HCT CO.,LTD.
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
TEL: +82-31-645-6300 FAX: +82-31-645-6401

FCC / ISED REPORT

Certification

Applicant Name:
SOLiD, Inc.

Address:
10, 9th Floor, SOLiD Space, Pangyoyeok-ro 220, Bundang-gu, Seongnam-si, Gyeonggi-do, 463-400, South Korea

Date of Issue:
January 26, 2018
Location:
HCT CO., LTD.,
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
Report No.: HCT-RF-1801-FI004

ISED Registration No.: 5944A-5

FCC ID:	**W6UNHRAWS13**
IC:	**9354A-NHRAWS13**
APPLICANT:	**SOLiD, Inc**

FCC Model(s):	N20-R-HRDU-AWS13, THOR-R-HRDU-AWS13
FCC EUT Type	ALLIANCE_N20, ALLIANCE-TR
IC Model:	N20-R-HRDU-AWS13
IC EUT Type	ALLIANCE_N20
Frequency Ranges	2 110 MHz ~ 2 180 MHz (Downlink)
Conducted Output Power:	20 W (43 dBm, Downlink)
Date of Test:	November 01, 2017 ~ November 14, 2017
FCC Rule Part(s):	CFR 47 Part 2, Part 27
IC Rules(s):	RSS-Gen (Issue 4, November 2014), RSS-131 (Issue 3, May 2017) RSS-139 (Issue 3, July 2015)

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC / IC Rules under normal use and maintenance.

Report prepared by : Kyung Soo Kang
Engineer of Telecommunication testing center

Approved by : Kwon Jeong
Manager of Telecommunication testing center

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-1801-FI004	January 26, 2018	- First Approval Report

Table of Contents

1. CLIENT INFORMATION

The EUT has been tested by request of

Applicant	SOLiD, Inc. 10, 9th Floor, SOLiD Space, Pangyoyeok-ro 220, Bundang-gu, Seongnam-si, Gyeonggi-do, 463-400, South Korea

FCC ID: W6UNHRAWS13

IC: 9354A-NHRAWS13

FCC Model(s): N20-R-HRDU-AWS13, THOR-R-HRDU-AWS13

FCC EUT Type ALLIANCE_N20, ALLIANCE-TR

IC Model: N20-R-HRDU-AWS13

IC EUT Type ALLIANCE_N20

Power Supply:

N20-R-HRDU-AWS13	THOR-R-HRDU-AWS13
120VAC, 50Hz / DC -48V	100-240VAC, 50/60Hz / DC -48V

FCC Frequency Ranges: 2 110 ~ 2 180 MHz (Downlink)

Conducted Output Power: 20 W (43 dBm, Downlink)

Antenna Gain(s): Manufacturer does not provide an antenna.

Measurement standard(s): ANSI/TIA-603-E-2016, KDB 971168 D01 v03, KDB 935210 D05 v01r02, RSS-GEN, RSS-131, RSS-139

FCC Rule Part(s): CFR 47 Part 2, Part 27

IC Rules Part(s): RSS-Gen (Issue 4, November 2014), RSS-131 (Issue 3, May 2017), RSS-139 (Issue 3, July 2015)

Place of Tests: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
(ISED Registration Number: 5944A-5)

2. FACILITIES AND ACCREDITATIONS

2.1. FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 07, 2015 (Registration Number: 90661).

2.2. EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.
Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

3. TEST SPECIFICATIONS

3.1. STANDARDS

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 2, Part 27, RSS-Gen, RSS-131, RSS-139

Description	Reference (FCC)	Reference (IC)	Results
Conducted RF Output Power	§2.1046, §27.50	RSS-139, Section 6.5 SRSP-513	Compliant
Occupied Bandwidth	§2.1049	RSS-Gen, Section 6.6	Compliant
Input-versus-output Spectrum	-	RSS-131 Section 5.2.2	Compliant
Out of Band Rejection & Mean Output Power and Zone Enhancer Gain	KDB 935210 D05 v01r02	RSS-131, Section 5.2.1 RSS-131, Section 5.2.3	Compliant
Spurious Emissions at Antenna Terminals	§2.1051, §27.53	RSS-139, Section 6.6	Compliant
Radiated Spurious Emissions	§2.1053, §27.53	RSS-Gen, Section 7.1.2	Compliant
Frequency Stability	§2.1055, §27.54	RSS-131, Section 5.2.4 RSS-139, Section 6.4	Compliant

3.2. MODE OF OPERATION DURING THE TEST

The EUT was operated in a manner representative of the typical usage of the equipment.
During all testing, system components were manipulated within the confines of typical usage to maximize each emission.
The device does not supply antenna(s) with the system, so the dummy loads were connected to the RF output ports for radiated spurious emission testing.

* Note: This EUT is supported power supply both of AC and DC. Test results are only attached worst cases.
* The tests results in plots are already including the actual value of loss for the attenuator and cable combination. Please check correction factors below table.

▣ Correction Factor

Freq(MHz)	Factor(dB)
30	30.504
100	29.246
200	29.578
300	29.551
400	29.859
500	29.924
600	29.983
700	29.946
800	30.056
900	30.200
1000	30.263
2000	31.164
3000	32.243
4000	32.456
5000	30.504
6000	29.246
7000	33.210
8000	33.429
9000	34.210
10000	34.597
11000	35.485
12000	36.128
13000	37.014
14000	37.524
15000	38.070
16000	41.191
17000	41.070
18000	42.726
19000	41.312
20000	41.964
21000	42.616
22000	43.268
23000	43.920
24000	44.572
25000	45.225

3.3. MAXIMUM MEASUREMENT UNCERTAINTY

The value of the measurement uncertainty for the measurement of each parameter.

Coverage factor *k* = 2, Confidence levels of 95 %

Description	Condition	Uncertainty
Conducted RF Output Power	-	± 0.72 dB
Occupied Bandwidth	OBW ≤ 20 MHz	± 52 kHz
Input-versus-output Spectrum		
Out of Band Rejection & Mean Output Power and Zone Enhancer Gain	Gain 20 dB bandwidth	± 0.89 dB ± 0.58 MHz
Transmitter unwanted emissions	-	± 1.08 dB
Radiated Spurious Emissions	f ≤ 1 GHz f > 1 GHz	± 4.80 dB ± 6.07 dB
Frequency Stability	-	± 1.22 x 10^{-6}

4. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature :	**+ 15 ℃ to + 35 ℃**
Relative humidity:	**30 % to 60 %**
Air pressure	**860 mbar to 1 060 mbar**

5. TEST EQUIPMENT

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Agilent	N5182A /Signal Generator	03/29/2017	Annual	MY50141649
Agilent	N5182A /Signal Generator	01/19/2018	Annual	MY47070406
Agilent	N9020A / Spectrum Analyzer	09/15/2017	Annual	MY46471250
Weinschel	67-30-33 / Fixed Attenuator	02/09/2017	Annual	CC7264
Weinschel	2-10 / 10 dB Attenuator	02/22/2017	Annual	BR0554
Agilent	11636A / Power Divider	08/01/2017	Annual	09109
DEAYOUNG ENT	DFSS60 / AC Power Supply	04/05/2017	Annual	1003030-1
NANGYEUL CO., LTD.	NY-THR18750 / Temperature and Humidity Chamber	10/21/2017	Annual	NY-2009012201A
Innco system	MA4000-EP / Antenna Position Tower	N/A	N/A	N/A
Innco system	CT0800 / Turn Table	N/A	N/A	N/A
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
ETS	2090 / Controller(Turn table)	N/A	N/A	1646
Rohde & Schwarz	Loop Antenna	04/19/2017	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	04/06/2017	Biennial	760
Schwarzbeck	BBHA 9120D / Horn Antenna	08/28/2017	Biennial	1300
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	04/25/2017	Biennial	BBHA9170124
Rohde & Schwarz	FSP / Spectrum Analyzer	09/06/2017	Annual	100688
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/27/2017	Annual	101068-SZ
Wainwright Instruments	WHKX10-2700-3000-18000-40SS / High Pass Filter	08/01/2017	Annual	4
CERNEX	CBLU1183540 / Power Amplifier	09/22/2017	Annual	24614
CERNEX	CBL06185030 / Power Amplifier	01/03/2018	Annual	24615
CERNEX	CBL18265035 / Power Amplifier	01/10/2018	Annual	22966

6. RF OUTPUT POWER

FCC Rules

Test Requirements:

§ 2.1046 Measurements required: RF power output:

(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 § 2.1033(c)(8).The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

(b) For single sideband, independent sideband, and single channel, controlled carrier radio telephone transmitters, the procedure specified in paragraph (a) of this section shall be employed and, in addition, the transmitter shall be modulated during the test as specified and as applicable in § 2.1046 (b) (1-5). In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.

(c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

§ 27.50 Power limits and duty cycle.

(d) The following power and antenna height requirements apply to stations transmitting in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz and 2180-2200 MHz bands:

(1) The power of each fixed or base station transmitting in the 1995-2000 MHz, 2110-2155 MHz, 2155-2180 MHz or 2180-2200 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to:

(i) An equivalent isotropically radiated power (EIRP) of 3280 watts when transmitting with an emission bandwidth of 1 MHz or less;

(ii) An EIRP of 3280 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

(2) The power of each fixed or base station transmitting in the 1995-2000 MHz, the 2110-2155 MHz 2155-2180 MHz band, or 2180-2200 MHz band and situated in any geographic location other than that described in paragraph (d)(1) of this section is limited to:

(i) An equivalent isotropically radiated power (EIRP) of 1640 watts when transmitting with an emission bandwidth of 1 MHz or less;

(ii) An EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

(3) A licensee operating a base or fixed station in the 2110-2155 MHz band utilizing a power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must coordinate such operations in advance with all Government and non-Government satellite entities in the 2025-2110 MHz band. A licensee operating a base or fixed station in the 2110-2180 MHz band utilizing power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must be coordinated in advance with the following licensees authorized to operate within 120 kilometers (75 miles) of the base or fixed station operating in this band: All Broadband Radio Service (BRS) licensees authorized under this part in the 2155-2160 MHz band and all advanced wireless services (AWS) licensees authorized to operate on adjacent frequency blocks in the 2110-2180 MHz band.

(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

(5) Equipment employed must be authorized in accordance with the provisions of §24.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

(6) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

(7) Fixed, mobile, and portable (hand-held) stations operating in the 2000-2020 MHz band are limited to 2 watts EIRP, except that the total power of any portion of an emission that falls within the 2000-2005 MHz band may not exceed 5 milliwatts. A licensee of AWS-4 authority may enter into private operator-to-operator agreements with all 1995-2000 MHz licensees to operate in 2000-2005 MHz at power levels above 5 milliwatts EIRP; except the total power of the AWS-4 mobile emissions may not exceed 2 watts EIRP.

(8) A licensee operating a base or fixed station in the 2180-2200 MHz band utilizing a power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must be coordinated in advance with all AWS licensees authorized to operate on adjacent frequency blocks in the 2180-2200 MHz band.

(9) Fixed, mobile and portable (hand-held) stations operating in the 1915-1920 MHz band are limited to 300 milliwatts EIRP.

(10) A licensee operating a base or fixed station in the 1995-2000 MHz band utilizing a power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must be coordinated in advance with all PCS G Block licensees authorized to operate on adjacent frequency blocks in the 1990-1995 MHz band within 120 kilometers of the base or fixed station operating in this band.

IC Rules

Test Requirements:

RSS-139

6. Transmitter Standard Specifications

6.5 Transmitter Output Power

The equivalent isotropically radiated power (e.i.r.p.) for mobile and portable transmitters shall not exceed one watt. The e.i.r.p. for fixed and base stations in the band 1710-1780 MHz shall not exceed one watt.

Consult SRSP-513 for e.i.r.p. limits on fixed and base stations operating in the band 2110-2180 MHz.

In addition, the peak to average power ratio (PAPR) of the equipment shall not exceed 13 dB for more than 0.1% of the time, using a signal that corresponds to the highest PAPR during periods of continuous transmission.

SRSP-513

5. Technical Criteria

5.1 Radiated Power and Antenna Height Limits

5.1.1 Fixed and Base Stations

5.1.1.1 For fixed and base stations operating within the frequency range 2110-2180 MHz with a channel bandwidth equal to or less than 1 MHz, the maximum permissible equivalent isotropically radiated power (e.i.r.p.) is 1640 watts with an antenna height above average terrain (HAAT)Footnote 4 up to 300 metres.

5.1.1.2 For fixed and base stations operating within the frequency range 2110-2180 MHz with a channel bandwidth greater than 1 MHz, the maximum permissible e.i.r.p. is 1640 watts/MHz e.i.r.p. (i.e. no more than 1640 watts e.i.r.p. in any 1 MHz band segment) with an antenna height above average terrain (HAAT) up to 300 metres.

5.1.1.3 Fixed and base stations located in geographic areas at a distance greater than 26 km from large or medium population centres,Footnote 5 and transmitting within the frequency range 2110-2180 MHz, may increase their e.i.r.p. up to a maximum of 3280 watts/MHz (i.e. no more than 3280 watts e.i.r.p. in any 1 MHz band segment), with an antenna HAAT up to 300 metres.

Within 26 km of any large or medium population centre, fixed and base stations may operate at increased e.i.r.p. if more than 50% of the population within a particular sector's coverageFootnote 6 is located outside these large and medium population centres.

Fixed and base stations with increased e.i.r.p. must not be used to provide coverage to large and medium population centres. However, some incidental coverage of these large and medium population centres by stations with increased e.i.r.p. is permitted.

This provision also applies for fixed and base stations with a channel bandwidth equal to or less than 1 MHz (i.e. the e.i.r.p. may be increased up to a maximum of 3280 watts).

5.1.1.4 Fixed and base station antenna heights above average terrain may exceed 300 metres with a reduction in e.i.r.p. The maximum permissible e.i.r.p. for installations with antenna HAAT in excess of 300 metres is given in the following table:

Table 2 — Reduction to Maximum Allowable E.I.R.P. for HAAT > 300 m

HAAT (in metres)	Maximum e.i.r.p. (watts or watts per MHza)
HAAT ≤ 300	1640 (or 3280[b])
300 < HAAT ≤ 500	1070
500 < HAAT ≤ 1000	490
1000 < HAAT ≤ 1500	270
1500 < HAAT ≤ 2000	160

Notes:

a Depending on the channel bandwidth: watts if less than 1 MHz bandwidth or else watts per MHz.

b If Section 5.1.1.3 applies.

5.1.1.5 Fixed or base stations transmitting in the lower sub-band (1710-1780 MHz) shall comply with the power limits set forth in Section 5.1.2.

5.1.2 Mobile and Portable Stations

Maximum e.i.r.p. limits for mobile and portable (hand-held) stations are specified in RSS-139, Advanced Wireless Services (AWS) Equipment Operating in the Bands 1710–1780 MHz and 2110–2180 MHz. These stations should employ automatic transmit power control such that stations operate on the minimum required power.

Test Procedures:

Measurements were in accordance with the test methods section 3.5.2 of KDB 935210 D05 v01r02.

a) Connect a signal generator to the input of the EUT.

b) Configure to generate the AWGN (broadband) test signal.

c) The frequency of the signal generator shall be set to the frequency f0 as determined from 3.3.

d) Connect a spectrum analyzer or power meter to the output of the EUT using appropriate attenuation as necessary.

e) Set the signal generator output power to a level that produces an EUT output level that is just below the AGC threshold (see 3.2), but not more than 0.5 dB below.

f) Measure and record the output power of the EUT; use 3.5.3 or 3.5.4 for power measurement.

g) Remove the EUT from the measurement setup. Using the same signal generator settings, repeat the power measurement at the signal generator port, which was used as the input signal to the EUT, and record as the input power. EUT gain may be calculated as described in 3.5.5.

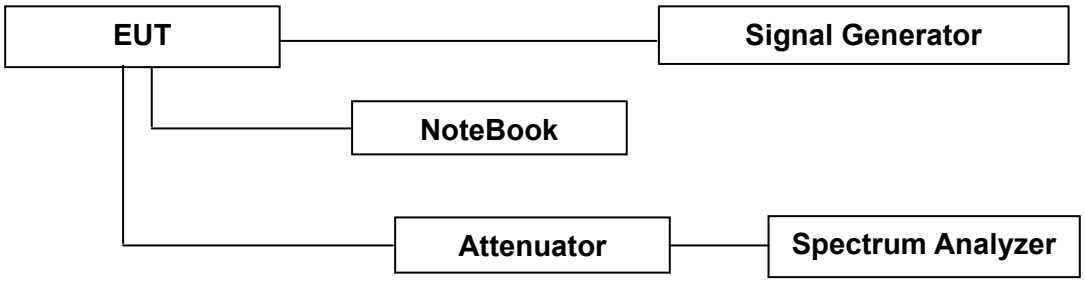
h) Repeat steps f) and g) with input signal amplitude set to 3 dB above the AGC threshold level.

i) Repeat steps e) to h) with the narrowband test signal.

j) Repeat steps e) to i) for all frequency bands authorized for use by the EUT.

Power measurement Method:

Guidance for performing input/output power measurements using a spectrum or signal analyzer is provided in 5.2 of KDB Publication 971168 D01 v03.



Block Diagram 1. RF Power Output Test Setup

Test Results:

AWS 2100 Band

Input Signal	Input Level	Maximum Amp Gain
AWS 2100	DL: -20 dBm	DL : 63 dB

*Note: Due to EUT's ALC function (Auto Level Control), even if input signal is increased, the same output power is transmit.

[Downlink]

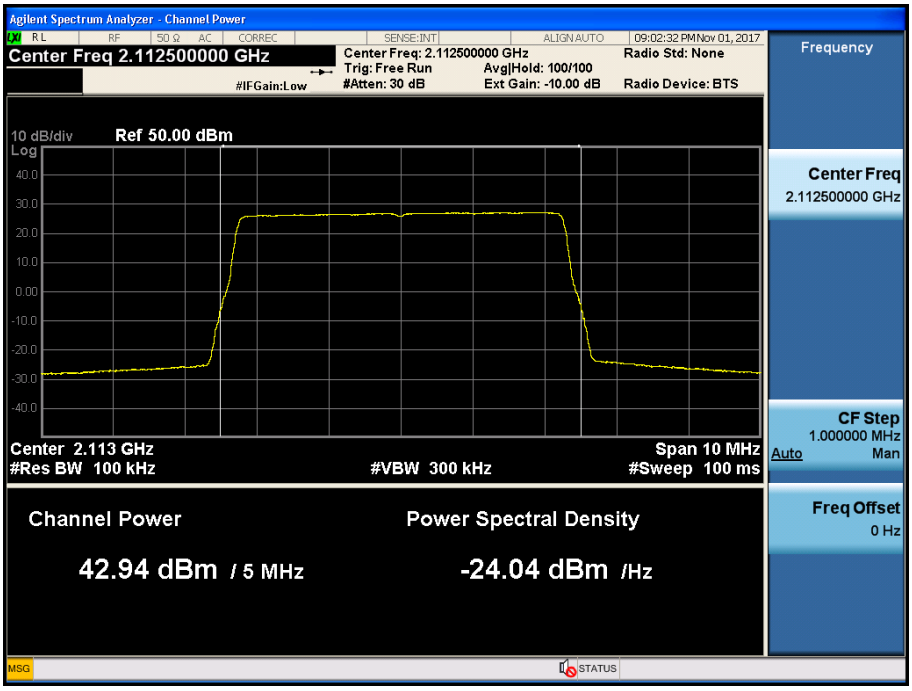
	Channel	Frequency (MHz)	Output Power	
			(dBm)	(W)
LTE 5 MHz AGC threshold	Low	2112.50	42.94	19.679
	Middle	2145.00	42.95	19.724
	High	2177.50	42.92	19.588
LTE 5 MHz +3 dB above the AGC threshold	Low	2112.50	42.98	19.861
	Middle	2145.00	42.93	19.634
	High	2177.50	42.94	19.679
LTE 10 MHz AGC threshold	Low	2115.00	42.96	19.770
	Middle	2145.00	42.95	19.724
	High	2175.00	42.90	19.498
LTE 10 MHz +3 dB above the AGC threshold	Low	2115.00	42.81	19.099
	Middle	2145.00	43.05	20.184
	High	2175.00	42.97	19.815
WCDMA AGC threshold	Low	2112.50	42.99	19.907
	Middle	2145.00	43.04	20.137
	High	2177.50	42.94	19.679
WCDMA +3 dB above the AGC threshold	Low	2112.50	43.01	19.999
	Middle	2145.00	42.92	19.588
	High	2177.50	42.82	19.143

	Channel	Frequency (MHz)	Output Power	
			(dBm)	(W)
CDMA AGC threshold	Low	2111.25	43.11	20.464
	Middle	2145.00	42.94	19.679
	High	2178.75	42.65	18.408
CDMA +3 dB above the AGC threshold	Low	2111.25	43.04	20.137
	Middle	2145.00	42.94	19.679
	High	2178.75	42.51	17.824

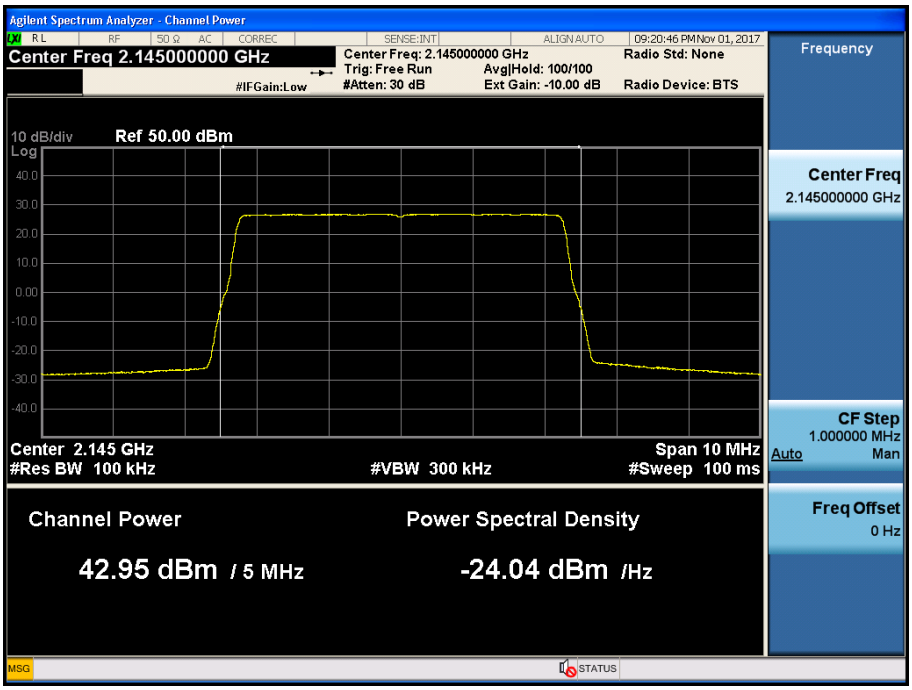
*Note: We have done CDMA and 1xEVDO modulation test in technology. Test results are only attached worst cases.

RF Output Power for AWS 2100_LTE 5 MHz

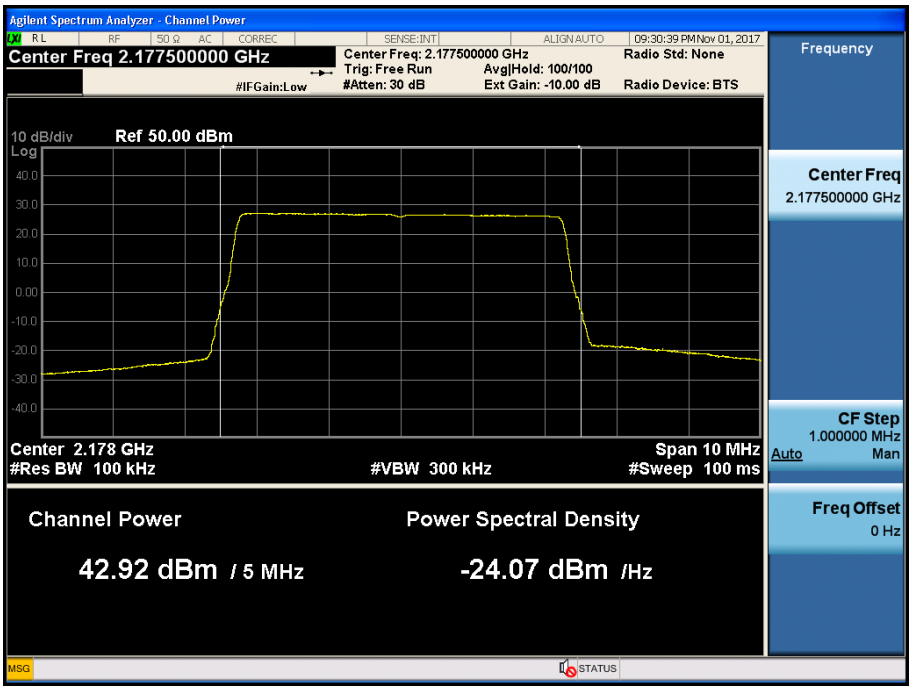
[AGC threshold Downlink Low]



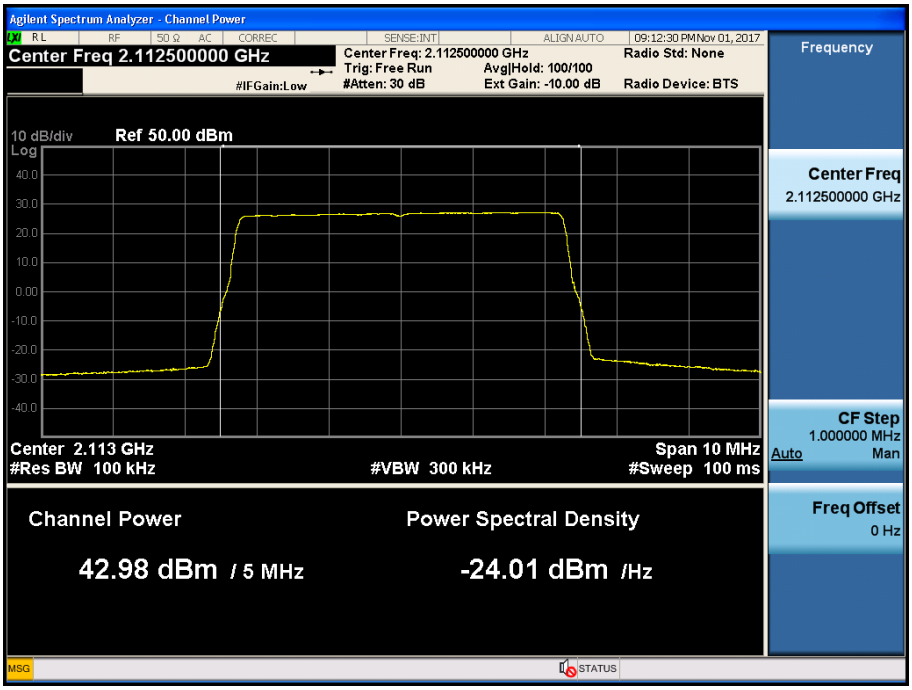
[AGC threshold Downlink Middle]



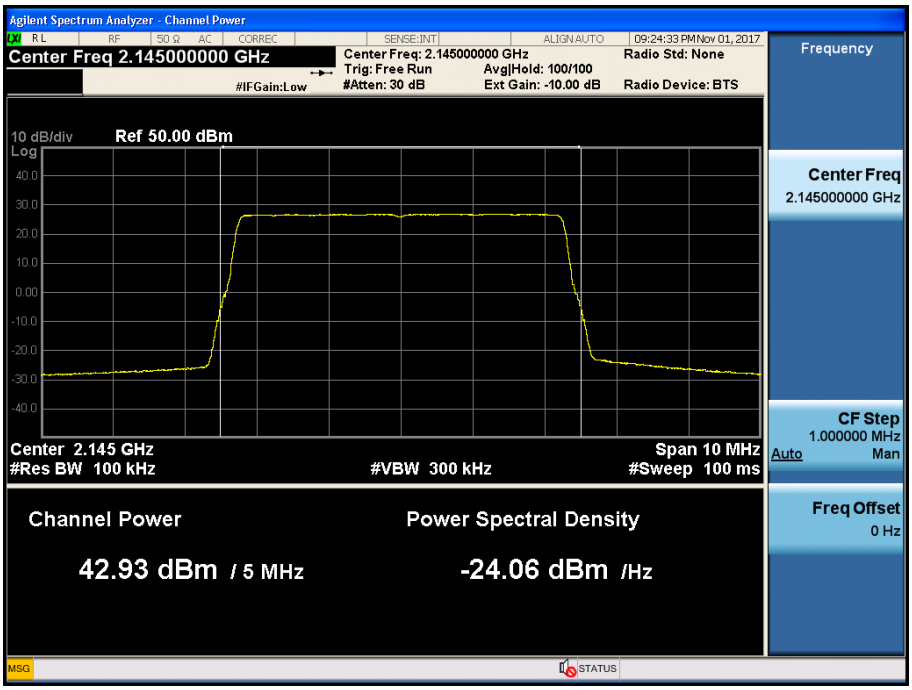
[AGC threshold Downlink High]



[+3 dB above AGC threshold Downlink Low]



[+3 dB above AGC threshold Downlink Middle]



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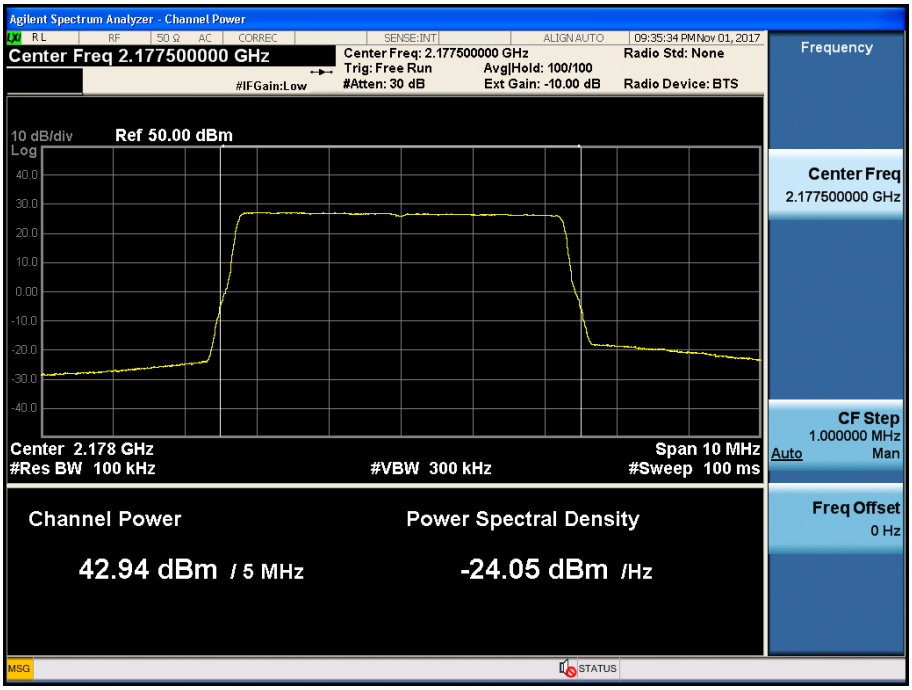
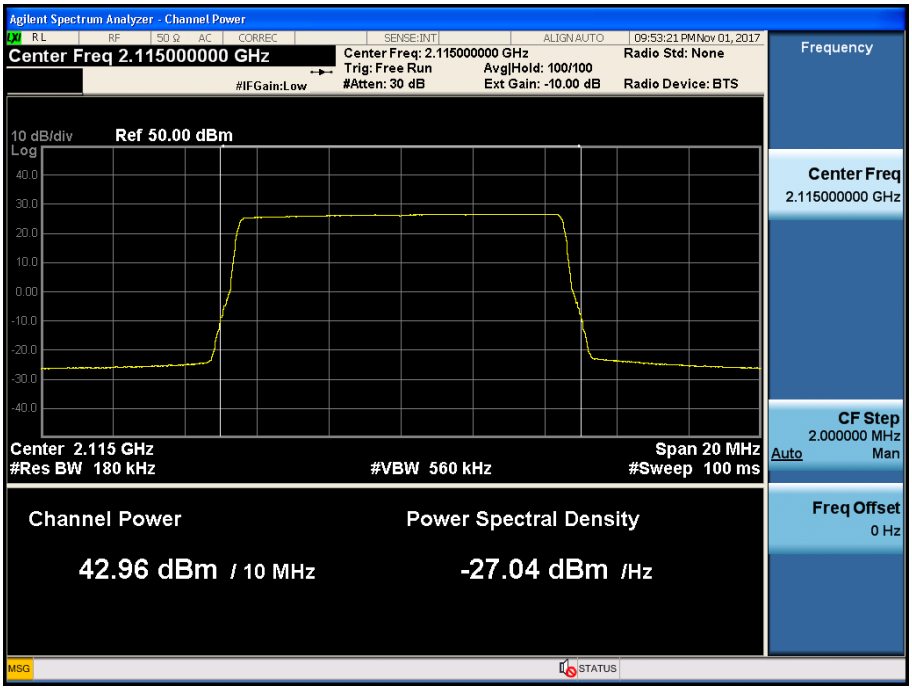


RF Output Power for AWS 2100_LTE 10 MHz

[AGC threshold Downlink Low]



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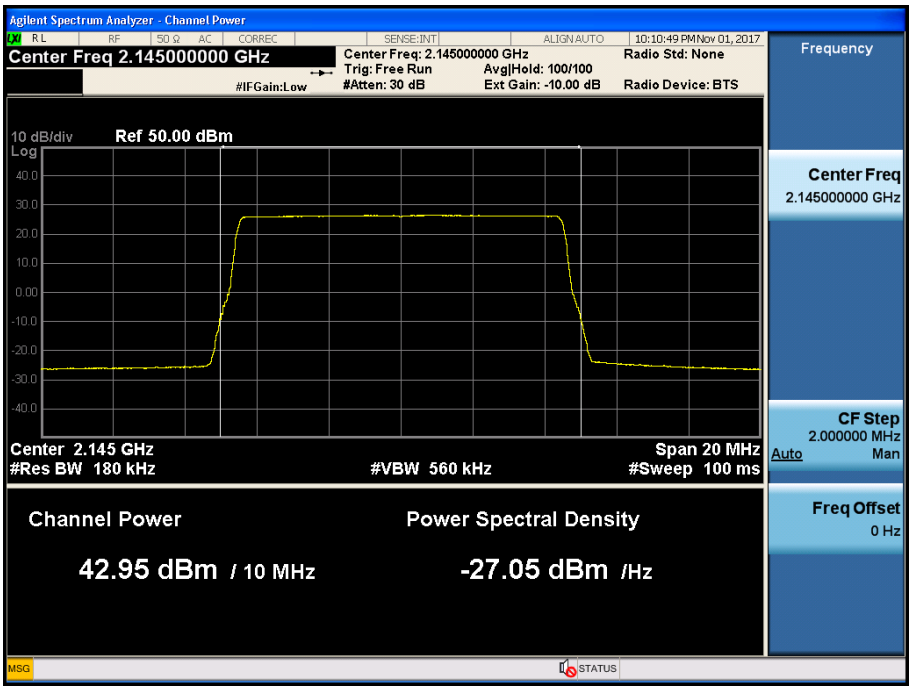

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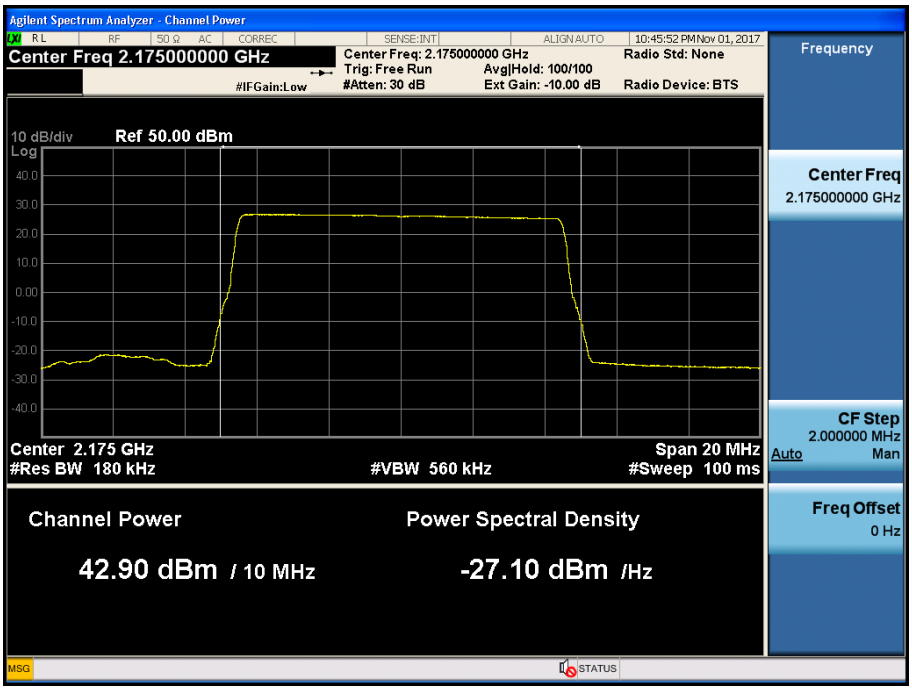
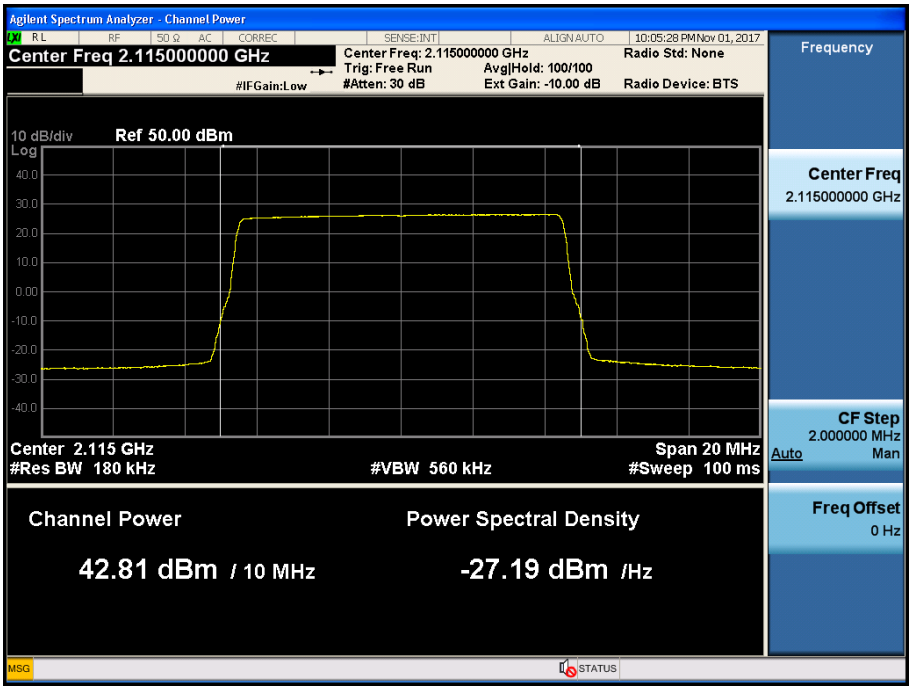
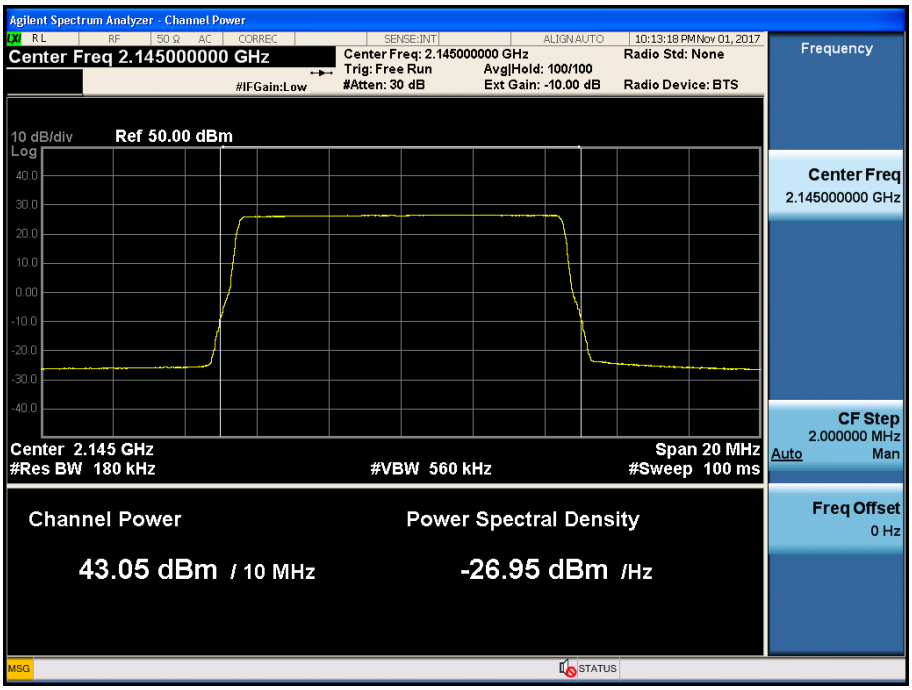


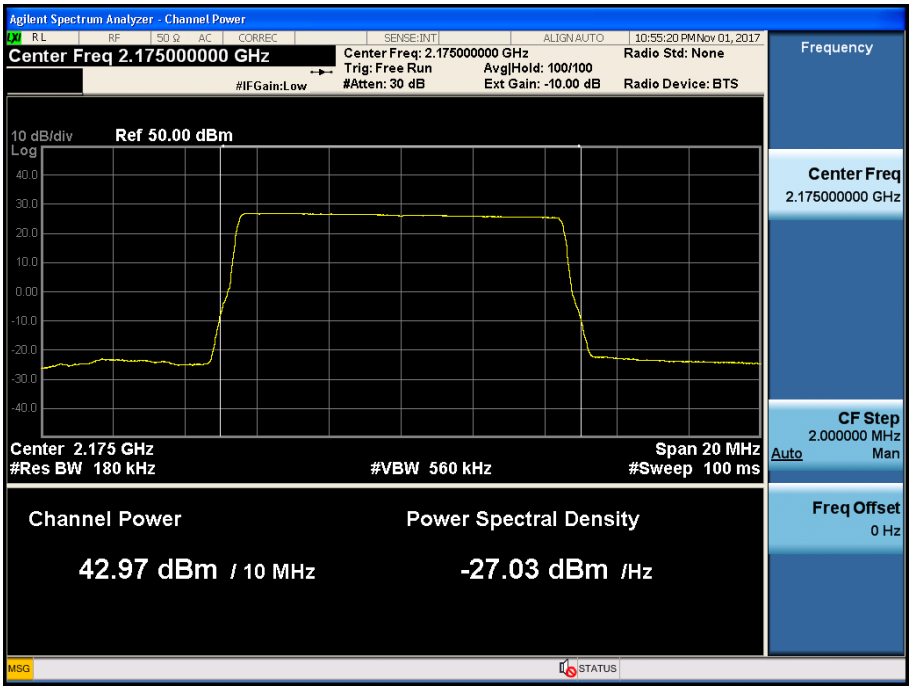
[+3 dB above AGC threshold Downlink Low]



[+3 dB above AGC threshold Downlink Middle]

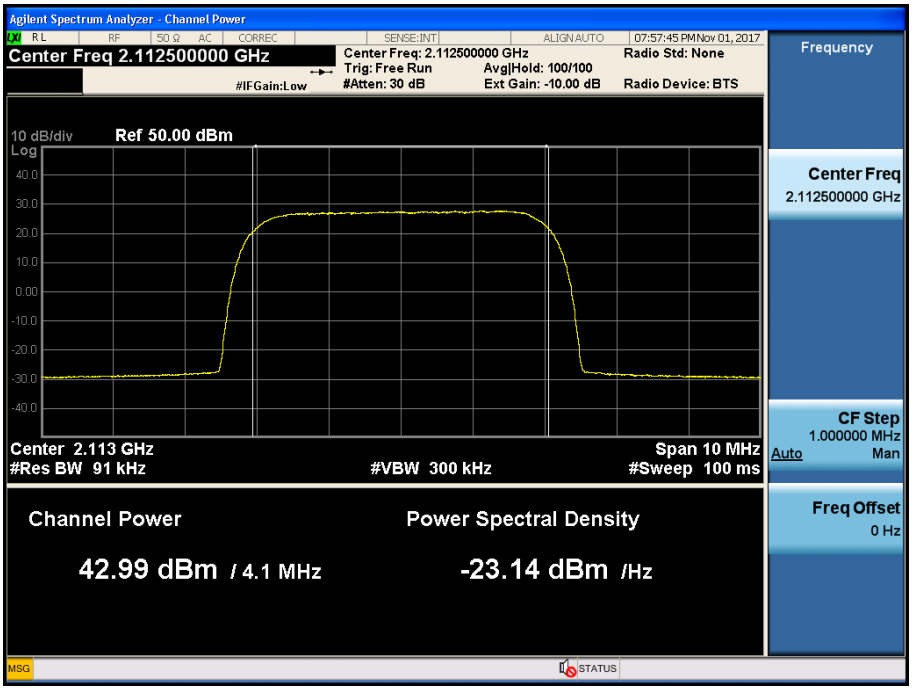


[+3 dB above AGC threshold Downlink High]

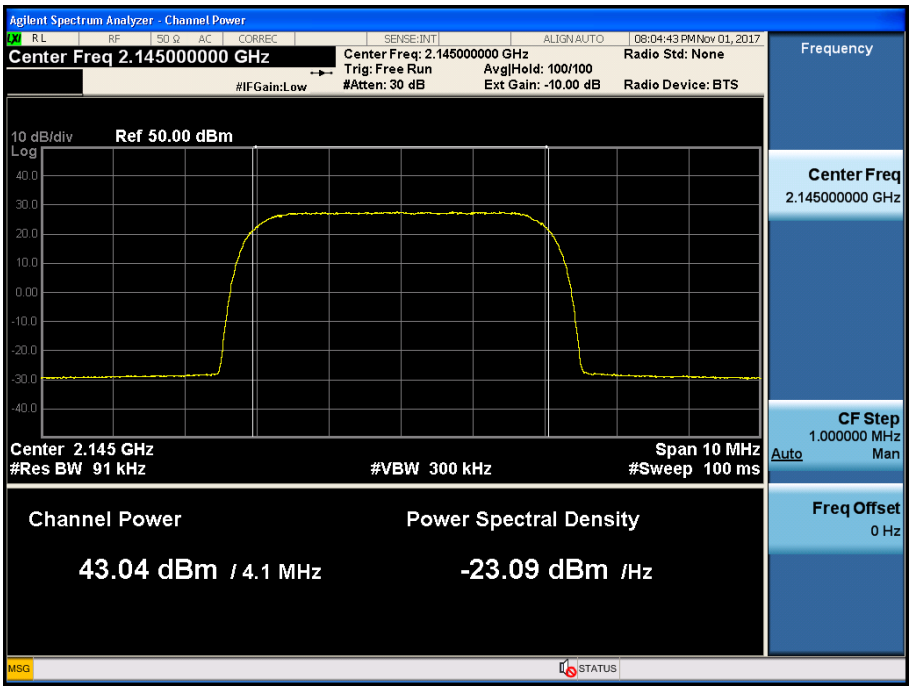


RF Output Power for AWS 2100_WCDMA

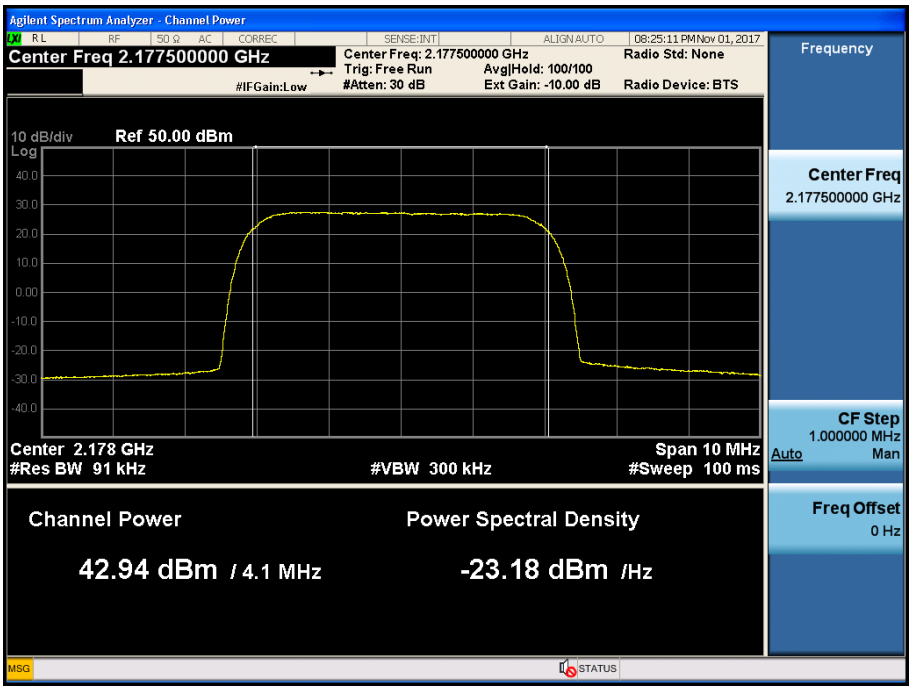
[AGC threshold Downlink Low]



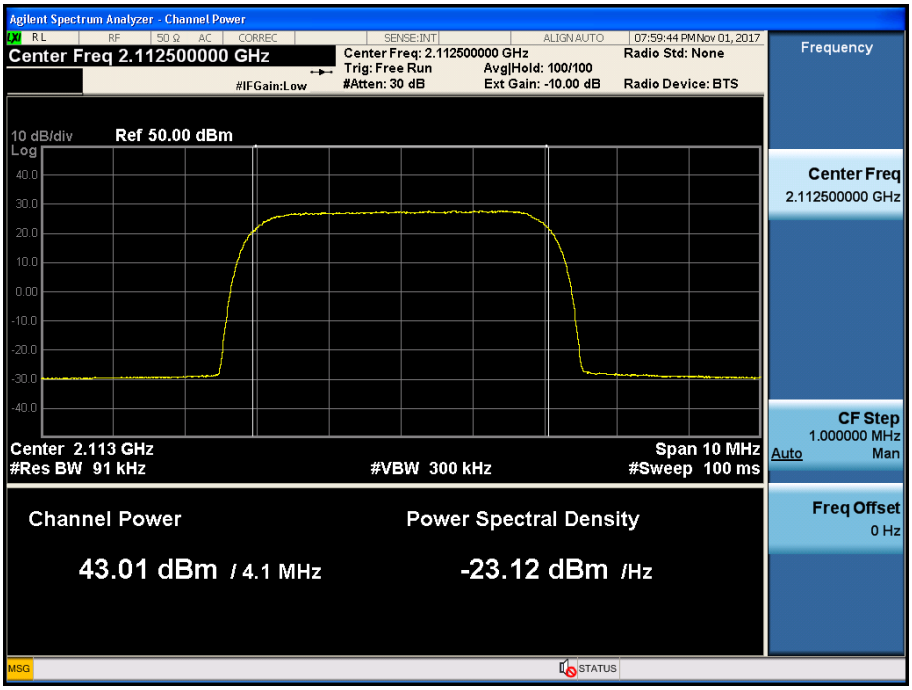
[AGC threshold Downlink Middle]



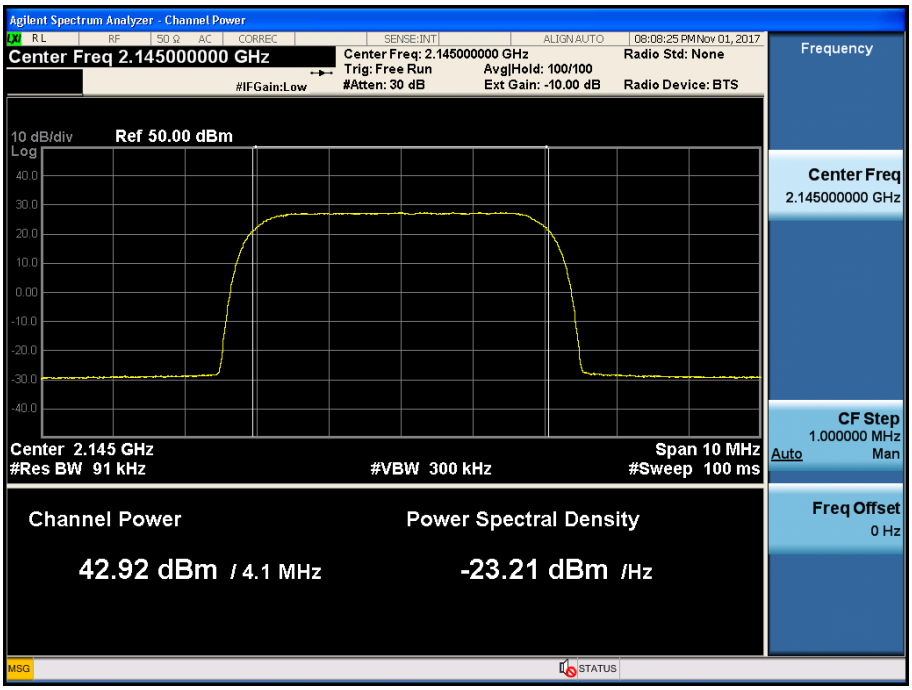
[AGC threshold Downlink High]



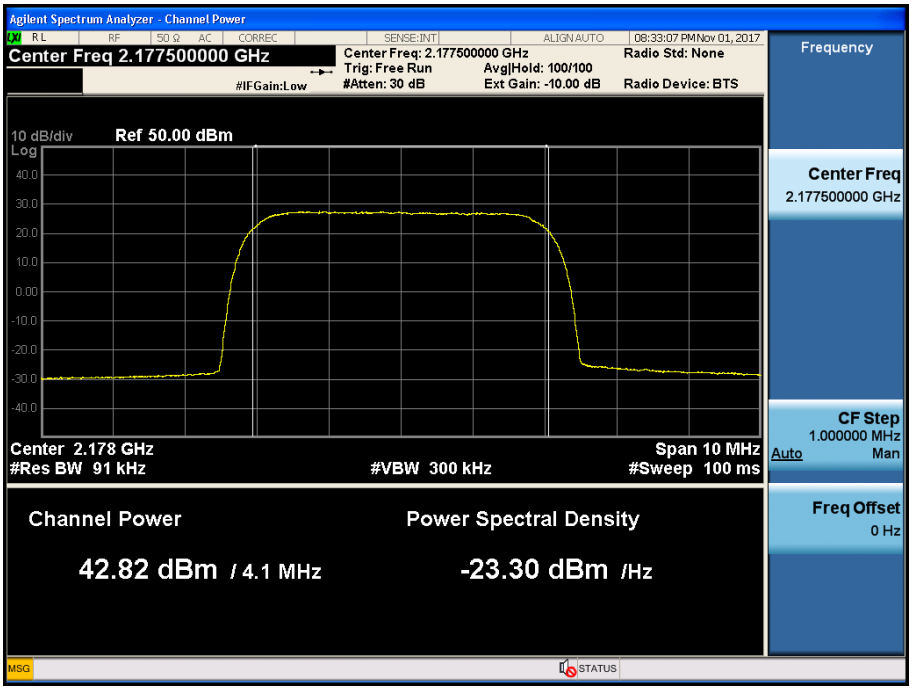
[+3 dB above AGC threshold Downlink Low]



[+3 dB above AGC threshold Downlink Middle]

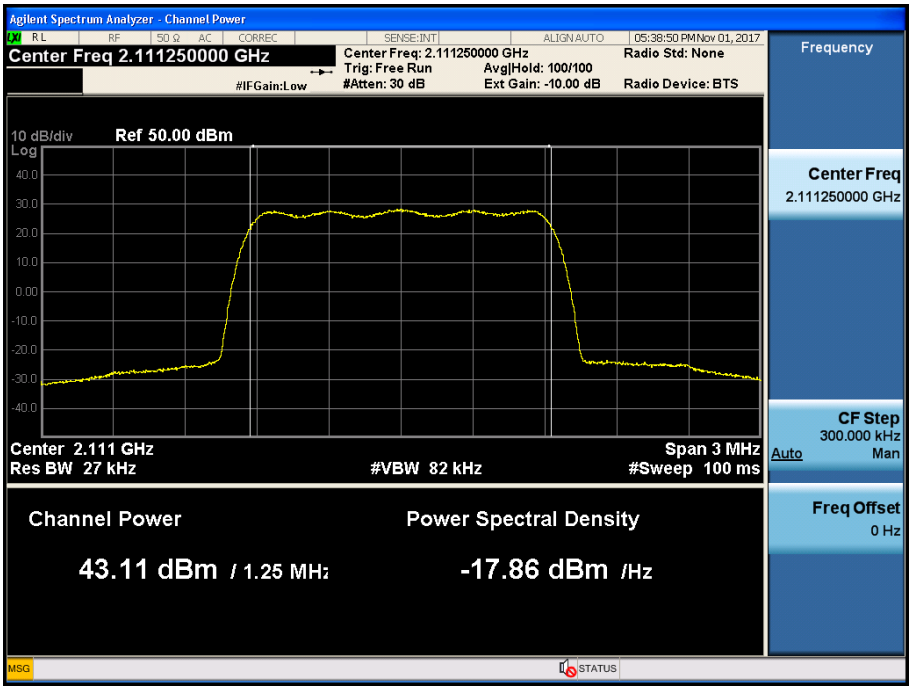


[+3 dB above AGC threshold Downlink High]

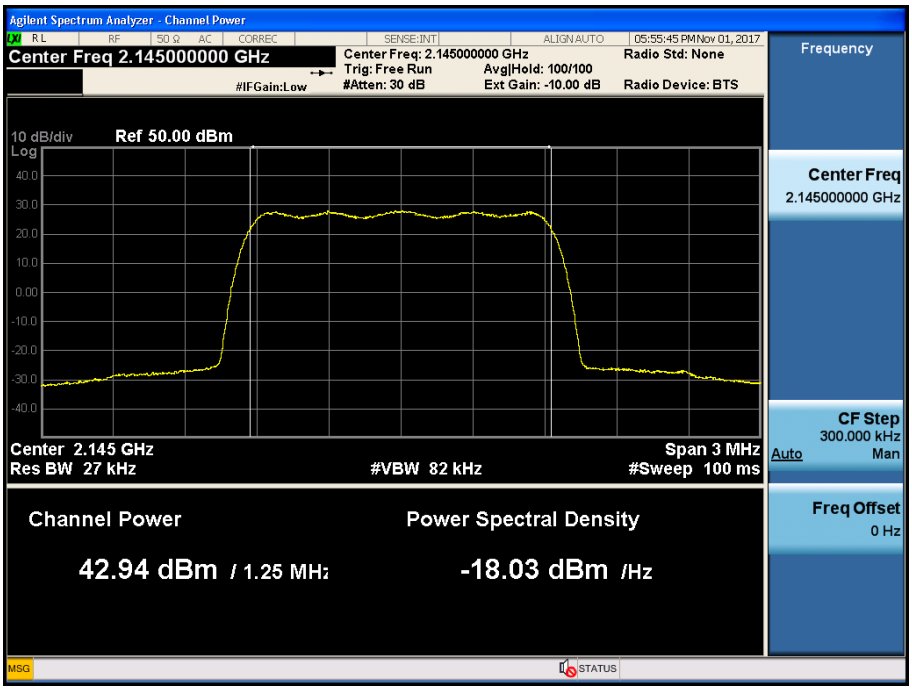


RF Output Power for AWS 2100_CDMA

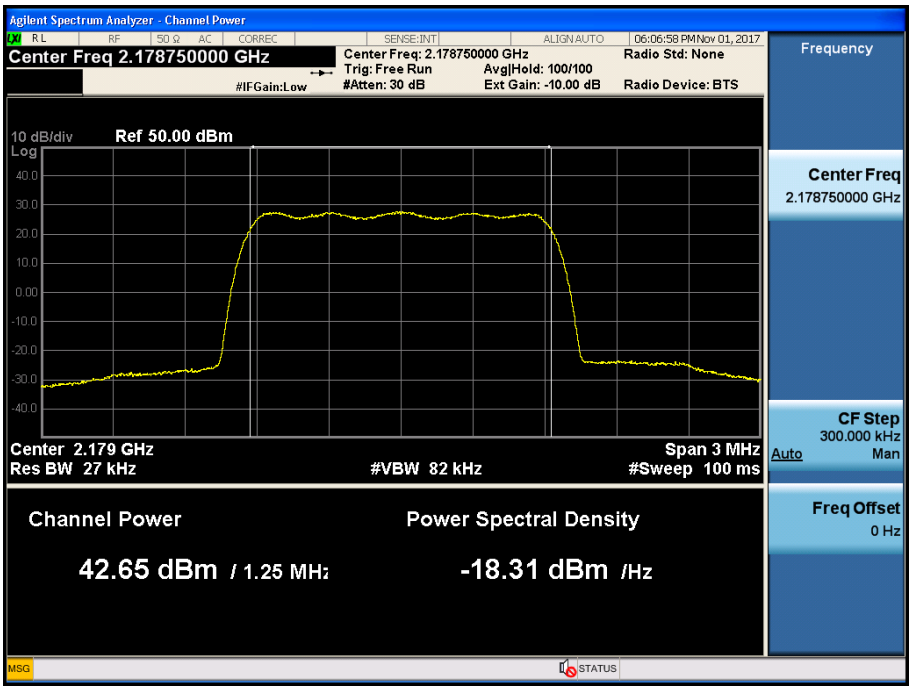
[AGC threshold Downlink Low]



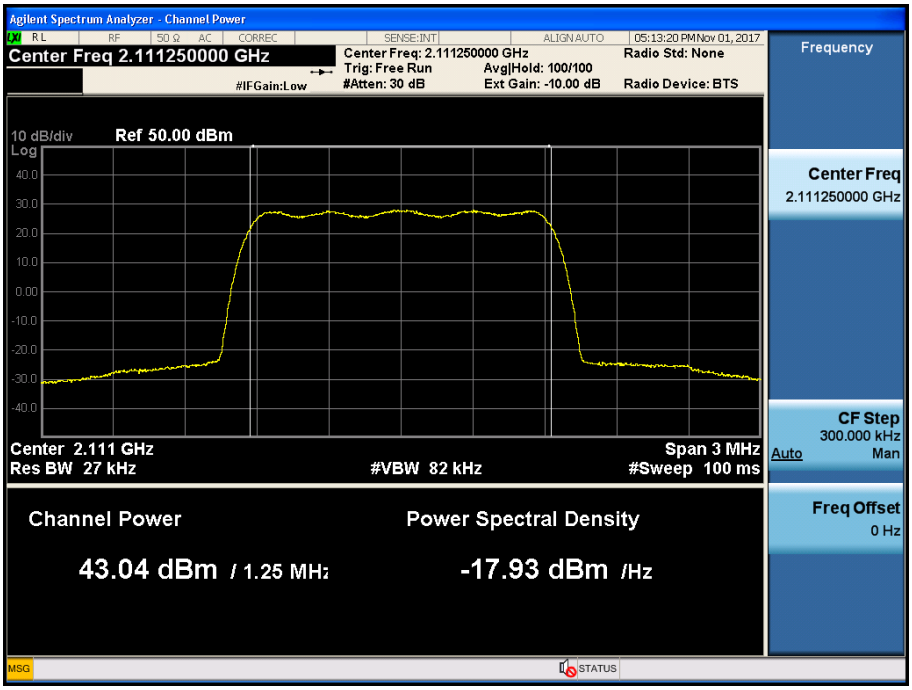
[AGC threshold Downlink Middle]



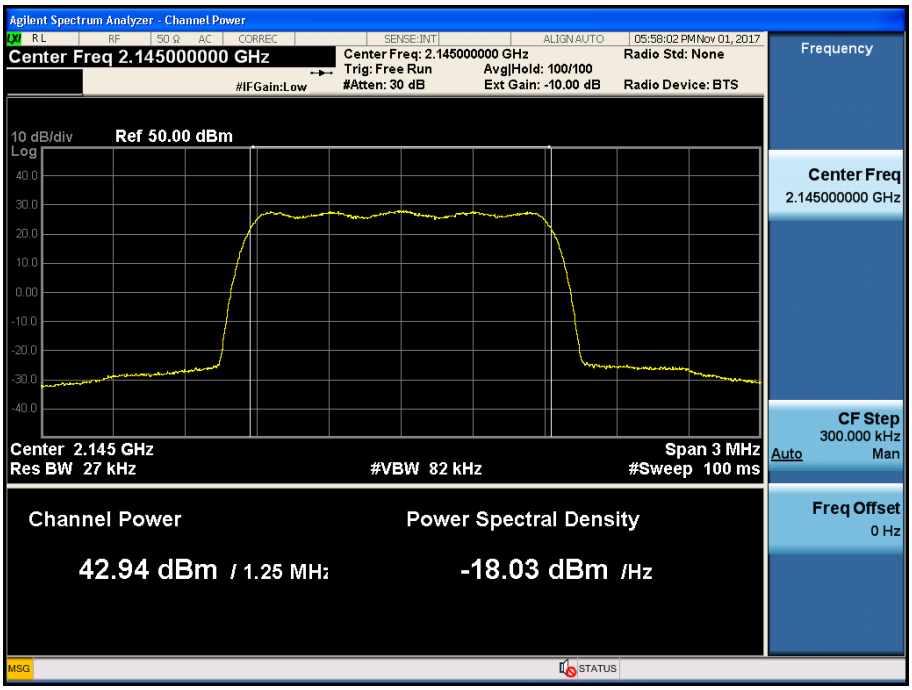
[AGC threshold Downlink High]



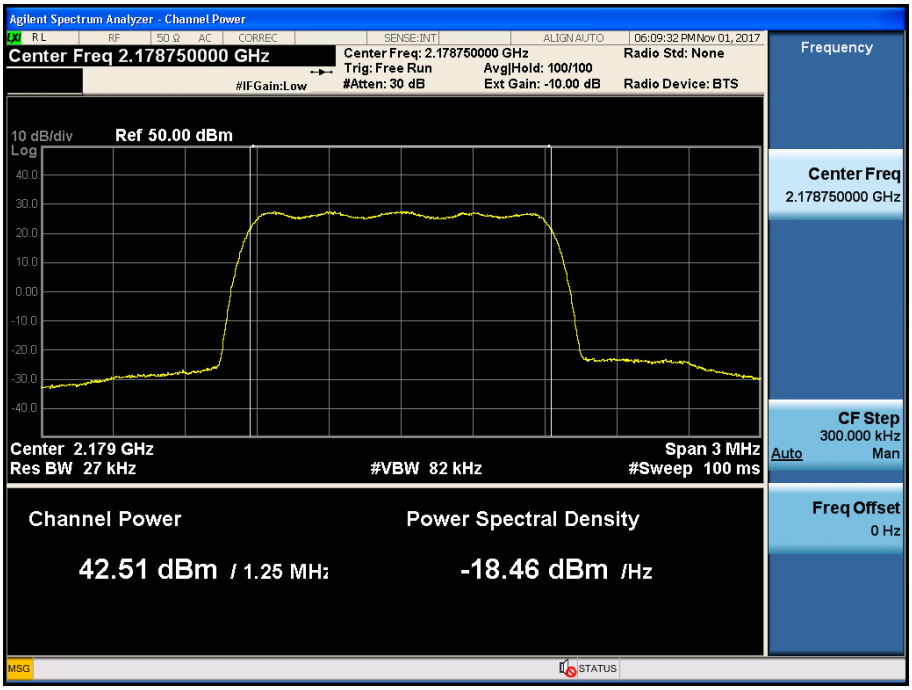
[+3 dB above AGC threshold Downlink Low]



[+3 dB above AGC threshold Downlink Middle]



[+3 dB above AGC threshold Downlink High]



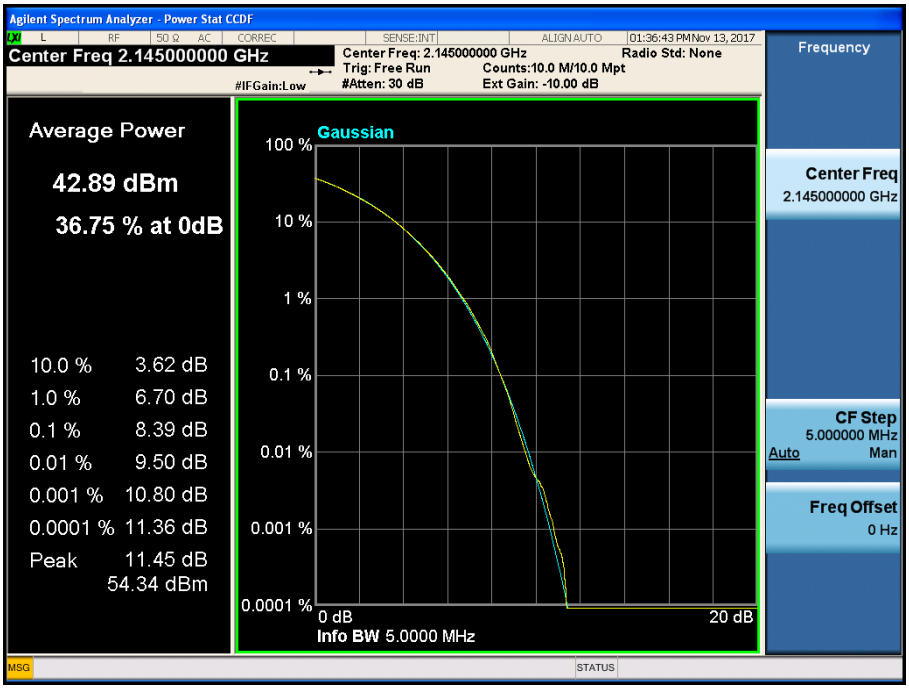
Peak-to-Average Ratio (PAR)

	Channel	Frequency (MHz)	PAR (dB)
LTE 5 MHz AGC threshold	Middle	2145.00	8.39
LTE 5 MHz +3 dB above the AGC threshold	Middle	2145.00	8.39
LTE 10 MHz AGC threshold	Middle	2145.00	8.38
LTE 10 MHz +3 dB above the AGC threshold	Middle	2145.00	8.38
WCDMA AGC threshold	Middle	2145.00	4.50
WCDMA +3 dB above the AGC threshold	Middle	2145.00	4.49
CDMA AGC threshold	Middle	2145.00	7.76
CDMA +3 dB above the AGC threshold	Middle	2145.00	7.76

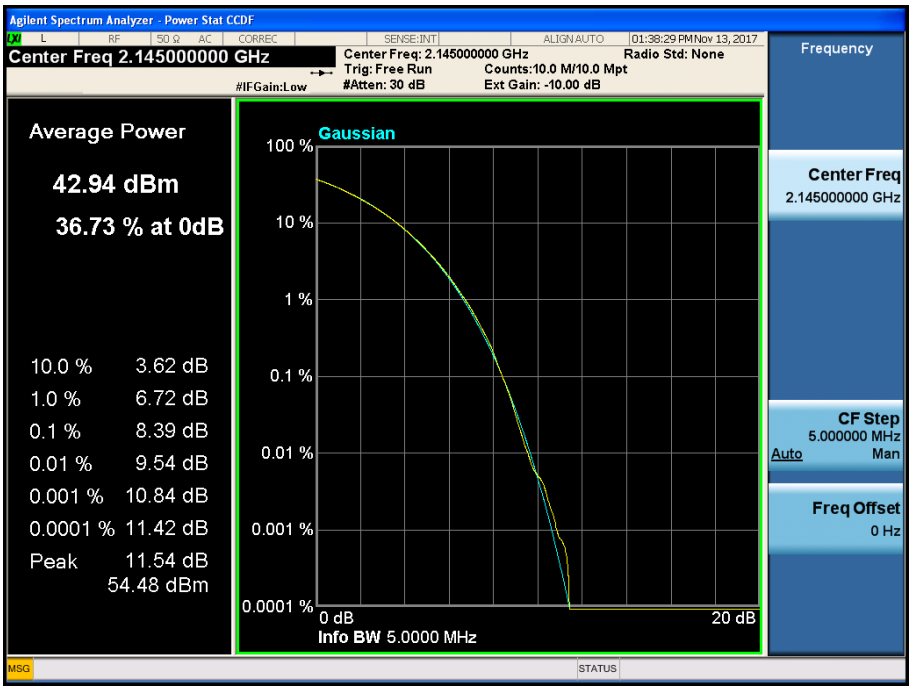
*Note: We have done CDMA and 1xEVDO modulation test in technology. Test results are only attached worst cases.

Plots of Peak-to-Average Ratio for AWS 2100_LTE 5MHz

[AGC threshold Downlink Middle]

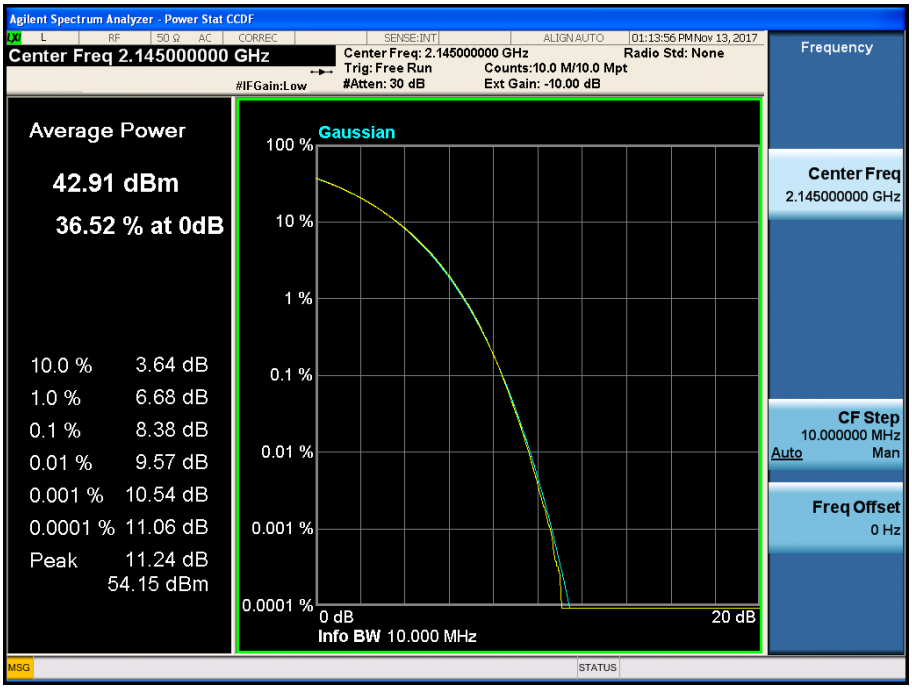


[+3 dB above AGC threshold Downlink Middle]

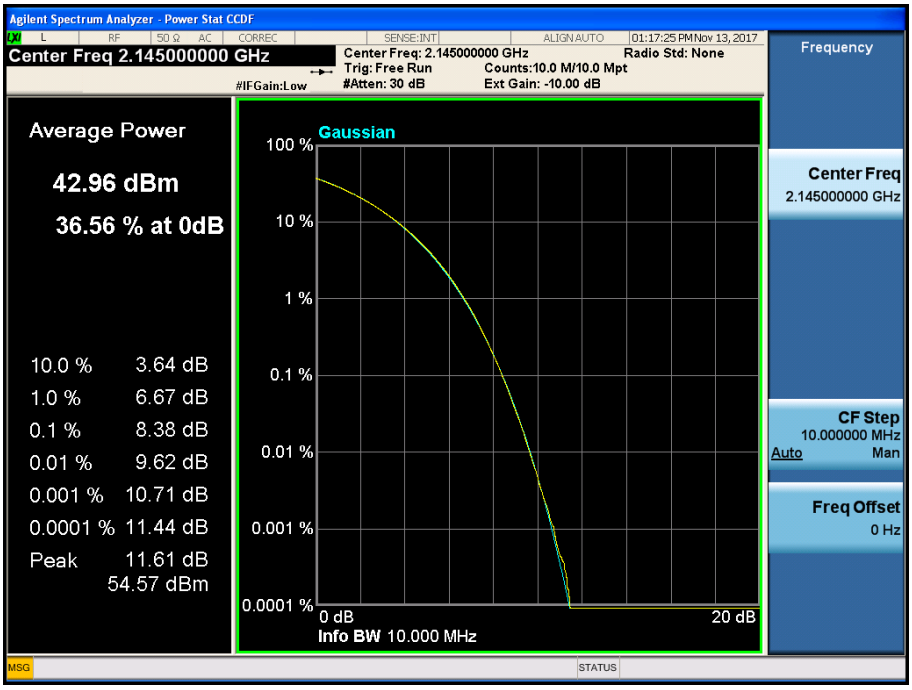


Plots of Peak-to-Average Ratio for AWS 2100_LTE 10MHz

[AGC threshold Downlink Middle]

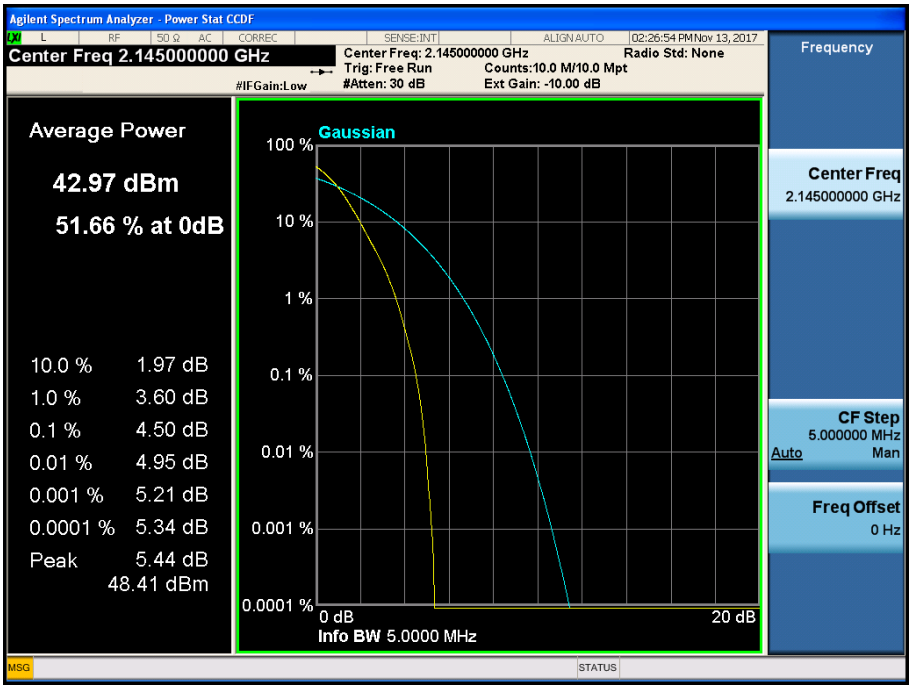


[+3 dB above AGC threshold Downlink Middle]

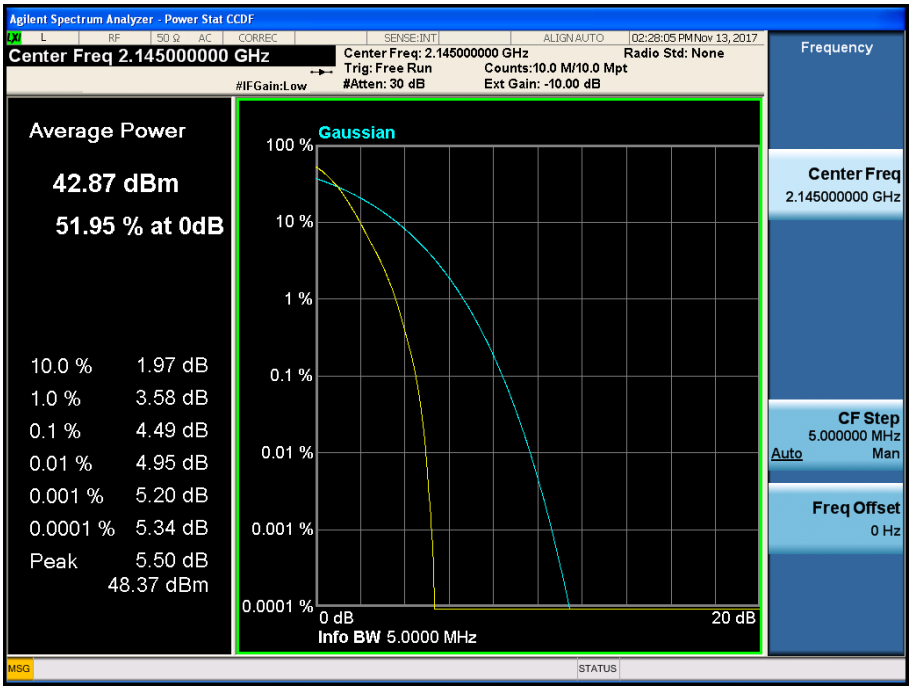


Plots of Peak-to-Average Ratio for AWS 2100_WCDMA

[AGC threshold Downlink Middle]

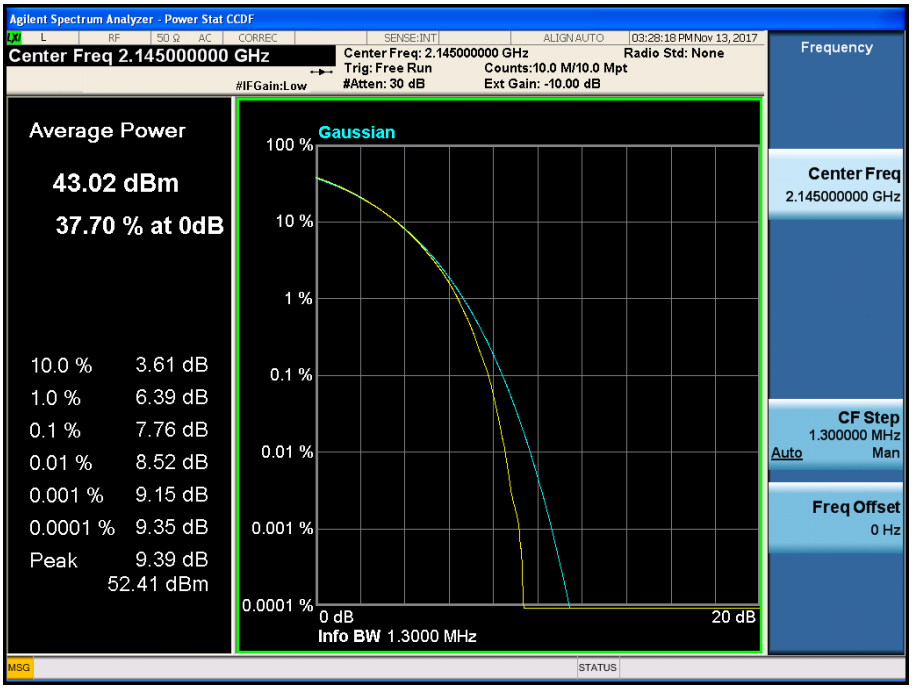


[+3 dB above AGC threshold Downlink Middle]

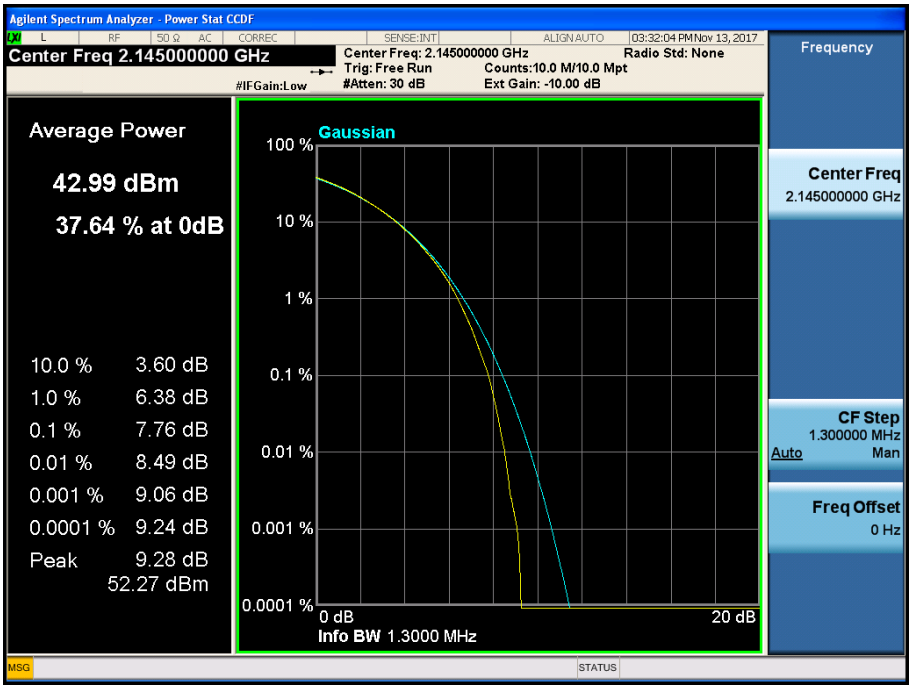


Plots of Peak-to-Average Ratio for AWS 2100_CDMA

[AGC threshold Downlink Middle]



[+3 dB above AGC threshold Downlink Middle]



7. OCCUPIED BANDWIDTH

FCC Rules

Test Requirements:

§ 2.1049 Measurements required: Occupied bandwidth:

The occupied bandwidth, that 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 shall be measured under the specified conditions of § 2.1049 (a) through (i) as applicable.

IC Rules

Test Requirements:

RSS-Gen

6 Technical Requirements

6.6 Occupied Bandwidth

When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99 % emission bandwidth, as calculated or measured.

Test Procedures:

Measurements were in accordance with the test methods section 3.4 of KDB 935210 D05 v01r02 and section 4.2 of KDB 971168 D01 v03.

Test is 99% OBW measured and used.

a) Connect a signal generator to the input of the EUT.

b) Configure the signal generator to transmit the AWGN signal.

c) Configure the signal amplitude to be just below the AGC threshold level (see 3.2), but not more than 0.5 dB below.

d) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation.

e) Set the spectrum analyzer center frequency to the center frequency of the operational band under test. The span range of the spectrum analyzer shall be between 2 times to 5 times the emission bandwidth (EBW) or alternatively, the OBW.

f) The nominal RBW shall be in the range of 1 % to 5 % of the anticipated OBW, and the VBW shall be $\geq 3 \times$ RBW.

g) Set the reference level of the instrument as required to preclude the signal from exceeding the maximum spectrum analyzer input mixer level for linear operation. In general, the peak of the spectral envelope must be more than [10 log (OBW / RBW)] below the reference level.

Steps f) and g) may require iteration to enable adjustments within the specified tolerances.

h) The noise floor of the spectrum analyzer at the selected RBW shall be at least 36 dB below

the reference level.

i) Set spectrum analyzer detection function to positive peak.

j) Set the trace mode to max hold.

k) Determine the reference value: Allow the trace to stabilize. Set the spectrum analyzer marker to the highest amplitude level of the displayed trace (this is the reference value) and record the associated frequency as f0.

l) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the −26 dB down amplitude. The 26 dB EBW (alternatively OBW) is the positive frequency difference between the two markers. If the spectral envelope crosses the −26 dB down amplitude at multiple points, the lowest or highest frequency shall be selected as the frequencies that are the furthest removed from the center frequency at which the spectral envelope crosses the −26 dB down amplitude point.

m) Repeat steps e) to l) with the input signal connected directly to the spectrum analyzer (i.e., input signal measurement).

n) Compare the spectral plot of the input signal (determined from step m) to the output signal (determined from step l) to affirm that they are similar (in passband and rolloff characteristic features and relative spectral locations), and include plot(s) and descriptions in test report.

o) Repeat the procedure [steps e) to n)] with the input signal amplitude set to 3 dB above the AGC threshold.

p) Repeat steps e) to o) with the signal generator set to the narrowband signal.

q) Repeat steps e) to p) for all frequency bands authorized for use by the EUT.

RSS-Gen

6 Technical Requirements

6.6 Occupied Bandwidth

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3×RBW.

Note: Video averaging is not permitted.

A peak, or peak hold, may be used in place of the sampling detector as this may produce a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold may be necessary to determine the occupied bandwidth if the device is not transmitting continuously.

The trace data points are recovered and are directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum

until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded.
The difference between the two recorded frequencies is the 99% occupied bandwidth.

Test Results:

[Downlink Output]

	Channel	Frequency (MHz)	OBW (MHz)
LTE 5 MHz AGC threshold	Low	2112.50	4.5048
	Middle	2145.00	4.5109
	High	2177.50	4.5148
LTE 5 MHz +3 dB above the AGC threshold	Low	2112.50	4.5094
	Middle	2145.00	4.5113
	High	2177.50	4.5140
LTE 10 MHz AGC threshold	Low	2115.00	8.9846
	Middle	2145.00	8.9944
	High	2175.00	9.0003
LTE 10 MHz +3 dB above the AGC threshold	Low	2115.00	8.9883
	Middle	2145.00	8.9881
	High	2175.00	8.9996
WCDMA AGC threshold	Low	2112.50	4.1779
	Middle	2145.00	4.1743
	High	2177.50	4.1785
WCDMA +3 dB above the AGC threshold	Low	2112.50	4.1754
	Middle	2145.00	4.1814
	High	2177.50	4.1831

	Channel	Frequency (MHz)	OBW (MHz)
CDMA AGC threshold	Low	2111.25	1.2629
	Middle	2145.00	1.2623
	High	2178.75	1.2668
CDMA +3 dB above the AGC threshold	Low	2111.25	1.2658
	Middle	2145.00	1.2624
	High	2178.75	1.2581

*Note: We have done CDMA and 1xEVDO modulation test in technology. Test results are only attached worst cases.

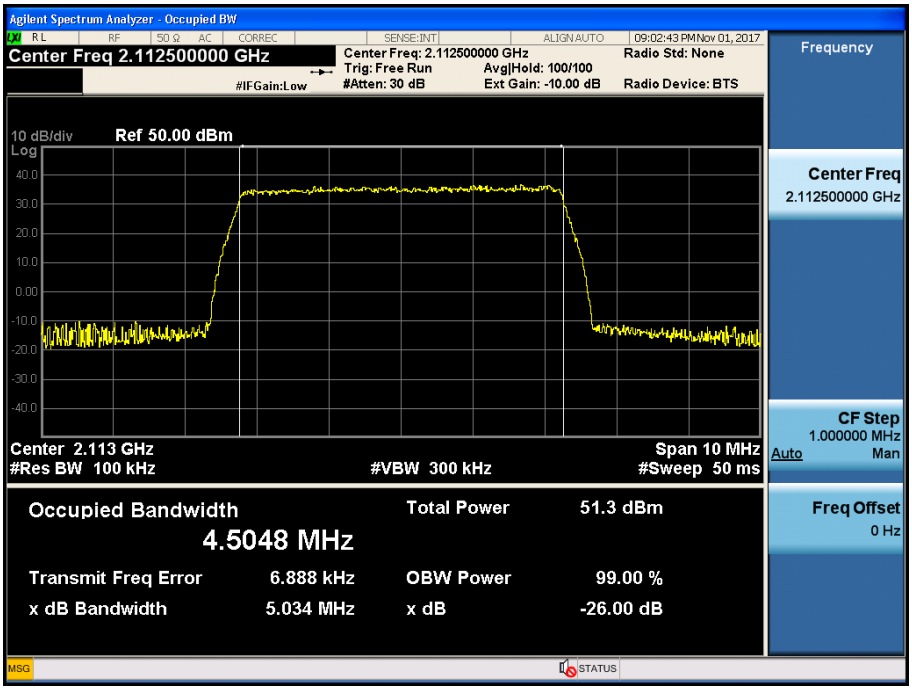
[Downlink Input]

	Channel	Frequency (MHz)	OBW (MHz)
LTE 5 MHz AGC threshold	Low	2112.50	4.5131
	Middle	2145.00	4.5098
	High	2177.50	4.5116
LTE 10 MHz AGC threshold	Low	2115.00	8.9999
	Middle	2145.00	9.0100
	High	2175.00	8.9966
WCDMA AGC threshold	Low	2112.50	4.1852
	Middle	2145.00	4.1758
	High	2177.50	4.1845
CDMA AGC threshold	Low	2111.25	1.2602
	Middle	2145.00	1.2667
	High	2178.75	1.2628

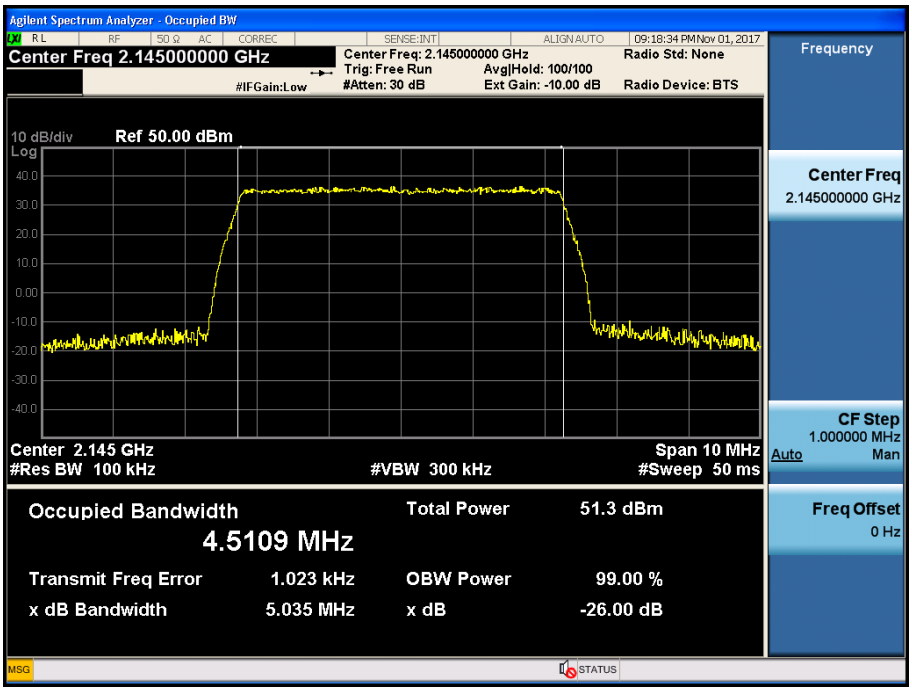
*Note: We have done CDMA and 1xEVDO modulation test in technology. Test results are only attached worst cases.

Occupied Bandwidth for AWS 2100_LTE 5 MHz

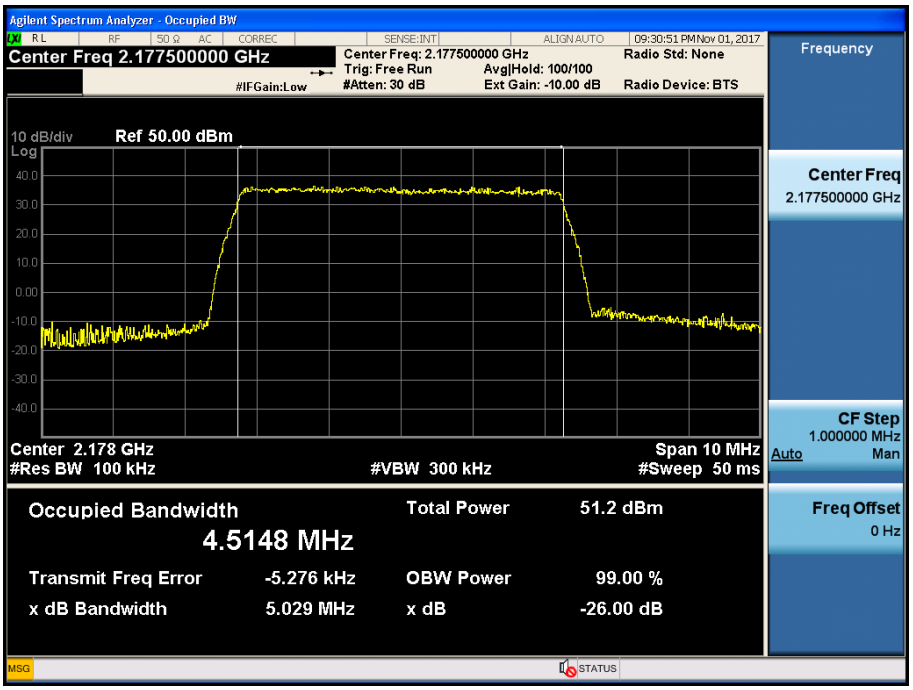
[AGC threshold Output Downlink Low]



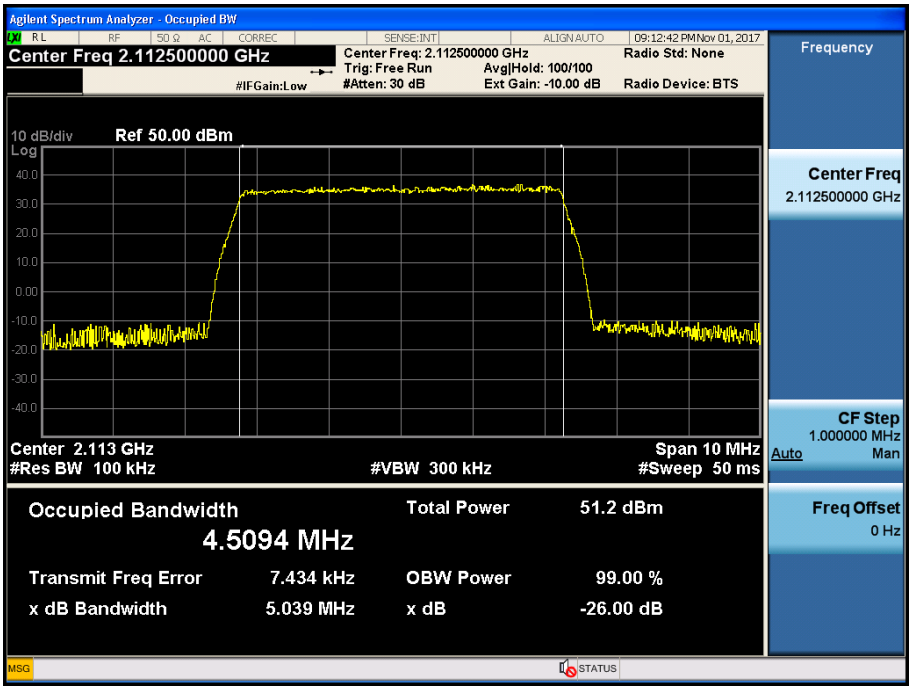
[AGC threshold Output Downlink Middle]



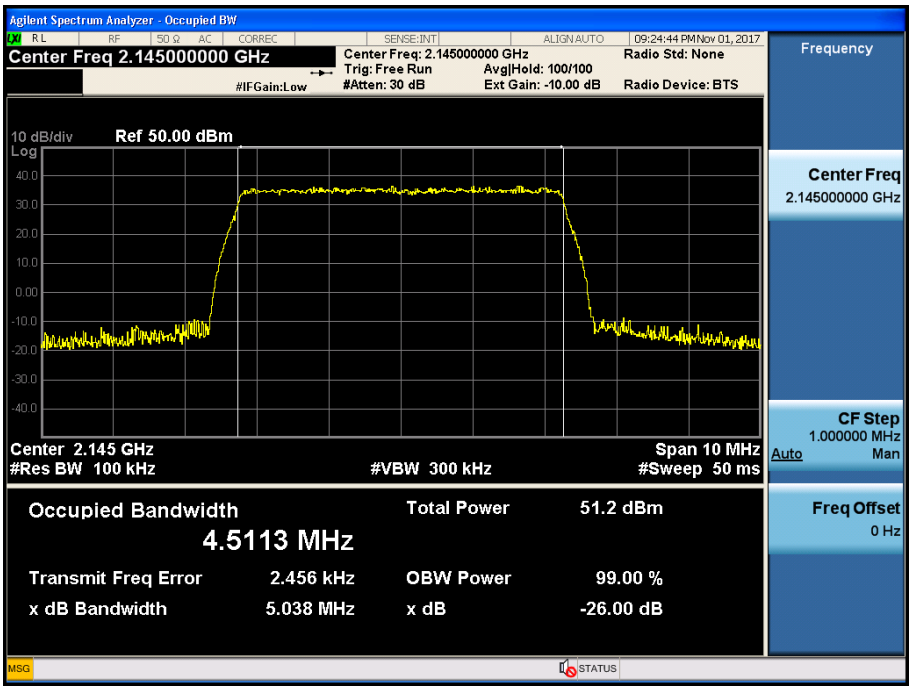
[AGC threshold Output Downlink High]



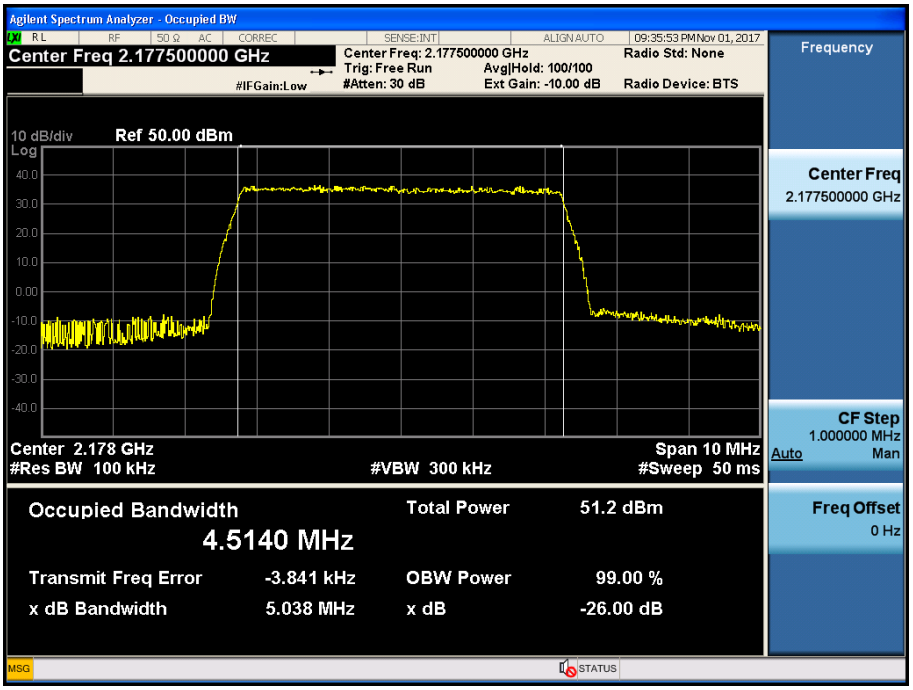
[+3 dB above AGC threshold Output Downlink Low]



[+3 dB above AGC threshold Output Downlink Middle]

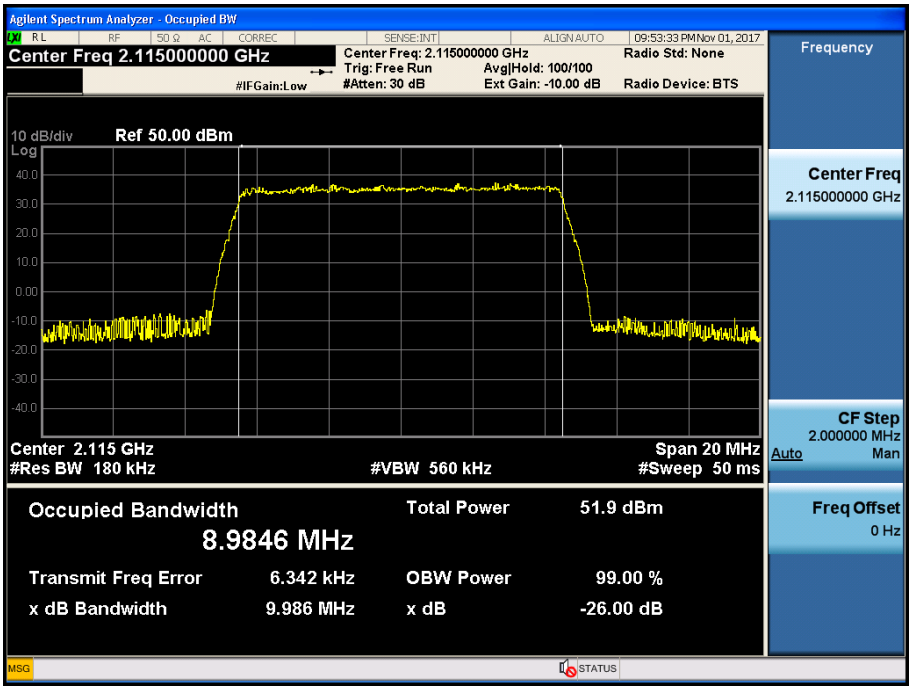


[+3 dB above AGC threshold Output Downlink High]

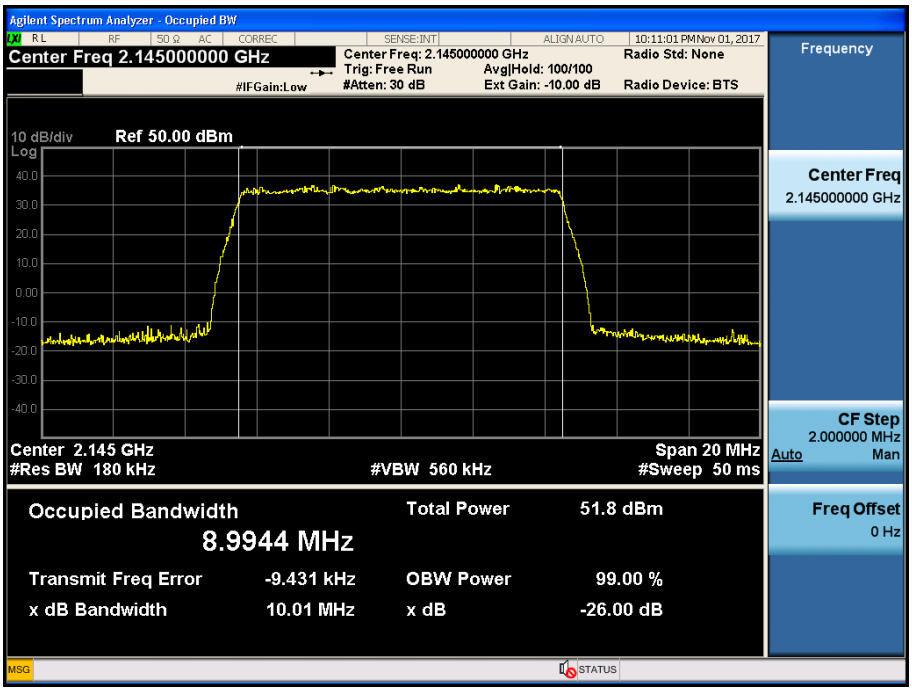


Occupied Bandwidth for AWS 2100_LTE 10 MHz

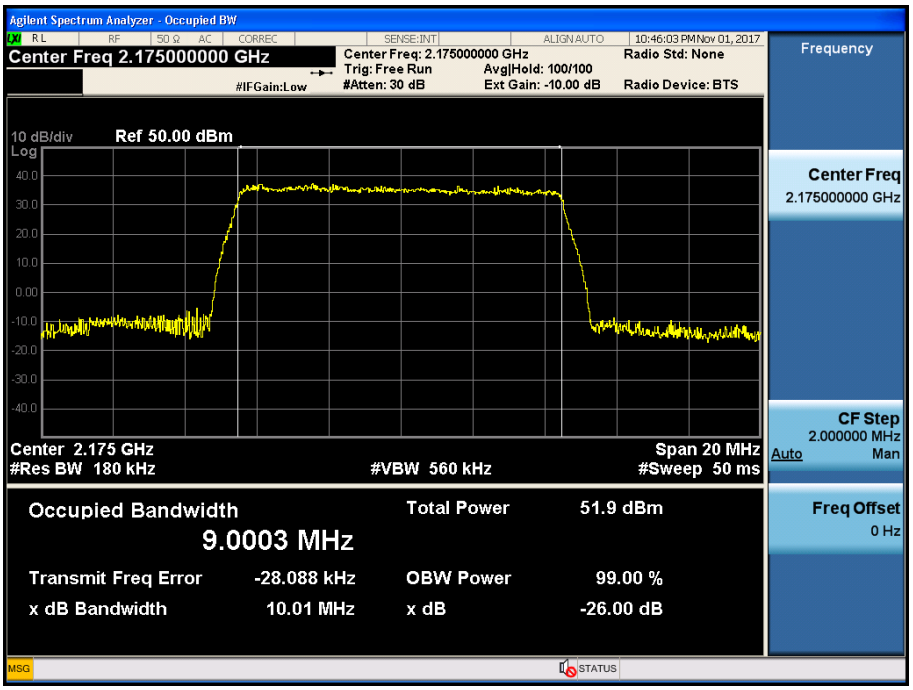
[AGC threshold Output Downlink Low]



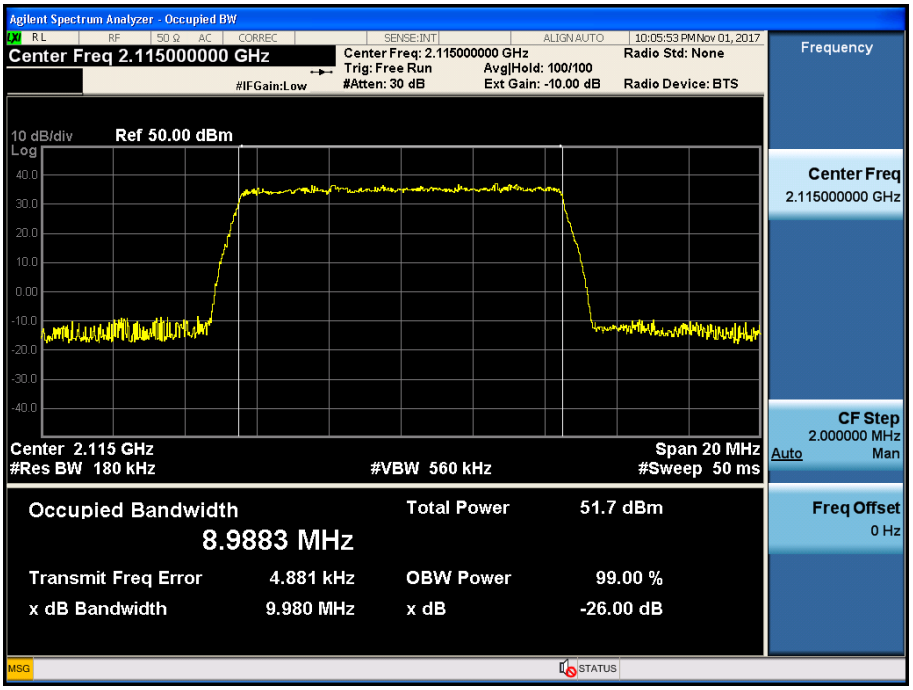
[AGC threshold Output Downlink Middle]



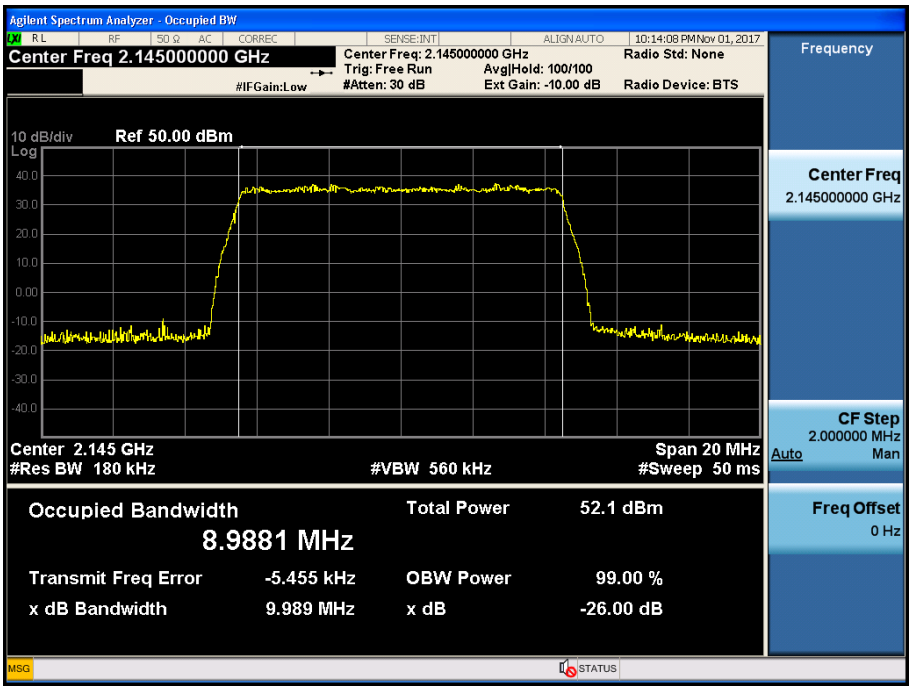
[AGC threshold Output Downlink High]



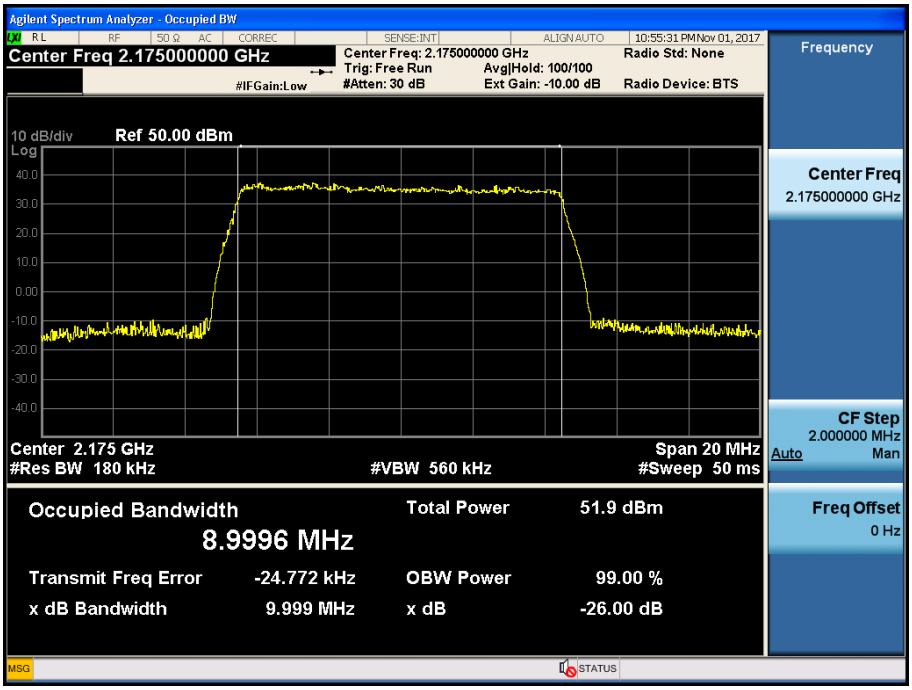
[+3 dB above AGC threshold Output Downlink Low]



[+3 dB above AGC threshold Output Downlink Middle]

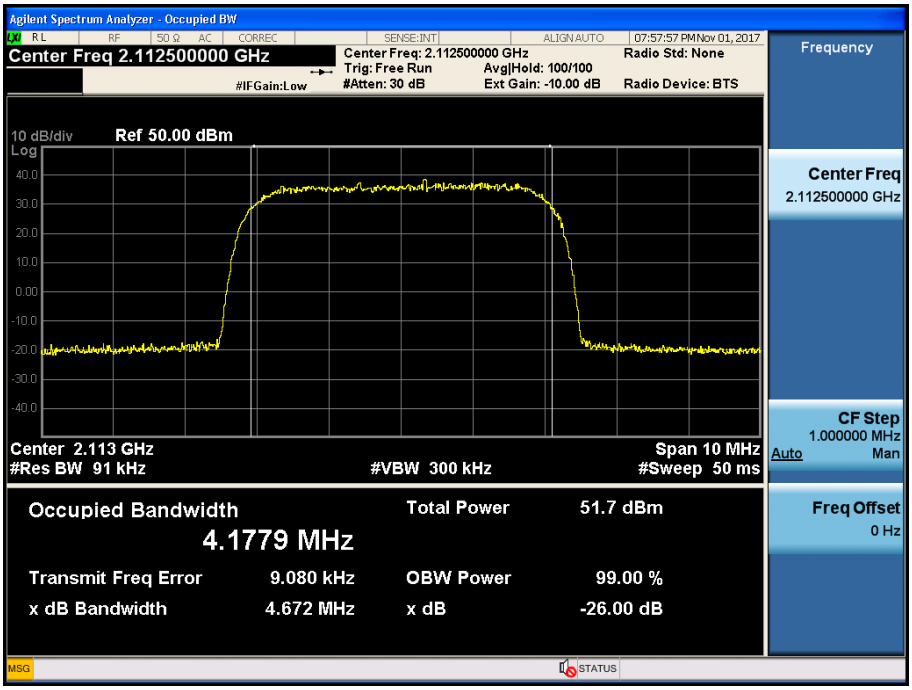


[+3 dB above AGC threshold Output Downlink High]

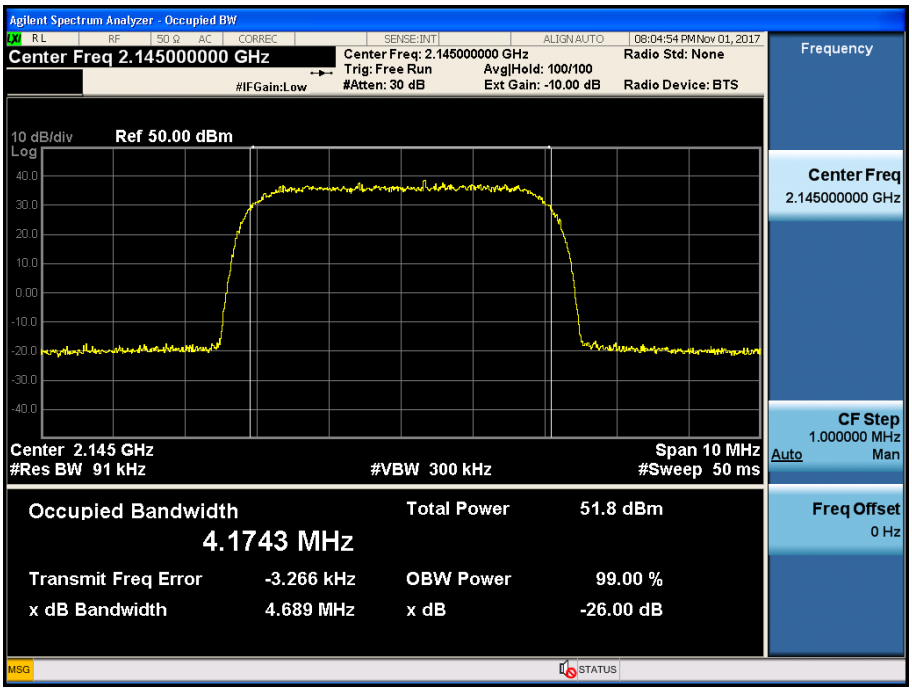


Occupied Bandwidth for AWS 2100_WCDMA

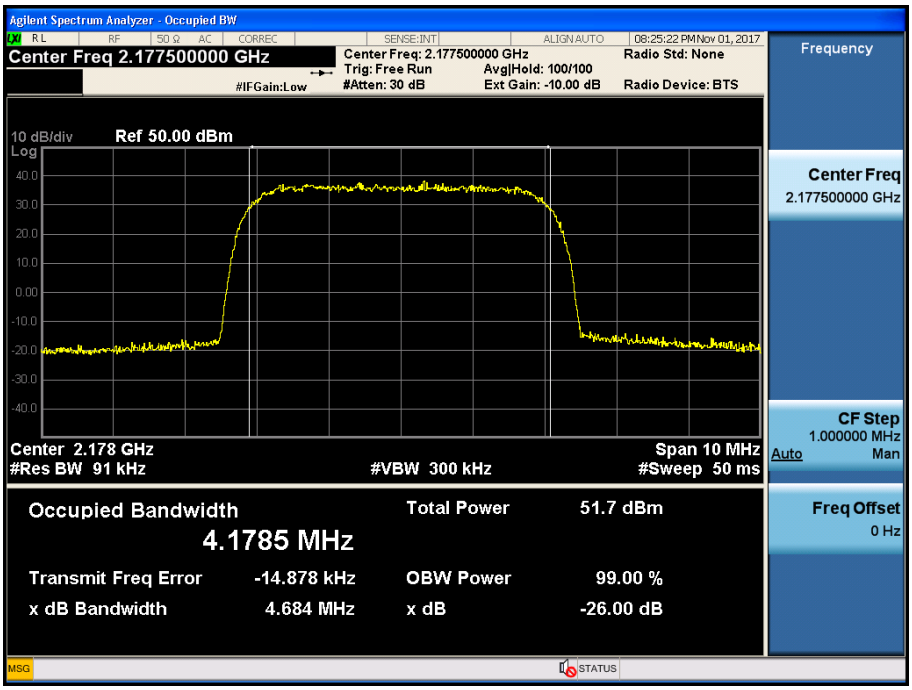
[AGC threshold Output Downlink Low]



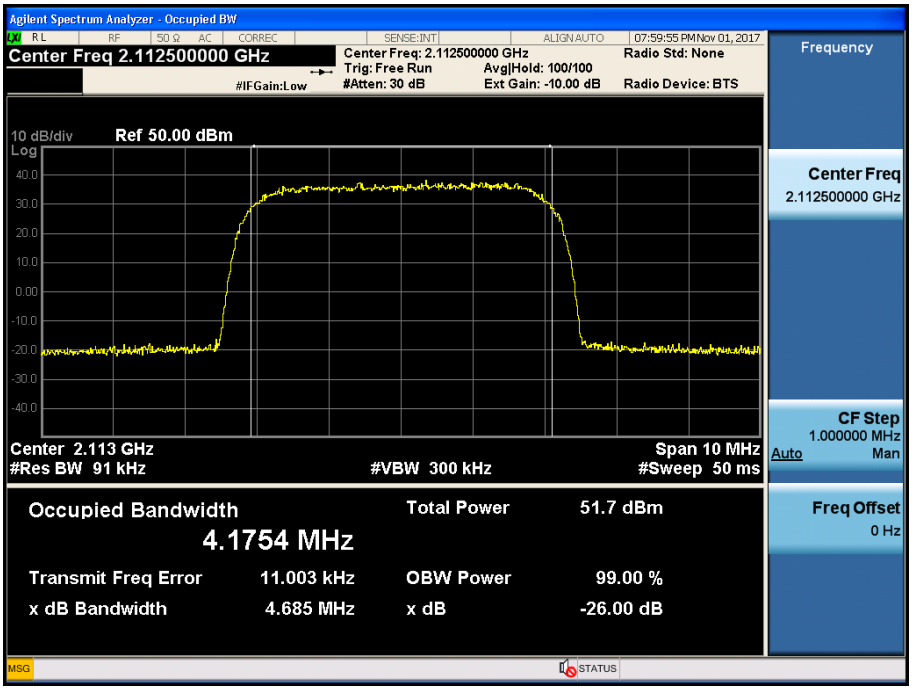
[AGC threshold Output Downlink Middle]



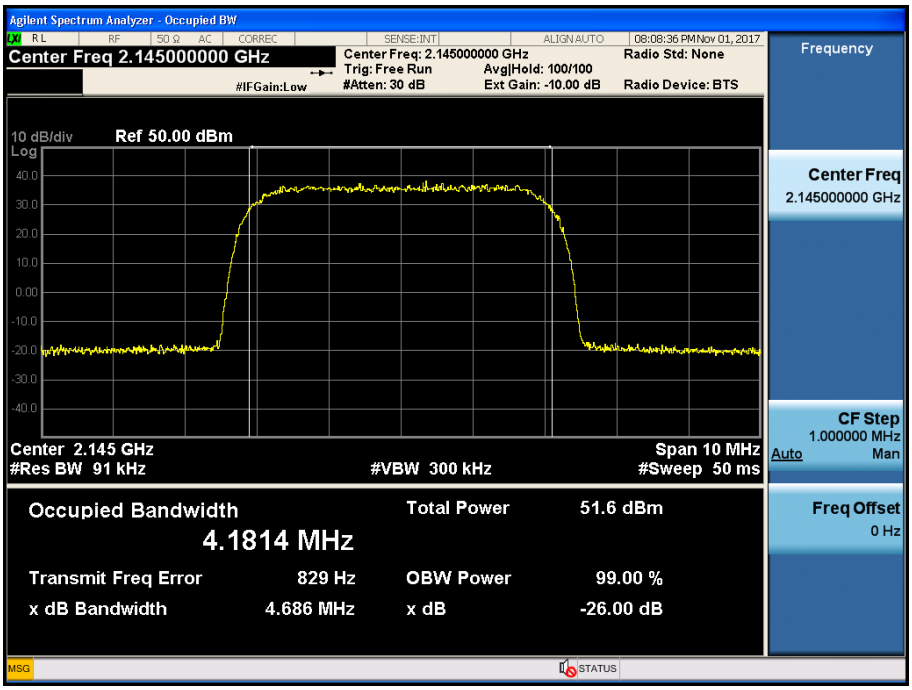
[AGC threshold Output Downlink High]



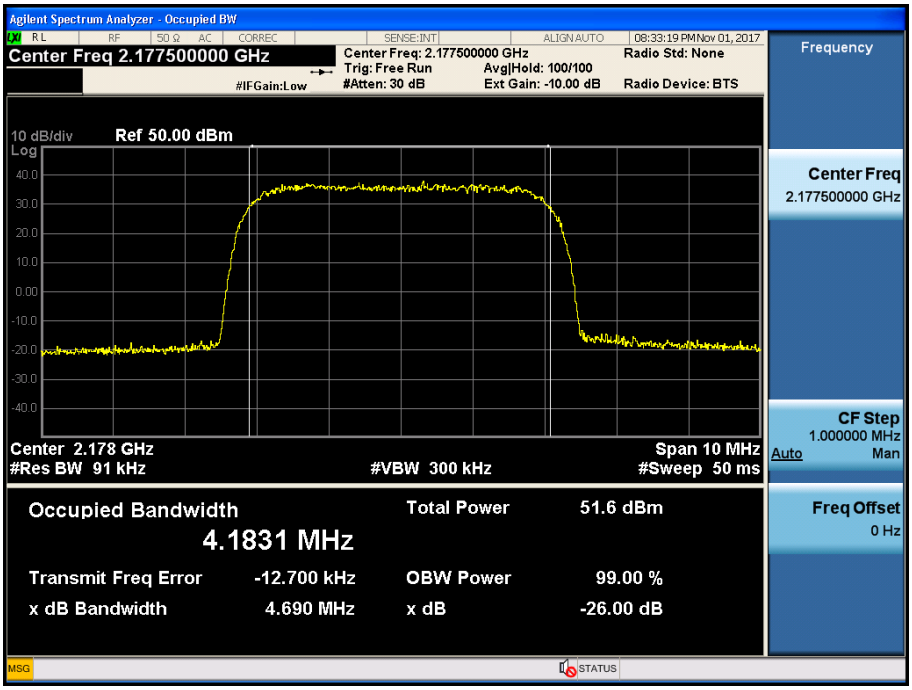
[+3 dB above AGC threshold Output Downlink Low]



[+3 dB above AGC threshold Output Downlink Middle]

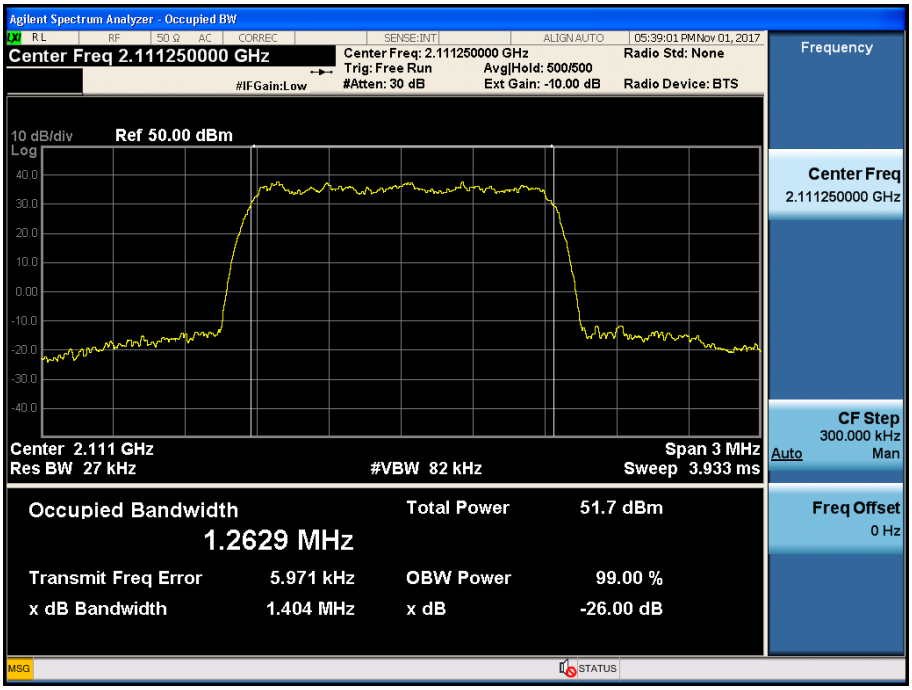


[+3 dB above AGC threshold Output Downlink High]

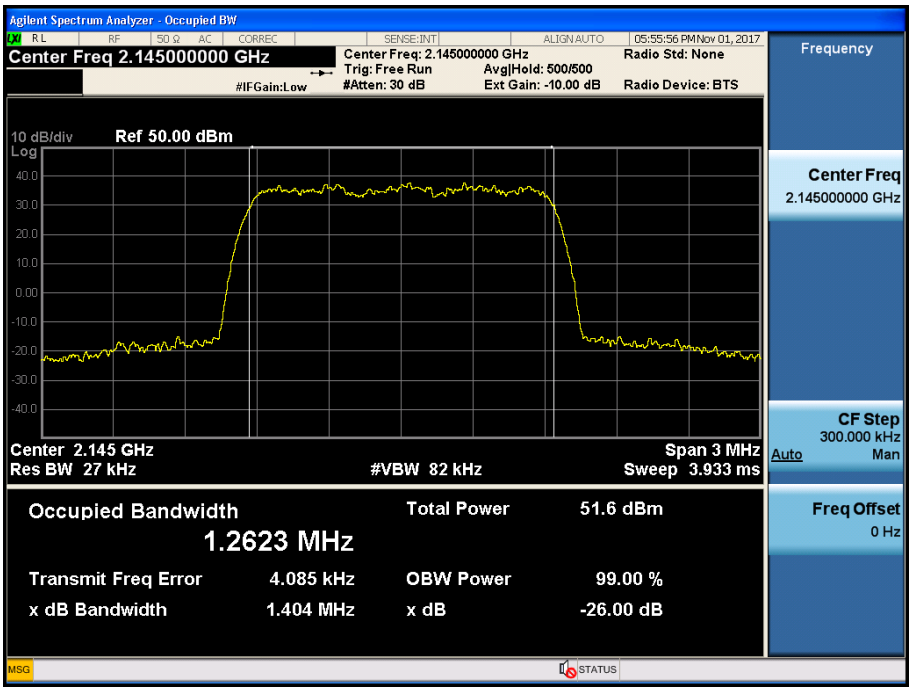


Occupied Bandwidth for AWS 2100_CDMA

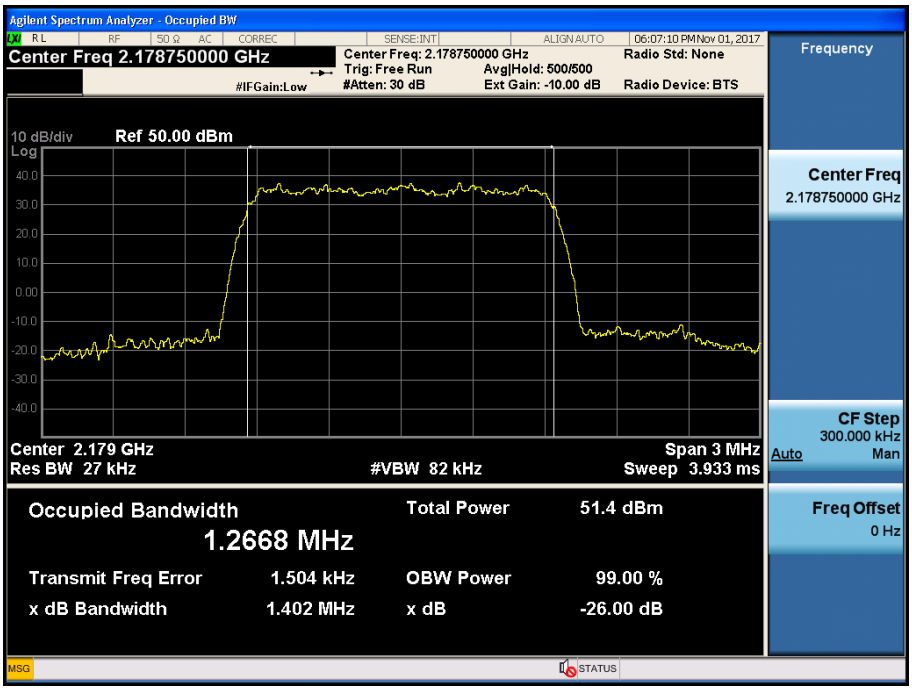
[AGC threshold Output Downlink Low]



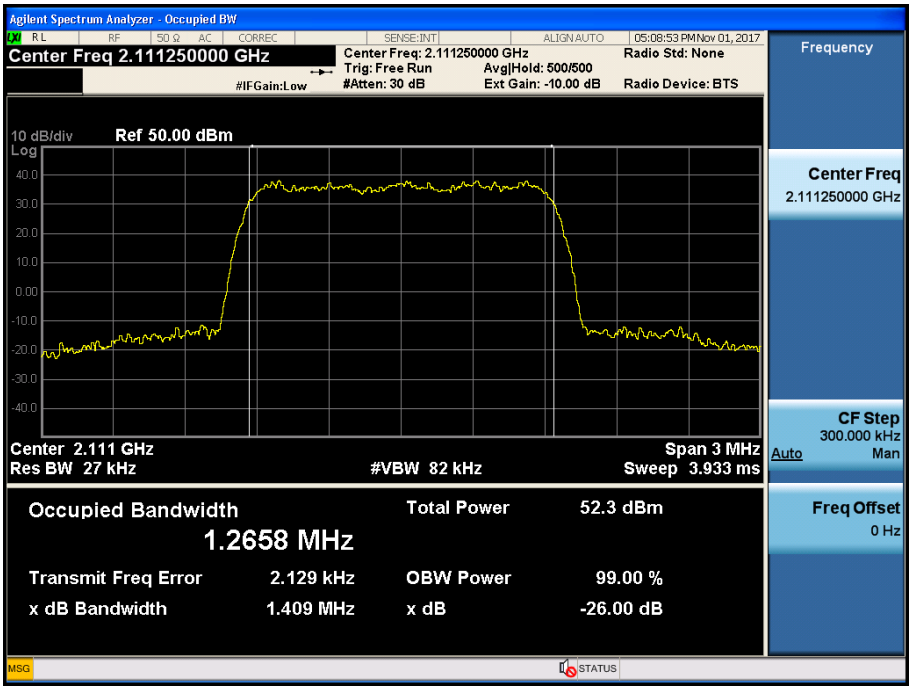
[AGC threshold Output Downlink Middle]



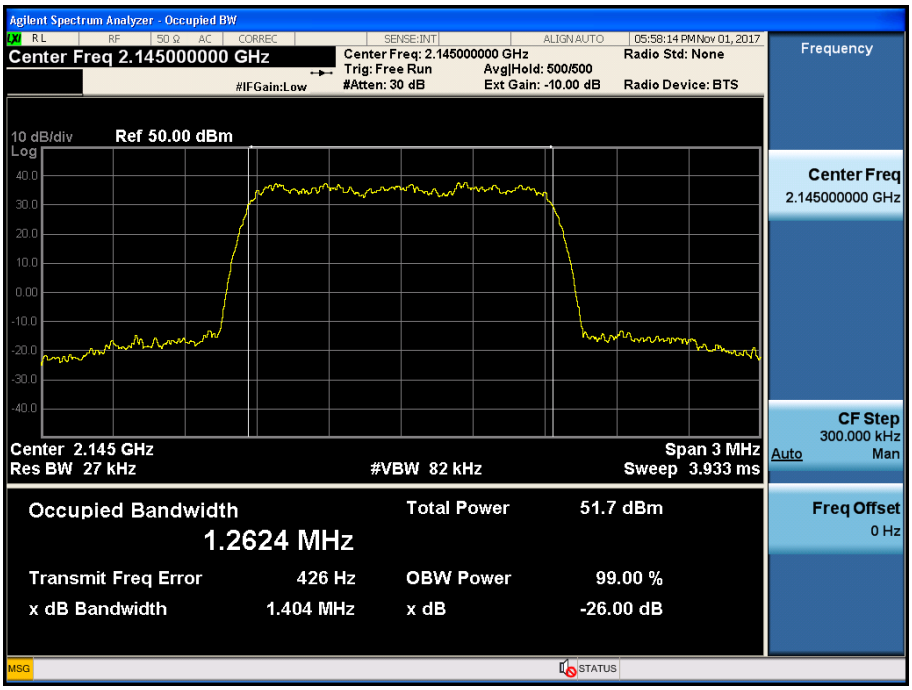
[AGC threshold Output Downlink High]



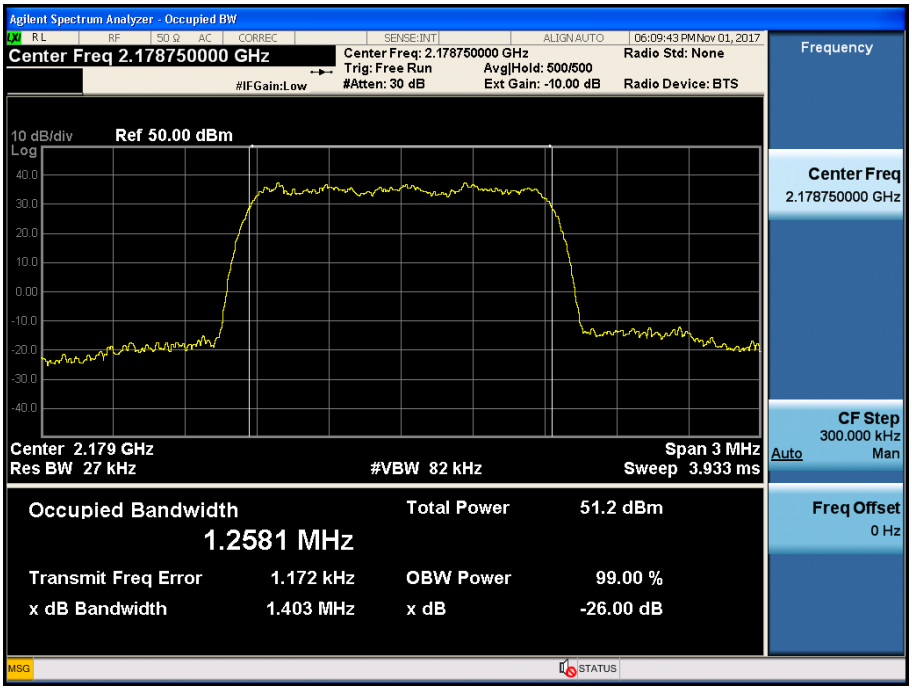
[+3 dB above AGC threshold Output Downlink Low]



[+3 dB above AGC threshold Output Downlink Middle]

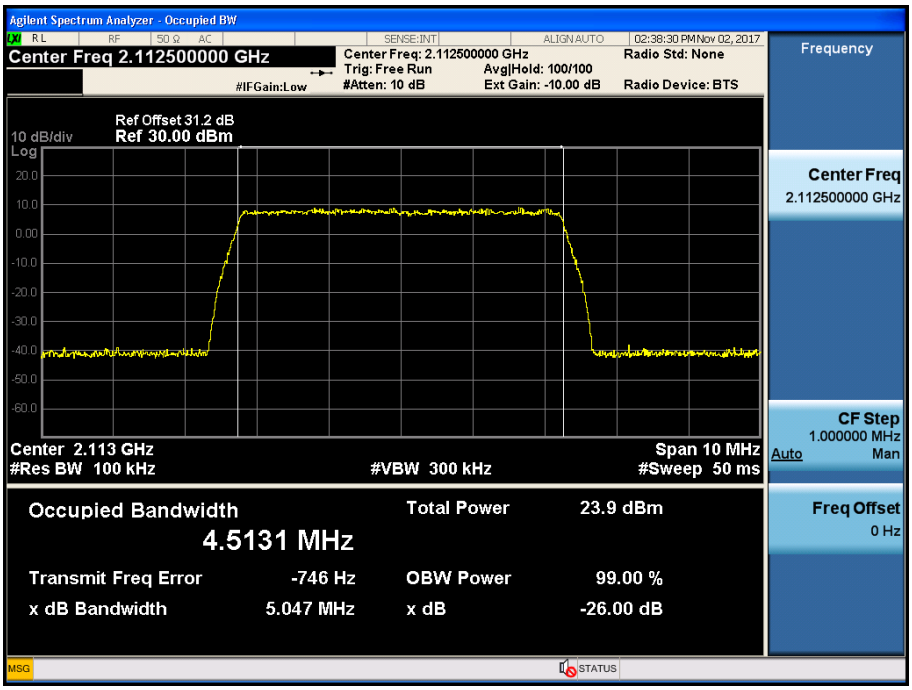


[+3 dB above AGC threshold Output Downlink High]

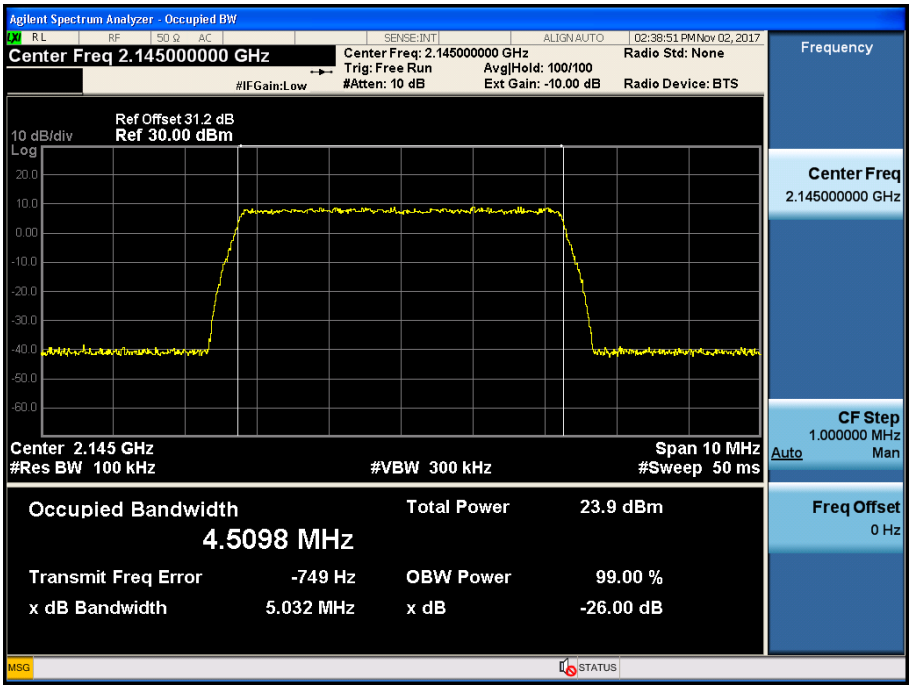


Occupied Bandwidth for AWS 2100_LTE 5 MHz

[AGC threshold Input Downlink Low]



[AGC threshold Input Downlink Middle]



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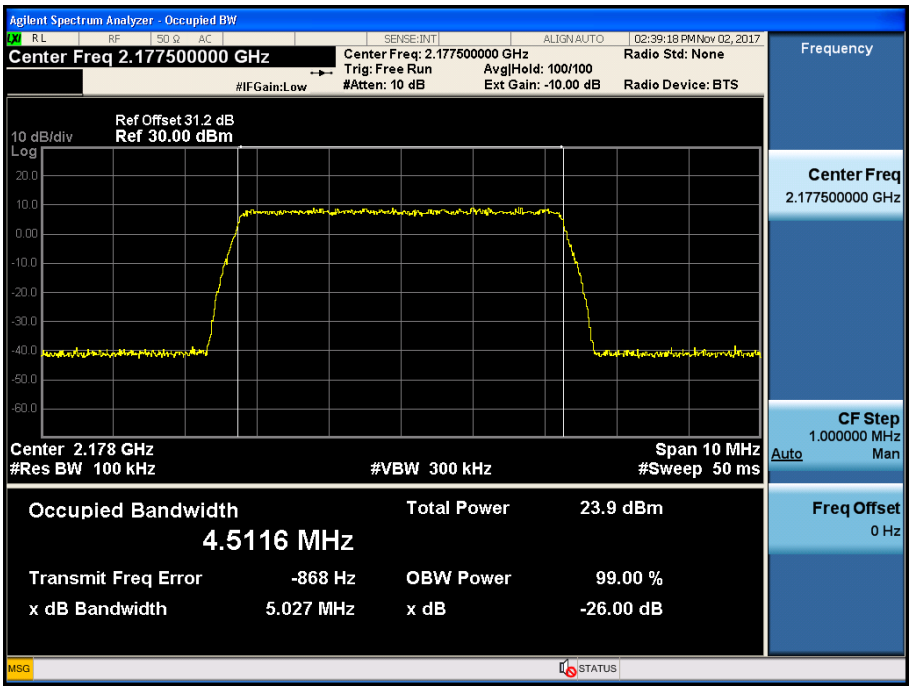
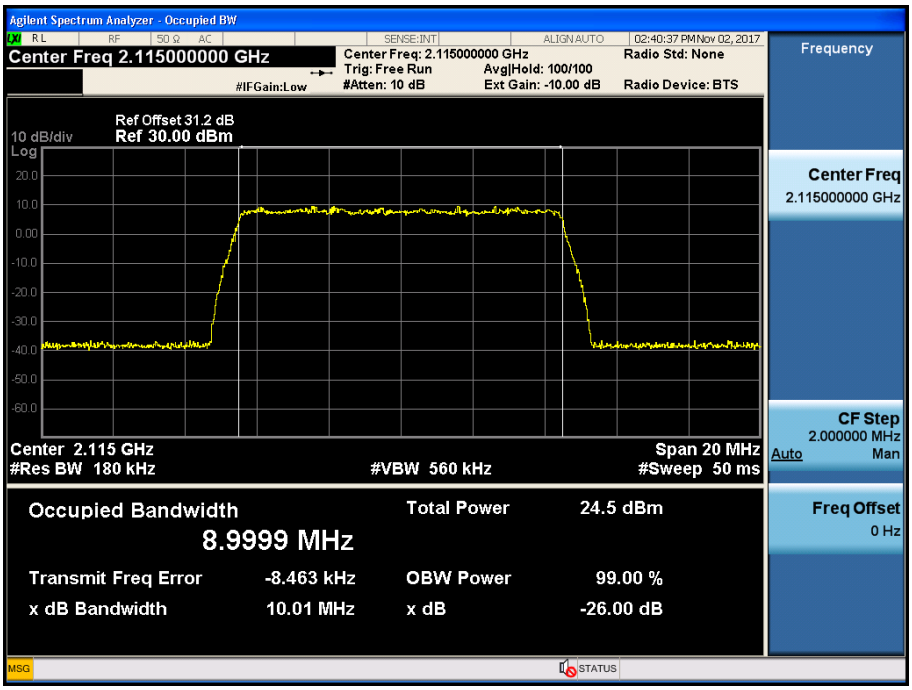
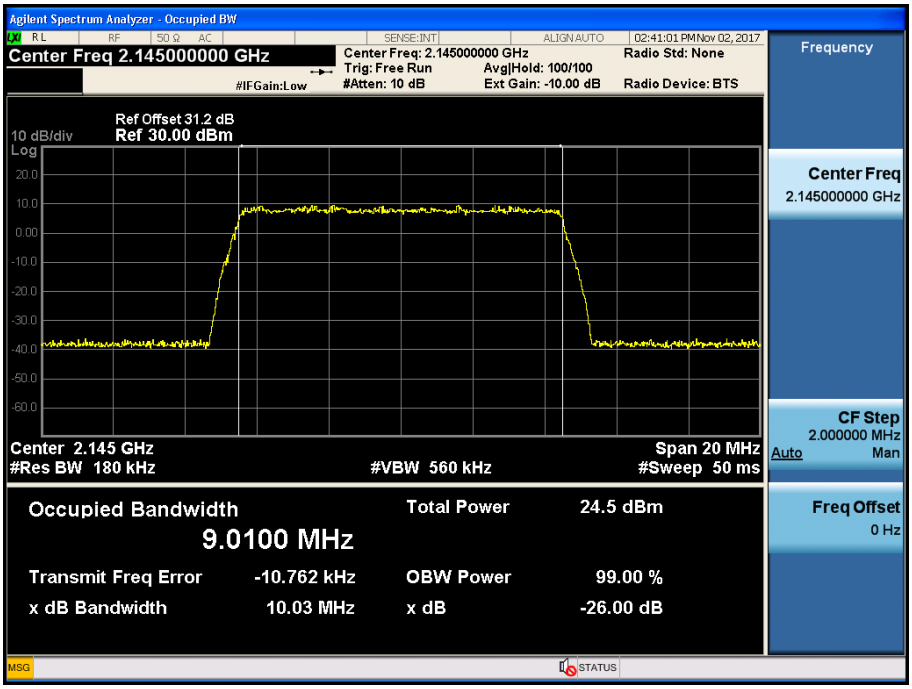


Occupied Bandwidth for AWS 2100_LTE 10 MHz

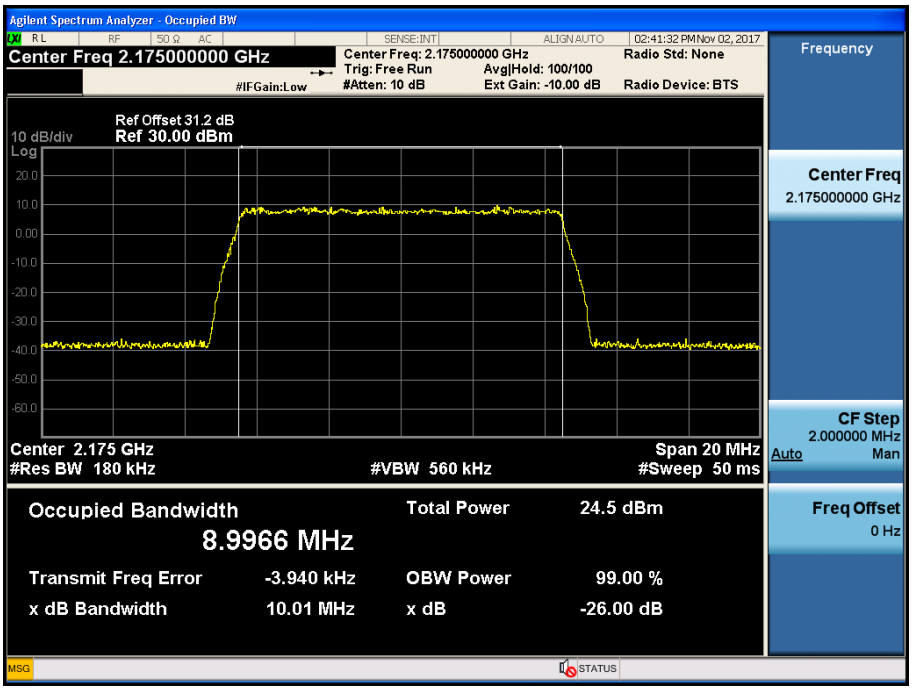
[AGC threshold Input Downlink Low]



[AGC threshold Input Downlink Middle]

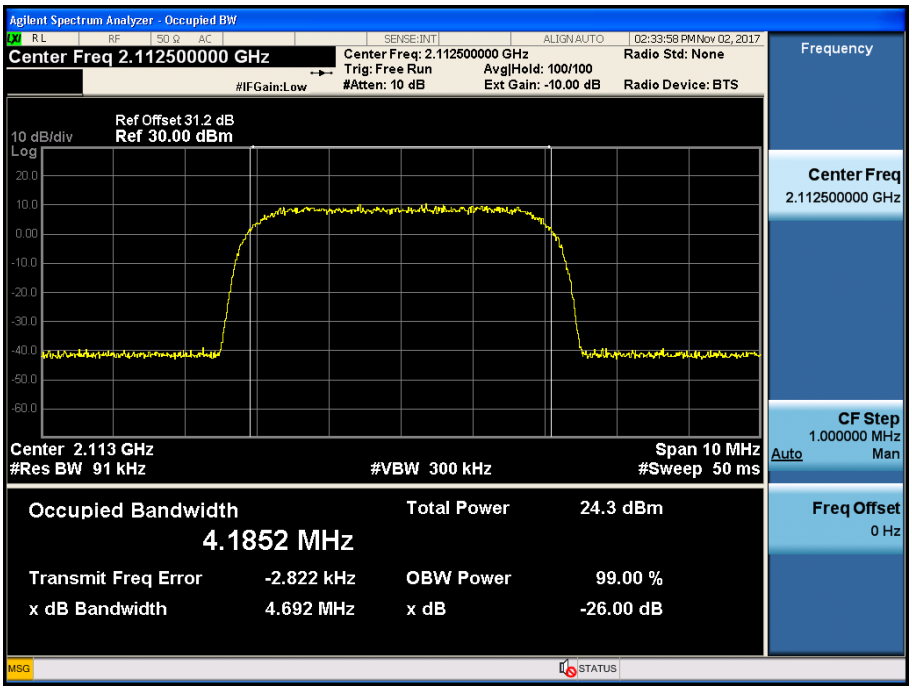


[AGC threshold Input Downlink High]

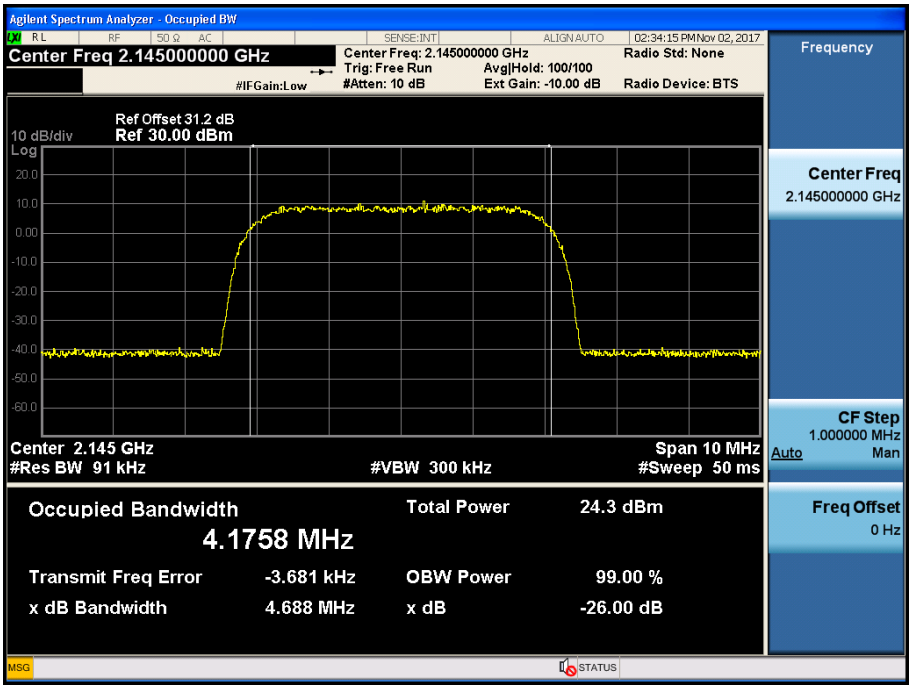


Occupied Bandwidth for AWS 2100_WCDMA

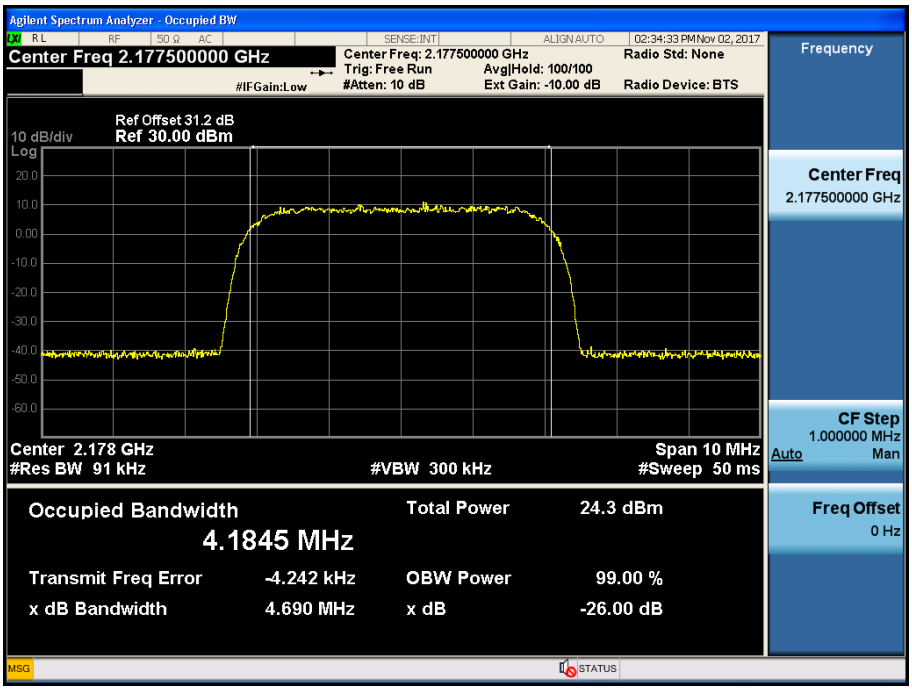
[AGC threshold Input Downlink Low]



[AGC threshold Input Downlink Middle]

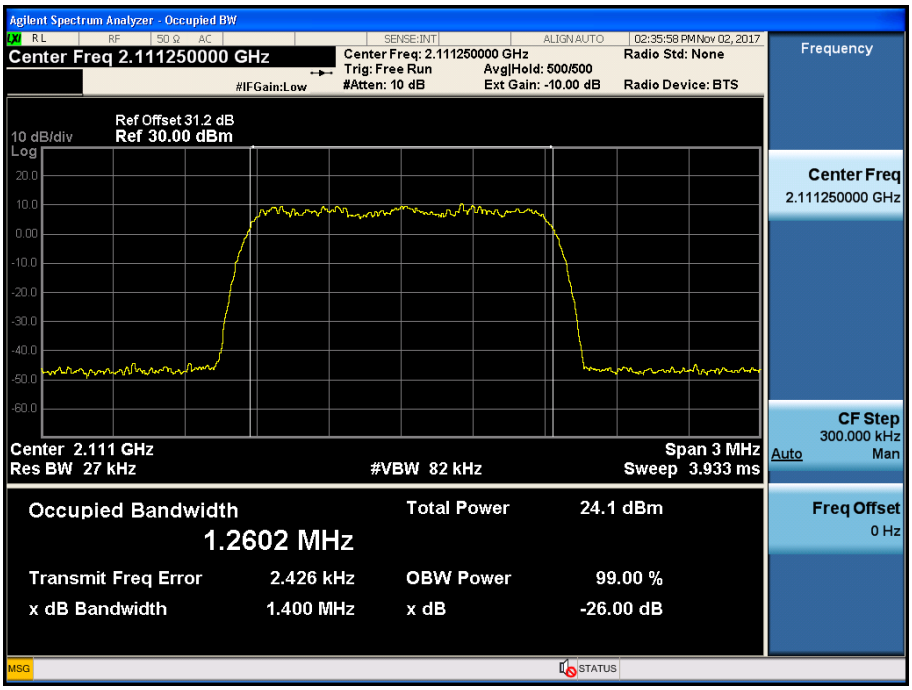


[AGC threshold Input Downlink High]

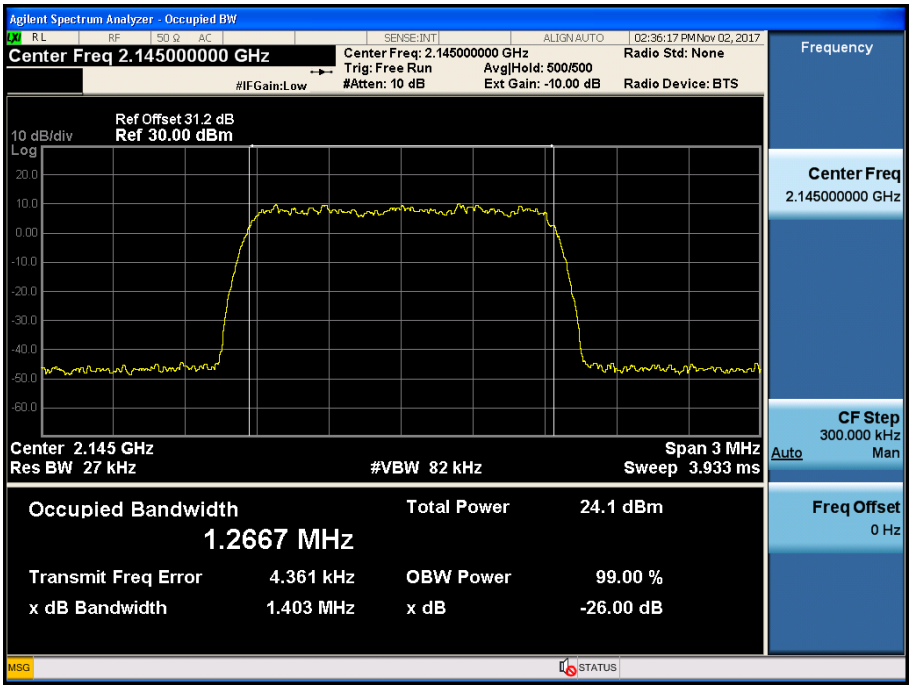


Occupied Bandwidth for AWS 2100_CDMA

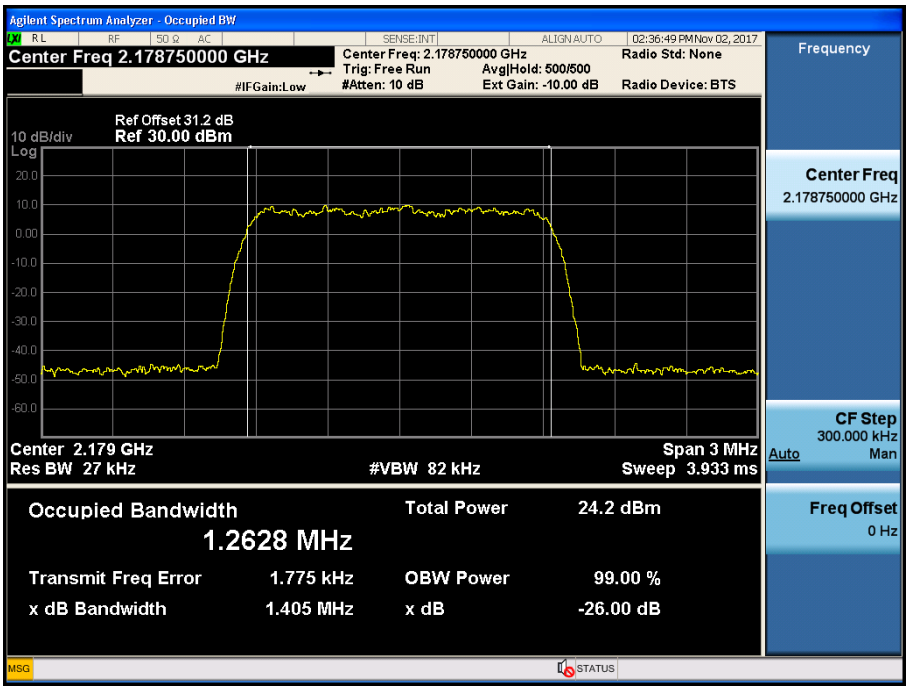
[AGC threshold Input Downlink Low]



[AGC threshold Input Downlink Middle]



[AGC threshold Input Downlink High]



8. INPUT VERSUS OUTPUT SPECTRUM

IC Rules

Test Requirements:

RSS-131

5. Equipment standard specifications for zone enhancers working with equipment certified in RSSs listed in section 1 except RSS-119

5.2 Industrial Zone Enhancers

5.2.2 Input-versus-output spectrum

The spectral growth of the 26 dB bandwidth of the output signal shall be less than 5% of the input signal spectrum.

Test Procedures:

RSS-GEN

6 Technical Requirements

6.6 Occupied Bandwidth

The emission bandwidth (X dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated X dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3 x the resolution bandwidth.

Note : We tested using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 26 dB.

Test Results:

[Downlink Output]

	Channel	Input 26 dB bandwidth (MHz)	AGC threshold output		+3 dB above the AGC threshold output	
			26 dB bandwidth (MHz)	Spectral growth (%)	26 dB bandwidth (MHz)	Spectral growth (%)
LTE 5 MHz	Low	5.047	5.034	-0.26	5.039	-0.16
	Middle	5.032	5.035	0.06	5.038	0.12
	High	5.027	5.029	0.04	5.038	0.22
LTE 10 MHz	Low	10.01	9.986	-0.24	9.980	-0.30
	Middle	10.03	10.01	-0.20	9.989	-0.41
	High	10.01	10.01	0.00	9.999	-0.11
WCDMA	Low	4.692	4.672	-0.43	4.685	-0.15
	Middle	4.688	4.689	0.02	4.686	-0.04
	High	4.690	4.684	-0.13	4.690	0.00
CDMA	Low	1.400	1.404	0.29	1.409	0.64
	Middle	1.403	1.404	0.07	1.404	0.07
	High	1.405	1.402	-0.21	1.403	-0.14

*** Plots of results are the same as Section 7.**

9. OUT OF BAND REJECTION & MEAN OUTPUT POWER AND ZONE ENHANCER GAIN

FCC Rules

Test Requirements:

KDB 935210 D05 v01r02

Out of Band Rejection – Testing for rejection of out of band signals. Alternatively, filter freq. response plots are acceptable.

IC Rules

Test Requirements:

RSS-131

5. Equipment standard specifications for zone enhancers working with equipment certified in RSSs listed in section 1 except RSS-119

5.2 Industrial Zone Enhancers

5.2.1 Out-of-band rejection

The gain-versus-frequency response and the 20 dB bandwidth of the zone enhancer shall be reported. The zone enhancer shall reject amplification of other signals outside the passband of the zone enhancer.

5.2.3 Mean output power and zone enhancer gain

The zone enhancer gain shall not exceed the nominal gain by more than 1.0 dB. Outside of the 20 dB bandwidth, the gain shall not exceed the gain at the 20 dB point.

Test Procedures:

Measurements were in accordance with the test methods section 3.3, 4.3 of KDB 935210 D05 v01r02.

3.3 EUT out-of-band rejection

a) Connect a signal generator to the input of the EUT.

b) Configure a swept CW signal with the following parameters:

1) Frequency range = ± 250 % of the passband from the center of the passband.

2) Level = a sufficient level to affirm that the out-of-band rejection is > 20 dB above the noise floor and will not engage the AGC during the entire sweep.

3) Dwell time = approx. 10 ms.

4) Number of points = SPAN/(RBW/2).

c) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation.

d) Set the span of the spectrum analyzer to the same as the frequency range of the signal generator.

e) Set the resolution bandwidth of the spectrum analyzer to be 1 % to 5 % of the passband and

the video bandwidth shall be set to ≥ 3 × RBW.

f) Set the detector to Peak Max-Hold and wait for the spectrum analyzer's spectral display to fill.

g) Place a marker to the peak of the frequency response and record this frequency as f0.

h) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the −20 dB down amplitude to determine the 20 dB bandwidth. Capture the frequency response of the EUT.

4.3 PLMRS device out-of-band rejection

Adjust the internal gain control of the equipment under test to the maximum gain for which equipment certification is sought.

a) Connect a signal generator to the input of the EUT.

b) Configure a swept CW signal with the following parameters:

c) Frequency range = ± 250 % of the manufacturer's pass band.

d) The CW amplitude will be 3 dB below the AGC threshold (see 4.2) and but not activate the AGC threshold throughout the test.

e) Dwell time = approx. 10 ms.

f) Frequency step = 50 kHz.

g) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation.

h) Set the resolution bandwidth of the spectrum analyzer between 1 % and 5 % of the manufacturer's pass band with the video bandwidth set to 3 × RBW.

i) Set the detector to Peak and the trace to Max-Hold.

j) After the trace is completely filled, place a marker at the peak amplitude, which is designated as f0, and with two additional markers (use the marker-delta method) at the 20 dB bandwidth (i.e., at the points where the gain has fallen by 20 dB).

k) Capture the frequency response plot and for inclusion in the test report.

Test Results:

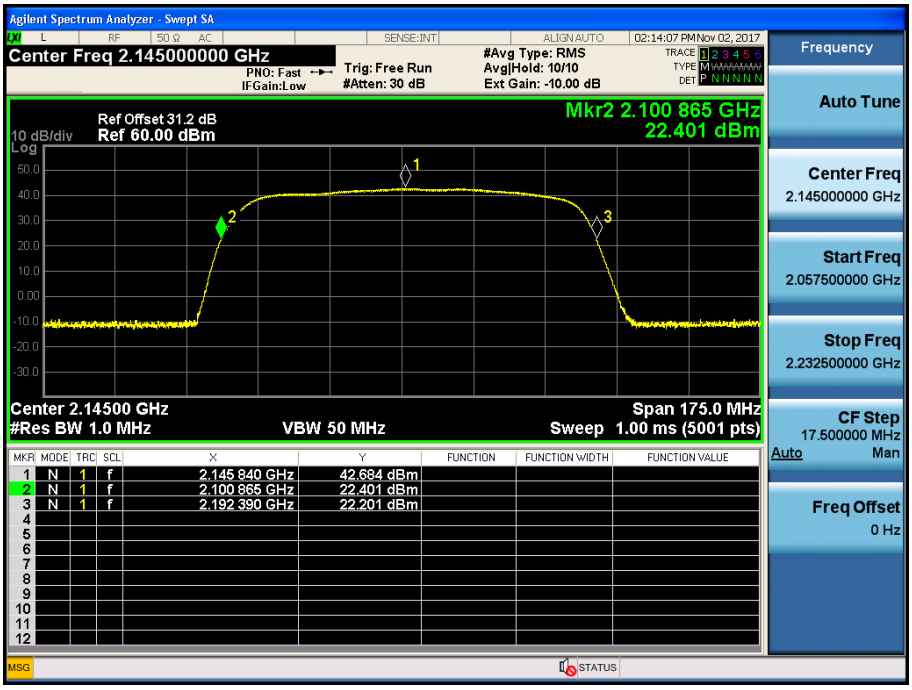
Input Signal	Input Level (dBm)	Maximum Amp Gain (dB)
Sinusoidal	DL: -20 dBm	DL : 63 dB

[Downlink]

	20 dB point frequency (MHz)	Output power (dBm)	Gain (dB)
AWS 2100	2 100.865 MHz ~ 2 192.390 MHz	42.684	63.684

Plots of Out of Band Rejection & Mean Output Power and Zone Enhancer Gain

[AWS 2100 Band]



10. SPURIOUS AND HARMONIC EMISSION AT ANTENNA TERMINAL

FCC Rules

Test Requirements:

§ 2.1051 Measurements required: Spurious emissions at antenna terminals:

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 27.53 Emission limits

(h) *AWS emission limits*

(1) *General protection levels.* Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB.

(2) *Additional protection levels.* Notwithstanding the foregoing paragraph (h)(1) of this section:

(i) Operations in the 2180-2200 MHz band are subject to the out-of-band emission requirements set forth in §27.1134 for the protection of federal government operations operating in the 2200-2290 MHz band.

(ii) For operations in the 2000-2020 MHz band, the power of any emissions below 2000 MHz shall be attenuated below the transmitter power (P) in watts by at least $70 + 10 \log_{10}(P)$ dB.

(iii) For operations in the 1915-1920 MHz band, the power of any emission between 1930-1995 MHz shall be attenuated below the transmitter power (P) in watts by at least $70 + 10 \log_{10}(P)$ dB.

(iv) For operations in the 1995-2000 MHz band, the power of any emission between 2005-2020 MHz shall be attenuated below the transmitter power (P) in watts by at least $70 + 10 \log_{10}(P)$ dB.

(3) *Measurement procedure.*

(i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier

center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(ii) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(iii) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

(4) *Private agreements.*

(i) For AWS operations in the 2000-2020 MHz and 2180-2200 MHz bands, to the extent a licensee establishes unified operations across the AWS blocks, that licensee may choose not to observe the emission limit specified in paragraph (h)(1), above, strictly between its adjacent block licenses in a geographic area, so long as it complies with other Commission rules and is not adversely affecting the operations of other parties by virtue of exceeding the emission limit.

(ii) For AWS operations in the 2000-2020 MHz band, a licensee may enter into private agreements with all licensees operating between 1995 and 2000 MHz to allow the 70 + 10 $\log_{10}$(P) dB limit to be exceeded within the 1995-2000 MHz band.

(iii) An AWS licensee who is a party to a private agreement described in this section (4) must maintain a copy of the agreement in its station files and disclose it, upon request, to prospective AWS assignees, transferees, or spectrum lessees and to the Commission.

IC Rules

Test Requirements:

RSS-139

6. Transmitter Standard Specifications

6.6 Transmitter Unwanted Emissions

i. In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 $\log_{10}$ p (watts) dB.

ii. After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 $\log_{10}$ p (watts) dB.

Test Procedures:

Measurements were in accordance with the test methods section 3.6 and 4.7 of KDB 935210 D05 v01r02.

3.6.1 General

Refer to the applicable rule part(s) for specified limits on unwanted (out-of-band/out-of-block and spurious) emissions.

Spurious emissions shall be measured using a single test signal sequentially tuned to the low, middle, and high channels or frequencies within each authorized frequency band of operation.

Out-of-band/out-of-block emissions (including intermodulation products) shall be measured under each of the following two stimulus conditions:

a) two adjacent test signals sequentially tuned to the lower and upper frequency band/block edges;

b) a single test signal, sequentially tuned to the lowest and highest frequencies or channels within the frequency band/block under examination.

NOTE—Single-channel boosters that cannot accommodate two simultaneous signals within the passband may be excluded from the test stipulated in step a).

3.6.2 Out-of-band/out-of-block emissions conducted measurements

a) Connect a signal generator to the input of the EUT.

If the signal generator is not capable of generating two modulated carriers simultaneously, then two discrete signal generators can be connected with an appropriate combining network to support this two-signal test.

b) Set the signal generator to produce two AWGN signals as previously described (e.g., 4.1 MHz OBW).

c) Set the center frequencies such that the AWGN signals occupy adjacent channels, as defined by industry standards such as 3GPP or 3GPP2, at the upper edge of the frequency band or block under test.

d) Set the composite power levels such that the input signal is just below the AGC threshold (see 3.2), but not more than 0.5 dB below. The composite power can be measured using the procedures provided in KDB Publication 971168, but it will be necessary to expand the power integration bandwidth so as to include both of the transmit channels. Alternatively, the composite power can be measured using an average power meter as described in KDB Publication 971168.

e) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation as necessary.

f) Set the RBW = reference bandwidth in the applicable rule section for the supported frequency band (typically 1 % of the EBW or 100 kHz or 1 MHz)

g) Set the VBW = 3 × RBW.

h) Set the detector to power averaging (rms) detector.

i) Set the Sweep time = auto-couple.

j) Set the spectrum analyzer start frequency to the upper block edge frequency, and the stop frequency to the upper block edge frequency plus 300 kHz or 3 MHz, for frequencies below and above 1 GHz, respectively.

k) Trace average at least 100 traces in power averaging (rms) mode.

l) Use the marker function to find the maximum power level.

m) Capture the spectrum analyzer trace of the power level for inclusion in the test report.

n) Repeat steps k) to m) with the composite input power level set to 3 dB above the AGC threshold.

o) Reset the frequencies of the input signals to the lower edge of the frequency block or band under test.

p) Reset the spectrum analyzer start frequency to the lower block edge frequency minus 300 kHz or 3 MHz, for frequencies below and above 1 GHz, respectively, and the stop frequency to the lower band or block edge frequency.

q) Repeat steps k) to n).

r) Repeat steps a) to q) with the signal generator configured for a single test signal tuned as close as possible to the block edges.

s) Repeat steps a) to r) with the narrowband test signal.

t) Repeat steps a) to s) for all authorized frequency bands or blocks used by the EUT.

3.6.3 Spurious emissions conducted measurements

a) Connect a signal generator to the input of the EUT.

b) Set the signal generator to produce the broadband test signal as previously described (i.e., 4.1 MHz OBW AWGN).

c) Set the center frequency of the test signal to the lowest available channel within the frequency band or block.

d) Set the EUT input power to a level that is just below the AGC threshold (see 3.2), but not more than 0.5 dB below.

e) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation as necessary.

f) Set the RBW = reference bandwidth in the applicable rule section for the supported frequency band of operation (e.g., reference bandwidth is typically 100 kHz or 1 MHz).

g) Set the VBW ≥ 3 × RBW.

h) Set the Sweep time = auto-couple.

i) Set the spectrum analyzer start frequency to the lowest RF signal generated in the equipment, without going below 9 kHz, and the stop frequency to the lower band/block edge frequency minus 100 kHz or 1 MHz, as specified in the applicable rule part.

The number of measurement points in each sweep must be ≥ (2 × span/RBW), which may require that the measurement range defined by the start and stop frequencies be subdivided, depending on the available number of measurement points provided by the spectrum analyzer.2

j) Select the power averaging (rms) detector function.

k) Trace average at least 10 traces in power averaging (rms) mode.

l) Use the peak marker function to identify the highest amplitude level over each measured frequency range. Record the frequency and amplitude and capture a plot for inclusion in the test

report.

m) Reset the spectrum analyzer start frequency to the upper band/block edge frequency plus 100 kHz or 1 MHz, as specified in the applicable rule part, and the spectrum analyzer stop frequency to 10 times the highest frequency of the fundamental emission (see § 2.1057). The number of measurement points in each sweep must be ≥ (2 × span/RBW), which may require that the measurement range defined by the start and stop frequencies be subdivided, depending on the available number of measurement points provided by the spectrum analyzer.

n) Trace average at least 10 traces in power averaging (rms) mode.

o) Use the peak marker function to identify the highest amplitude level over each of the measured frequency ranges. Record the frequency and amplitude and capture a plot for inclusion in the test report; also provide tabular data, if required.

p) Repeat steps i) to o) with the input test signals firstly tuned to a middle band/block frequency/channel, and then tuned to a high band/block frequency/channel.

q) Repeat steps b) to p) with the narrowband test signal.

r) Repeat steps b) to q) for all authorized frequency bands/blocks used by the EUT.

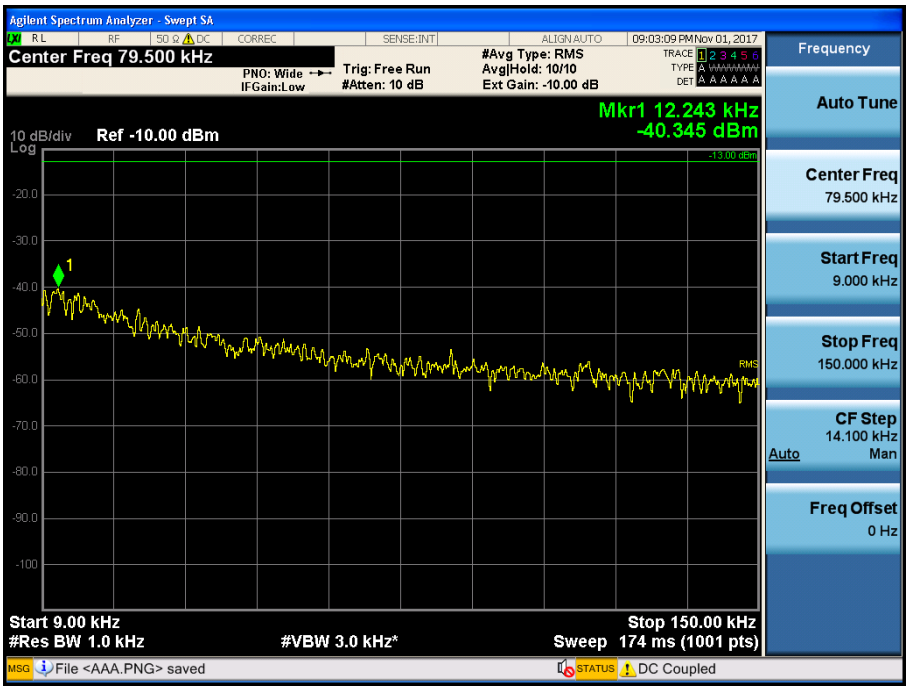
Notes:

1. In 9 KHz-150 KHz and 150 KHz-30 MHz bands, RBW was reduced to 1% and 10% of the reference bandwidth for measuring unwanted emission level(typically, 100KHz if the authorized frequency band is below 1GHz) and power was integrated.(1% = +20 dB, 10% = +10 dB)
2. We have done CDMA and 1xEVDO modulation test in technology. Test results are only attached worst cases.

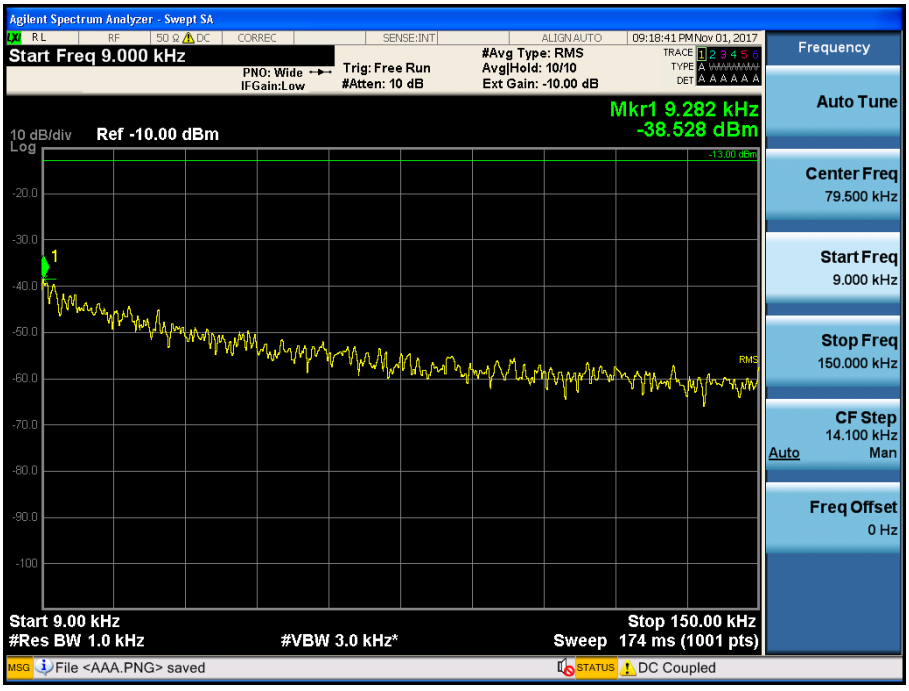
Plots of Spurious Emission for AWS 2100_LTE 5 MHz

Conducted Spurious Emissions (9 kHz – 150 kHz)

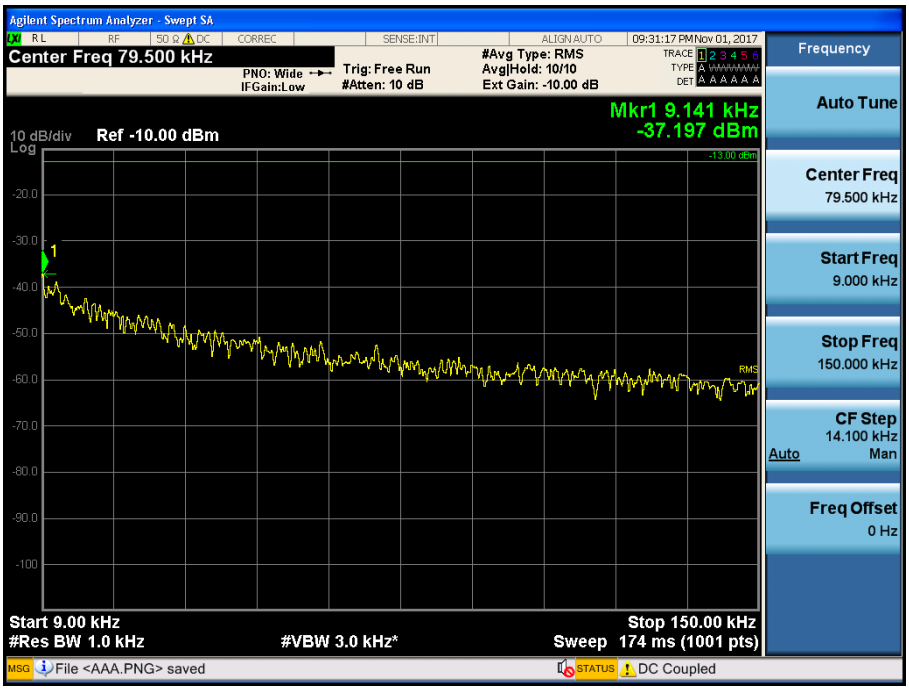
[Downlink Low]



[Downlink Middle]

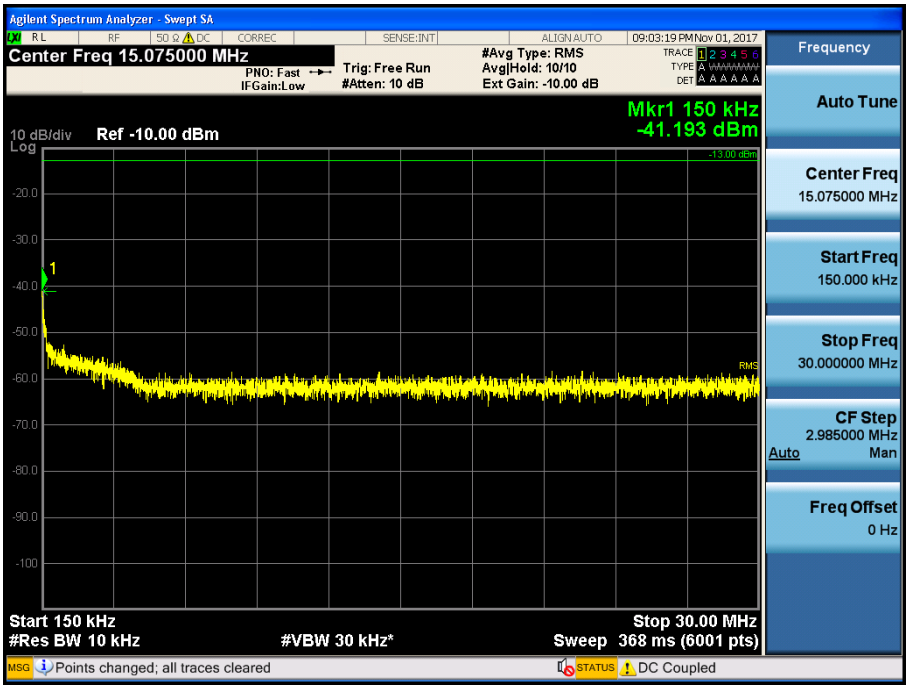


[Downlink High]

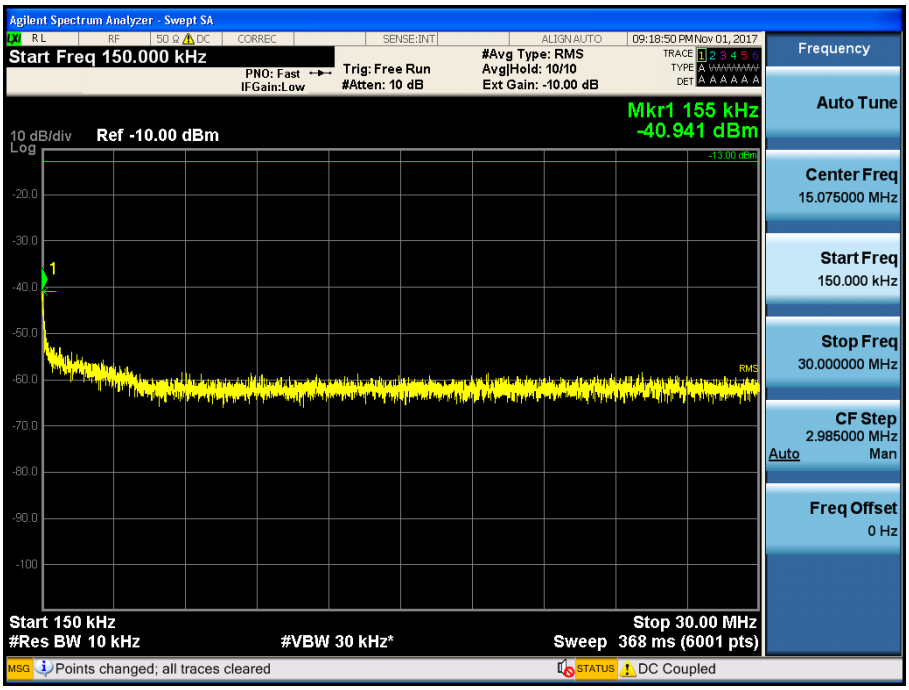


Conducted Spurious Emissions (150 kHz – 30 MHz)

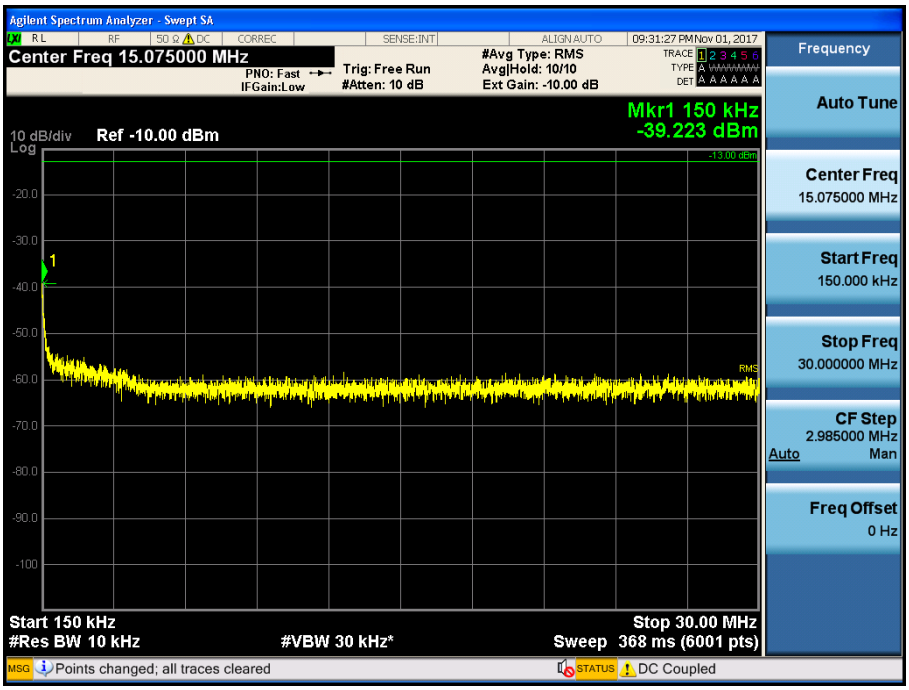
[Downlink Low]



[Downlink Middle]

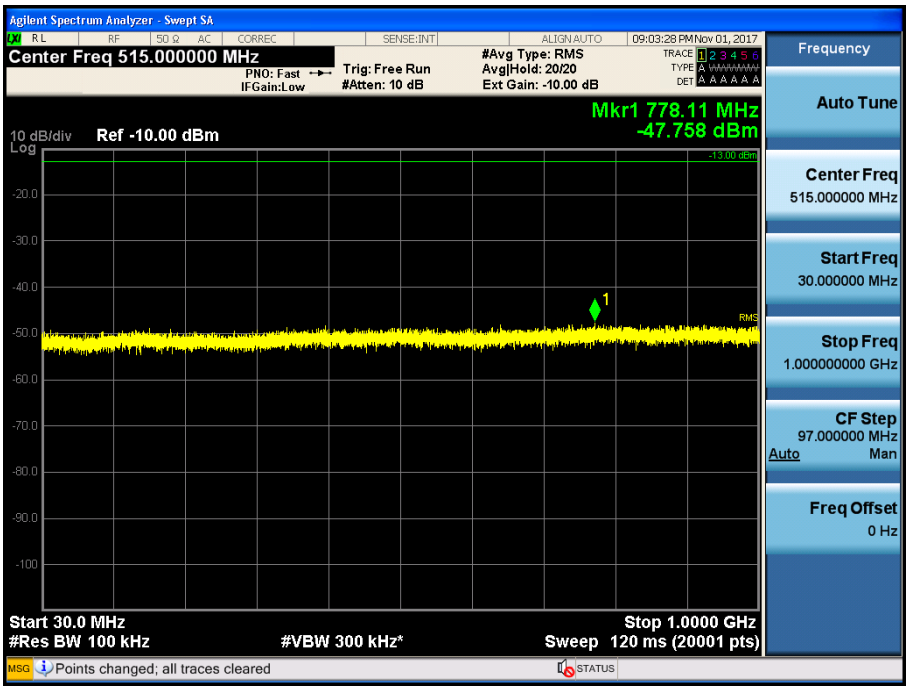


[Downlink High]

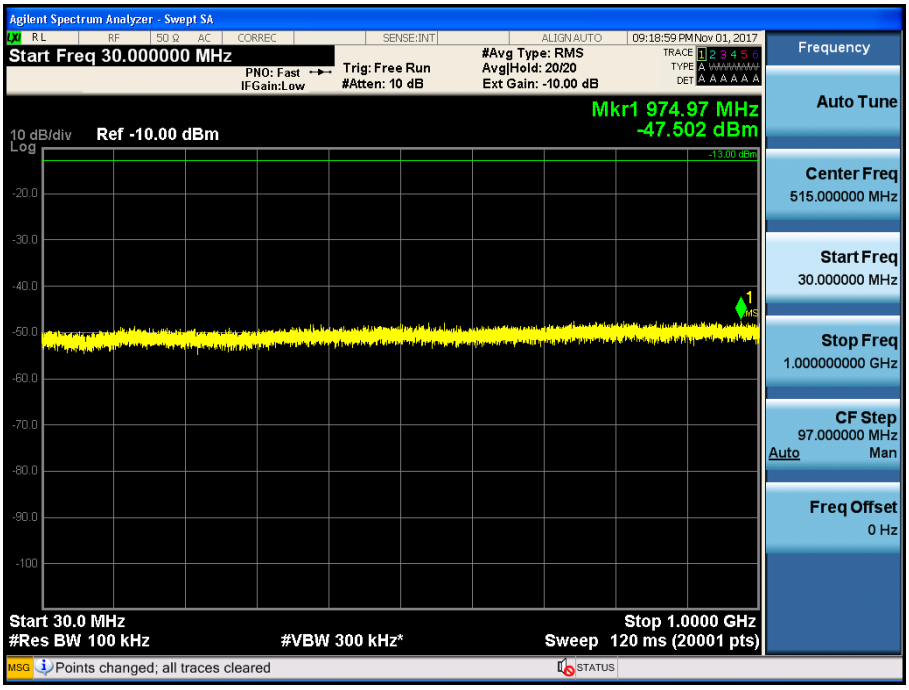


Conducted Spurious Emissions (30 MHz – 1 GHz)

[Downlink Low]



[Downlink Middle]



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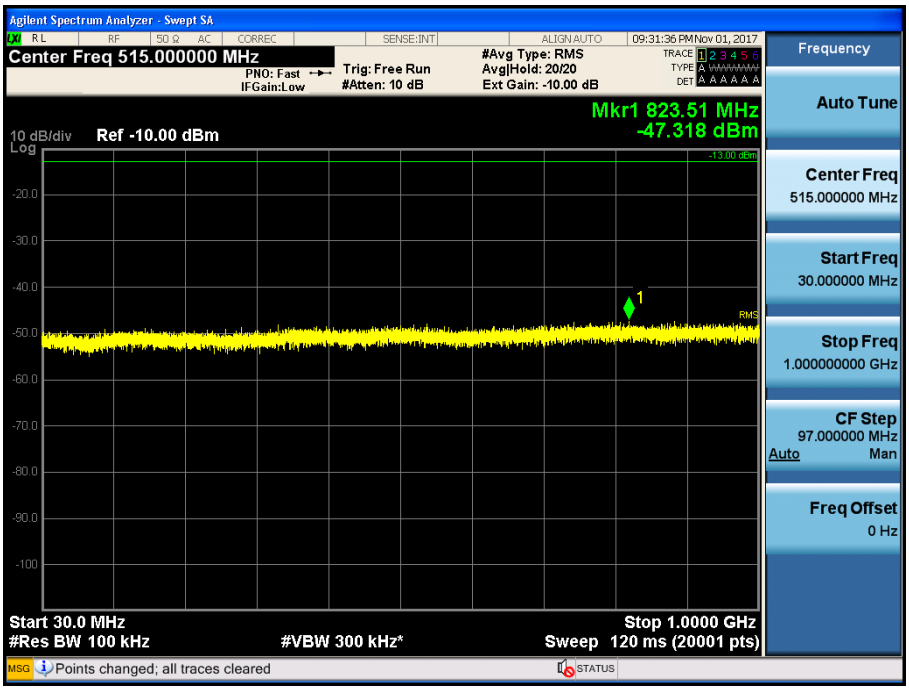
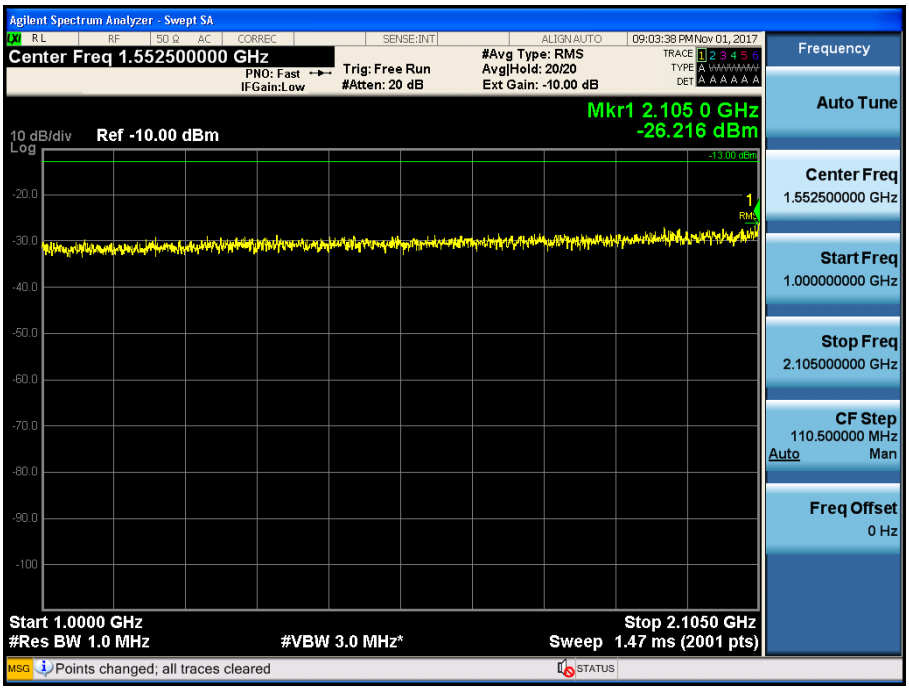


Conducted Spurious Emissions (1 GHz – 2.105 GHz)

[Downlink Low]



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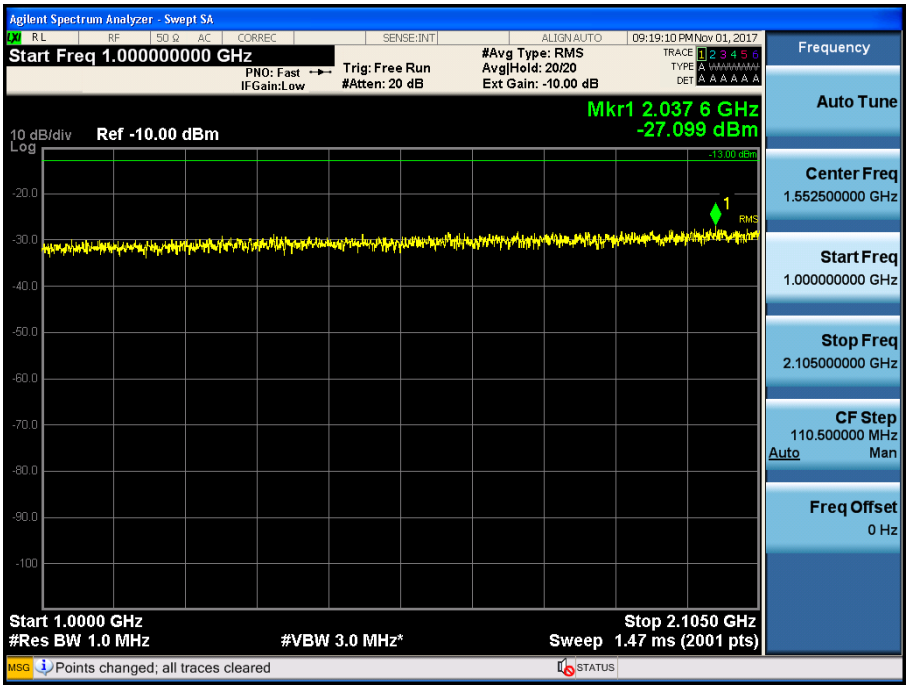

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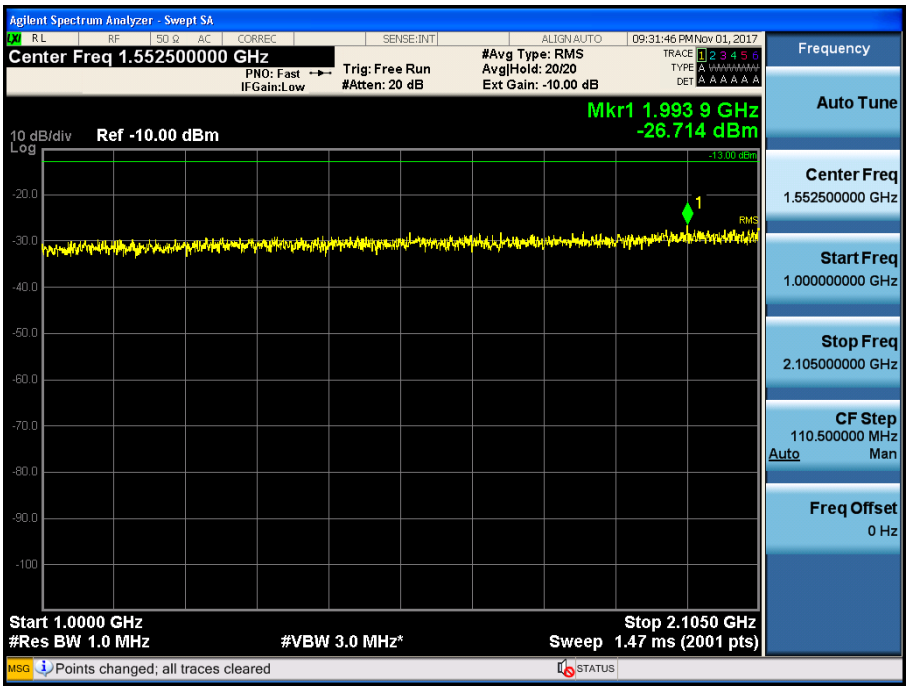
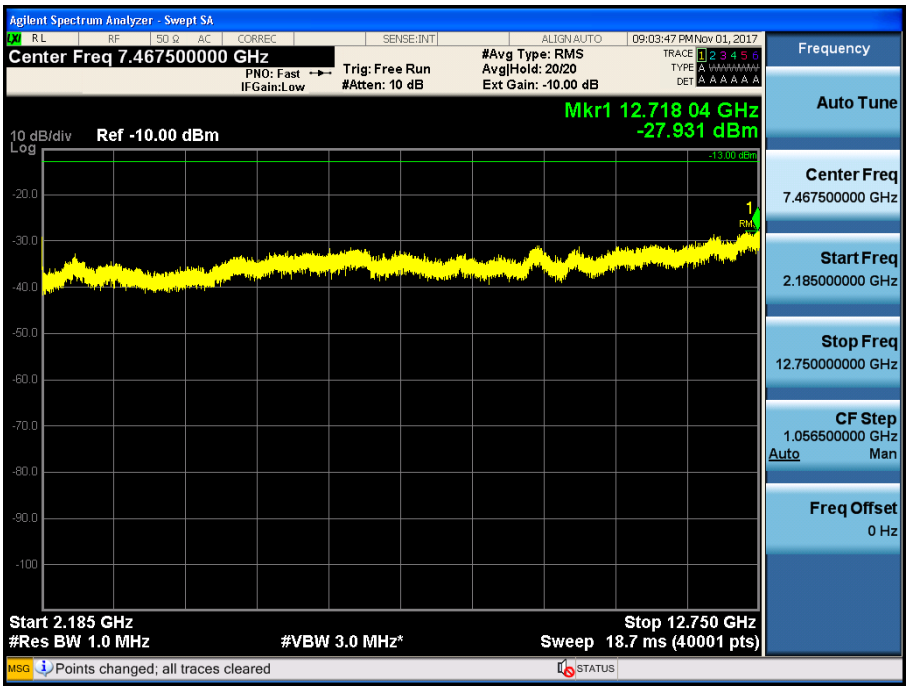


Conducted Spurious Emissions (2.185 GHz – 12.75 GHz)

[Downlink Low]



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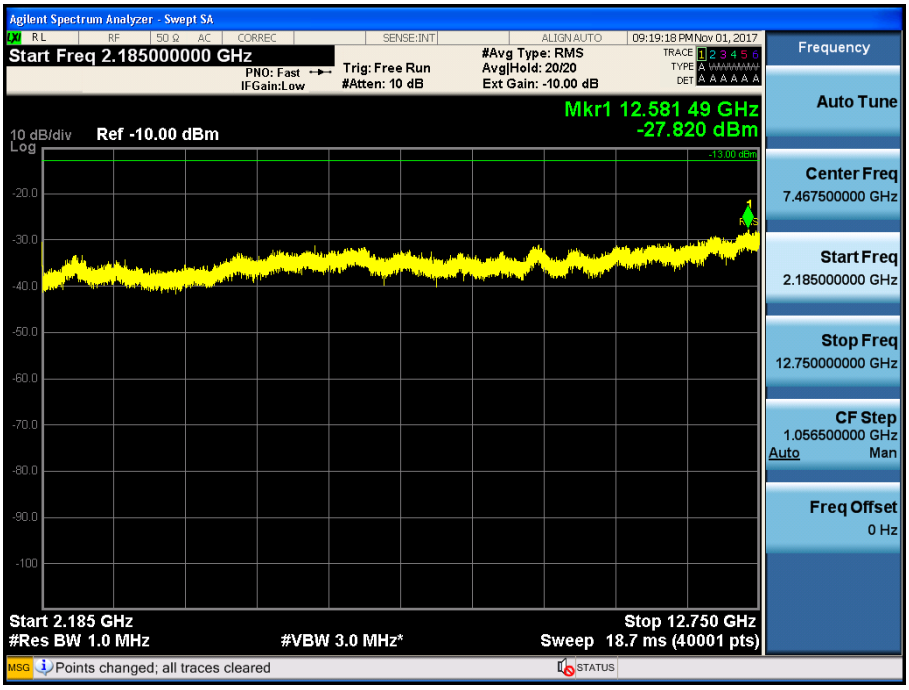

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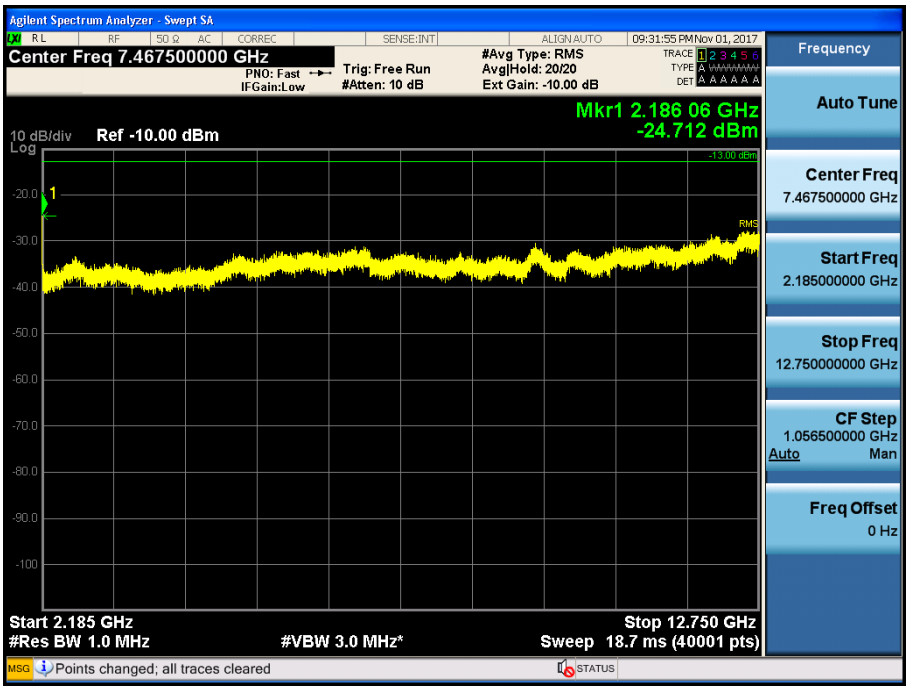

Conducted Spurious Emissions (12.75 GHz – 26.5 GHz)

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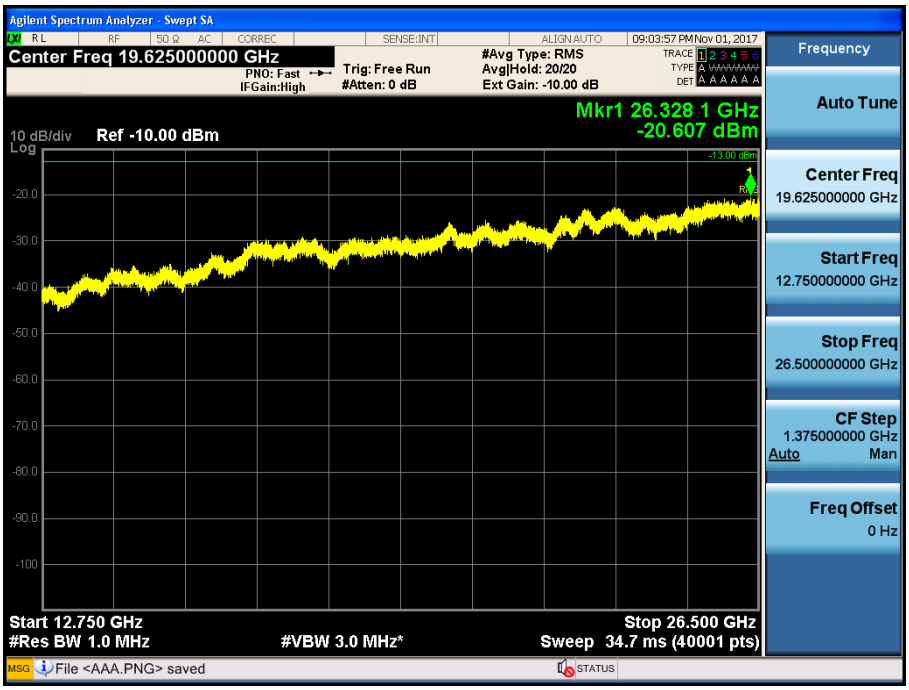

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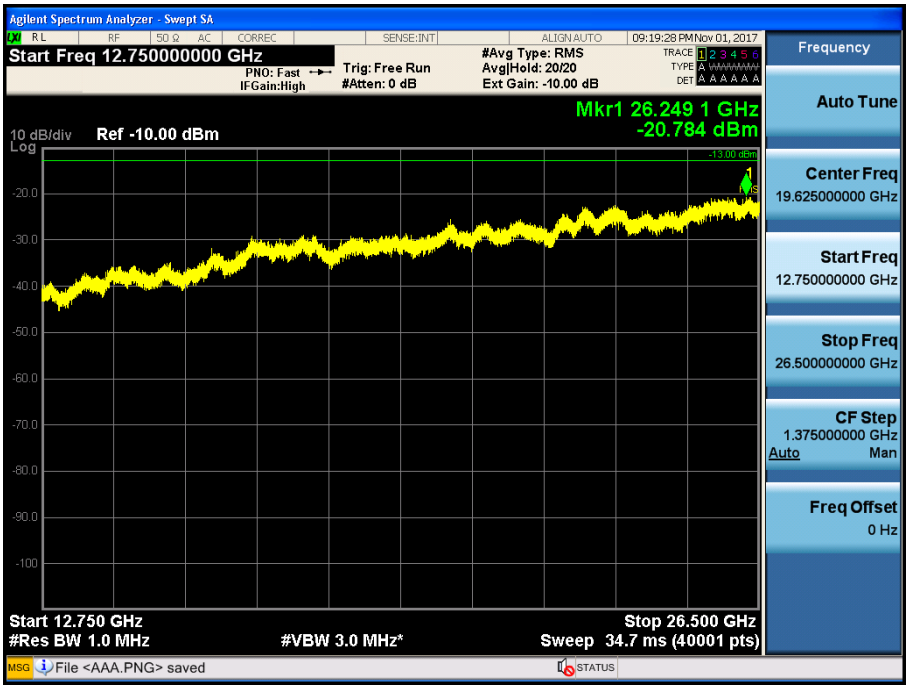

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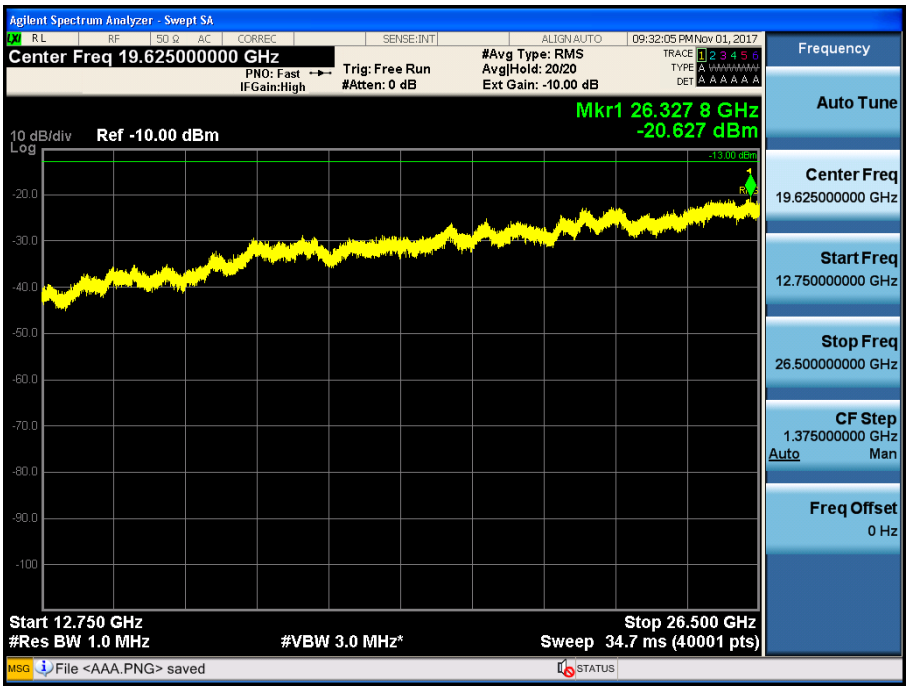
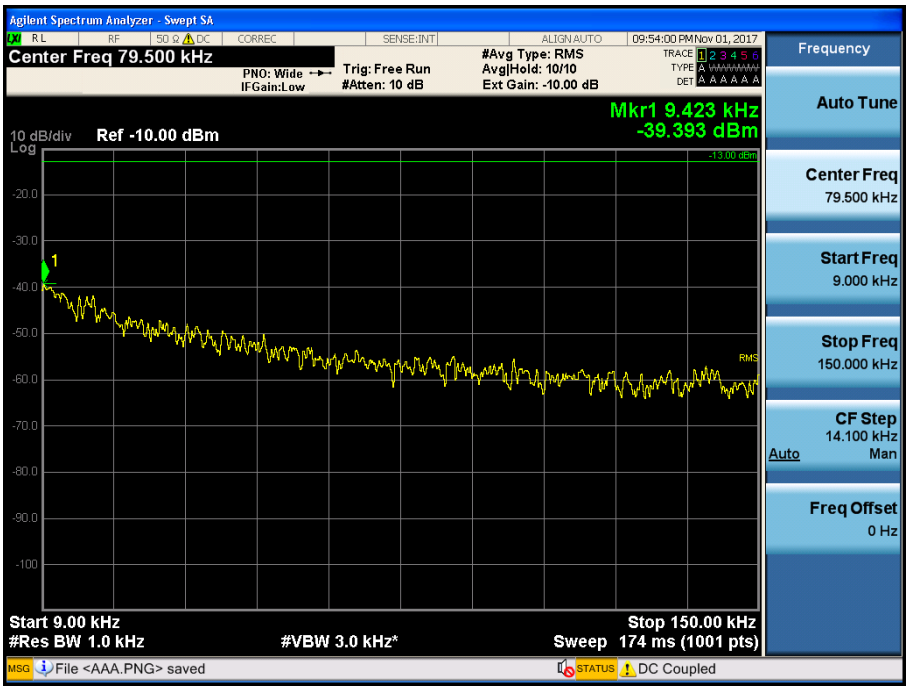


Plots of Spurious Emission for AWS 2100_LTE 10 MHz

Conducted Spurious Emissions (9 kHz – 150 kHz)

[Downlink Low]



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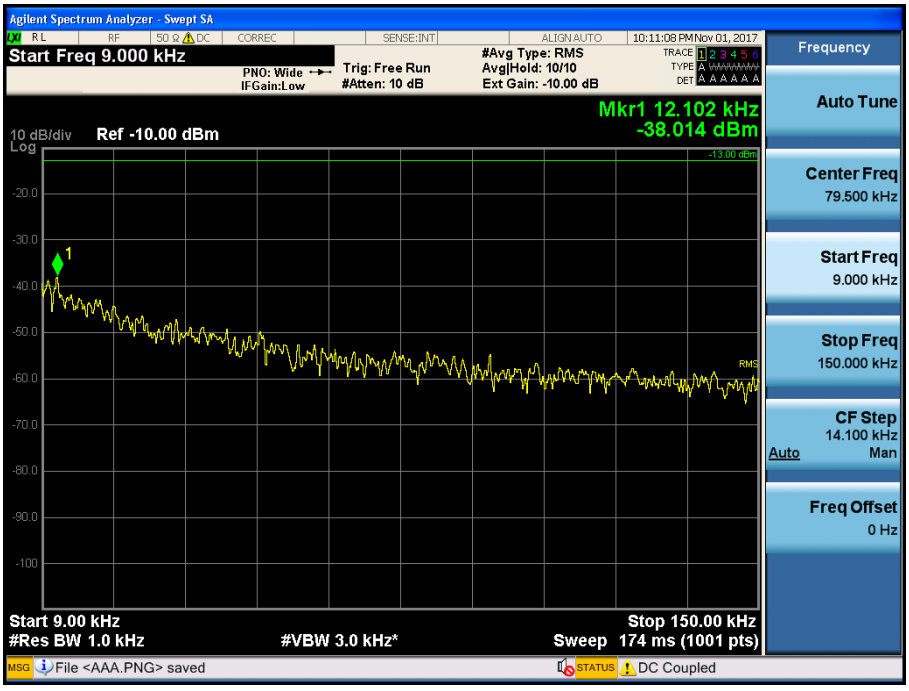

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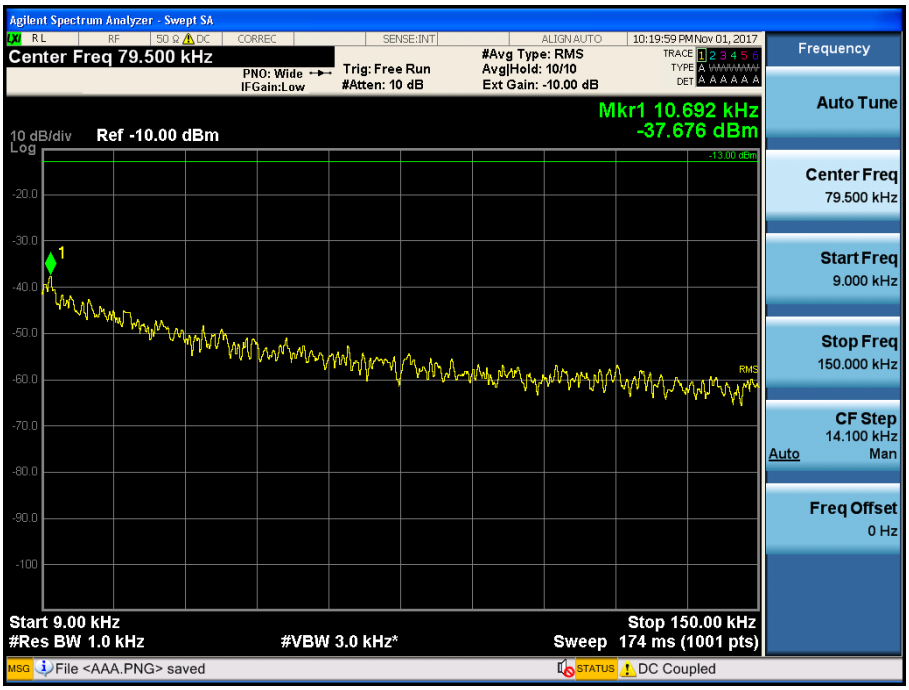

Conducted Spurious Emissions (150 kHz – 30 MHz)

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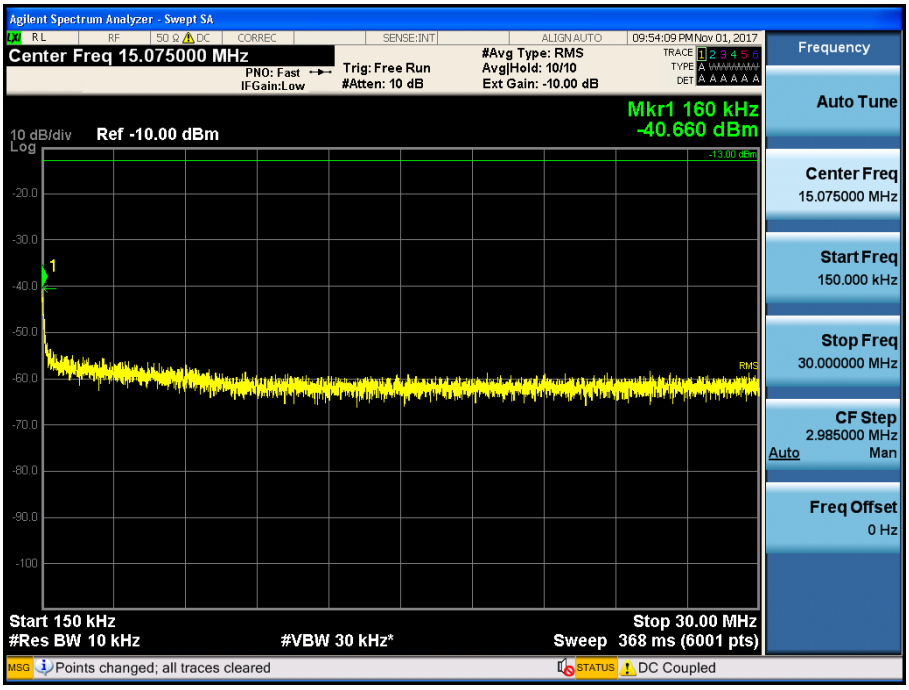

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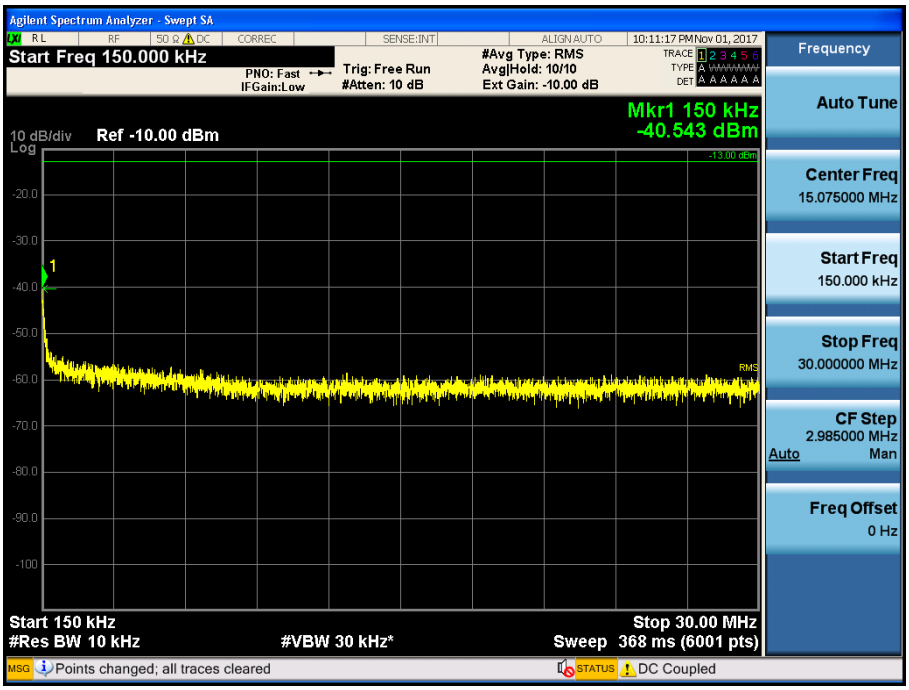

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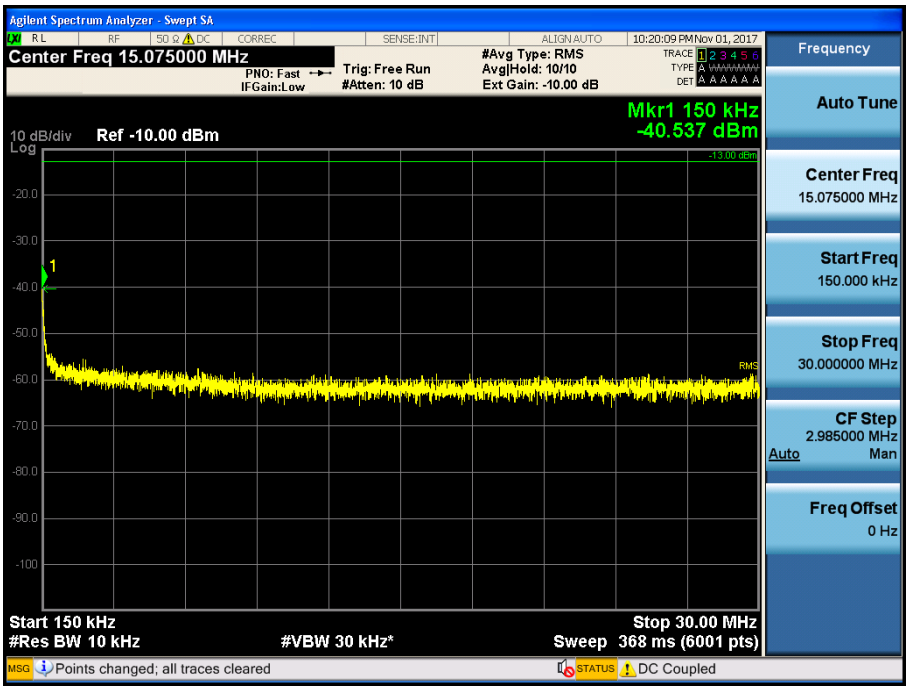

Conducted Spurious Emissions (30 MHz – 1 GHz)

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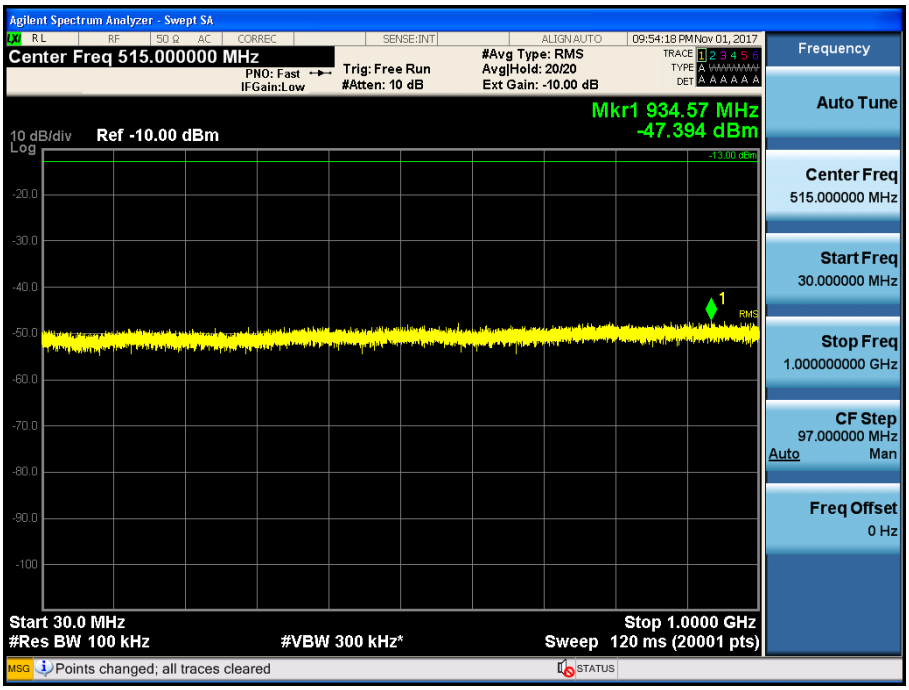

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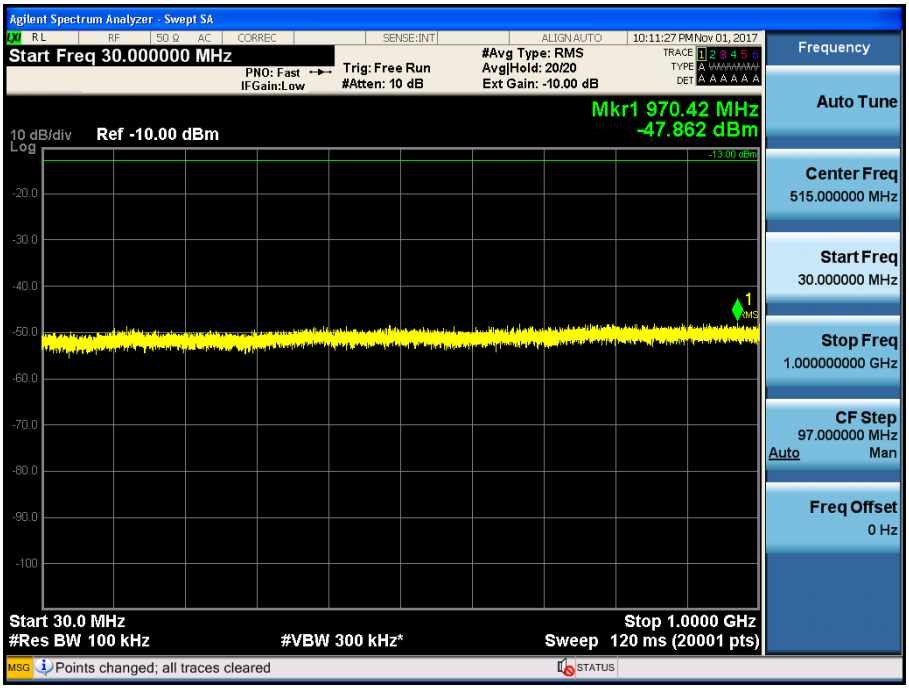

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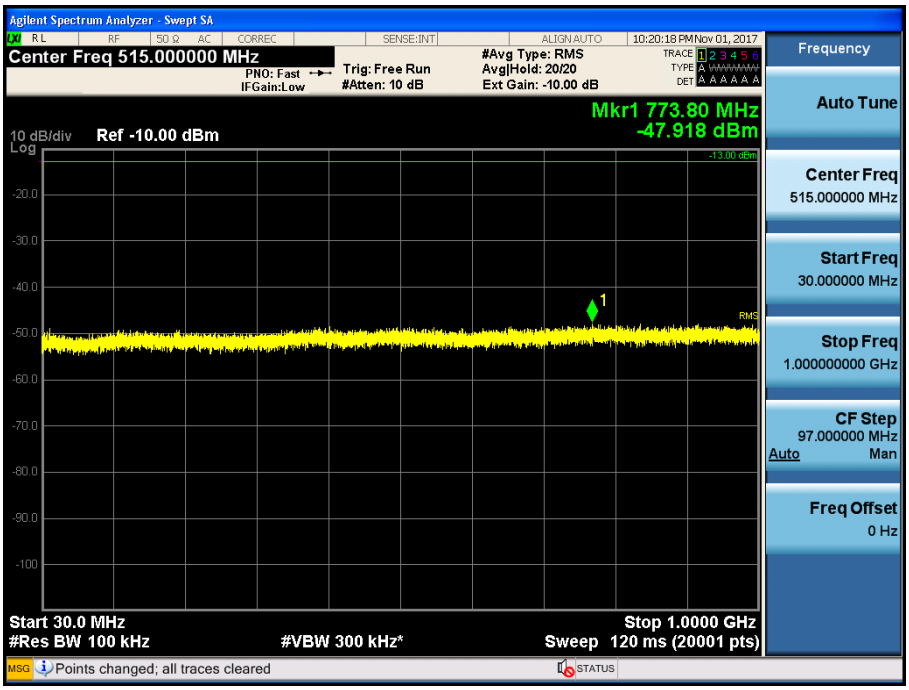
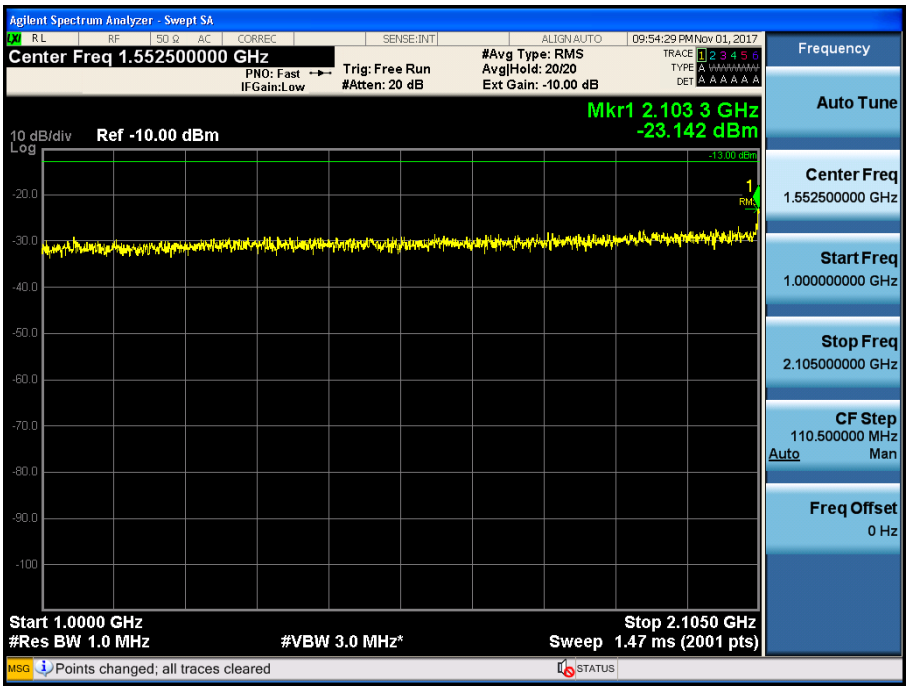


Conducted Spurious Emissions (1 GHz – 2.105 GHz)

[Downlink Low]



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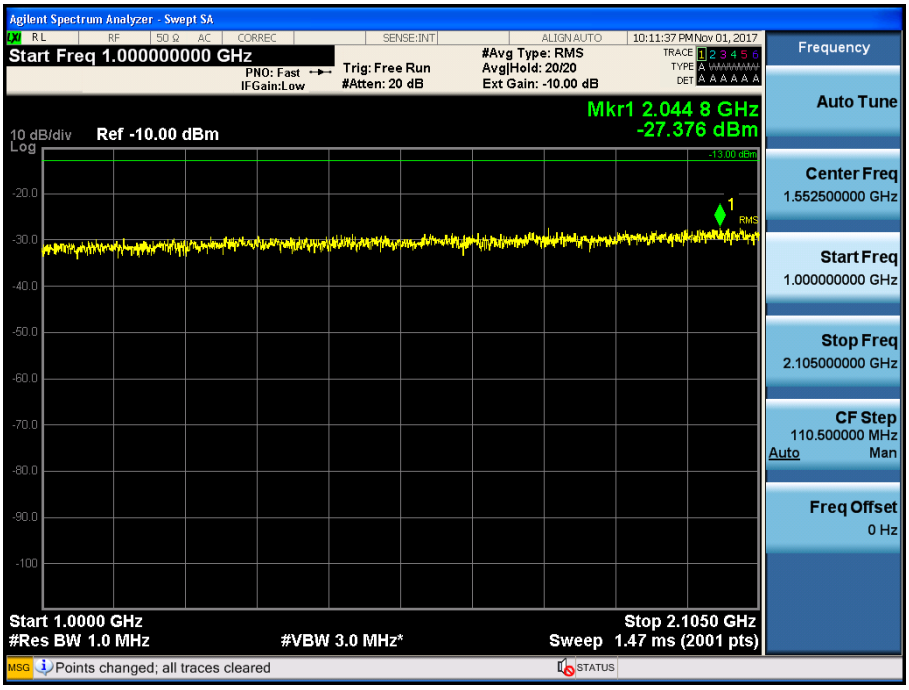

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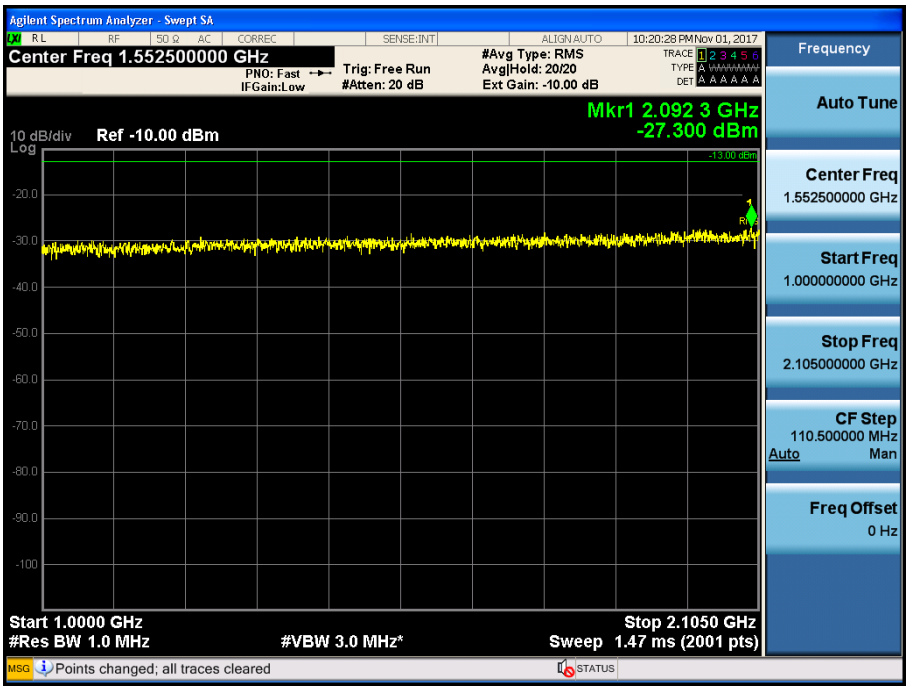
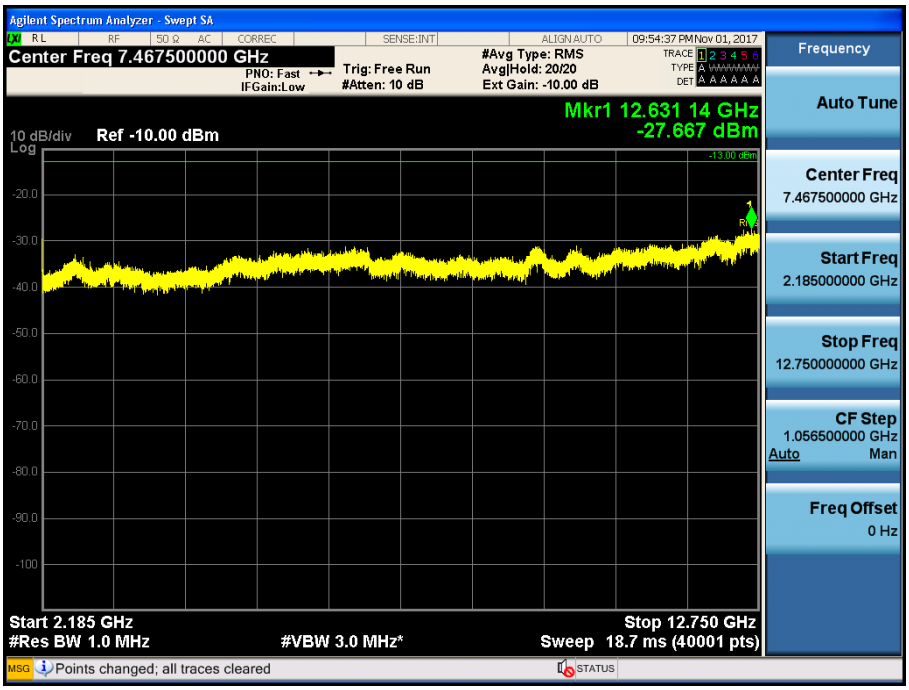


Conducted Spurious Emissions (2.185 GHz – 12.75 GHz)

[Downlink Low]



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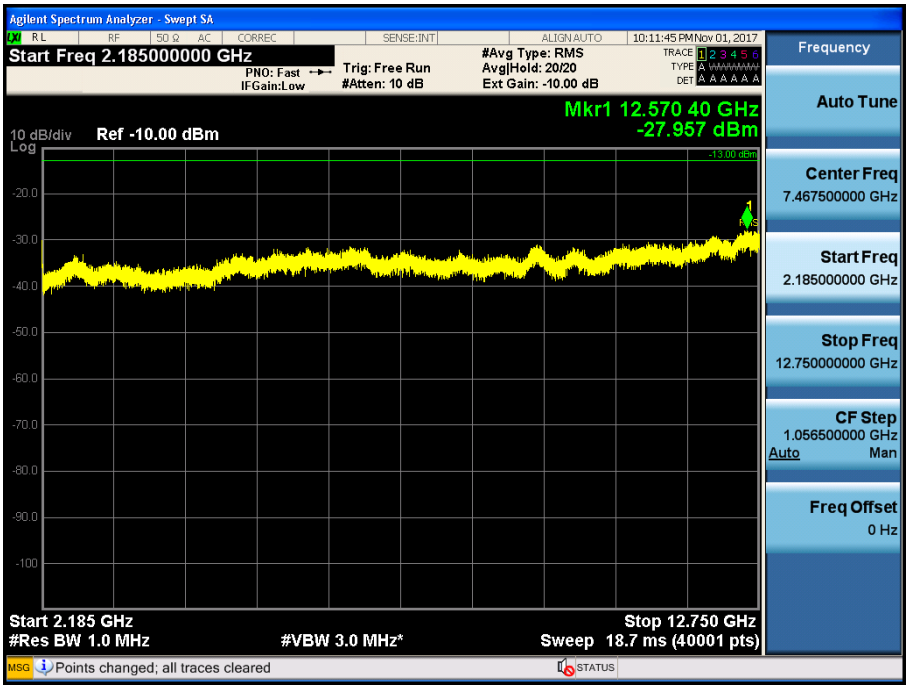

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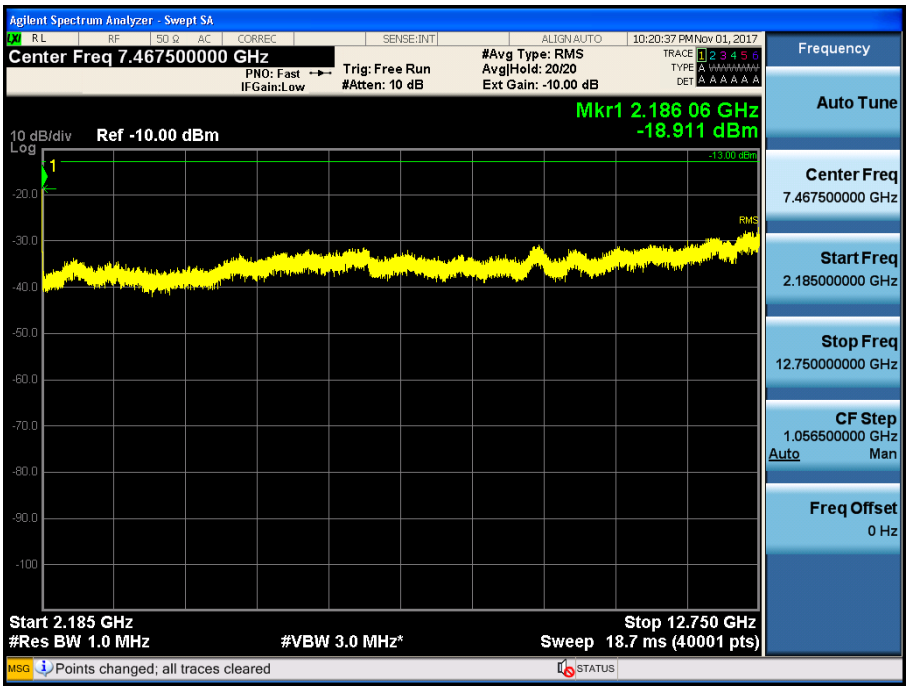
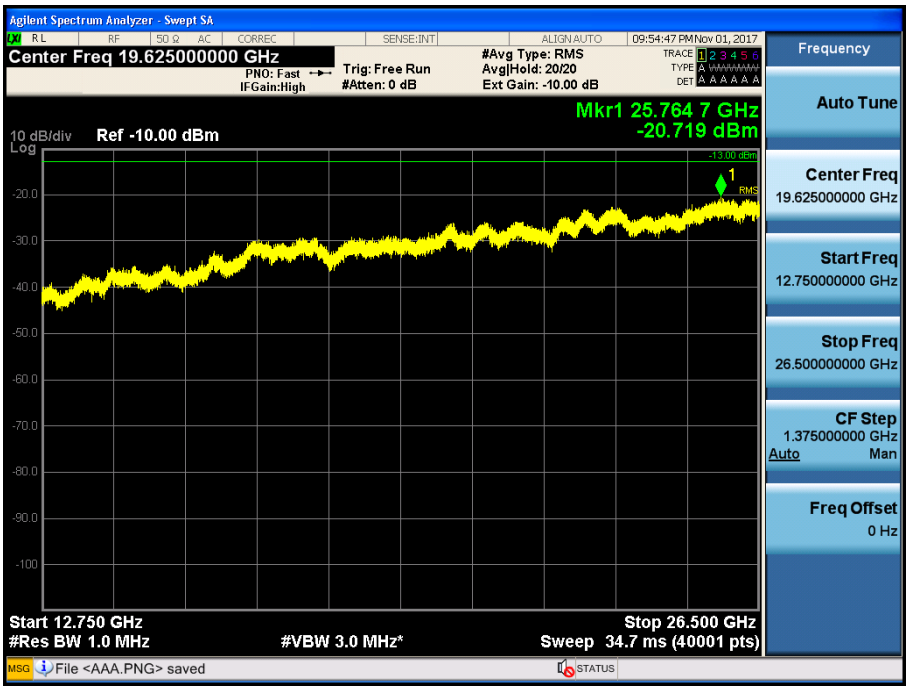


Conducted Spurious Emissions (12.75 GHz – 26.5 GHz)

[Downlink Low]



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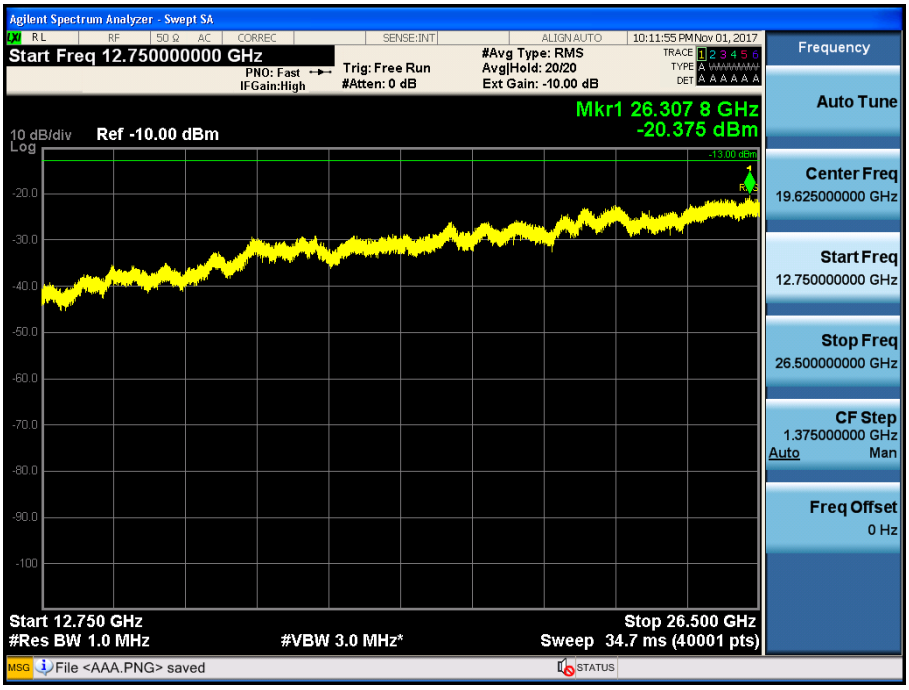

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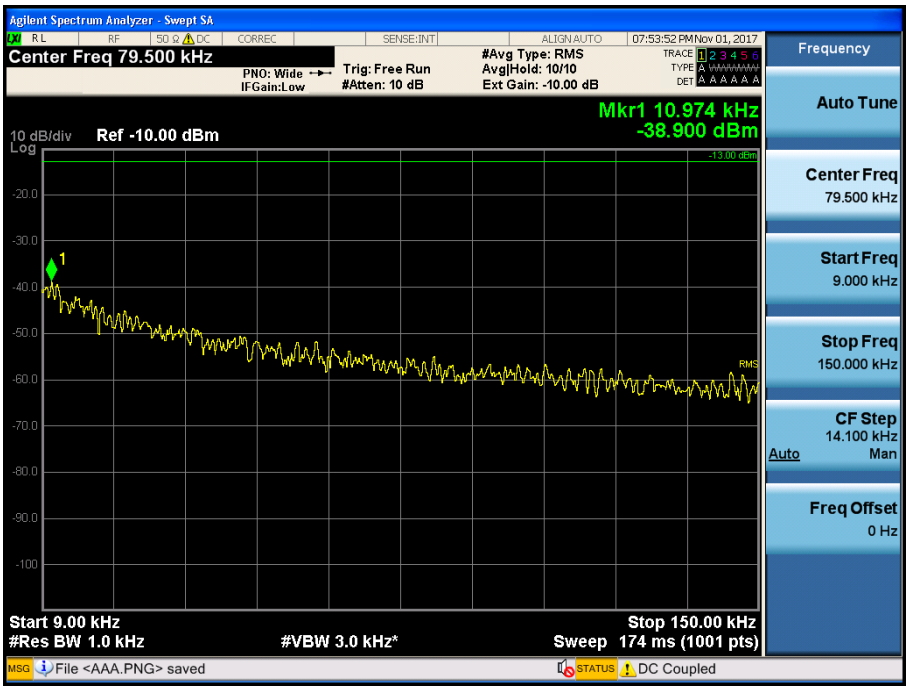
Plots of Spurious Emission for AWS 2100_WCDMA

Conducted Spurious Emissions (9 kHz – 150 kHz)

[Downlink Low]



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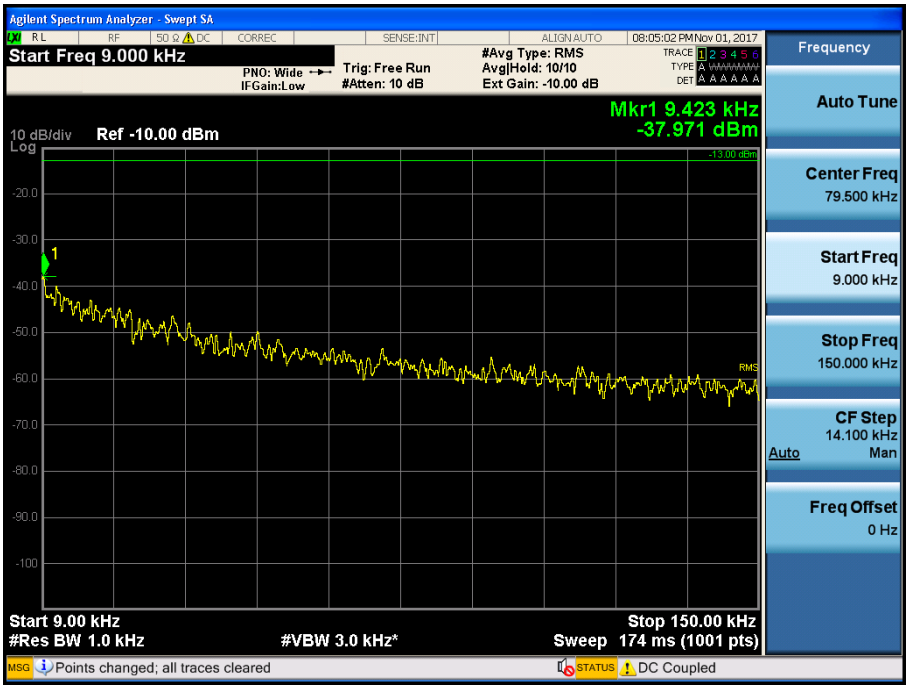

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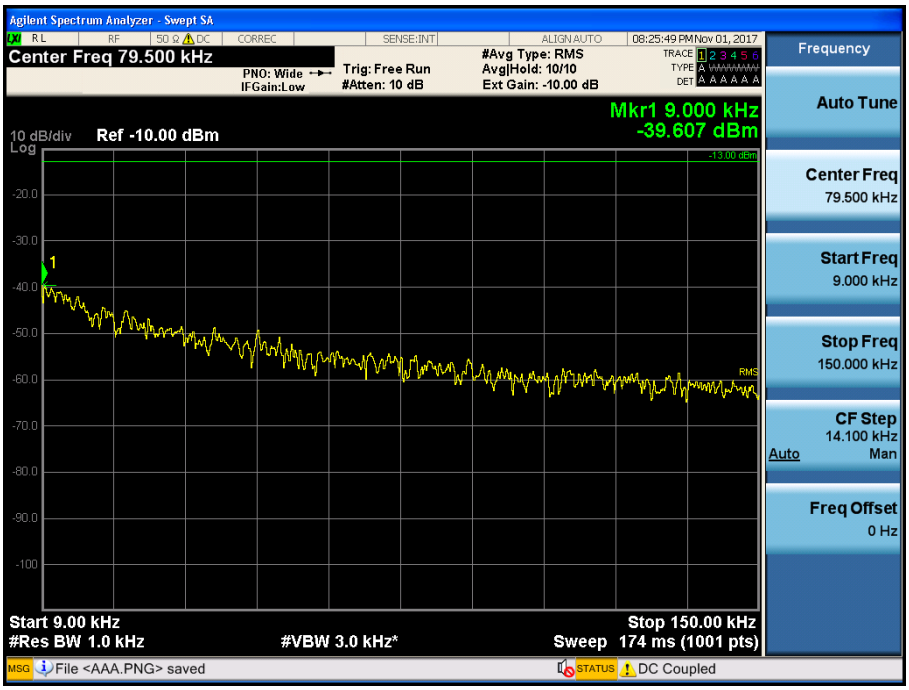

Conducted Spurious Emissions (150 kHz – 30 MHz)

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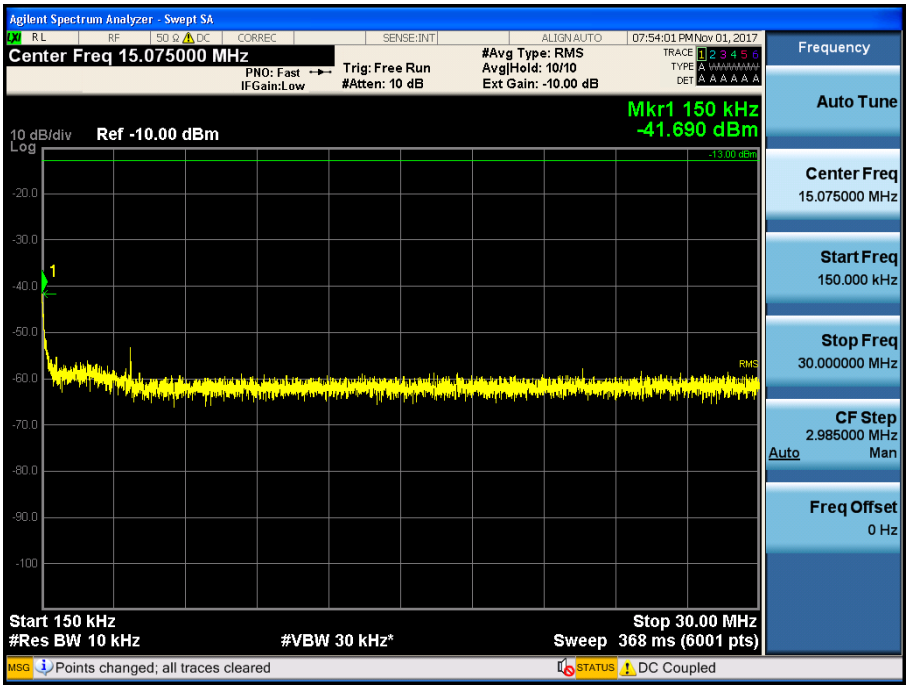

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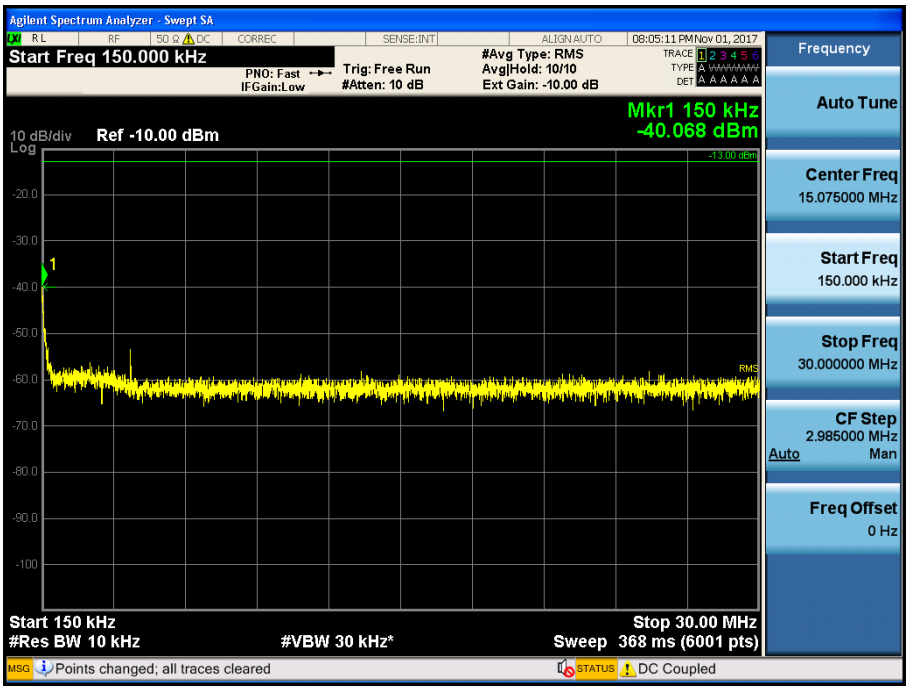

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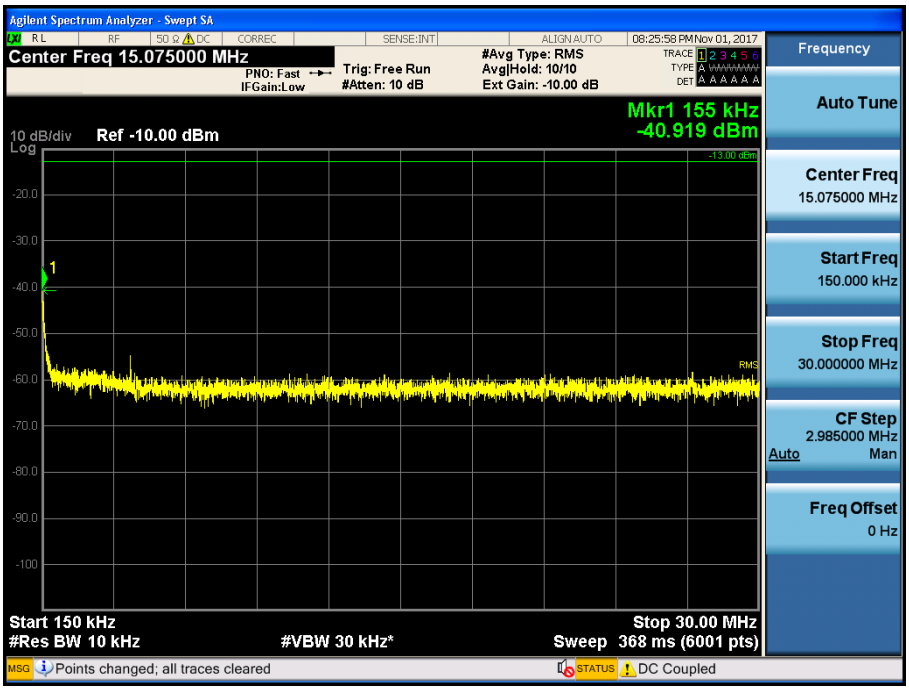
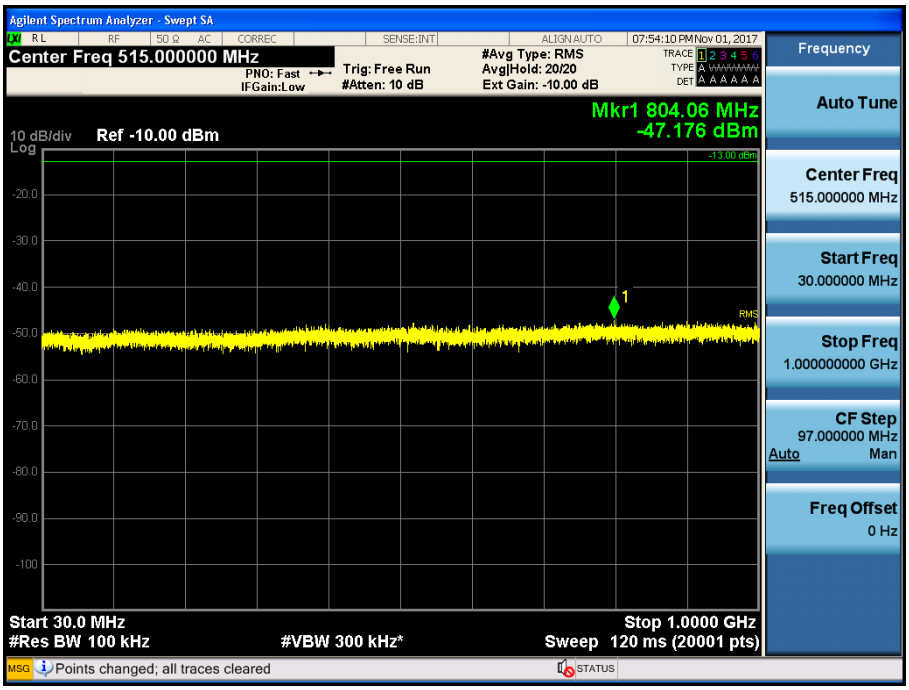


Conducted Spurious Emissions (30 MHz – 1 GHz)

[Downlink Low]



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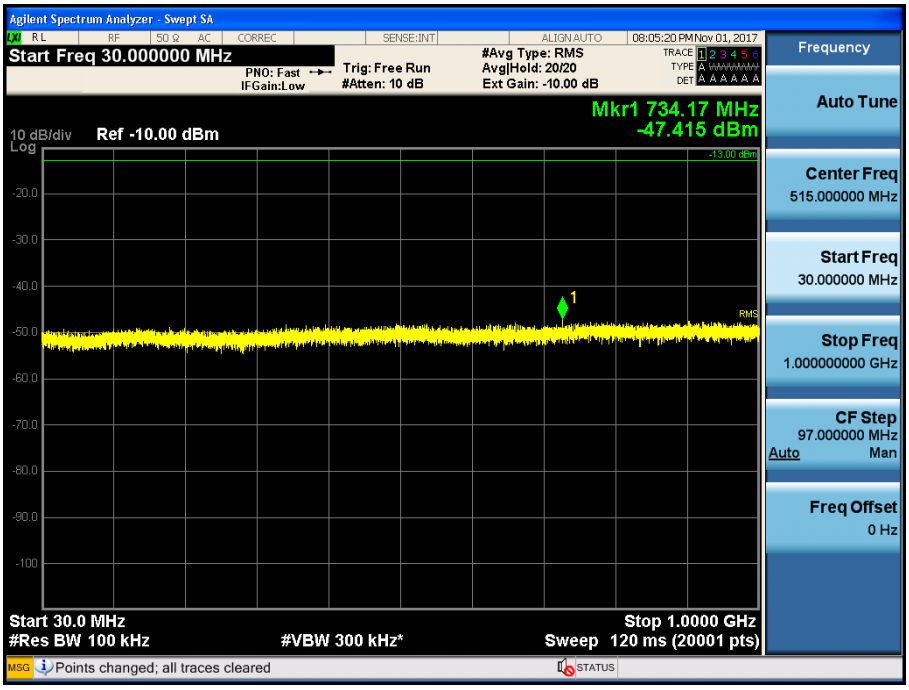

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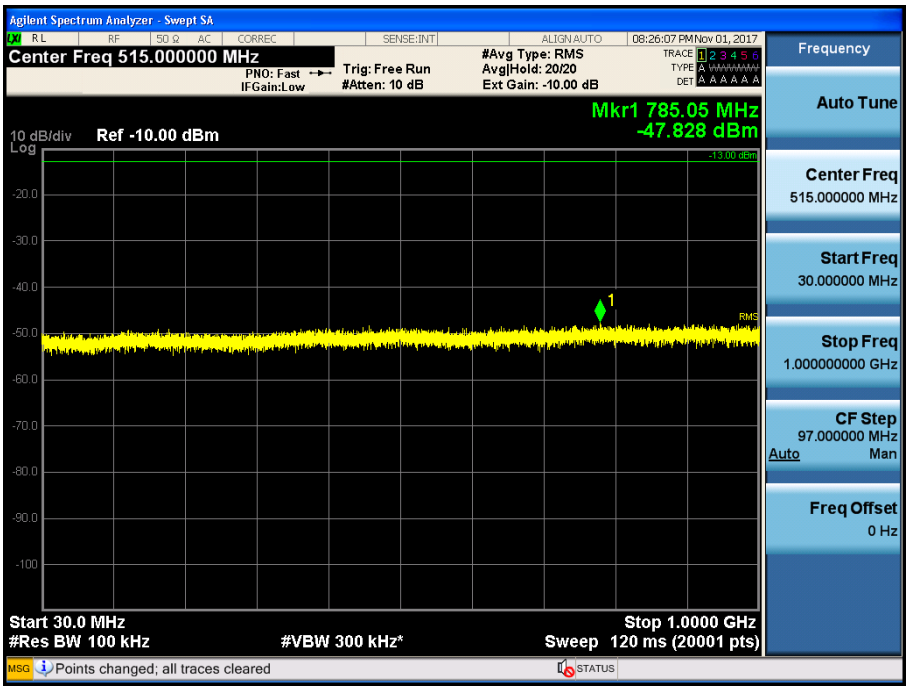
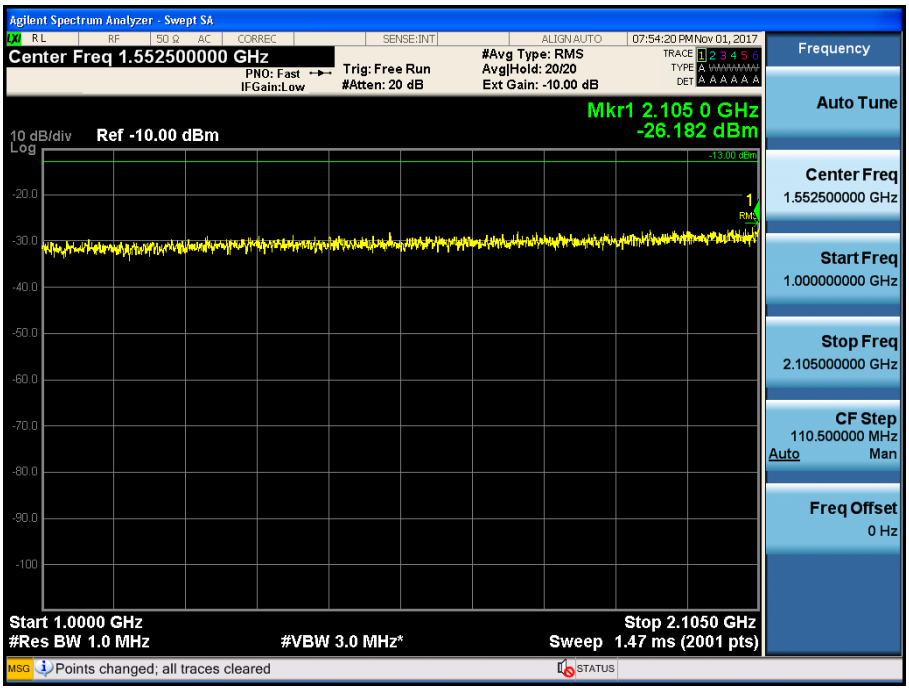


Conducted Spurious Emissions (1 GHz – 2.105 GHz)

[Downlink Low]



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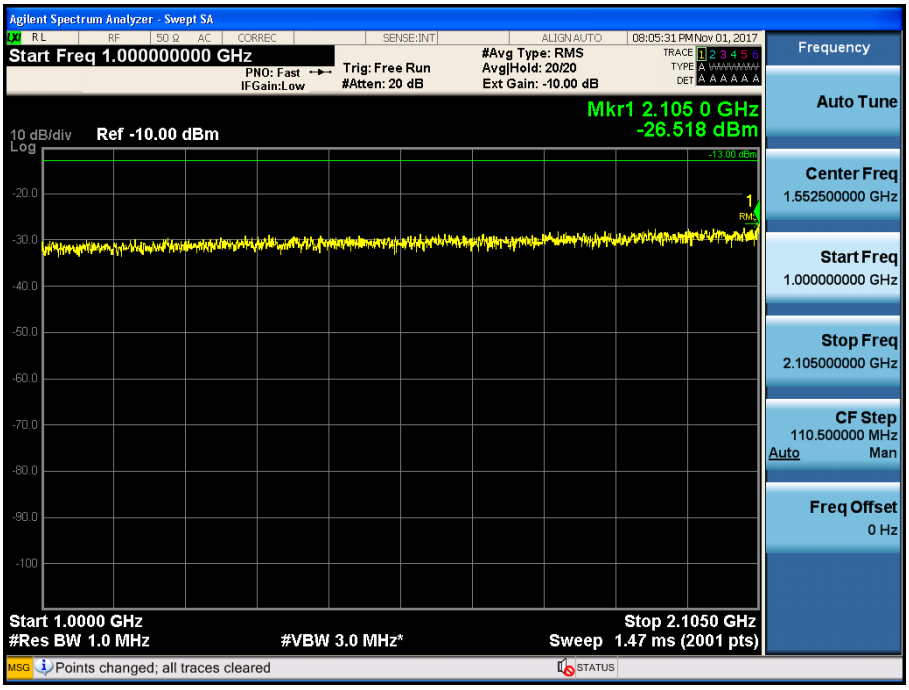

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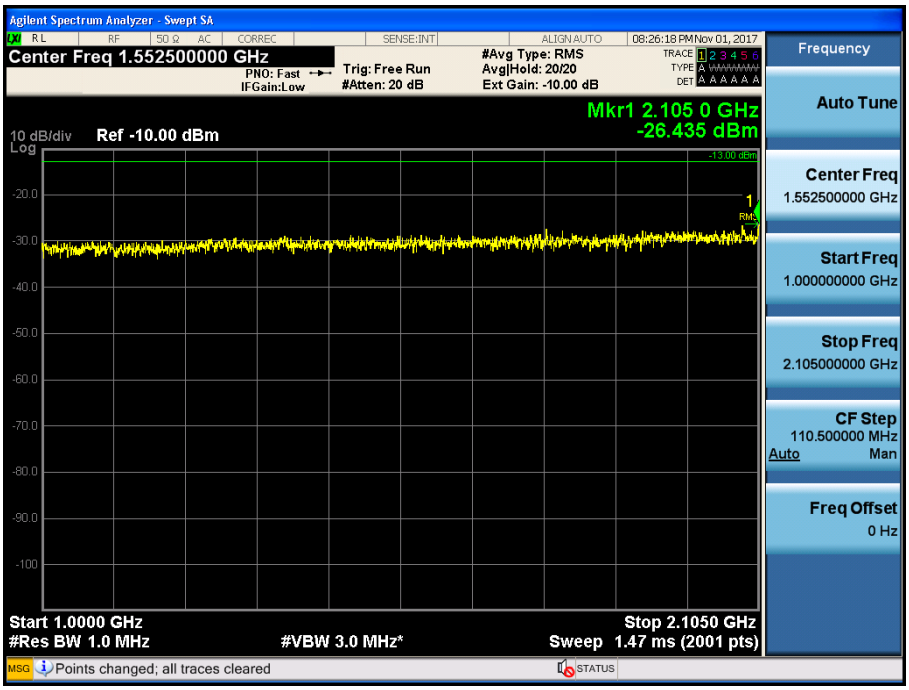

Conducted Spurious Emissions (2.185 GHz – 12.75 GHz)

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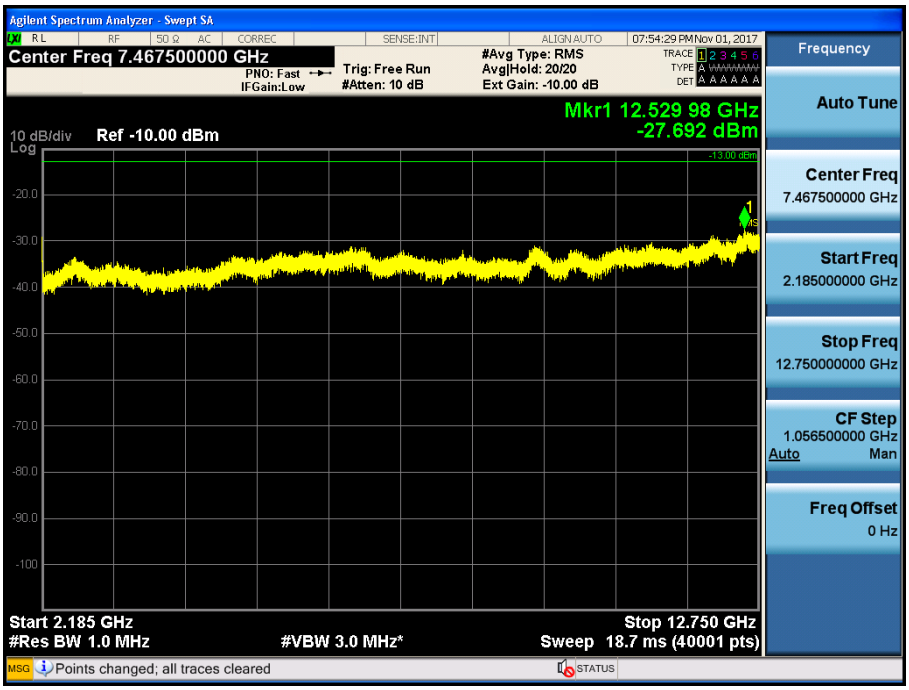

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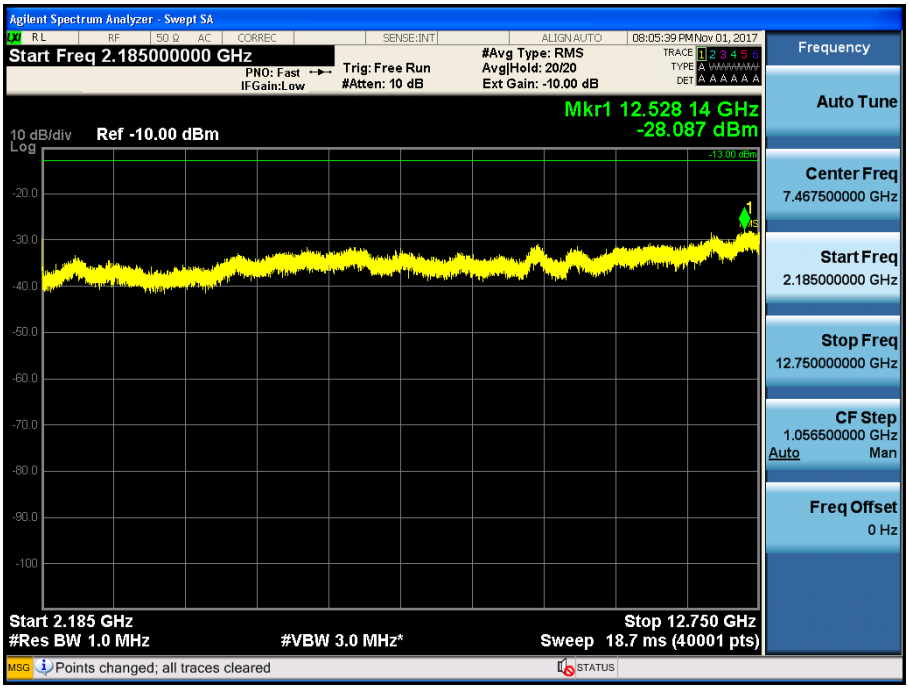

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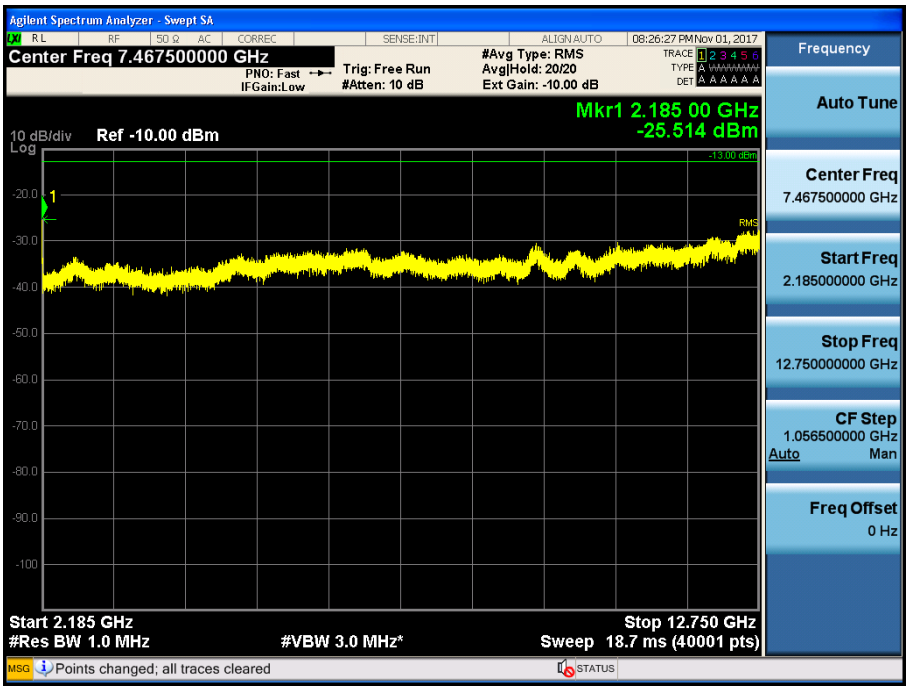

Conducted Spurious Emissions (12.75 GHz – 26.5 GHz)

[Downlink Low]

[Downlink Middle]