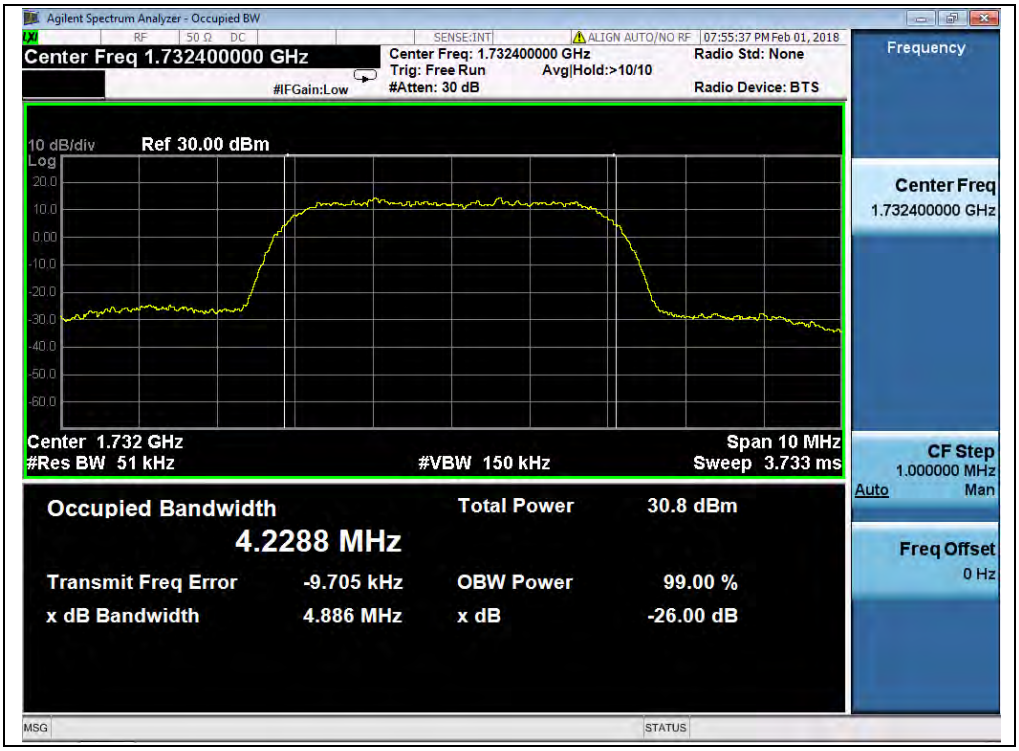
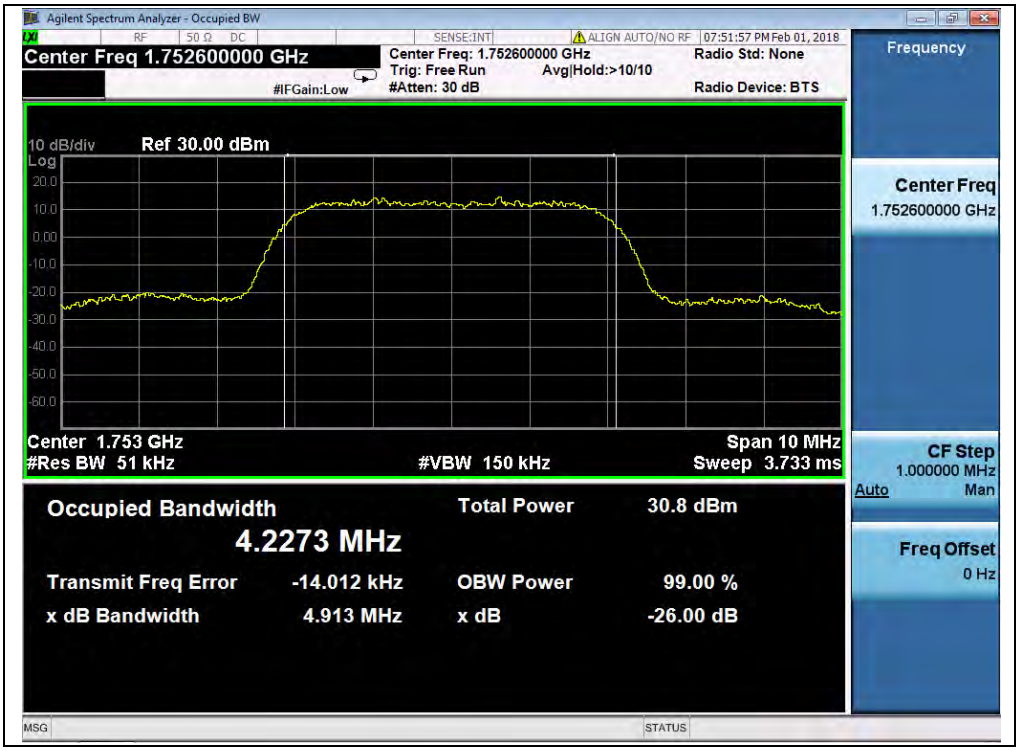
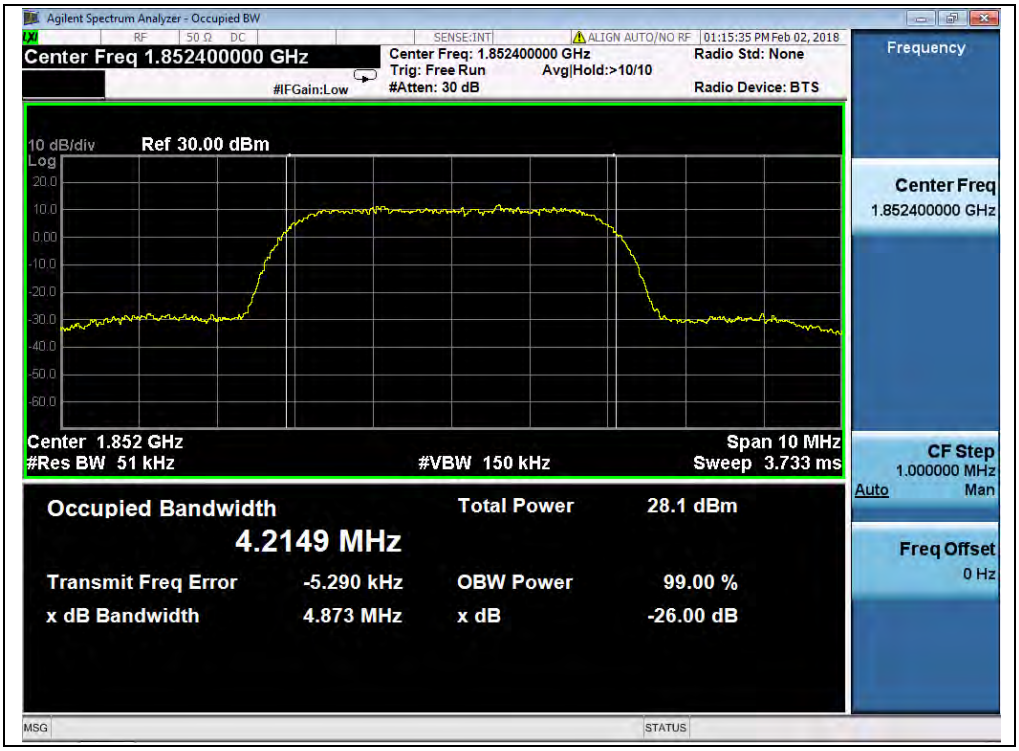


(Plot Q2, HSPA+ 1700 MHz, Channel = 1412)

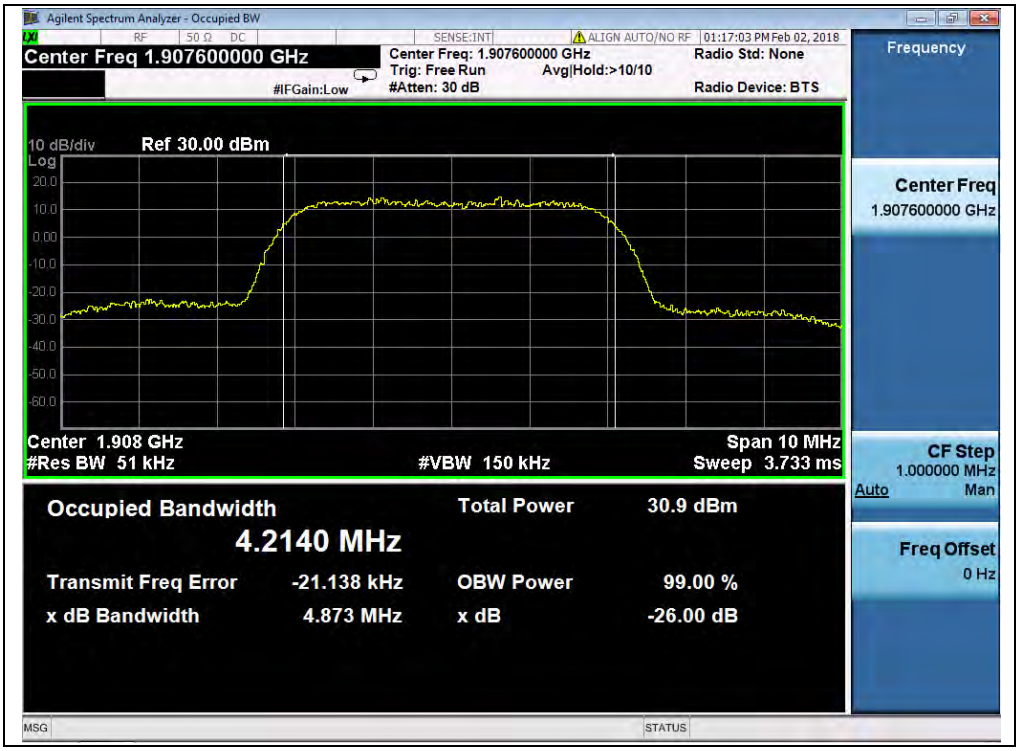


(Plot Q3, HSPA+ 1700MHz, Channel = 1513)



(Plot R1, HSPA+ 1900MHz, Channel = 9262)

(Plot R2, HSPA+ 1900 MHz, Channel = 9400)



(Plot R3, HSPA+ 1900MHz, Channel = 9538)

2.4. Frequency Stability

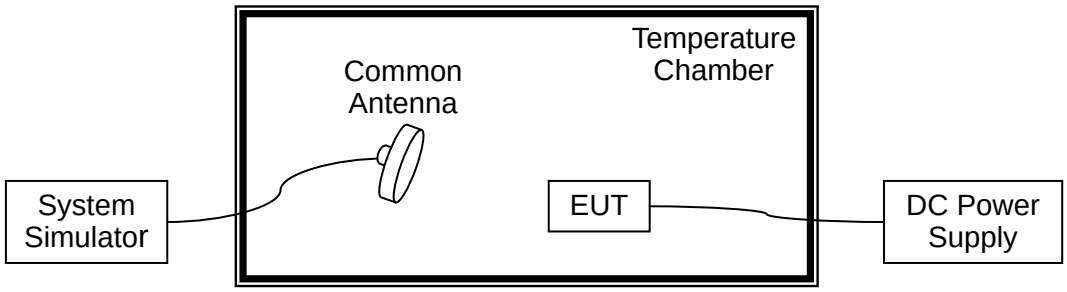
2.4.1. Requirement

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.

2.4.3. Test Result

The nominal, highest and lowest extreme voltages are separately 3.8VDC, 4.35VDC and 3.6VDC, 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.

A. Test Verdict:

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	
3.80	-30	-5.87	±2060.5	25.63	±2091.5	3.50	±2122	PASS
	-20	33.7		28.52		5.94		
	-10	-20.76		3.93		-1.36		
	0	26.2		-3.37		32.75		
	+10	-15.28		17.47		44.44		
	+20	-8.5		43.23		-18.06		
	+30	46.52		20.44		17.91		
	+40	40.45		16.12		-8.35		
	+50	37.3		-20.99		6.03		
4.35	+20	29.87		-8.31		1.56		
3.60	+20	2.94		12.54		-6.48		

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	
3.80	-30	-2.16	±1850.2	50.06	±1880.0	-0.07	±1909.8	PASS
	-20	34.52		50.37		7.62		
	-10	53.54		46.91		21.02		
	0	24.26		42.00		46.18		
	+10	17.27		5.31		13.66		
	+20	19.23		2.57		32.44		
	+30	-0.83		5.92		37.08		
	+40	25.06		4.51		56.19		
	+50	22.95		-6.93		20.03		
4.35	+20	11.27		40.92		49.79		
3.60	+20	45.36		4.12		-0.24		

EGPRS 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	
3.80	-30	7.13	±2060.5	5.80	±2091.5	9.18	±2122	PASS
	-20	6.35		9.08		-11.64		
	-10	-16.28		7.96		10.20		
	0	-11.77		8.04		-18.94		
	+10	2.38		12.16		21.79		
	+20	-7.11		5.18		23.20		
	+30	6.31		11.50		-12.93		
	+40	24.28		-0.82		21.79		
	+50	-15.78		1.31		16.40		
4.35	+20	-16.28		12.95		10.20		
3.60	+20	-11.77		15.18		-13.01		

EGPRS 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	
3.80	-30	-11.95	±1850.2	8.96	±1880.0	-12.86	±1909.8	PASS
	-20	21.57		18.75		0.81		
	-10	-7.94		-17.59		25.53		
	0	-13.58		-16.22		23.94		
	+10	-23.94		32.95		-11.27		
	+20	13.22		-10.57		26.53		
	+30	-14.38		-16.18		20.14		
	+40	23.74		12.15		-7.45		
	+50	17.39		19.29		14.15		
4.35	+20	35.6		-26.63		0.81		
3.60	+20	-17.7		8.76		25.55		

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	
3.80	-30	-10.05	±2066	-2.16	±2087.5	17.24	±2116.5	PASS
	-10	10.97		5.89		6.59		
	0	-2.91		3.85		11.88		
	+10	13.68		-7.83		4.8		
	+20	1.24		-8.39		2.25		
	+30	9.22		3.6		1.00		
	+40	16.14		17.26		6.19		
	+50	4.52		6.86		-7.94		
	-20	-5.26		-2.47		-9.92		
4.35	+20	-6.16		1.37		4.98		
3.60	+20	5.26		11.53		-9.24		

WCDMA 1700MHz Band

Test Conditions		Frequency Deviation						Verdict
Power (VDC)	Temperature (°C)	Channel = 1312 (1712.4MHz)		Channel = 1412 (1732.4MHz)		Channel = 1513 (1752.6MHz)		
		Hz	Limit	Hz	Limit	Hz	Limit	
3.8	-30	12.47	±4281	23.73	±4331	19.92	±4381.5	PASS
	-10	25.17		11.52		37.39		
	0	32.92		22.51		16.07		
	+10	31.24		4.08		-0.53		
	+20	9.41		30.67		39.27		
	+30	13.96		27.35		32.13		
	+40	0.13		32.26		18.39		
	+50	7.77		23.68		37.38		
	-20	40.74		25.97		-2.54		
4.35	+20	28.09		39.87		-2.77		
3.0	+20	41.11		0.1		9.9		

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	
3.80	-30	-21.1	±1852.4	-22.01	±1880	7.68	±1907.6	PASS
	-10	-5.11		-1.17		4.52		
	0	19.28		1.08		-6.41		
	+10	-19.13		-1.38		8.18		
	+20	21.02		8.62		12.78		
	+30	23.6		-0.91		21.23		
	+40	18.55		15.2		17.38		
	+50	-12.25		19.87		-21.12		
	-20	-9.00		30.17		22.57		
4.35	+20	-10.67		-14.46		-11.39		
3.40	+20	30.46		-10.19		-10.28		

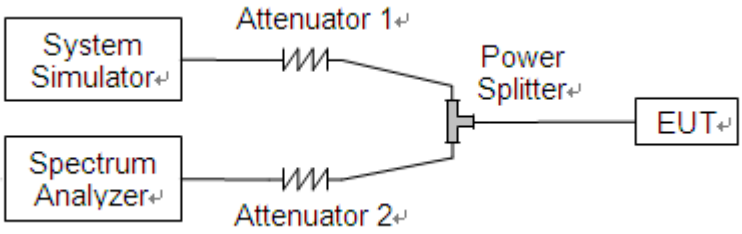
2.5. Conducted Out of Band Emissions

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

Test Setup:



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

2.5.3. Test Result

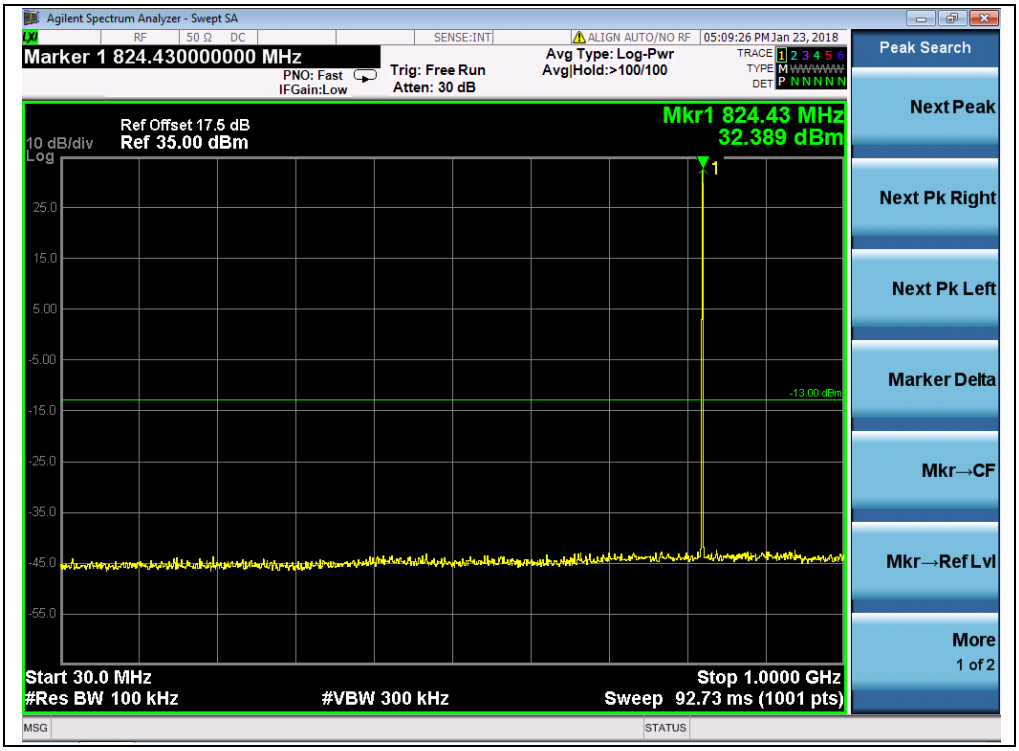
The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.

GSM Test Verdict:

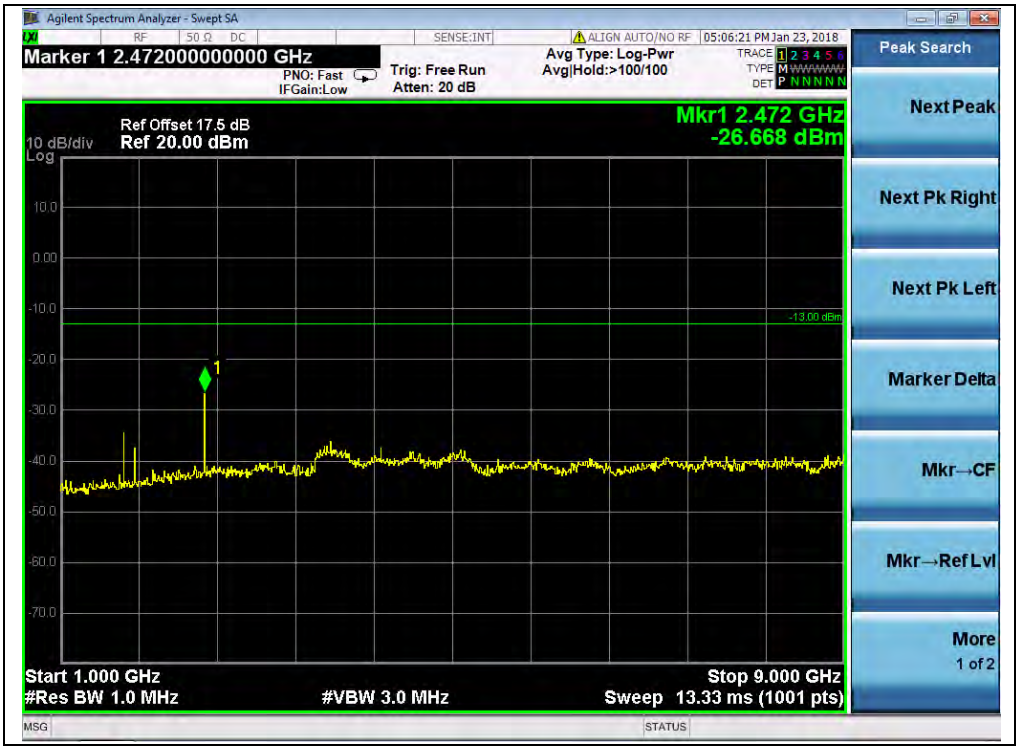
Band	Channel	Frequency (MHz)	Measured Max. Spurious Emission (dBm)	Refer to Plot	Limit (dBm)	Verdict
GSM 850MHz	128	824.2	-26.67	Plot A1 to A1.1	-13	PASS
	190	836.6	-26.58	Plot A2 to A2.1		PASS
	251	848.8	-26.56	Plot A3 to A3.1		PASS
GSM 1900MHz	512	1850.2	-26.66	Plot B1 to B1.1	-13	PASS
	661	1880.0	-26.04	Plot B2 to B2.1		PASS
	810	1909.8	-27.49	Plot B3 to B3.1		PASS
EGPRS 850MHz	128	824.2	-33.71	Plot C1 to C1.1	-13	PASS
	190	836.6	-32.90	Plot C2 to C2.1		PASS
	251	848.8	-33.41	Plot C3 to C3.1		PASS
EGPRS 1900MHz	512	1850.2	-19.60	Plot D1 to D1.1	-13	PASS
	661	1880.0	-19.75	Plot D2 to D2.1		PASS
	810	1909.8	-19.51	Plot D3 to D3.1		PASS

Test Plots:

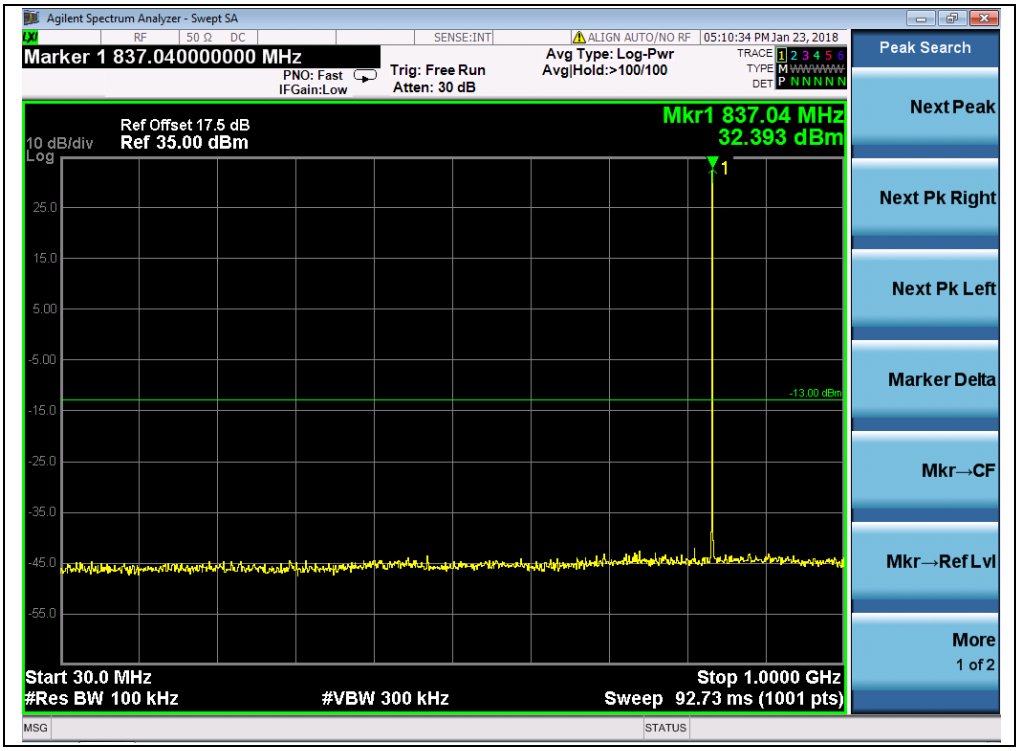
Note: The power of the EUT transmitting frequency should be ignored.



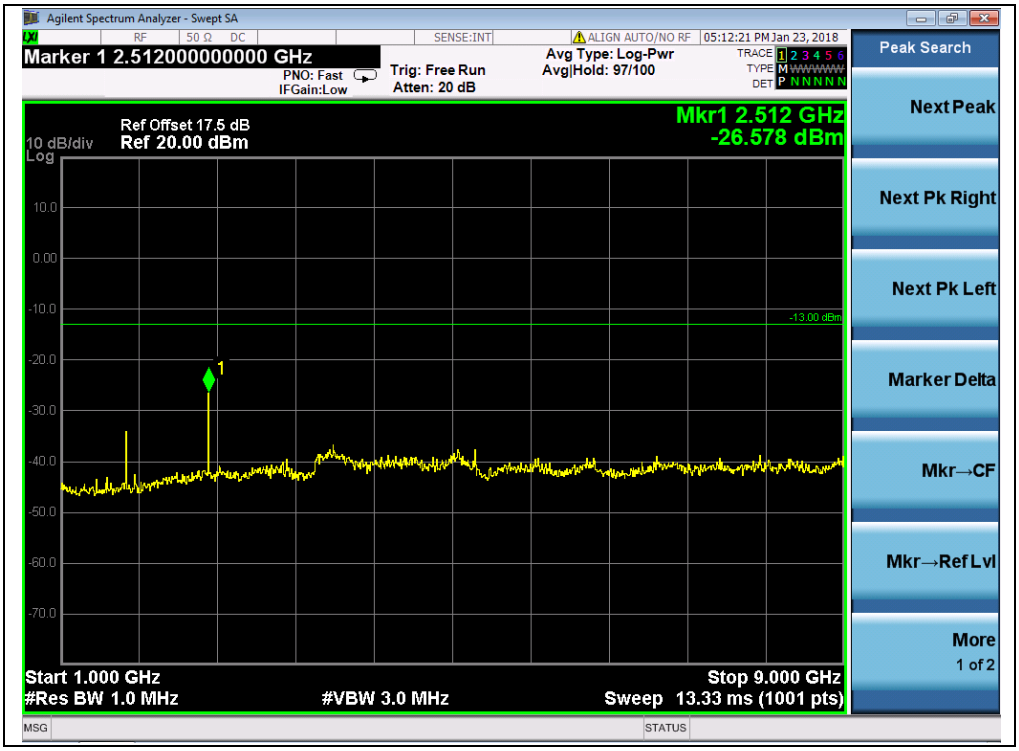
(Plot A1, GSM 850MHz, Channel = 128, 30MHz to 1GHz)



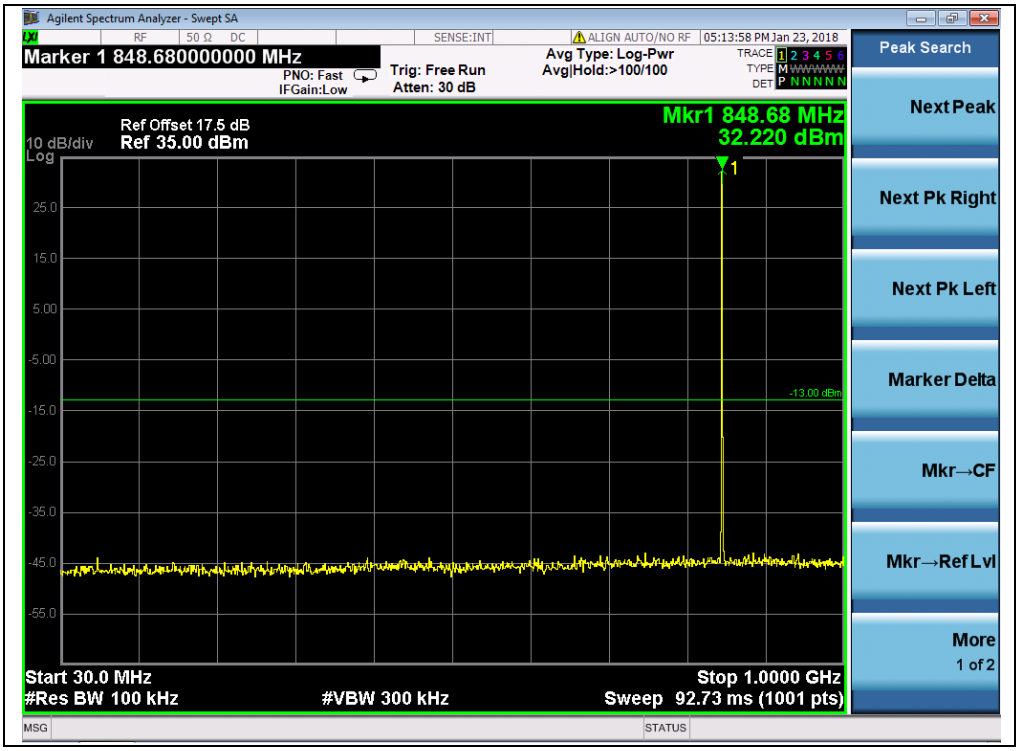
(Plot A1.1, GSM 850MHz, Channel = 128, 1GHz to 9GHz)



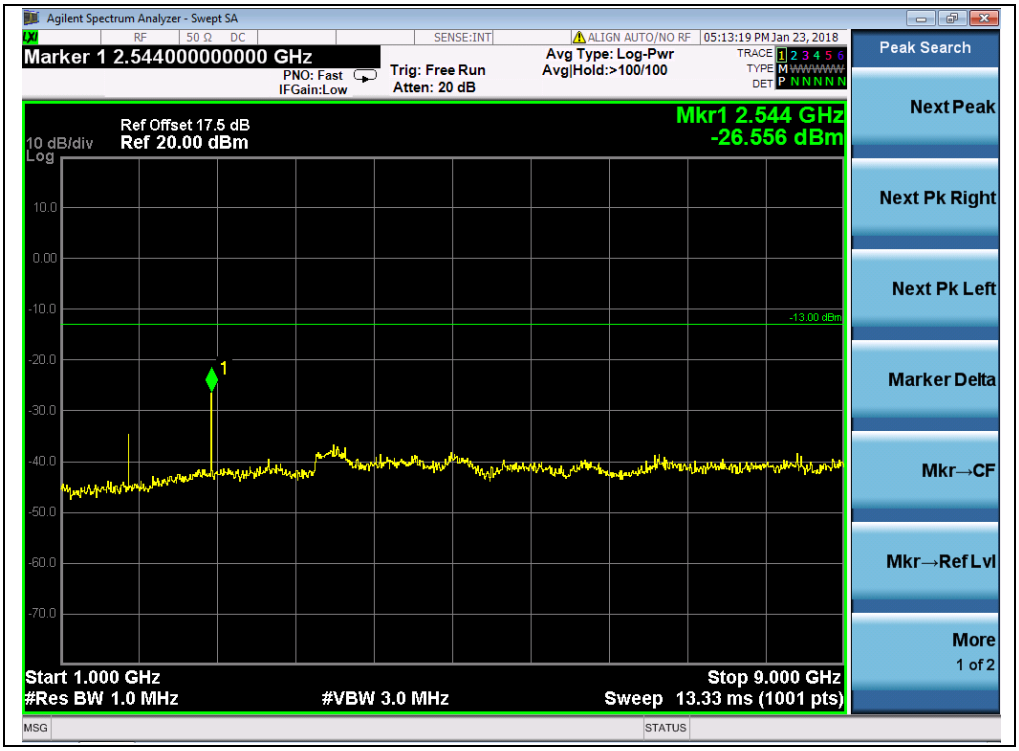
(Plot A2, GSM 850MHz, Channel = 190, 30MHz to 1GHz)



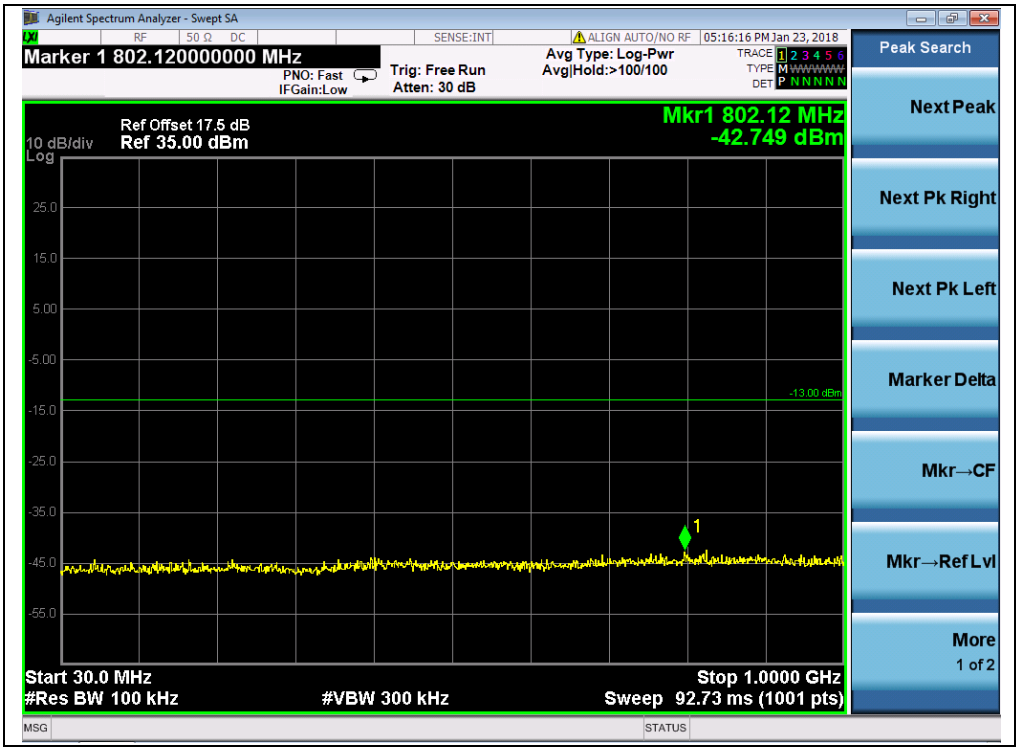
(Plot A2.1, GSM 850MHz, Channel = 190, 1GHz to 9GHz)



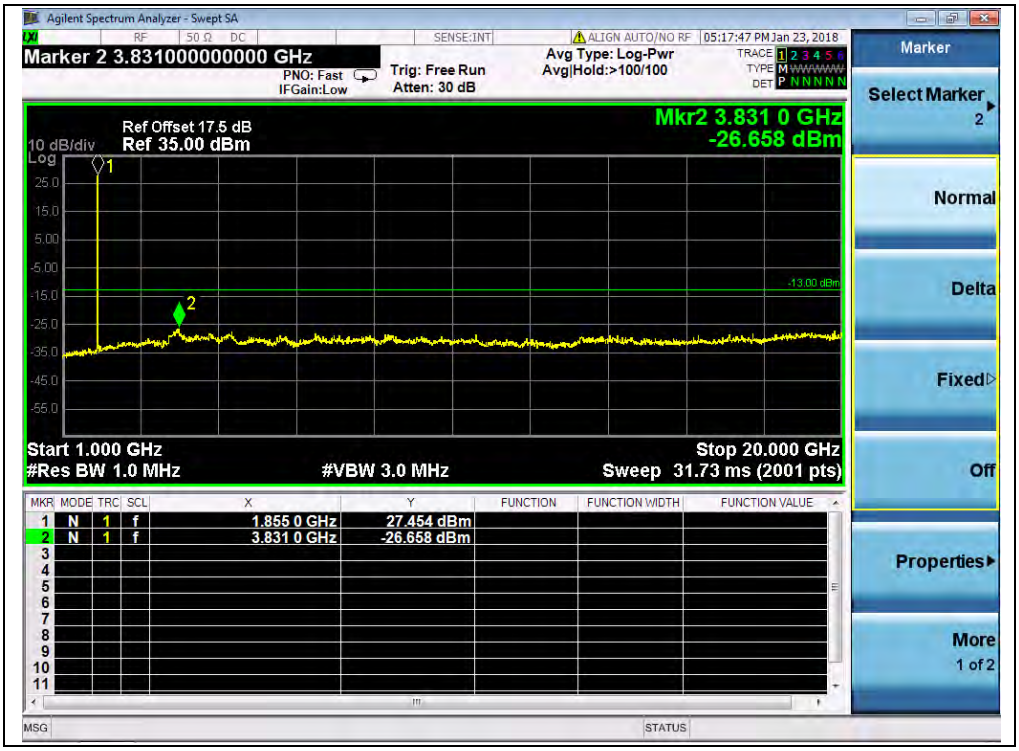
(Plot A3, GSM 850MHz, Channel = 251, 30MHz to 1GHz)



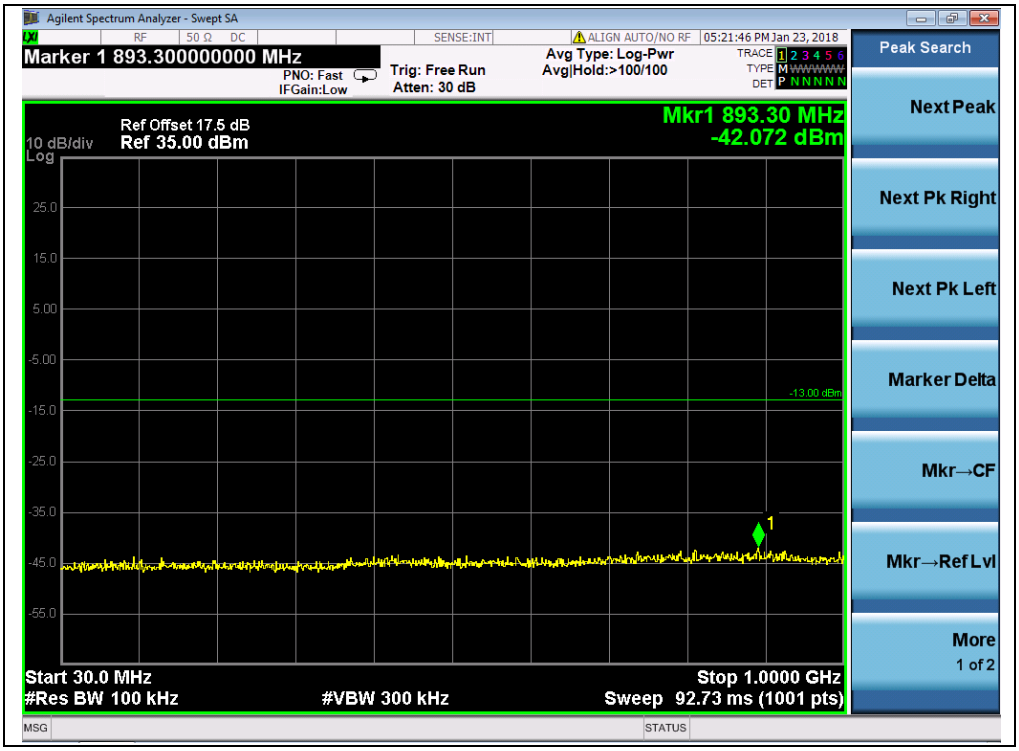
(Plot A3.1, GSM 850MHz, Channel = 251, 1GHz to 9GHz)



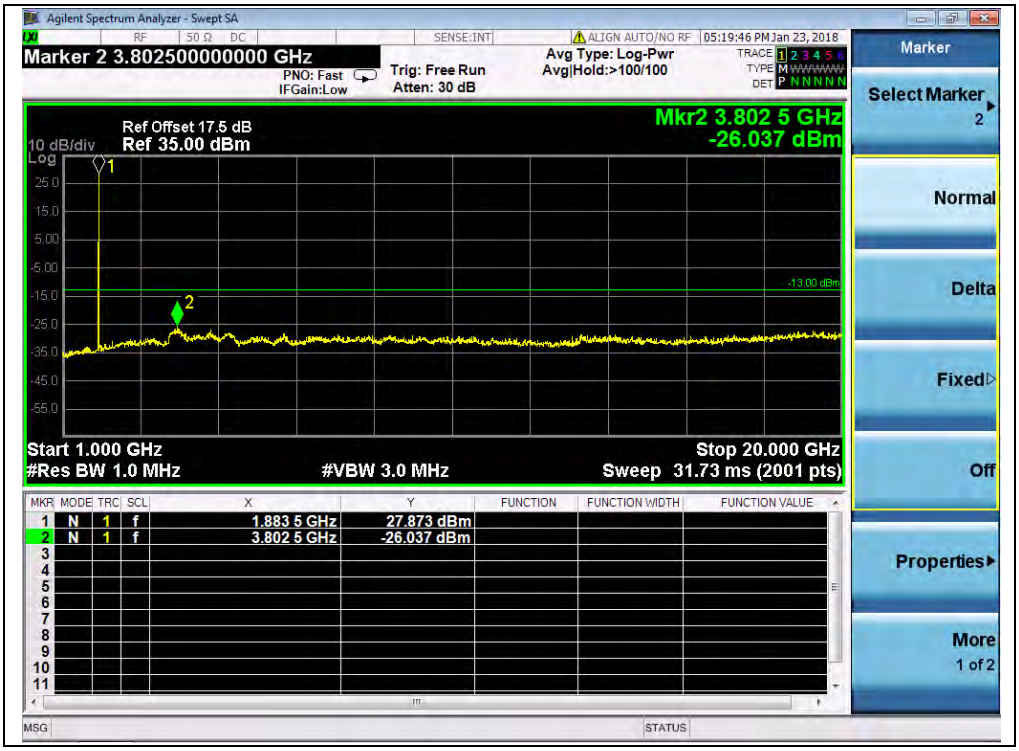
(Plot B1, GSM 1900MHz, Channel = 512, 30MHz to 1GHz)



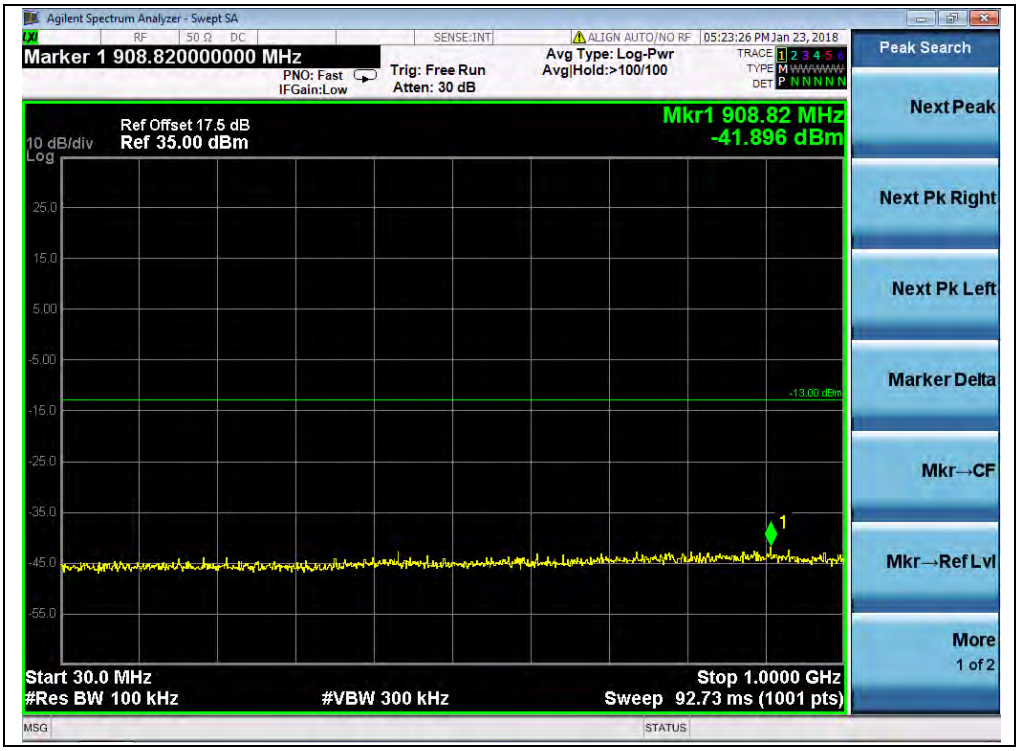
(Plot B1.1, GSM 1900MHz, Channel = 512, 1GHz to 20GHz)



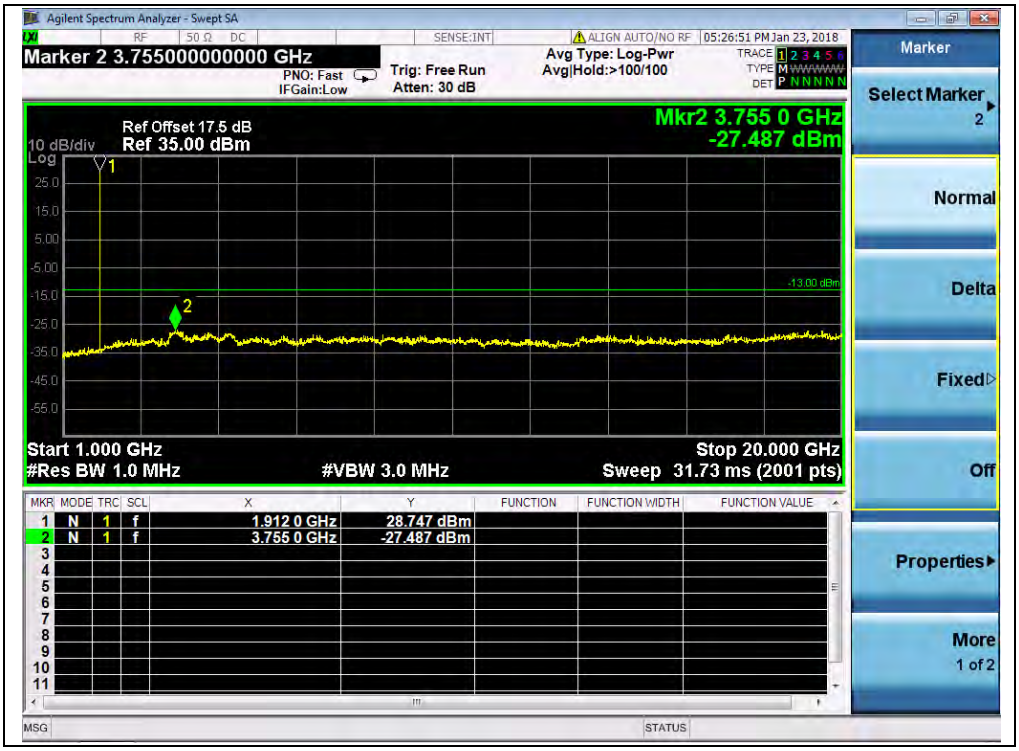
(Plot B2, GSM 1900MHz, Channel = 661, 30MHz to 1GHz)



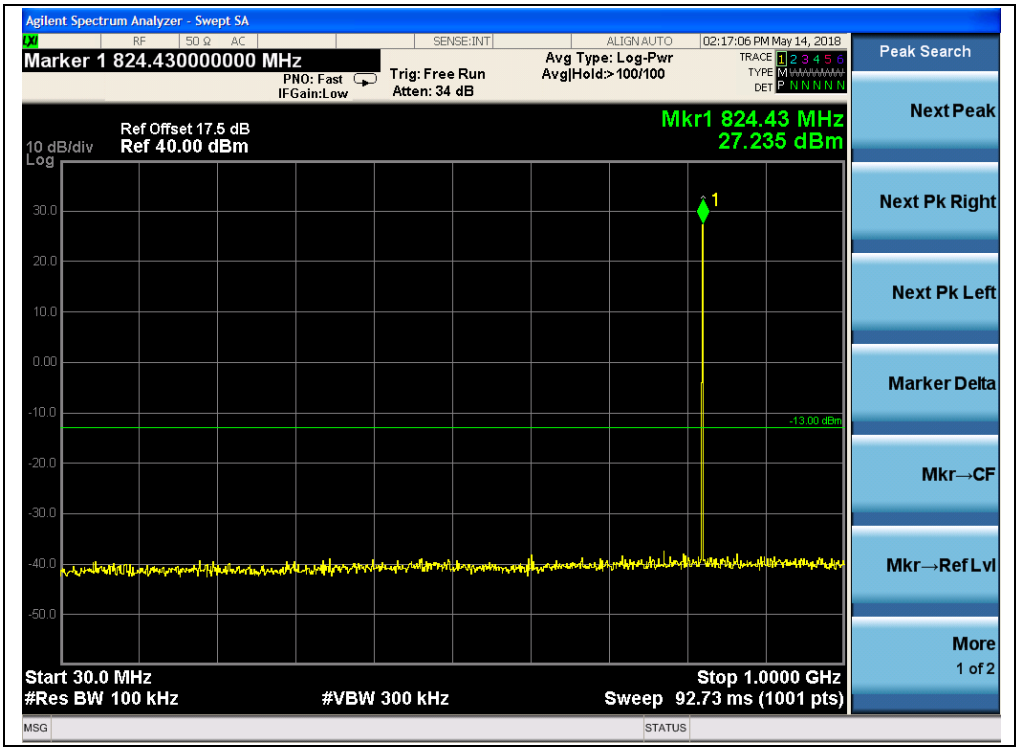
(Plot B2.1, GSM 1900MHz, Channel = 661, 1GHz to 20GHz)



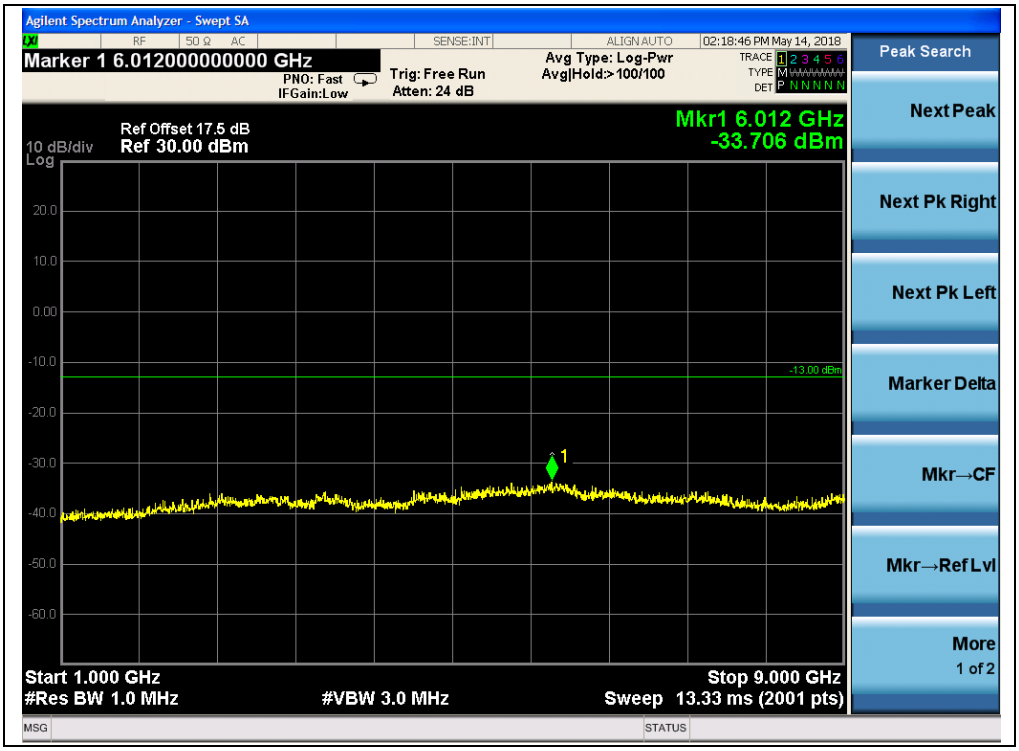
(Plot B3, GSM 1900MHz, Channel = 810, 30MHz to 1GHz)



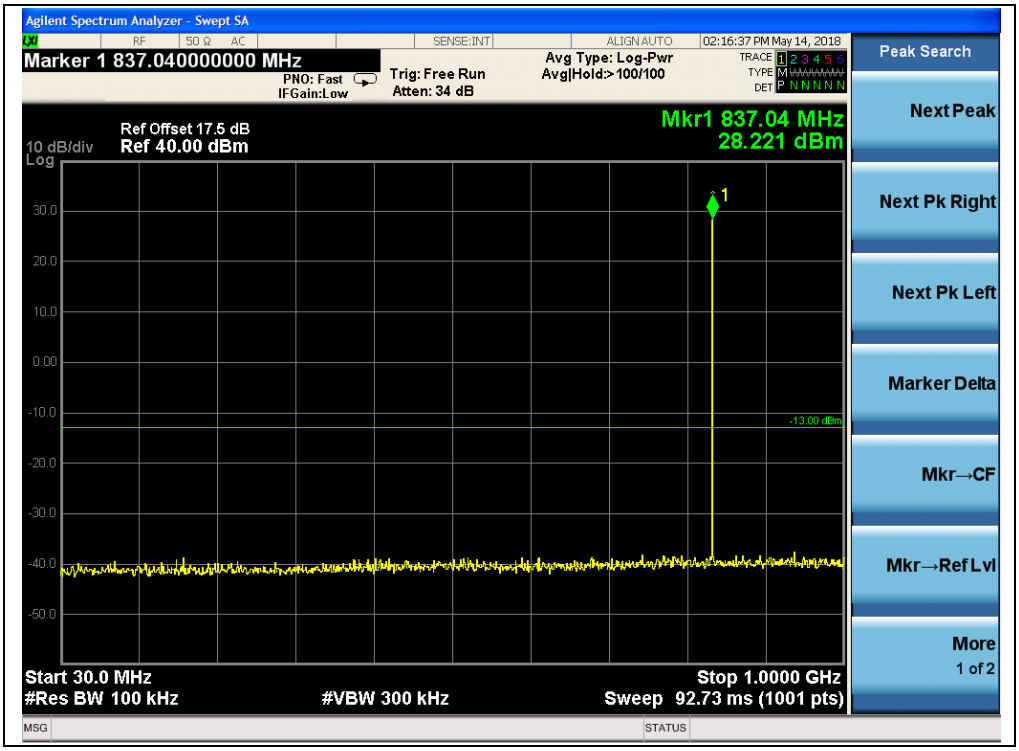
(Plot B3.1, GSM 1900MHz, Channel = 810, 1GHz to 20GHz)



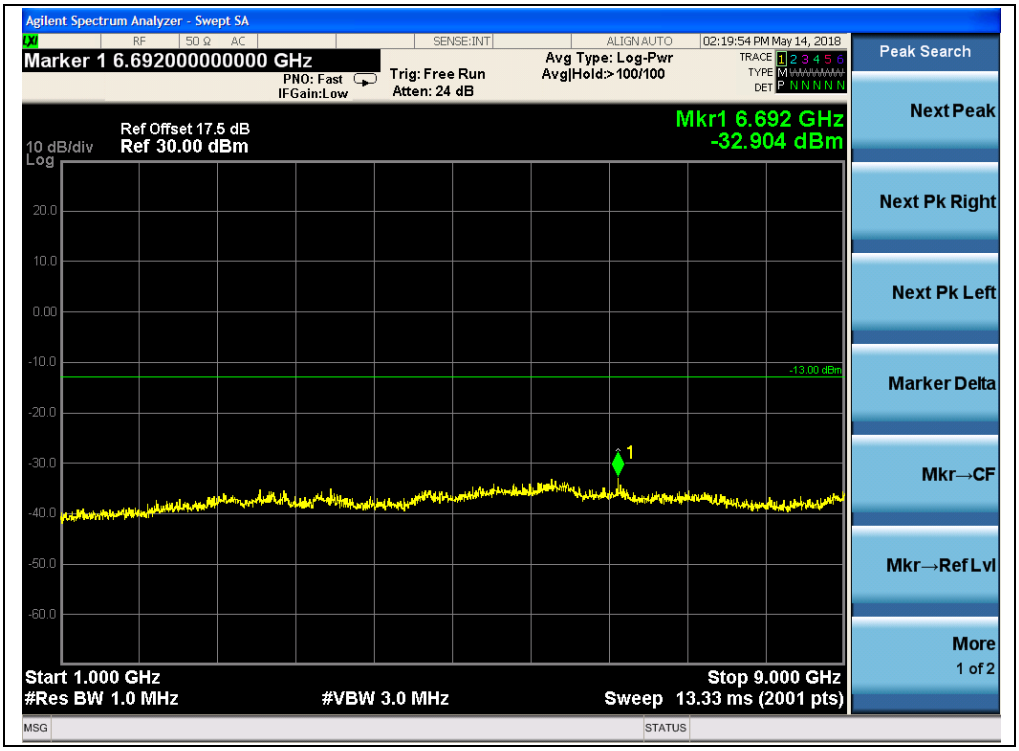
(Plot C1, EGPRS 850MHz, Channel = 128, 30MHz to 1GHz)



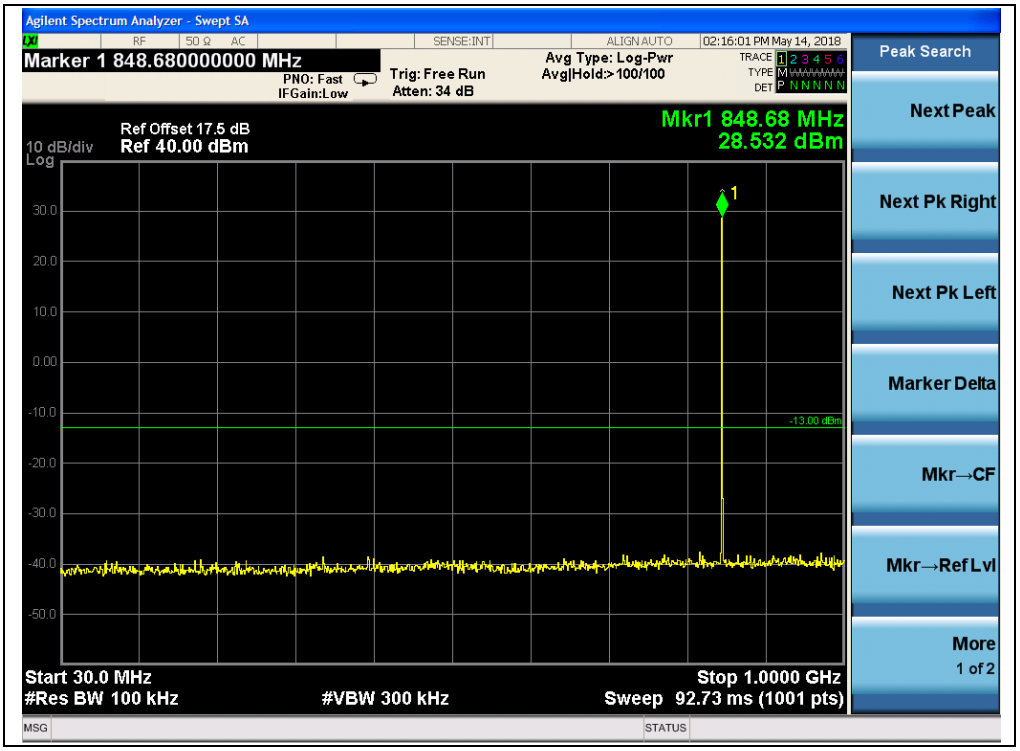
(Plot C1.1, EGPRS 850MHz, Channel = 128, 1GHz to 9GHz)



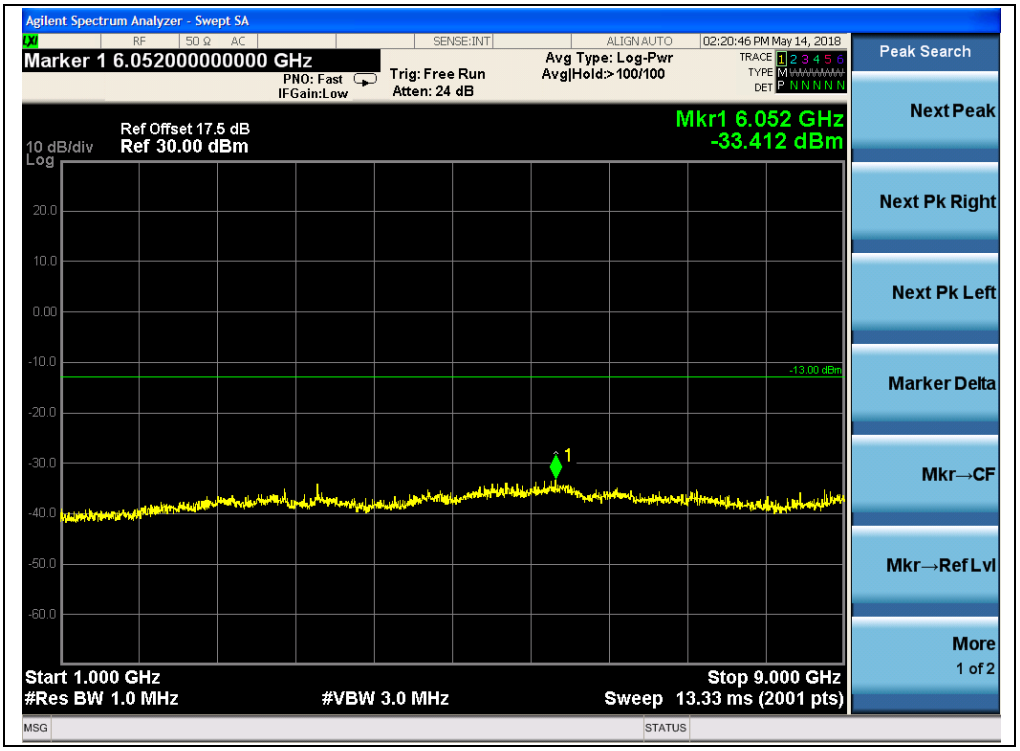
(Plot C2, EGPRS 850MHz, Channel = 190, 30MHz to 1GHz)



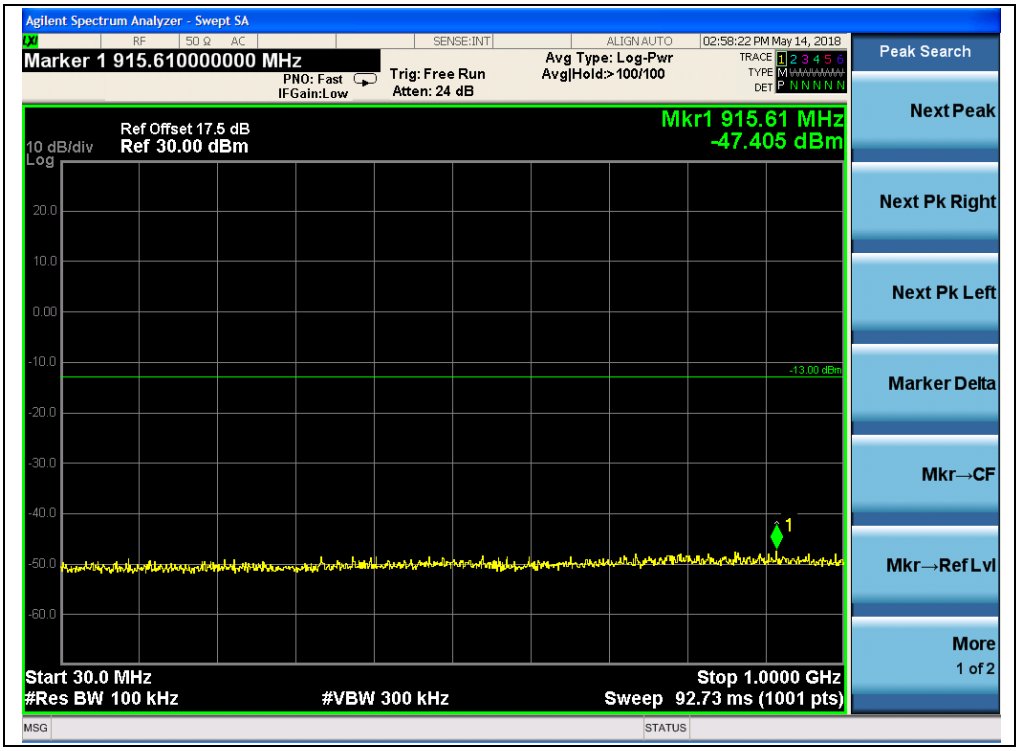
(Plot C2.1, EGPRS 850MHz, Channel = 190, 1GHz to 9GHz)



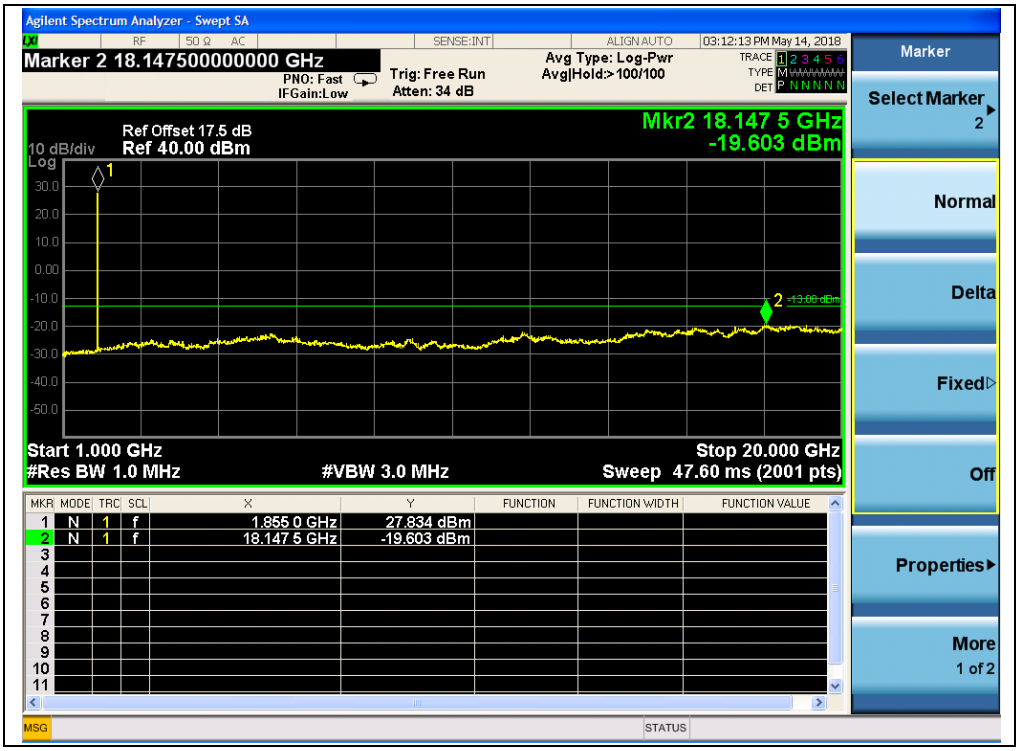
(Plot C3, EGPRS 850MHz, Channel = 251, 30MHz to 1GHz)



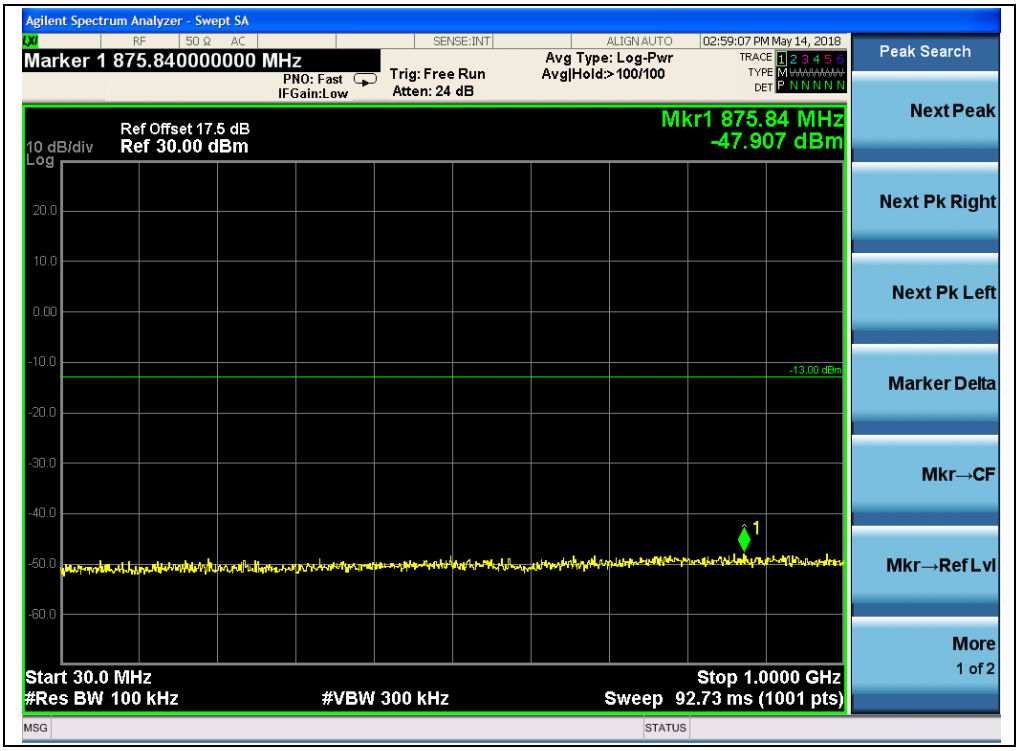
(Plot C3.1, EGPRS 850MHz, Channel = 251, 1GHz to 9GHz)



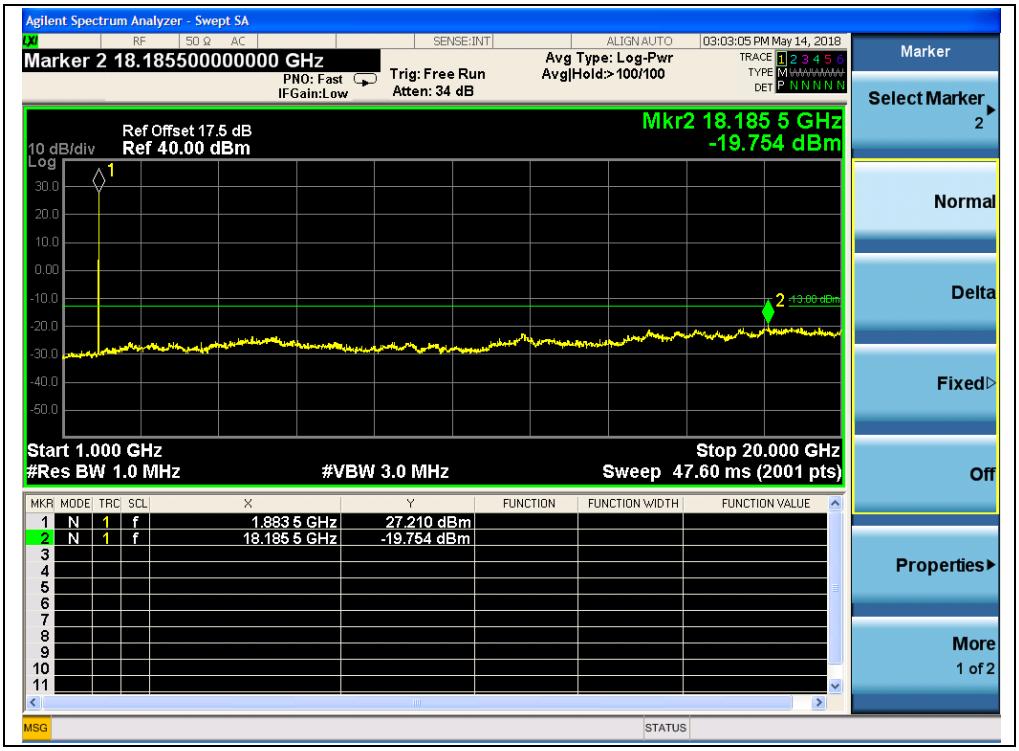
(Plot D1, EGPRS 1900MHz, Channel = 512, 30MHz to 1GHz)



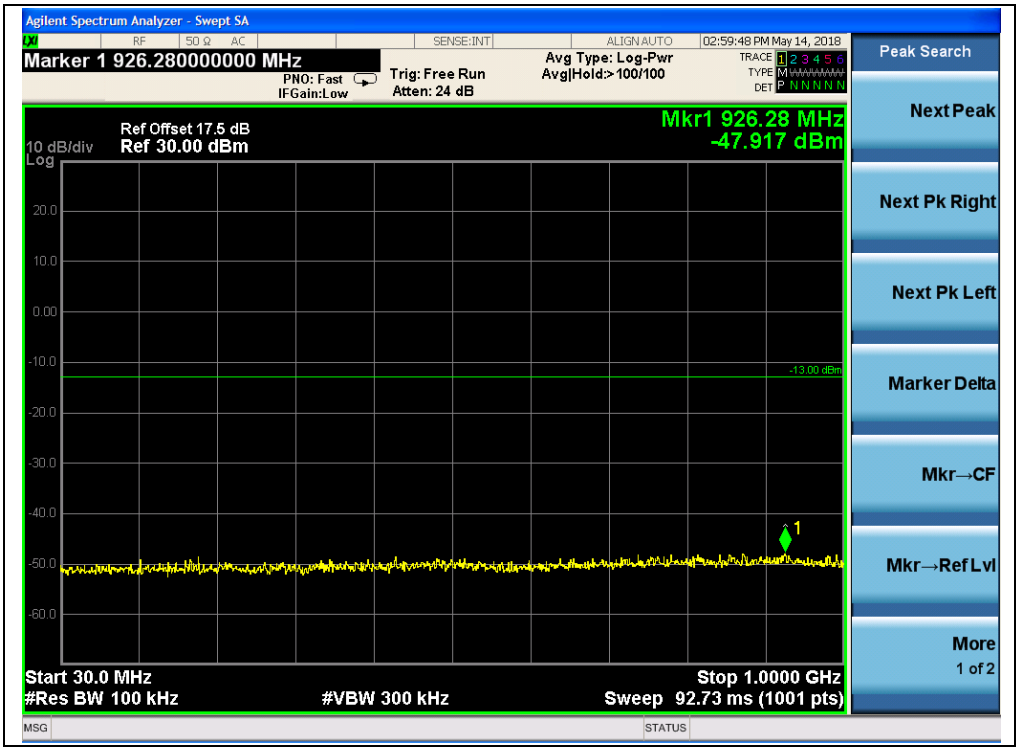
(Plot D1.1, EGPRS 1900MHz, Channel = 512, 1GHz to 20GHz)



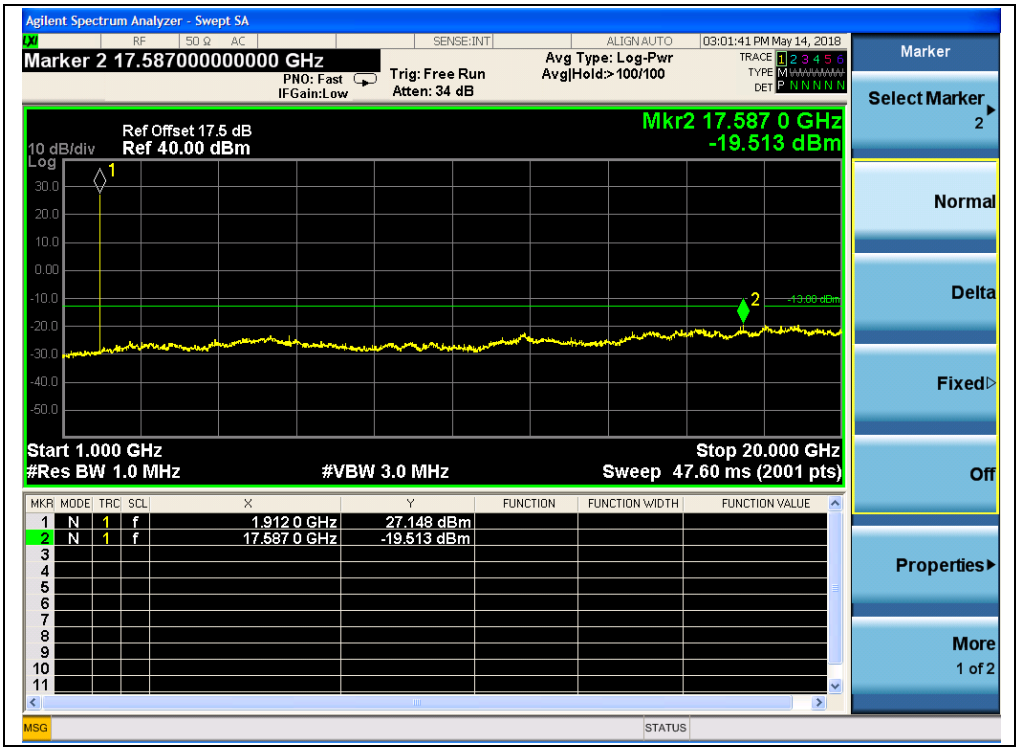
(Plot D2, EGPRS 1900MHz, Channel = 661, 30MHz to 1GHz)



(Plot D2.1, EGPRS 1900MHz, Channel = 661, 1GHz to 20GHz)



(Plot D3, EGPRS 1900MHz, Channel = 810, 30MHz to 1GHz)



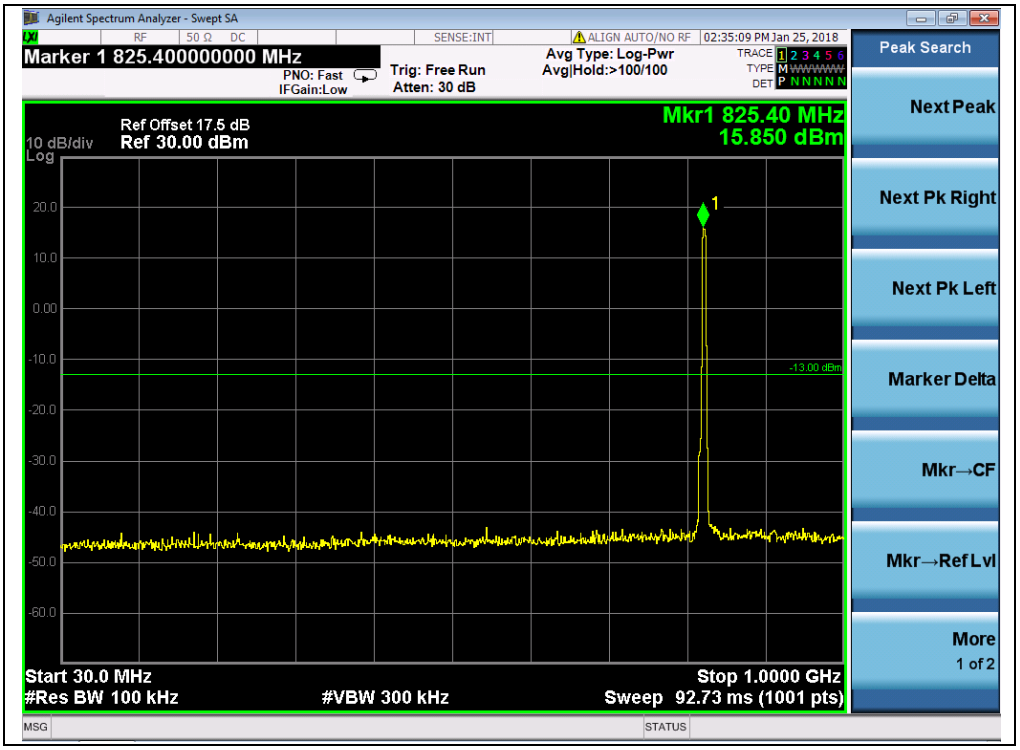
(Plot D3.1, EGPRS 1900MHz, Channel = 810, 1GHz to 20GHz)

WCDMA Test Verdict

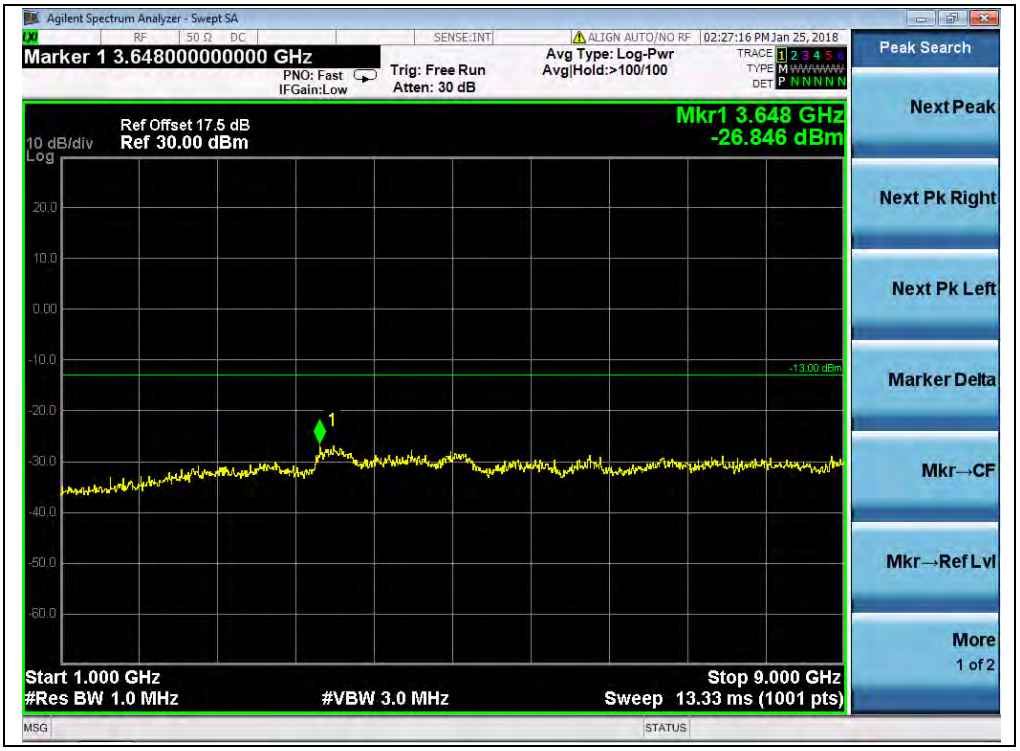
Band	Channel	Frequency (MHz)	Measured Max. Spurious Emission (dBm)	Refer to Plot	Limit (dBm)	Verdict
WCDMA 850MHz	4132	826.4	< -25	Plot G1 to G1.1	-13	PASS
	4175	835.0	< -25	Plot G2 to G2.1		PASS
	4233	846.6	< -25	Plot G3 to G3.1		PASS
WCDMA 1700MHz	1312	1712.4	< -25	Plot H1 to H1.1	-13	PASS
	1412	1732.4	< -25	Plot H2 to H2.1		PASS
	1513	1752.6	< -25	Plot H3 to H3.1		PASS
WCDMA 1900MHz	9262	1852.4	< -25	Plot I1 to I1.1	-13	PASS
	9400	1880.0	< -25	Plot I2 to I2.1		PASS
	9538	1907.6	< -25	Plot I3 to I3.1		PASS
HSDPA 850MHz	4132	826.4	< -25	Plot J1 to J1.1	-13	PASS
	4175	835.0	< -25	Plot J2 to J2.1		PASS
	4233	846.6	< -25	Plot J3 to J3.1		PASS
HSDPA 1700MHz	1312	1712.4	< -25	Plot K1 to K1.1	-13	PASS
	1412	1732.4	< -25	Plot K2 to K2.1		PASS
	1513	1752.6	< -25	Plot K3 to K3.1		PASS
HSDPA 1900MHz	9262	1852.4	< -25	Plot L1 to L1.1	-13	PASS
	9400	1880.0	< -25	Plot L2 to L2.1		PASS
	9538	1907.6	< -25	Plot L3 to L3.1		PASS
HSUPA 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
HSUPA 1700MHz	1312	1712.4	< -25	Plot N1 to N1.1	-13	PASS
	1412	1732.4	< -25	Plot N2 to N2.1		PASS
	1513	1752.6	< -25	Plot N3 to N3.1		PASS
HSUPA 1900MHz	9262	1852.4	< -25	Plot O1 to M1.1	-13	PASS
	9400	1880.0	< -25	Plot O2 to M2.1		PASS
	9538	1907.6	< -25	Plot O3 to M3.1		PASS
HSPA+ 850 MHz	4132	826.4	< -25	Plot P1 to N1.1	-13	PASS
	4175	835.0	< -25	Plot P2 to N2.1		PASS
	4233	846.6	< -25	Plot P3 to N3.1		PASS
HSPA+ 1700MHz	1312	1712.4	< -25	Plot Q1 to M1.1	-13	PASS
	1412	1732.4	< -25	Plot Q2 to M2.1		PASS
	1513	1752.6	< -25	Plot Q3 to M3.1		PASS

HSPA+ 1900MHz	9262	1852.4	< -25	Plot R1 to N1.1	-13	PASS
	9400	1880.0	< -25	Plot R2 to N2.1		PASS
	9538	1907.6	< -25	Plot R3 to N3.1		PASS

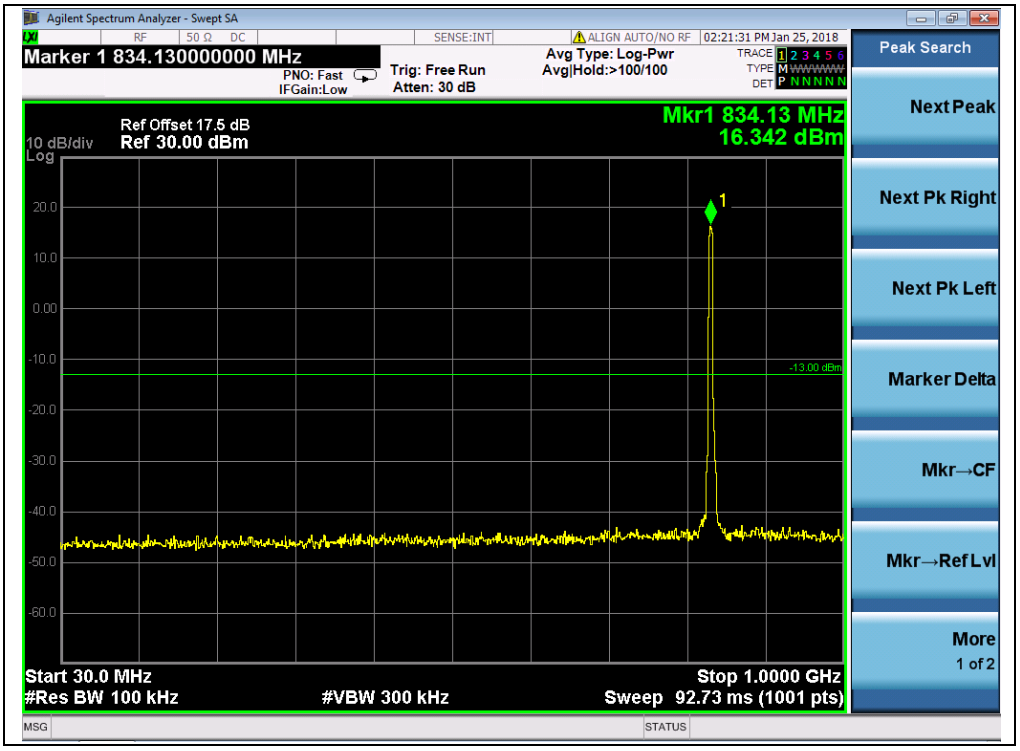
Test Plot



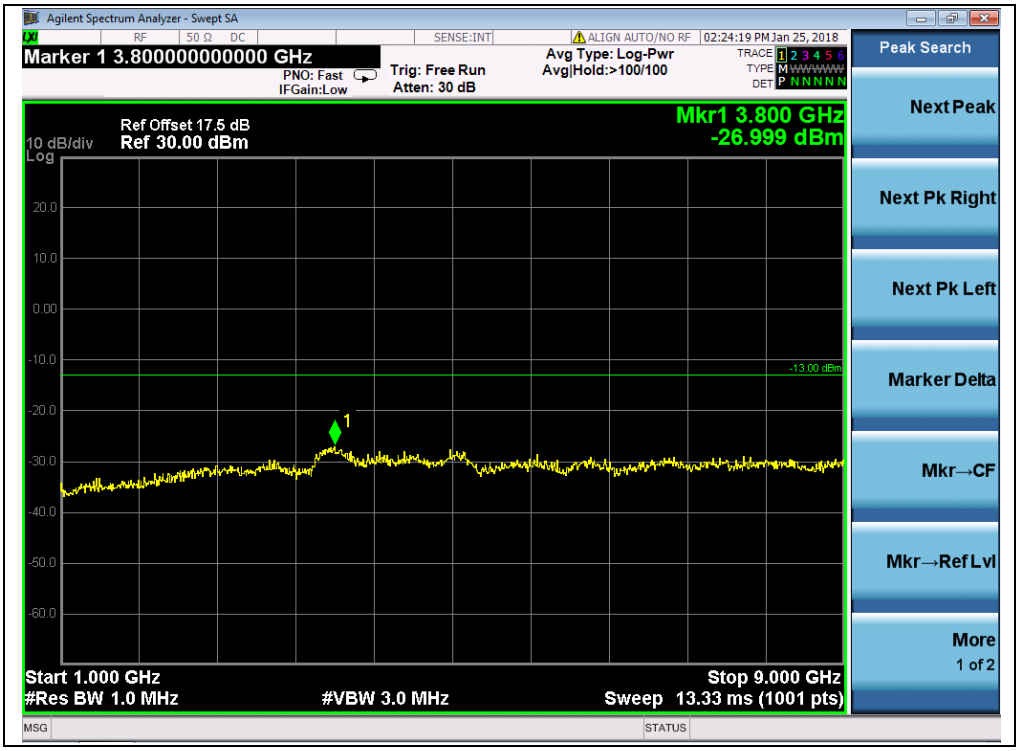
(Plot G1, WCDMA850MHz, Channel = 4132, 30MHz to 1GHz)



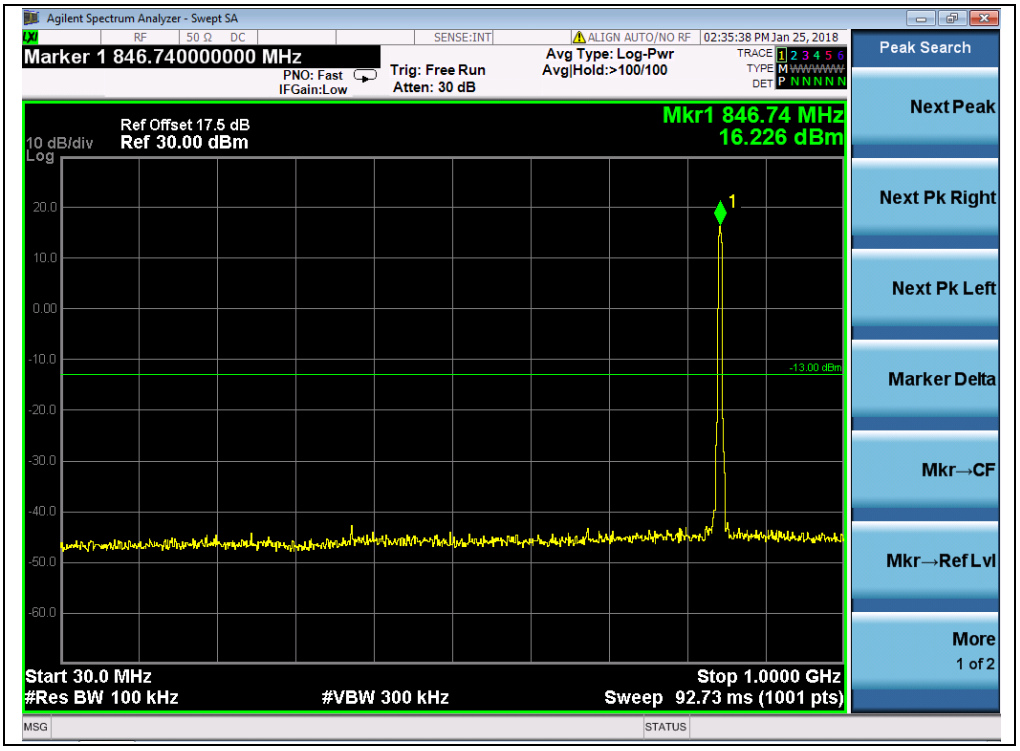
(Plot G1.1, WCDMA850MHz, Channel = 4132, 1GHz to 9GHz)



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

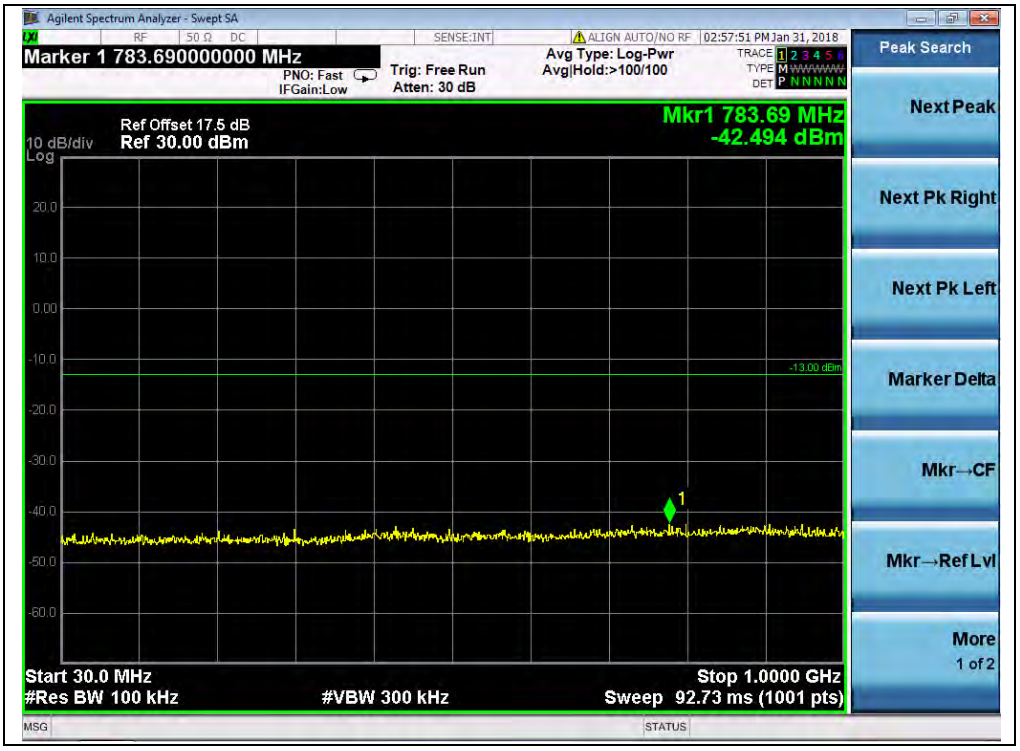


(Plot G2.1, WCDMA850MHz, Channel = 4175, 1GHz to 9GHz)

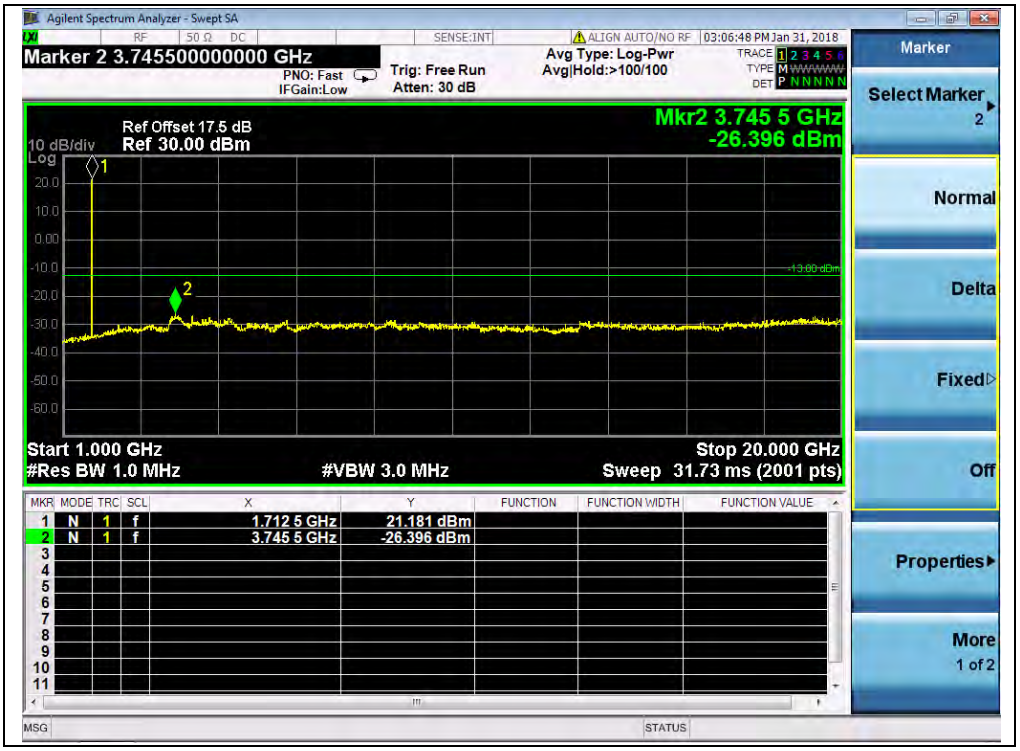


(Plot G3, WCDMA850MHz, Channel = 4233, 30MHz to 1GHz)

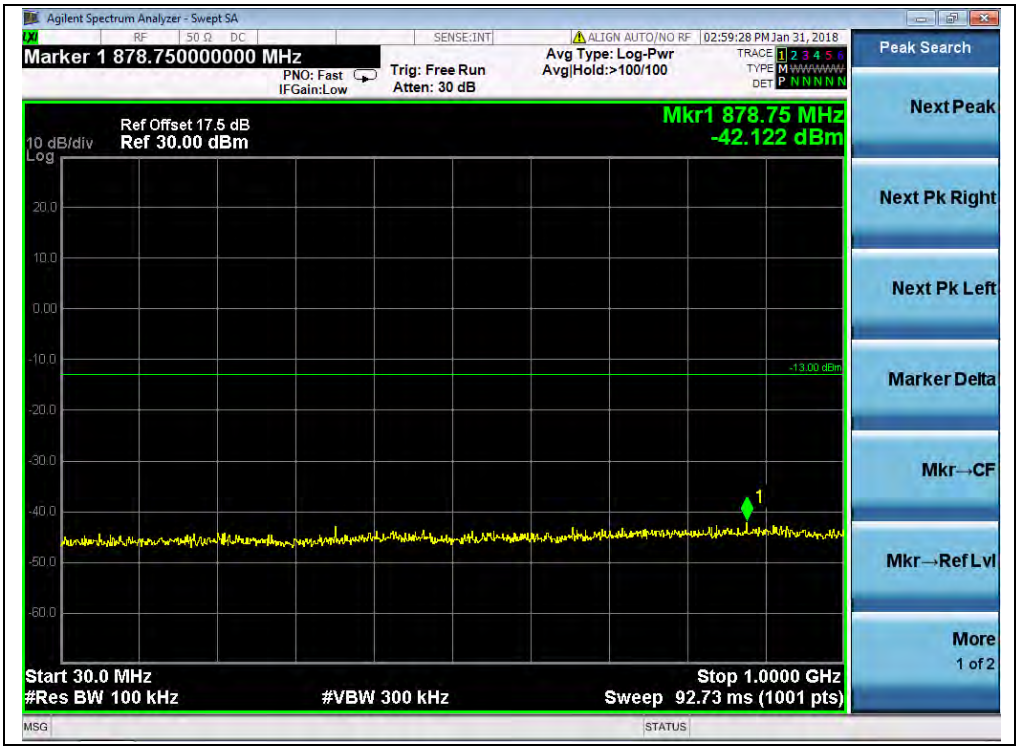
(Plot G3.1, WCDMA850MHz, Channel = 4233, 1GHz to 9GHz)



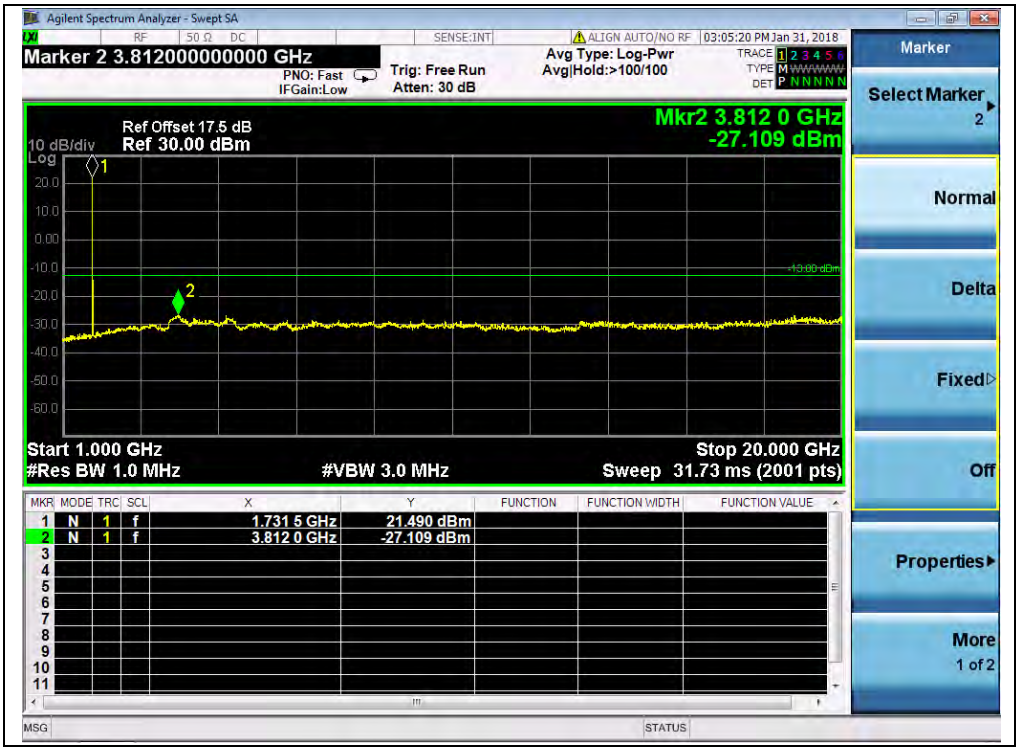
(Plot H1, WCDMA1700MHz, Channel = 1312, 30MHz to 1GHz)



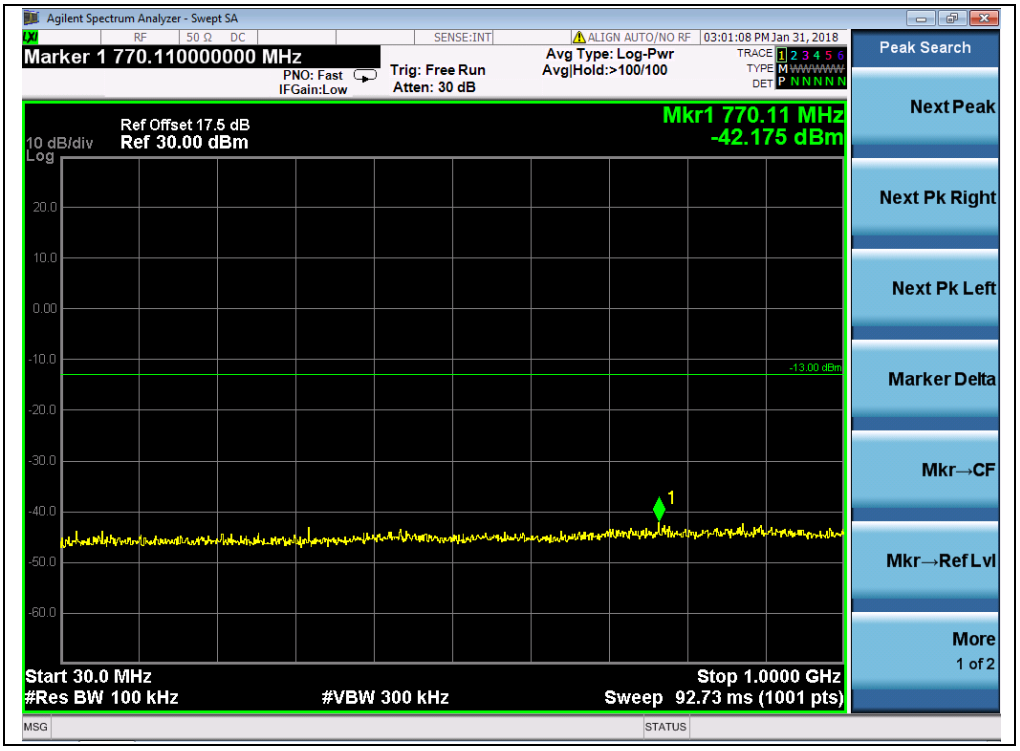
(Plot H1.1, WCDMA1700MHz, Channel = 1312, 1GHz to 20GHz)



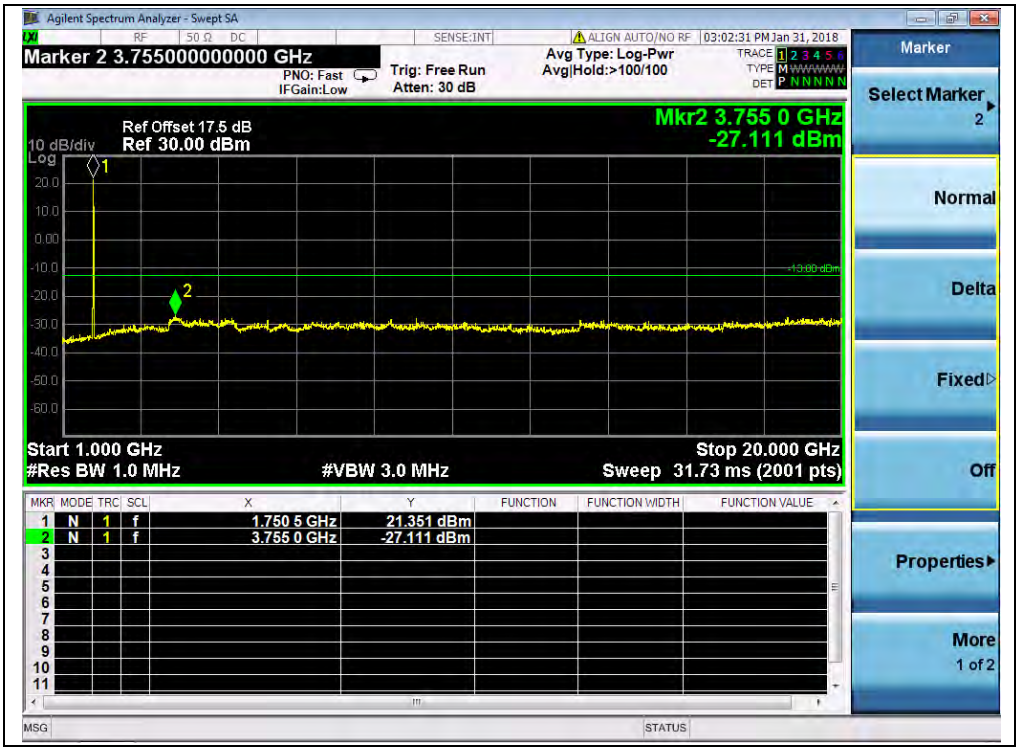
(Plot H2, WCDMA1700MHz, Channel = 1412, 30MHz to 1GHz)



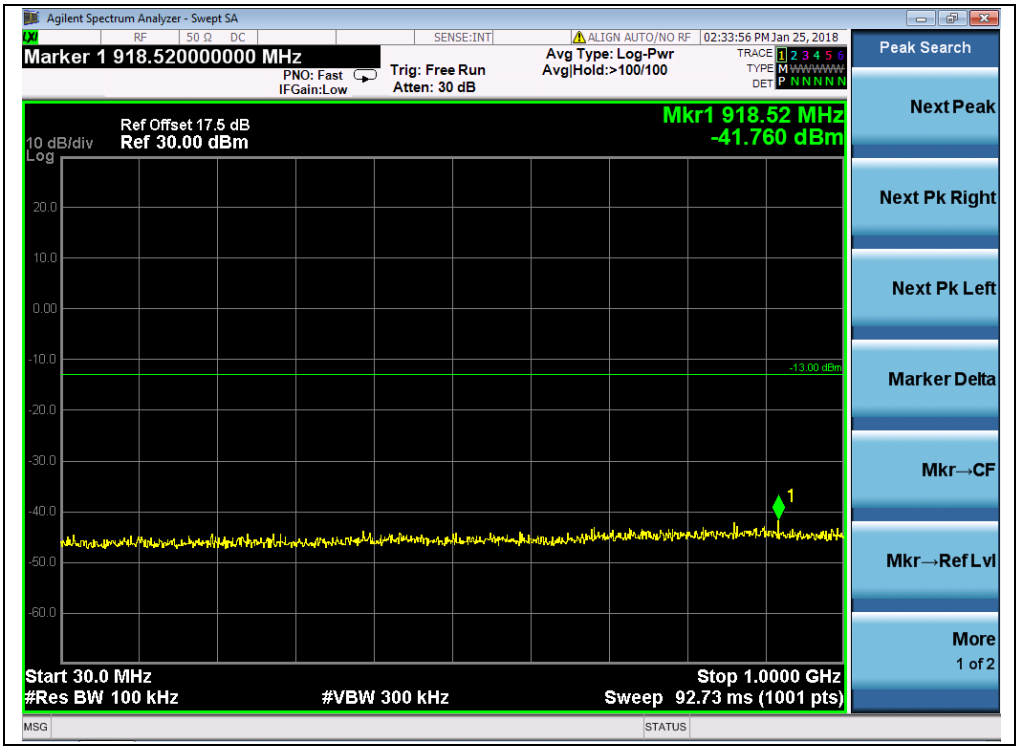
(Plot H2.1, WCDMA1700MHz, Channel = 1412, 1GHz to 20GHz)



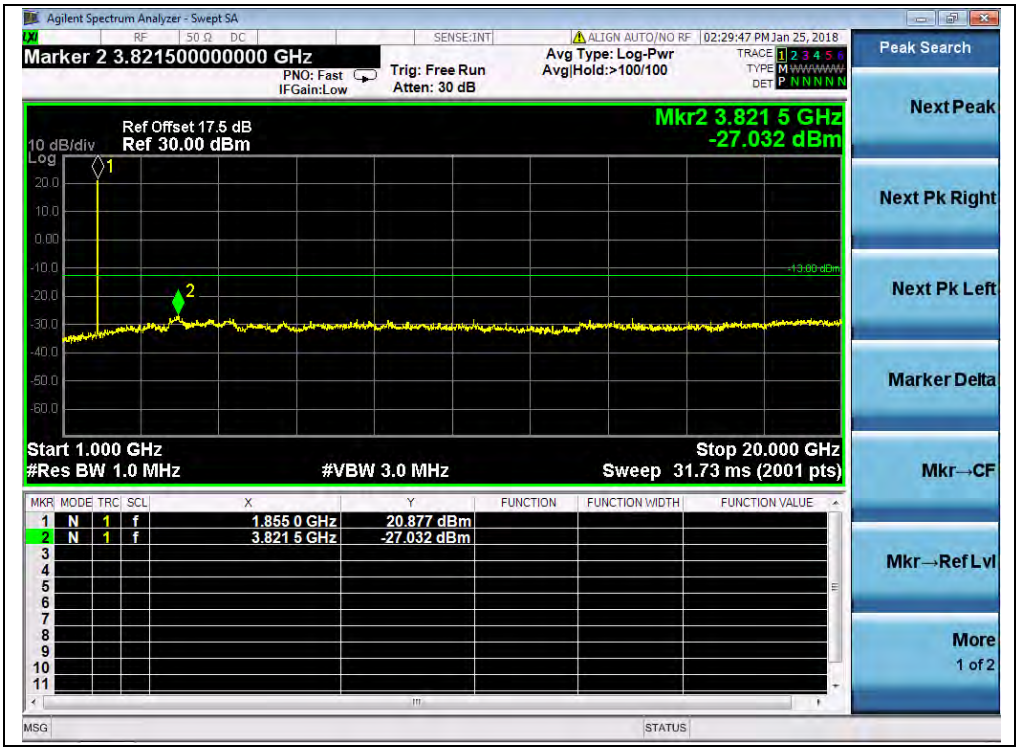
(Plot H3, WCDMA1700MHz, Channel = 1513, 30MHz to 1GHz)



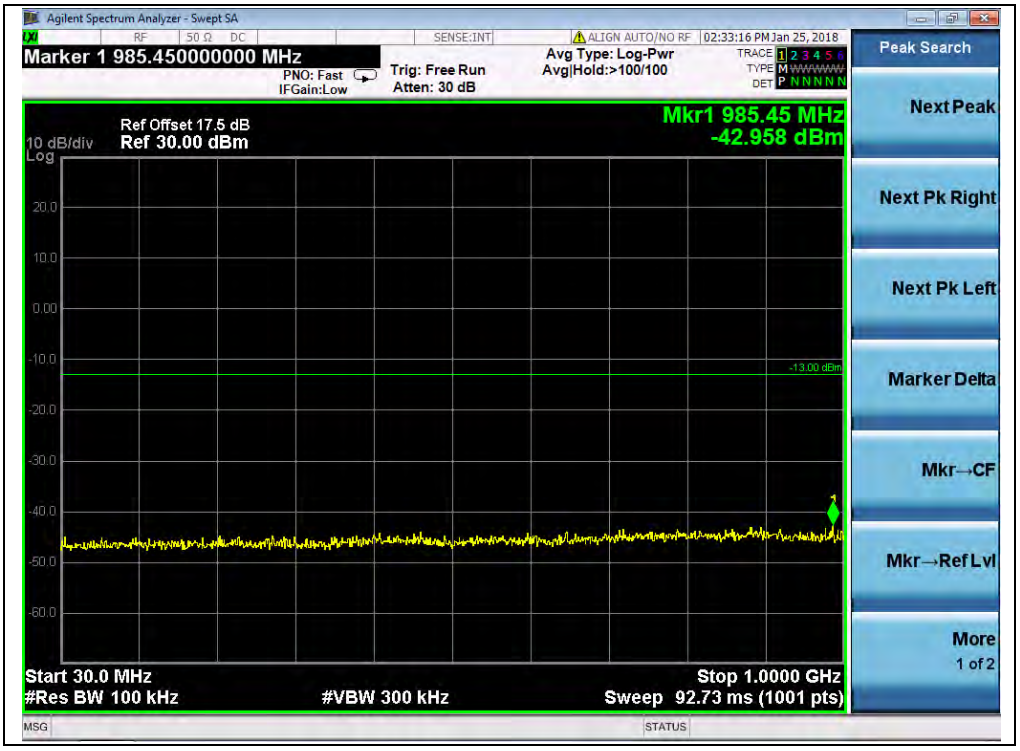
(Plot H3.1: WCDMA1700MHz Channel = 1513, 1GHz to 20GHz)



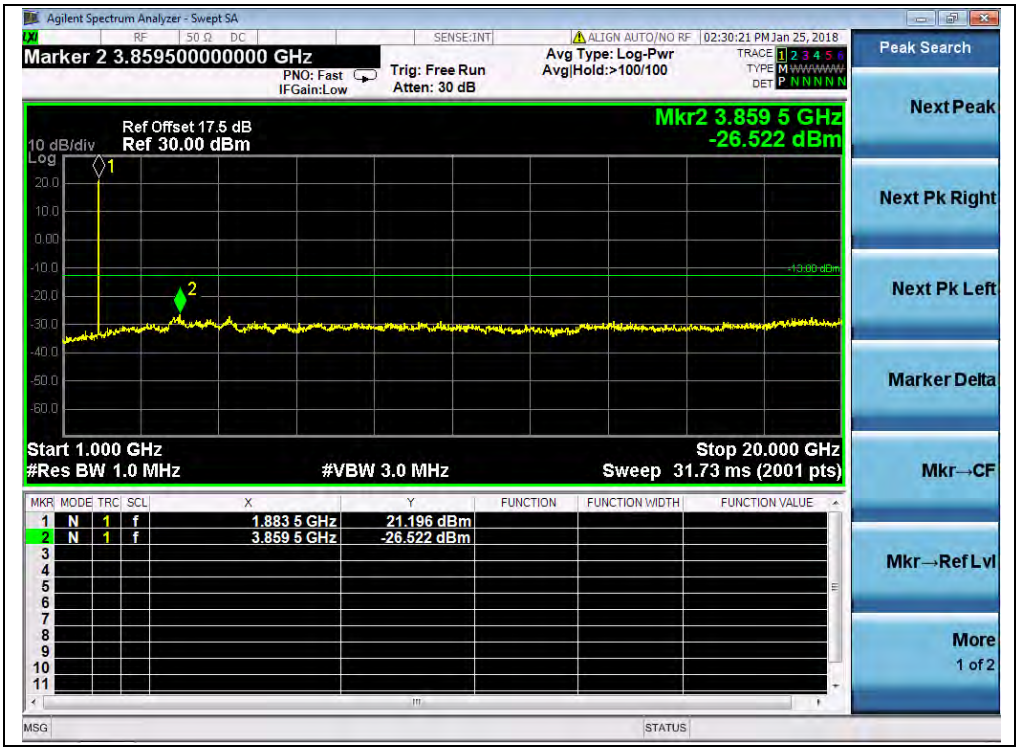
(Plot I1, WCDMA1900MHz, Channel = 9262, 30MHz to 1GHz)



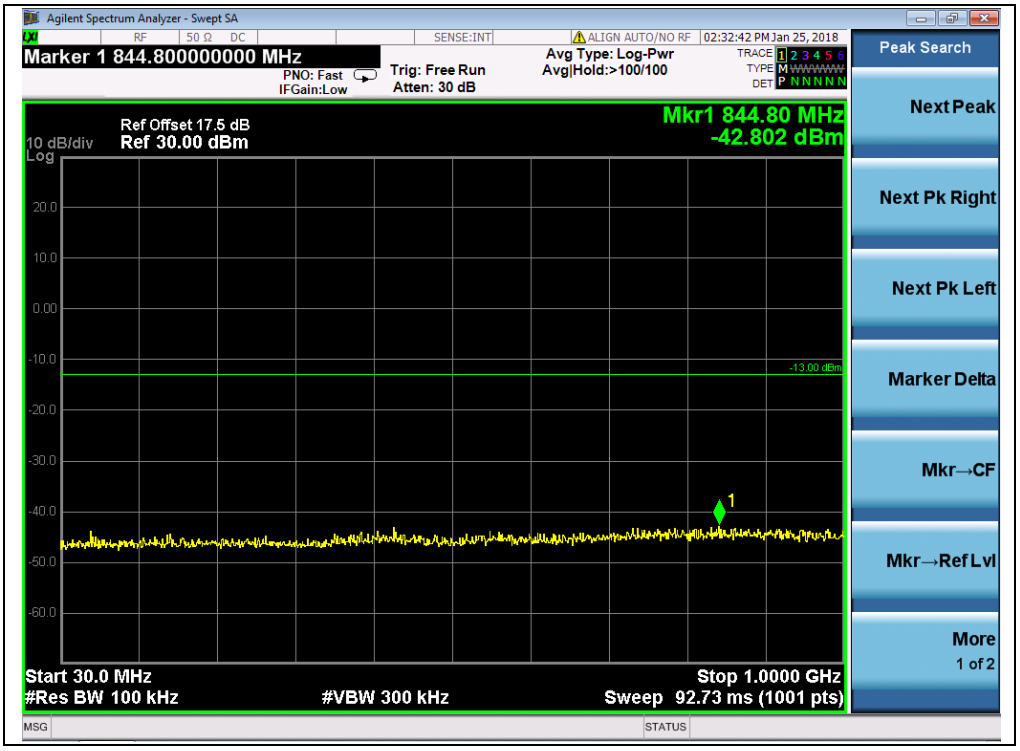
(Plot I1.1, WCDMA1900MHz, Channel = 9262, 1GHz to 20GHz)



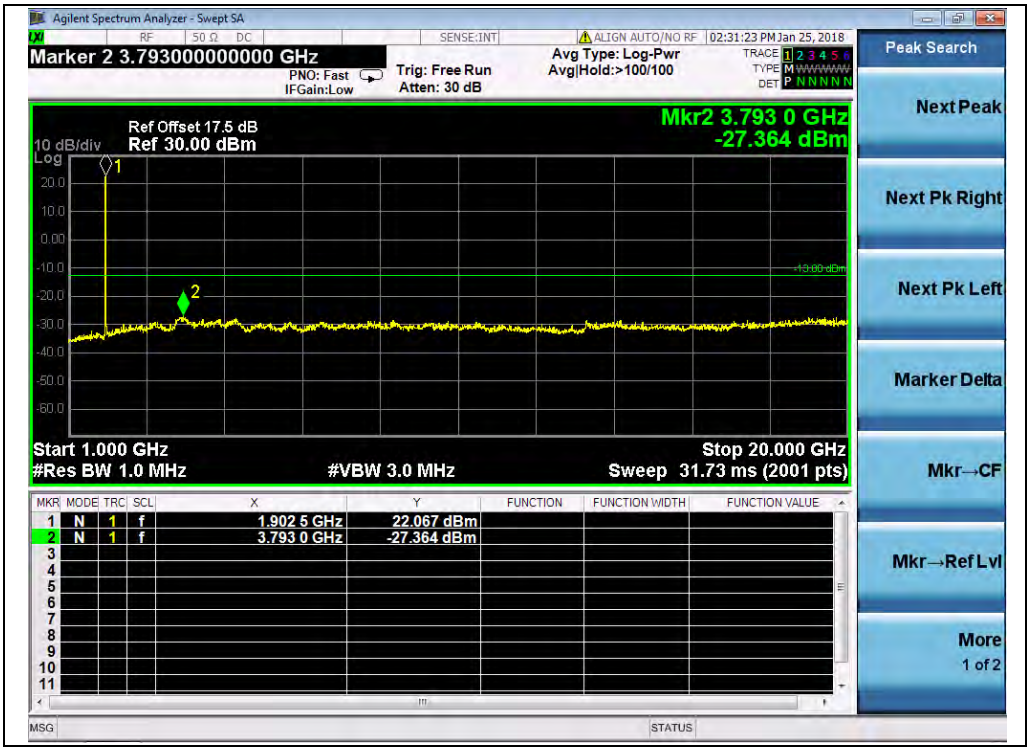
(Plot I2, WCDMA1900MHz, Channel = 9400, 30MHz to 1GHz)



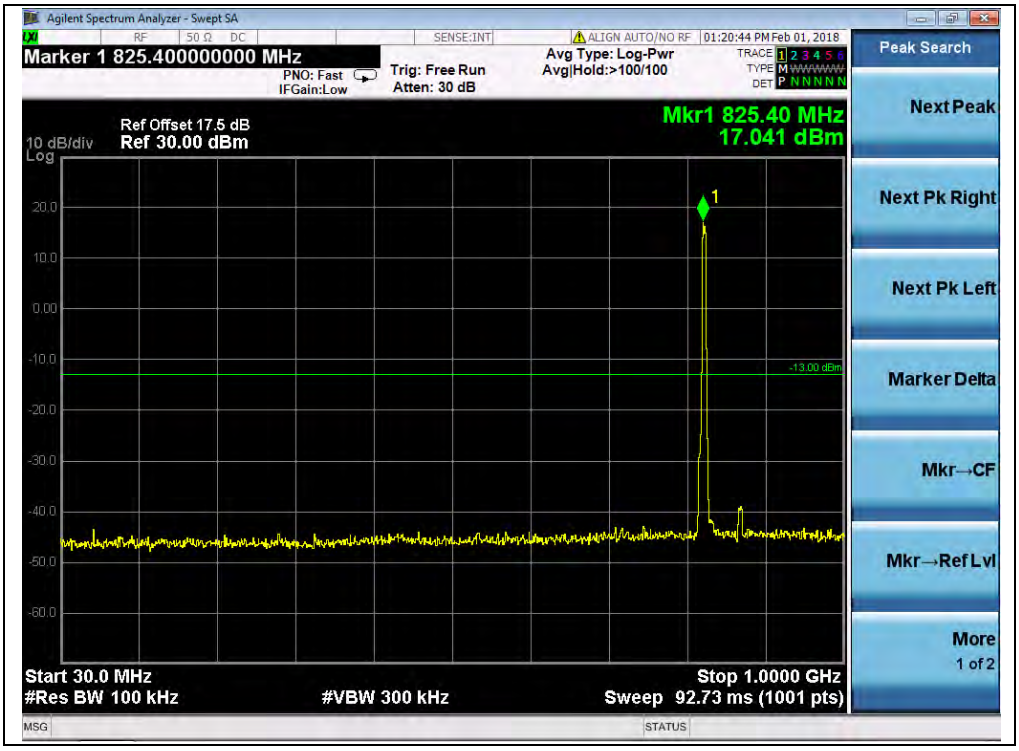
(Plot I2.1, WCDMA1900MHz, Channel = 9400, 1GHz to 20GHz)



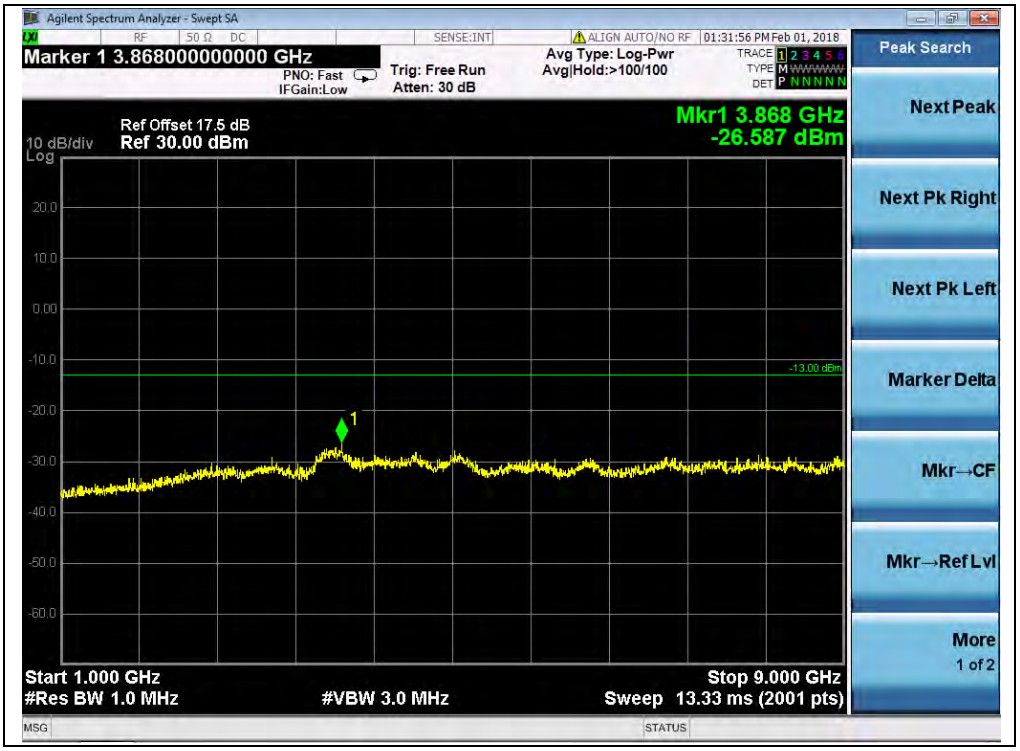
(Plot I3, WCDMA1900MHz, Channel = 9538, 30MHz to 1GHz)



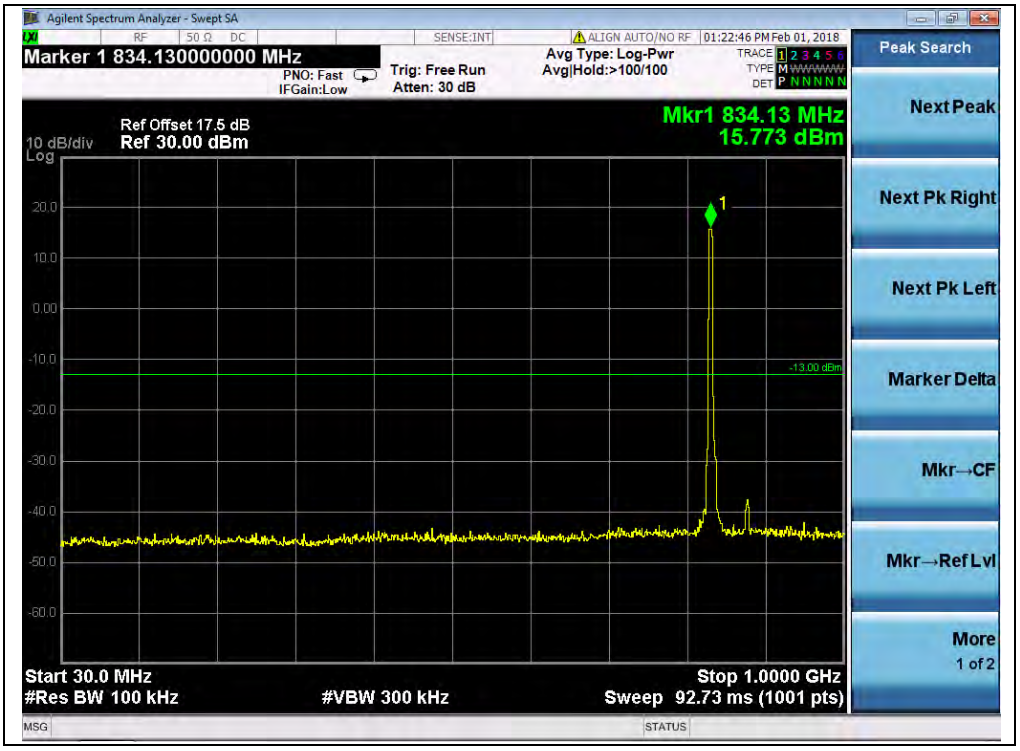
(Plot I3.1, WCDMA1900MHz, Channel = 9538 1GHz to 20GHz)



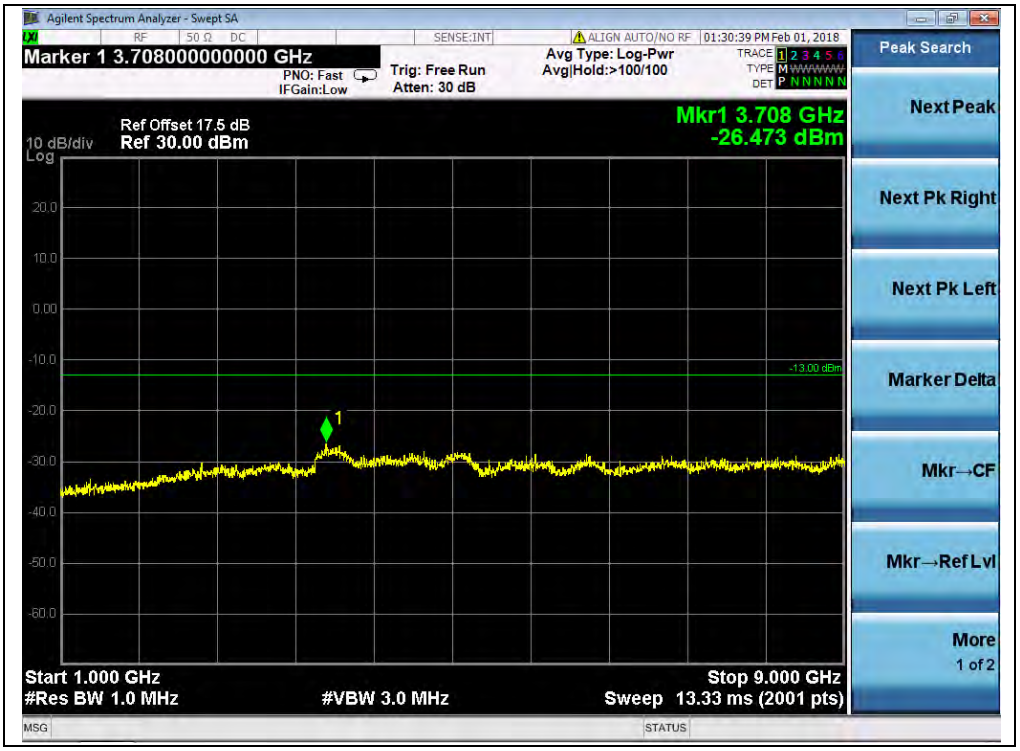
(Plot J1, HSDPA 850MHz, Channel = 4132, 30MHz to 1GHz)



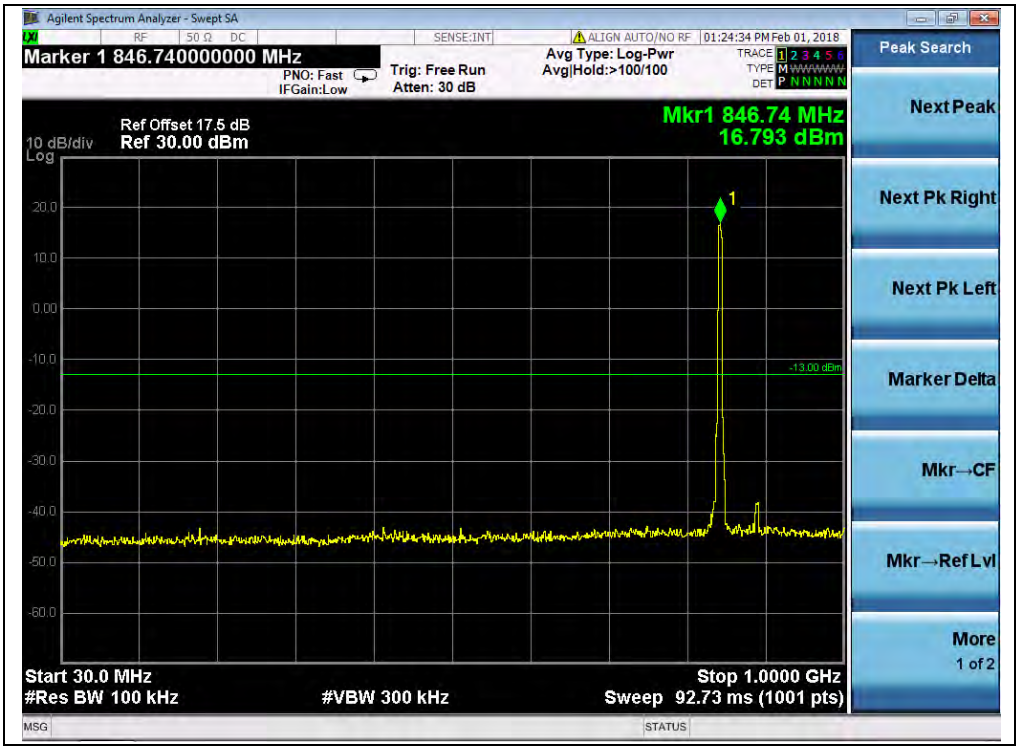
(Plot J1.1, HSDPA 850MHz, Channel = 4132, 1GHz to 9GHz)



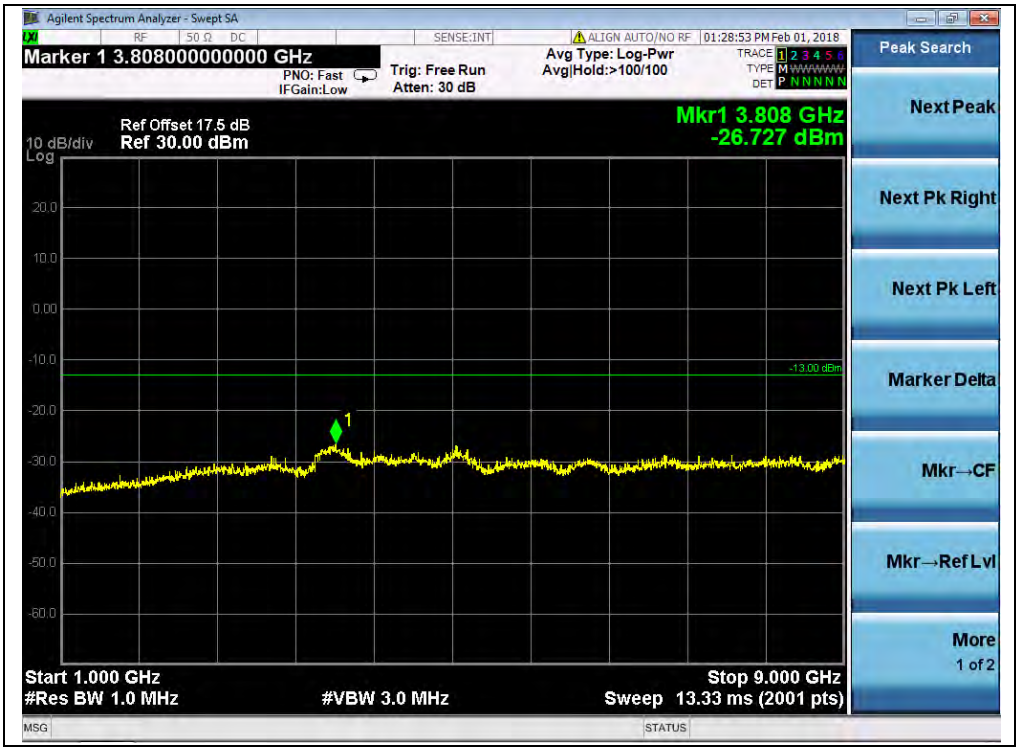
(Plot J2, HSDPA 850MHz, Channel = 4175, 30MHz to 1GHz)



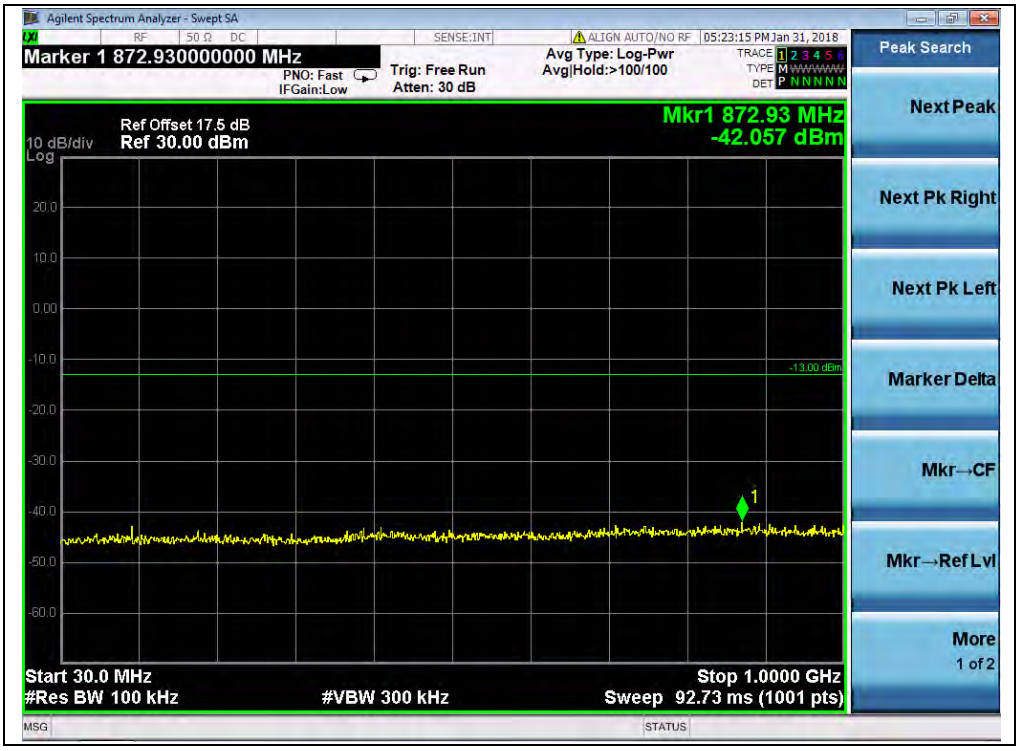
(Plot J2.1, HSDPA 850MHz, Channel = 4175, 1GHz to 9GHz)



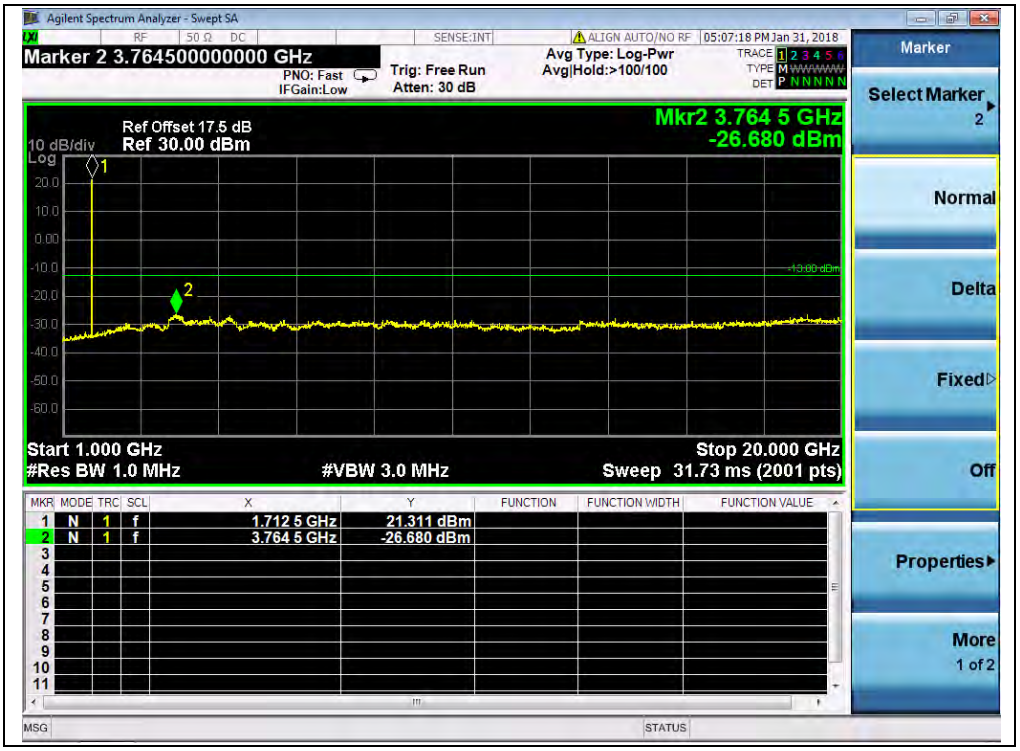
(Plot J3, HSDPA 850MHz, Channel = 4233, 30MHz to 1GHz)



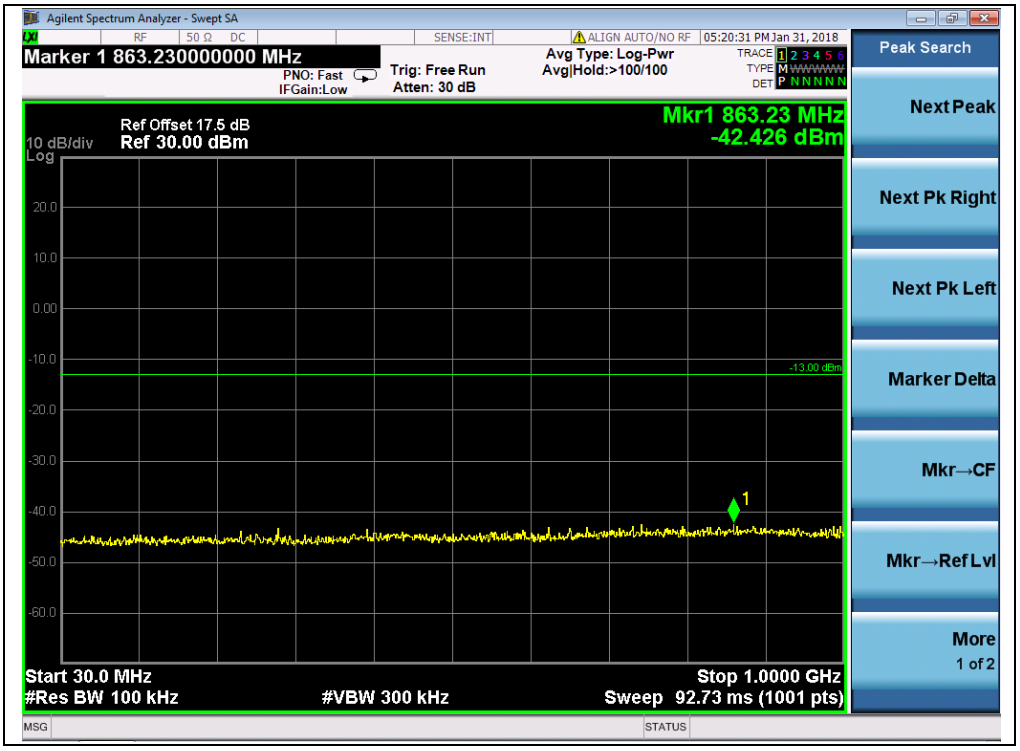
(Plot J3.1, HSDPA 850MHz, Channel = 4233, 1GHz to 9GHz)



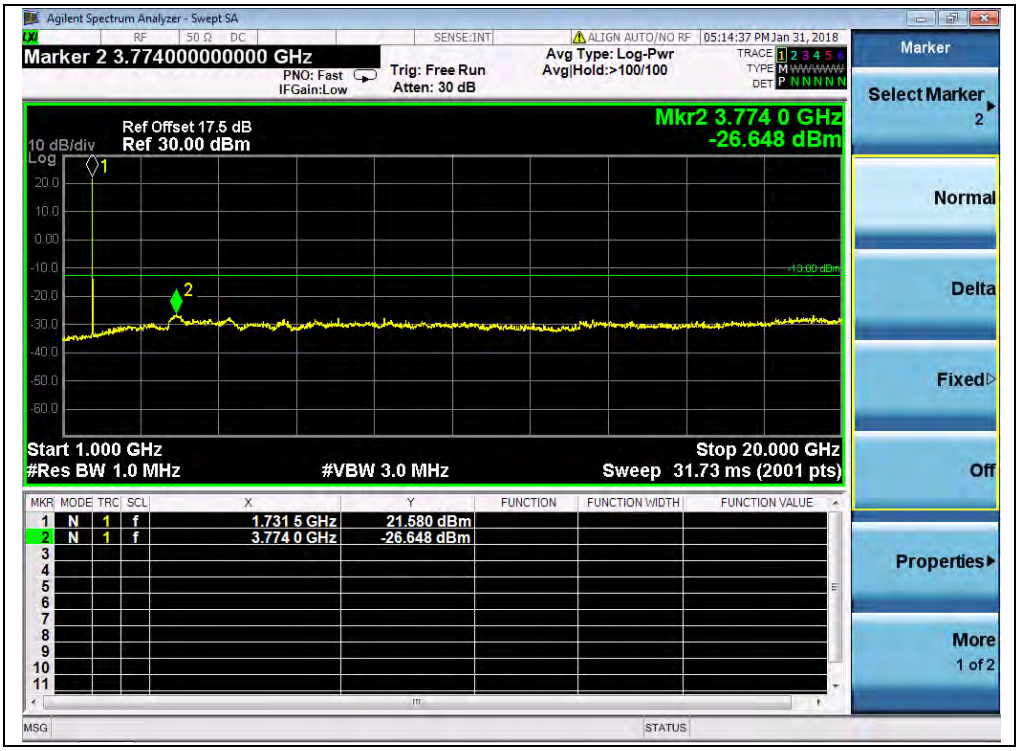
(Plot K1, HSDPA 1700MHz, Channel = 1312, 30MHz to 1GHz)



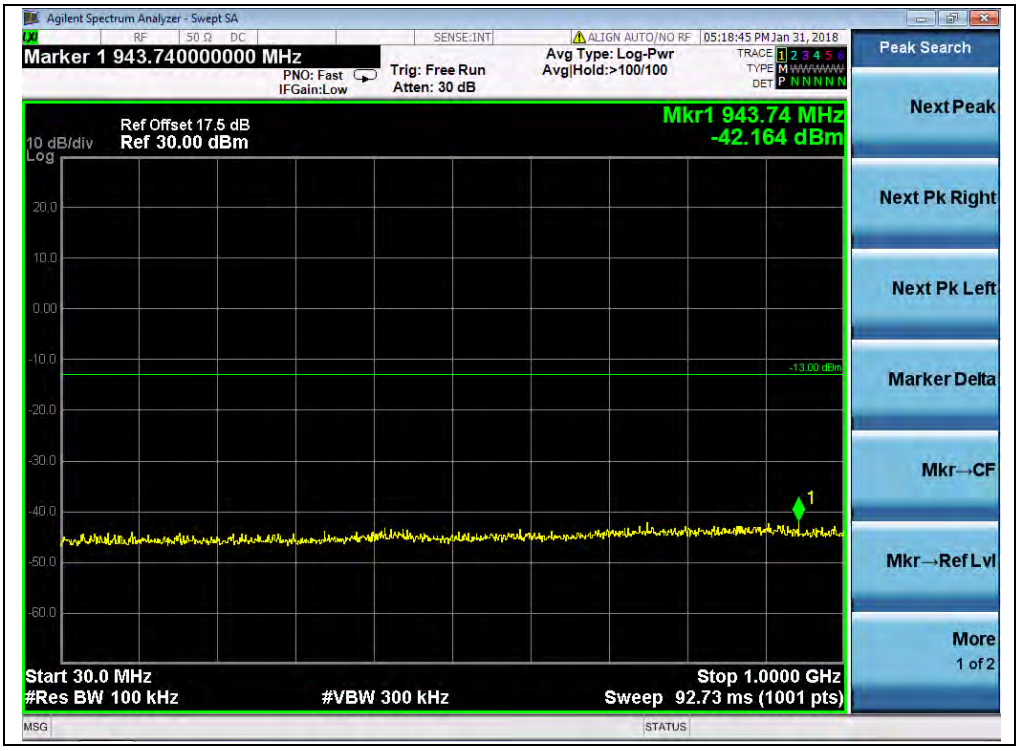
(Plot K1.1, HSDPA 1700MHz, Channel = 1312, 1GHz to 20GHz)



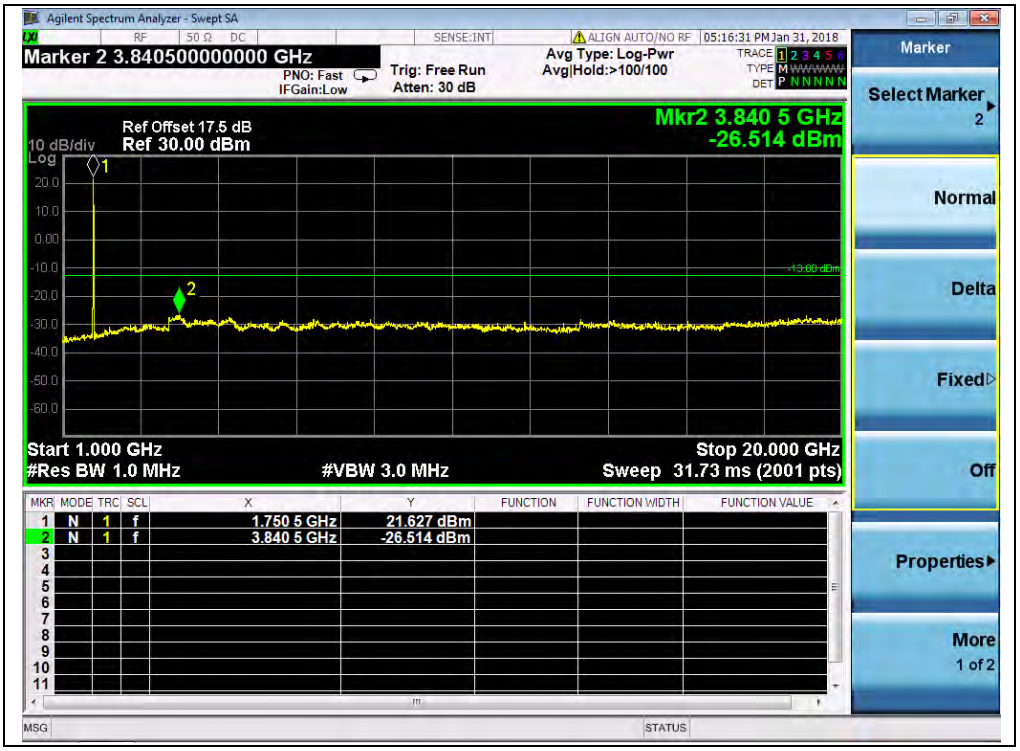
(Plot K2, HSDPA 1700MHz, Channel = 1412, 30MHz to 1GHz)



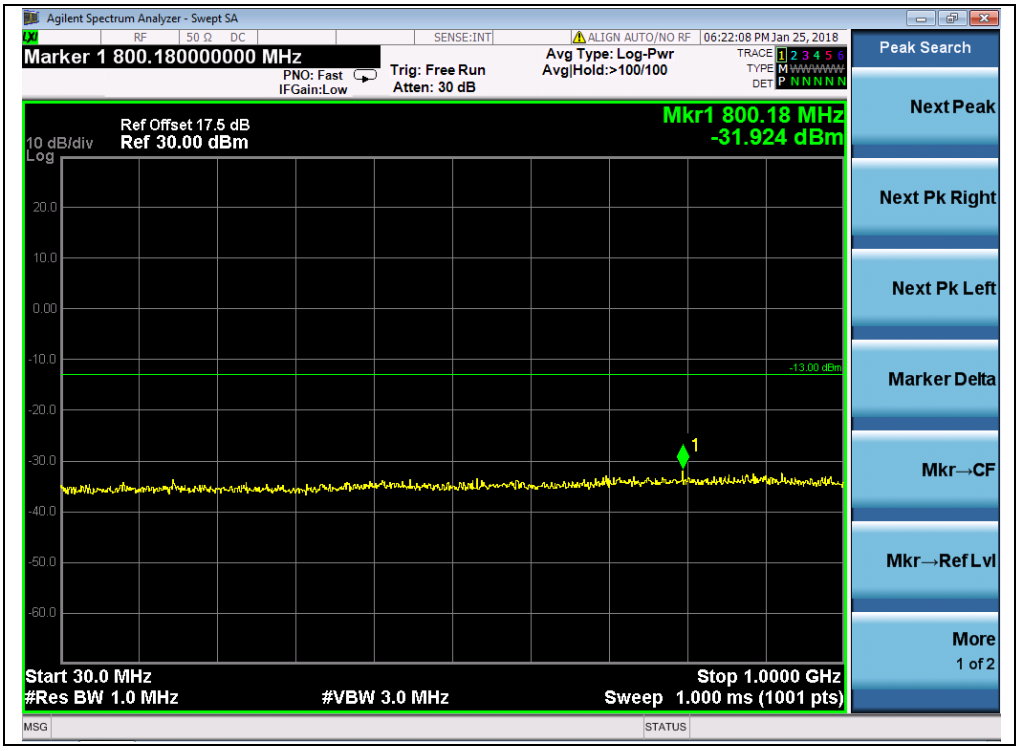
(Plot K2.1, HSDPA1700MHz, Channel = 1412, 1GHz to 20GHz)



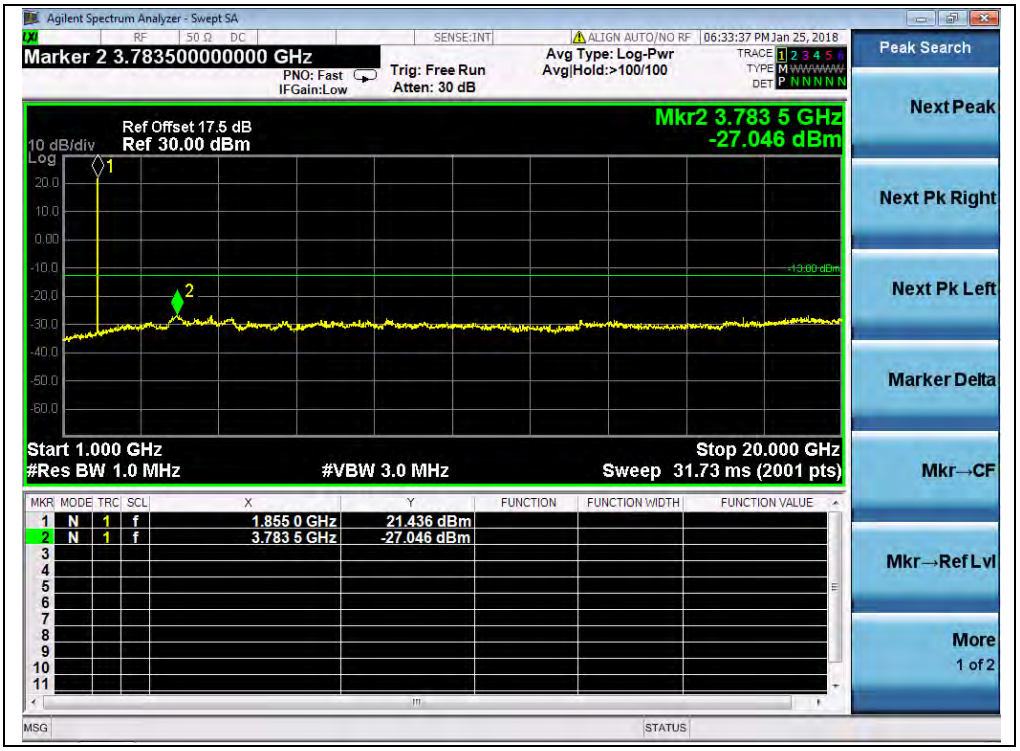
(Plot K3, HSDPA1700MHz, Channel = 1513, 30MHz to 1GHz)



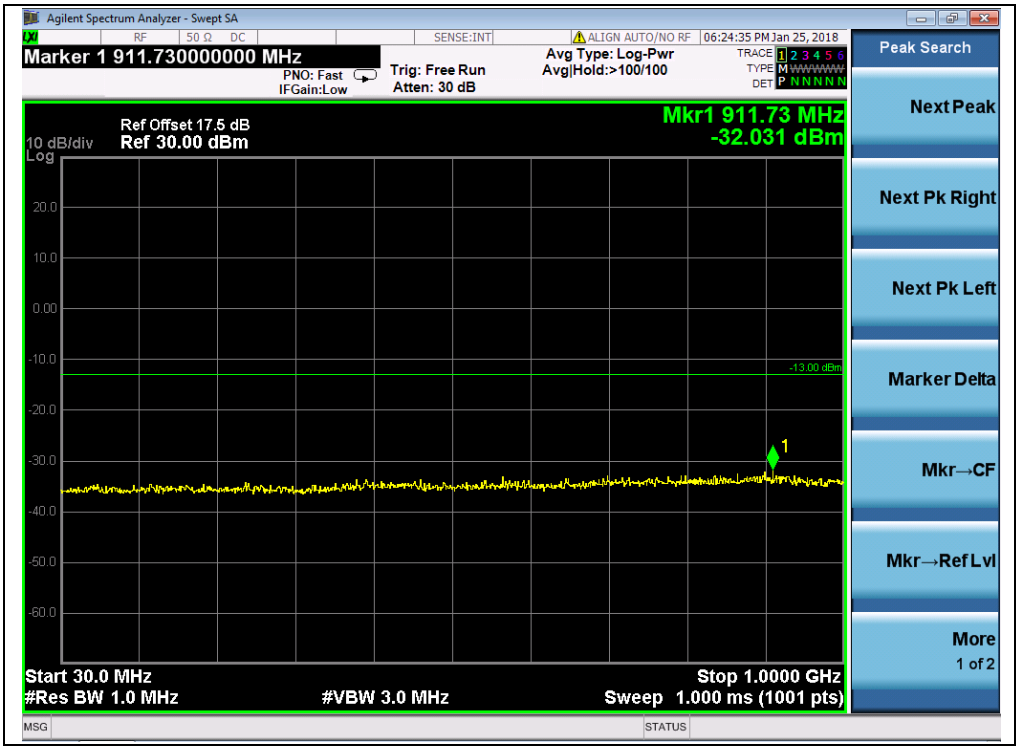
(Plot K3.1, HSDPA1700MHz, Channel = 1513 1GHz to 20GHz)



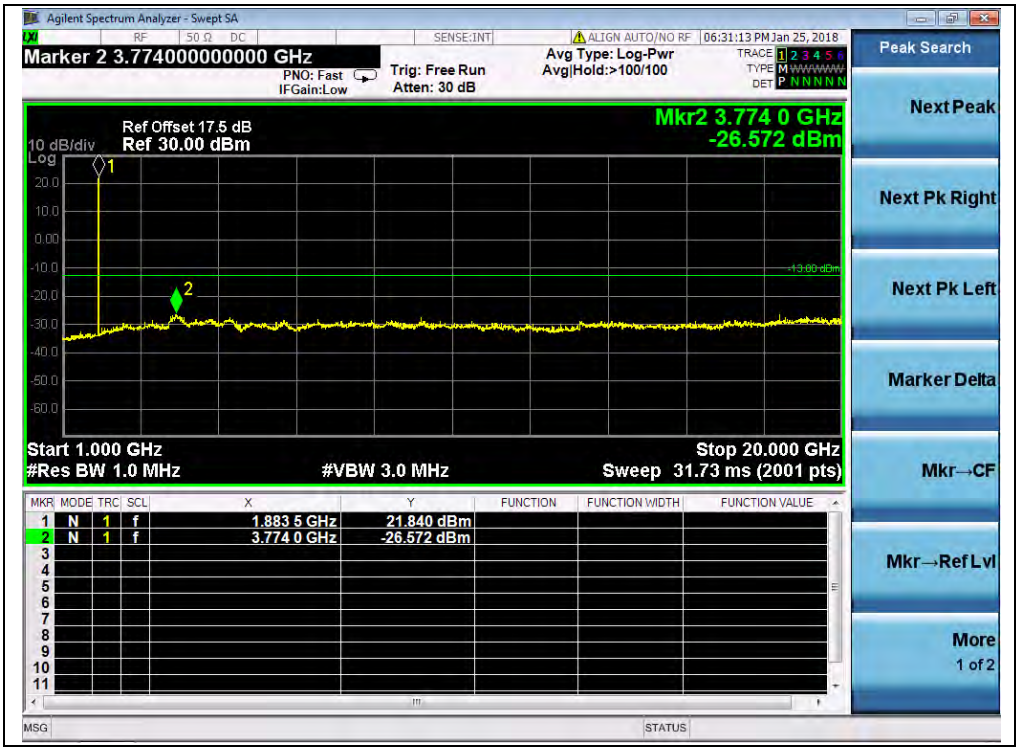
(Plot L1, HSDPA 1900MHz, Channel = 9262, 30MHz to 1GHz)



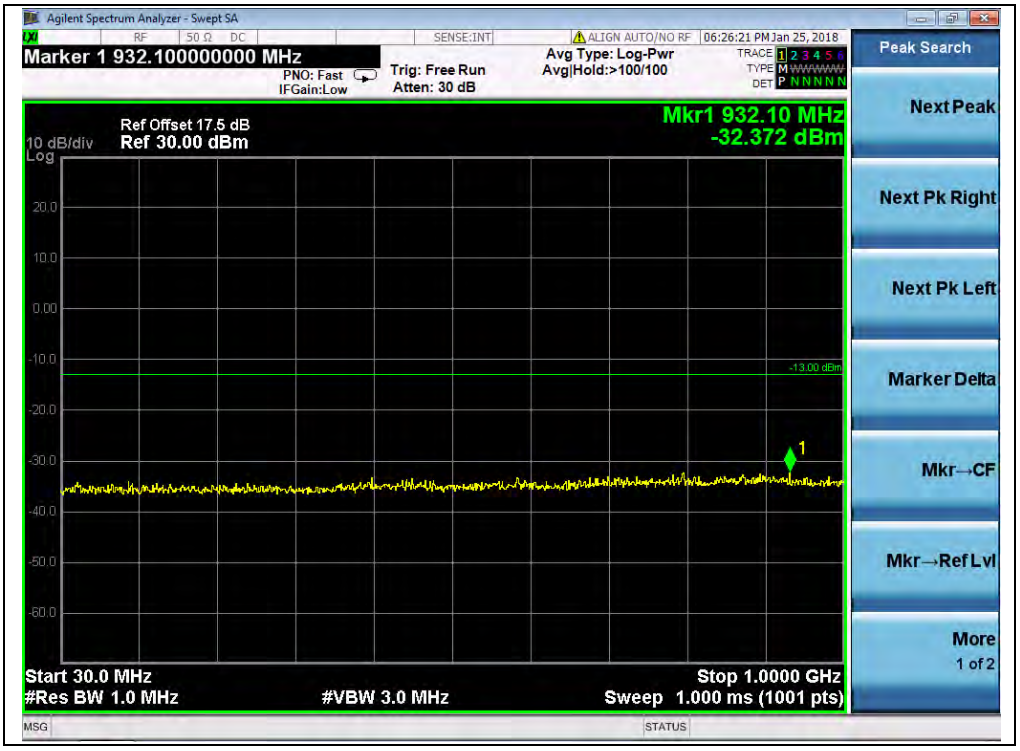
(Plot L1.1, HSDPA 1900MHz, Channel = 9262, 1GHz to 20GHz)



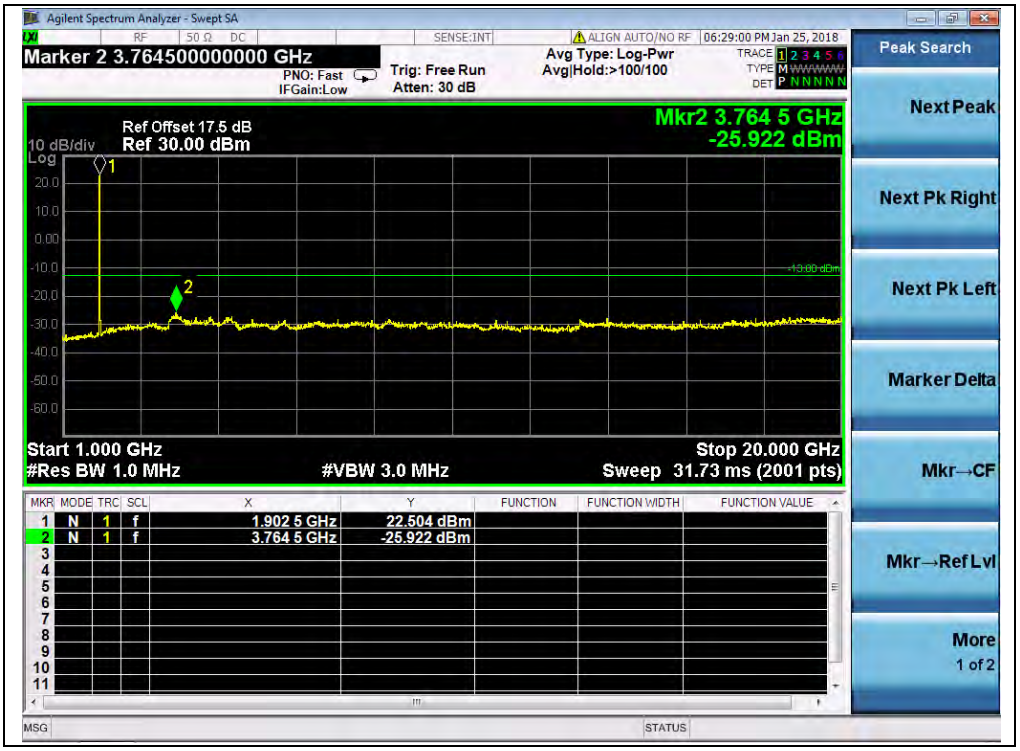
(Plot L2, HSDPA 1900MHz, Channel = 9400, 30MHz to 1GHz)



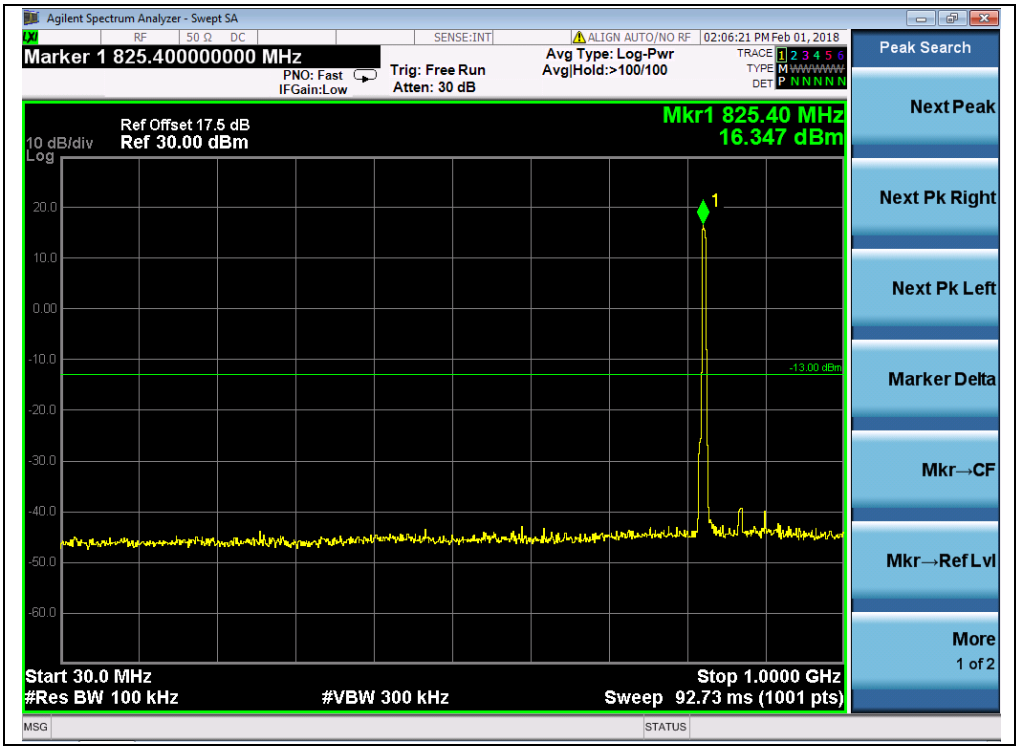
(Plot L2.1, HSDPA1900MHz, Channel = 9400, 1GHz to 20GHz)



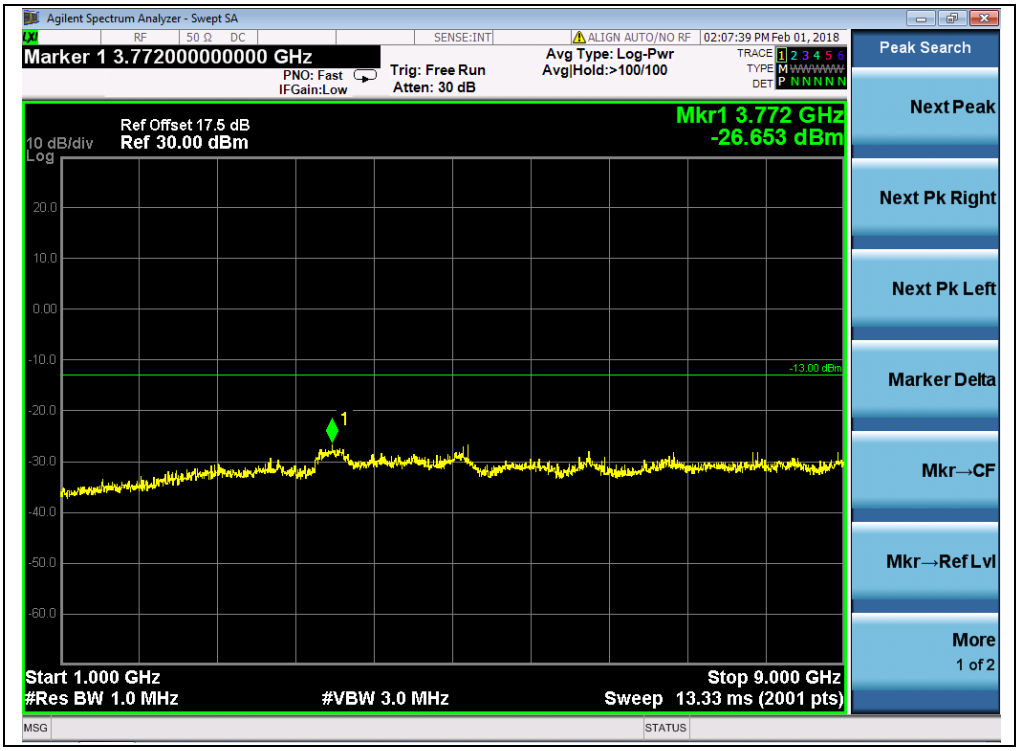
(Plot L3, HSDPA1900MHz, Channel = 9538, 30MHz to 1GHz)



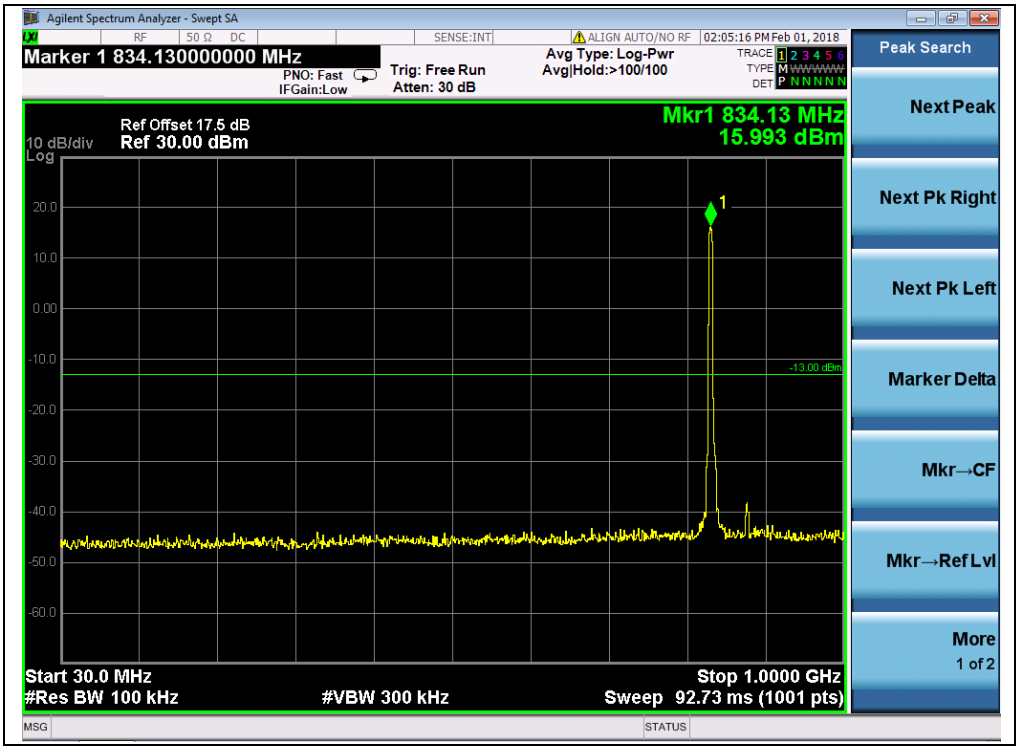
(Plot L3.1, HSDPA1900MHz, Channel = 9538 1GHz to 20GHz)



(Plot M1, HSUPA 850MHz, Channel = 4132, 30MHz to 1GHz)

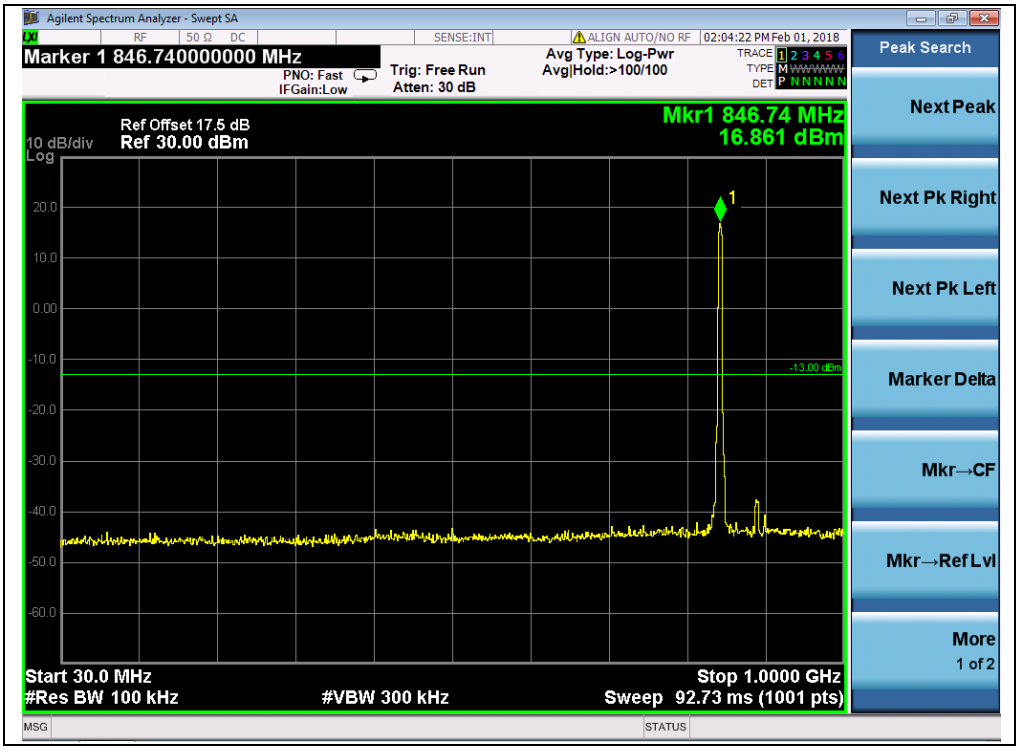


(Plot M1.1, HSUPA 850MHz, Channel = 4132, 1GHz to 9GHz)



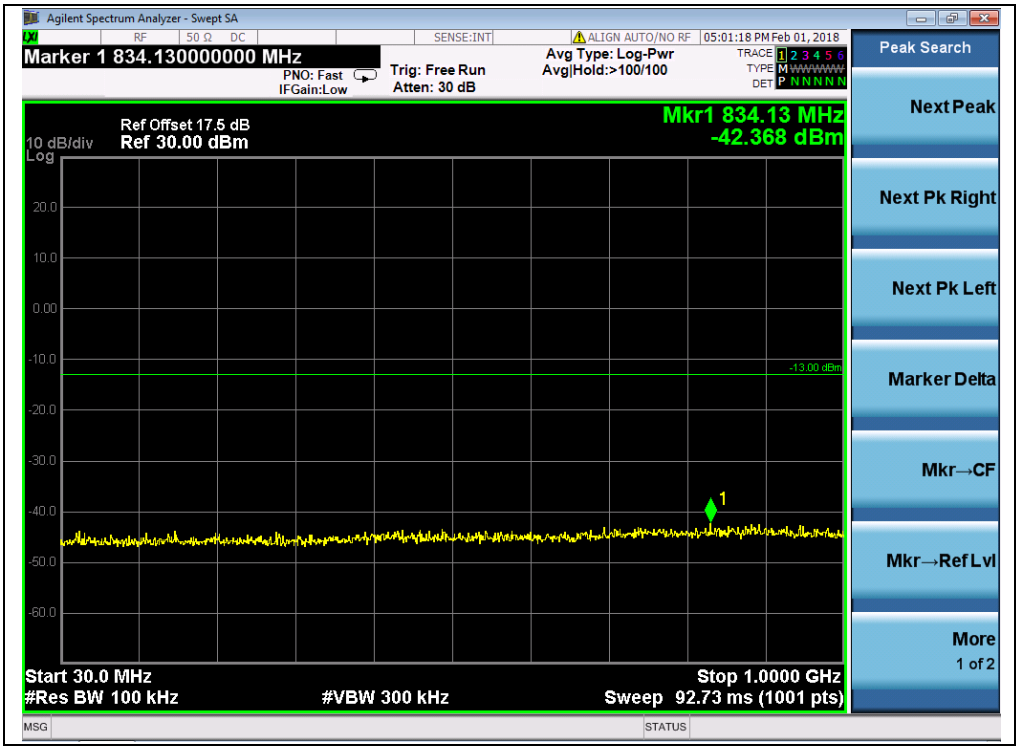
(Plot M2, HSUPA 850MHz, Channel = 4175, 30MHz to 1GHz)

(Plot M2.1, HSUPA 850MHz, Channel = 4175, 1GHz to 9GHz)

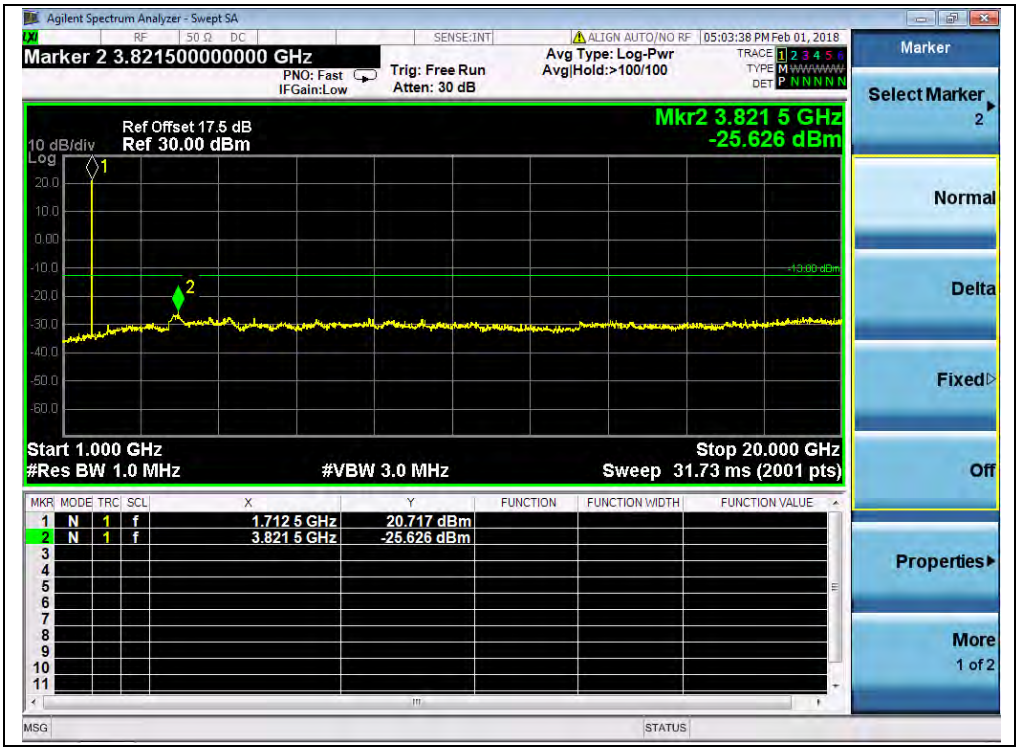


(Plot M3, HSUPA 850MHz, Channel = 4233, 30MHz to 1GHz)

(Plot M3.1, HSUPA 850MHz, Channel = 4233, 1GHz to 9GHz)

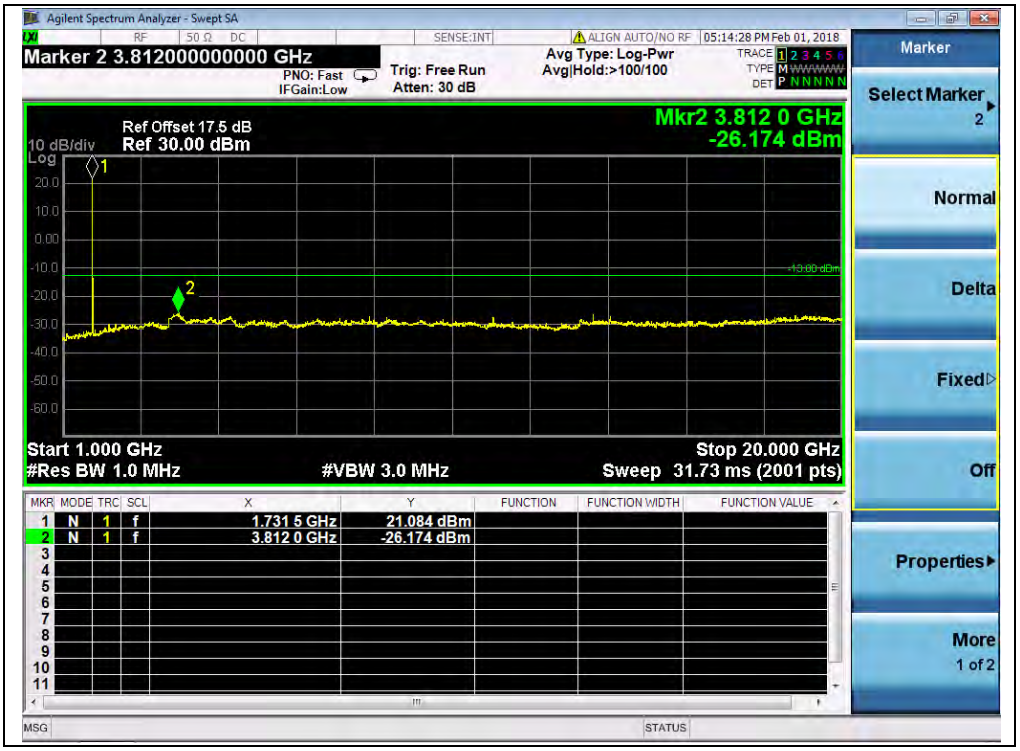


(Plot N1, HSUPA 1700MHz, Channel = 1312, 30MHz to 1GHz)

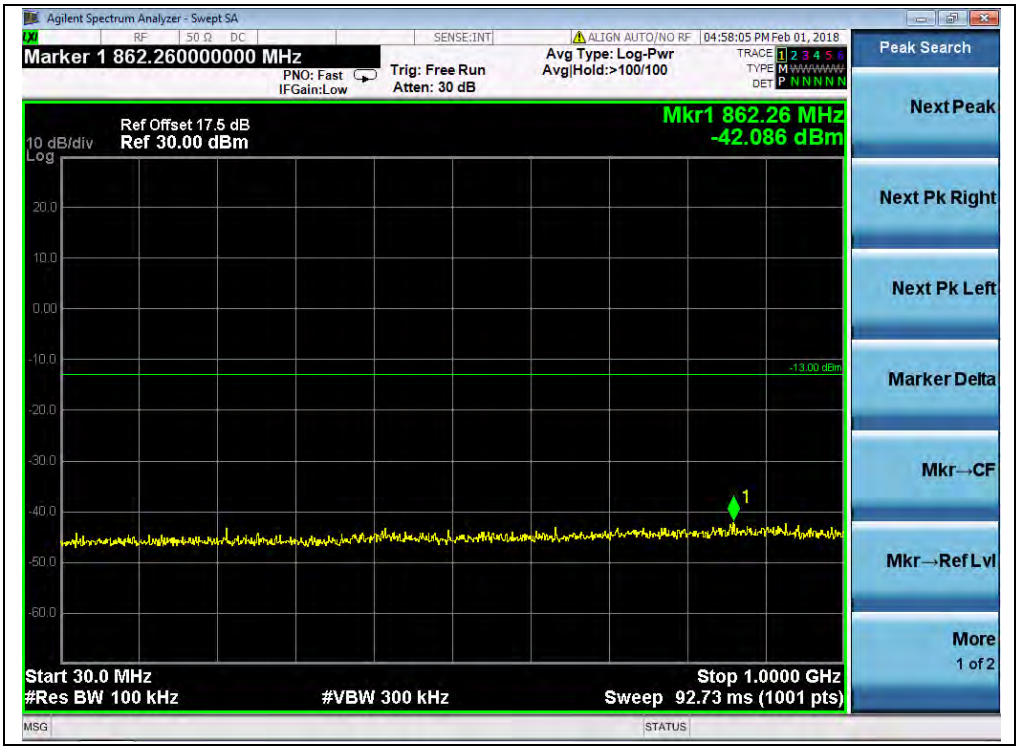


(Plot N1.1, HSUPA 1700MHz, Channel = 1312, 1GHz to 20GHz)

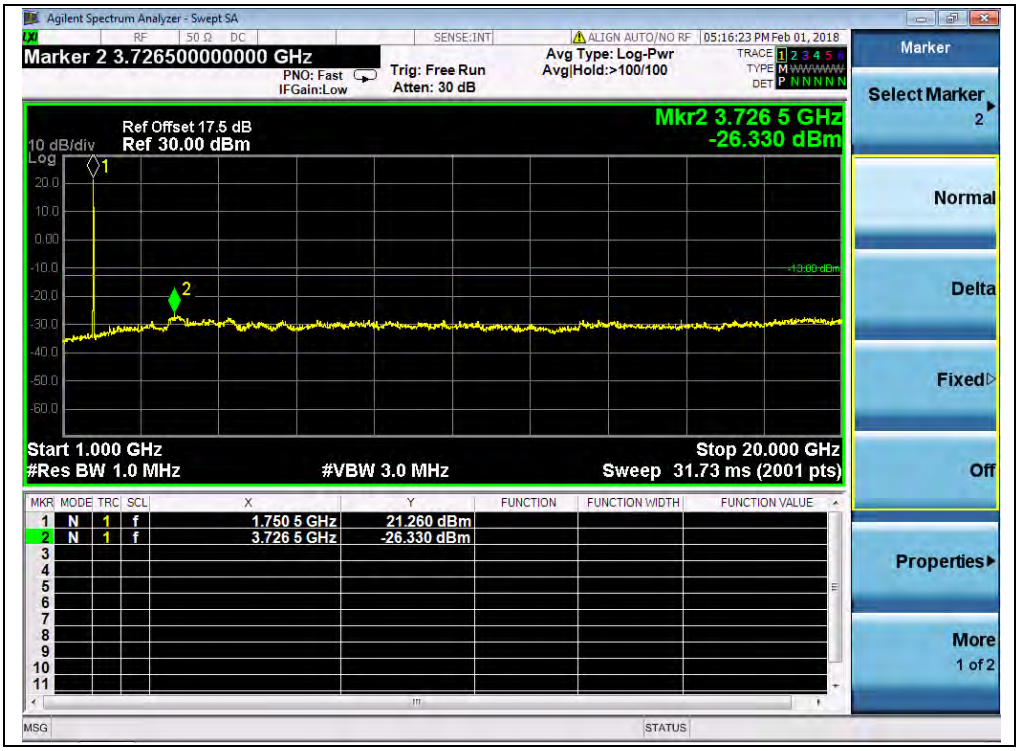
(Plot N2, HSUPA 1700MHz, Channel = 1412, 30MHz to 1GHz)



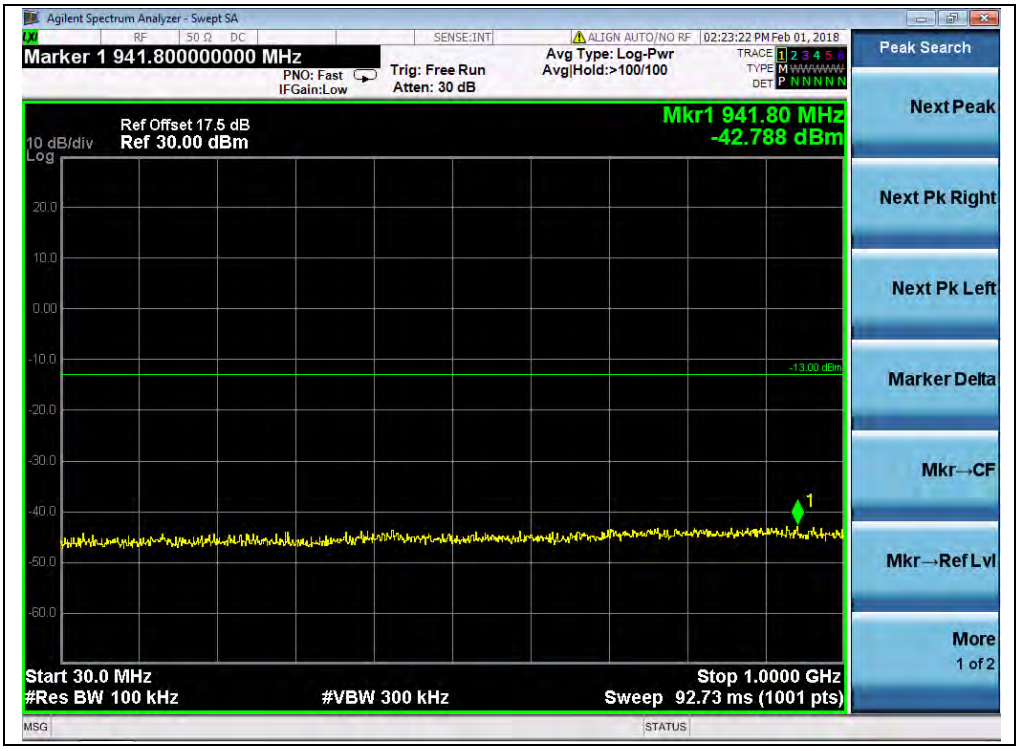
(Plot N2.1, HSUPA1700MHz, Channel = 1412, 1GHz to 20GHz)



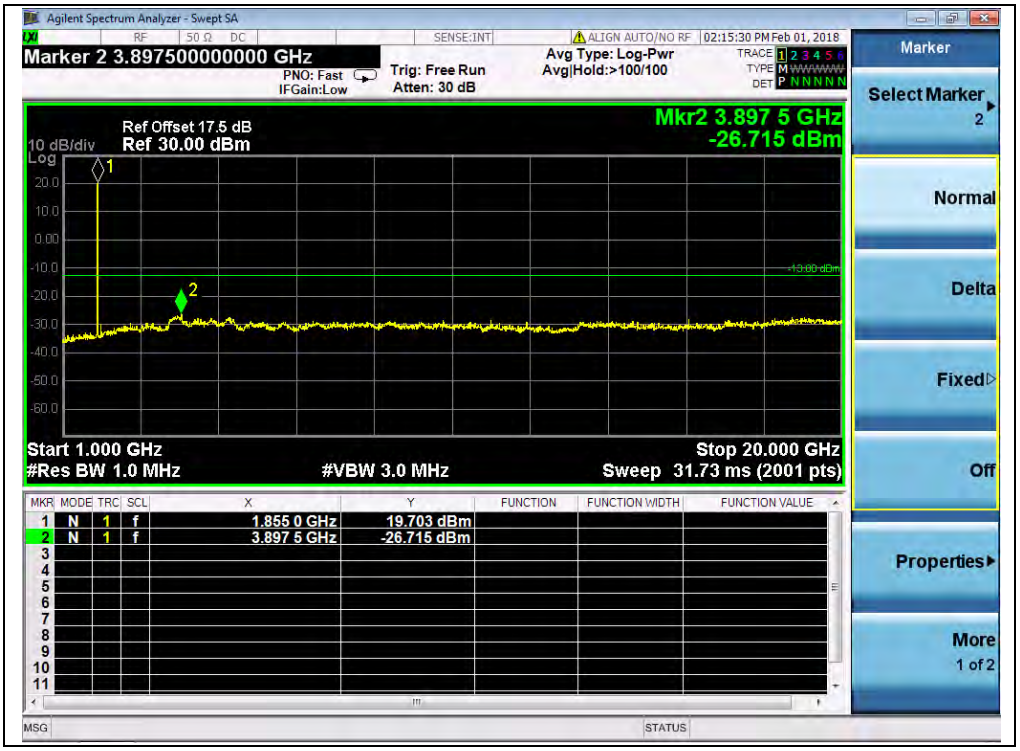
(Plot N3, HSUPA1700MHz, Channel = 1513, 30MHz to 1GHz)



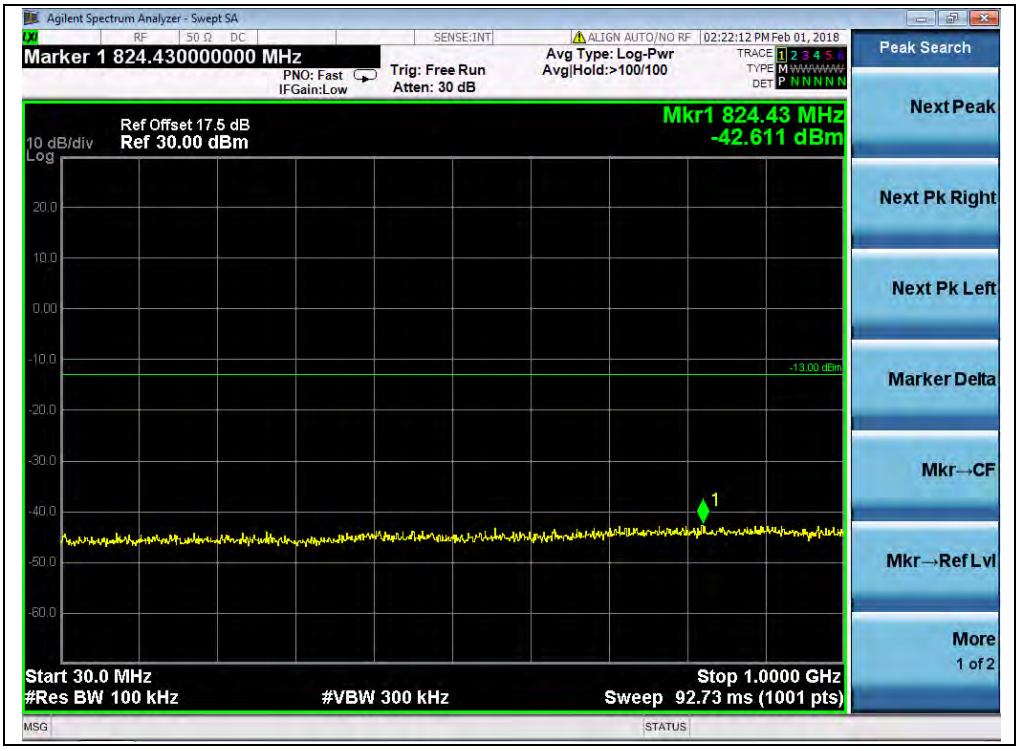
(Plot N3.1, HSUPA1700MHz, Channel = 1513, 1GHz to 20GHz)



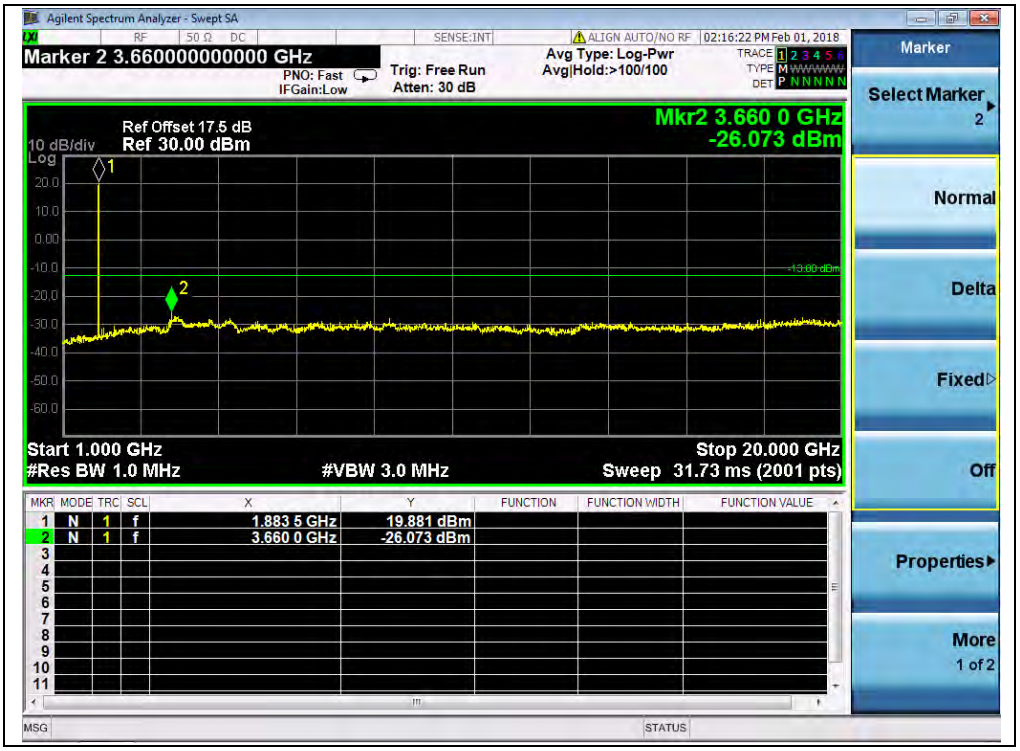
(Plot O1,HSUPA 1900MHz, Channel = 9262, 30MHz to 1GHz)



(Plot O1.1, HSUPA 1900MHz, Channel = 9262, 1GHz to 20GHz)



(Plot O2, HSUPA 1900MHz, Channel = 9400, 30MHz to 1GHz)



(Plot O2.1, HSUPA1900MHz, Channel = 9400, 1GHz to 20GHz)

(Plot O3, HSUPA1900MHz, Channel = 9538, 30MHz to 1GHz)