REPORT No.: SZ18050200W07

TEST REPORT

APPLICANT	:	Shenzhen Chainway Information Technology Co.,Ltd.
PRODUCT NAME	:	Mobile Data Terminal
MODEL NAME	:	C75
BRAND NAME	:	CHAINWAY
FCC ID	:	2AC6AC75
STANDARD(S)	:	47 CFR Part 22 Subpart H 47 CFR Part 24 Subpart E 47 CFR Part 27 Subpart L
TEST DATE	:	2018-01-24 and 2018-06-14
ISSUE DATE	:	2018-06-28

Tested by: Su Hang

Su Hang (Test Engineer)

Approved by: Andy Yeh

Andy Yeh (Technical Director)

MORLAB

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DIRECTORY

Change History		
Issue	**Date**	**Reason for change**
1.0	2018-06-28	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Shenzhen Chainway Information Technology Co.,Ltd.
Applicant Address:	9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen
Manufacturer:	Shenzhen Chainway Information Technology Co.,Ltd.
Manufacturer Address:	9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen

1.2. Equipment Under Test (EUT) Description

Product Name:	Mobile Data Terminal
Serial No:	(N/A, marked #1 by test site)
Hardware Version:	C70_MB_V11
Software Version:	C75A_MT6737_V1.2_AM_GITe4dc346_201805181532
Modulation Type:	GSM,GPRS Mode with GMSK Modulation
Operating 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 1700MHz Tx: 1712.4 – 1752.6MHz (at intervals of 200kHz); Rx: 2112.4 - 2152.6MHz (at intervals of 200kHz) WCDMA 1900MHz Tx: 1852.4 - 1907.6MHz (at intervals of 200kHz); Rx: 1932.4 - 1987.6MHz (at intervals of 200kHz)
Multi-slot Class:	GPRS: Multislot Class12; EGPRS: Multislot Class12
Emission Designators:	GSM 850:248KGXW,GSM 1900:244KGXW EGPRS850:251KG7W, EGPRS1900:252KG7W,

	WCDMA 850:4M22F9W , WCDMA1700:4M24F9W WCDMA1900:4M23F9W	
Antenna Type:	PIFA Antenna	
Antenna Gain:	0.38 dBi	
Operating voltage:	Normal(NV):	3.8V
	Lowest(LV):	3.6V
	Highest(HV):	4.35V

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.

Note 6: This test report is updated from report SZ18010063W08, based on the similarity between before, the model name, the software and hardware version, the antenna and the appearance of EUT are changed. And remove the RFID function. The changes only affect the test results of Transmitter Radiated Power and Radiated Out of Band Emissions.

1.3. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part 22, Part 24 and Part 27 for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 2 (10-1-12 Edition)	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 22 (10-1-12 Edition)	Public Mobile Services
3	47 CFR Part 24 (10-1-12 Edition)	Personal Communications Services
4	47 CFR Part 27 (10-1-12 Edition)	Miscellaneous Wireless Communications Services

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

No.	Section	Description	Test Date	Test Engineer	Result
1	2.1046	Conducted RF Output Power	Jan 24, 2018	Su Hang	PASS Note1
2	24.232(d) 27.50(d)	Peak - Average Radio	Jan 25, 2018 Jan 31, 2018	Su Hang	PASS Note1
3	2.1049	99% Occupied Bandwidth	Jan 25, 2018 Jan 31, 2018	Su Hang	PASS Note1
4	2.1055,22.355, 24.235,27.54	Frequency Stability	Jan 25, 2018 Jan 31, 2018	Su Hang	PASS Note1
5	2.1051, 22.917(a), 24.238(a), 27.53(h)	Conducted Out of Band Emissions	Jan 25, 2018 Jan 31, 2018	Su Hang	PASS Note1
6	2.1051, 22.917(a), 24.238(a), 27.53(h)	Band Edge	Jan 25, 2018 Jan 31, 2018	Su Hang	PASS Note1
7	22.913(a), 24.232(a)	Transmitter Radiated Power (EIPR/ERP)	Jun 14, 2018	Wu Zhongwen	PASS
8	2.1051, 22.917(a), 24.238(a), 27.53(h)	Radiated Out of Band Emissions	Jun 14, 2018	Wu Zhongwen	PASS

Note1: The test results of these test items in this report refer to the test report (Report No.: SZ18010063W08).

Note 2: The tests were performed according to the method of measurements prescribed in KDB971168 D01 v03 (Oct 27, 2017) and ANSI/TIA-603-E-2016.

1.4. Environmental Conditions

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

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

2. 47 CFR Part 2, Part 22H & 24E Requirements

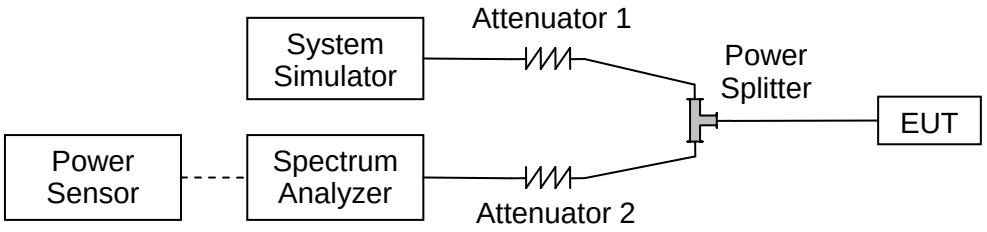
2.1. Conducted RF Output Power

2.1.1. Requirement

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

2.1.2. Test Description

Test Setup:



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

2.1.3. Test Results

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

GSM Test Verdict:

Band	Channel	Frequency (MHz)	Measured Output Power dBm	Limit dBm	Verdict
GSM 850MHz	128	824.2	32.09	35	PASS
	190	836.6	32.12		PASS
	251	848.8	32.15		PASS
GSM 1900MHz	512	1850.2	27.52	32	PASS
	661	1880.0	27.91		PASS
	810	1909.8	28.41		PASS
GPRS 850MHz	128	824.2	32.15	35	PASS
	190	836.6	32.19		PASS
	251	848.8	32.22		PASS
GPRS 1900MHz	512	1850.2	27.34	32	PASS
	661	1880.0	27.71		PASS
	810	1909.8	28.49		PASS
EGPRS 850MHz	128	824.2	27.06	35	PASS
	190	836.6	27.14		PASS
	251	848.8	26.99		PASS
EGPRS 1900MHz	512	1850.2	26.06	32	PASS
	661	1880.0	26.02		PASS
	810	1909.8	26.16		PASS
Note 1: For the GPRS and EGPRS model, all the slots were tested and just the worst data was recorded in this report.					

WCDMA Test Verdict:

Item	band	WCDMA 850			WCDMA 1700			WCDMA 1900		
	ARFCN	4132	4175	4233	1312	1412	1513	9262	9400	9538
	subtest	dBm			dBm			dBm		
5.2(WCDMA)	non	22.21	21.98	22.10	21.54	21.54	21.56	20.93	20.99	21.27
HSDPA	1	21.10	20.98	21.19	20.63	20.66	20.63	20.09	20.13	20.5
	2	21.16	21.02	21.18	20.64	20.7	20.67	20.03	20.12	20.51
	3	20.69	20.56	20.7	20.21	20.23	20.21	19.59	19.70	20.08
	4	20.66	20.56	20.67	20.18	20.22	20.21	19.56	19.64	20.07
HSUPA	1	19.21	19.03	19.18	18.73	18.7	18.71	18.07	18.19	18.45
	2	19.15	19.05	19.14	18.67	18.7	18.73	17.98	18.08	18.47
	3	20.14	20.05	20.18	19.68	19.69	19.72	19.02	19.07	19.43
	4	18.68	18.49	18.66	18.12	18.14	18.15	17.6	17.68	17.89
	5	21.19	21.01	21.12	20.65	20.65	20.63	19.98	20.02	20.39
HSPA+	1	21.77	21.66	21.70	21.48	21.64	21.65	22.10	22.36	22.60

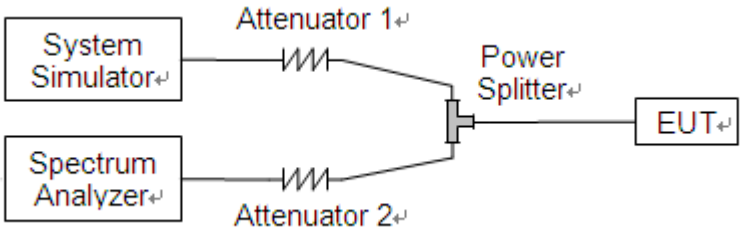
2.2. Peak to Average Radio

2.2.1. Requirement

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

2.2.2. Test Description

Test Setup:



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

2.2.3. Test procedure

1 .For GSM/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.

2. For UMTS operating mode:

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

2.2.4. Test Result

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

A. Test Verdict:

Band	Channel	Frequency (MHz)	Peak to Average radio		Limit	Verdict
			dB	Refer to Plot	dB	
GSM 1900MHz	512	1850.2	0.03	Plot A1 to A3	13	PASS
	661	1880.0	0.05			PASS
	810	1909.8	0.02			PASS
EGPRS 1900MHz	512	1850.2	0.01	Plot B1 to B3	13	PASS
	661	1880.0	0.01			PASS
	810	1909.8	0.02			PASS
WCDMA 1900MHz	9262	1852.4	2.53	Plot C1 to C3	13	PASS
	9400	1880.0	2.52			PASS
	9538	1907.6	2.44			PASS
WCDMA 1700MHz	1312	1712.4	2.52	Plot D1 to D3	13	PASS
	1412	1732.4	2.56			PASS
	1513	1752.6	2.33			PASS

B. Test Plots:

(Plot A1, GSM 1900 MHz, Channel = 512)

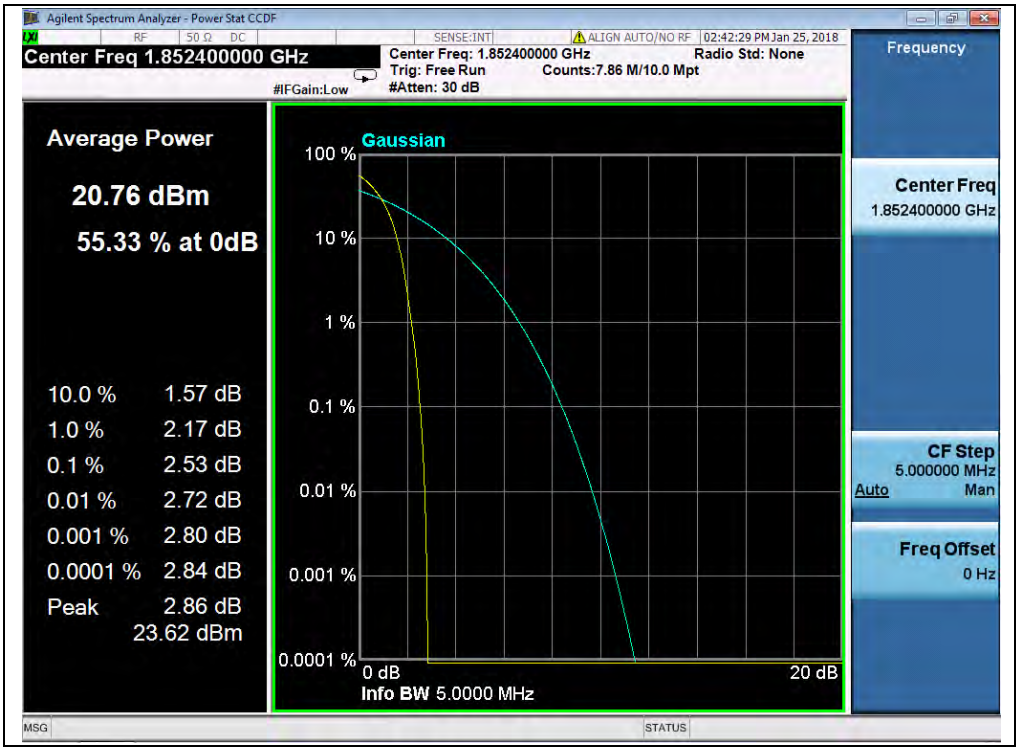
(Plot A2, GSM 1900 MHz, Channel = 661)

(Plot A3, GSM 1900MHz, Channel = 810)

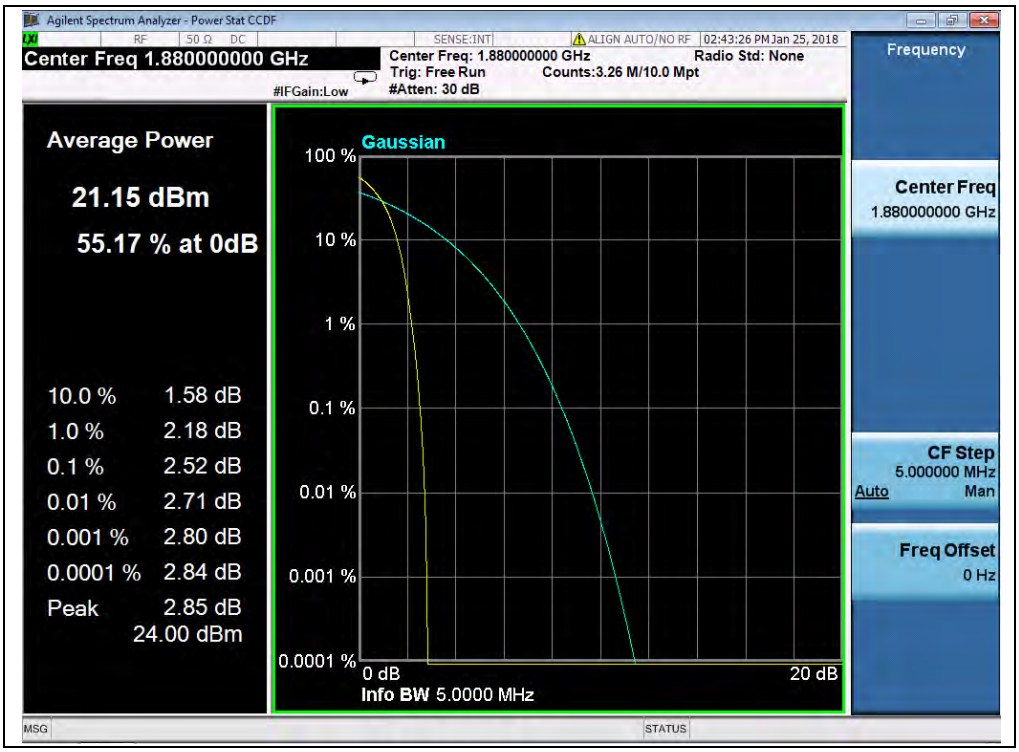
(Plot B1, EGPRS 1900 MHz, Channel = 512)

(Plot B2, EGPRS 1900 MHz, Channel = 661)

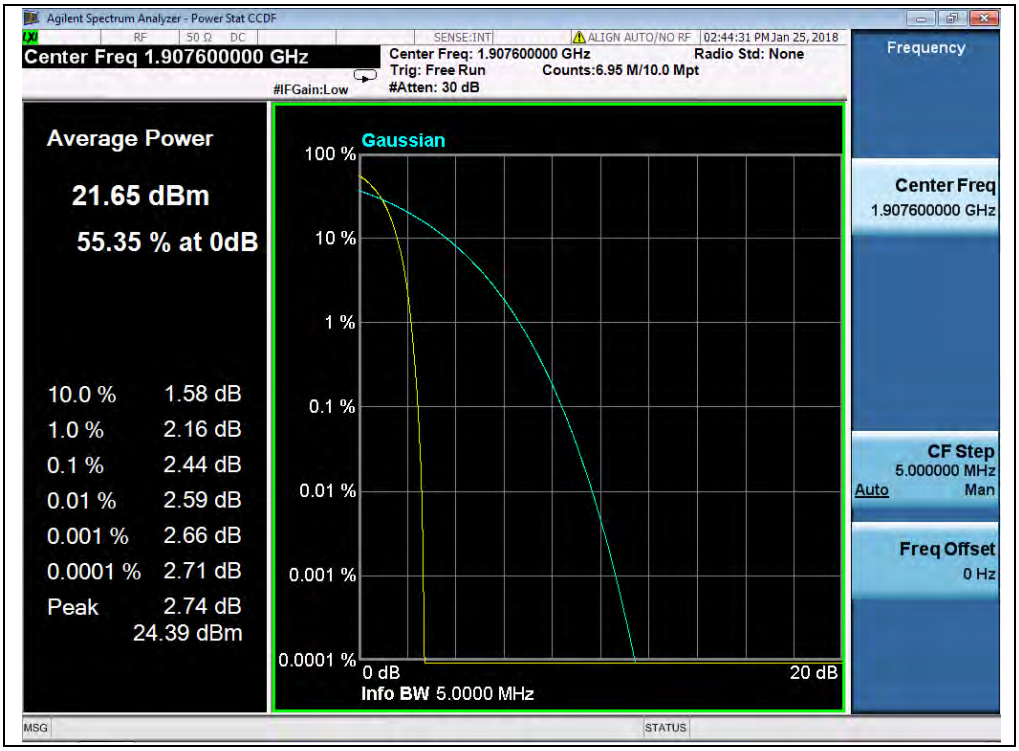
(Plot B3, EGPRS 1900MHz, Channel = 810)



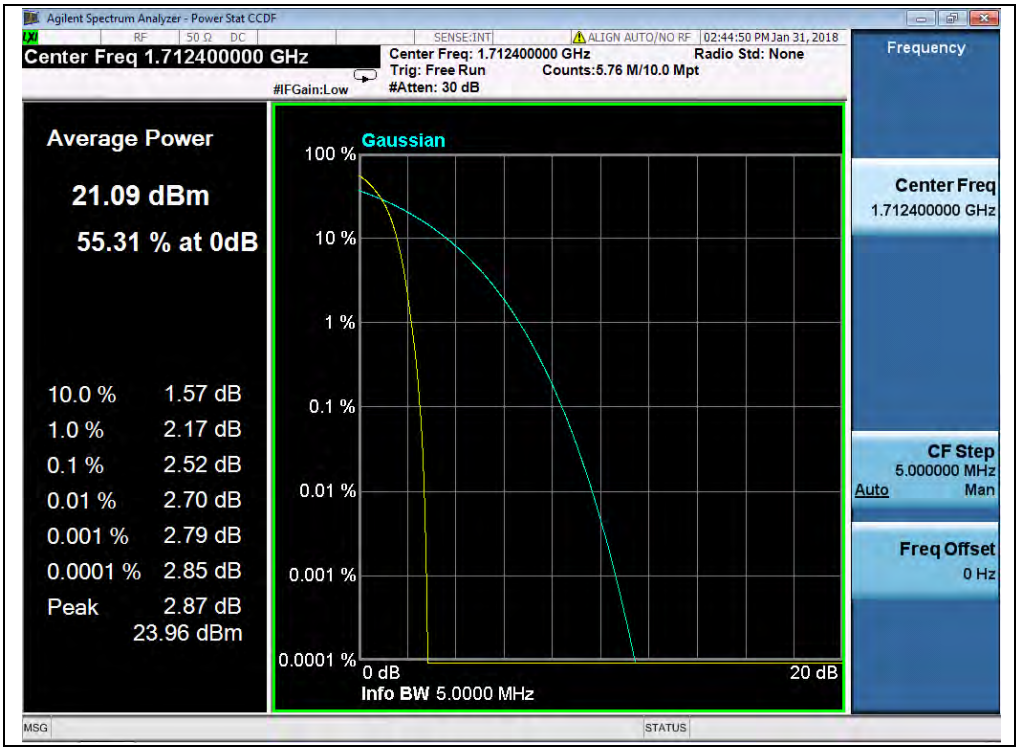
(Plot C1, WCDMA 1900MHz, Channel = 9262)



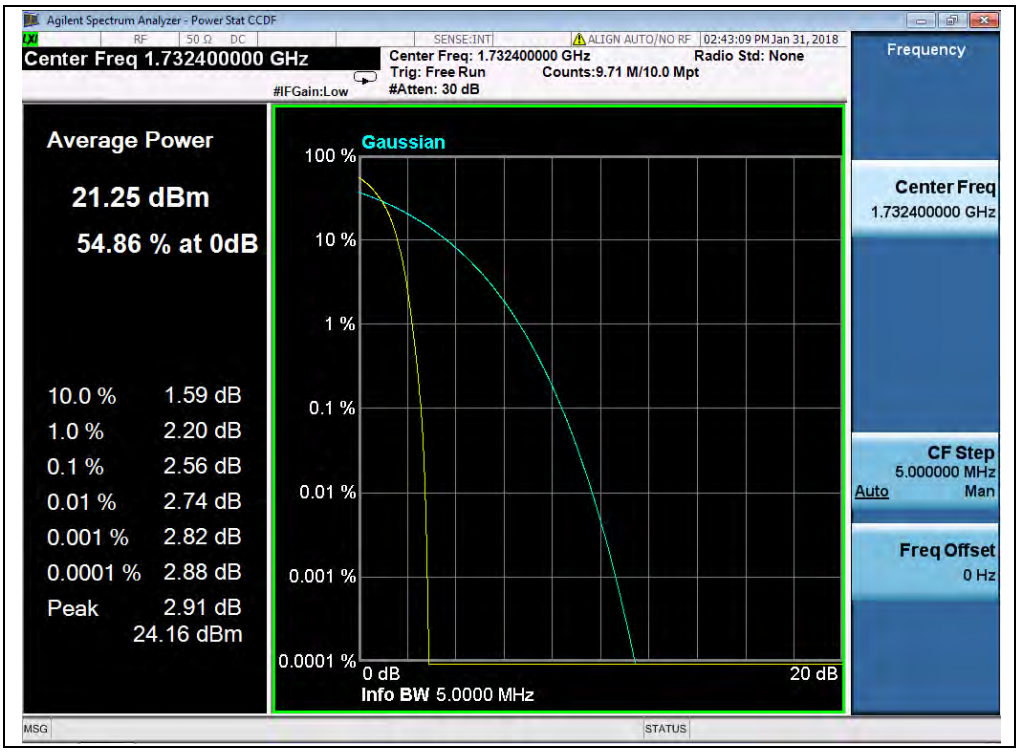
(Plot C2, WCDMA 1900MHz, Channel = 9400)



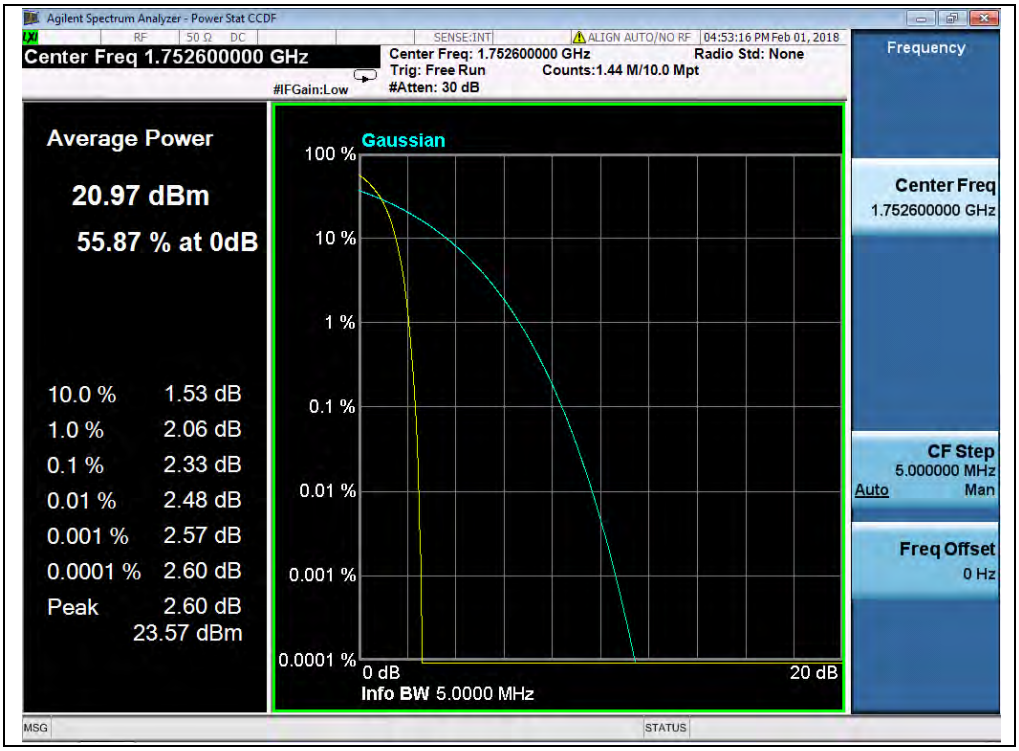
(Plot C3, WCDMA 1900MHz, Channel = 9538)



(Plot D1, WCDMA 1700MHz, Channel = 1312)



(Plot D2, WCDMA 1700MHz, Channel = 1412)



(Plot D3, WCDMA 1700MHz, Channel = 1513)

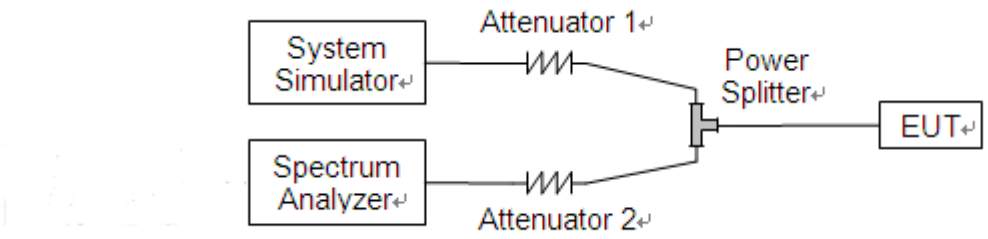
2.3. 99% Occupied Bandwidth

2.3.1. Requirement

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

Test Setup:



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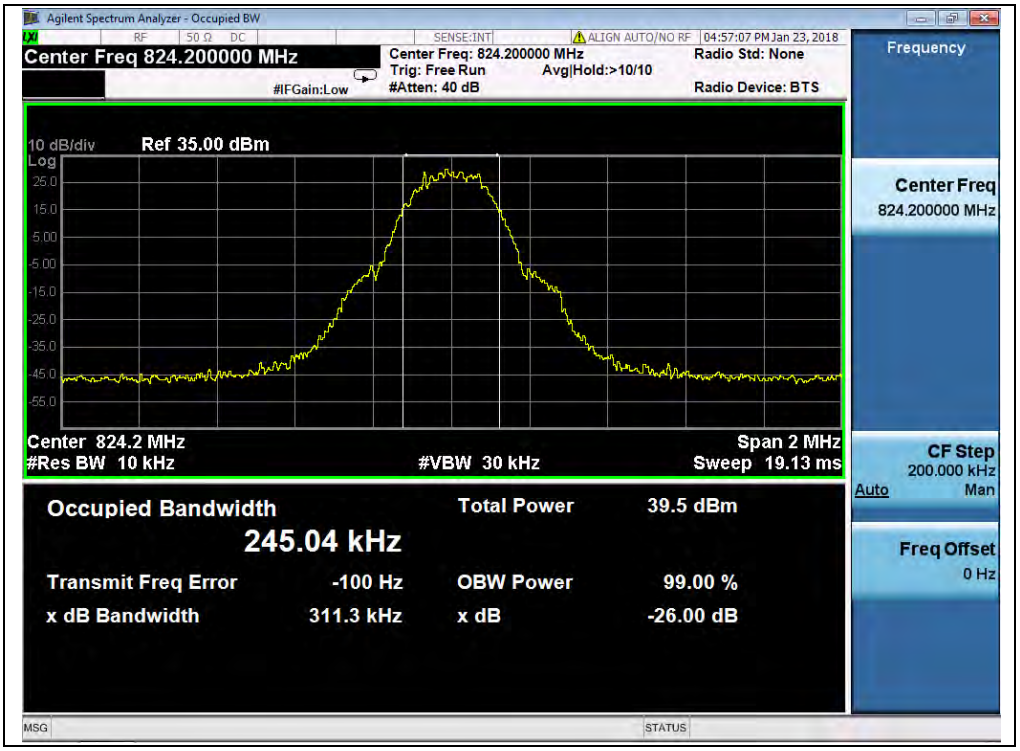
2.3.3. Test Result

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

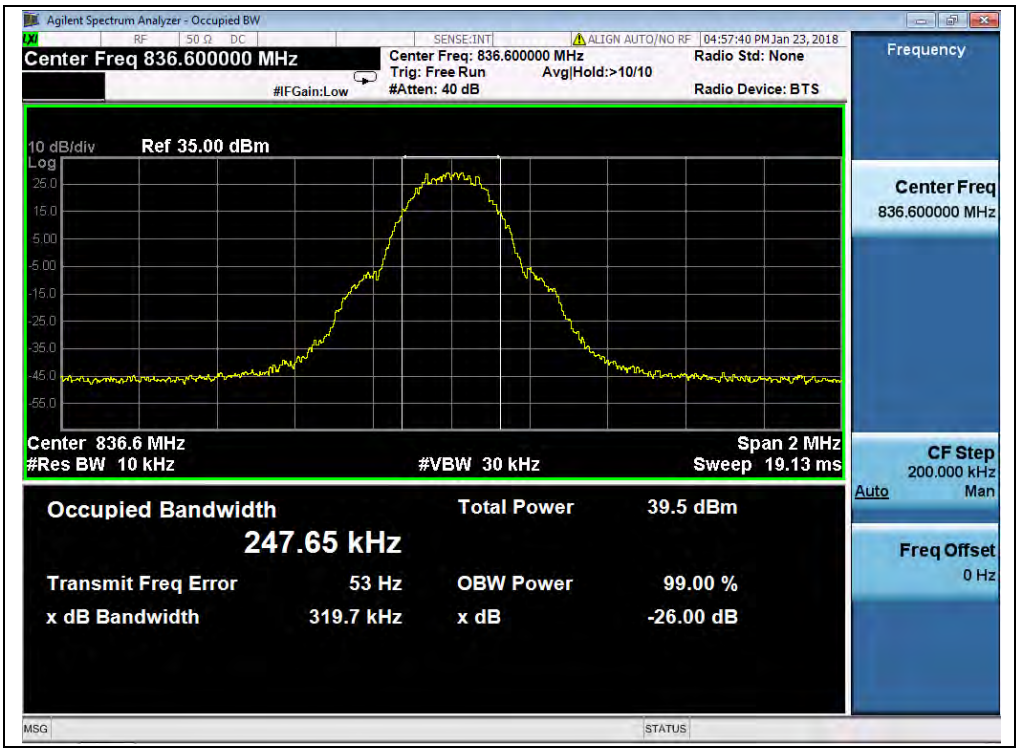
GSM Test Verdict:

Band	Channel	Frequency (MHz)	26dB bandwidth (kHz)	99% Occupied Bandwidth (kHz)	Refer to Plot
GSM 850MHz	128	824.2	311.3	245.04	Plot A1 to A3
	190	836.6	319.7	247.65	
	251	848.8	321.5	247.43	
GSM 1900MHz	512	1850.2	319.2	243.43	Plot B1 to B3
	661	1880.0	324.2	244.11	
	810	1909.8	313.9	242.97	
GPRS 850MHz	128	824.2	321.6	244.02	Plot C1 to C3
	190	836.6	316.0	244.06	
	251	848.8	313.1	242.77	
GPRS 1900MHz	512	1850.2	318.0	243.89	Plot D1 to D3
	661	1880.0	317.8	243.49	
	810	1909.8	320.5	243.52	
EGPRS 850MHz	128	824.2	315.8	251.27	Plot E1 to E3
	190	836.6	315.9	248.58	
	251	848.8	311.1	246.58	
EGPRS 1900MHz	512	1850.2	317.2	250.14	Plot F1 to F3
	661	1880.0	314.8	247.66	
	810	1909.8	312.4	252.06	

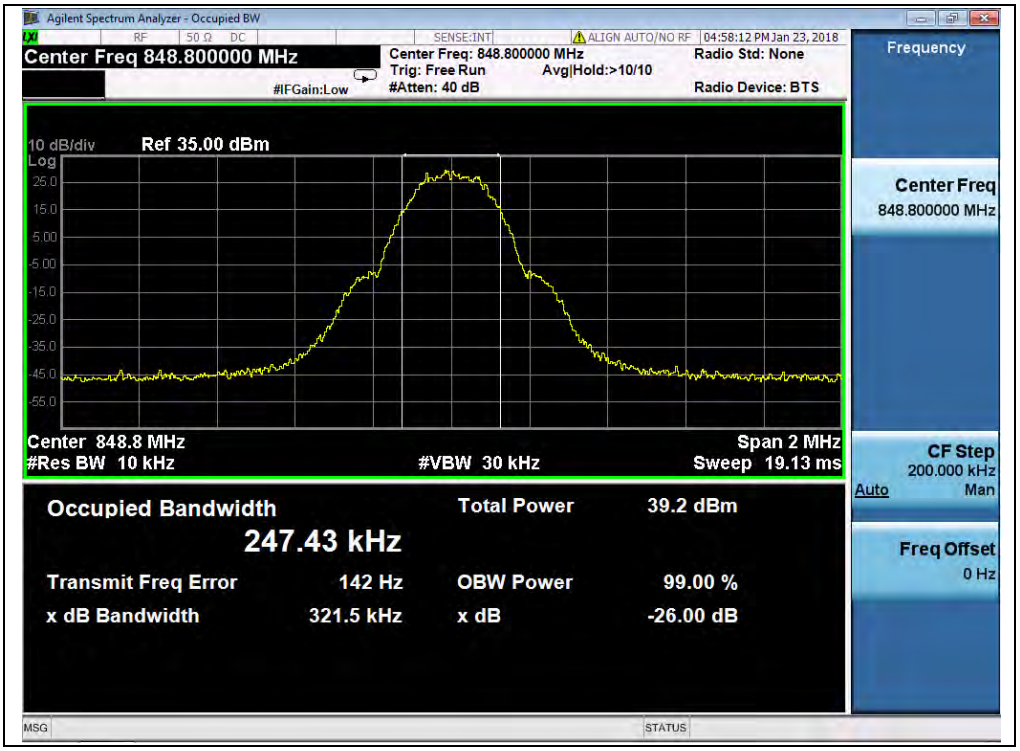
Test Plots:



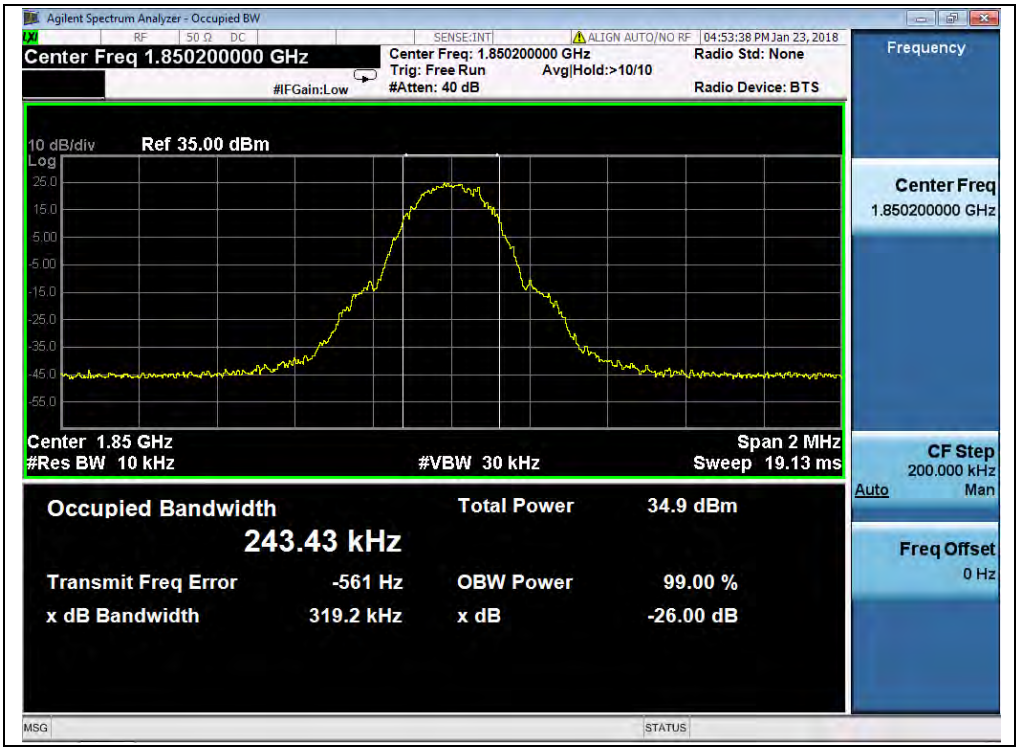
(Plot A1, GSM 850MHz, Channel = 128)



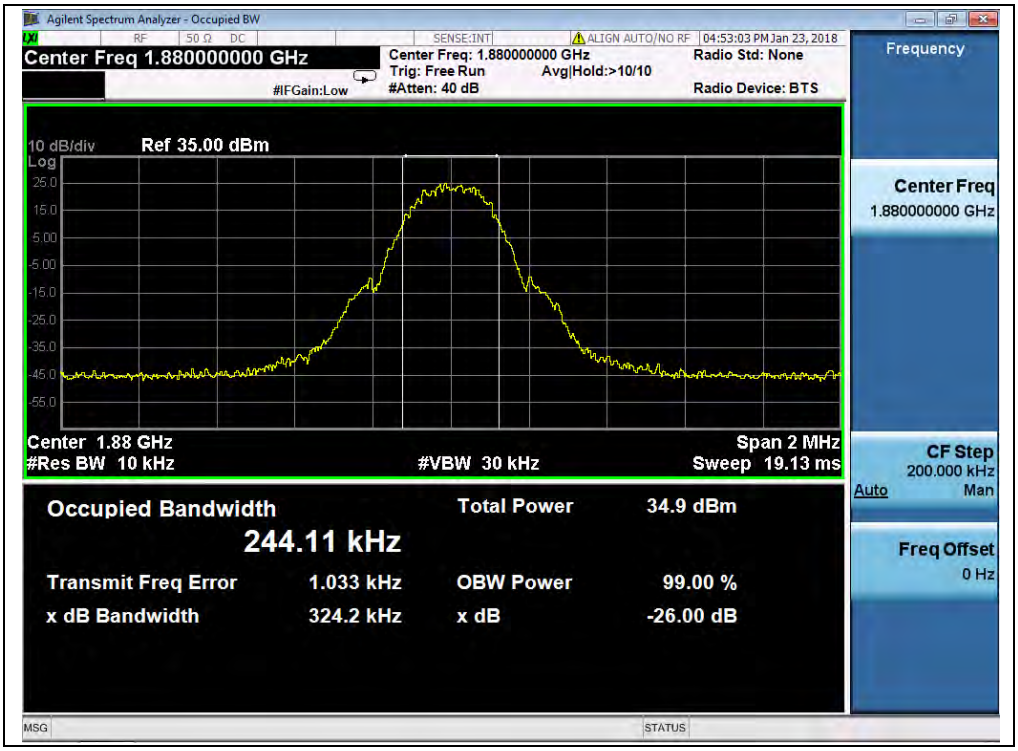
(Plot A2, GSM 850MHz, Channel = 190)



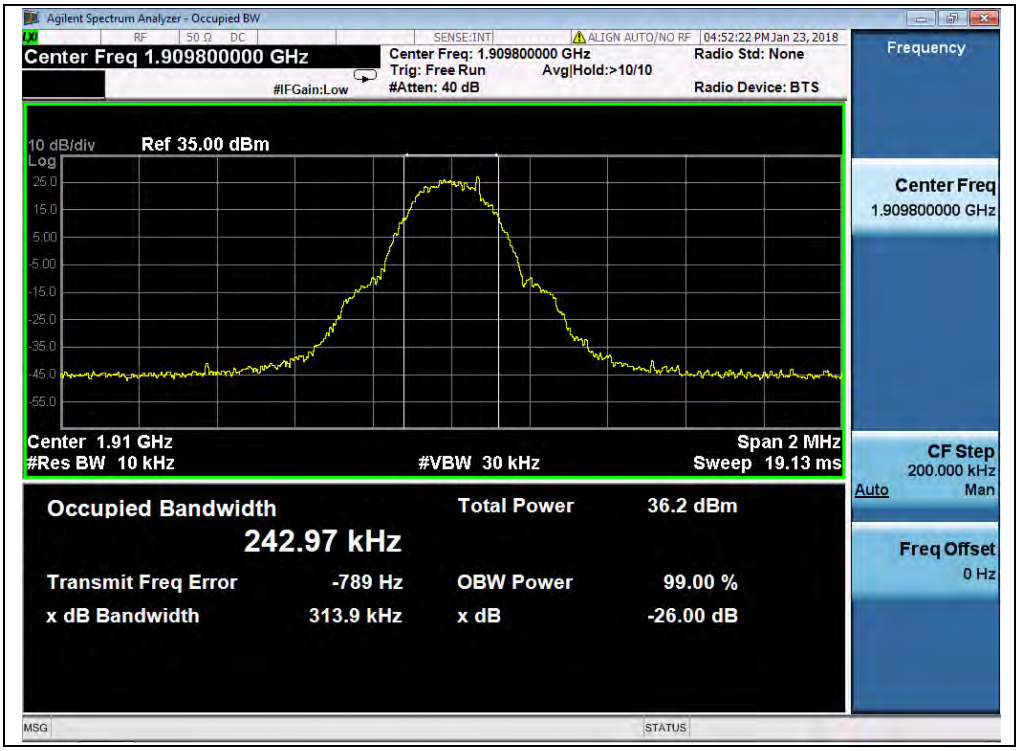
(Plot A3, GSM 850MHz, Channel = 251)



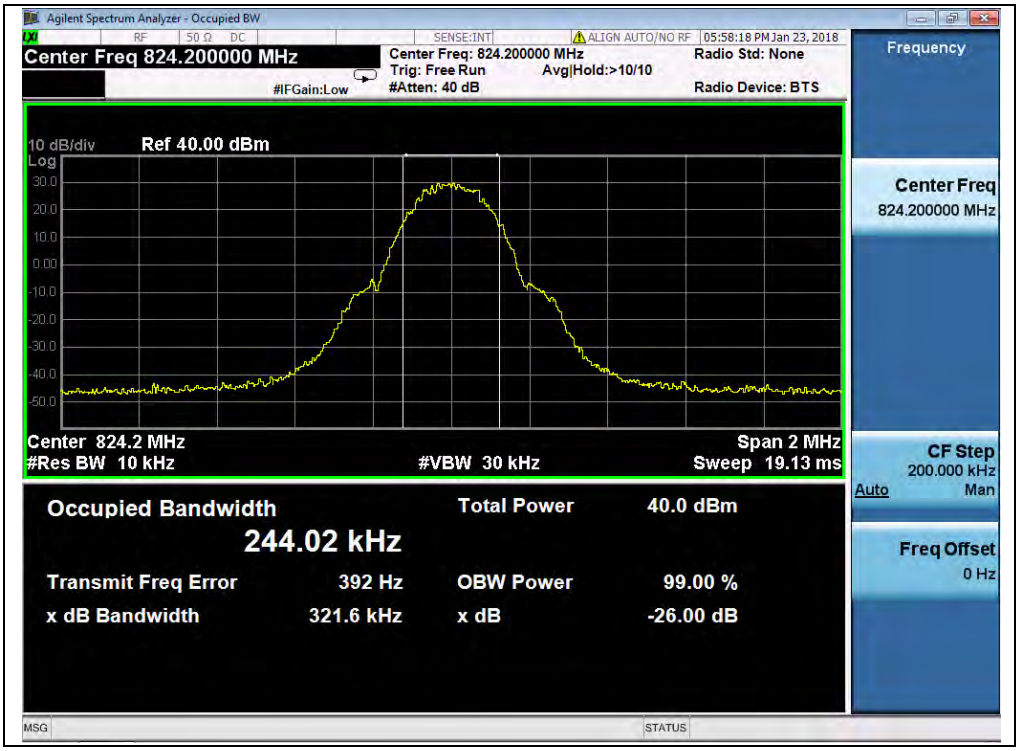
(Plot B1, GSM1900MHz, Channel = 512)



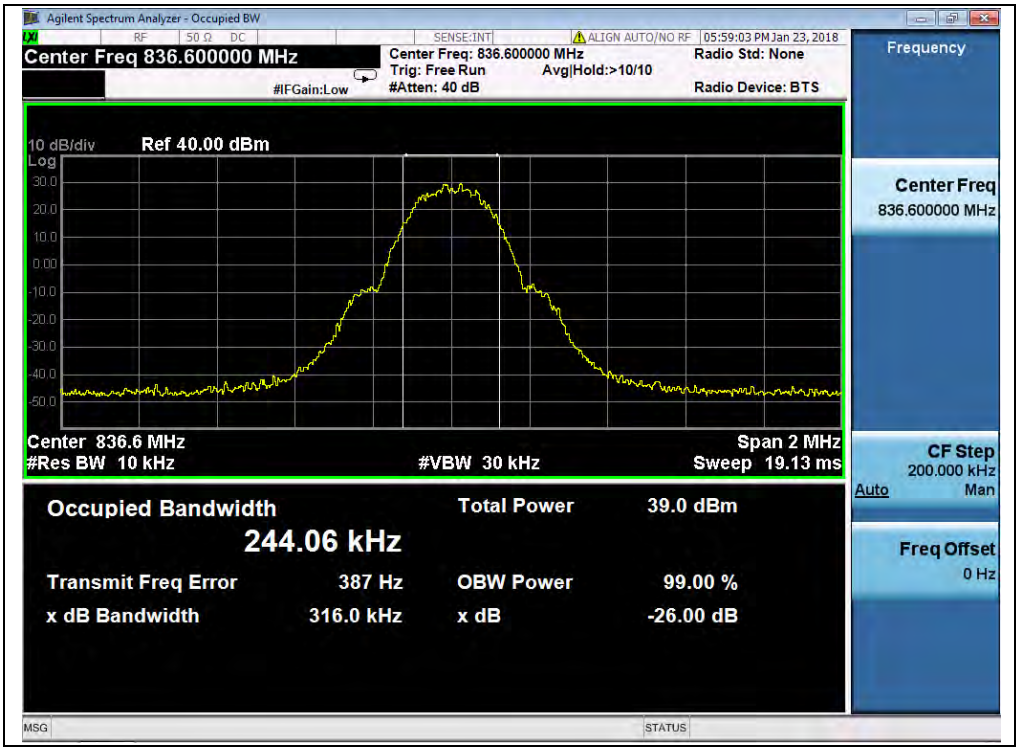
(Plot B2, GSM1900MHz, Channel = 661)



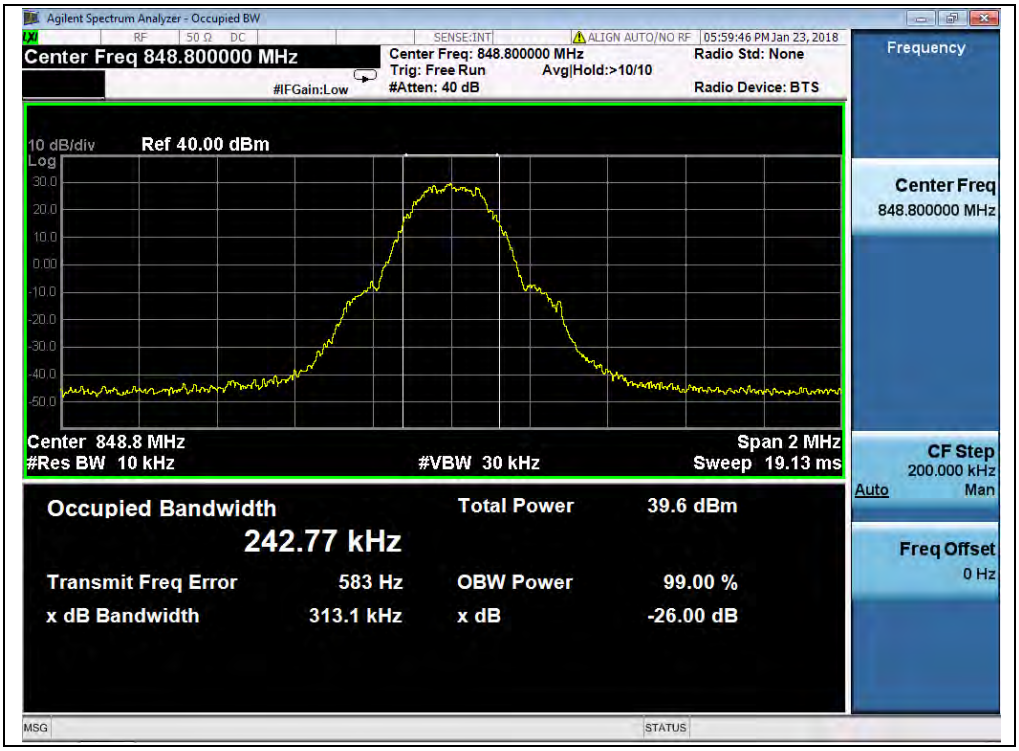
(Plot B3, GSM 1900MHz, Channel = 810)



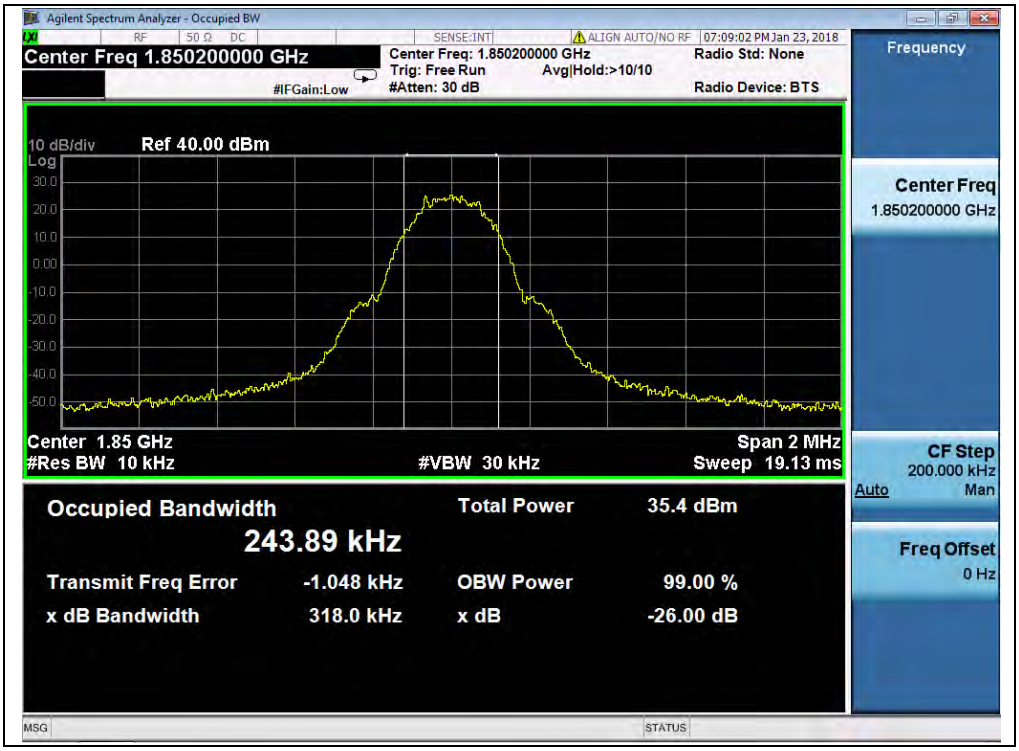
(Plot C1, GPRS 850MHz, Channel = 128)



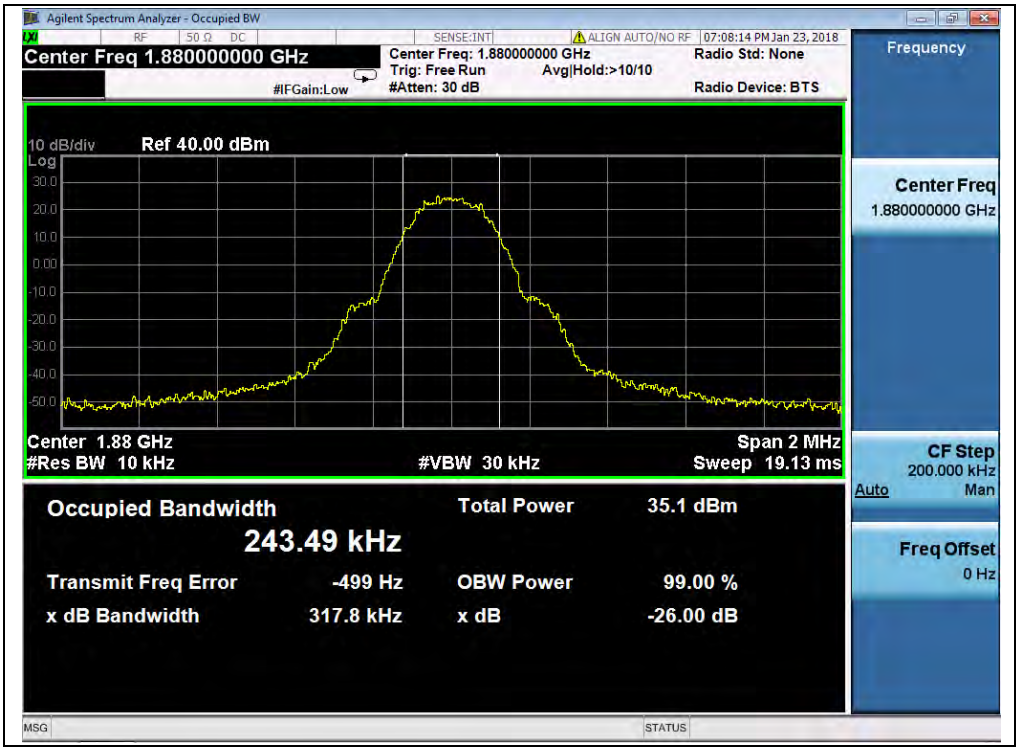
(Plot C2, GPRS 850MHz, Channel = 190)



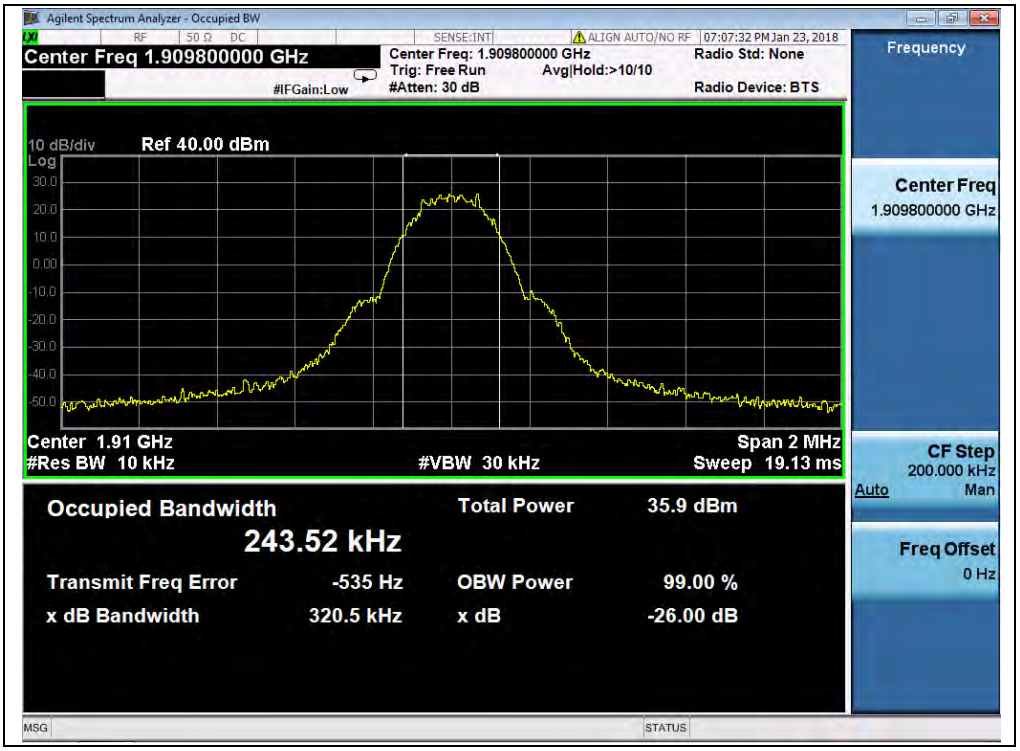
(Plot C3, GPRS 850MHz, Channel = 251)



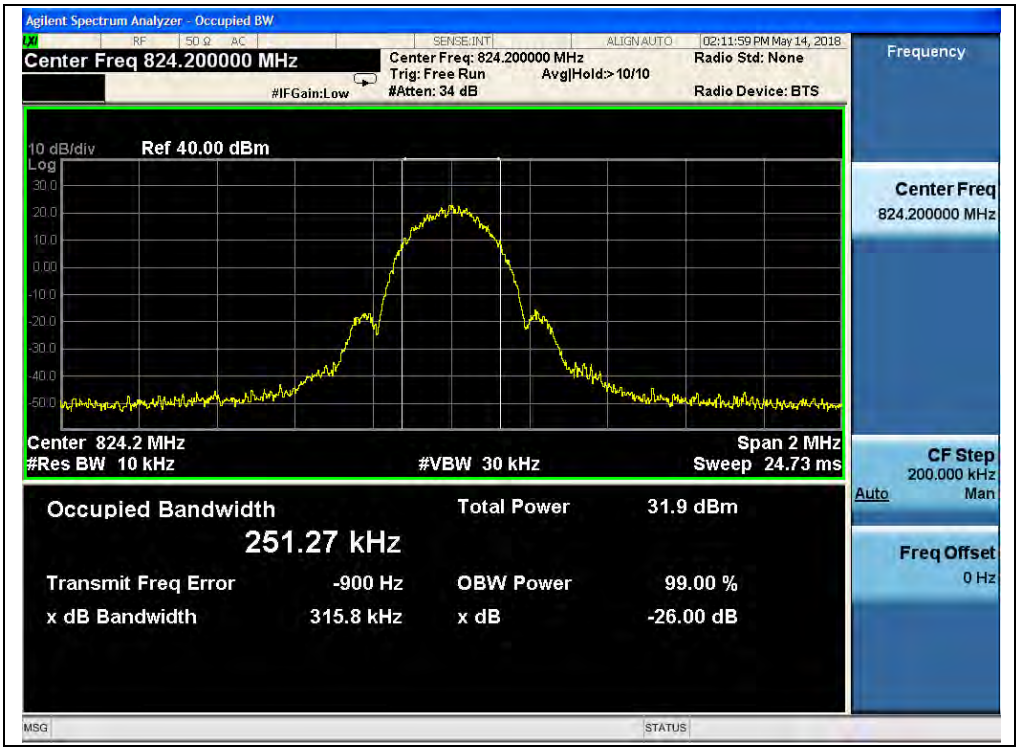
(Plot D1, GPRS1900MHz, Channel = 512)



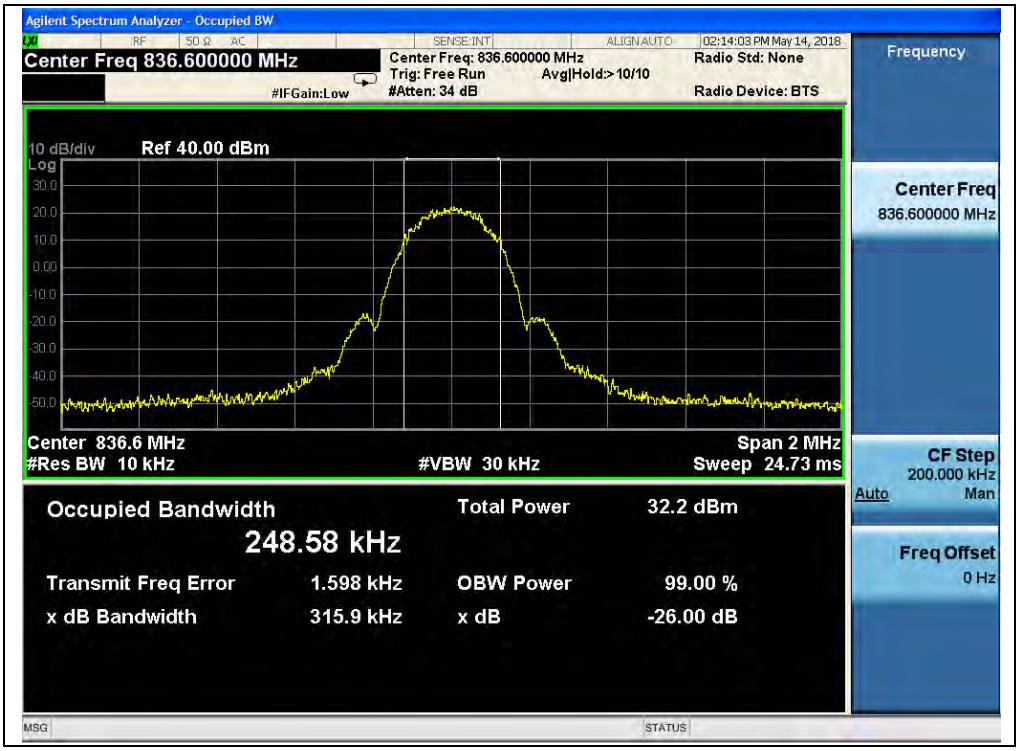
(Plot D2, GPRS1900MHz, Channel = 661)



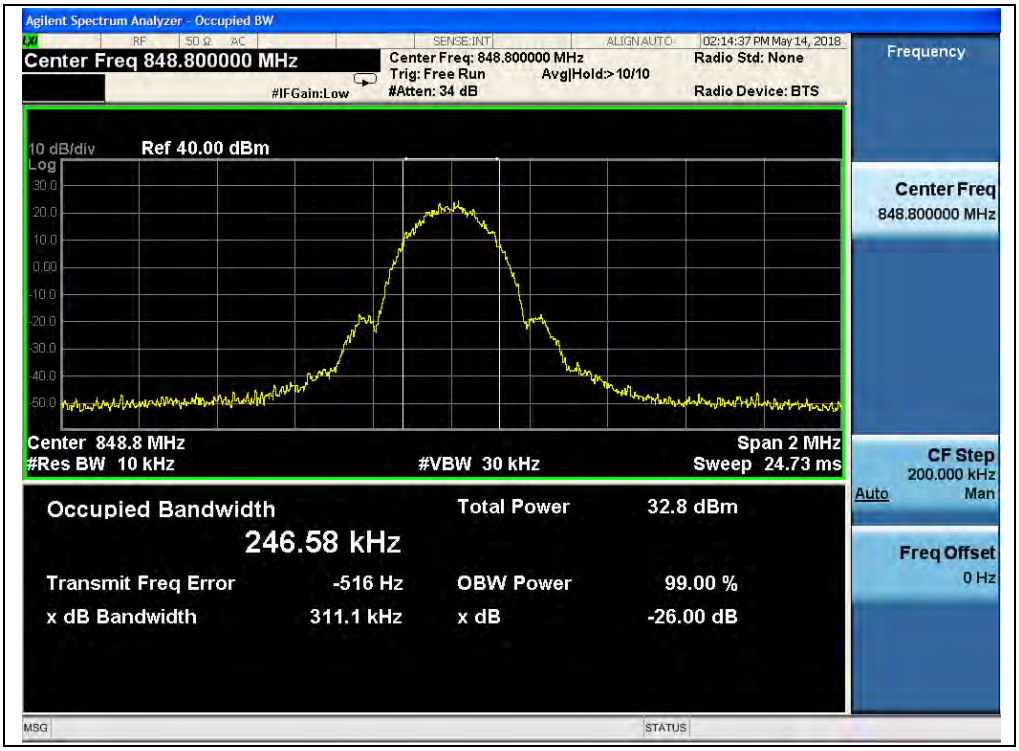
(Plot D3, GPRS 1900MHz, Channel = 810)



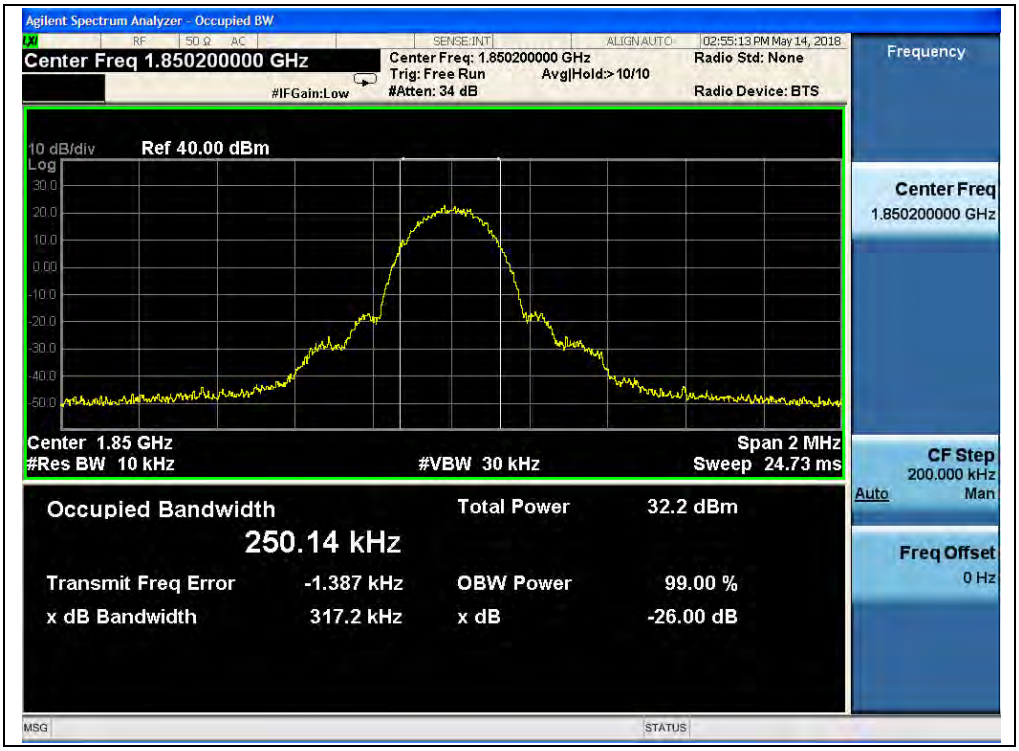
(Plot E1, EGPRS 850MHz, Channel = 128)



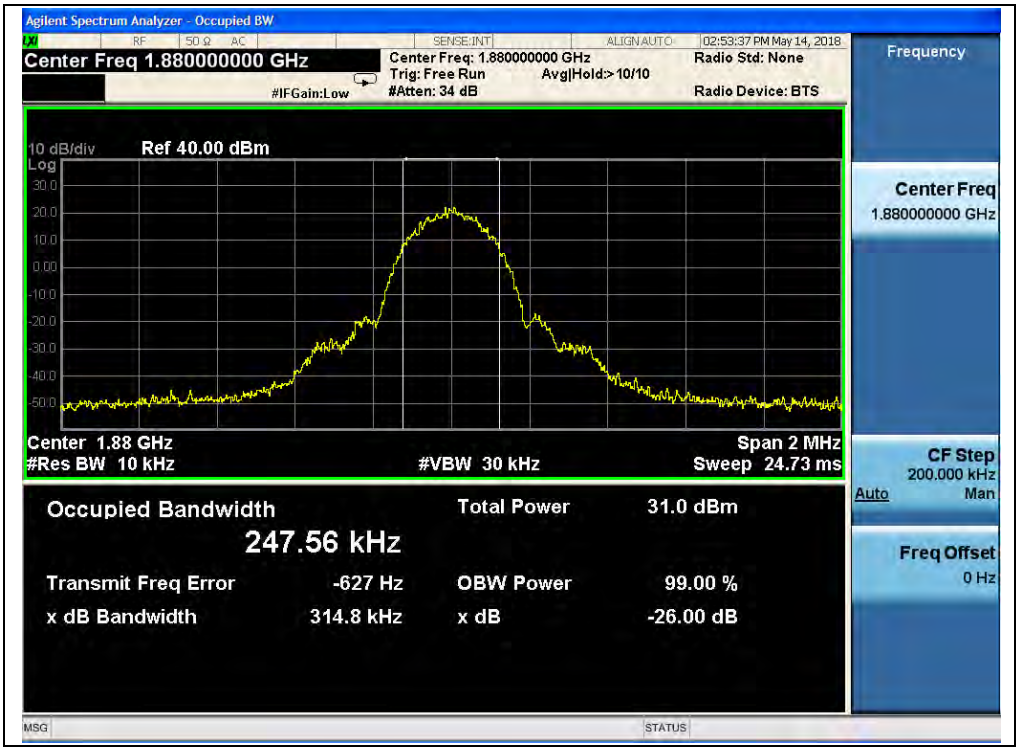
(Plot E2, EGPRS 850MHz, Channel = 190)



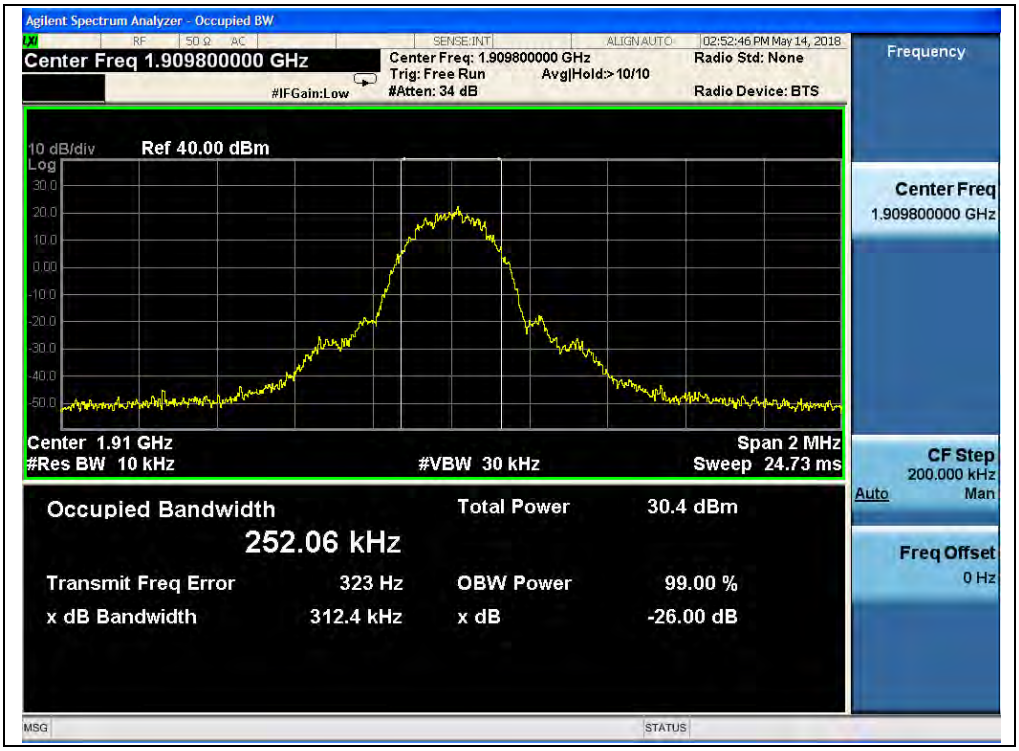
(Plot E3, EGPRS 850MHz, Channel = 251)



(Plot F1, EGPRS1900MHz, Channel = 512)



(Plot F2, EGPRS1900MHz, Channel = 661)



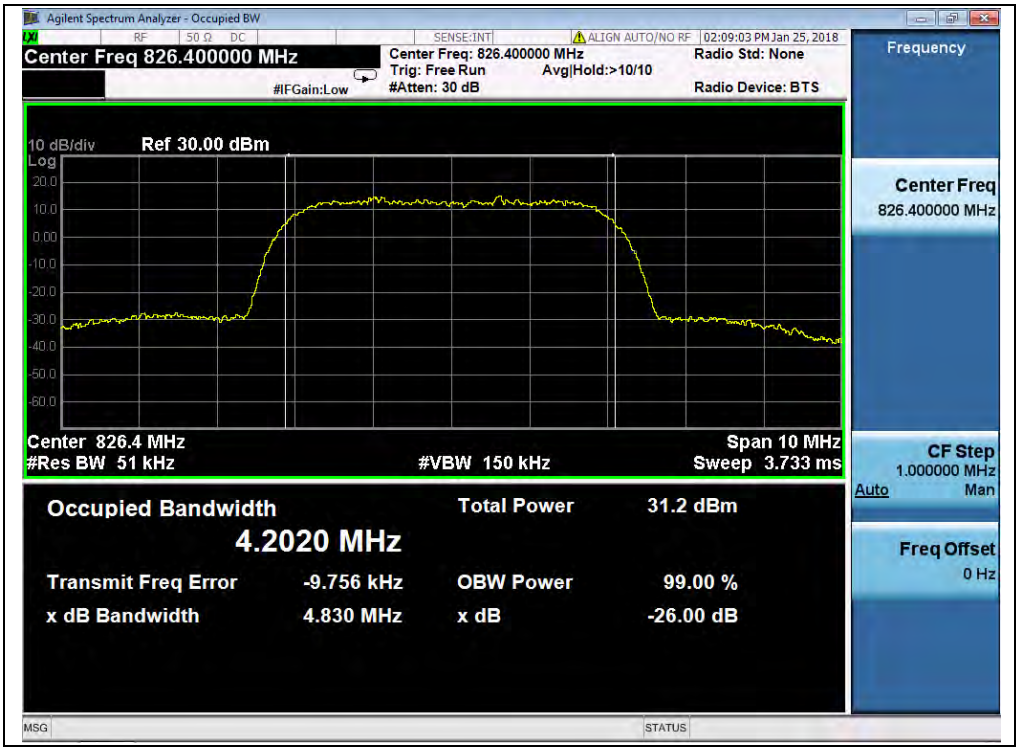
(Plot F3, EGPRS 1900MHz, Channel = 810)

WCDMA Test Verdict:

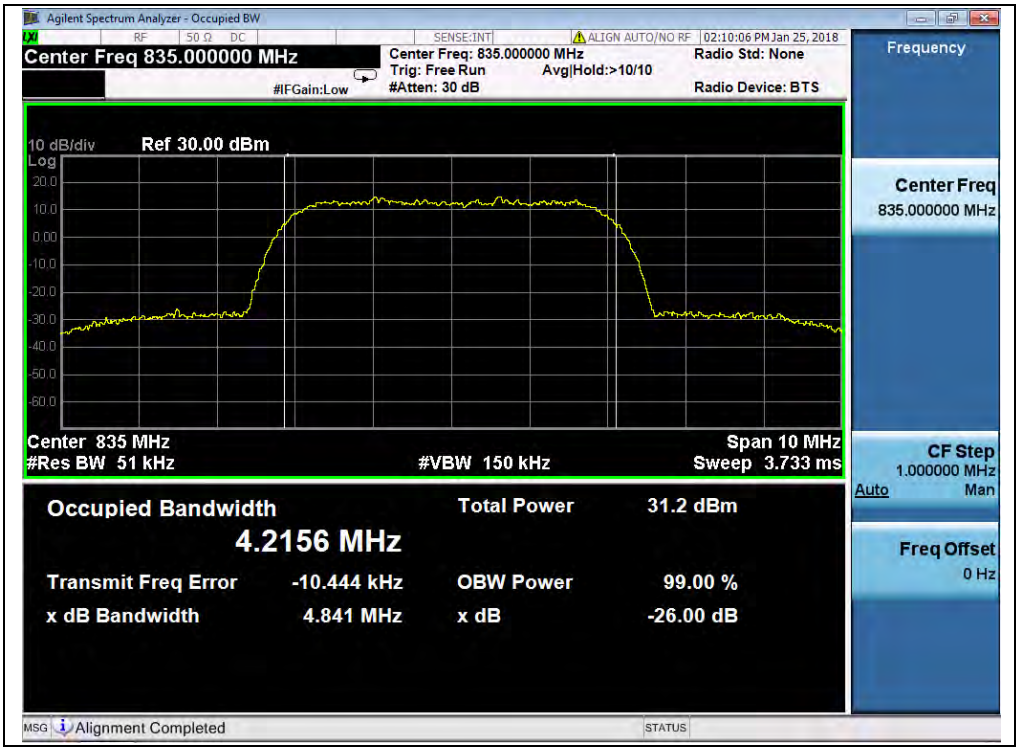
Band	Channel	Frequency (MHz)	26dB bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Refer to Plot
WCDMA 850MHz	4132	826.4	4.830	4.2020	Plot G1 to G3
	4175	835.0	4.841	4.2156	
	4233	846.6	4.849	4.2089	
WCDMA 1700MHz	1312	1712.4	4.892	4.2239	Plot H1 to H3
	1412	1732.4	4.892	4.2237	
	1513	1752.6	4.910	4.2268	
WCDMA 1900MHz	9262	1852.4	4.868	4.2227	Plot I1 to I3
	9400	1880.0	4.891	4.2310	
	9538	1907.6	4.878	4.2184	
HSDPA 850MHz	4132	826.4	4.831	4.2019	Plot J1 to J3
	4175	835.0	4.861	4.2147	
	4233	846.6	4.816	4.2129	
HSDPA 1700MHz	1312	1712.4	4.893	4.2311	Plot K1 to K3
	1412	1732.4	4.873	4.2235	
	1513	1752.6	4.903	4.2274	
HSDPA 1900MHz	9262	1852.4	4.888	4.2226	Plot L1 to L3
	9400	1880.0	4.890	4.2222	
	9538	1907.6	4.876	4.2224	
HSUPA 850MHz	4132	826.4	4.826	4.1975	Plot M1 to M3
	4175	835.0	4.855	4.2097	
	4233	846.6	4.864	4.1938	
HSUPA 1700MHz	1312	1712.4	4.880	4.2400	Plot N1 to N3
	1412	1732.4	4.870	4.2195	
	1513	1752.6	4.905	4.2366	
HSUPA 1900MHz	9262	1852.4	4.874	4.2247	Plot O1 to O3
	9400	1880.0	4.862	4.2084	
	9538	1907.6	4.873	4.2231	

Band	Channel	Frequency (MHz)	26dB bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Refer to Plot
HSPA+ 850MHz	4132	826.4	4.834	4.2008	Plot P1 to P3
	4175	835.0	4.850	4.2138	
	4233	846.6	4.858	4.2084	
HSPA+ 1700MHz	1312	1712.4	4.904	4.2271	Plot Q1 to Q3
	1412	1732.4	4.886	4.2288	
	1513	1752.6	4.913	4.2273	
HSPA+ 1900MHz	9262	1852.4	4.873	4.2149	Plot R1 to R3
	9400	1880.0	4.867	4.2150	
	9538	1907.6	4.873	4.2140	

Test Plots:

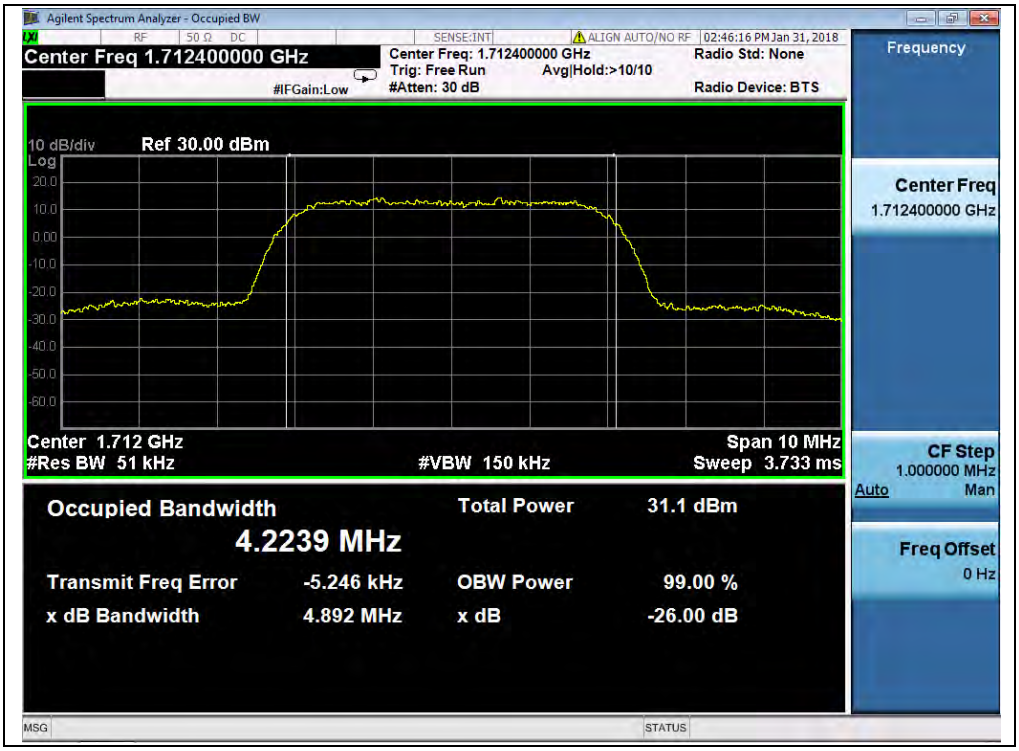


(Plot G1, WCDMA 850MHz, Channel = 4132)

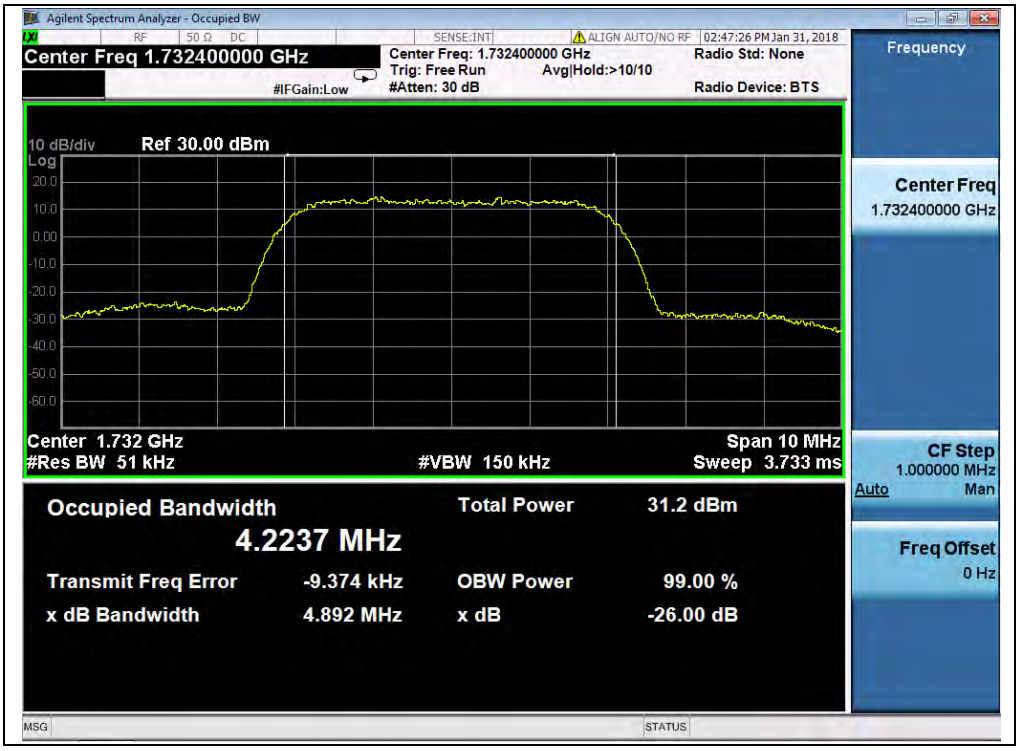


(Plot G2, WCDMA 850 MHz, Channel = 4175)

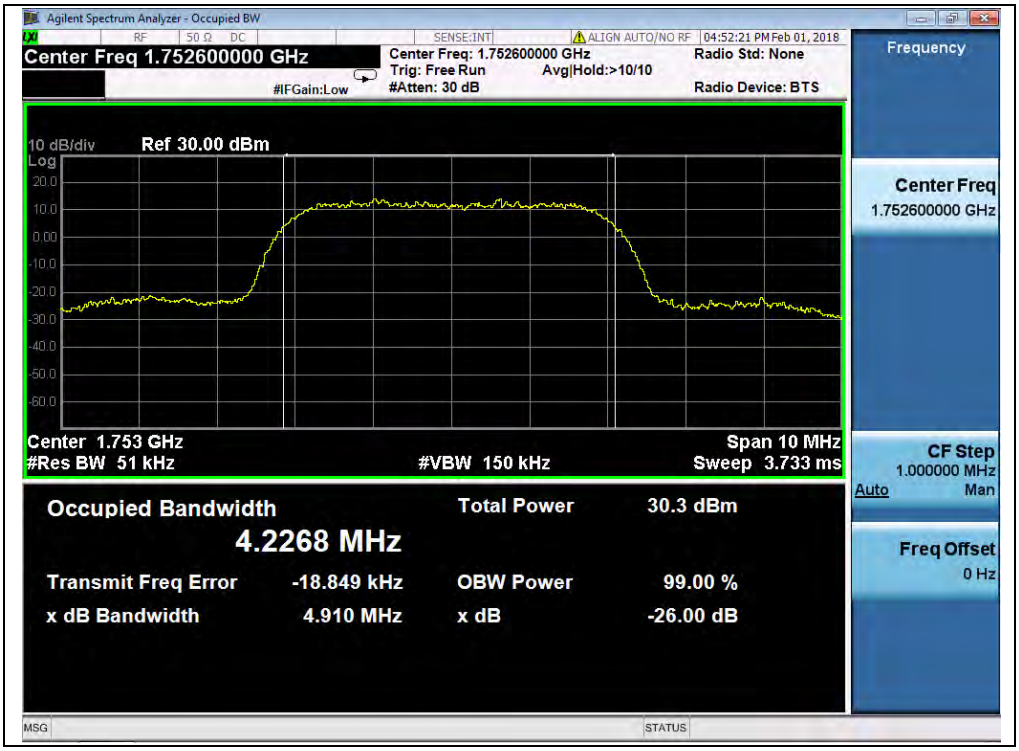
(Plot G3, WCDMA 850MHz, Channel = 4233)



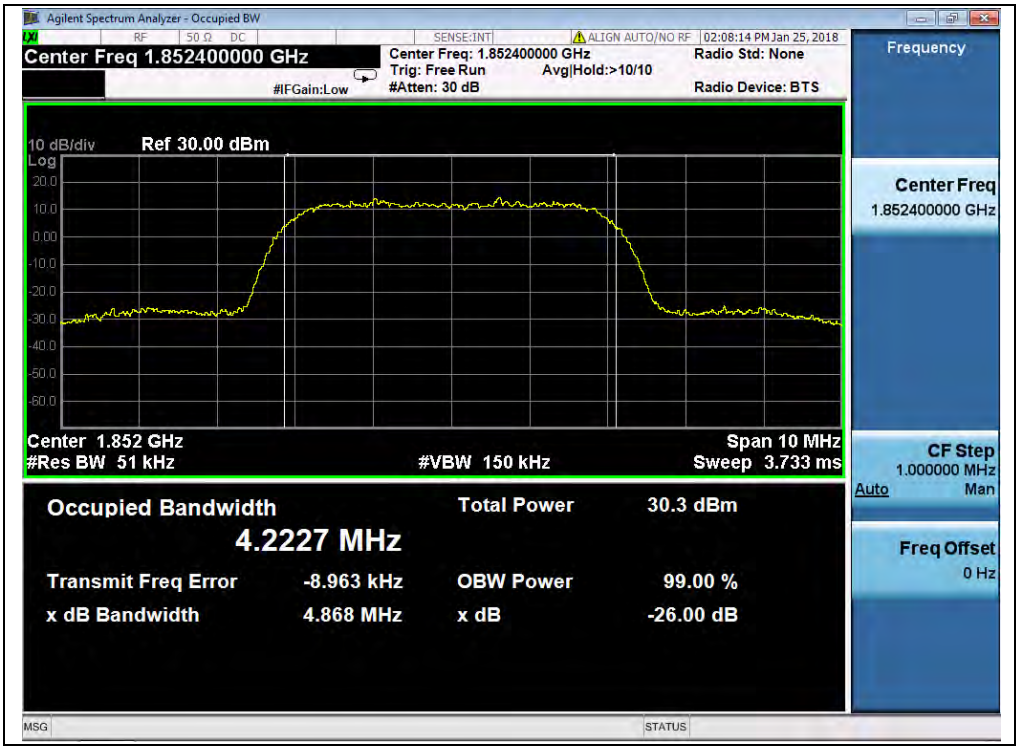
(Plot H1, WCDMA 1700MHz, Channel = 1312)



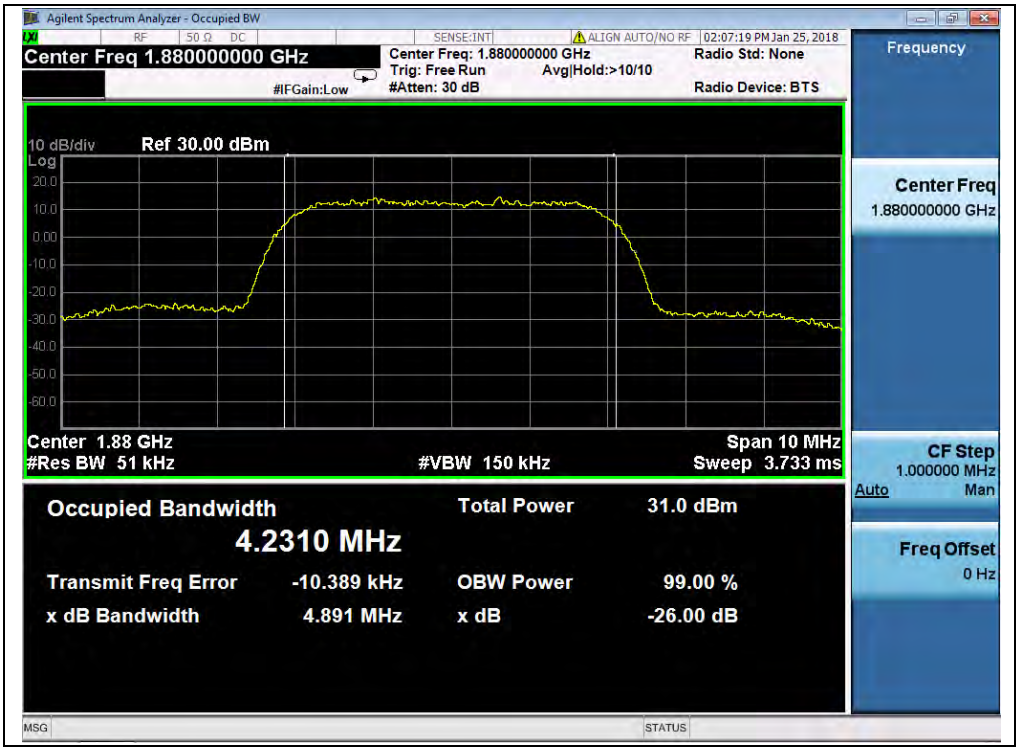
(Plot H2, WCDMA 1700 MHz, Channel = 1412)



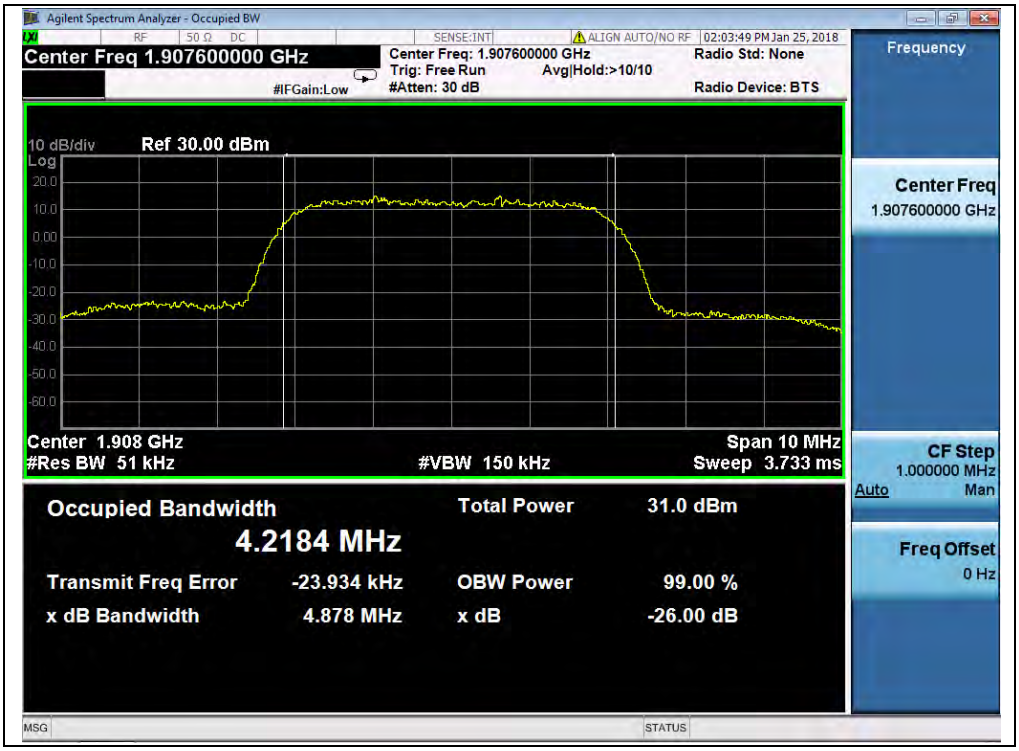
(Plot H3, WCDMA1700MHz, Channel = 1513)



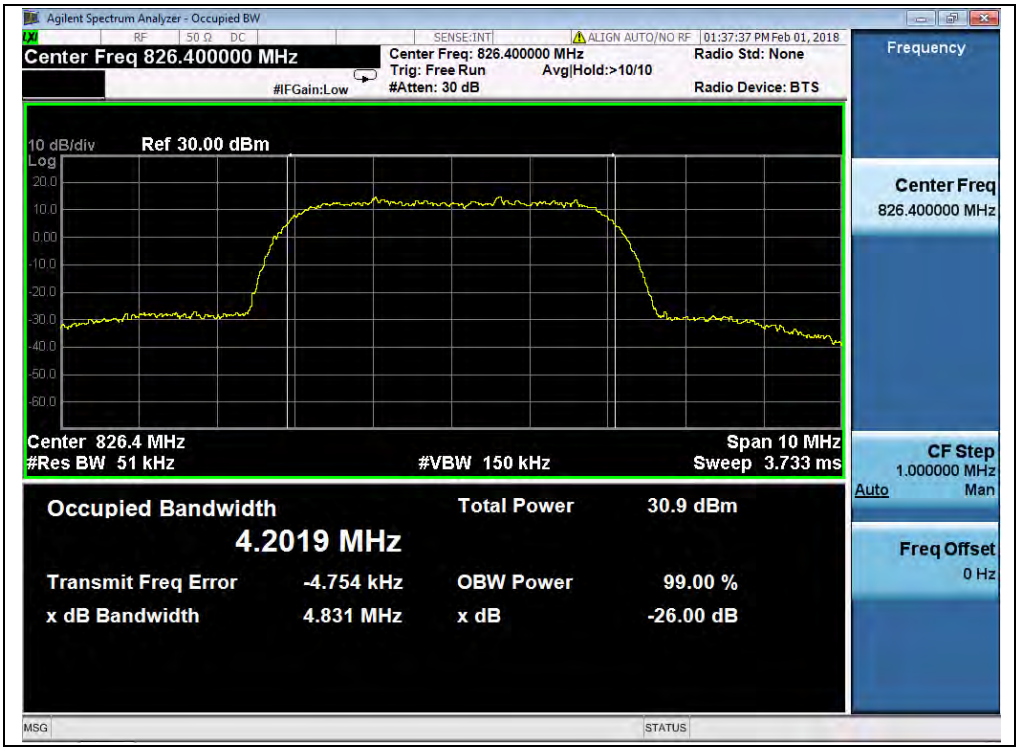
(Plot I1, WCDMA 1900MHz, Channel = 9262)



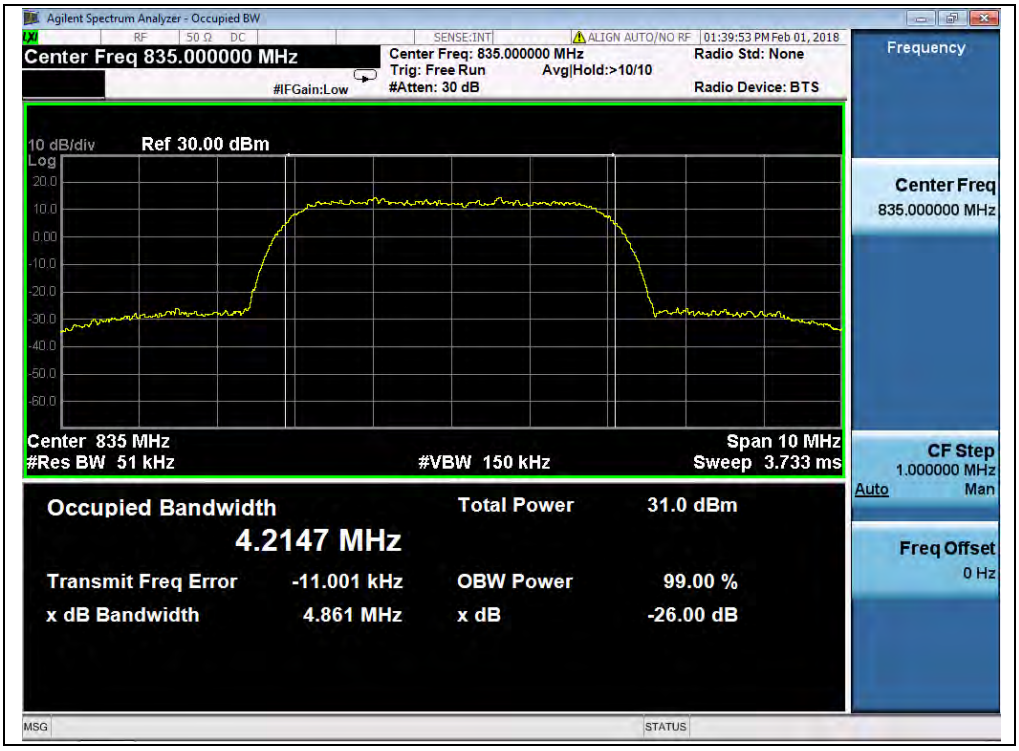
(Plot I2, WCDMA 1900 MHz, Channel = 9400)



(Plot I3, WCDMA1900MHz, Channel = 9538)

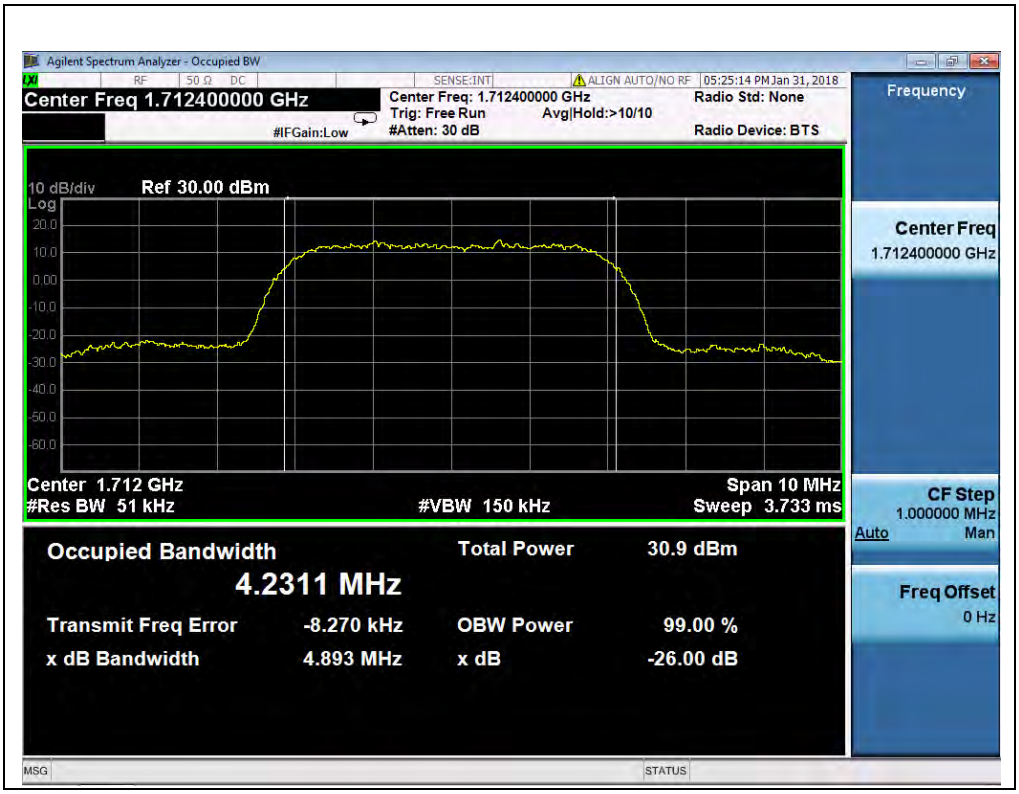


(Plot J1, HSDPA 850MHz, Channel = 4132)

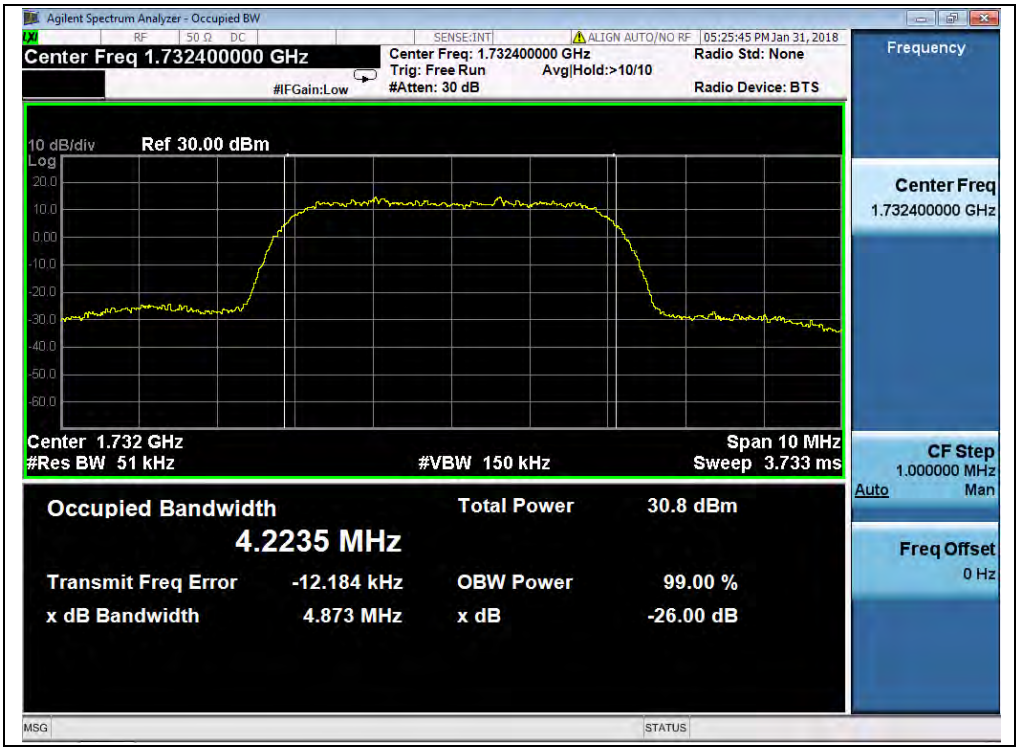


(Plot J2, HSDPA 850 MHz, Channel = 4175)

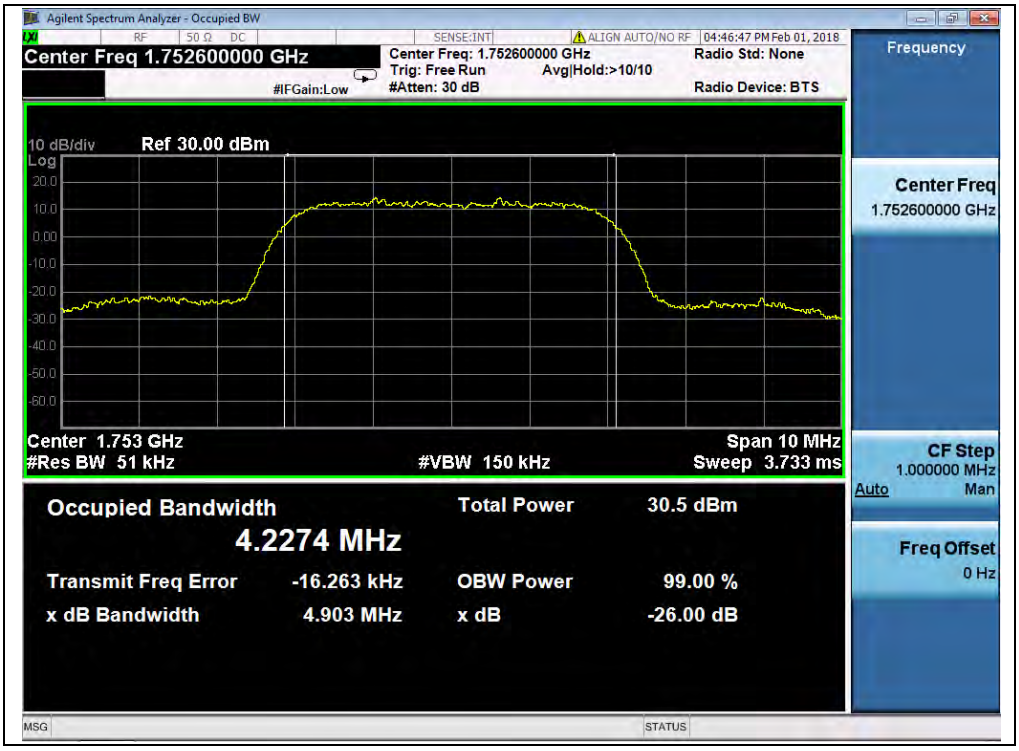
(Plot J3, HSDPA 850MHz, Channel = 4233)



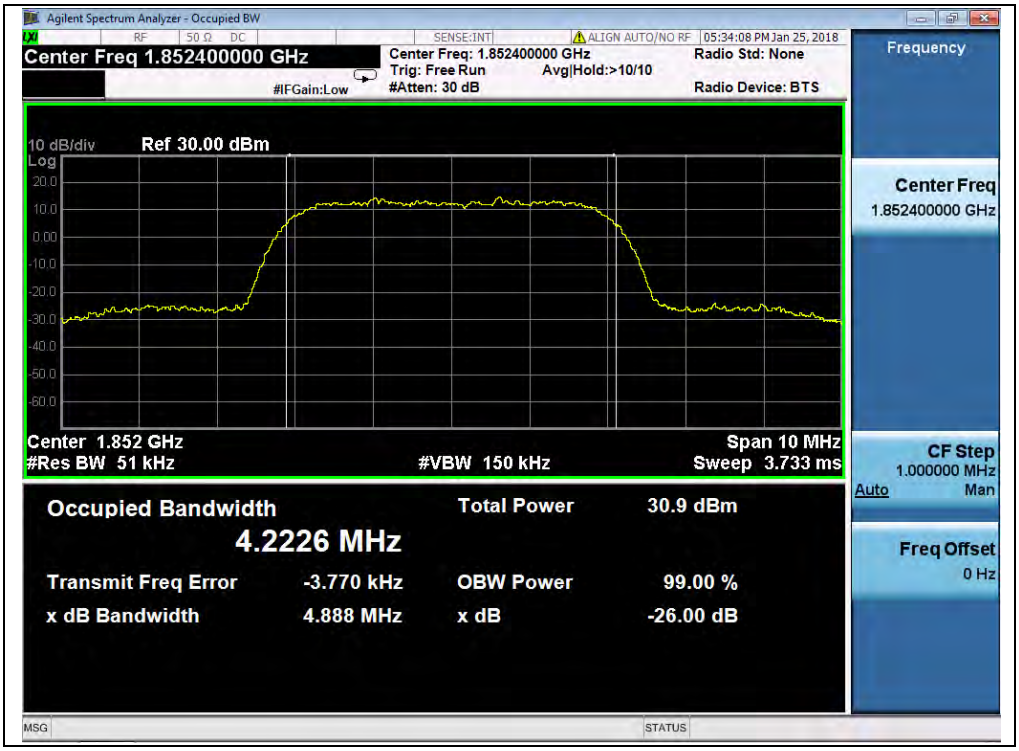
(Plot K1, HSDPA 1700MHz, Channel = 1312)



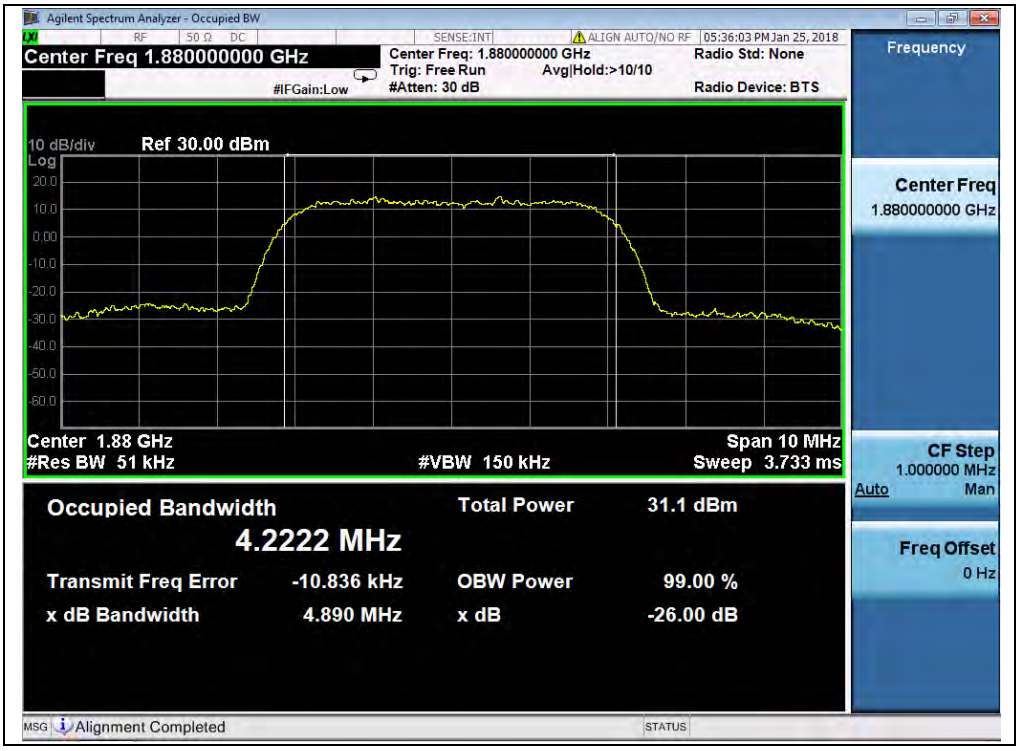
(Plot K2, HSDPA 1700 MHz, Channel = 1412)



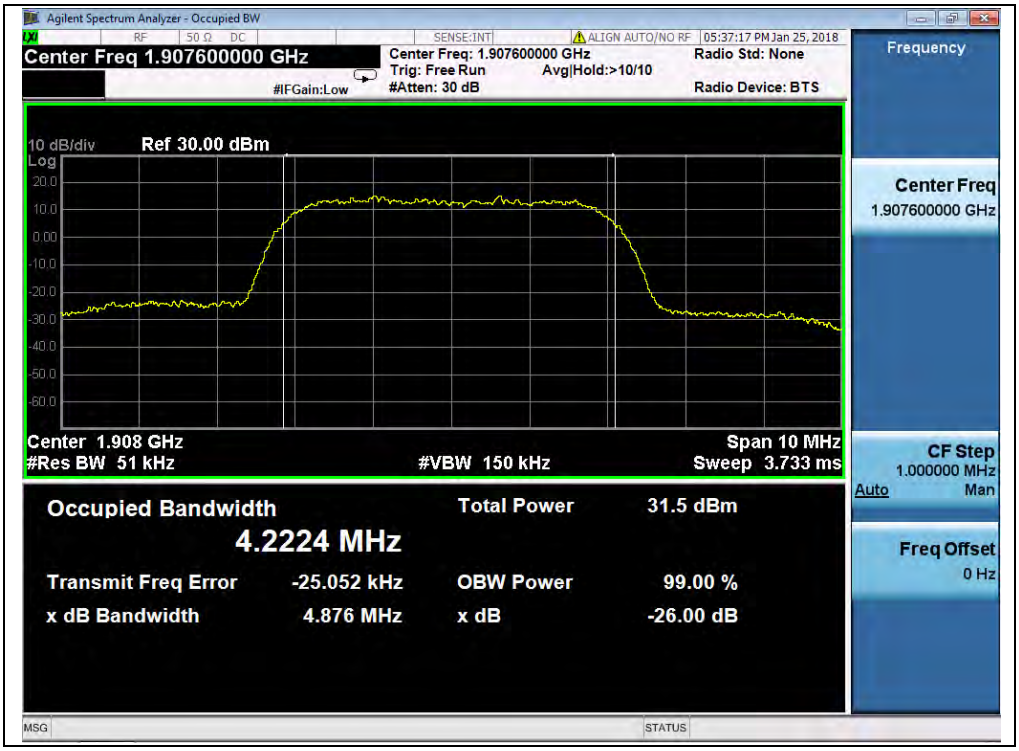
(Plot K3, HSDPA 1700MHz, Channel = 1513)



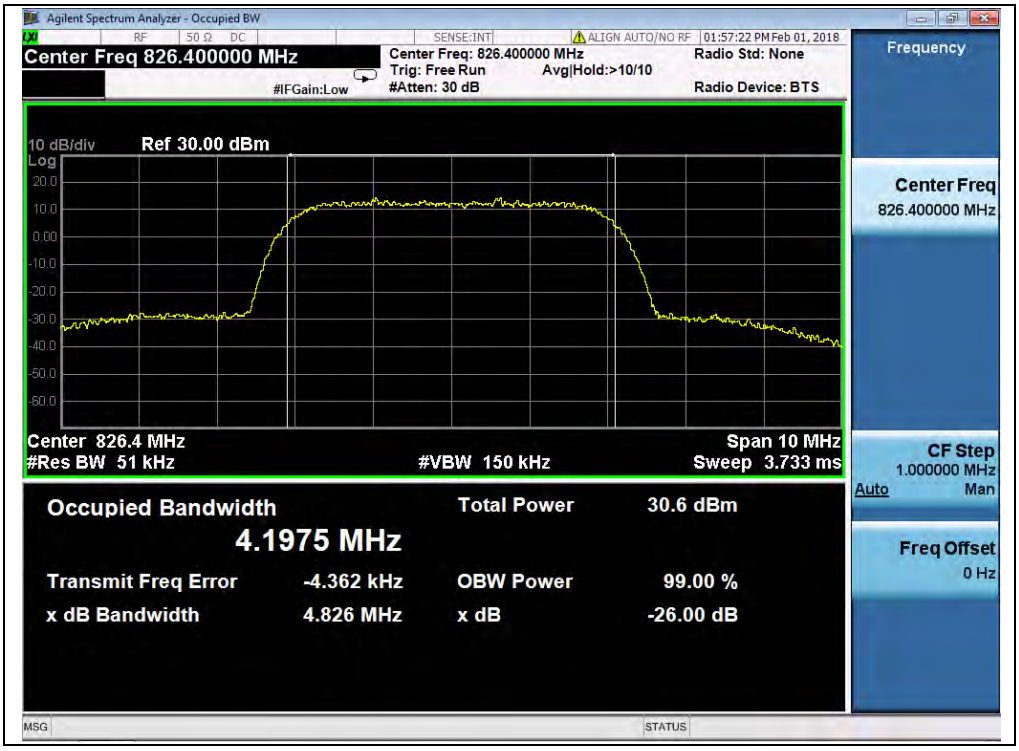
(Plot L1, HSDPA 1900MHz, Channel = 9262)



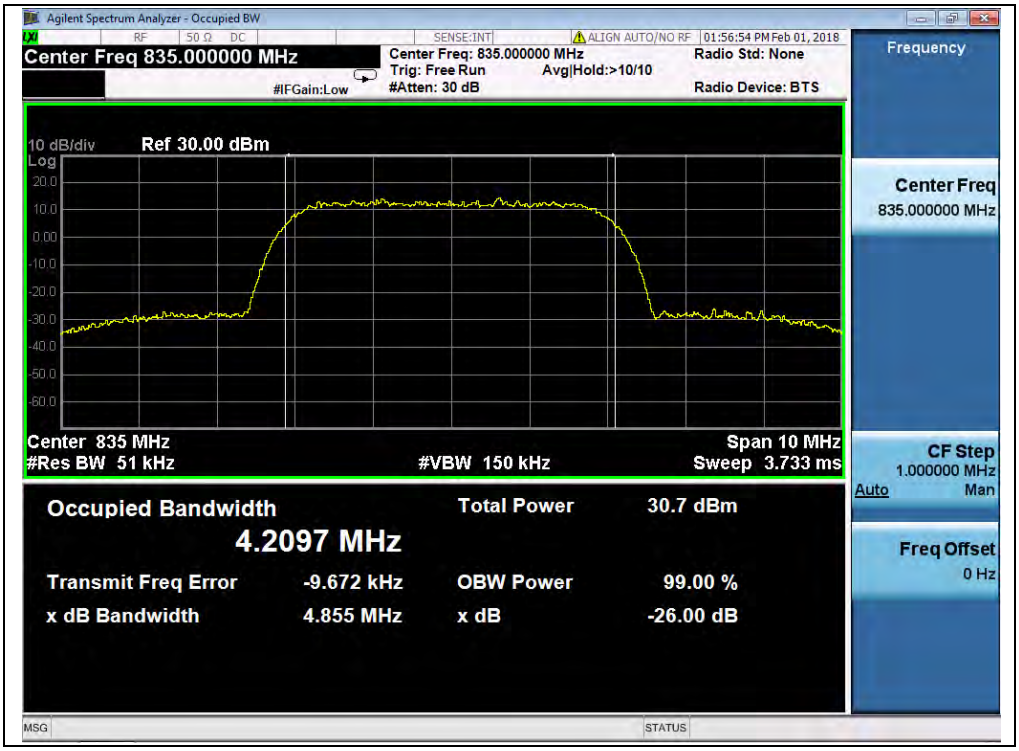
(Plot L2, HSDPA 1900 MHz, Channel = 9400)



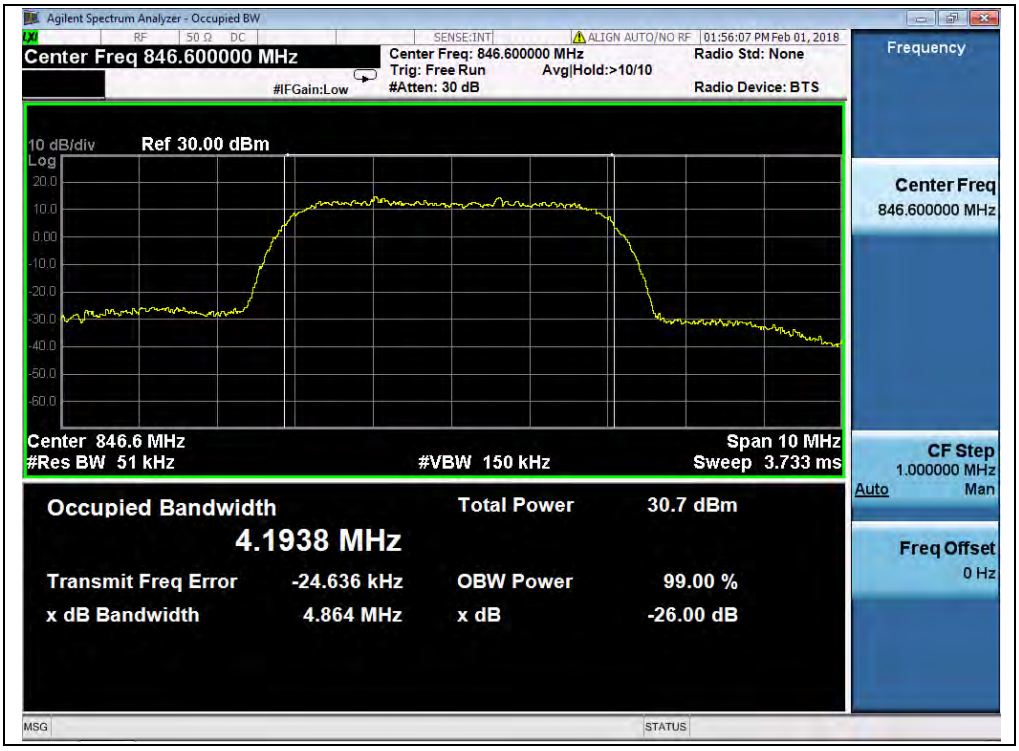
(Plot L3, HSDPA 1900MHz, Channel = 9538)



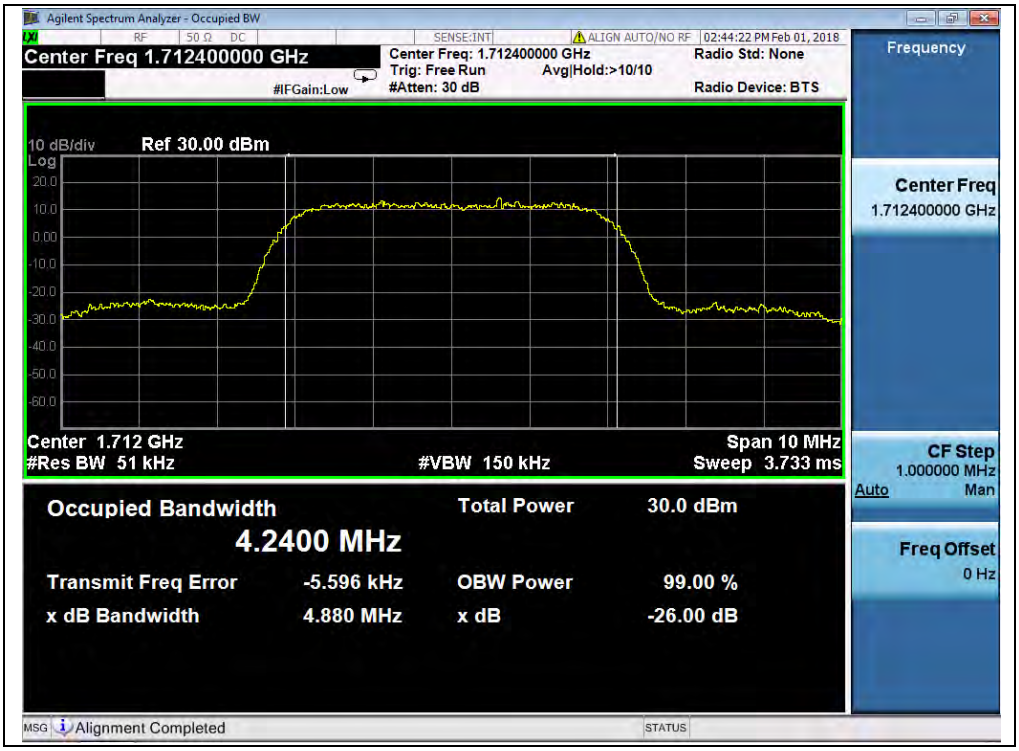
(Plot M1, HSUPA 850MHz, Channel = 4132)



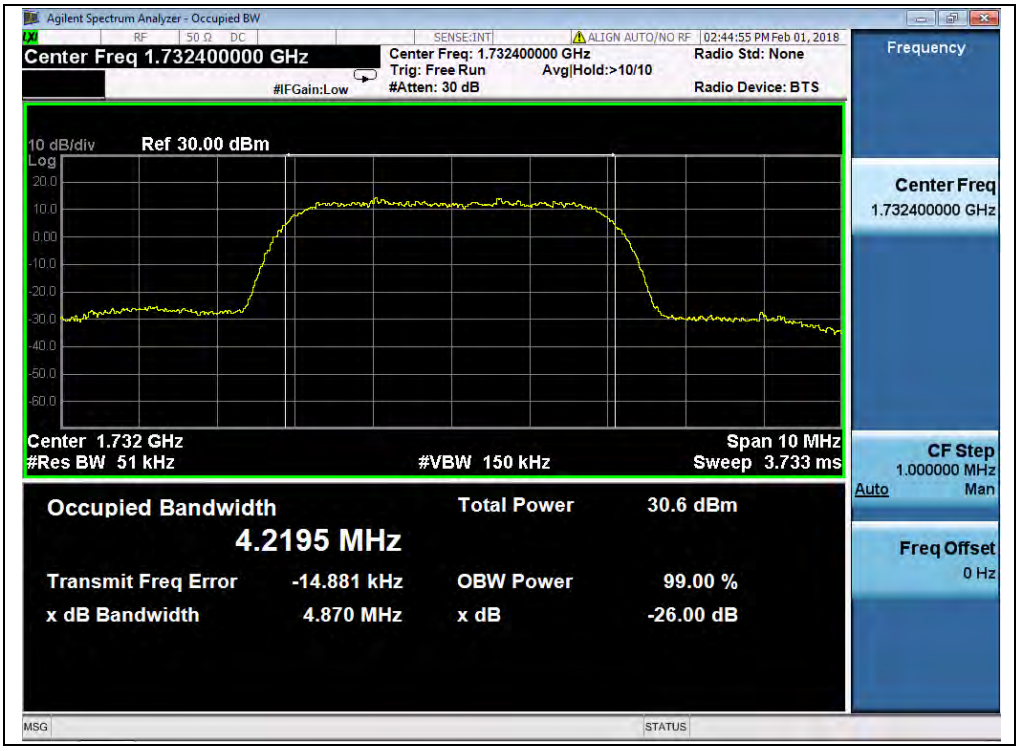
(Plot M2, HSUPA 850 MHz, Channel = 4175)



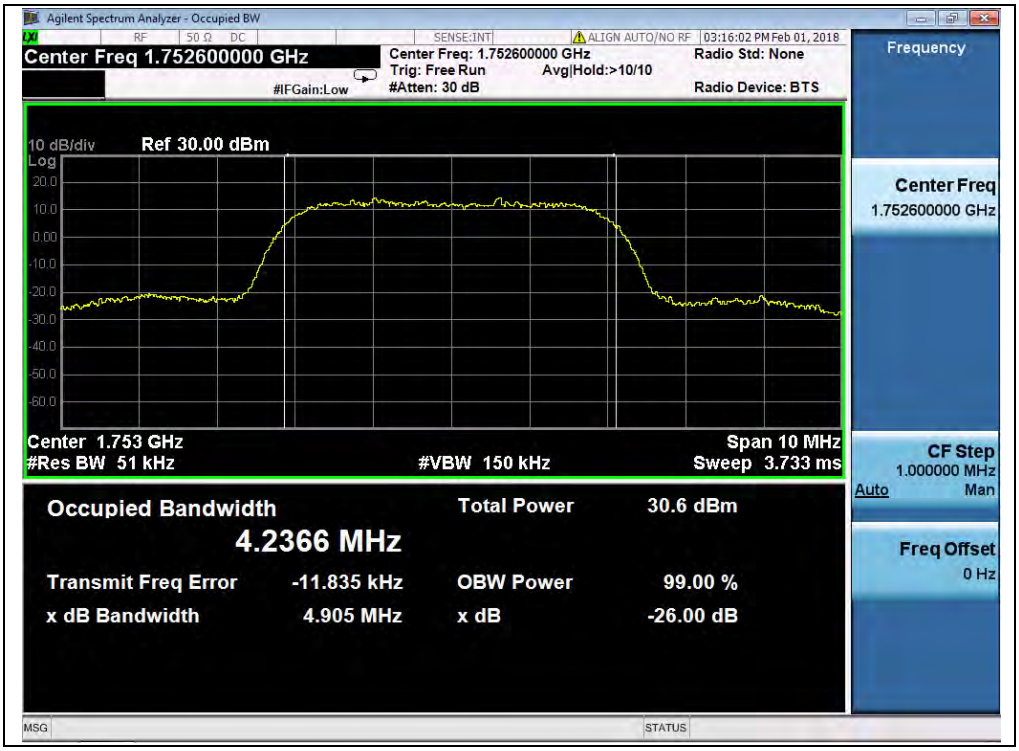
(Plot M3, HSUPA 850MHz, Channel = 4233)



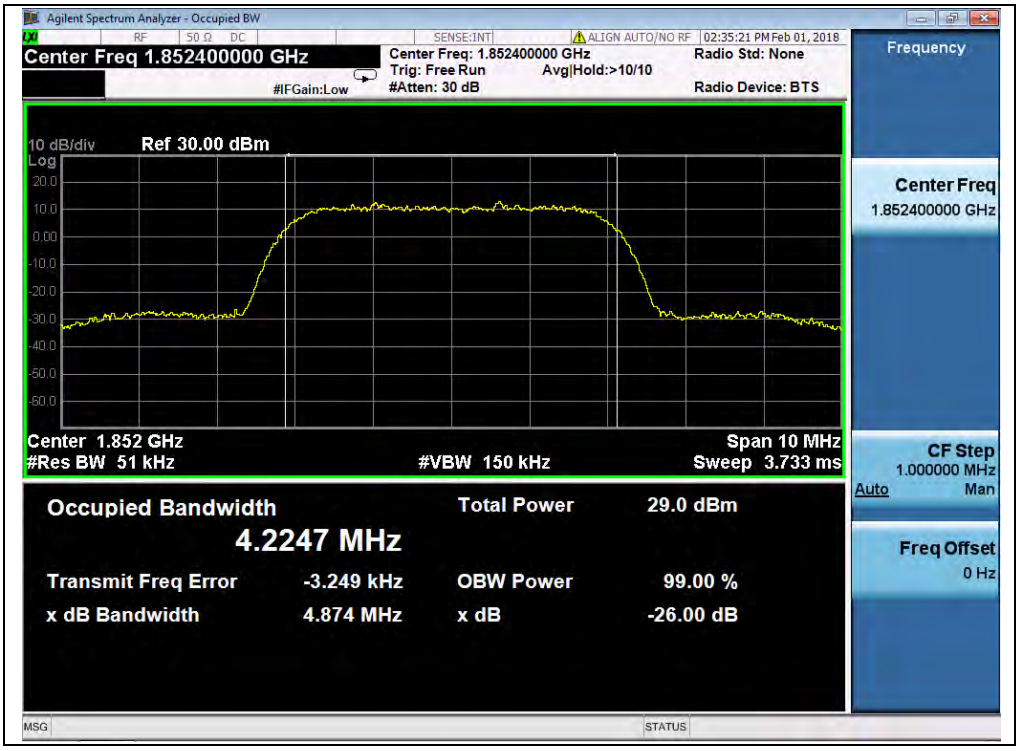
(Plot N1, HSUPA 1700MHz, Channel =1312)



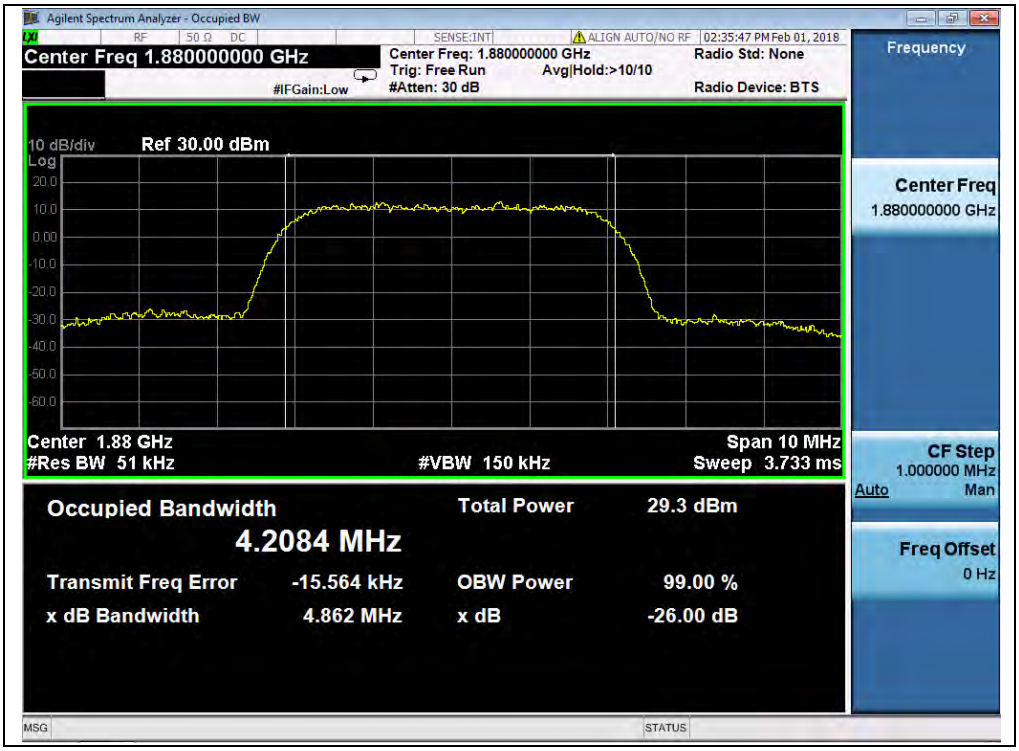
(Plot N2, HSUPA 1700 MHz, Channel = 1412)



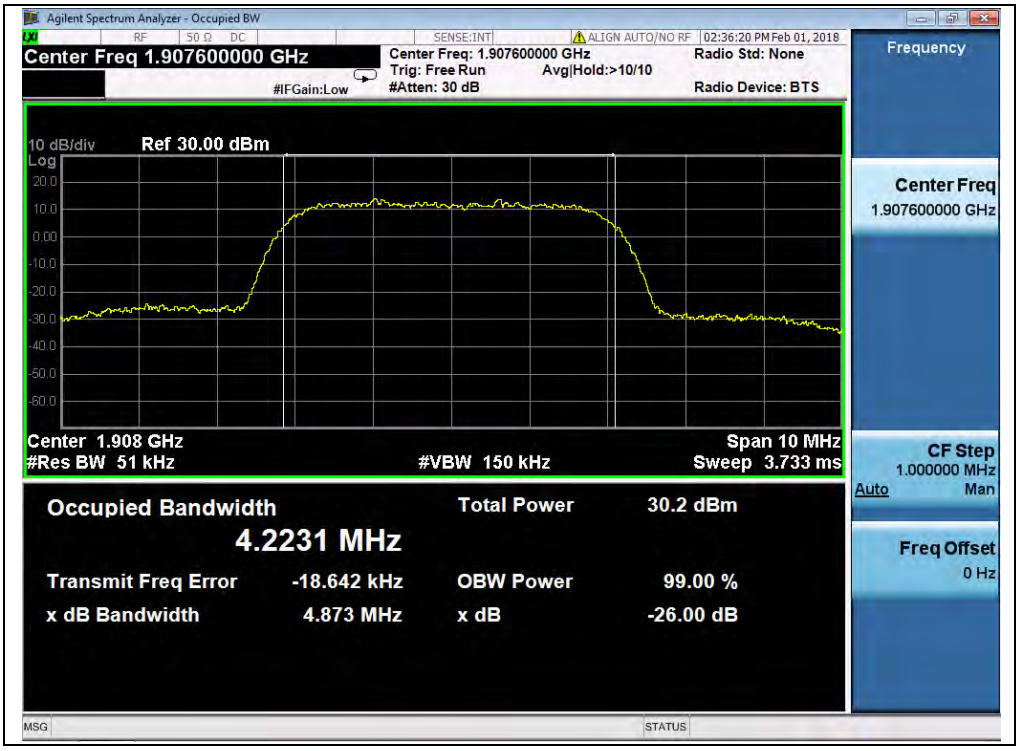
(Plot N3, HSUPA 1700MHz, Channel = 1513)



(Plot O1, HSUPA 1900MHz, Channel = 9262)

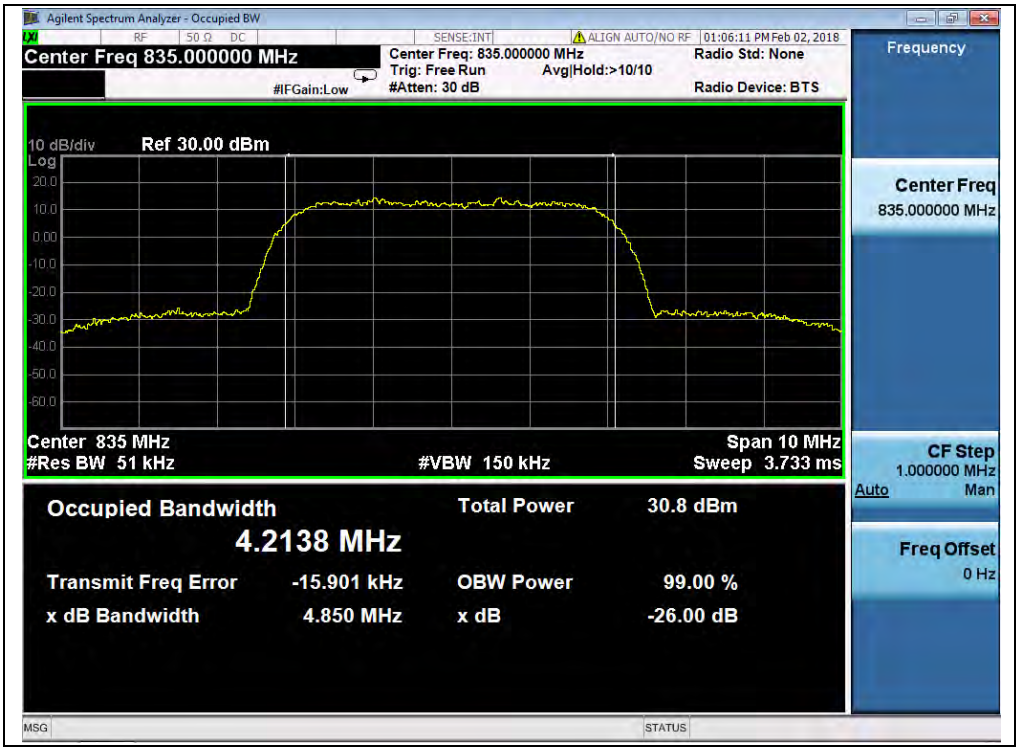


(Plot O2, HSUPA 1900 MHz, Channel = 9400)



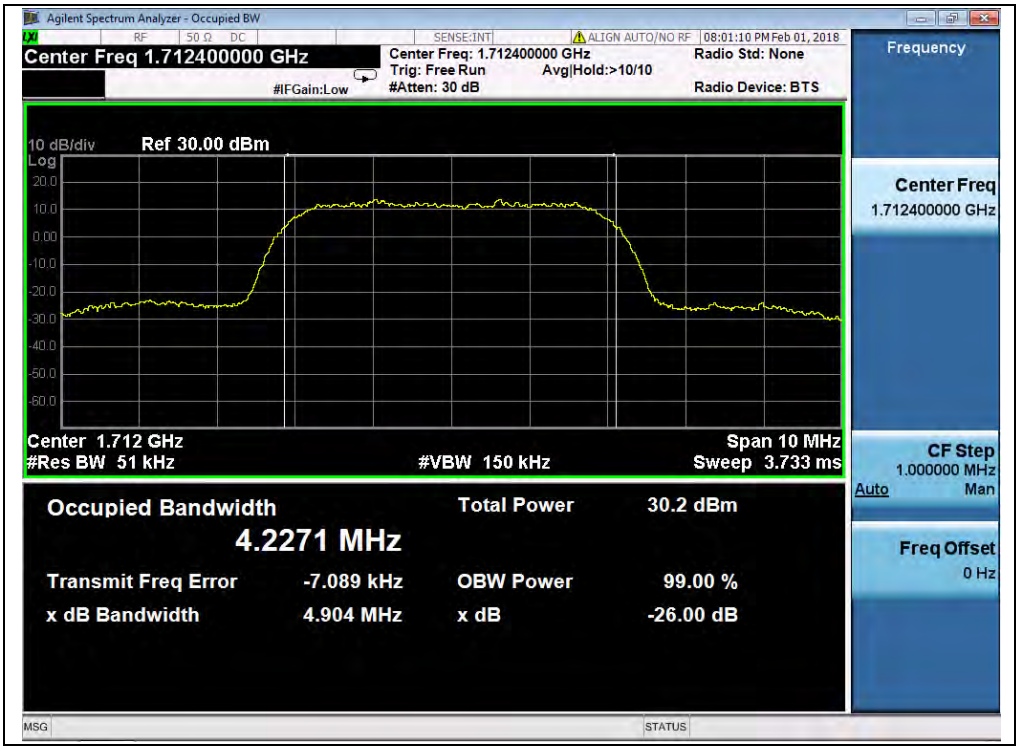
(Plot O3, HSUPA 1900MHz, Channel = 9538)

(Plot P1, HSPA+ 850MHz, Channel = 4132)



(Plot P2, HSPA+850 MHz, Channel = 4175)

(Plot P3, HSPA+ 850MHz, Channel = 4233)



(Plot Q1, HSPA+ 1700MHz, Channel =1312)