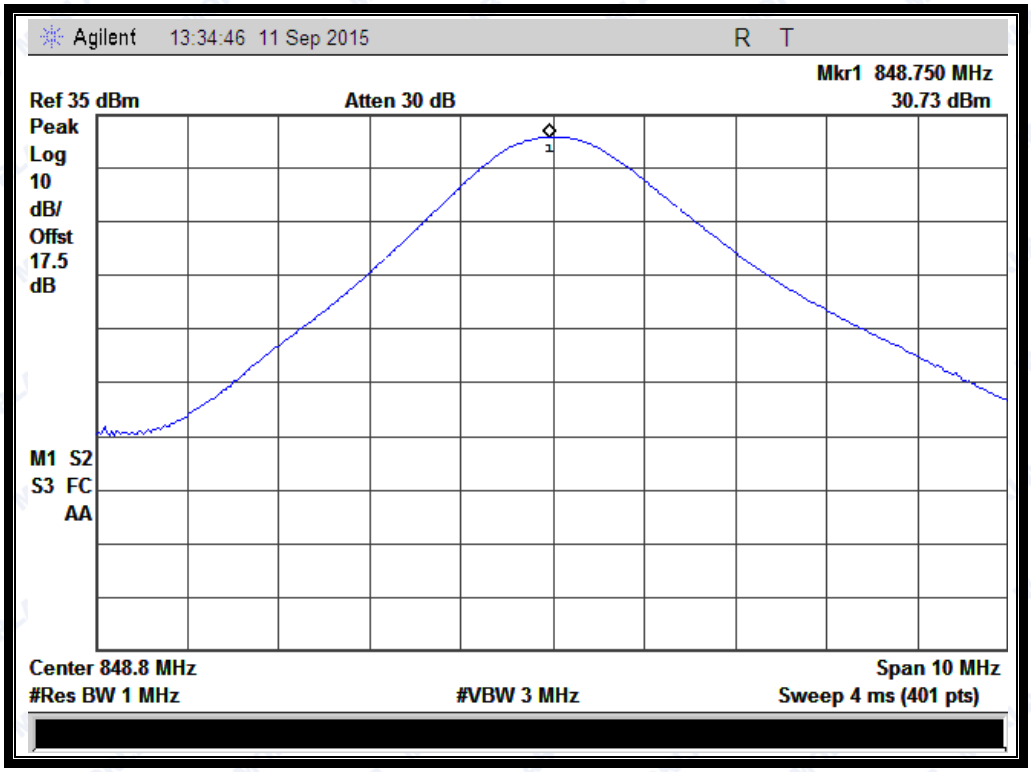
(Plot B3: GSM 1900Hz Channel = 810)



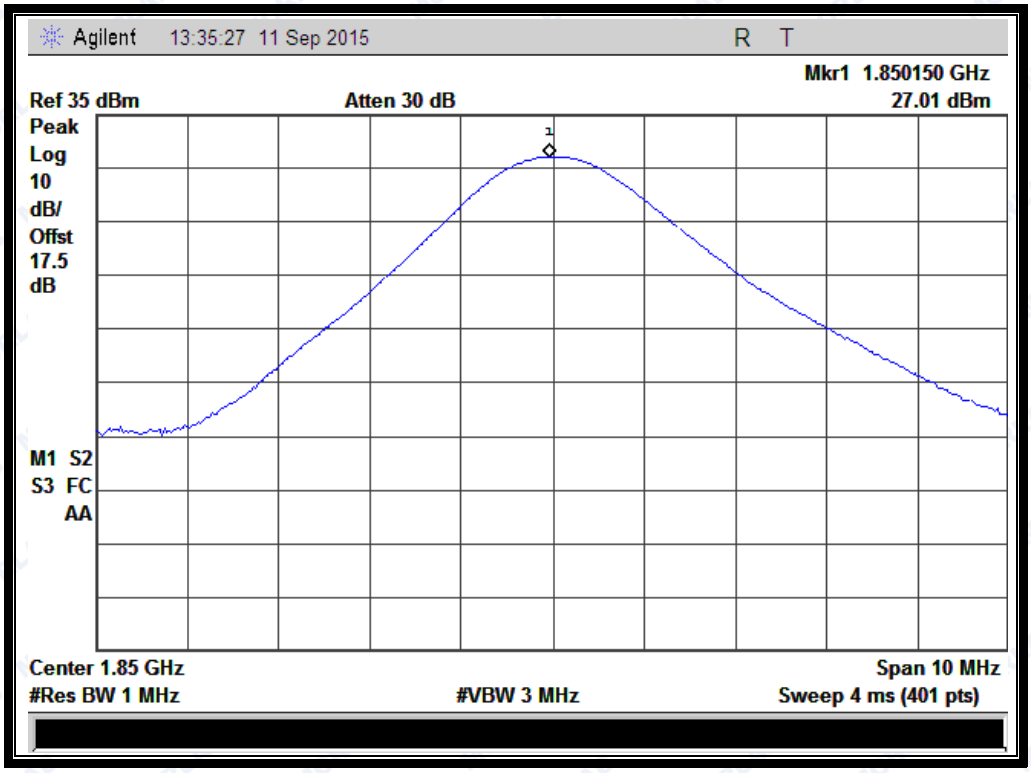
(Plot C1: GPRS 850MHz Channel = 128)



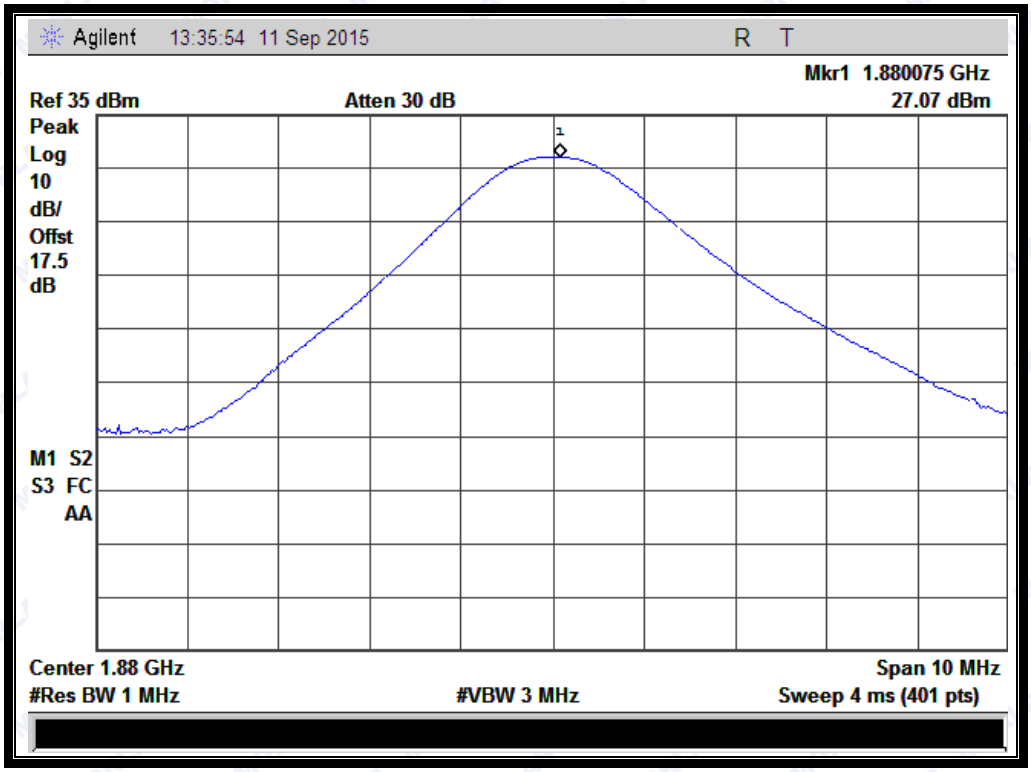
(Plot C2: GPRS 850MHz Channel = 190)



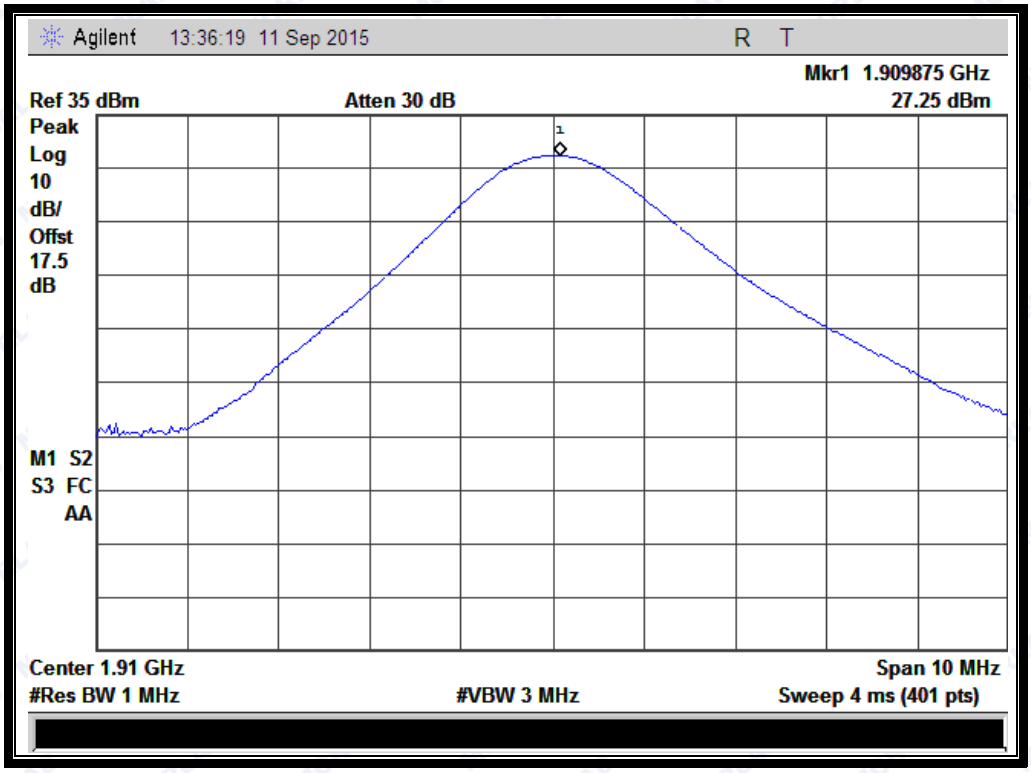
(Plot C3: GPRS 850MHz Channel = 251)



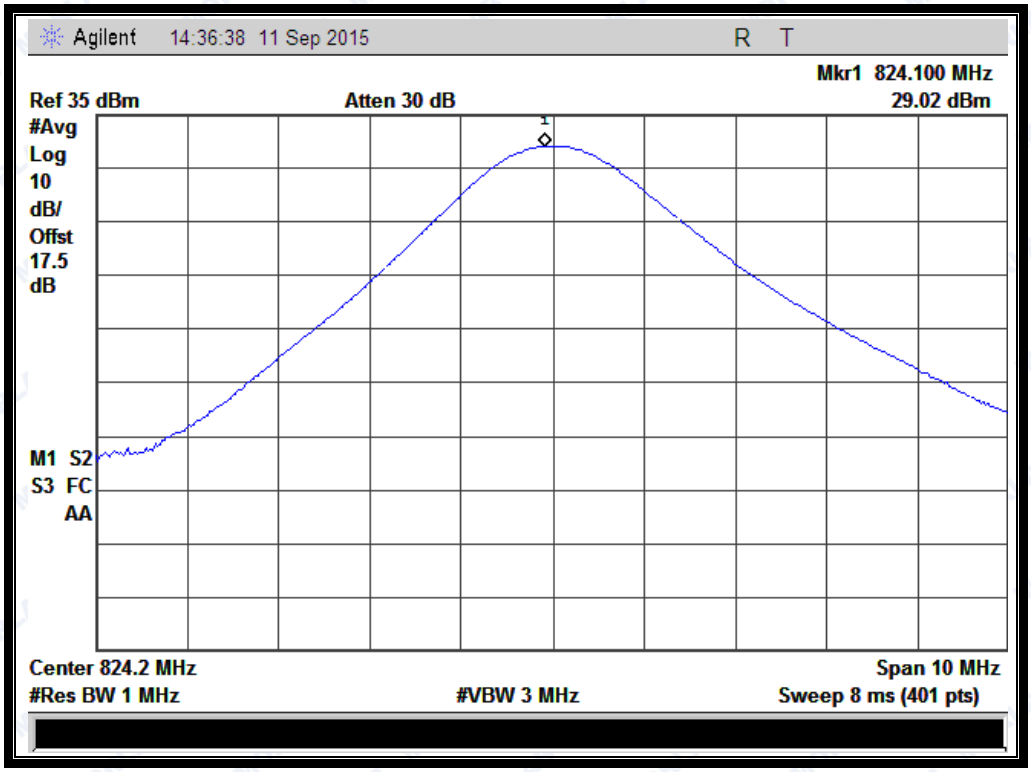
(Plot D1: GPRS 1900MHz Channel = 512)



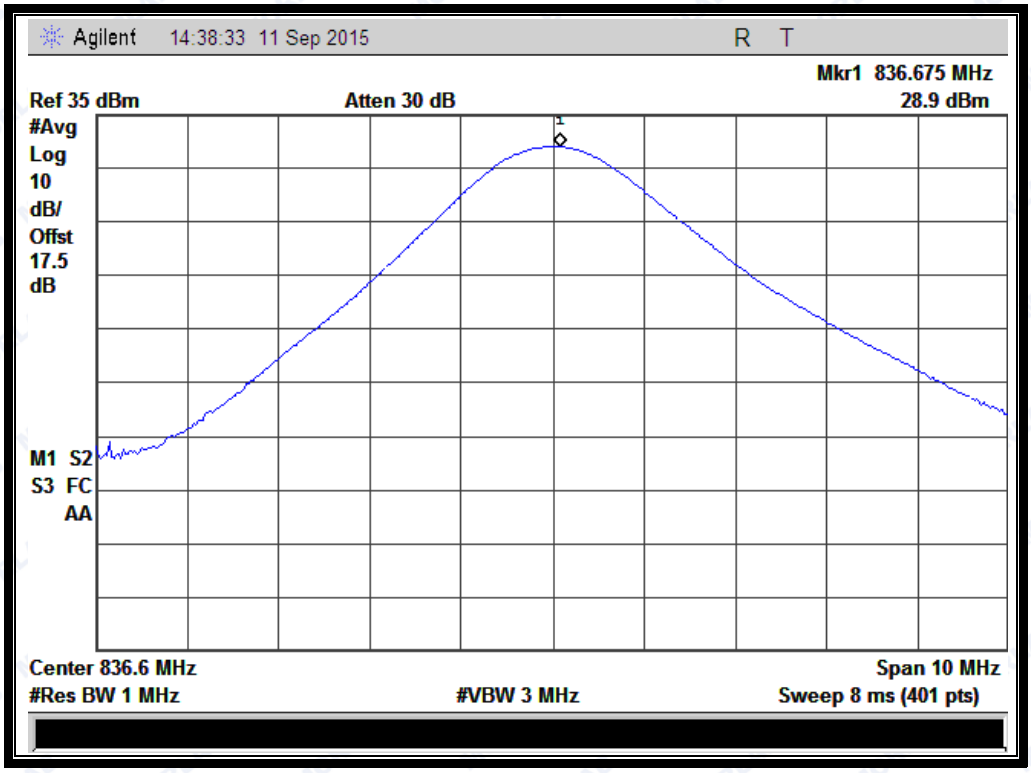
(Plot D2: GPRS 1900MHz Channel = 661)



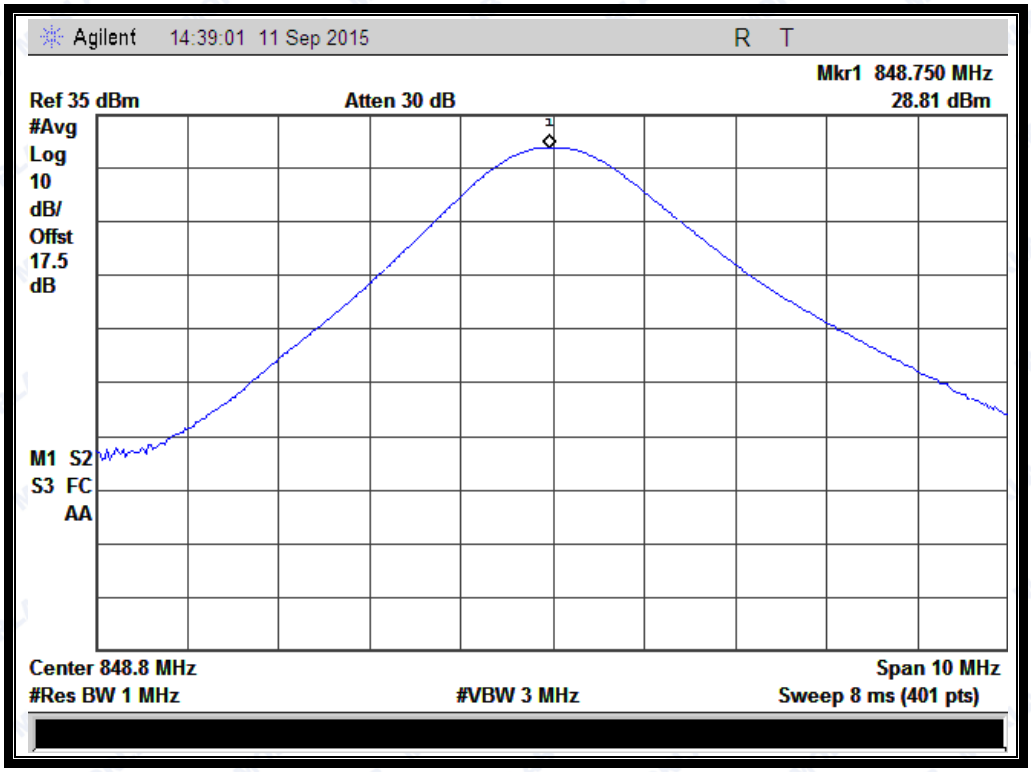
(Plot D3: GPRS 1900Hz Channel = 810)



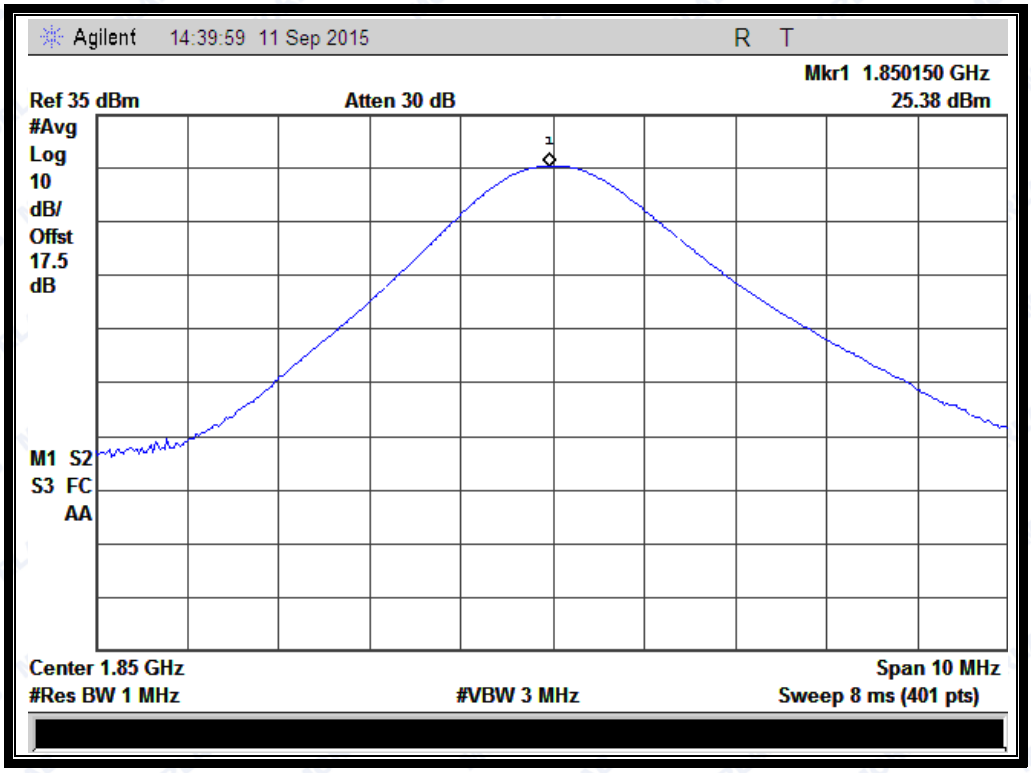
(Plot E1: EGPRS 850MHz Channel = 128)



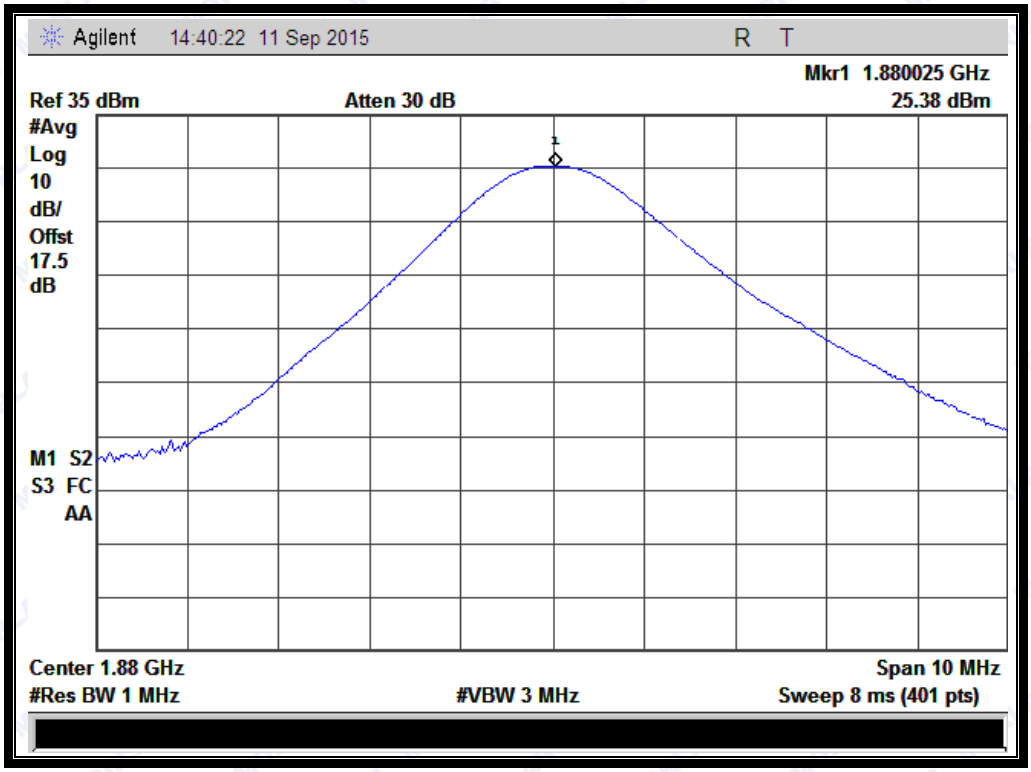
(Plot E2: EGPRS 850MHz Channel = 190)



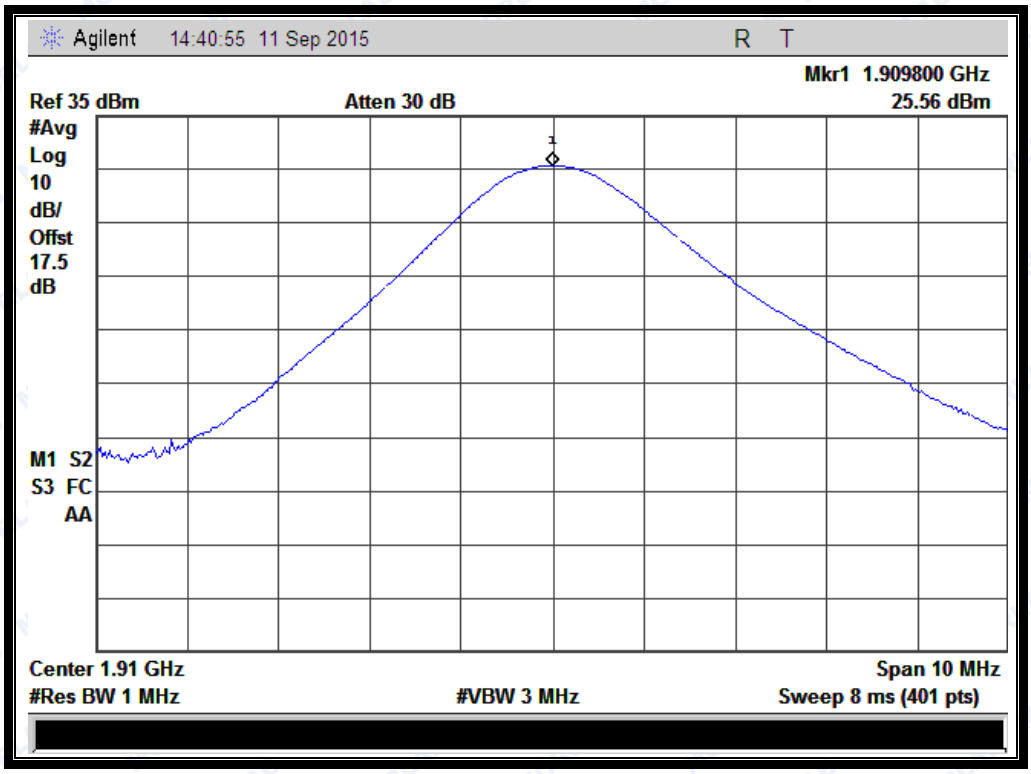
(Plot E3: EGPRS 850MHz Channel = 251)



(Plot F1: EGPRS 1900MHz Channel = 512)



(Plot F2: EGPRS 1900MHz Channel = 661)



(Plot F3: EGPRS 1900Hz Channel = 810)

2.2 Peak to Average Radio

2.2.1 Definition

According to FCC section 2.1049 and FCC 24.232(d) the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

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 selected to perform testing to verify the peak-to-average ratio.

Test procedures:

A .For GSM/EGPRS operating mode:

a. Set RBW=1MHz, VBW=3MHz, peak detector in spectrum analyzer.

b. Set EUT in maximum output power, and triggered the bust signal.

c. Measured respectively the peak level and mean level, and the deviation was recorded as Peak to Average radio.

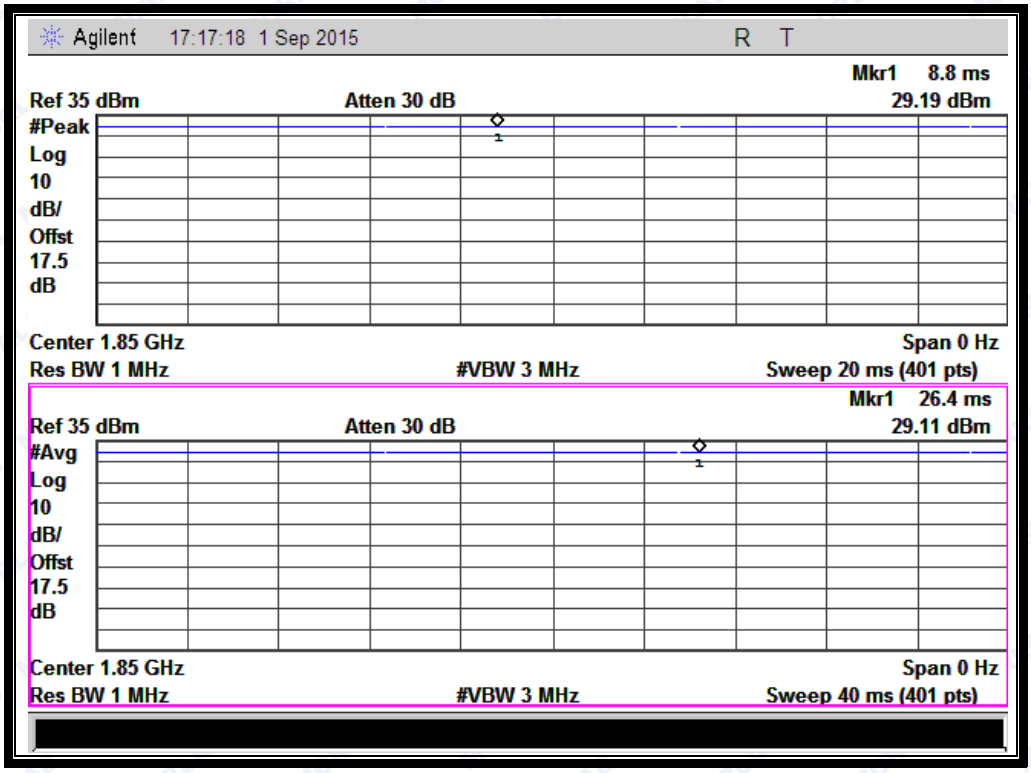
B. For UMTS operating mode:

a. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.

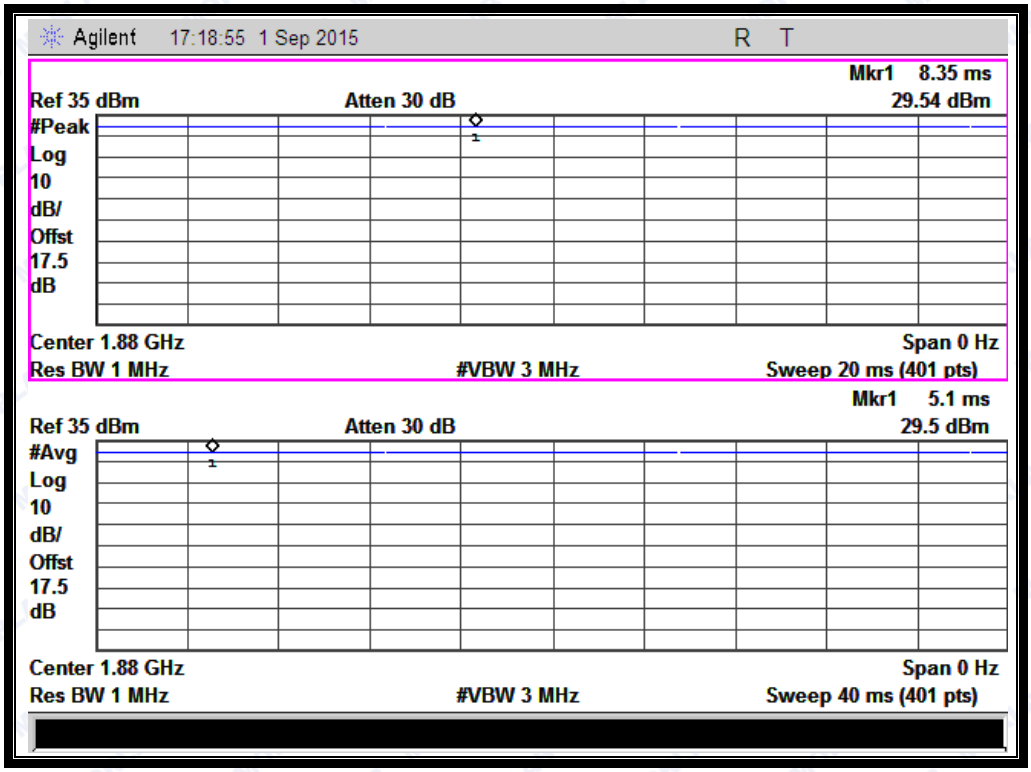
b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1%.

Test Verdict:

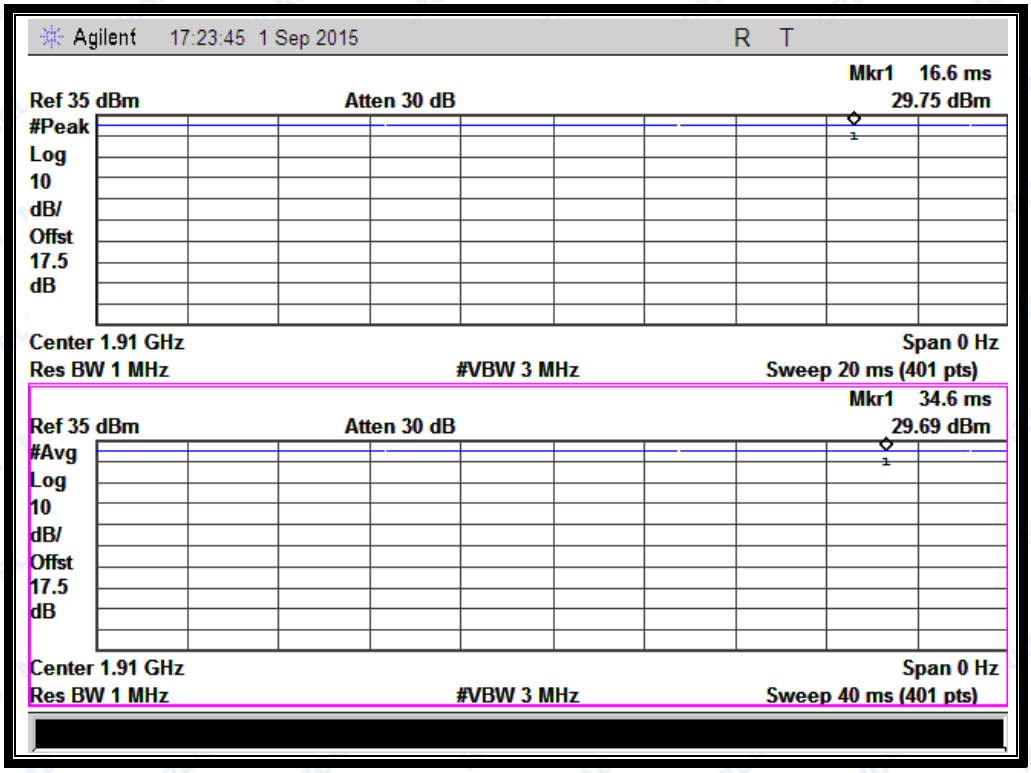
Band	Channel	Frequency (MHz)	Peak to Average radio		Limit	Verdict
			dB	Refer to Plot	dB	
GSM 1900MHz	512	1850.2	0.08	Plot A1 to A3	13	PASS
	661	1880.0	0.04			PASS
	810	1909.8	0.06			PASS
EGPRS 1900MHz	512	1850.2	0.04	Plot B1 to B3	13	PASS
	661	1880.0	0.04			PASS
	810	1909.8	0.05			PASS
WCDMA 1900MHz	9262	1852.4	3.17	Plot C1 to C3	13	PASS
	9400	1880.0	3.23			PASS
	9538	1907.6	2.91			PASS



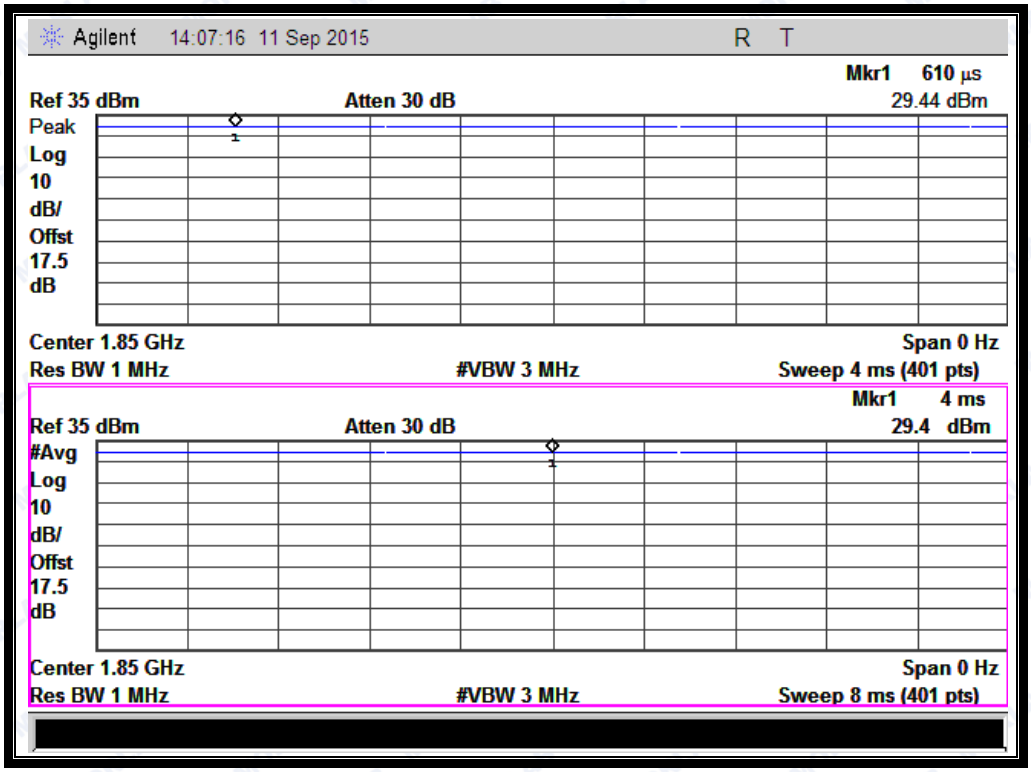
(Plot A1: GSM 1900 MHz Channel = 512)



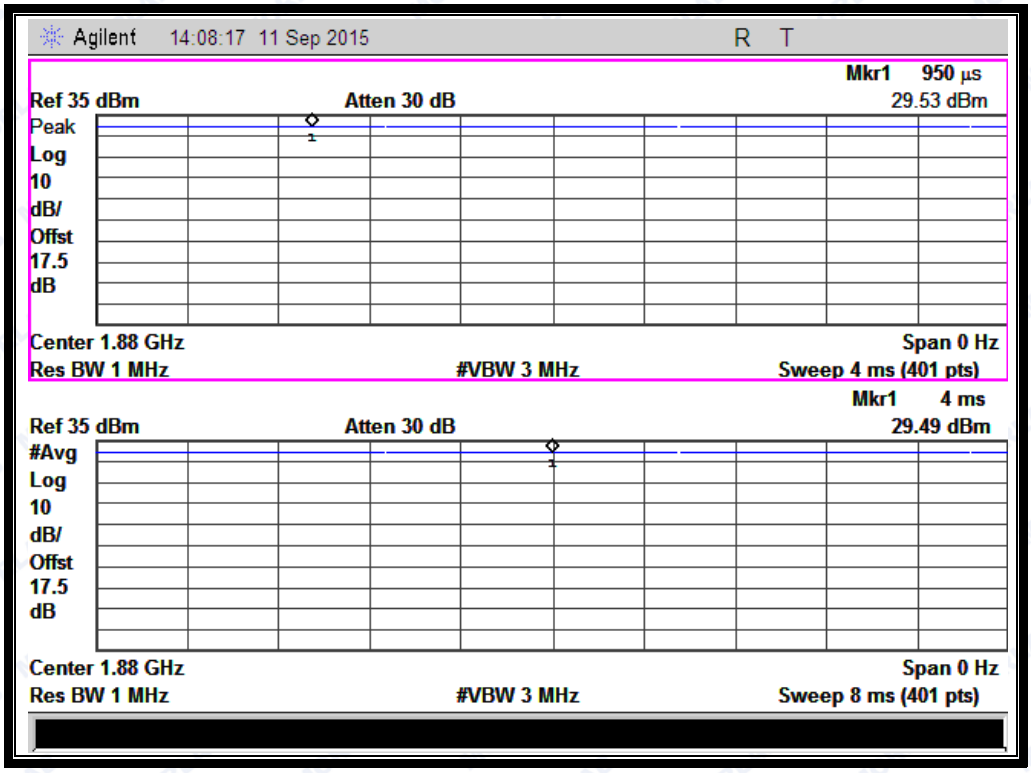
(Plot A2: GSM 1900 MHz Channel = 661)



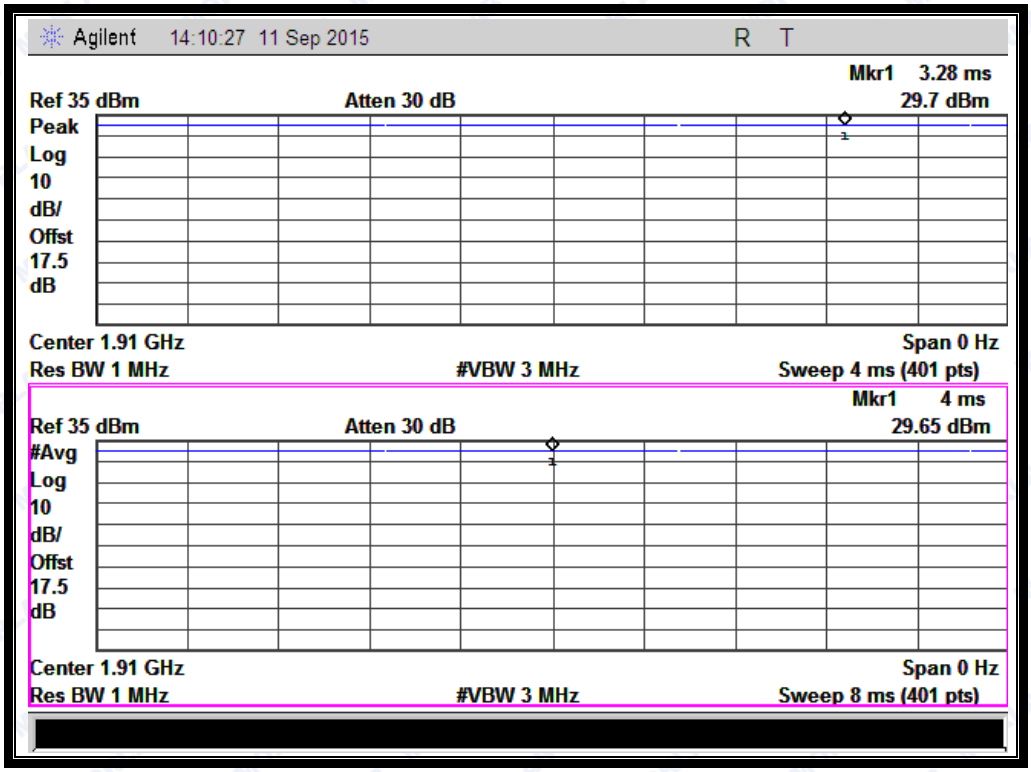
(Plot A3: GSM 1900MHz Channel = 810)



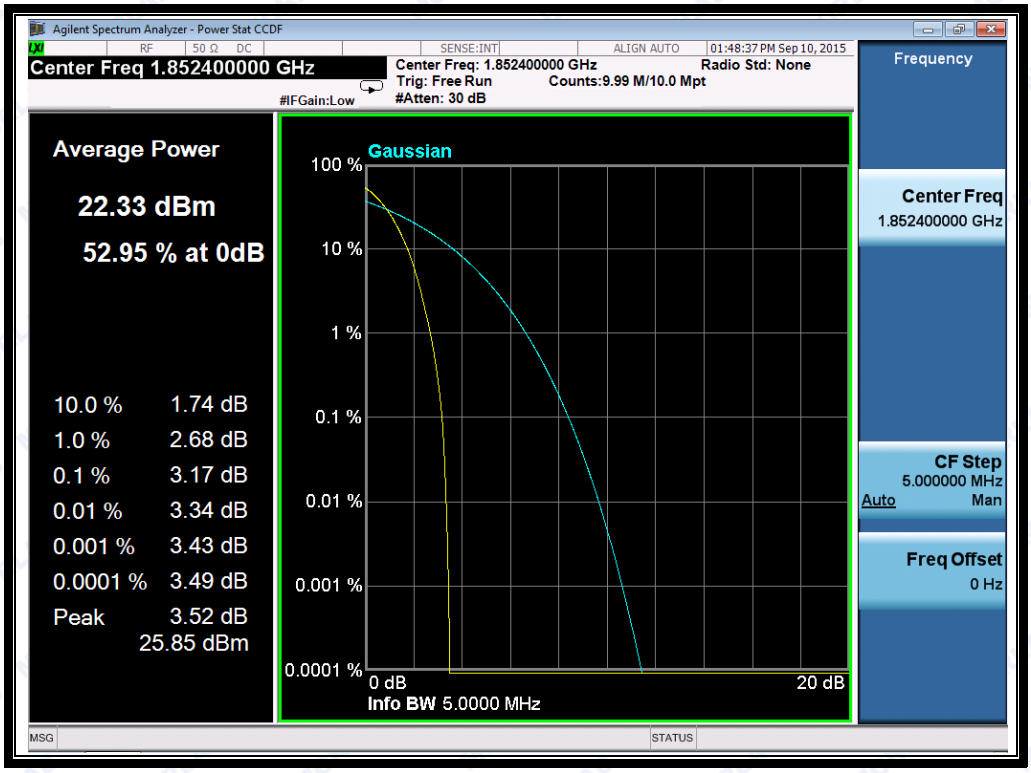
(Plot B1: EGPRS 1900 MHz Channel = 512)



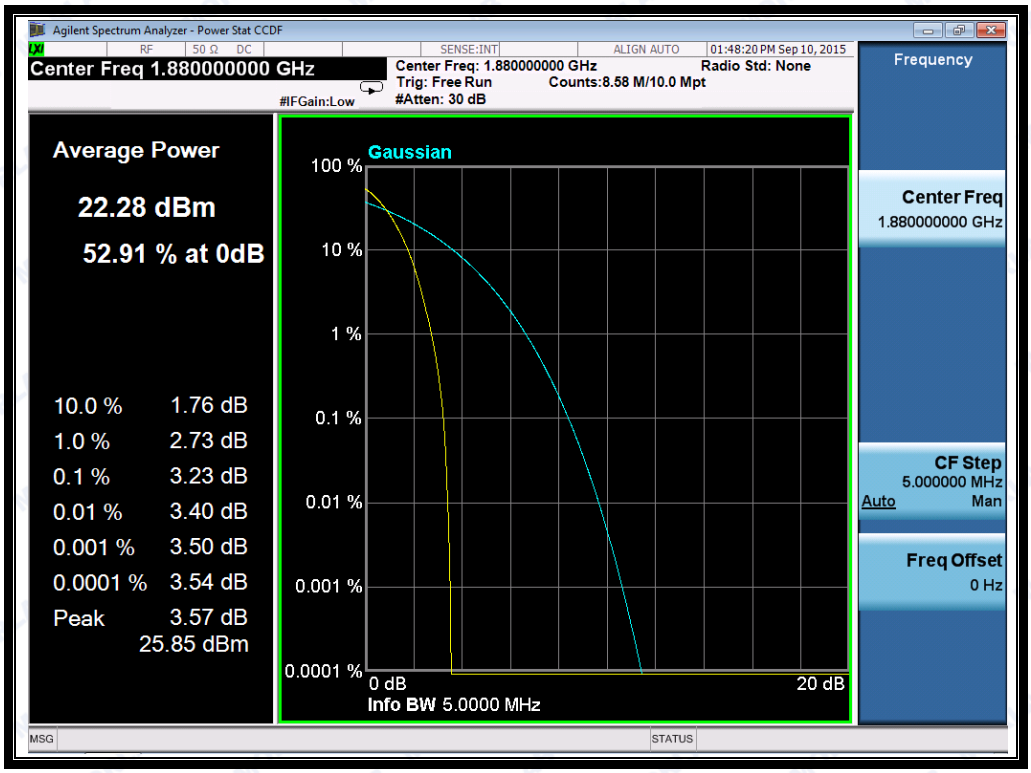
(Plot B2: EGPRS 1900 MHz Channel = 661)



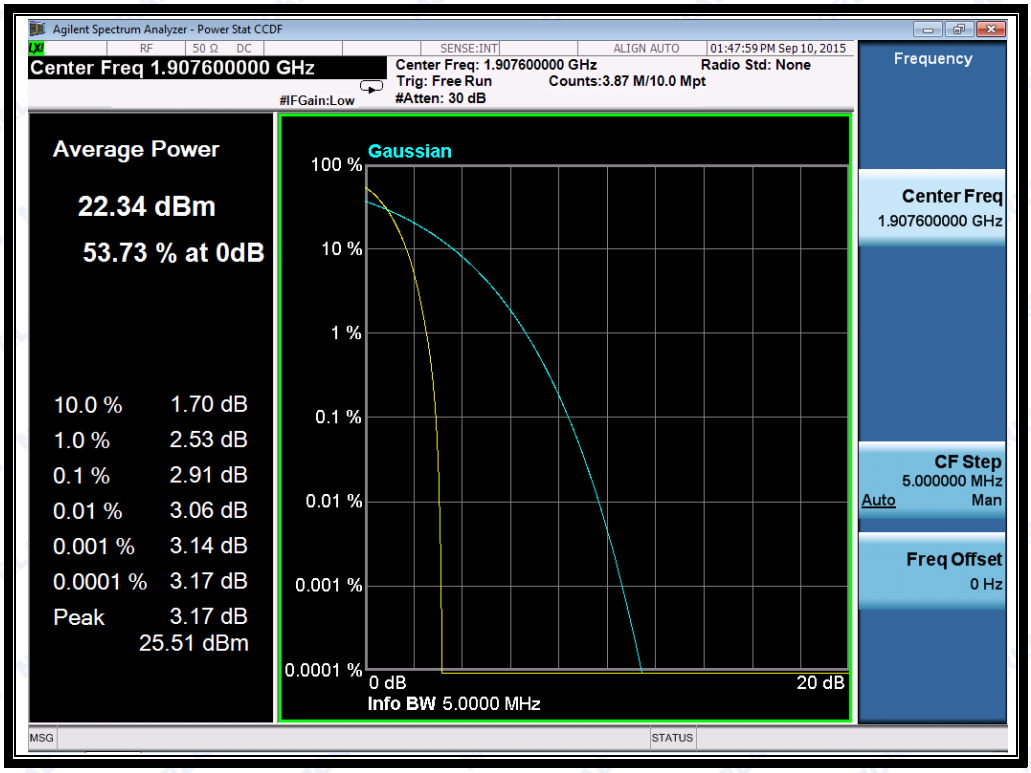
(Plot B3: EGPRS 1900MHz Channel = 810)



(Plot C1: WCDMA 1900MHz Channel = 9262)



(Plot C2: WCDMA 1900MHz Channel = 9400)



(Plot C3: WCDMA 1900MHz Channel = 9538)

2.3 99% Occupied Bandwidth

2.3.1 Definition

According to FCC section 2.1049 and FCC § 22.917 &24.238, 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

See section 2.1.2 of this report.

2.3.3 Test Verdict

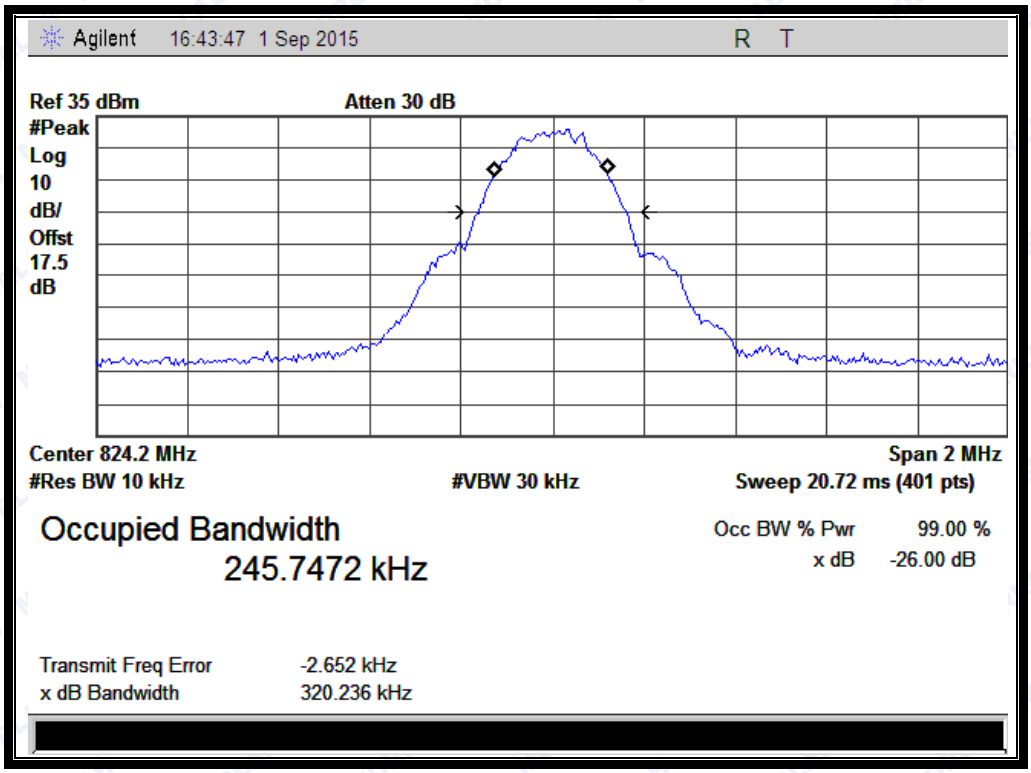
Here the lowest, middle and highest channels are selected to perform testing to verify the 99% occupied bandwidth.

Test Verdict:

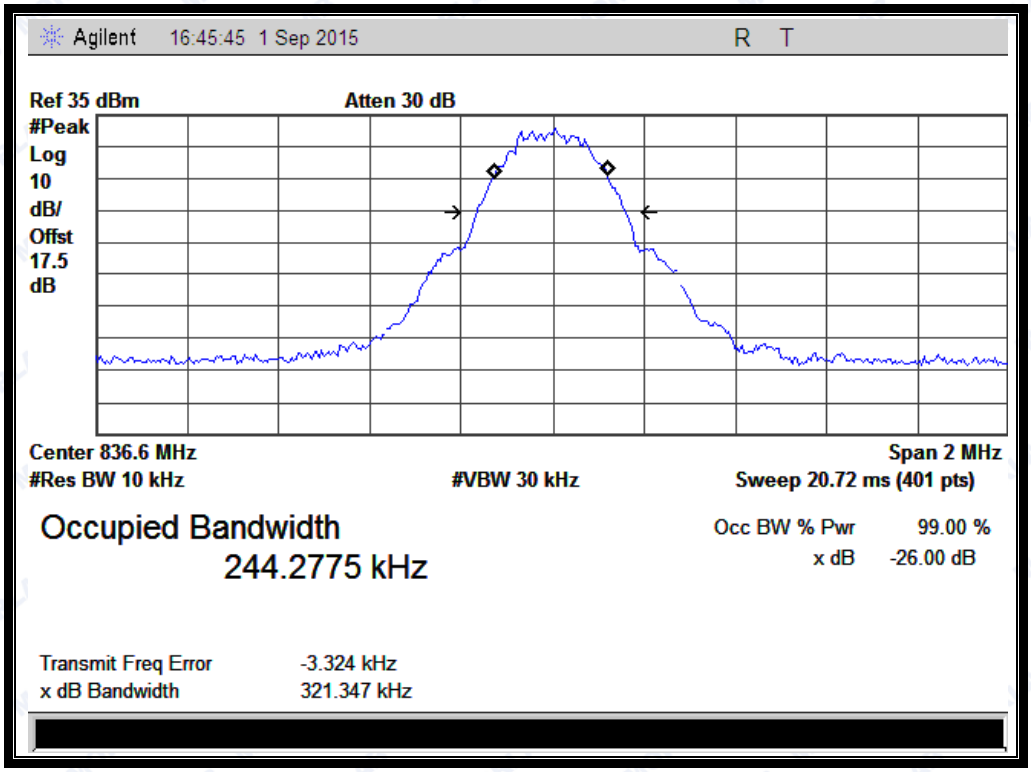
Band	Channel	Frequency (MHz)	26dB bandwidth	99% Occupied Bandwidth	Refer to Plot
GSM 850MHz	128	824.2	320.236 KHz	245.7472 KHz	Plot A1 to A3
	190	836.6	321.347 KHz	244.2775 KHz	
	251	848.8	319.796 KHz	245.4758 KHz	
GSM 1900MHz	512	1850.2	319.651 KHz	242.2213 KHz	Plot B1 to B3
	661	1880.0	312.788 KHz	242.1172 KHz	
	810	1909.8	324.344 KHz	243.1270 KHz	
GPRS 850MHz	128	824.2	321.082 KHz	248.1139 KHz	Plot C1 to C3
	190	836.6	321.730 KHz	245.2563 KHz	
	251	848.8	322.122 KHz	249.1350 KHz	
GPRS 1900MHz	512	1850.2	325.951 KHz	250.8134 KHz	Plot D1 to D3
	661	1880.0	321.571 KHz	245.5142 KHz	
	810	1909.8	324.958 KHz	253.7443 KHz	
EGPRS 850MHz	128	824.2	327.834 KHz	247.2102 KHz	Plot E1 to E3
	190	836.6	323.354 KHz	251.7435 KHz	
	251	848.8	326.880 KHz	248.9212 KHz	
EGPRS 1900MHz	512	1850.2	318.844 KHz	243.6023 KHz	Plot F1 to F3
	661	1880.0	320.534 KHz	252.7597 KHz	
	810	1909.8	325.303 KHz	248.3654 KHz	
WCDMA 850MHz	4132	826.4	4.638 MHz	4.0904 MHz	Plot G1 to G3
	4175	835.0	4.626 MHz	4.0918 MHz	
	4233	846.6	4.612 MHz	4.0881 MHz	

Band	Channel	Frequency (MHz)	26dB bandwidth	99% Occupied Bandwidth	Refer to Plot
WCDMA 1900MHz	9262	1852.4	4.618 MHz	4.0890 MHz	Plot H1 to H3
	9400	1880.0	4.611 MHz	4.0849 MHz	
	9538	1907.6	4.625 MHz	4.1030 MHz	
HSDPA 850MHz	4132	826.4	4.623 MHz	4.0860 MHz	Plot I1 to I3
	4175	835.0	4.630 MHz	4.1013 MHz	
	4233	846.6	4.631 MHz	4.0869 MHz	
HSDPA 1900MHz	9262	1852.4	4.620 MHz	4.0879 MHz	Plot J1 to J3
	9400	1880.0	4.604 MHz	4.0920 MHz	
	9538	1907.6	4.613 MHz	4.1075 MHz	
HSUPA 850MHz	4132	826.4	4.631 MHz	4.0863 MHz	Plot K1 to K3
	4175	835.0	4.622 MHz	4.1010 MHz	
	4233	846.6	4.632 MHz	4.0847 MHz	
HSUPA 1900MHz	9262	1852.4	4.615 MHz	4.0864 MHz	Plot L1 to L3
	9400	1880.0	4.613 MHz	4.0921 MHz	
	9538	1907.6	4.621 MHz	4.0877 MHz	
HSPA+ 850MHz	4132	826.4	4.632 MHz	4.0932 MHz	Plot M1 to M3
	4175	835.0	4.640 MHz	4.0989 MHz	
	4233	846.6	4.627 MHz	4.0869 MHz	
HSPA+ 1900MHz	9262	1852.4	4.617 MHz	4.0886 MHz	Plot N1 to N3
	9400	1880.0	4.613 MHz	4.0889 MHz	
	9538	1907.6	4.663 MHz	4.0941 MHz	

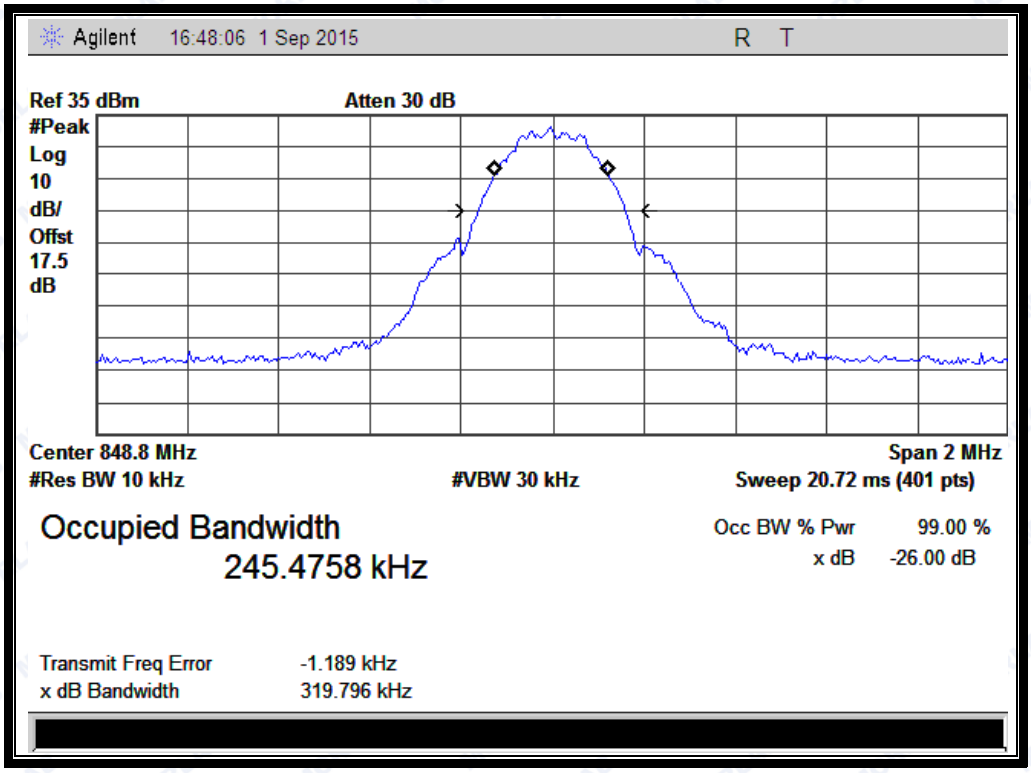
Test Plots:



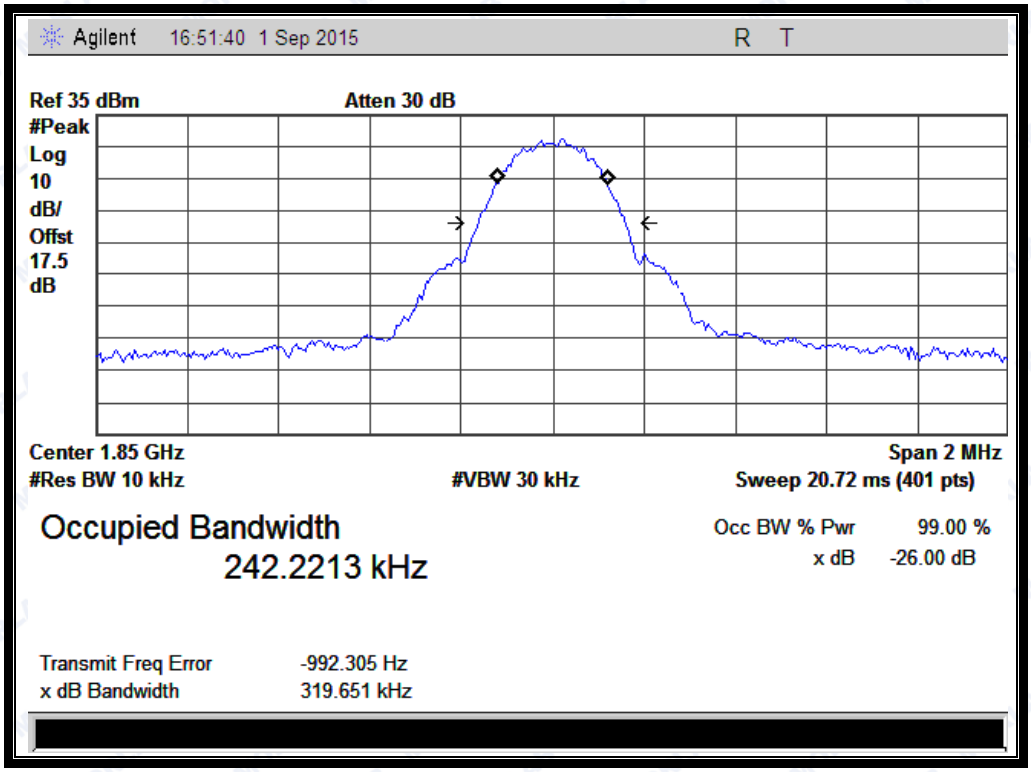
(Plot A1: GSM 850MHz Channel = 128)



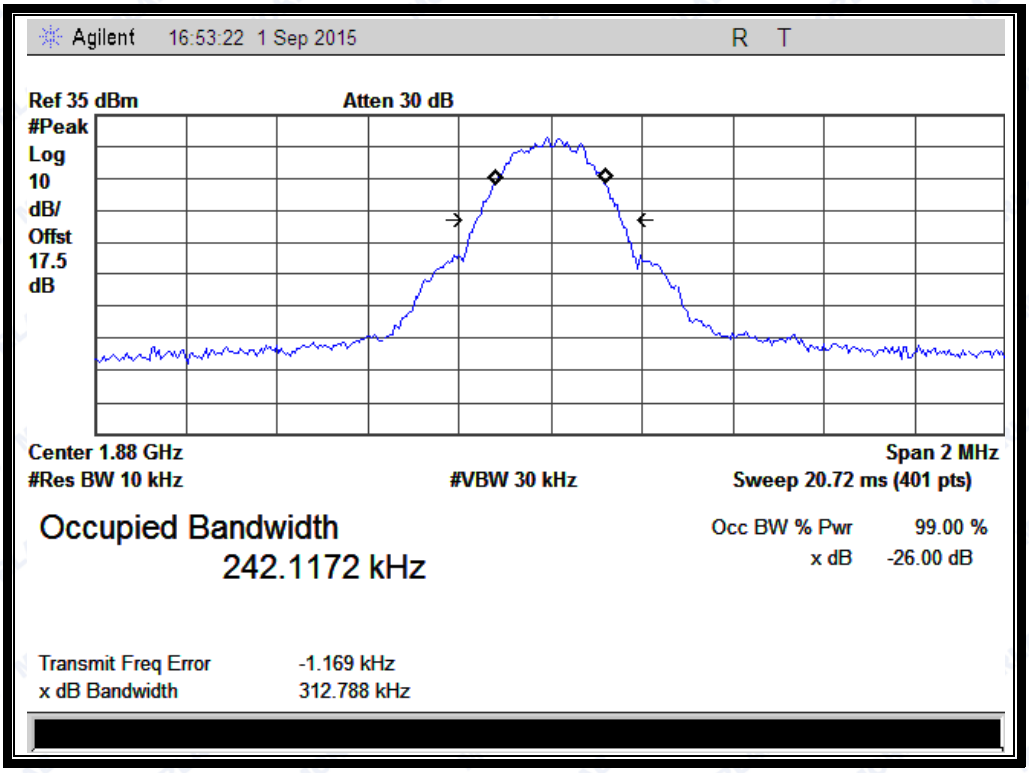
(Plot A2: GSM 850MHz Channel = 190)



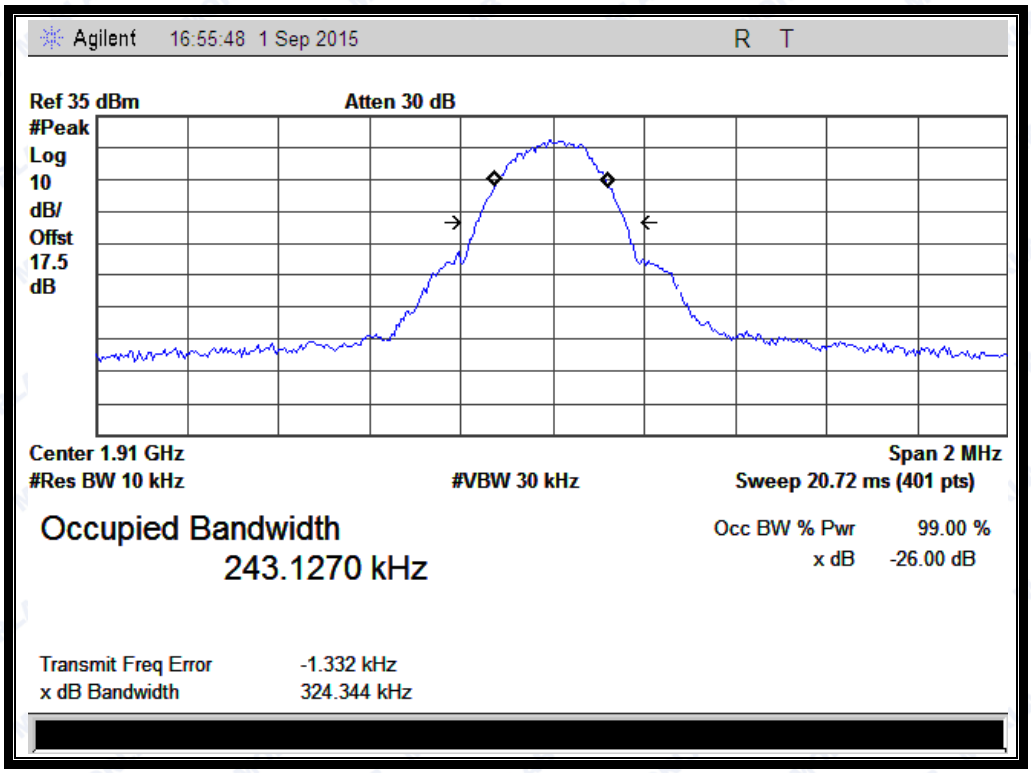
(Plot A3: GSM 850MHz Channel = 251)



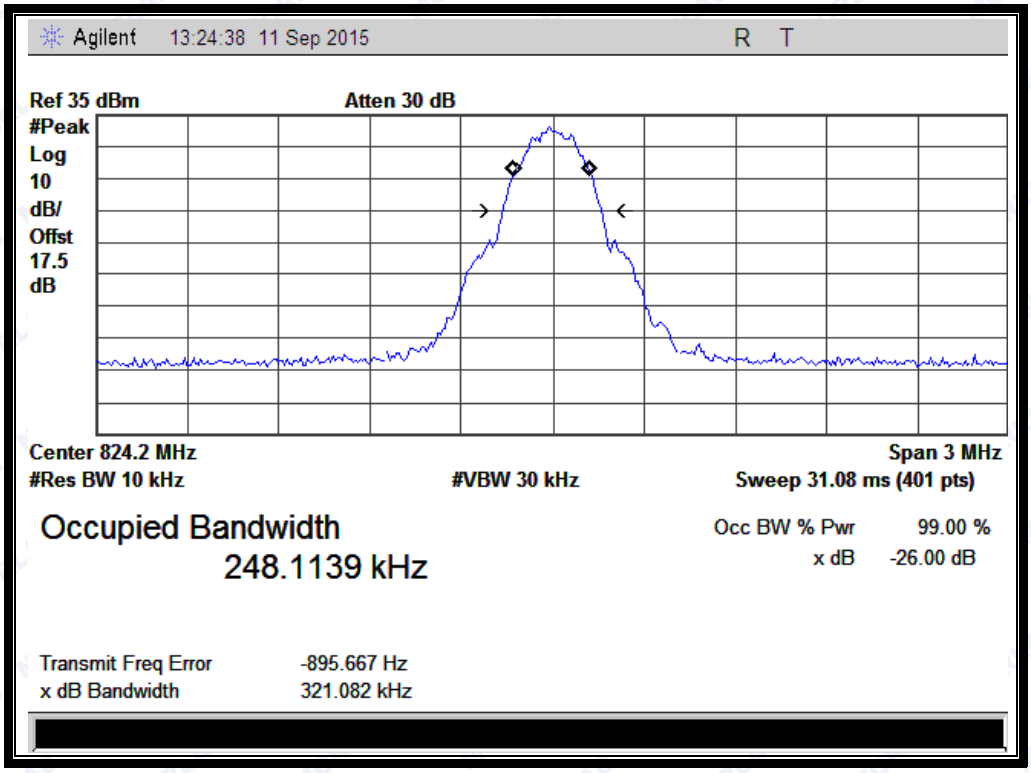
(Plot B1: GSM1900MHz Channel = 512)



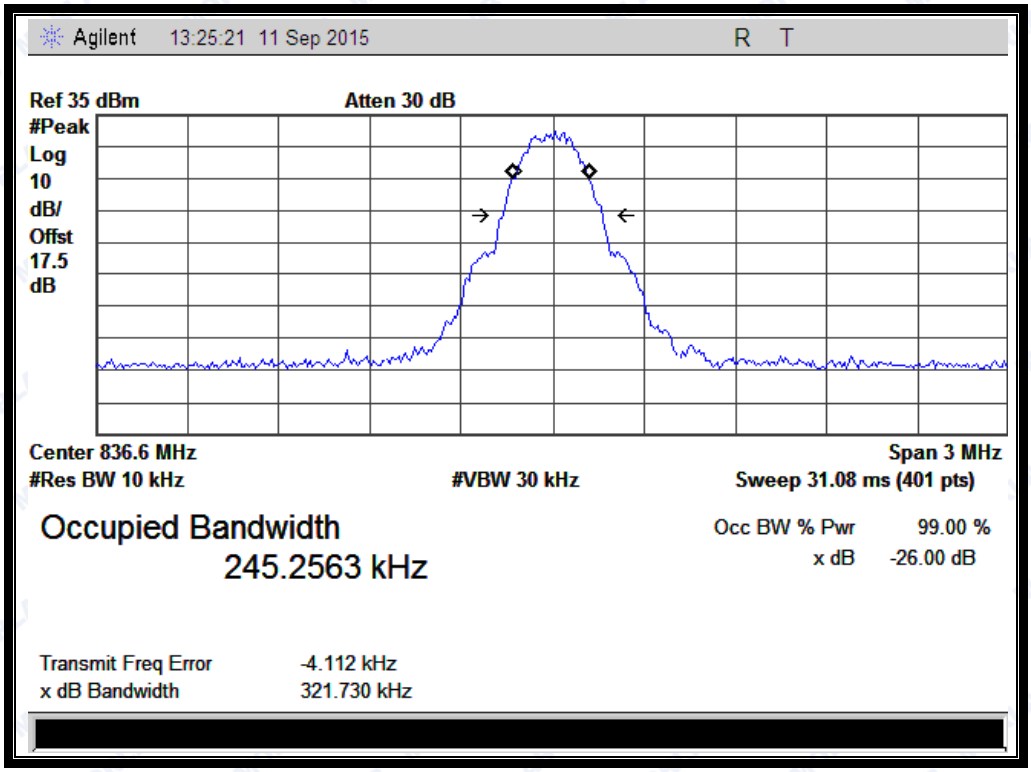
(Plot B2: GSM1900MHz Channel = 661)



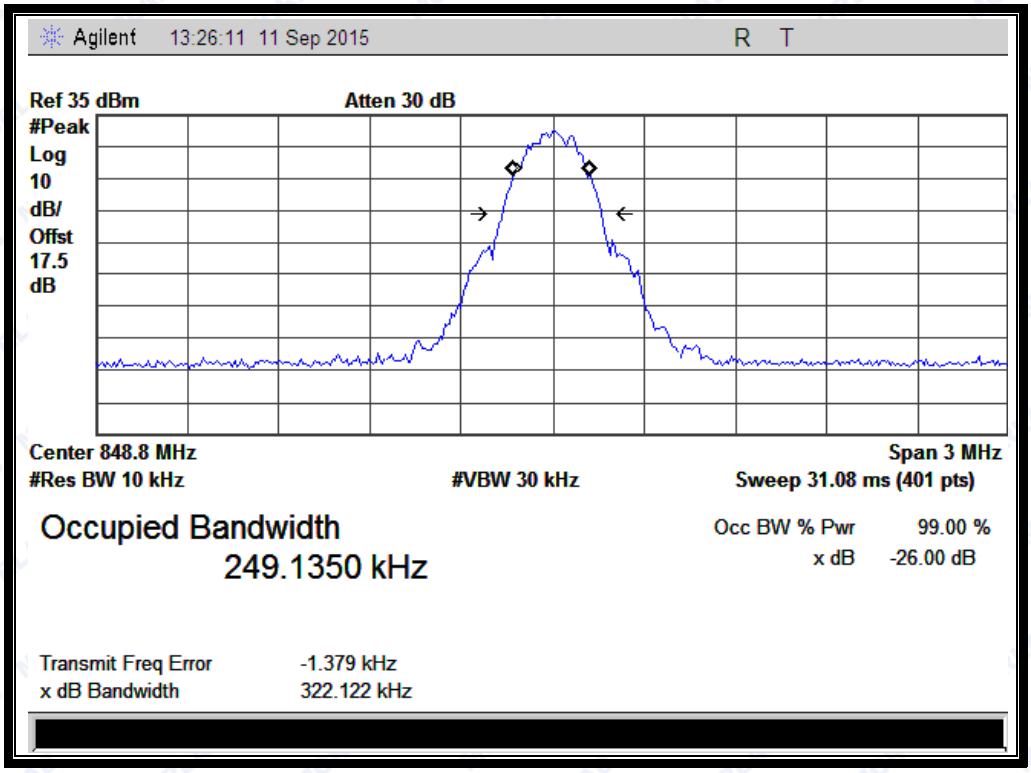
(Plot B3: GSM 1900MHz Channel = 810)



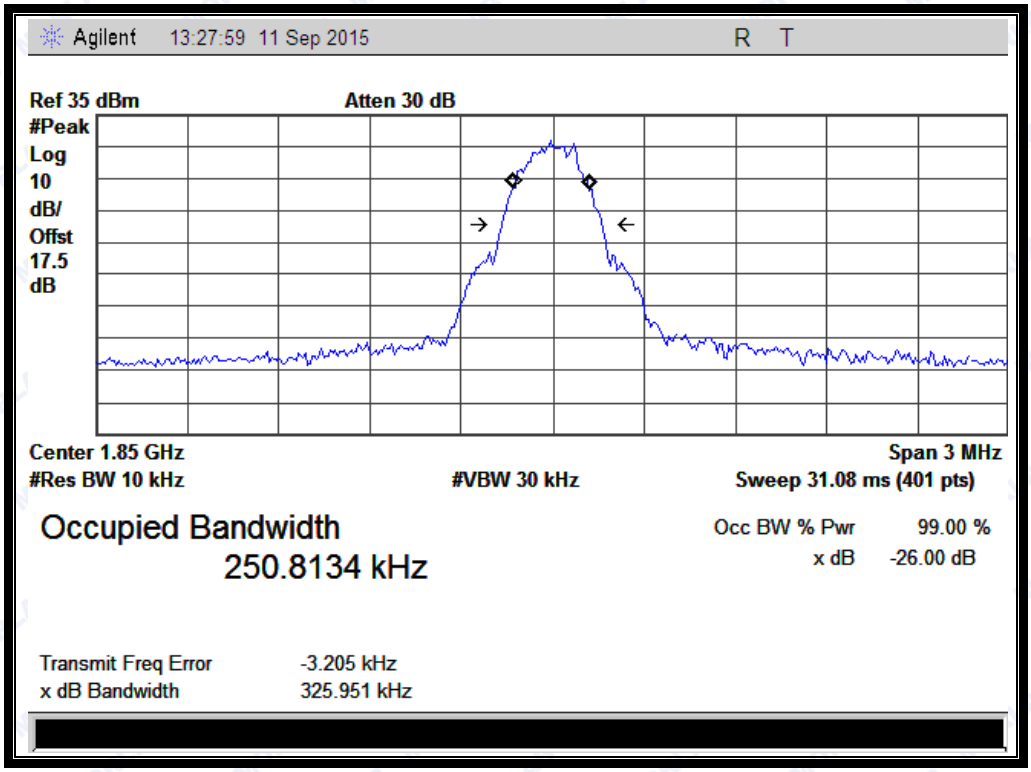
(Plot C1: GPRS 850MHz Channel = 128)



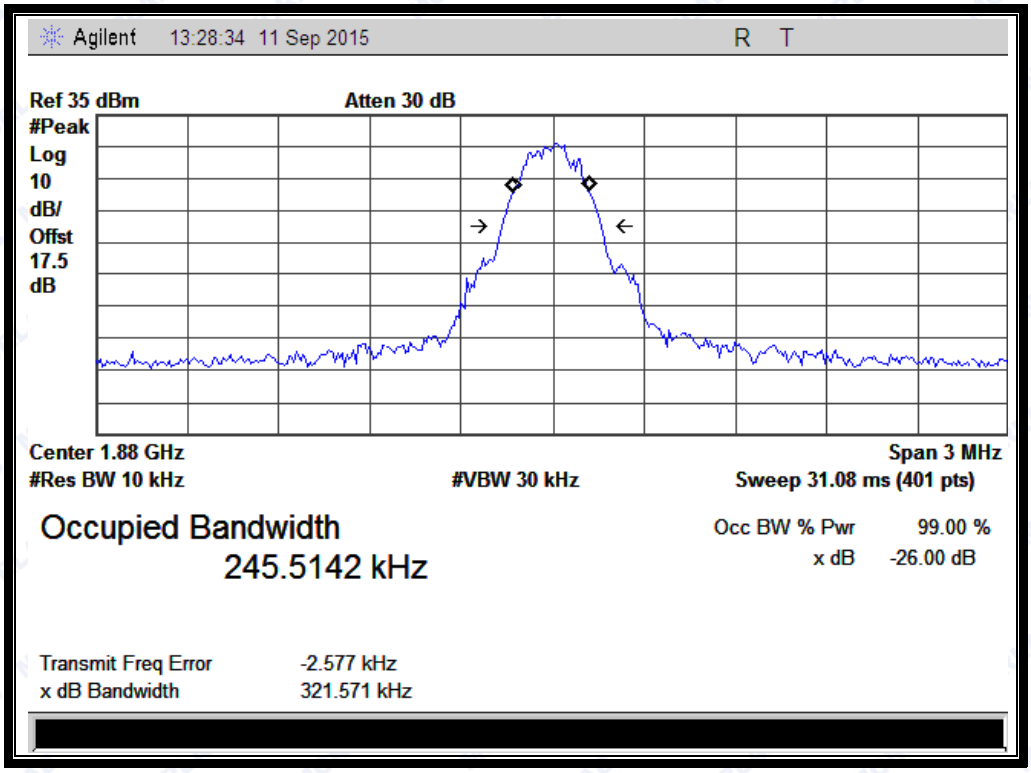
(Plot C2: GPRS 850MHz Channel = 190)



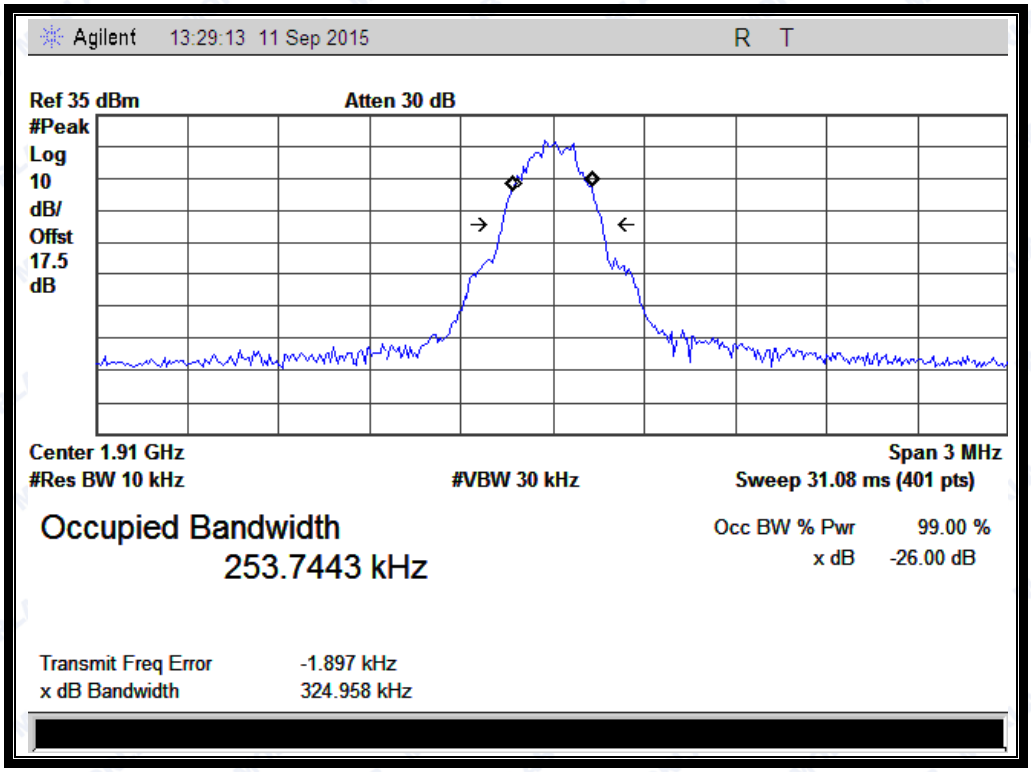
(Plot C3: GPRS 850MHz Channel = 251)



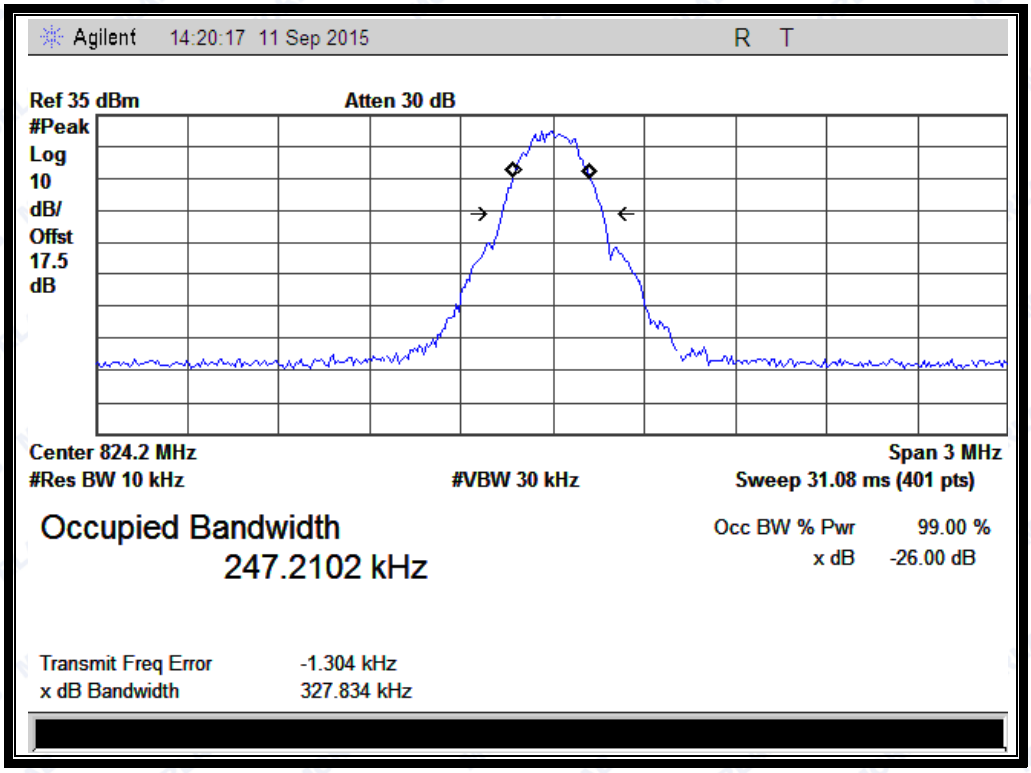
(Plot D1: GPRS1900MHz Channel = 512)



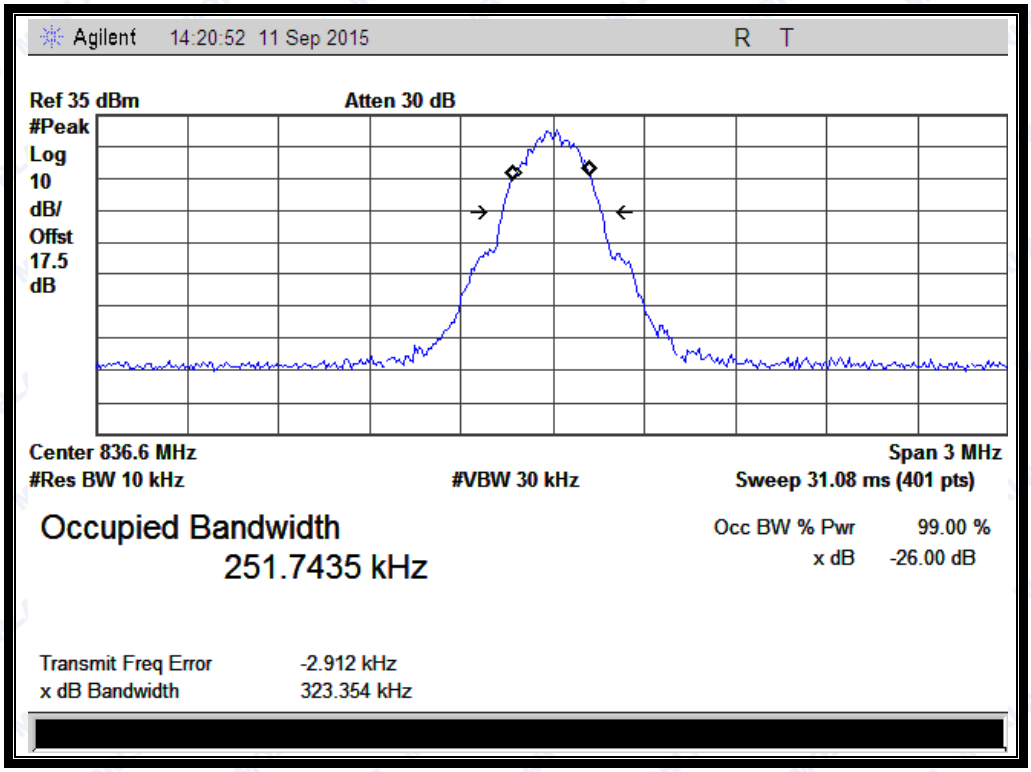
(Plot D2: GPRS1900MHz Channel = 661)



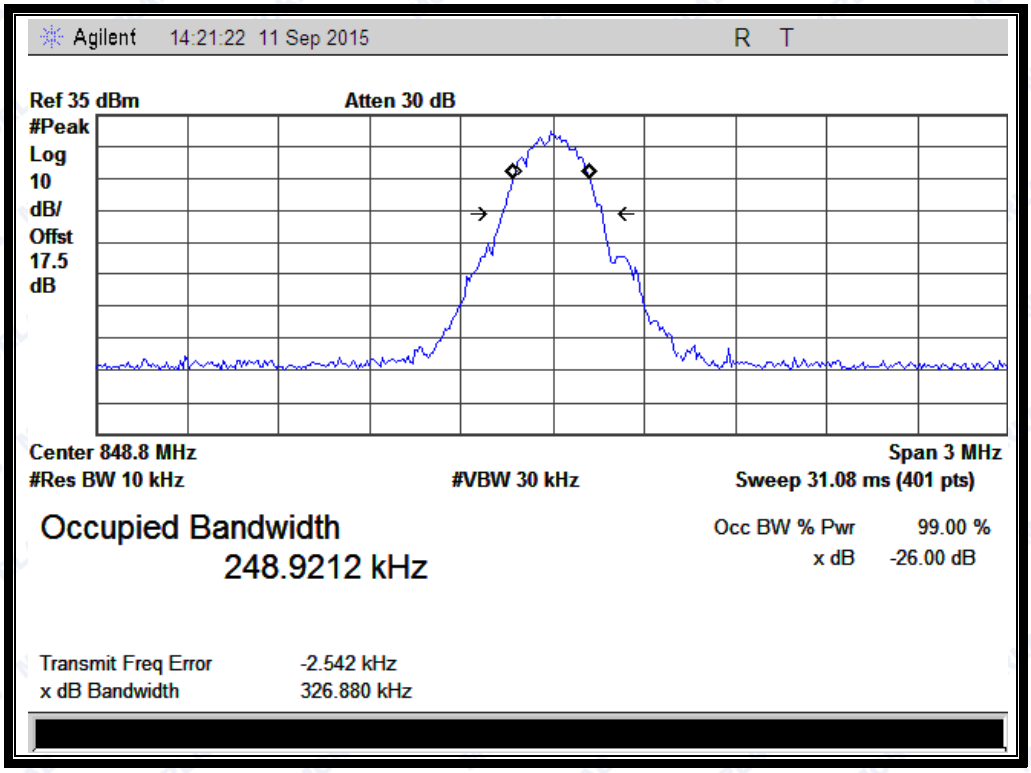
(Plot D3: GPRS 1900MHz Channel = 810)



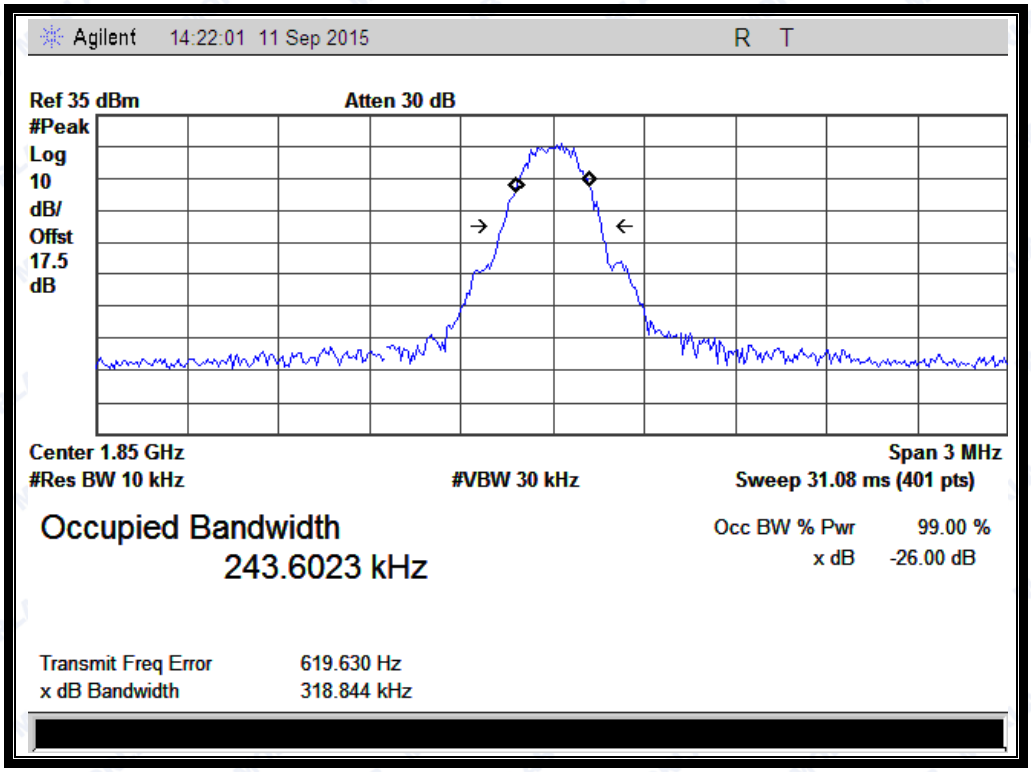
(Plot E1: EGPRS 850MHz Channel = 128)



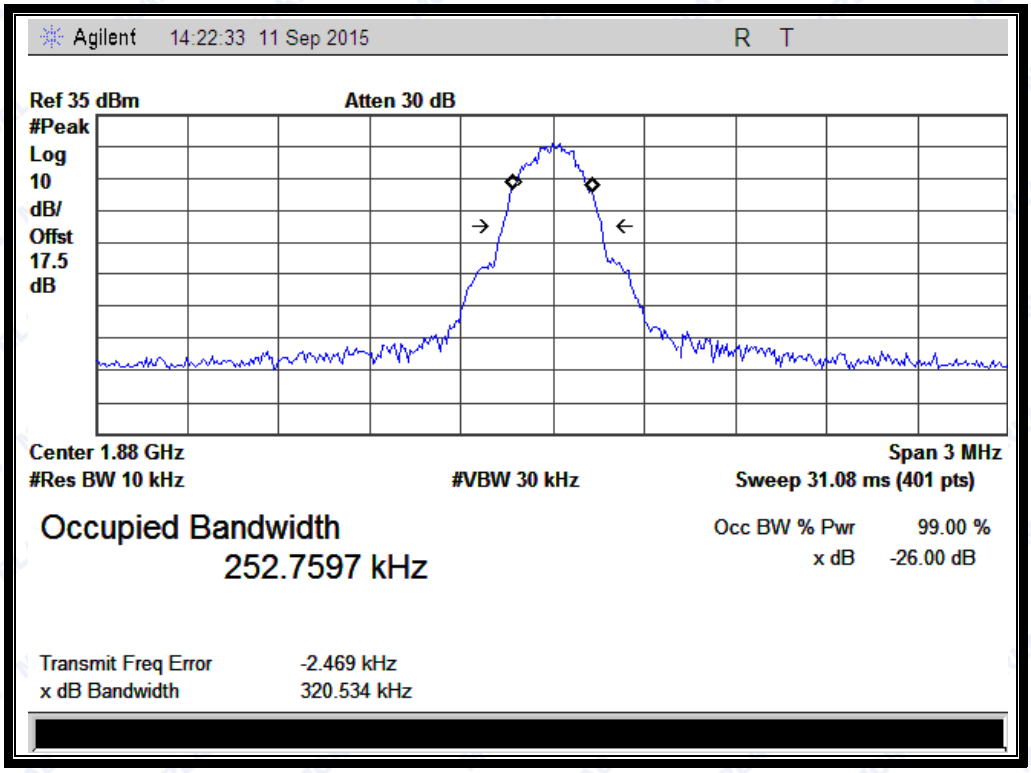
(Plot E2: EGPRS 850MHz Channel = 190)



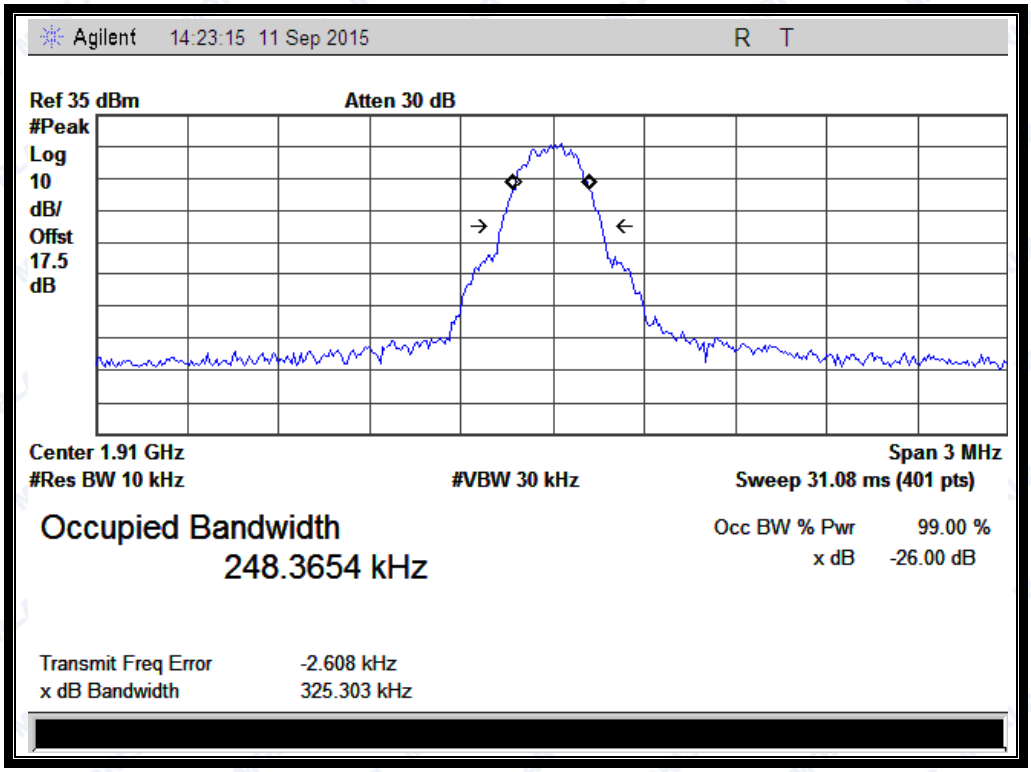
(Plot E3: EGPRS 850MHz Channel = 251)



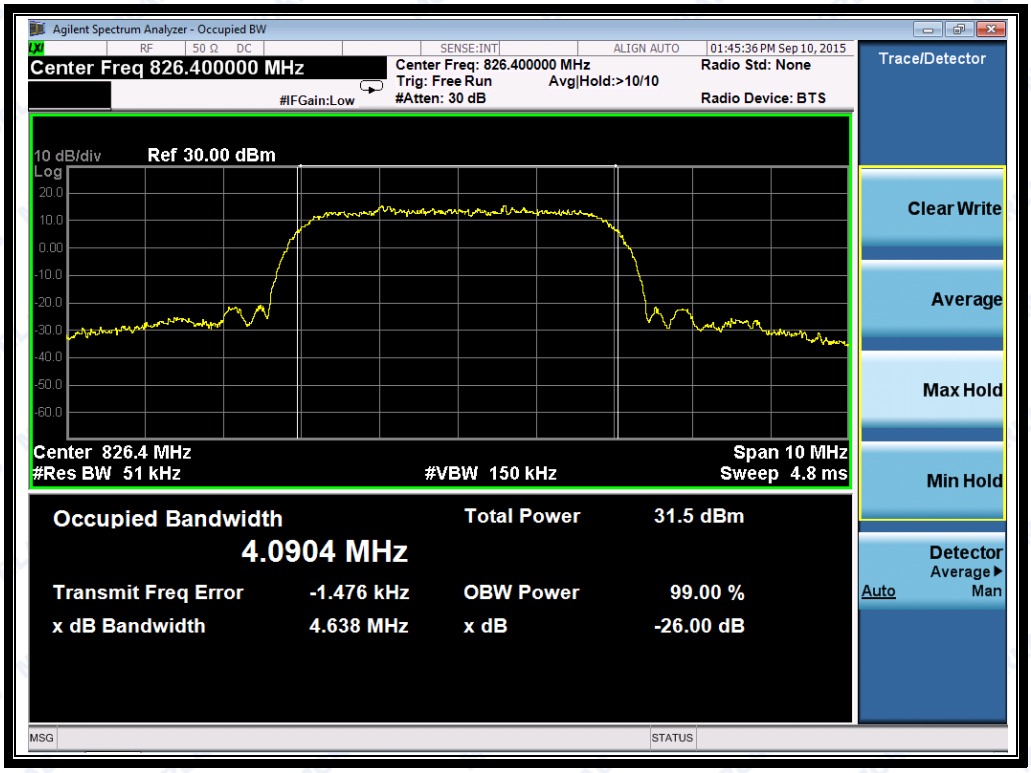
(Plot F1: EGPRS1900MHz Channel = 512)



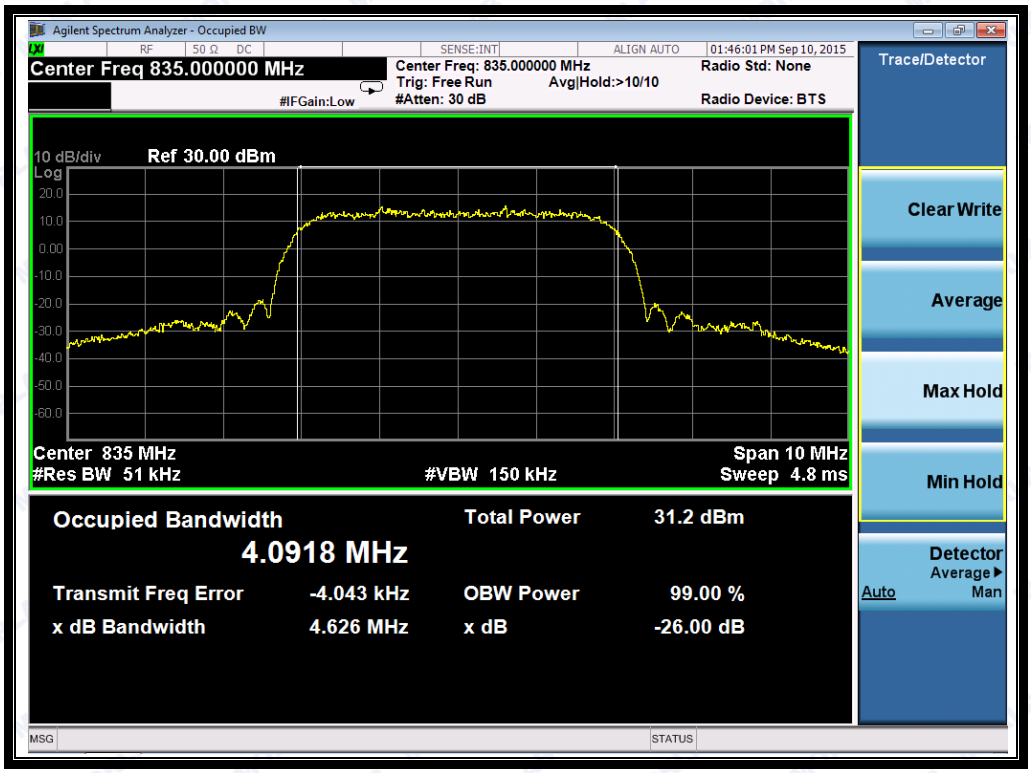
(Plot F2: EGPRS1900MHz Channel = 661)



(Plot F3: EGPRS 1900MHz Channel = 810)

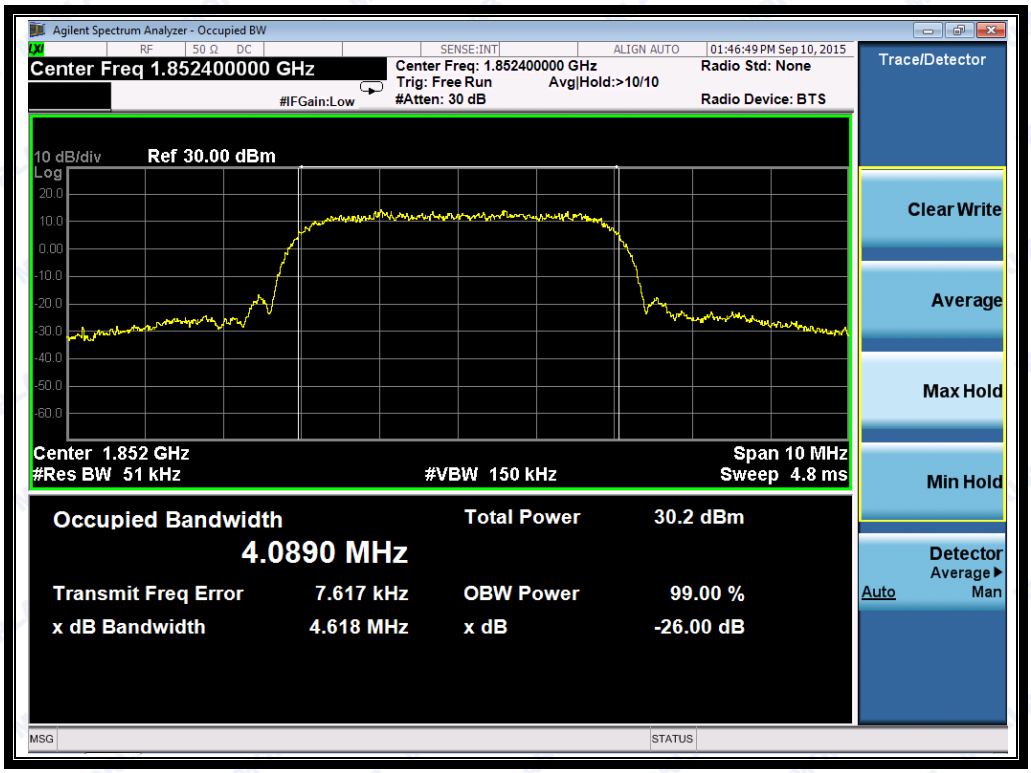


(Plot G1: WCDMA 850MHz Channel = 4132)

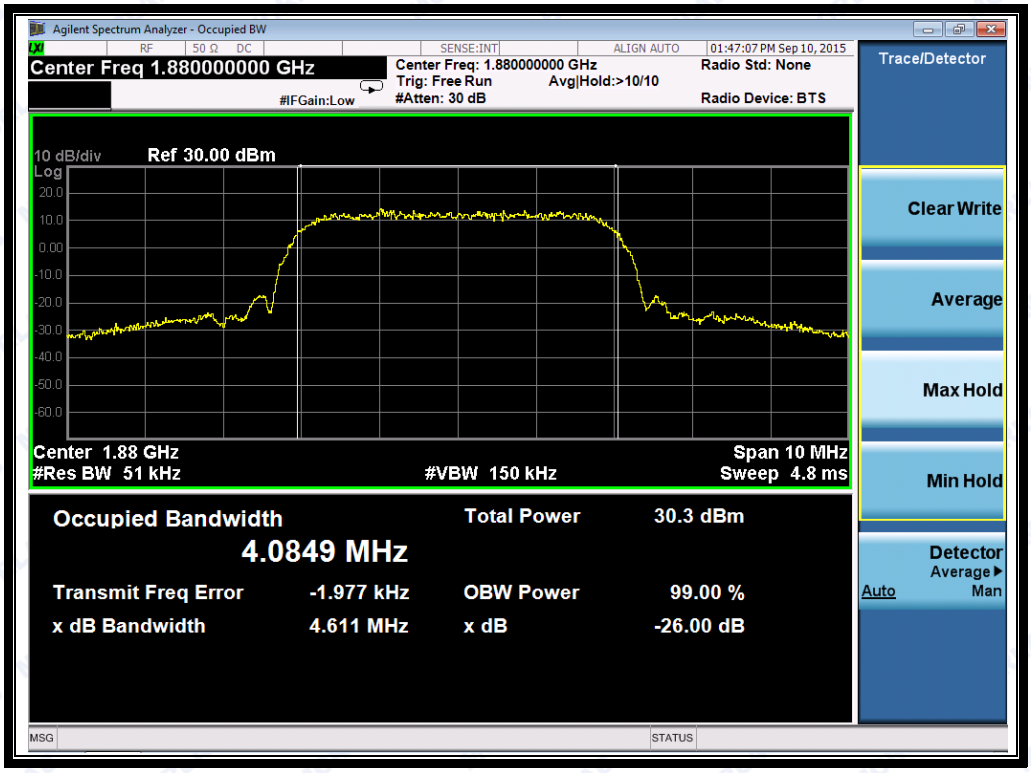


(Plot G2: WCDMA 850 MHz Channel = 4175)

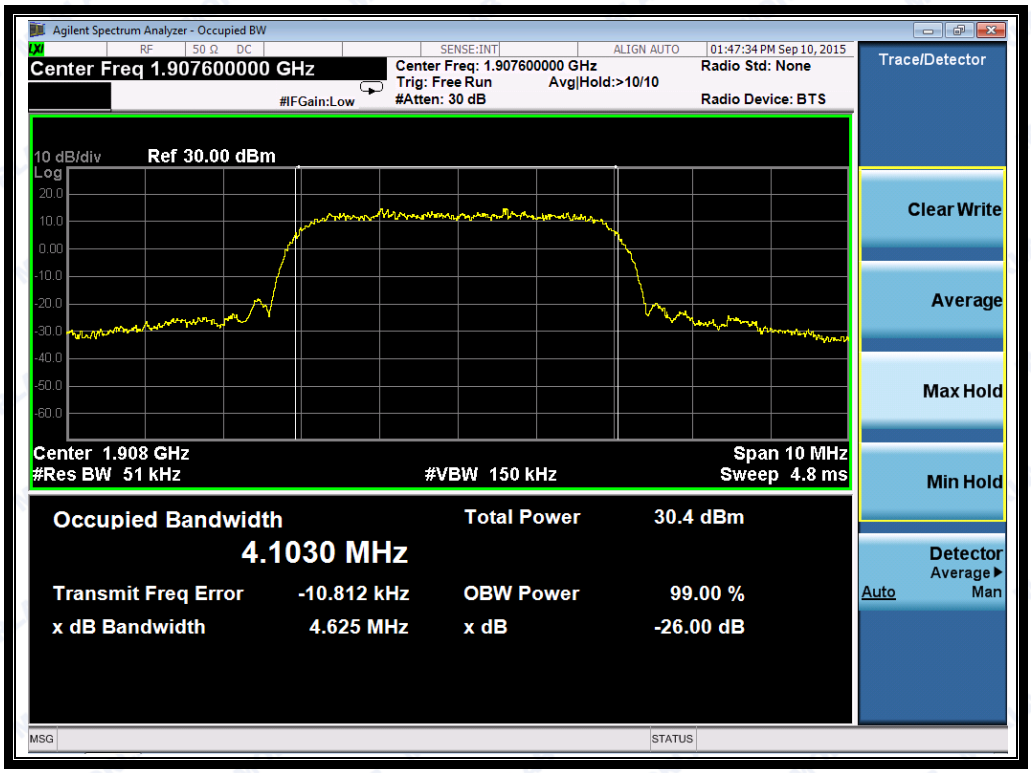
(Plot G3: WCDMA 850MHz Channel = 4233)



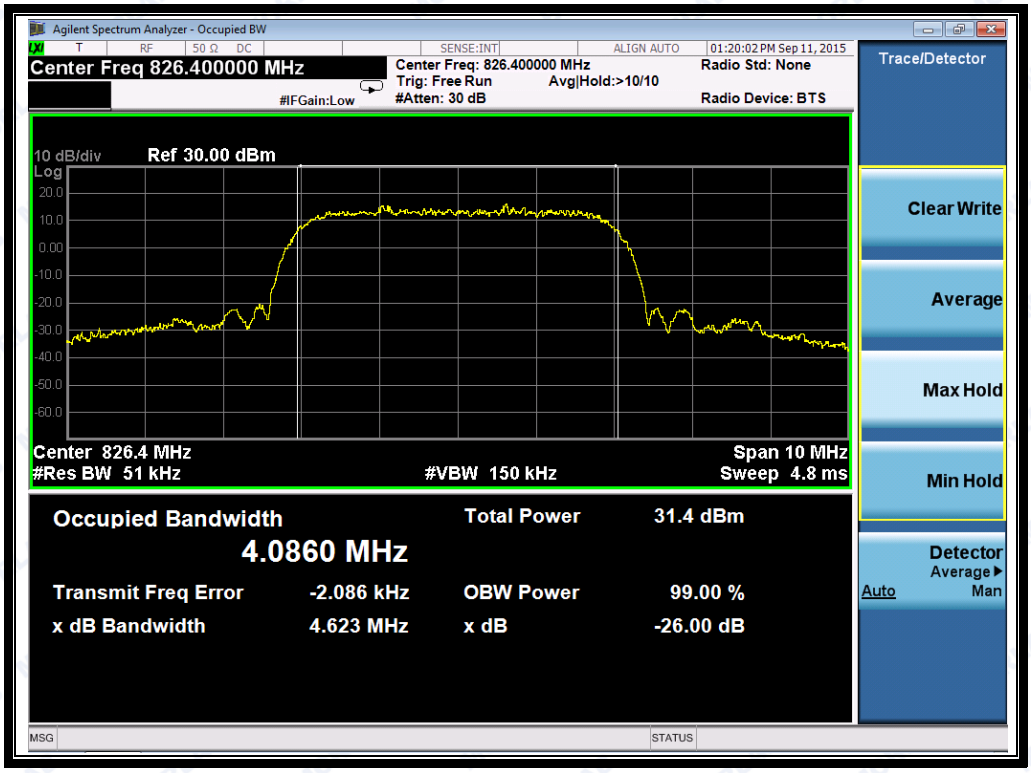
(Plot H1: WCDMA 1900MHz Channel = 9262)



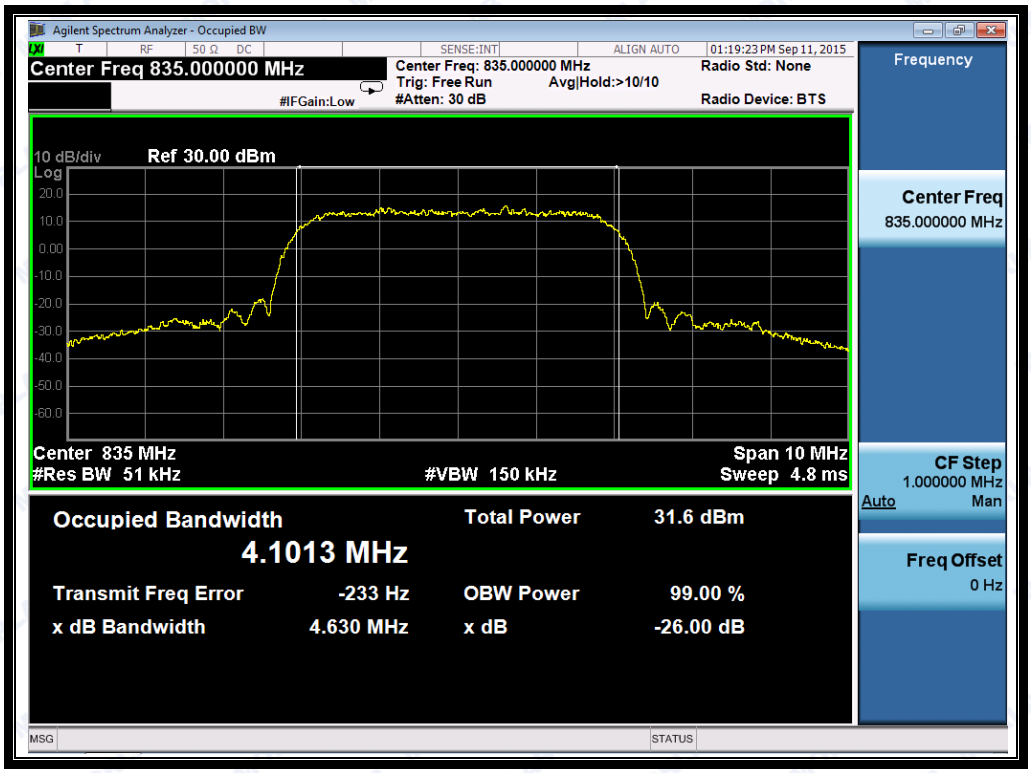
(Plot H2: WCDMA 1900 MHz Channel = 9400)



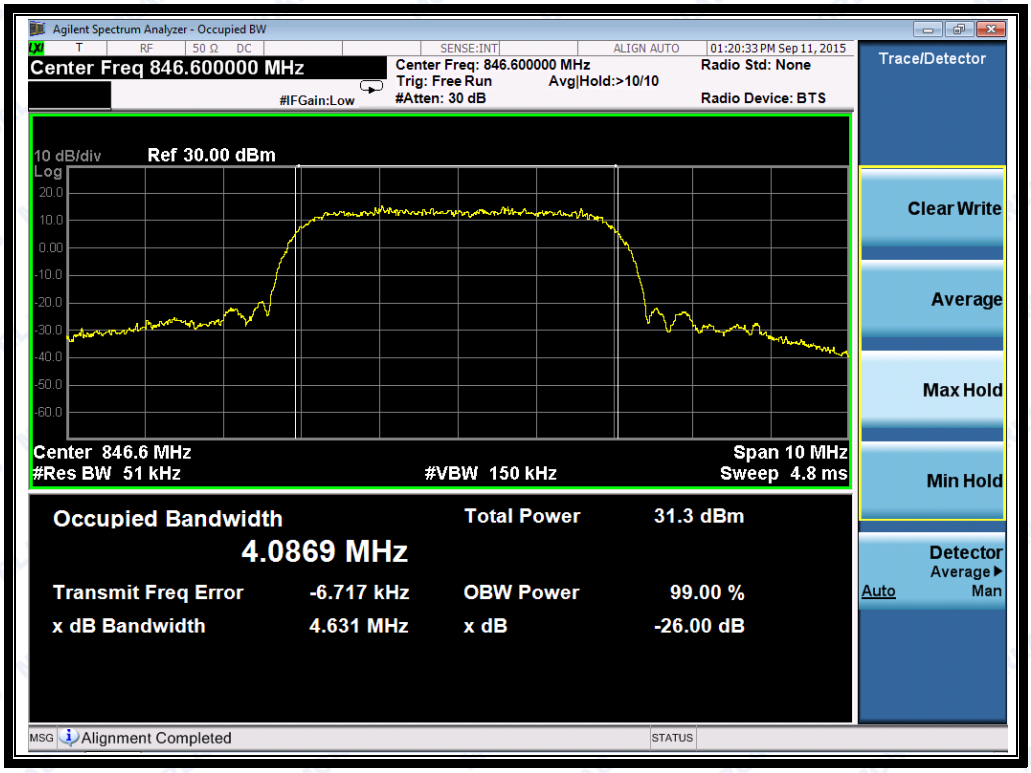
(Plot H3: WCDMA1900MHz Channel = 9538)



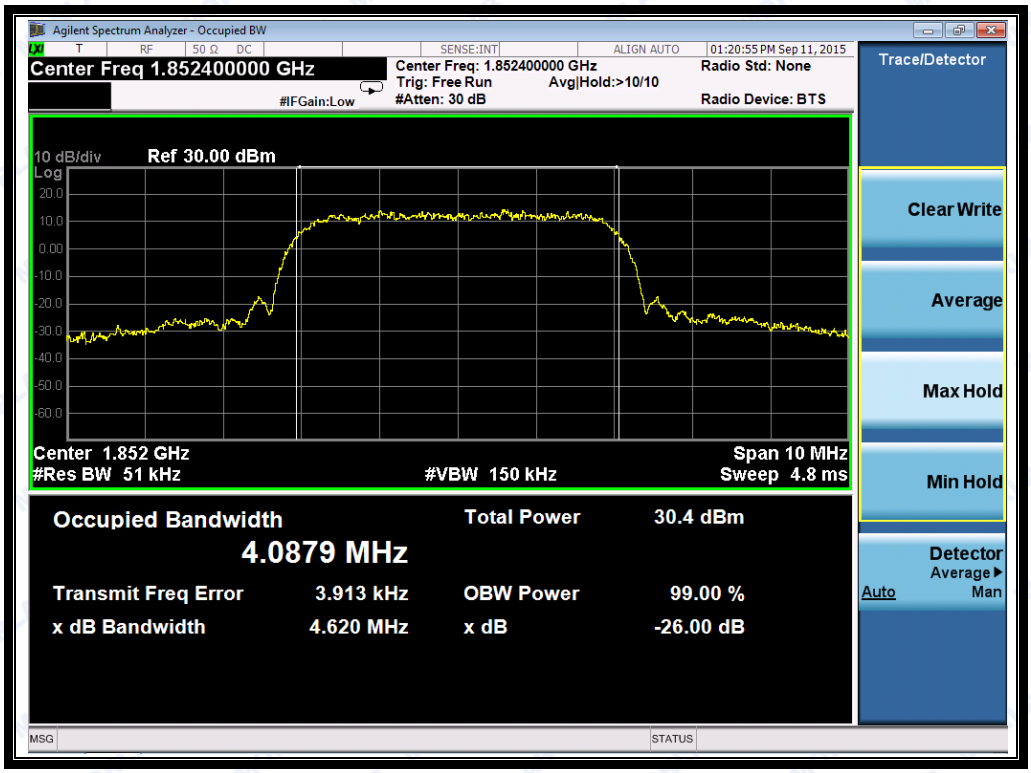
(Plot I1: HSDPA 850MHz Channel = 4132)



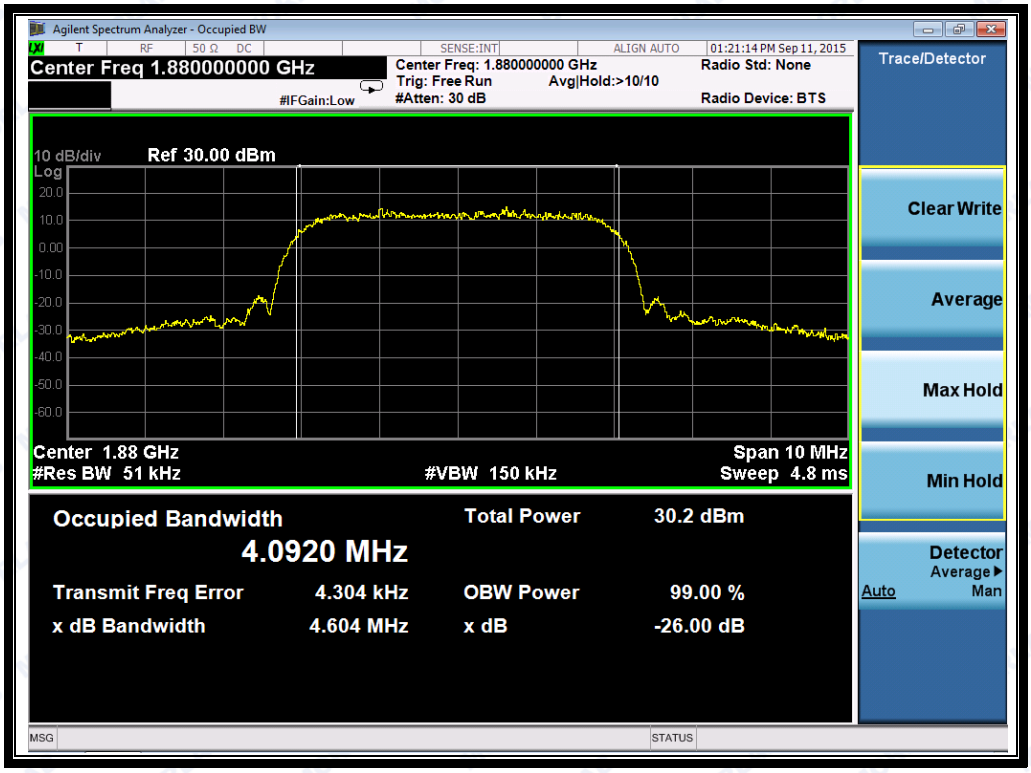
(Plot I2: HSDPA 850 MHz Channel = 4175)



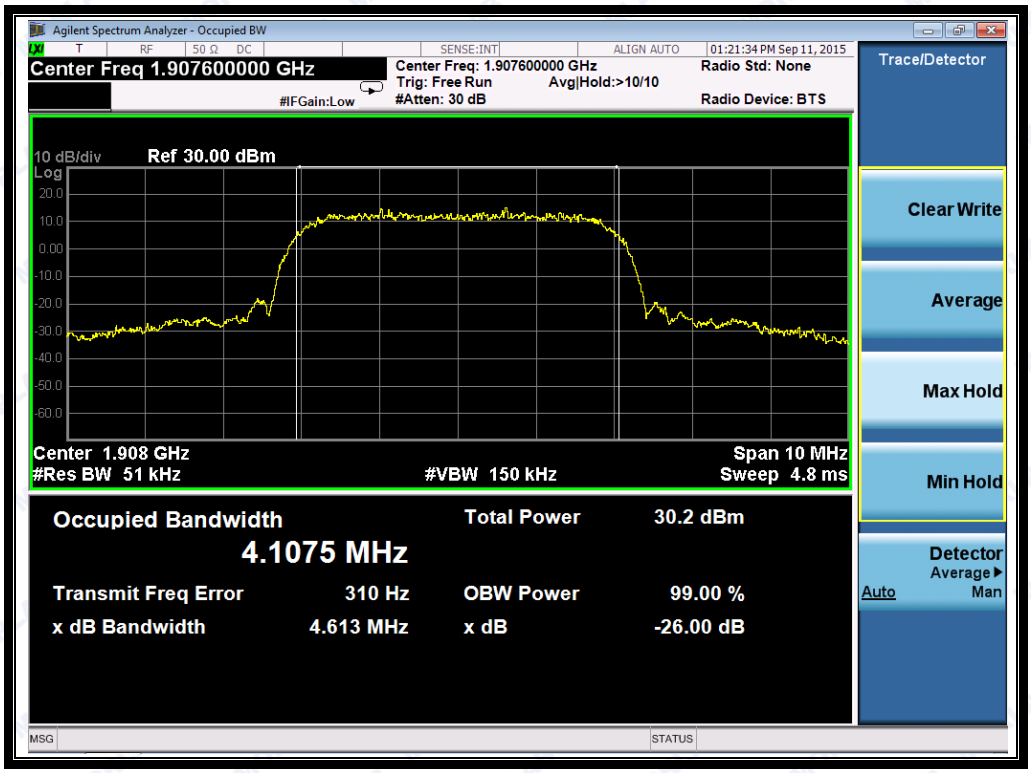
(Plot I3: HSDPA 850MHz Channel = 4233)



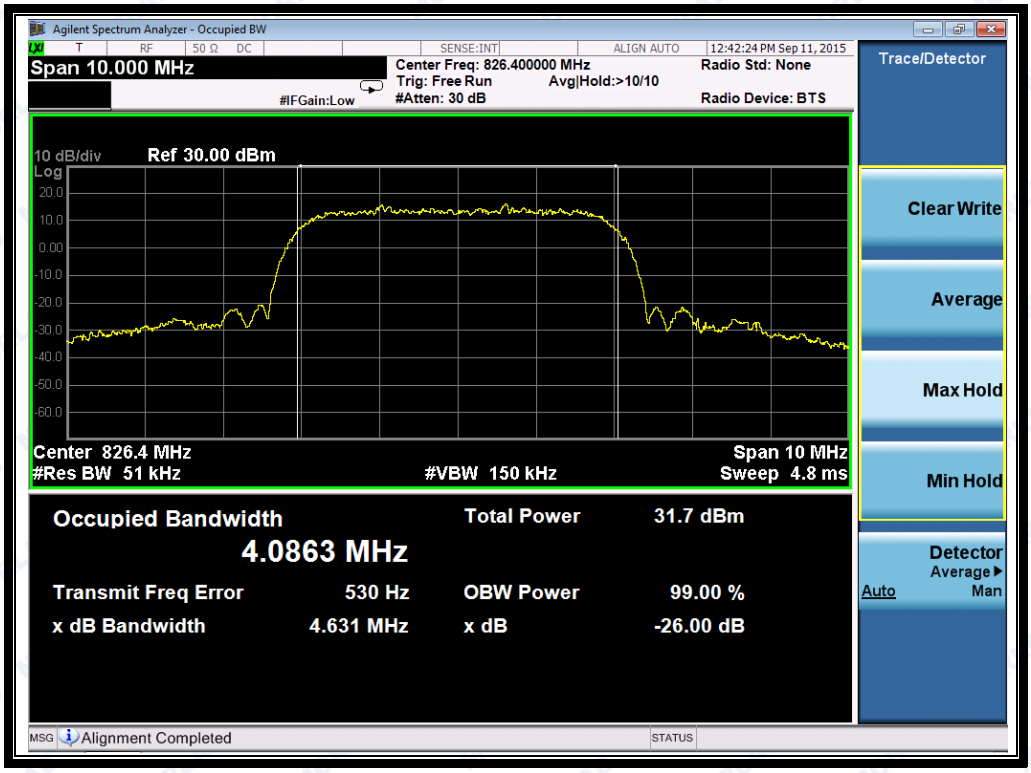
(Plot J1: HSDPA 1900MHz Channel = 9262)



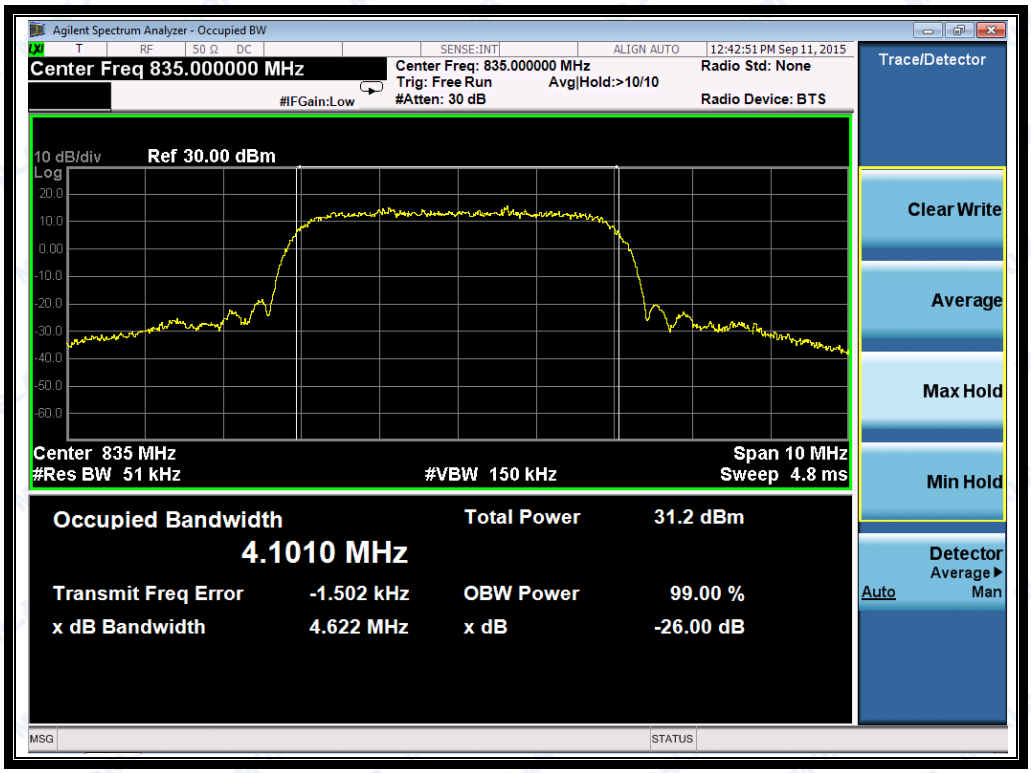
(Plot J2: HSDPA 1900 MHz Channel = 9400)



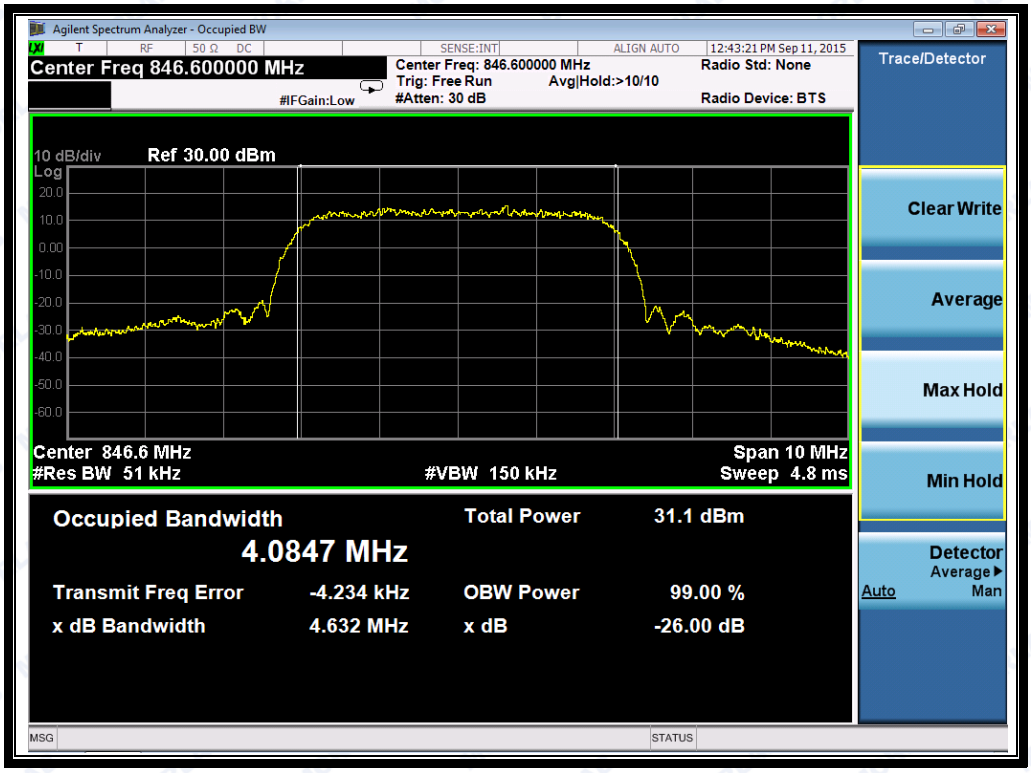
(Plot J3: HSDPA 1900MHz Channel = 9538)



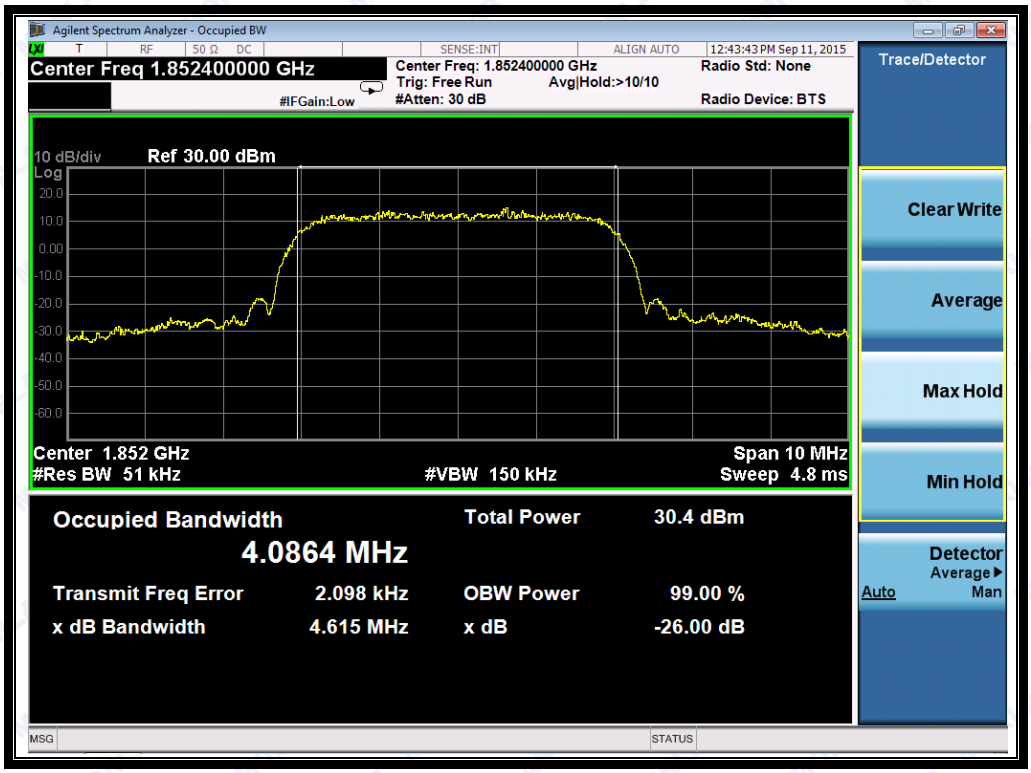
(Plot K1: HSUPA 850MHz Channel = 4132)



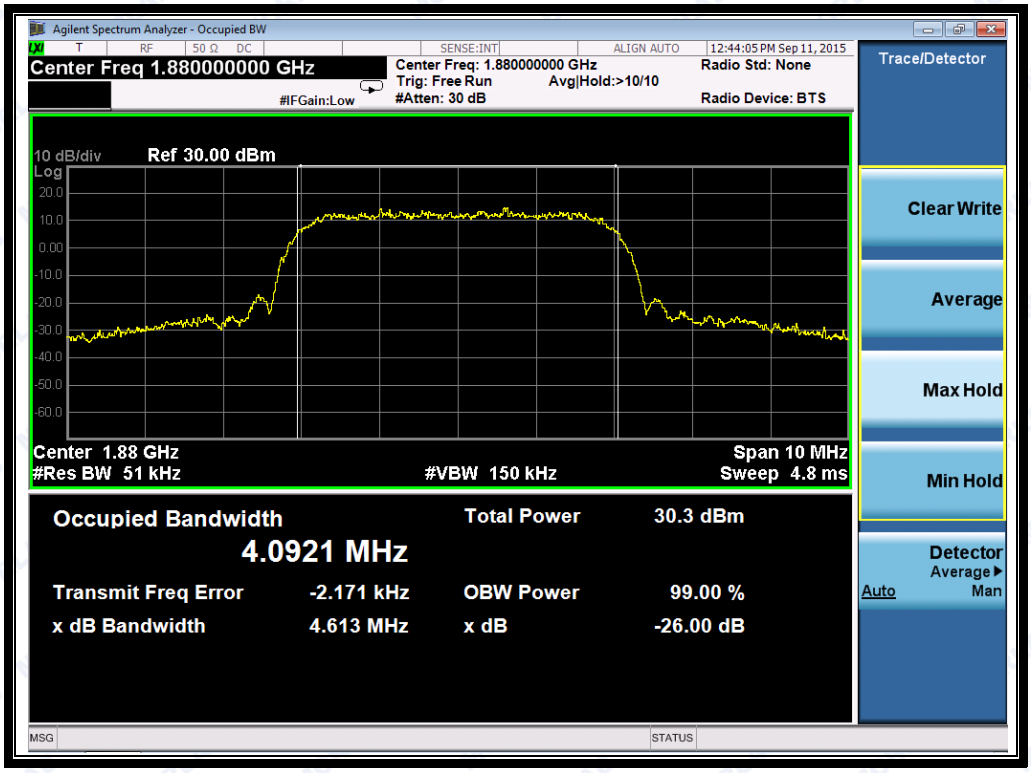
(Plot K2: HSUPA 850 MHz Channel = 4175)



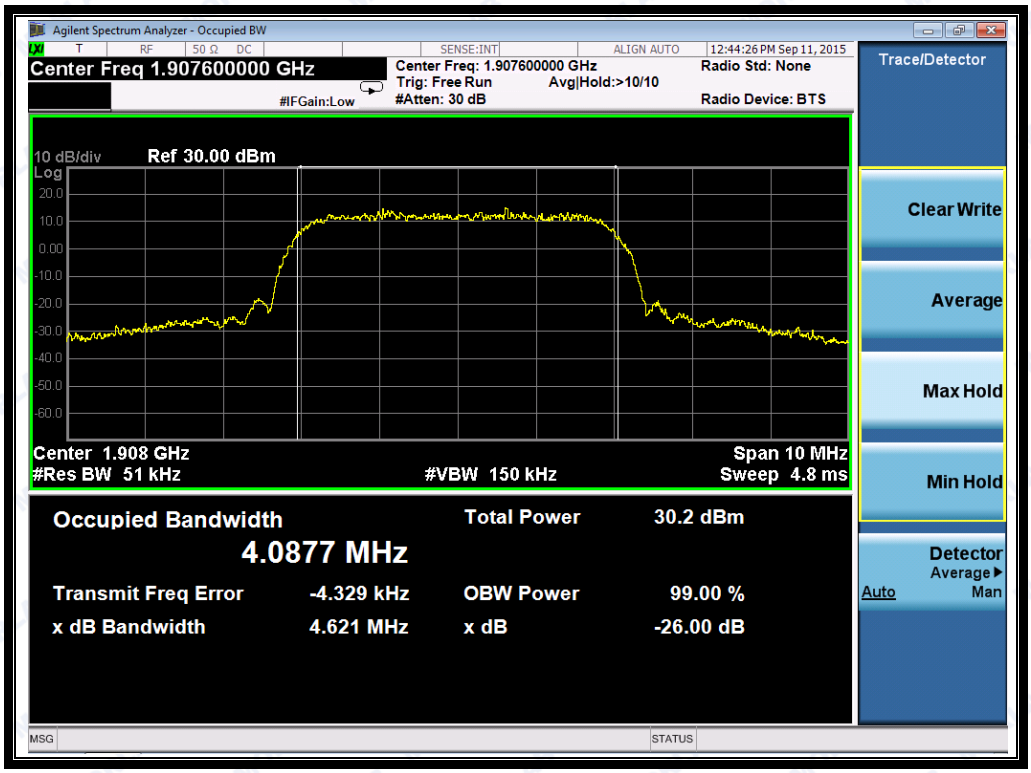
(Plot K3: HSUPA 850MHz Channel = 4233)



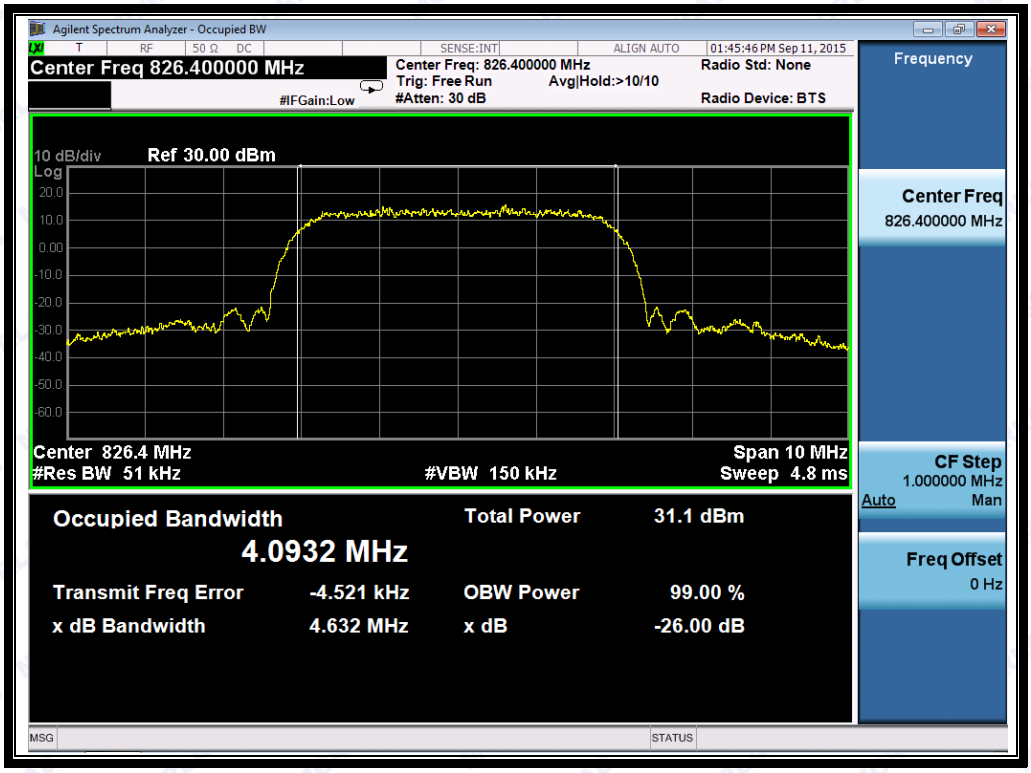
(Plot L1: HSUPA 1900MHz Channel = 9262)



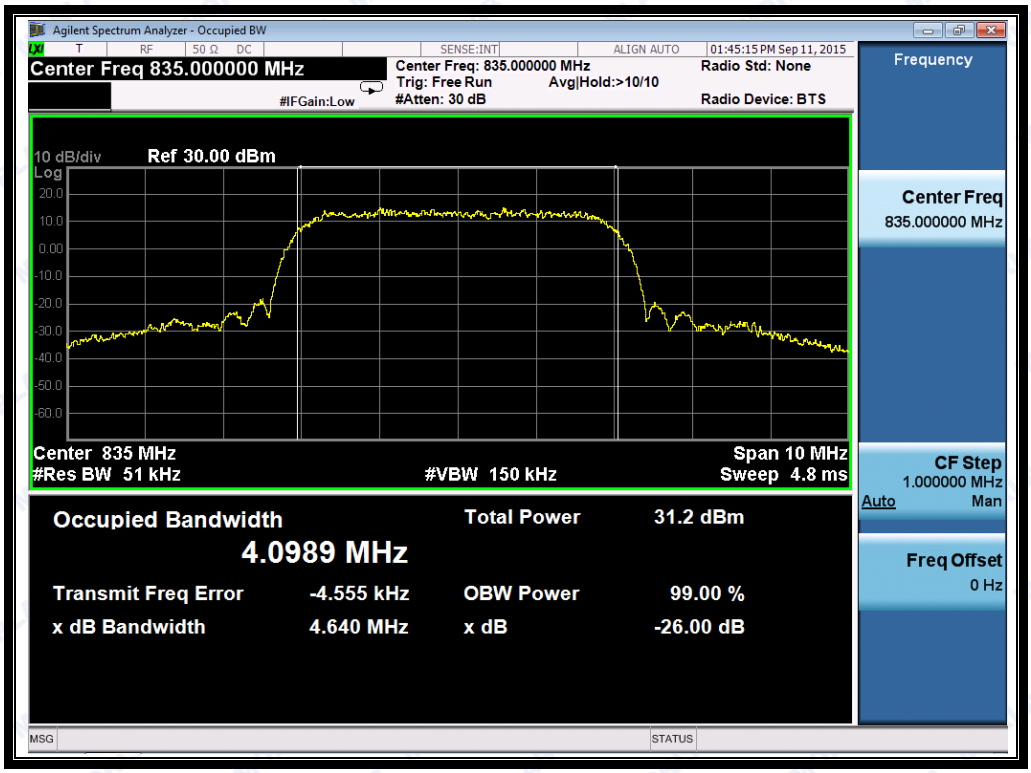
(Plot L2: HSUPA 1900 MHz Channel = 9400)



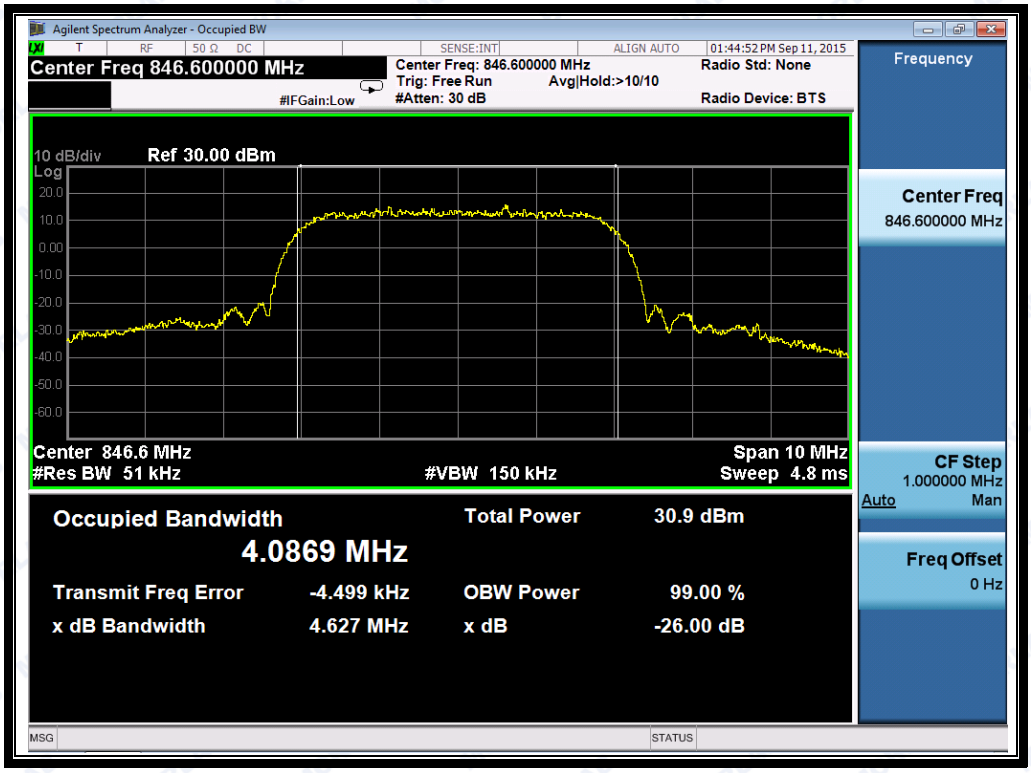
(Plot L3: HSUPA 1900MHz Channel = 9538)



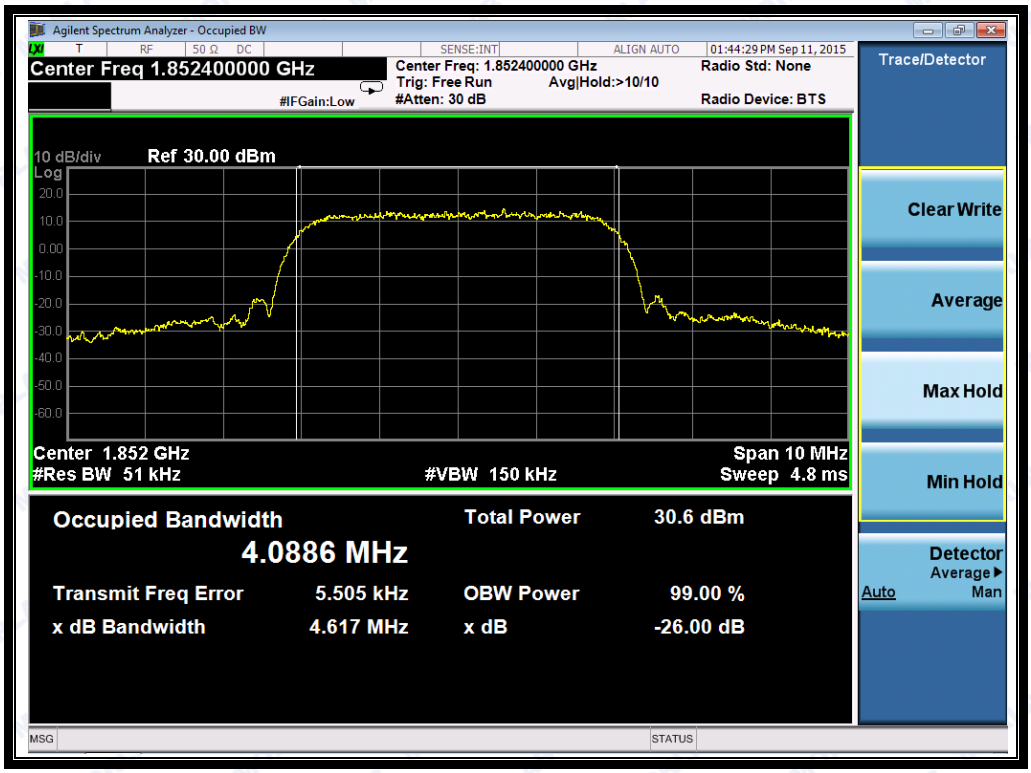
(Plot M1: HSPA+ 850MHz Channel = 4132)



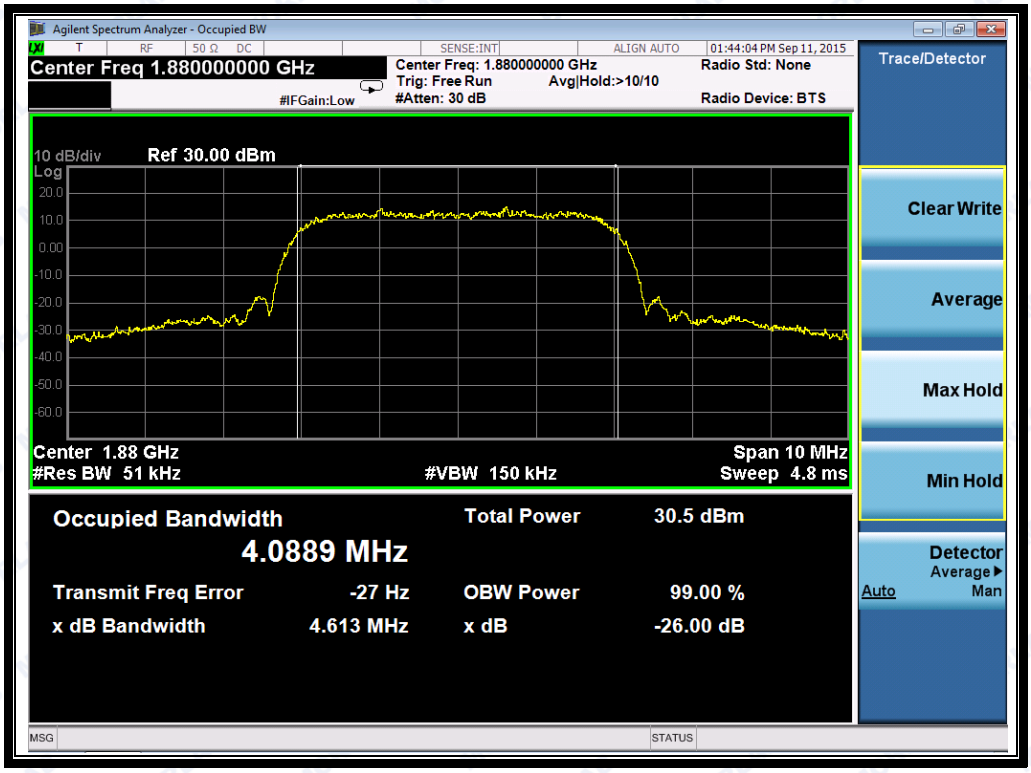
(Plot M2: HSPA+ 850 MHz Channel = 4175)



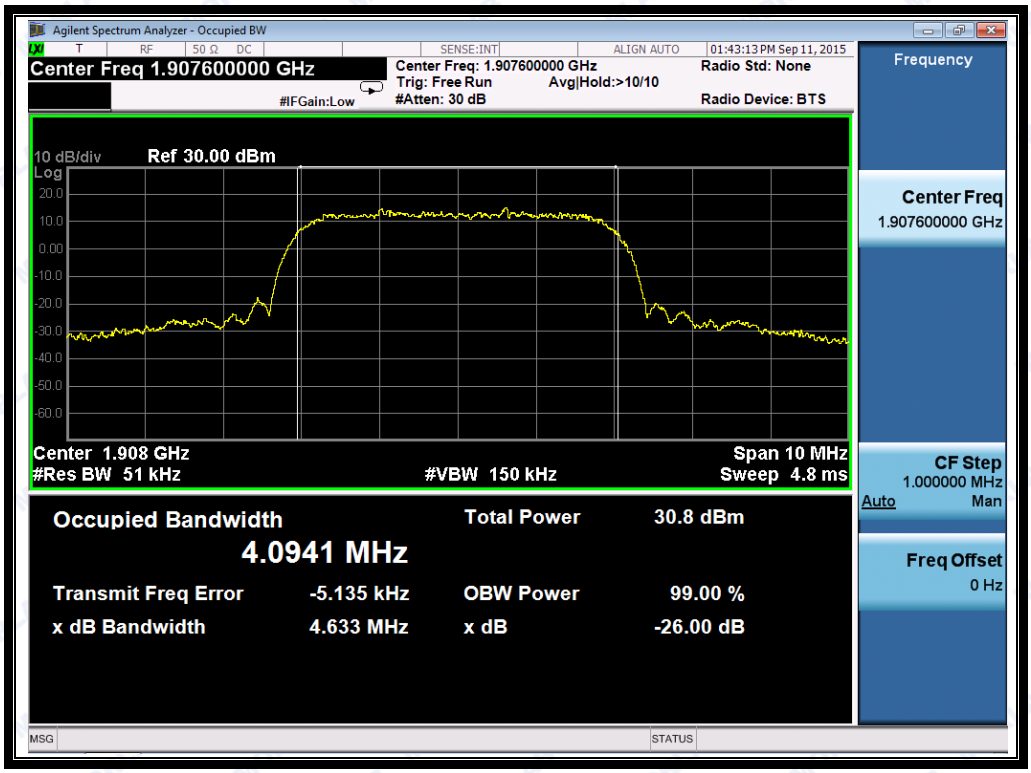
(Plot M3: HSPA+ 850MHz Channel = 4233)



(Plot N1: HSPA+ 1900MHz Channel = 9262)



(Plot N2: HSPA+ 1900 MHz Channel = 9400)



(Plot N3: HSPA+ 1900MHz Channel = 9538)

2.4 Frequency Stability

2.4.1 Requirement

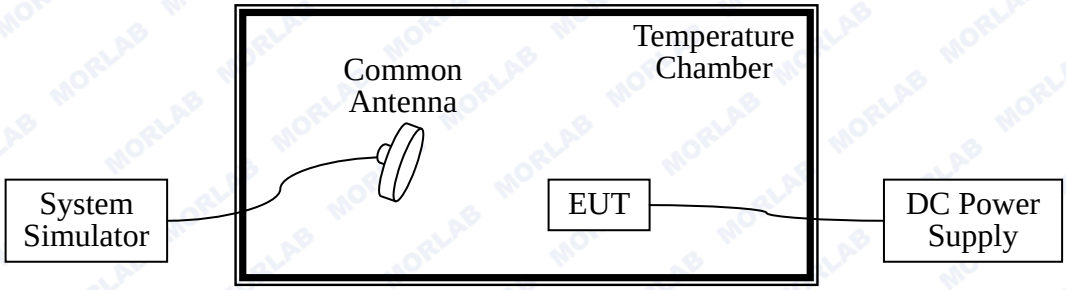
According to FCC section 22.355 and FCC section 24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

(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.

2.4.2 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.

Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	Agilent	E5515C	GB43130131	2015.02.26	2016.02.25
DC Power Supply	Good Will	GPS -3030DD	EF920938	2015.02.26	2016.02.25
Temperature Chamber	YinHe Experimental Equip.	HL4003T	(n.a.)	2015.02.26	2016.02.25

2.4.3 Test Verdict

The nominal, highest and lowest extreme voltages are separately 3.8VDC, 4.2VDC and 3.45VDC, which are specified by the applicant; the normal temperature here used is 25°C. The frequency deviation limit of 850MHz band is ±2.5ppm, and 1900MHz is ±1ppm.

1. GSM 850MHz 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	
3.8	-30	11.44	±2060.5	6.18	±2091.5	-6.85	±2122	PASS
	-20	-11.19		5.06		14.96		
	-10	-6.68		5.14		-14.18		
	0	7.47		9.26		26.55		
	+10	-2.02		2.28		27.96		
	+20	11.4		8.6		-8.17		
	+30	29.37		-3.72		26.55		
	+40	-10.69		-1.59		21.16		
	+55	-1		8.48		-6.81		
4.35	+25	-11.19		10.05		14.96		
3.30	+25	-6.68		12.28		-8.25		

2. GSM 1900MHz 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	
3.8	-30	12.21	±1850.2	-14.93	±1880.0	-9.81	±1909.8	PASS
	-20	22		-1.29		33.71		
	-10	-14.34		23.43		-5.8		
	0	-12.97		21.84		-11.44		
	+10	36.2		-13.37		-21.8		
	+20	-7.32		24.43		15.36		
	+30	-12.93		18.04		-12.24		
	+40	15.4		-9.55		25.88		
	+55	22.54		12.05		19.53		
4.35	+25	-23.38		-1.29		37.74		
3.3	+25	12.01		23.45		-15.56		

3. EDGE 850MHz 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	
3.8	-30	18.33	±2060.5	-15.73	±2091.5	2.43	±2122	PASS
	-20	34.1		30.44		24.47		
	-10	34.99		46.46		18.47		
	0	-5.06		-14.97		5.33		
	+10	29.13		13.33		-8.5		
	+20	14.02		9.05		34.64		
	+30	-3.25		31.35		17.47		
	+40	-9.76		21.64		-8.5		
	+55	39.79		24.61		3.43		
4.35	+25	5.94		29.21		19.62		
3.3	+25	16.11		21.35		-32.99		

4. EDGE 1900MHz 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	
3.8	-30	16.27	±1850.2	9.57	±1880.0	-11.88	±1909.8	PASS
	-20	-13.51		-19.44		-9.37		
	-10	42.14		2.08		14.17		
	0	-18.02		-15.34		6.17		
	+10	-12.07		-18.27		36.1		
	+20	21.8		17.92		-25.94		
	+30	19.68		2.66		20.38		
	+40	21.37		40.21		-15.83		
	+55	-13.51		7.01		27.63		
4.35	+25	-12.67		20.29		-9.92		
3.3	+25	-11.66		38.57		8.62		

5. WCDMA 850MHz Band

Test Conditions		Frequency Deviation						Verdict
Power (VDC)	Temperature (°C)	Channel = 4123 (826.4MHz)		Channel = 4175 (835MHz)		Channel = 4233 (846.6MHz)		
		Hz	Limit	Hz	Limit	Hz	Limit	
3.8	-30	31.24	±2066	15.6	±2087.5	-14.19	±2116.5	PASS
	-20	16.75		16.52		32.68		
	-10	28.75		7.46		14.08		
	0	-7.68		-5.77		50.26		
	+10	14.35		2.88		65.99		
	+20	12.97		18.32		-0.57		
	+30	20.59		10.32		6.53		
	+40	14.79		10.32		4.19		
	+55	17.35		2.43		4.25		
4.35	+25	30.64		22.59		12.49		
3.3	+25	15.72		-13.02		11.22		

6. WCDMA 1900MHz Band

Test Conditions		Frequency Deviation						Verdict
Power (VDC)	Temperature (°C)	Channel = 9262 (1852.4MHz)		Channel = 9400 (1880.0MHz)		Channel = 9538 (1907.6MHz)		
		Hz	Limits	Hz	Limits	Hz	Limits	
3.8	-30	10.58	±1852.4	-12.21	±1880	15.72	±1907.6	PASS
	-20	1.52		40.96		-5.8		
	-10	-11.71		-19.25		9.46		
	0	-3.06		-13.3		12.35		
	+10	12.38		20.57		10.5		
	+20	4.38		18.45		7.89		
	+30	-3.51		6.48		-19.38		
	+40	9.66		16.76		-4.97		
	+55	11.56		-14.74		-15.86		
4.35	+25	10.58		16.76		-10.4		
3.3	+25	-18.72		19.03		13.2		

7. HSDPA 850MHz Band

Test Conditions		Frequency Deviation						Verdict
Power (VDC)	Temperature (°C)	Channel = 4123 (826.4MHz)		Channel = 4175 (835MHz)		Channel = 4233 (846.6MHz)		
		Hz	Limit	Hz	Limit	Hz	Limit	
3.8	-30	13.95	±2066	-0.05	±2087.5	14.43	±2116.5	PASS
	-20	-7.57		-9.09		23.47		
	-10	7.69		14.86		14.93		
	0	10.58		-36.91		6.63		
	+10	8.73		-0.05		-2.41		
	+20	6.12		-9.09		21.54		
	+30	-21.15		15.85		-30.23		
	+40	-6.74		-34.41		30.48		
	+55	-17.63		19		27.11		
4.35	+25	-12.17		-0.05		-33.69		
3.3	+25	11.43		-19.44		24.9		

8. HSDPA 1900MHz Band

Test Conditions		Frequency Deviation						Verdict
Power (VDC)	Temperature (°C)	Channel = 9262 (1852.4MHz)		Channel = 9400 (1880.0MHz)		Channel = 9538 (1907.6MHz)		
		Hz	Limits	Hz	Limits	Hz	Limits	
3.8	-30	26.09	±1852.4	18.37	±1880	14.65	±1907.6	PASS
	-20	-16.43		22.18		-17.56		
	-10	-11.84		30.91		-2.29		
	0	-12.32		-17.36		0.16		
	+10	0.39		-14.65		-16.16		
	+20	-11.08		21.21		-11.64		
	+30	30.34		-6.08		-0.29		
	+40	-11.02		13.64		0.16		
	+55	0.33		28.31		23.91		
4.35	+25	9.48		28.97		-4.42		
3.3	+25	13.31		-7.89		16.4		

9. HSUPA 850MHz Band

Test Conditions		Frequency Deviation						Verdict
Power (VDC)	Temperature (°C)	Channel = 4123 (826.4MHz)		Channel = 4175 (835MHz)		Channel = 4233 (846.6MHz)		
		Hz	Limit	Hz	Limit	Hz	Limit	
3.8	-30	7.98	±2066	32.86	±2087.5	-11.93	±2116.5	PASS
	-20	3.3		28.42		0.52		
	-10	-4.46		7.91		0.87		
	0	16.67		2.6		14.68		
	+10	-1.47		-4.44		-14.39		
	+20	23.81		16.51		-10.93		
	+30	-0.09		-1.26		0.42		
	+40	-11.56		23.45		2.01		
	+55	-5.62		14.08		-7.08		
4.35	+25	25.77		-6.79		7.67		
3.3	+25	-16.49		21.87		-1.97		

10. HSUPA 1900MHz Band

Test Conditions		Frequency Deviation						Verdict
Power (VDC)	Temperature (°C)	Channel = 9262 (1852.4MHz)		Channel = 9400 (1880.0MHz)		Channel = 9538 (1907.6MHz)		
		Hz	Limits	Hz	Limits	Hz	Limits	
3.8	-30	32.84	±1852.4	11.67	±1880	16.63	±1907.6	PASS
	-20	28.4		25.54		-15.5		
	-10	7.89		34.13		-9.96		
	0	2.58		-10.2		1.39		
	+10	-4.46		-7.79		1.84		
	+20	16.49		18.47		-4.81		
	+30	-1.28		-8.82		26.08		
	+40	23.43		10.9		11.46		
	+55	14.06		25.57		25.59		
4.35	+25	-6.81		26.23		-2.74		
3.3	+25	21.85		-10.68		6.88		

11. HSPA+ 850MHz Band

Test Conditions		Frequency Deviation						Verdict
Power (VDC)	Temperature (°C)	Channel = 4123 (826.4MHz)		Channel = 4175 (835MHz)		Channel = 4233 (846.6MHz)		
		Hz	Limit	Hz	Limit	Hz	Limit	
3.8	-30	3.53	±2066	-7.87	±2087.5	9.28	±2116.5	PASS
	-20	-8.66		17.85		-18.14		
	-10	-13.1		10.51		18.53		
	0	-8.59		-15.07		-4.6		
	+10	5.56		6.74		20.12		
	+20	-3.93		-8.67		18.53		
	+30	9.49		30.45		-16.6		
	+40	27.46		4.5		21.12		
	+55	-12.6		-29.74		14.73		
4.35	+25	-2.91		25.67		-11.87		
3.3	+25	16.34		-6.23		9.04		

12. HSPA+ 1900MHz Band

Test Conditions		Frequency Deviation						Verdict
Power (VDC)	Temperature (°C)	Channel = 9262 (1852.4MHz)		Channel = 9400 (1880.0MHz)		Channel = 9538 (1907.6MHz)		
		Hz	Limits	Hz	Limits	Hz	Limits	
3.8	-30	14.46	±1852.4	-23.77	±1880	26.46	±1907.6	PASS
	-20	15.06		-13.36		-9.56		
	-10	21.22		36.83		20.65		
	0	-24.72		-6.71		12.88		
	+10	-14.31		-12.35		-14.75		
	+20	34.88		-22.77		8.78		
	+30	-8.66		14.48		-1.49		
	+40	-14.3		-13.15		17.14		
	+55	26.02		24.97		-23.61		
4.35	+25	7.57		9.53		30.03		
3.3	+25	2.43		-30.61		18.51		

2.5 Conducted Out of Band Emissions

2.5.1 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.

2.5.2 Test Description

See section 2.1.2 of this report.

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.

1. Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	Agilent	E5515C	GB43130131	2015.02.26	2016.02.25
Spectrum Analyzer	Agilent	E7405A	US44210471	2015.02.26	2016.02.25
Power Meter	Agilent	E4418B	GB43318055	2015.02.26	2016.02.25
Power Sensor	Agilent	8482A	MY41091706	2015.02.26	2016.02.25
Power Splitter	Weinschel	1506A	NW521	2015.02.26	2016.02.25
Attenuator 1	Resnet	20dB	(n.a.)	2015.02.26	2016.02.25
Attenuator 2	Resnet	3dB	(n.a.)	2015.02.26	2016.02.25

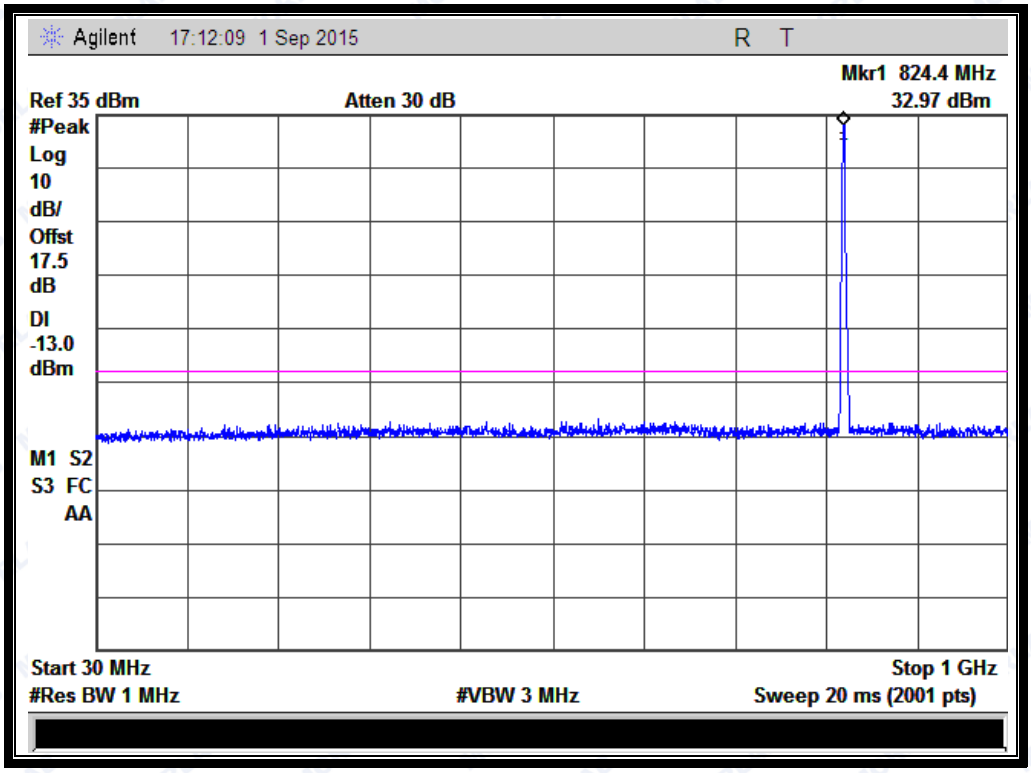
2. Test Verdict:

Band	Channel	Frequency (MHz)	Measured Max. Spurious Emission (dBm)	Refer to Plot	Limit (dBm)	Verdict
GSM 850MHz	128	824.2	-19.32	Plot A1 to A1.1	-13	PASS
	190	836.6	-19.38	Plot A2 to A2.1		PASS
	251	848.8	-18.88	Plot A3 to A3.1		PASS
GSM 1900MHz	512	1850.2	-18.78	Plot B1 to B1.1	-13	PASS
	661	1880.0	-18.94	Plot B2 to B2.1		PASS
	810	1909.8	-18.5	Plot B3 to B3.1		PASS
EGPRS 850MHz	128	824.2	-20.32	Plot E1 to E1.1	-13	PASS
	190	836.6	-20.4	Plot E2 to E2.1		PASS
	251	848.8	-21.22	Plot E3 to E3.1		PASS
EGPRS 1900MHz	512	1850.2	-19.49	Plot F1 to F1.1	-13	PASS
	661	1880.0	-19.72	Plot F2 to F2.1		PASS
	810	1909.8	-21.14	Plot F3 to F3.1		PASS

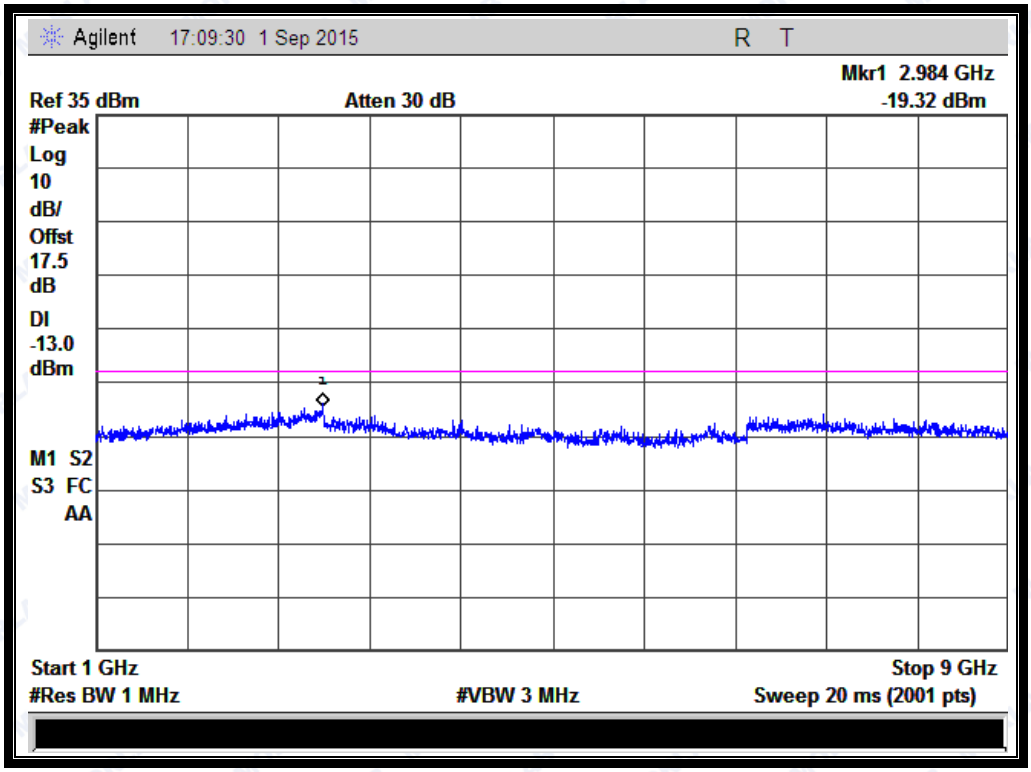
Band	Channel	Frequency (MHz)	Measured Max. Spurious Emission (dBm)	Refer to Plot	Limit (dBm)	Verdict
WCDMA 850MHz	4132	826.4	< -25	Plot G1 to G1.1	-13	PASS
	4175	835.0	< -25	Plot G2 to G2.1		PASS
	4233	846.6	< -25	Plot G3 to G3.1		PASS
WCDMA 1900MHz	9262	1852.4	-22.720	Plot H1 to H1.1	-13	PASS
	9400	1880.0	-22.557	Plot H2 to H2.1		PASS
	9538	1907.6	-18.733	Plot H3 to H3.1		PASS
HSDPA 850MHz	4132	826.4	< -25	Plot I1 to I1.1	-13	PASS
	4175	835.0	< -25	Plot I2 to I2.1		PASS
	4233	846.6	< -25	Plot I3 to I3.1		PASS
HSDPA 1900MHz	9262	1852.4	-24.587	Plot J1 to J1.1	-13	PASS
	9400	1880.0	-22.859	Plot J2 to J2.1		PASS
	9538	1907.6	-18.595	Plot J3 to J3.1		PASS
HSUPA 850MHz	4132	826.4	< -25	Plot K1 to K1.1	-13	PASS
	4175	835.0	< -25	Plot K2 to K2.1		PASS
	4233	846.6	< -25	Plot K3 to K3.1		PASS
HSUPA 1900MHz	9262	1852.4	< -25	Plot L1 to L1.1	-13	PASS
	9400	1880.0	-22.634	Plot L2 to L2.1		PASS
	9538	1907.6	-18.345	Plot L3 to L3.1		PASS
HSPA+ 850MHz	4132	826.4	< -25	Plot M1 to M1.1	-13	PASS
	4175	835.0	< -25	Plot M2 to M2.1		PASS
	4233	846.6	< -25	Plot M3 to M3.1		PASS
HSPA+ 1900MHz	9262	1852.4	-23.629	Plot N1 to N1.1	-13	PASS
	9400	1880.0	-21.423	Plot N2 to N2.1		PASS
	9538	1907.6	-18.692	Plot N3 to N3.1		PASS

Test Plots for the Whole Measurement Frequency Range:

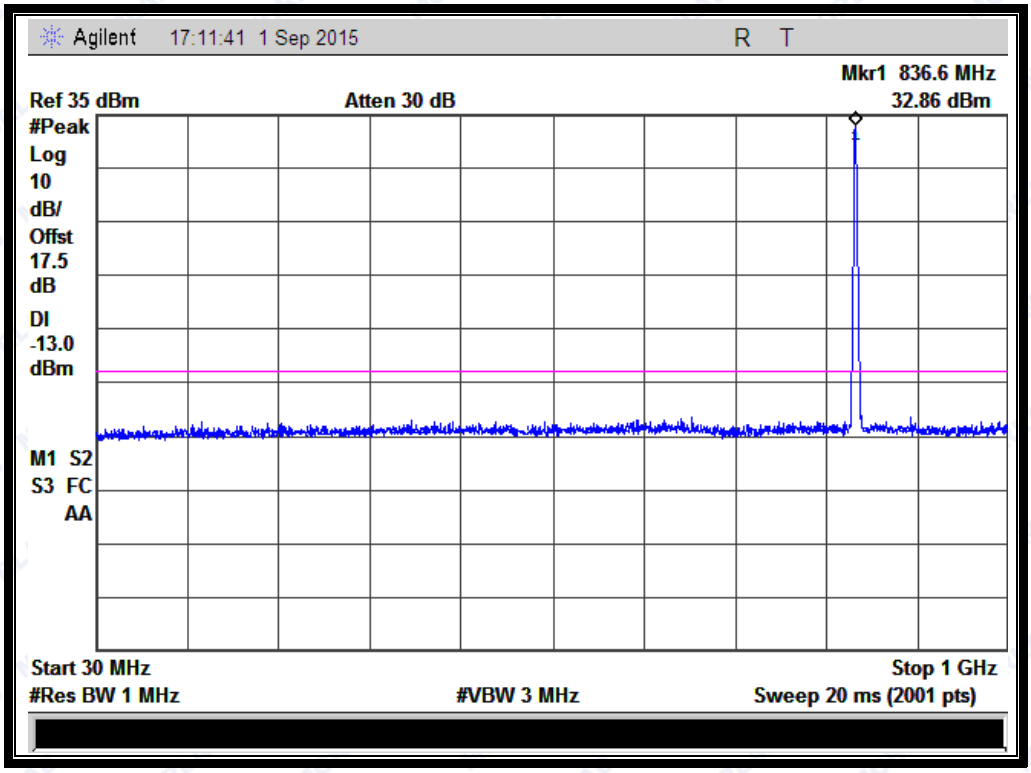
Note: the power of the EUT transmitting frequency should be ignored.



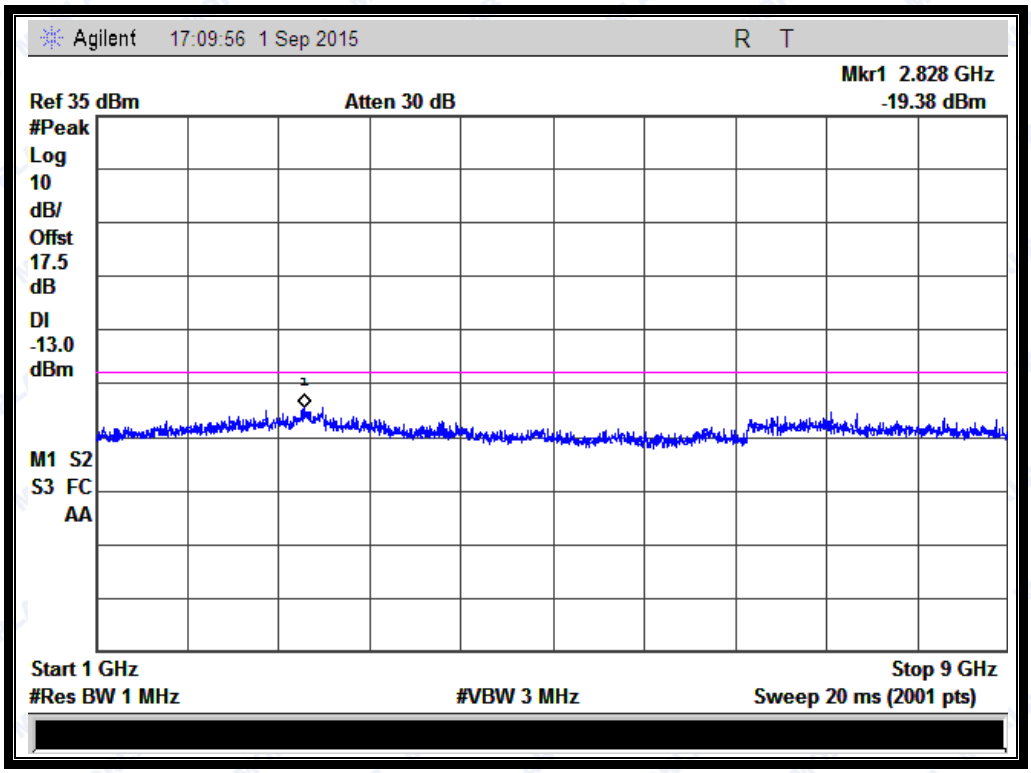
(Plot A1: GSM 850MHz Channel = 128, 30MHz to 1GHz)



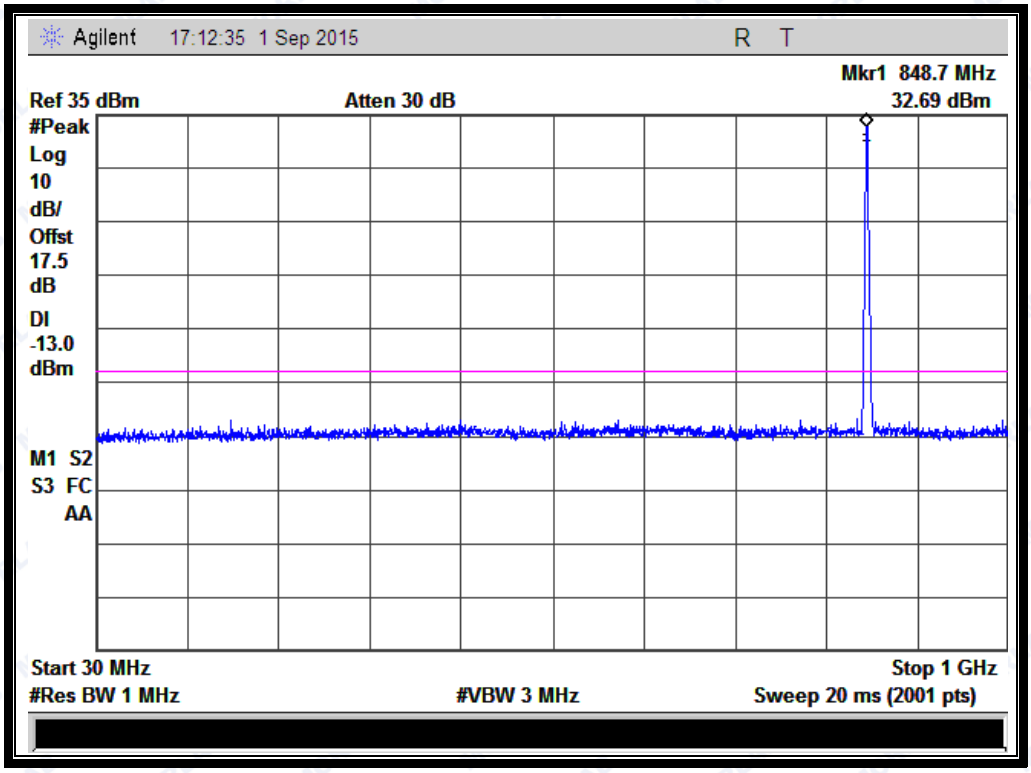
(Plot A1.1: GSM 850MHz Channel = 128, 1GHz to 9GHz)



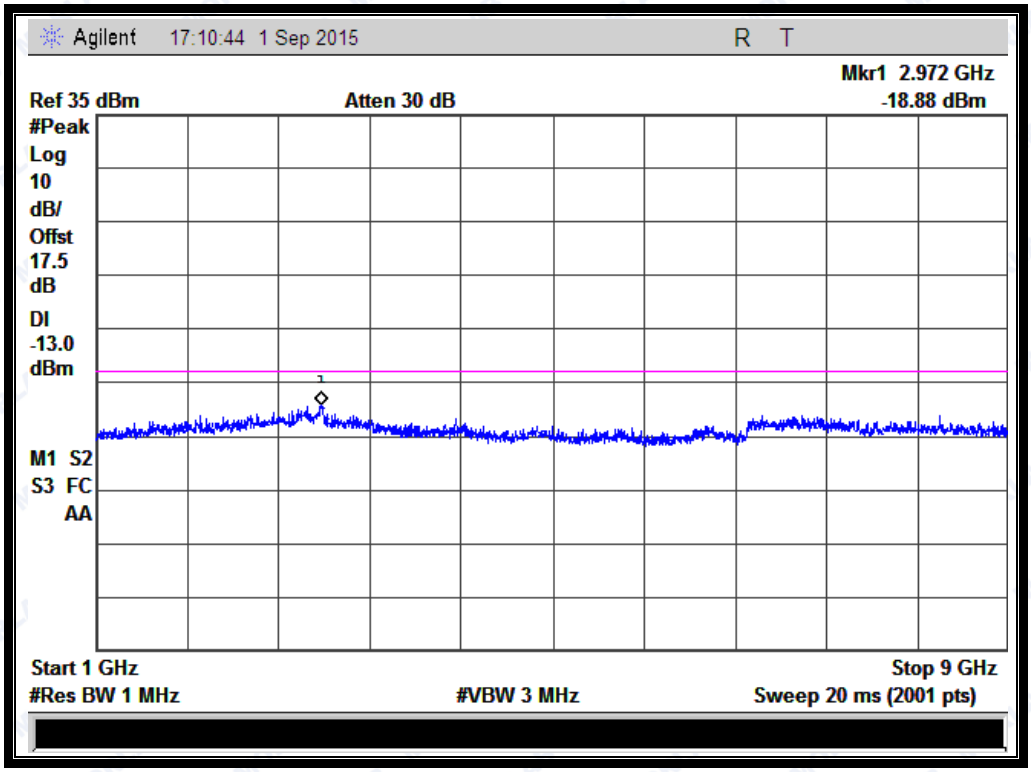
(Plot A2: GSM 850MHz Channel = 190, 30MHz to 1GHz)



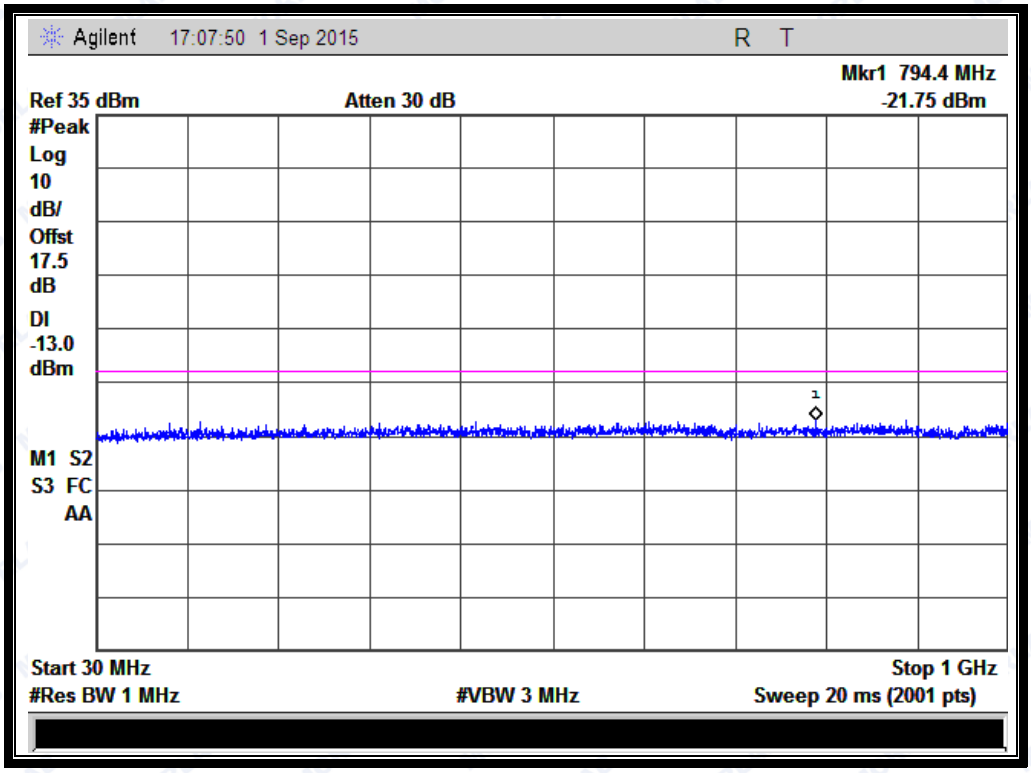
(Plot A2.1: GSM 850MHz Channel = 190, 1GHz to 9GHz)



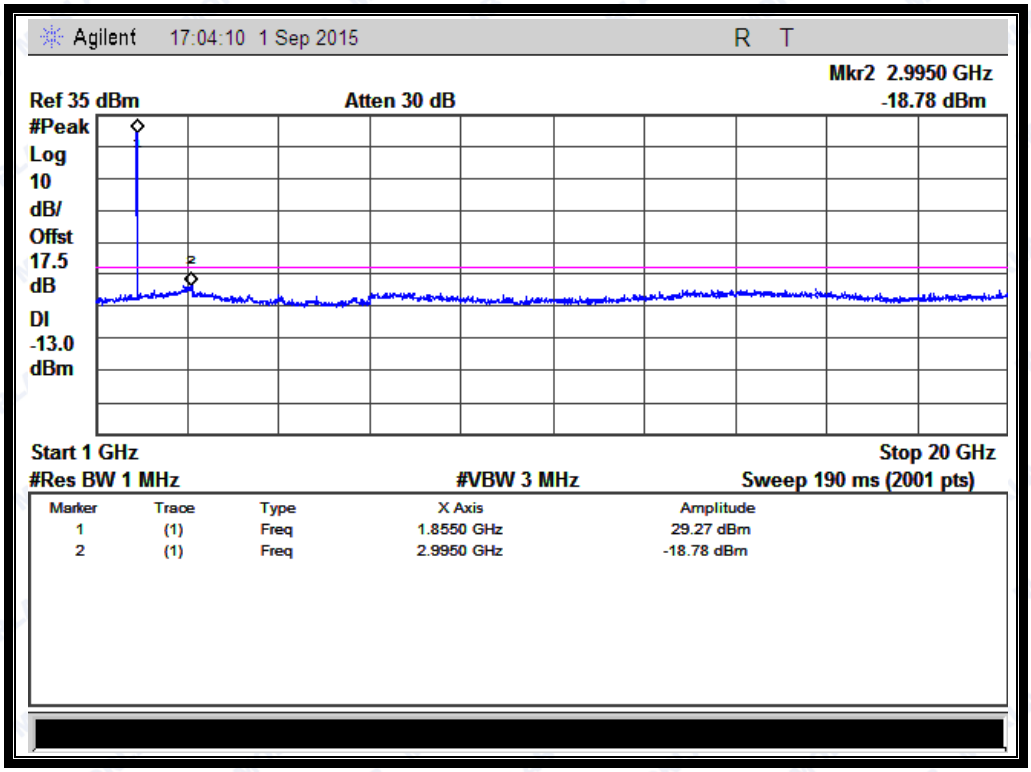
(Plot A3: GSM 850MHz Channel = 251, 30MHz to 1GHz)



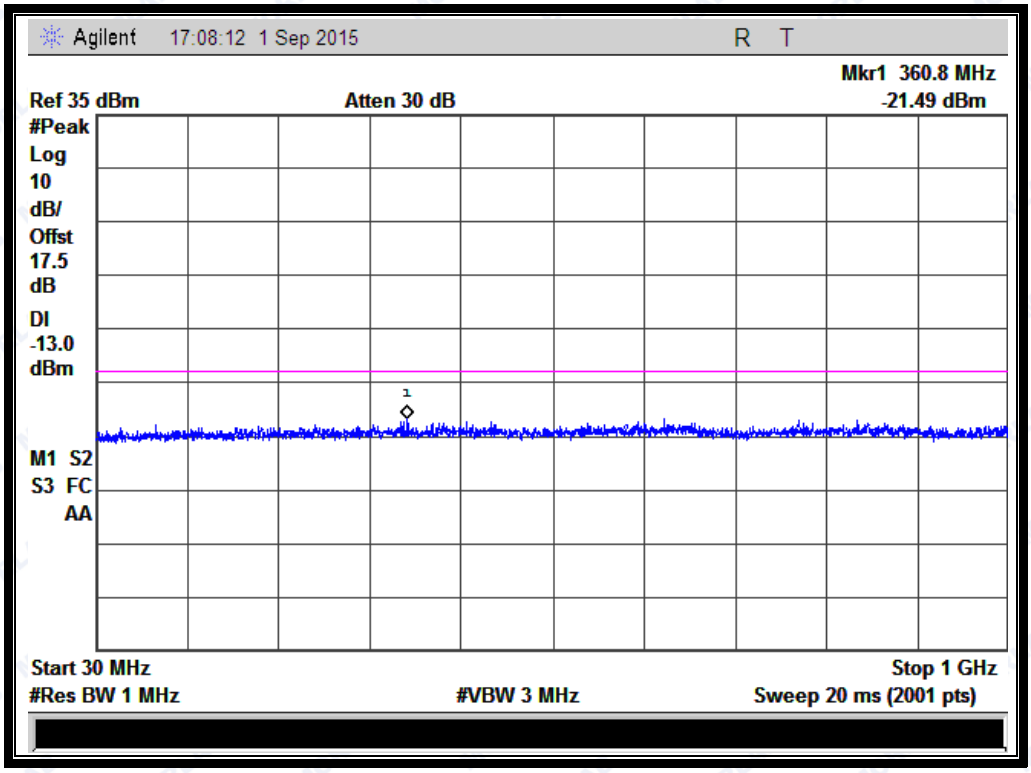
(Plot A3.1: GSM 850MHz Channel = 251, 1GHz to 9GHz)



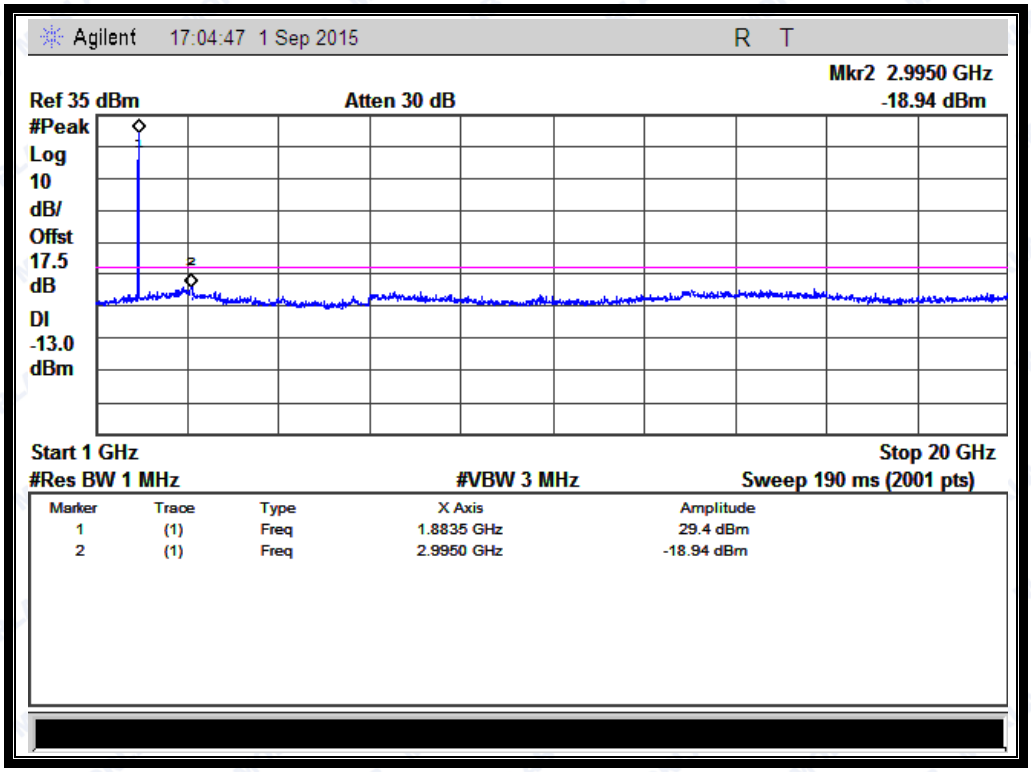
(Plot B1: GSM 1900MHz Channel = 512, 30MHz to 1GHz)



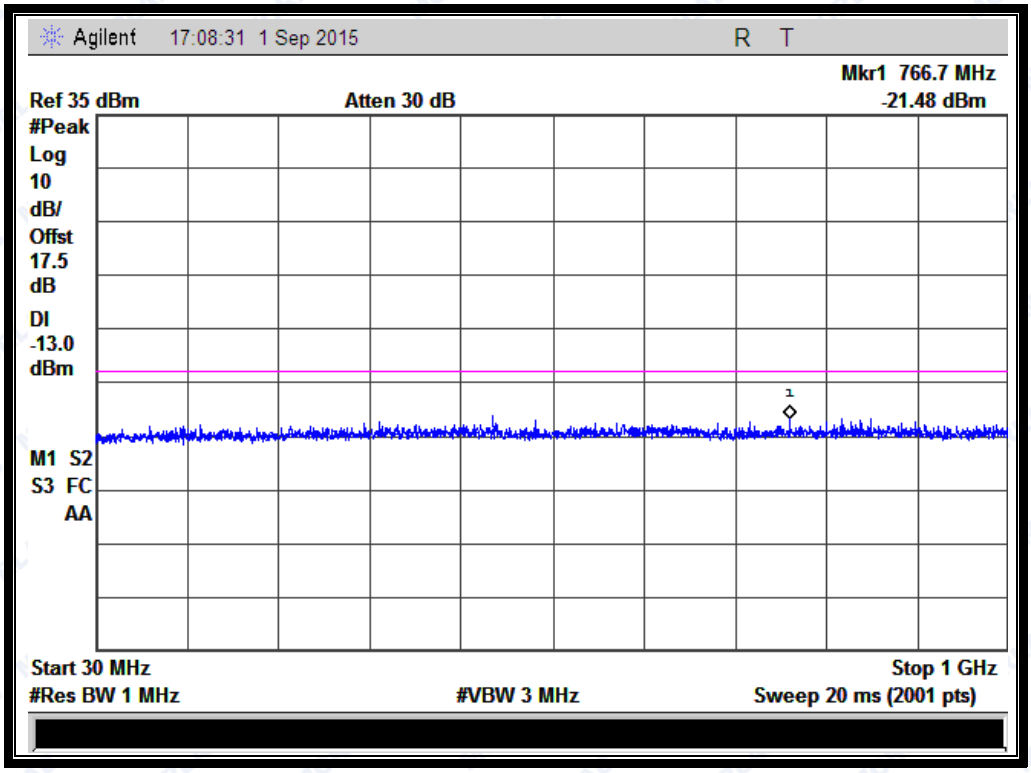
(Plot B1.1: GSM 1900MHz Channel = 512, 1GHz to 20GHz)



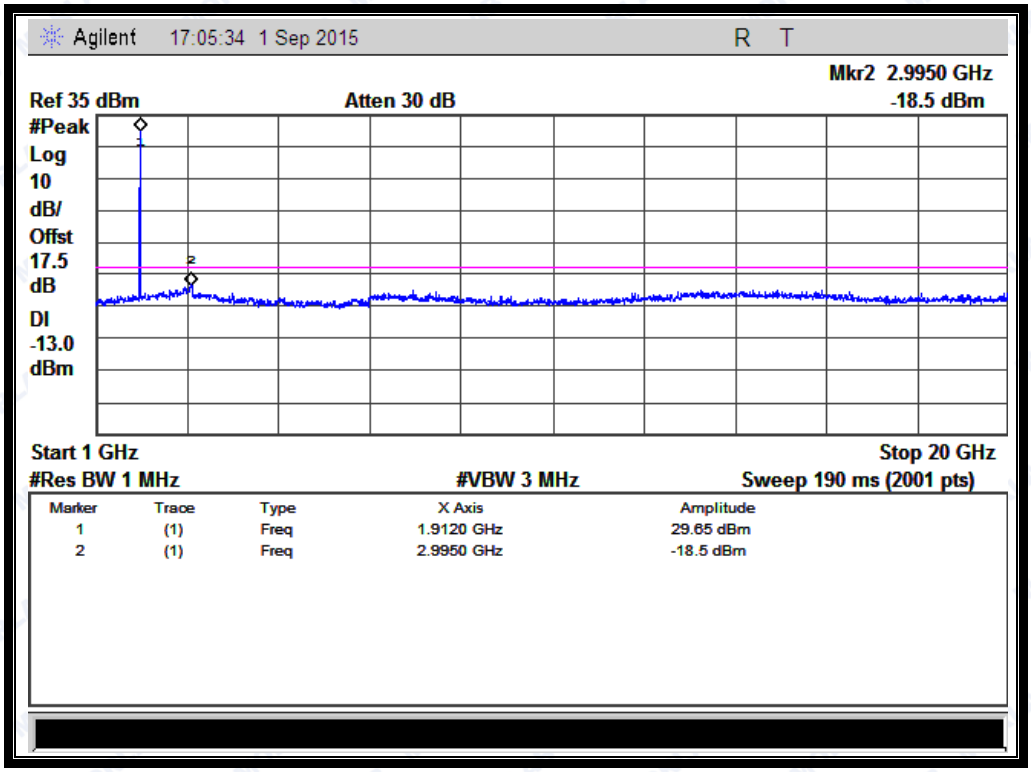
(Plot B2: GSM 1900MHz Channel = 661, 30MHz to 1GHz)



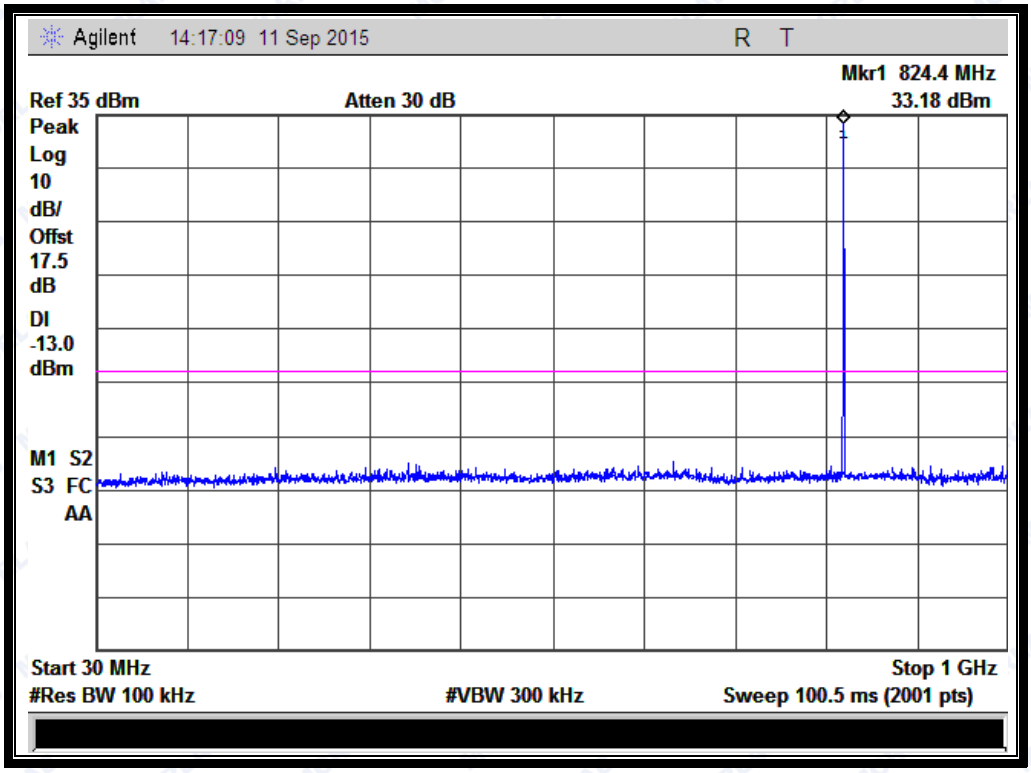
(Plot B2.1: GSM 1900MHz Channel = 661, 1GHz to 20GHz)



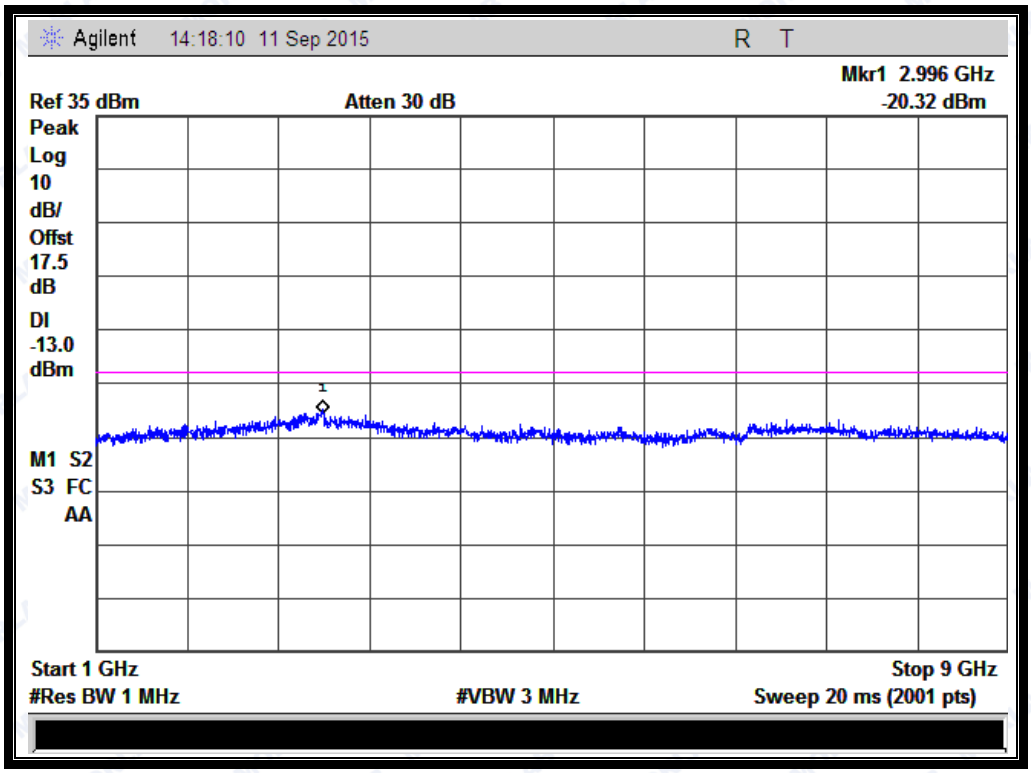
(Plot B3: GSM 1900MHz Channel = 810, 30MHz to 1GHz)



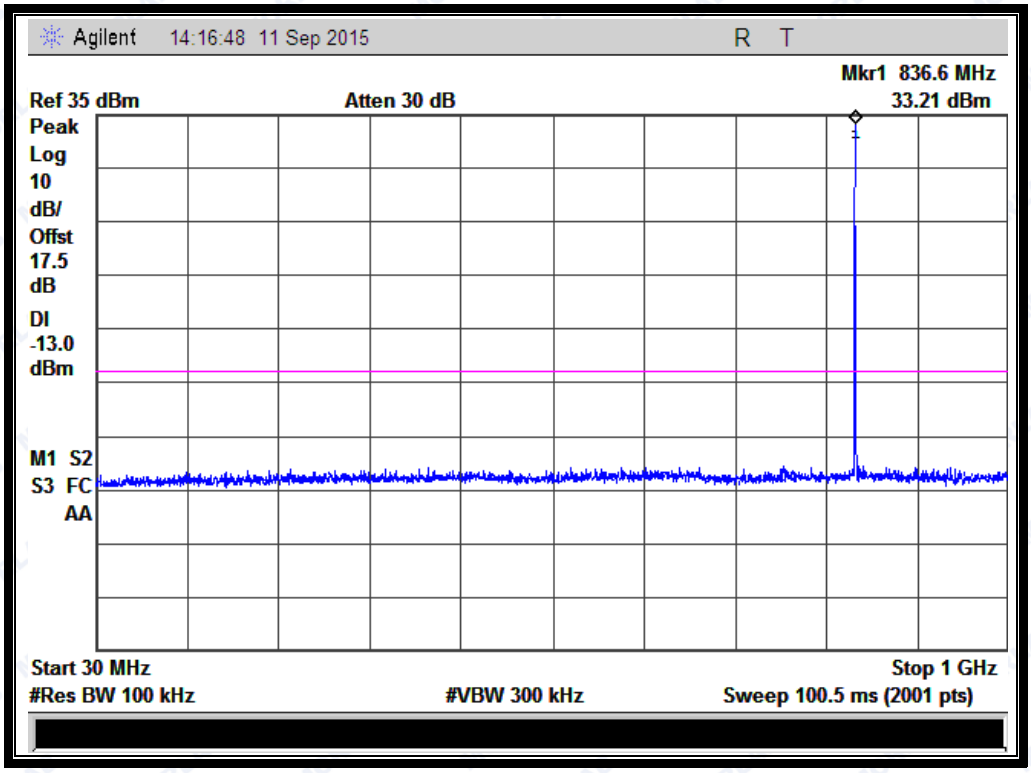
(Plot B3.1: GSM 1900MHz Channel = 810, 1GHz to 20GHz)



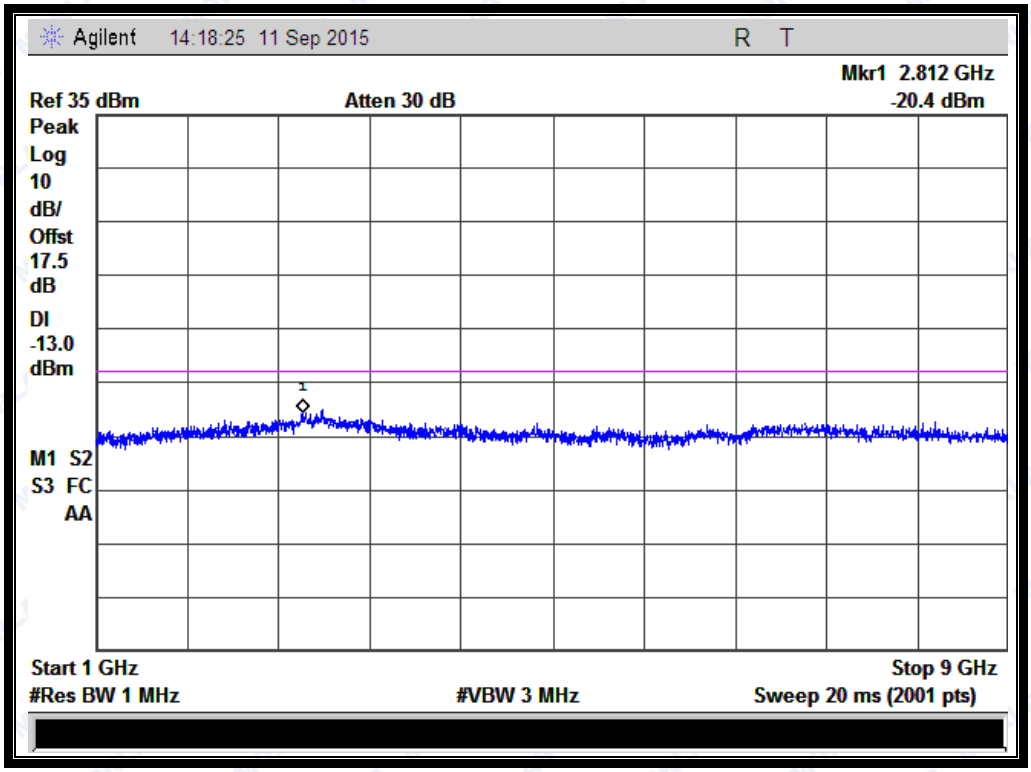
(Plot E1: EGPRS 850MHz Channel = 128, 30MHz to 1GHz)



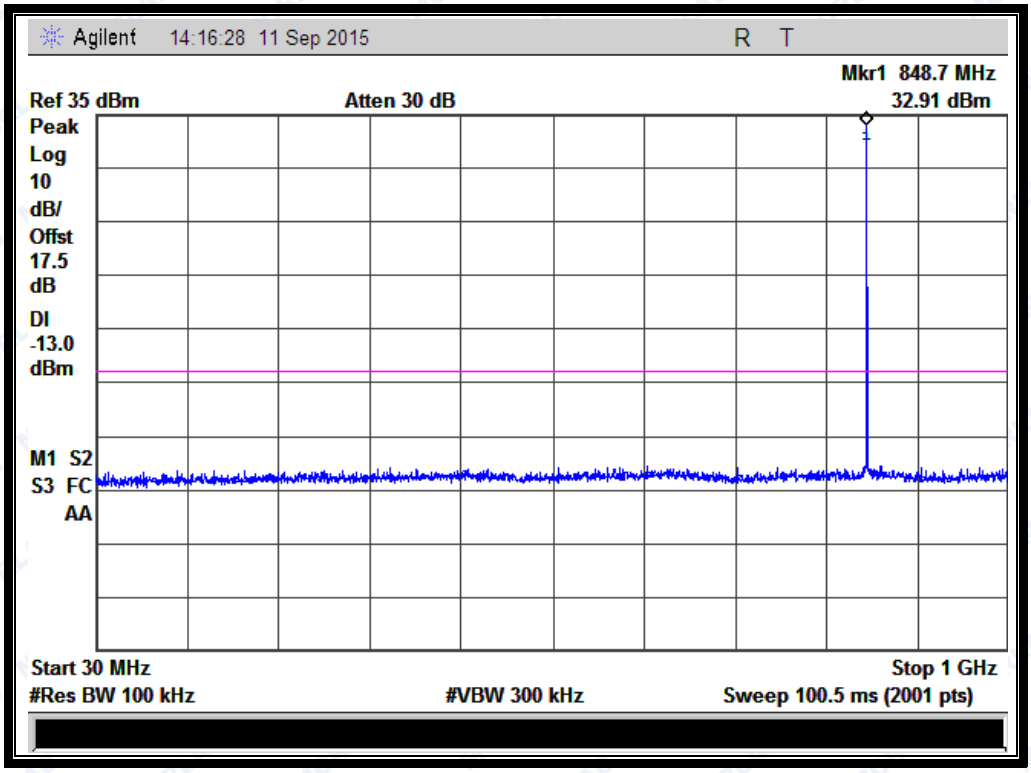
(Plot E1.1: EGPRS 850MHz Channel = 128, 1GHz to 9GHz)



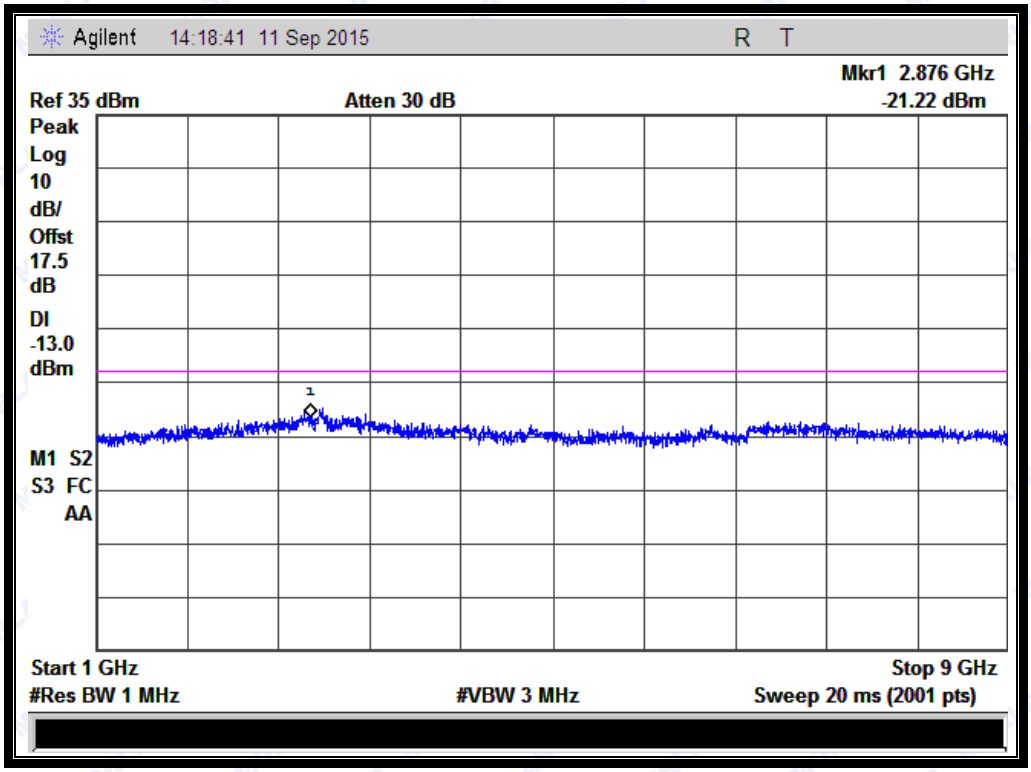
(Plot E2: EGPRS 850MHz Channel = 190, 30MHz to 1GHz)



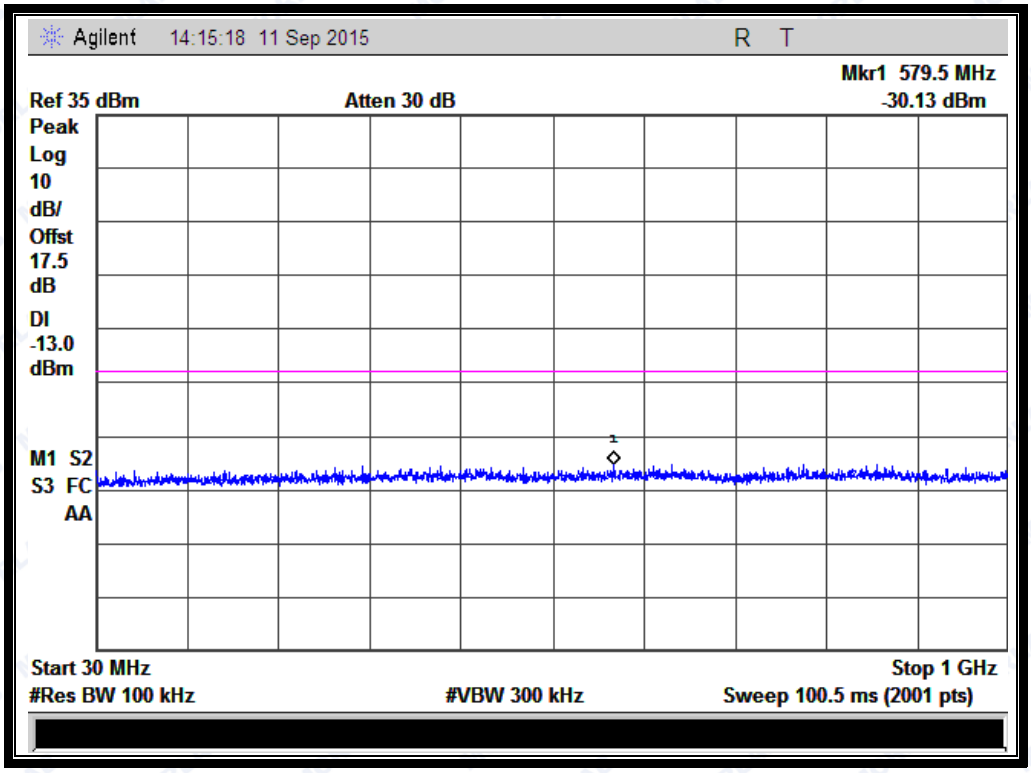
(Plot E2.1: EGPRS 850MHz Channel = 190, 1GHz to 9GHz)



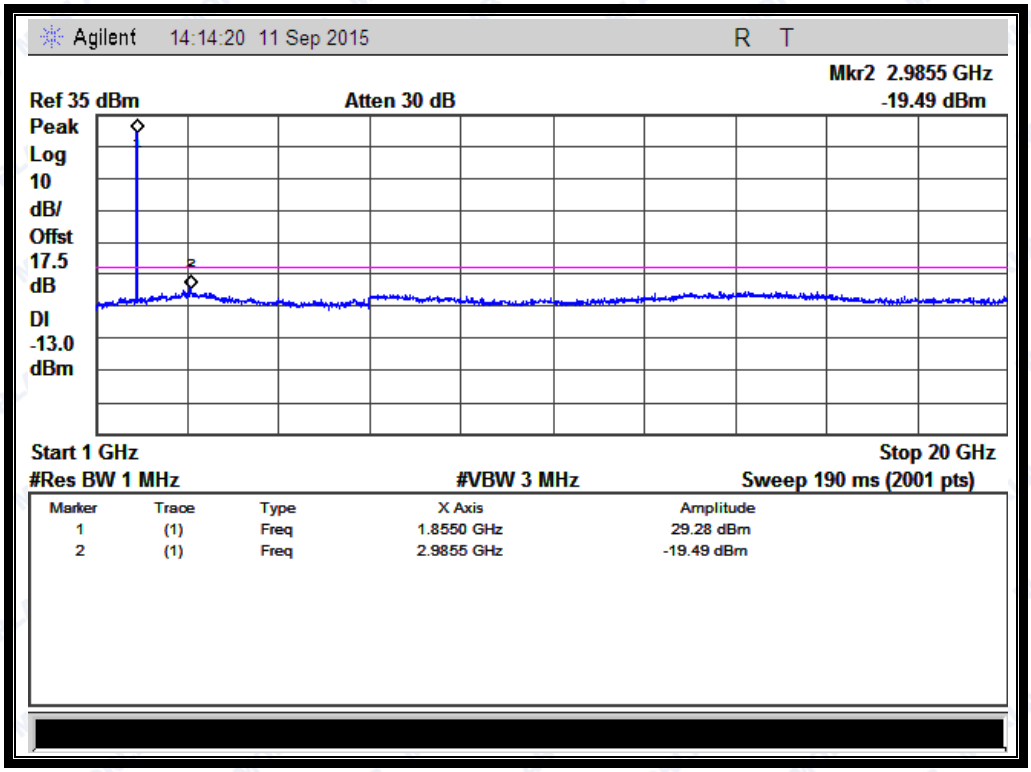
(Plot E3: EGPRS 850MHz Channel = 251, 30MHz to 1GHz)



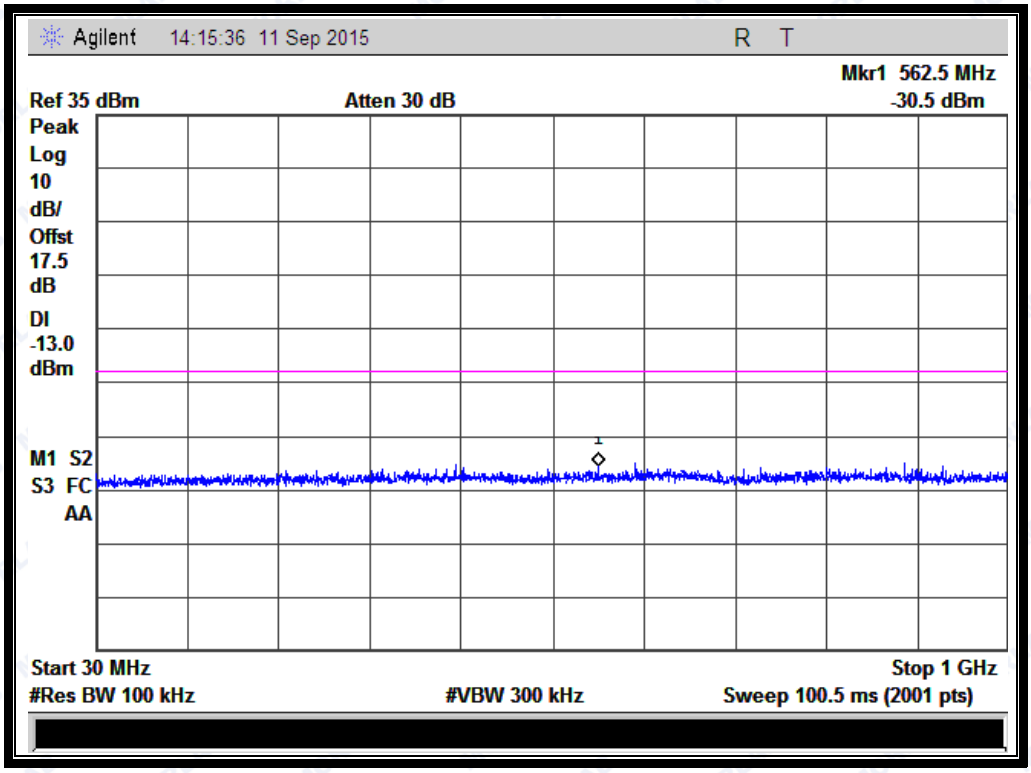
(Plot E3.1: EGPRS 850MHz Channel = 251, 1GHz to 9GHz)



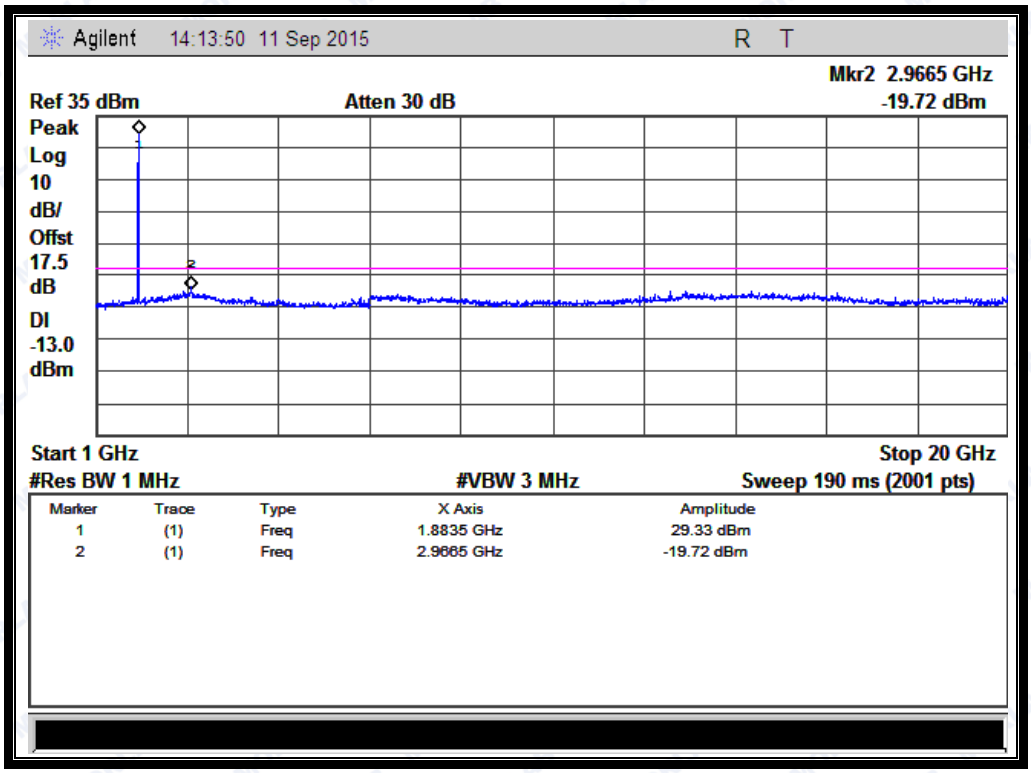
(Plot F1: EGPRS 1900MHz Channel = 512, 30MHz to 1GHz)



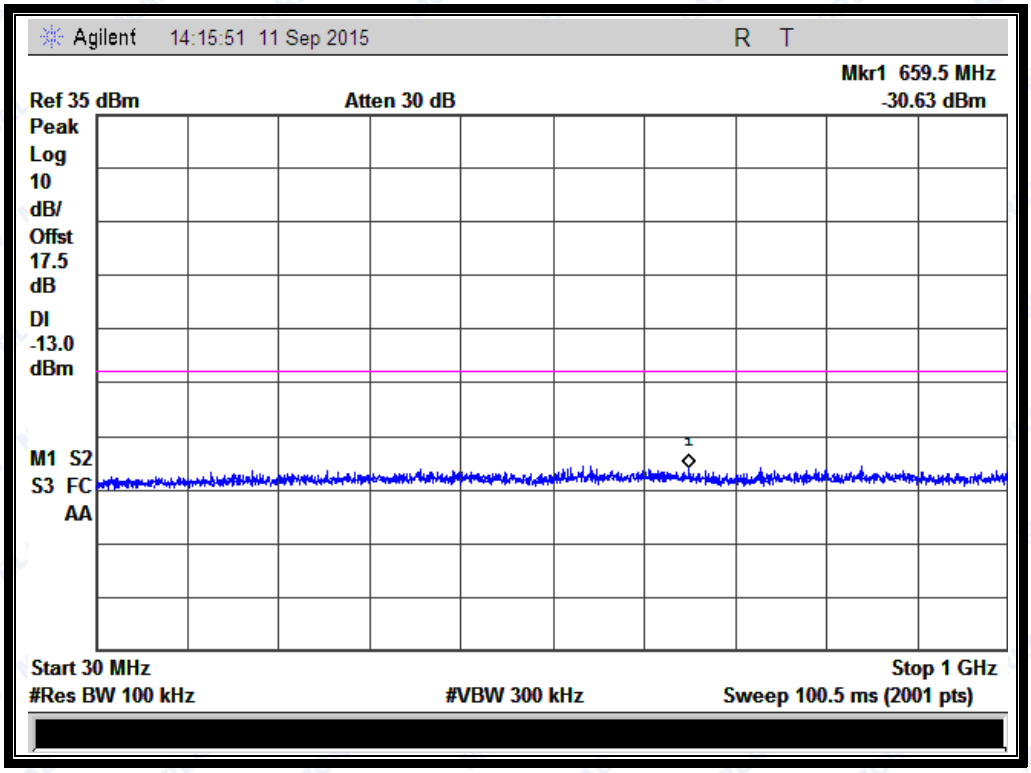
(Plot F1.1: EGPRS 1900MHz Channel = 512, 1GHz to 20GHz)



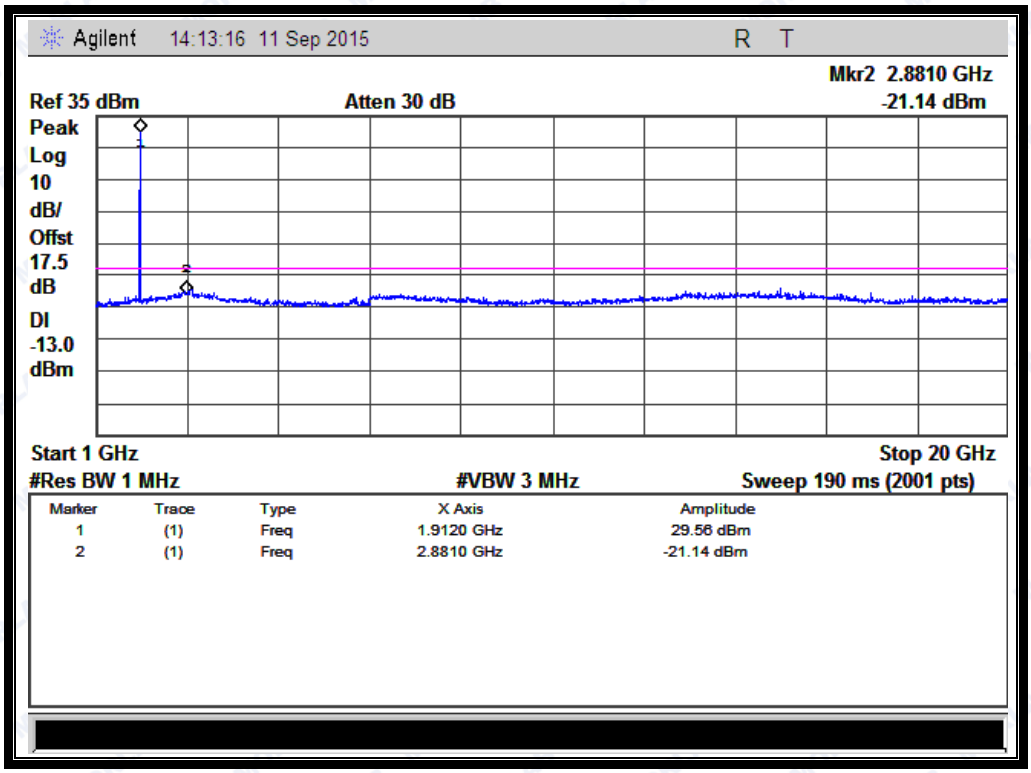
(Plot F2: EGPRS 1900MHz Channel = 661, 30MHz to 1GHz)



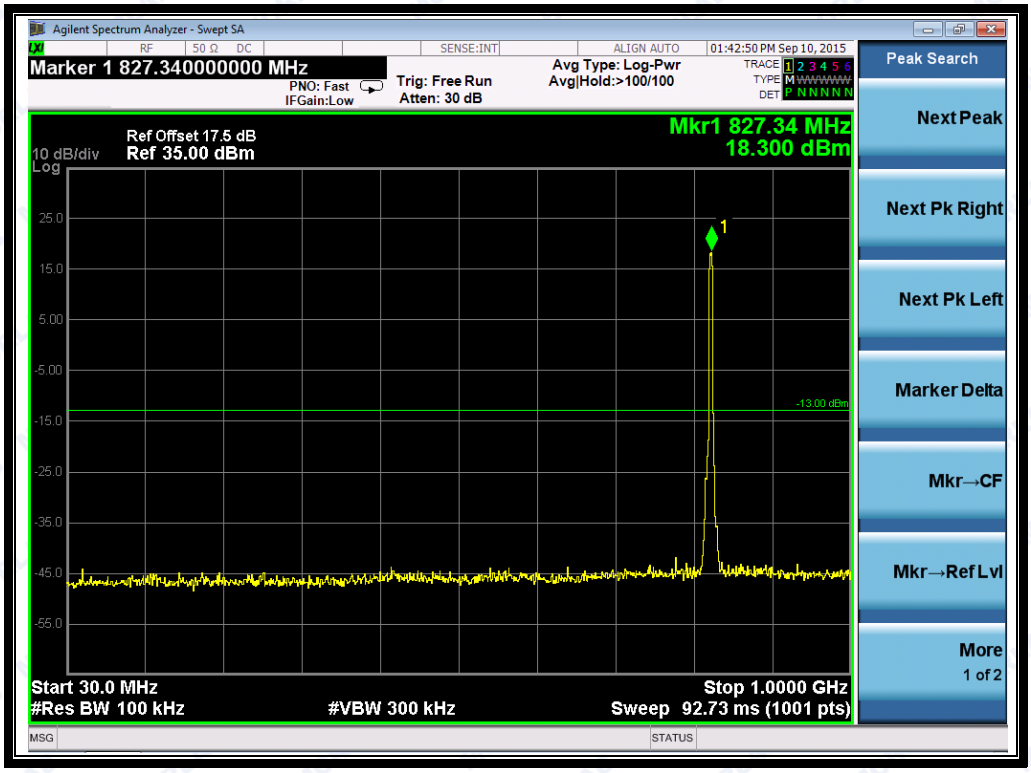
(Plot F2.1: EGPRS 1900MHz Channel = 661, 1GHz to 20GHz)



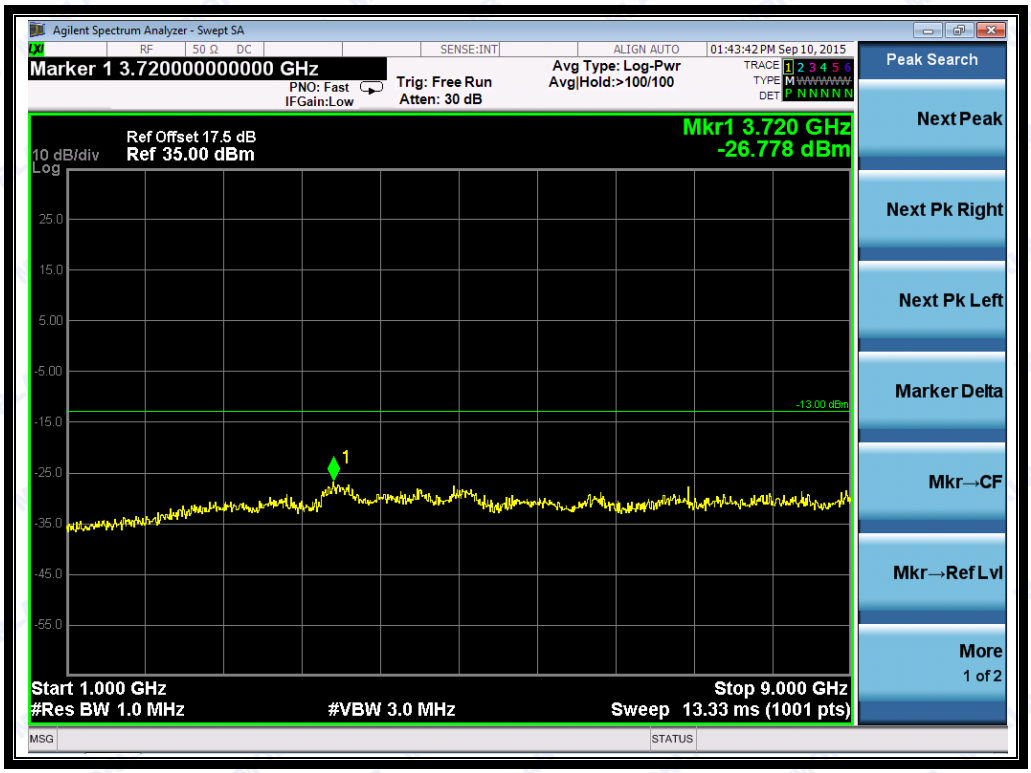
(Plot F3: EGPRS 1900MHz Channel = 810, 30MHz to 1GHz)



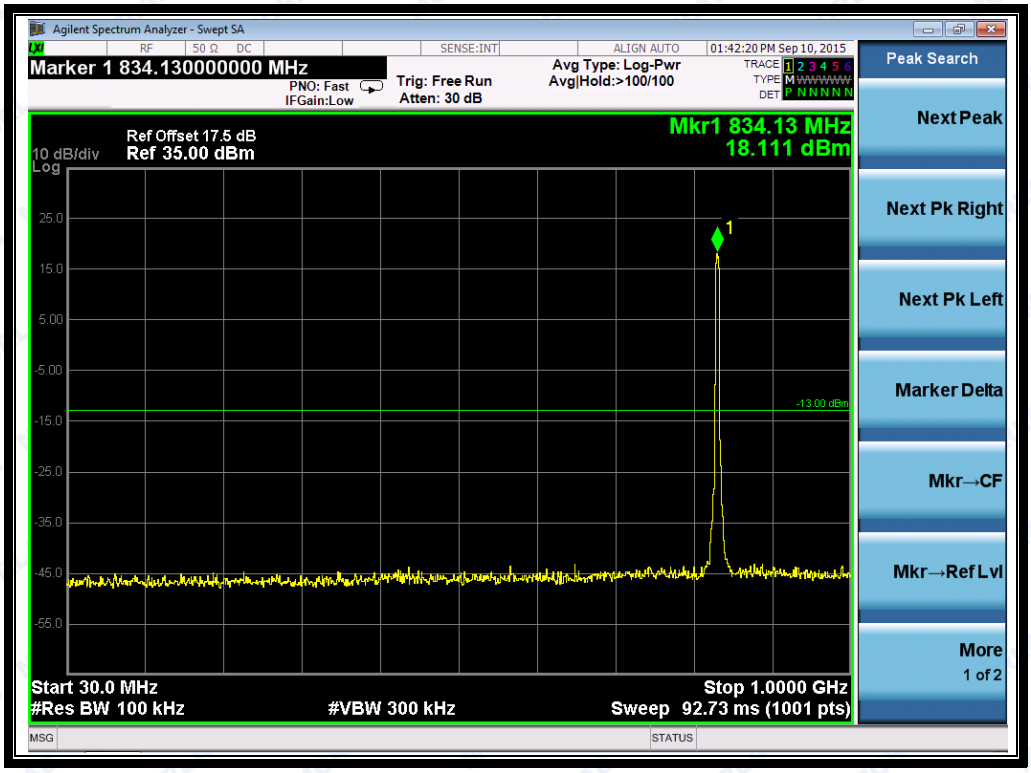
(Plot F3.1: EGPRS 1900MHz Channel = 810, 1GHz to 20GHz)



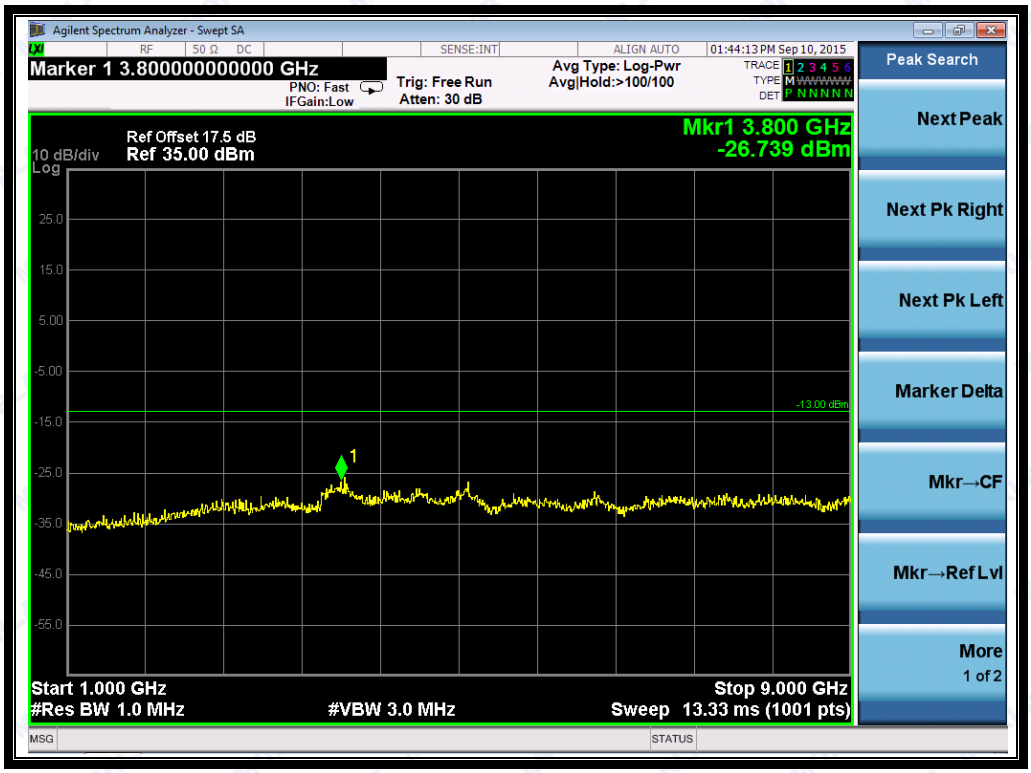
(Plot G1: WCDMA850MHz Channel = 4132, 30MHz to 1GHz)



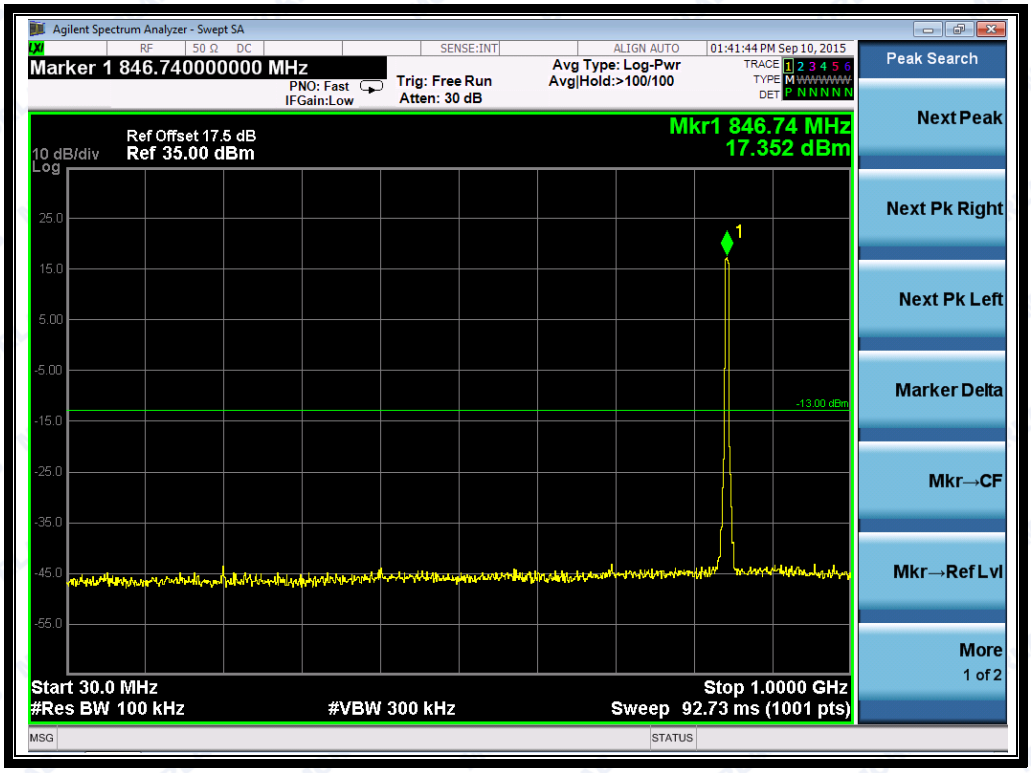
(Plot G1.1: WCDMA850MHz Channel = 4132, 1GHz to 9GHz)



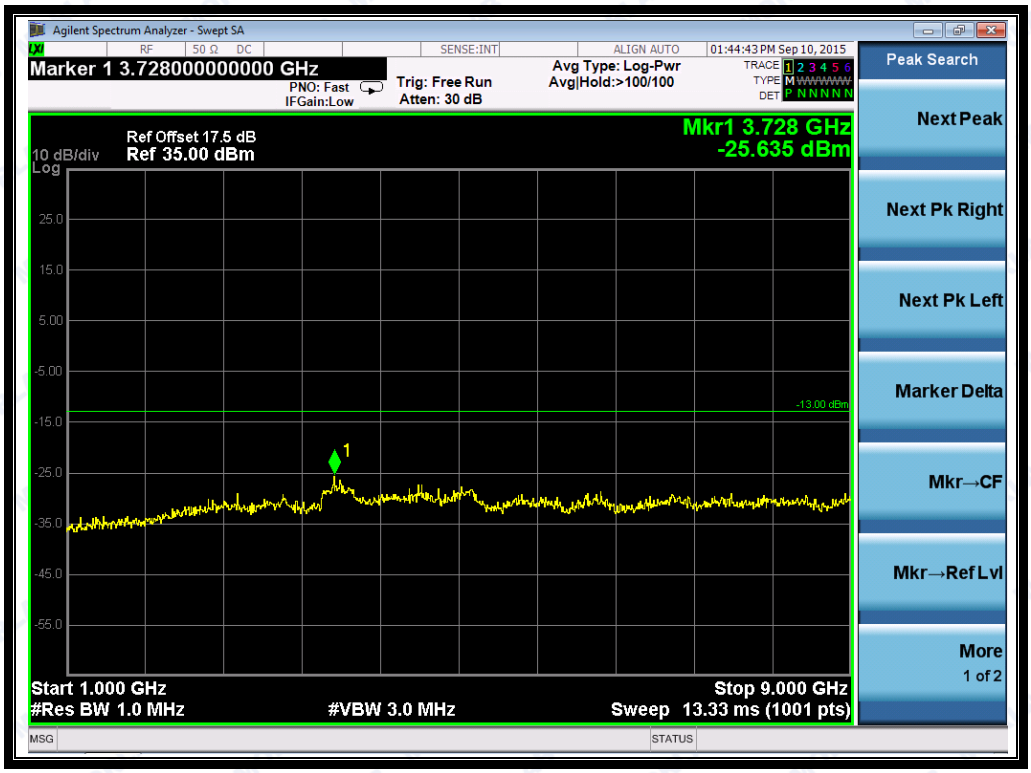
(Plot G2: WCDMA850MHz Channel = 4175, 30MHz to 1GHz)



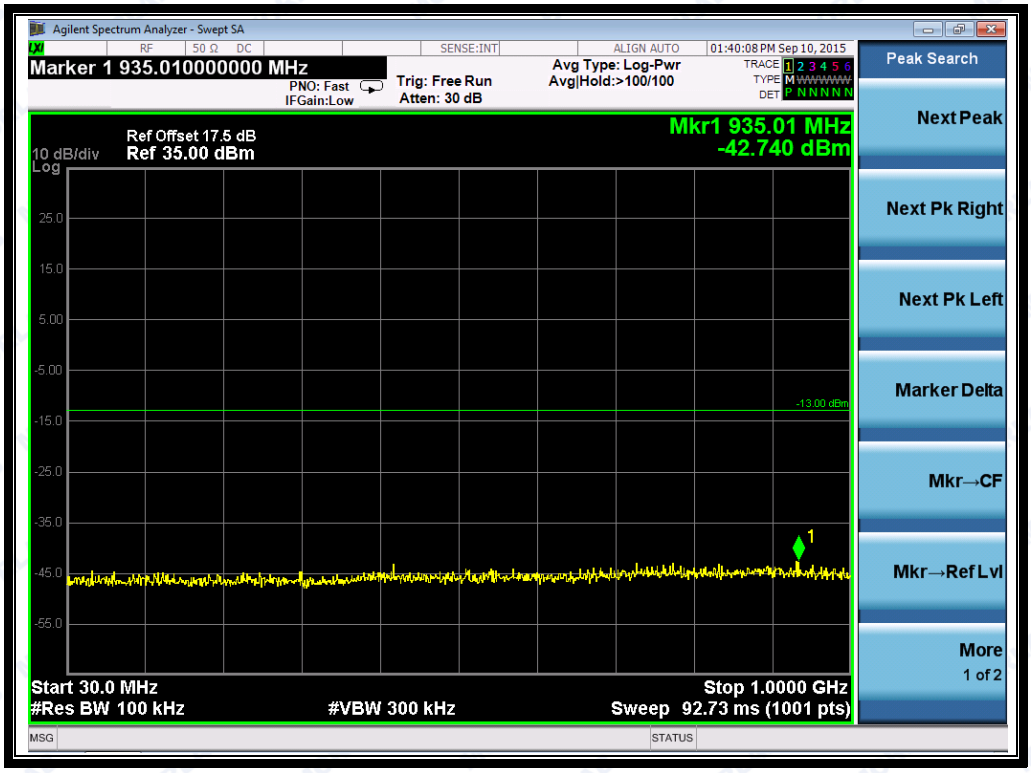
(Plot G2.1: WCDMA850MHz Channel = 4175, 1GHz to 9GHz)



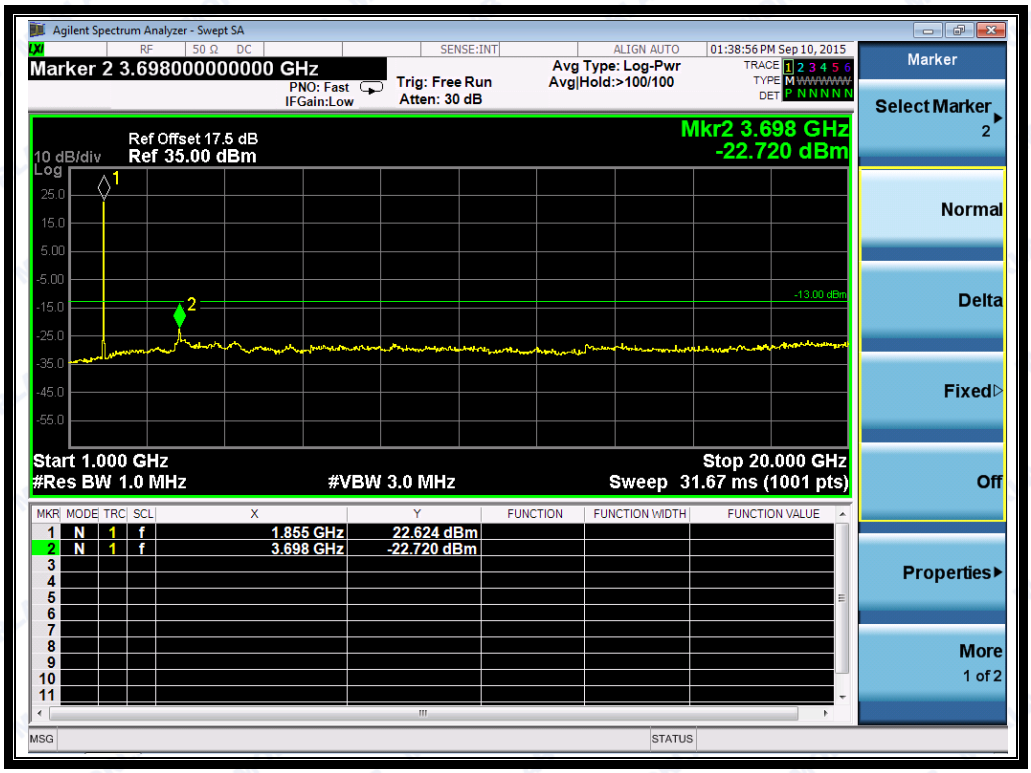
(Plot G3: WCDMA850MHz Channel = 4233, 30MHz to 1GHz)



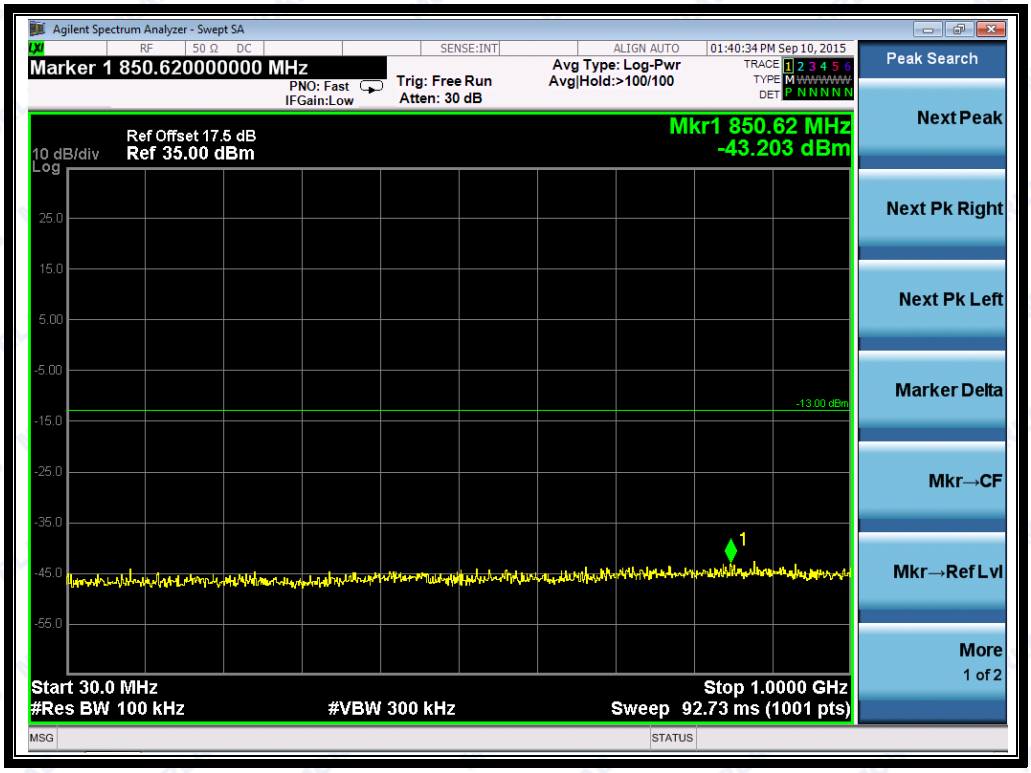
(Plot G3.1: WCDMA850MHz Channel = 4233, 1GHz to 9GHz)



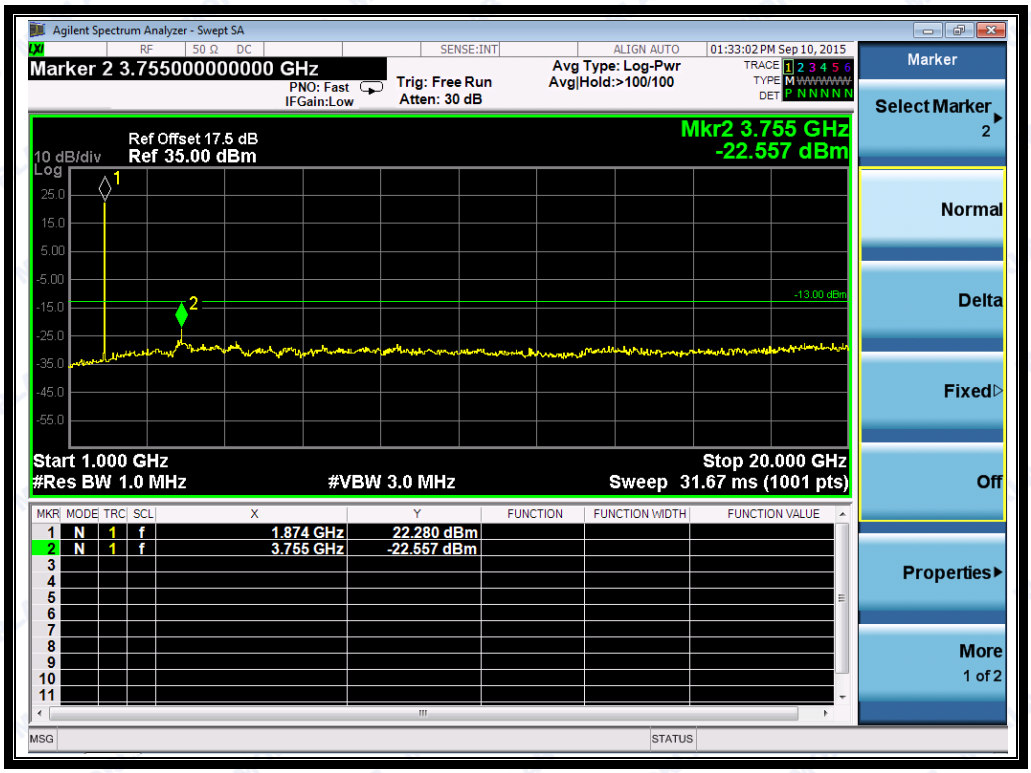
(Plot H1: WCDMA1900MHz Channel = 9262, 30MHz to 1GHz)



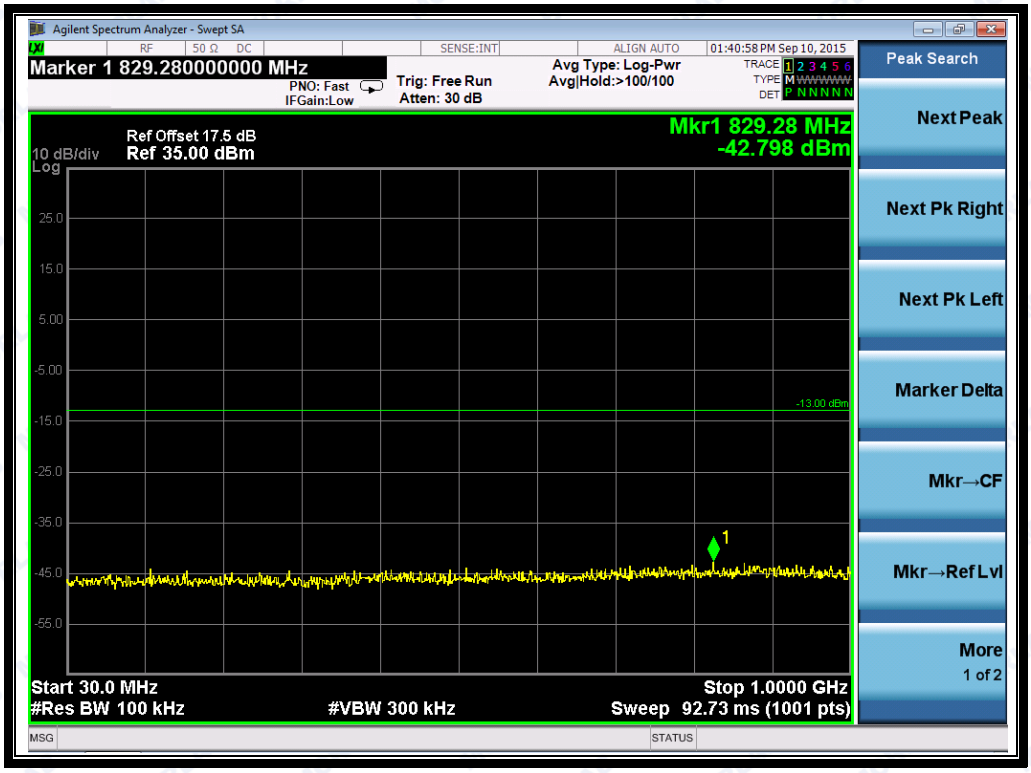
(Plot H1.1: WCDMA1900MHz Channel = 9262, 1GHz to 20GHz)



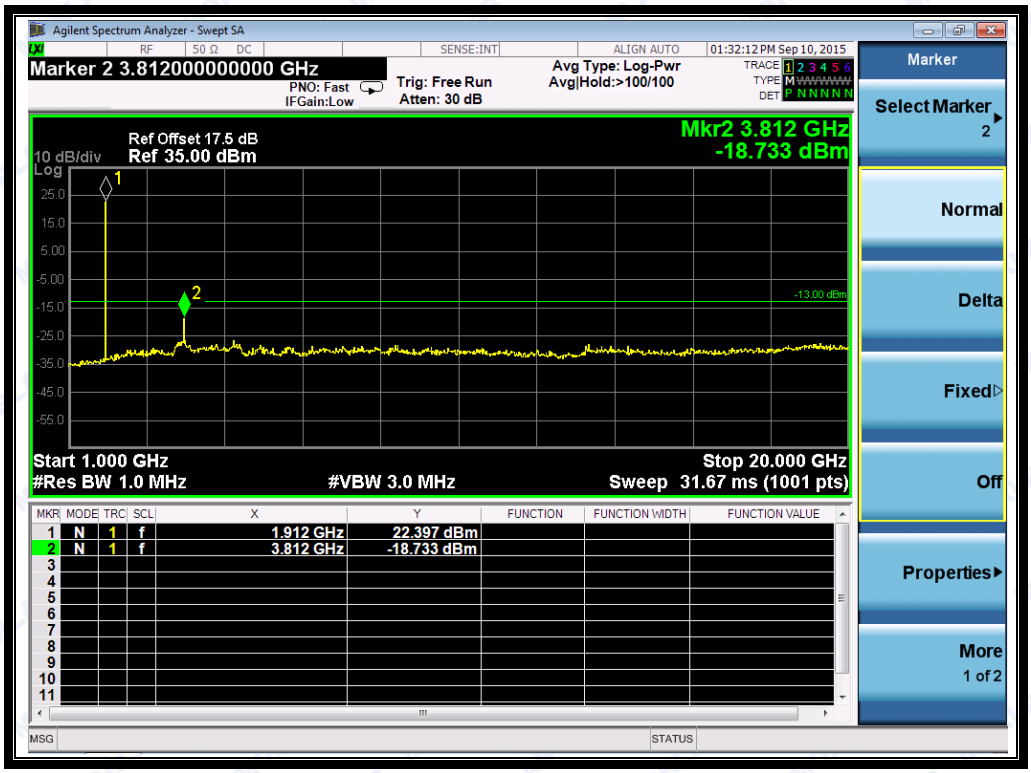
(Plot H2: WCDMA1900MHz Channel = 9400, 30MHz to 1GHz)



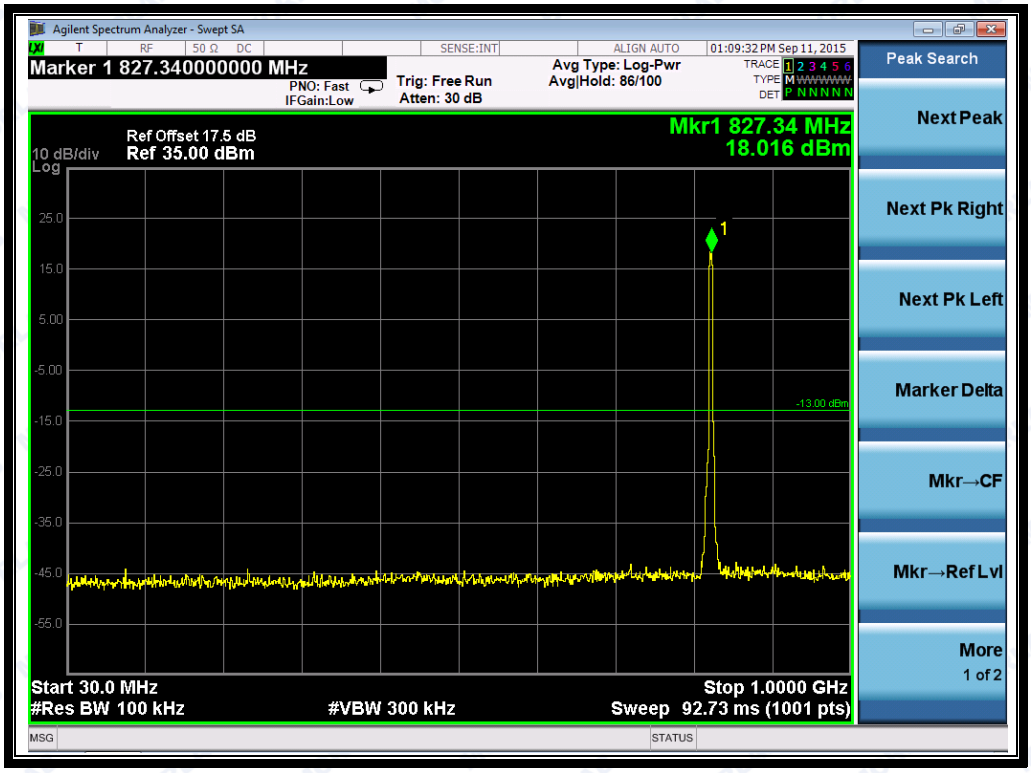
(Plot H2.1: WCDMA1900MHz Channel = 9400, 1GHz to 20GHz)



(Plot H3: WCDMA1900MHz Channel = 9538, 30MHz to 1GHz)

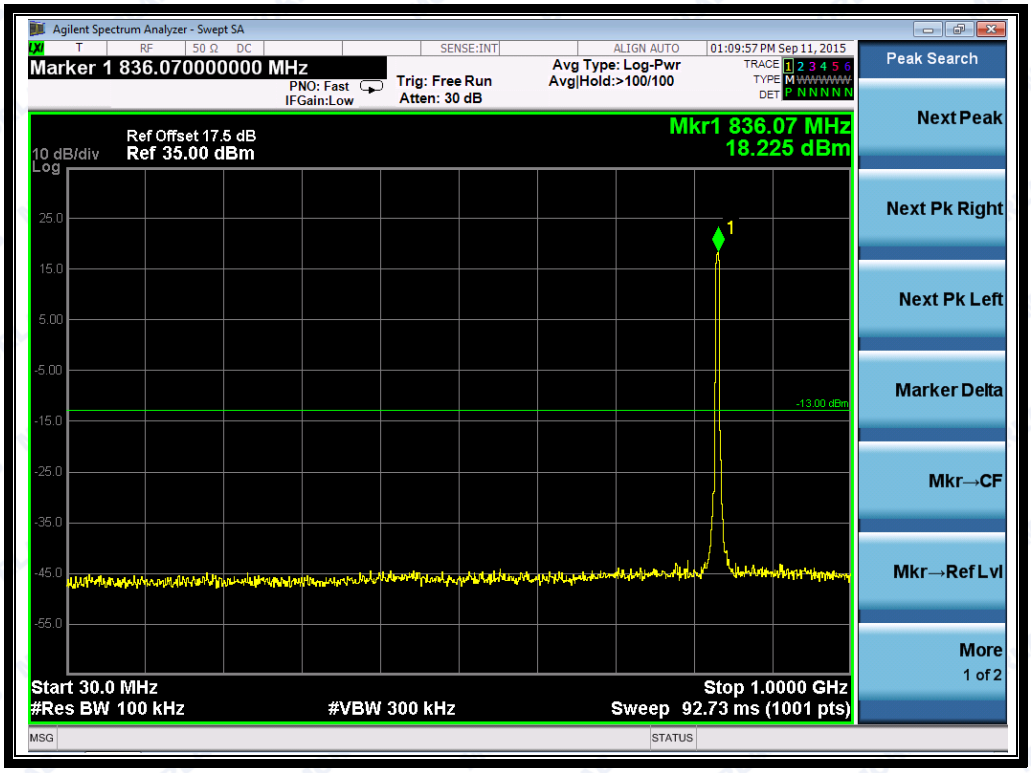


(Plot H3.1: WCDMA1900MHz Channel = 9538 1GHz to 20GHz)



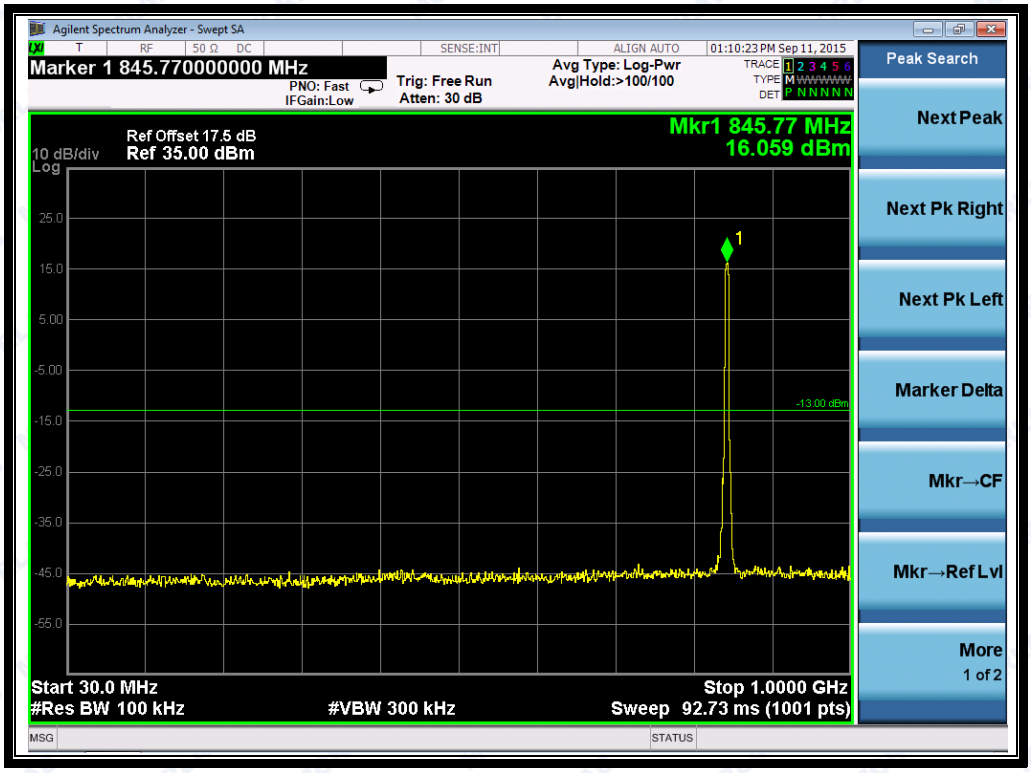
(Plot I1: HSDPA 850MHz Channel = 4132, 30MHz to 1GHz)

(Plot I1.1: HSDPA 850MHz Channel = 4132, 1GHz to 9GHz)

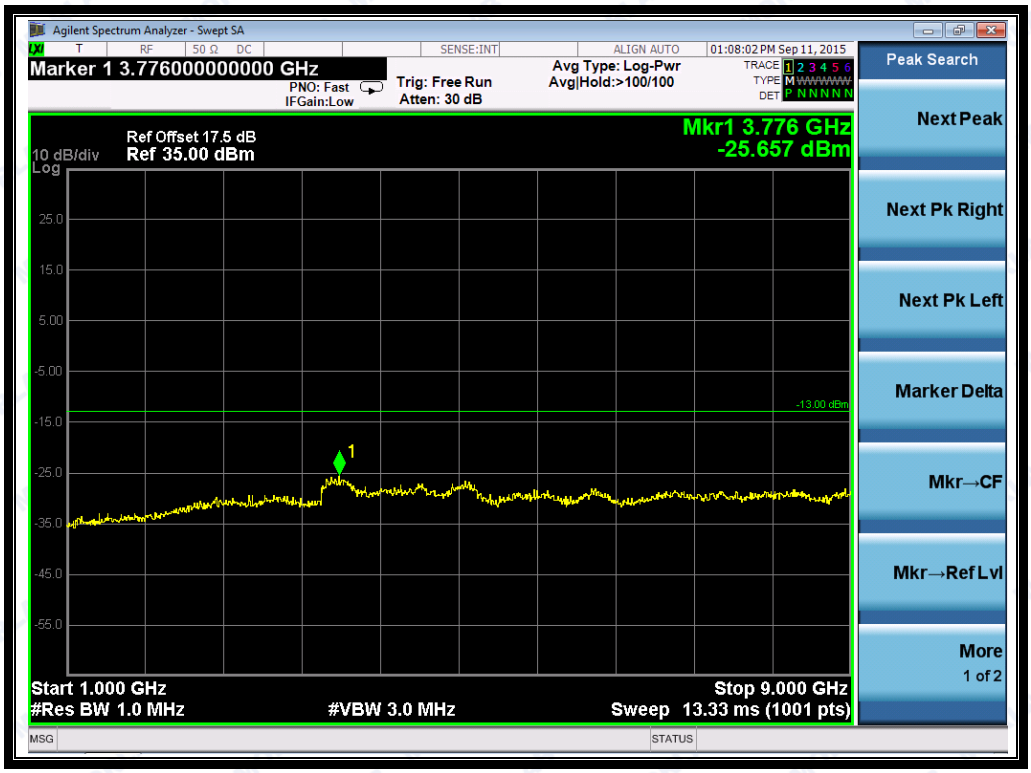


(Plot I2: HSDPA 850MHz Channel = 4175, 30MHz to 1GHz)

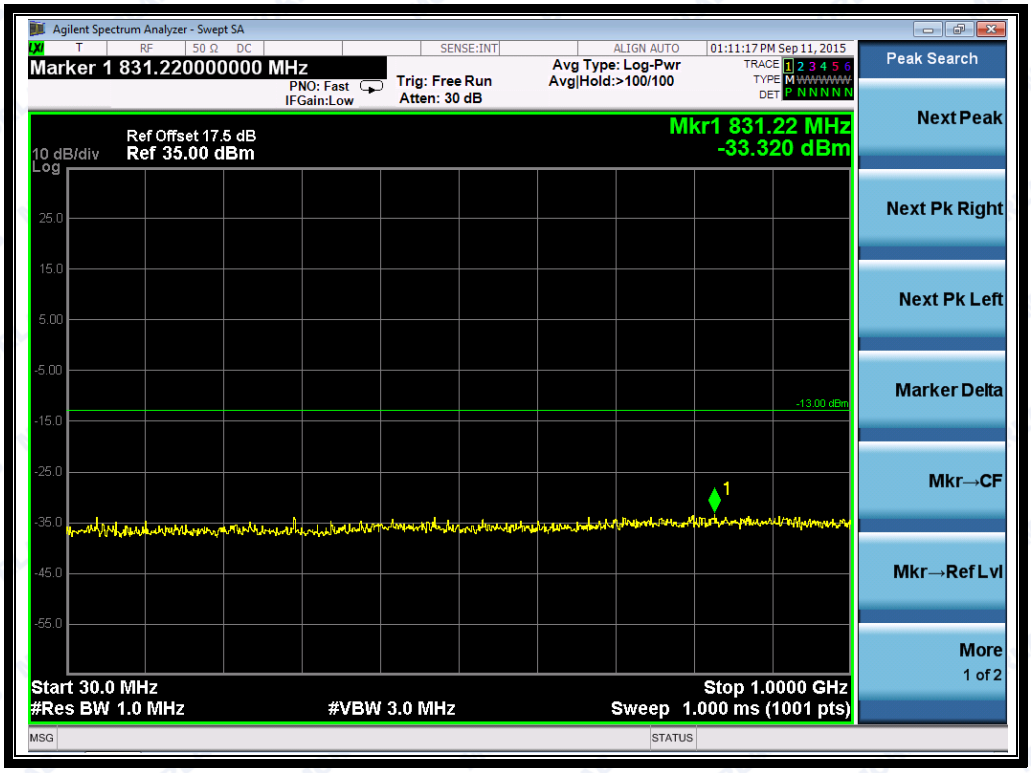
(Plot I2.1: HSDPA 850MHz Channel = 4175, 1GHz to 9GHz)



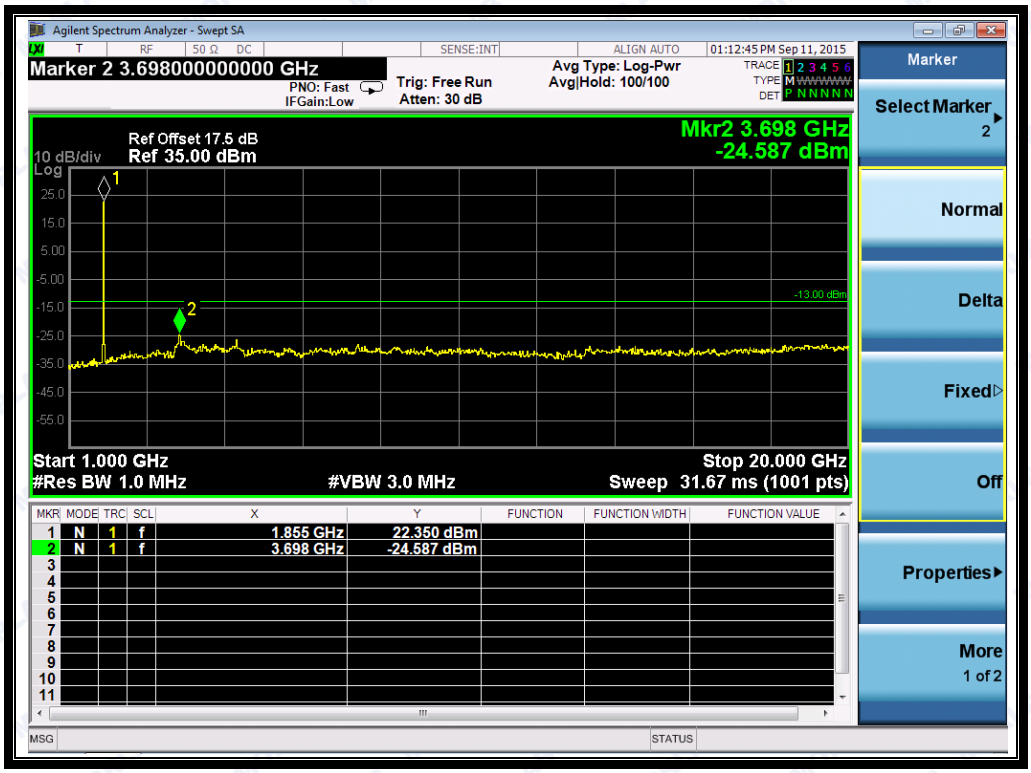
(Plot I3: HSDPA 850MHz Channel = 4233, 30MHz to 1GHz)



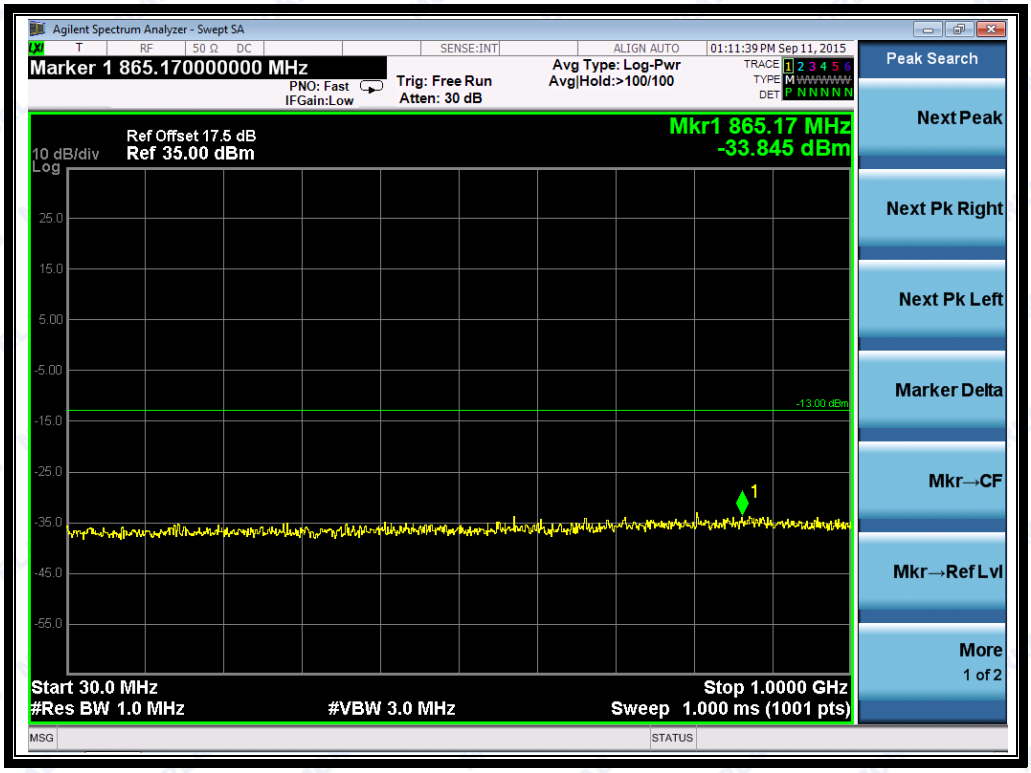
(Plot I3.1: HSDPA 850MHz Channel = 4233, 1GHz to 9GHz)



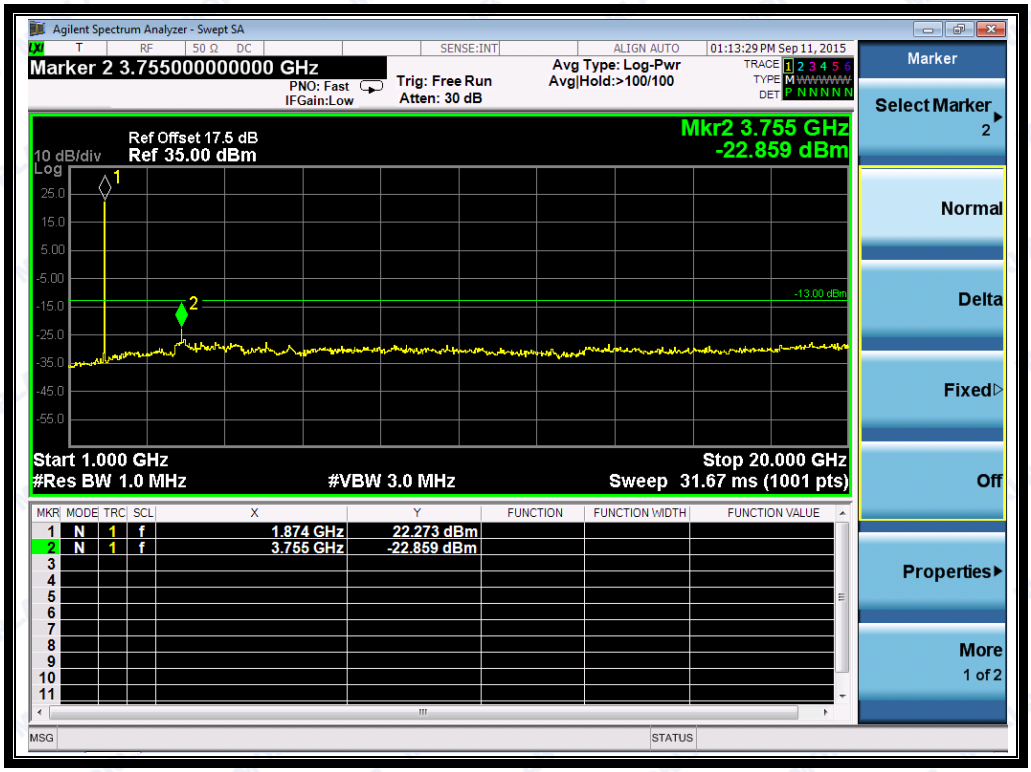
(Plot J1: HSDPA 1900MHz Channel = 9262, 30MHz to 1GHz)



(Plot J1.1: HSDPA 1900MHz Channel = 9262, 1GHz to 20GHz)



(Plot J2: HSDPA 1900MHz Channel = 9400, 30MHz to 1GHz)



(Plot J2.1: HSDPA1900MHz Channel = 9400, 1GHz to 20GHz)