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FCC /IC REPORT

Certification

Applicant Name:
SOLiD, Inc.

Address:
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Date of Issue:
April 11, 2016

Location:
HCT CO., LTD.,
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Report No.: HCT-R-1604-F030-1
HCT FRN: 0005866421
IC Recognition No.: 5944A-5

FCC ID:	**W6U700FB8085**
IC:	**9354A-700FB8085**
APPLICANT:	**SOLiD, Inc**

FCC/ IC Model(s):	L2RDU_8085_700FB
EUT Type:	Alliance_2W
Frequency Ranges:	729 MHz ~746 MHz (700 LTE Lower) / 746 MHz ~756 MHz (700 LTE Upper) 862 MHz ~869 MHz (800 IDEN) /869 MHz ~894 MHz (850 CEL)
Conducted Output Power:	2 W (33 dBm)
Date of Test:	February 29, 2016 ~ April 11, 2016
FCC Rule Part(s):	CFR 47, Part 22, Part 27, Part 90
IC Rules :	RSS-Gen (Issue 4, November 2014), RSS-131 (Issue 2, July 2003)

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
: Hwang Gu Kim
Test engineer of RF Team

Approved by
: Kyoung Houn Seo
Manager of RF Team

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1604-F030	April 04, 2016	- First Approval Report
HCT-R-1604-F030-1	April 11, 2016	- Add Test Requirements -Add the test 800 IDEN Band edge

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1. CLIENT INFORMATION

The EUT has been tested by request of

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

FCC ID:	W6U700FB8085
IC:	9354A-700FB8085
EUT Type:	Alliance_2W
FCC/ IC Model(s):	L2RDU_8085_700FB
FCC Frequency Ranges:	729 MHz ~746 MHz (700 LTE Lower) / 746 MHz ~756 MHz (700 LTE Upper) 862 MHz ~869 MHz (800 IDEN) /869 MHz ~894 MHz (850 CEL)
Conducted Output Power:	2 W (33 dBm)
Antenna Gain(s):	Manufacturer does not provide an antenna.
Measurement standard(s):	ANSI/TIA-603-C-2004, KDB 971168 D01 v02r02 KDB 935210 D02 v03r01, KDB 935210 D05 v01r01, RSS-131 (Issue 2, July 2003)
FCC Rule Part(s):	CFR 47, Part 22, Part 27, Part 90
IC Rules Part(s):	RSS-Gen (Issue 4, November 2014), RSS-131 (Issue 2, July 2003)
Place of Tests:	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA(IC Recognition No. : 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 :2003) 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 Part22, Part 27, Part 90, RSS-GEN, RSS-131.

Description	Reference (FCC)	Reference (IC)	Results
Conducted RF Output Power	§2.1046; §27.50 §22.913, §90.635	RSS-131, Section 4.3 RSS-131, Section 6.2 SRSP-502, SRSP-503, SRSP-518	Compliant
Occupied Bandwidth	§2.1049	RSS-GEN, Section 6.6	Compliant
Passband Gain and Bandwidth & Out of Band Rejection	KDB 935210 D02 v03	RSS-131, Section 4.2 RSS-131, Section 6.1	Compliant
Spurious Emissions at Antenna Terminals	§2.1051, §27.53 §22.917, §90.691	RSS-131, Section 4.4 RSS-131, Section 6.3 RSS-131, Section 6.4	Compliant
Radiated Spurious Emissions	§2.1053, §27.53 §22.917	-	Compliant
Frequency Stability	§2.1055, §27.54, §22.355, §90.213	RSS-131, Section 4.5 RSS-131, Section 6.5	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.

Band Info	Modulation
700 MHz	LTE(5 MHz), LTE(10 MHz)
800 IDEN	LTE(5 MHz), CDMA
850 Cellular	LTE(5 MHz), LTE(10 MHz) CDMA, UMTS

- Note

  800IDEN and 850CEL is same the RU. Different use BIU only.

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
Passband Gain and Bandwidth & Out of Band Rejection	Gain 20 dB bandwidth	± 0.89 dB ± 0.58 MHz
Spurious Emissions at Antenna Terminals	-	± 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	Cal Interval	Calibration Date	Serial No.
Agilent	E4438C /Signal Generator	Annual	09/02/2015	MY42082646
Agilent	N5182A /Signal Generator	Annual	04/07/2015	MY50141649
Agilent	N5182A /Signal Generator	Annual	05/13/2015	MY47070230
NANGYEUL CO., LTD.	NY-THR18750 / Temperature and Humidity Chamber	Annual	10/27/2015	NY-2009012201A
Agilent	N9020A /Signal Analyzer	Annual	02/29/2016	MY46471587
WEINSCHEL	67-30-33 / Fixed Attenuator	Annual	10/29/2015	BR5347
DEAYOUNG ENT	DFSS60 / AC Power Supply	Annual	04/07/2016	1003030-1
Rohde & Schwarz	FSP / Spectrum Analyzer	Annual	09/24/2015	100688
CERNEX, Inc	CBLU1183540/AMP	Annual	07/21/2015	22964
WEINSCHEL	1506A/Power Divider	Annual	10/21/2015	MD793
Schwarzbeck	BBHA 9120D / Horn Antenna	Biennial	07/30/2015	1151
Schwarzbeck	VULB 9160 / TRILOG Antenna	Biennial	10/10/2014	9160-3368
HD	MA240 / Antenna Position Tower	N/A	N/A	556
EMCO	1050 / Turn Table	N/A	N/A	114
HD GmbH	HD 100 / Controller	N/A	N/A	13
HD GmbH	KMS 560/ SlideBar	N/A	N/A	12

6. RF OUTPUT POWER

FCC Rules

Test Requirements:

§ 2.1046 Measurements required: RF power output:

§ 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 § 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.

§ 2.1046 (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.

§ 2.1046 (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.

§ 22.913 Effective radiated power limits. The effective radiated power (ERP) of transmitters in the Cellular Radiotelephone Service must not exceed the limits in this section.

(a) Maximum ERP. In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. However, for those systems operating in areas more than 72 km (45 miles) from international borders that:

(1) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or,

(2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in § 22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

§ 27.50 Power limits and duty cycle.

(b) The following power and antenna height limits apply to transmitters operating in the 746-758 MHz, 775-788 MHz and 805-806 MHz bands:

(4) Fixed and base stations transmitting a signal in the 746-757 MHz and 776-787 MHz bands with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz ERP in accordance with Table 3 of

this section.

(5) Fixed and base stations located in a 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, and transmitting a signal in the 746-757 MHz and 776-787 MHz bands with an emission bandwidth greater than 1 MHz must not exceed an ERP of 2000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 2000 watts/MHz ERP in accordance with Table 4 of this section.

(c) The following power and antenna height requirements apply to stations transmitting in the 600 MHz band and the 698-746 MHz band: permitted if power levels are reduced below 1000 watts/MHz ERP in accordance with Table 3 of this section;

(4) Fixed and base stations located in a 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, and transmitting a signal with an emission bandwidth greater than 1 MHz must not exceed an ERP of 2000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 2000 watts/MHz ERP in accordance with Table 4 of this section;

(5) Licensees, except for licensees operating in the 600 MHz downlink band, seeking to operate a fixed or base station located in a 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, and transmitting a signal at an ERP greater than 1000 watts must:

§90.635 Limitations on power and antenna height.

(a) The effective radiated power and antenna height for base stations may not exceed 1 kilowatt (30 dBw) and 304 m. (1,000 ft.) above average terrain (AAT), respectively, or the equivalent thereof as determined from the Table. These are maximum values, and applicants will be required to justify power levels and antenna heights requested. (b) The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw).

Antenna height (AAT) in meters (feet)	**Effective radiated power (watts)**
Above 1372 (4500)	65
Above 1220 (4000) To 1372 (4500)	70
Above 1067 (3500) To 1220 (4000)	75
Above 915 (3000) To 1067 (3500)	100

Above 763 (2500) To 915 (3000)	140
Above 610 (2000) To 763 (2500)	200
Above 458 (1500) To 610 (2000)	350
Above 305 (1000) To 458 (1500)	600
Up to 305 (1000)	1000

Test Procedures:

Measurements were in accordance with the test methods section 3.5.2 of KDB 935210 D05 v01r01.

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.

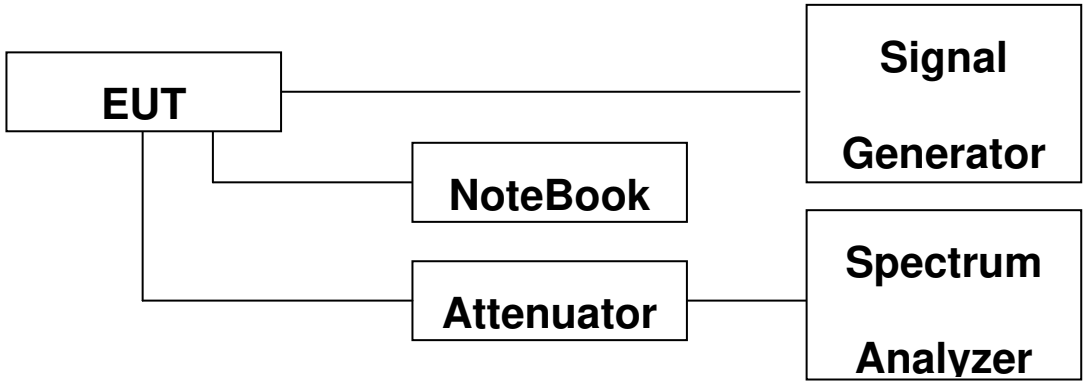
h) Repeat steps f) and g) with input signal amplitude set to 3 dB above the AGC threshold level.

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.



Block Diagram 1. RF Power Output Test Setup

IC Rules

Test Requirements:

SRSP-502

6.3 Technical Requirements

6.3.1 Radiated Power and Antenna Height Limits

Within the sharing and protection zones, the ERP will be subject to the limitations in tables C3 and C4 of Annex C. Outside the sharing and protection zones, the ERP shall be limited to that necessary to provide the required service as determined by the system requirements. Systems requiring an ERP greater than 125 watts may require additional justification and will be considered on a case−by−case basis by the local spectrum management office.

C3 Limits of Effective Radiated Power and Antenna Height for General Sharing Arrangements

Effective Radiated Power (ERP) is defined as the product of the power supplied to the antenna and its gain relative to a half−wave dipole in a given direction.

C3.1 For base stations in Sharing Zones I (include Sectors 1 and 2) and III, and the Protection Zones, Table C3 lists the limits of Effective Radiated Power (ERP) corresponding to the Effective Antenna Height (EAH) ranges shown. In this case, Effective Antenna Height is calculated by subtracting the Assumed Average Terrain Elevation given in Table C5 from the antenna height above mean sea level.

Table C3 — Limits of Effective Radiated Power (ERP) Corresponding to Effective Antenna Heights of Base Stations in Sharing Zones I (including Sectors 1 and 2) and III, and the Protection Zones

Effective Antenna Height (EAH) in Metres	ERP Watts (Maximum)
Up to 153	500
Above 153 to 306	125
Above 306 to 458	40
Above 458 to 610	20
Above 610 to 915	10
Above 915 to 1067	6
Above 1067	5

C3.2 For base stations in Sharing Zone II, Table C4 lists the limits of Effective Radiated Power (ERP) corresponding to the antenna height above mean sea level (AMSL) ranges shown.

Table C4 — Limits of Effective Radiated Power (ERP) Corresponding to Antenna Heights Above Mean Sea Level of Base Stations in Sharing Zone II	
Antenna Height Above Mean Sea Level (AMSL) in Metres	**ERP Watts (Maximum)**
Up to 504	500
Above 504 to 610	350
Above 610 to 763	200
Above 763 to 915	140
Above 915 to 1067	100
Above 1067 to 1220	75
Above 1220 to 1372	70
Above 1372 to 1523	65
Above 1523	5

SRSP-503

5. Technical Criteria

5.1 Power and Antenna Height Limitations

5.1.1 The maximum effective radiated power (ERP) for base stations shall be 100 watts for analogue systems and 500 watts per channel for digital systems.

5.1.2 Notwithstanding of section 5.1.1, outside of metropolitan areas along transportation corridors, when a directional antenna is used, the maximum allowable ERP of analogue systems shall not exceed 500 watts.

5.1.3 The maximum ERP shall be 6.3 watts for mobile stations.

5.1.4 The ERP and antenna height shall be limited to that necessary to provide the required service as governed by the system requirements.

5.1.5 A reduction in ERP from that specified in paragraphs 5.1.1 and 5.1.2 is required for base station antenna heights in excess of 150 meters above average terrain (AAT) as follows:

Antenna Height up to: (AAT) (meter)	150	180	210	240	270	300	450
Power Reduction (dB)	0.0	1.8	3.5	4.5	6.0	7.0	11.0

SRSP-518

5. Technical Criteria

5.1 Radiated Power and Antenna Height Limits

5.1.1.2 For fixed and base stations transmitting in accordance with sections 4.1.1 to 4.1.3 within

the frequency range 716-756 MHz with a channel bandwidth greater than 1 MHz, the maximum permissible e.i.r.p. is 1640 watts/MHz (i.e. no more than 1640 watts e.i.r.p. in any 1 MHz band segment) with a HAAT up to 305 metres. The same e.i.r.p. limit also applies to fixed and base stations operating at any frequency in the 700 MHz band in accordance with Section 4.1.4.
5.1.1.4 For all installations with an antenna HAAT in excess of 305 metres, a corresponding reduction in e.i.r.p. according to the following formula shall be applied:
EIRPreduction =20 log10(HAAT/305) dB

RSS-131 6.2

The manufacturer's output power rating Prated MUST NOT be greater than Pmean for all types of enhancers.

Additional Power Back-off Condition for Multiple Carrier Operations:

An example of a single carrier operation is a band translator that incorporates an (IF) filter of a passband equal to one channel bandwidth. Another example of a single carrier operation is the use of an enhancer, before the connection to the antenna, to boost a low power transmitter (single carrier) to a higher power.

An example of a multiple carrier operation is the use of an enhancer to amplify off-air signals that contain the wanted carrier and two (or more) adjacent band carriers. If the enhancer passband is wide enough to pass more than the wanted channel bandwidth, the enhancer output stage will be loaded by the multiple carriers.

Examination: with 3 carrier signals (of assumed equal level), the peak voltage will be 3 times the single carrier voltage. The corresponding Peak Envelope Power (PEP) will be 3^2 times greater than a single carrier or 9/4 = 2.25 times greater than 2 tones PEP. Therefore the permissible wanted signal operating point has to be backed off by 3.5 dB (i.e. **Ppermissible = Prated - 3.5 dB**).

Note 1: All enhancers will be classified in the Radio Equipment List (REL) for a single carrier operation.

Note 2: For a multiple carrier operation, the rating must be reduced by 3.5 dB or more.

Note 3: If there are more than 3 carriers present at the amplifier input point, greater power back-off may be required. This can be examined on a case-by-case basis.

Test Procedures: RSS-131 4.3

4.3.1 Multi-channel Enhancer

The following subscript "o" denotes a parameter at the enhancer output point.

Connect two signal generators to the input of the Device Under Test (DUT), via a proper impedance matching network (and preferably via a variable attenuator) so that the two input signals are equal sinusoids (and can be raised equally).

Connect a dummy load of suitable load rating to the enhancer output point. Connect also a spectrum analyser to this output point via a coupling network and attenuator, so that only a portion of the output signal is coupled to the spectrum analyser. The coupling attenuation shall be stated in the test report.

Set the two generator frequencies f1 and f2 such that they and their third-order intermodulation product frequencies, f3= 2f1-f2 and f4 = 2f2 - f1, are all within the passband of the DUT.

Raise the input level to the DUT while observing the output tone levels, Po1 and Po2, and the intermodulation product levels, Po3 and Po4.

For enhancers rated 500 watts or less: Raise the input level to the DUT until the greater level of the intermodulation products at the enhancer output terminals, Po3 or Po4, equals -43 dBW.
For enhancers rated over 500 watts: Raise the input level to the DUT until the greater level of the intermodulation products at the enhancer output terminals, Po3 or Po4, is 67 dB below the level of either output tone level, Po1 or Po2.
Record all signal levels and their frequencies. Calculate the mean output power (Pmean) under this testing condition using Pmean = Po1 + 3 dB.

4.3.2 Single Channel Enhancer

A suitably modulated signal, representative of the technology for which certification is sought, is applied to the input of the amplifier. The input power level is increased until the manufacturer's rated input power level is achieved or until a 2 dB increase in input level results in a 1 dB increase in output level (i.e. compression begins). Record the output power in the 99% emission bandwidth using any suitable means.

Test Results:

Input Signal	Input Level (dBm)	Maximum Amp Gain
700 LTE Lower	-10 dBm	43 dB
700 LTE Upper	-10 dBm	43 dB
800 IDEN	-10 dBm	43 dB
850 CEL	-10 dBm	43 dB

Single channel Enhancer

* 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)
700LTE_ LTE 5 MHz AGC threshold	Low	731.50	33.02	2.005
	Middle	742.50	33.05	2.017
	High	753.50	33.01	2.000
700LTE_ LTE 5 MHz +3dBm above the AGC threshold	Low	731.50	33.07	2.028
	Middle	742.50	33.05	2.018
	High	753.50	33.01	2.001
700LTE_ LTE 10 MHz AGC threshold	Low	734.00	33.06	2.022
	Middle	742.50	33.04	2.015
	High	751.00	33.05	2.017
700LTE_ LTE 10 MHz +3dBm above the AGC threshold	Low	734.00	33.06	2.021
	Middle	742.50	33.05	2.017
	High	751.00	33.04	2.015

	Channel	Frequency (MHz)	Output Power	
			(dBm)	(W)
800IDEN/850CEL_ LTE 5 MHz AGC threshold	Low	864.50	33.04	2.011
	Middle	878.00	33.02	2.006
	High	891.50	33.03	2.010
800IDEN/850CEL_ LTE 5 MHz +3dBm above the AGC threshold	Low	864.50	33.09	2.039
	Middle	878.00	33.03	2.011
	High	891.50	33.03	2.011
850CEL_ LTE 10 MHz AGC threshold	Low	874.00	33.06	2.023
	Middle	881.50	33.04	2.016
	High	889.00	33.05	2.018
850CEL_ LTE 10 MHz +3dBm above the AGC threshold	Low	874.00	33.08	2.032
	Middle	881.50	33.06	2.024
	High	889.00	33.05	2.019

	Channel	Frequency (MHz)	Output Power	
			(dBm)	(W)
800 IDEN CDMA AGC threshold	Low	863.25	33.01	2.001
	Middle	-	-	-
	High	867.75	33.04	2.013
800 IDEN CDMA +3dBm above the AGC threshold	Low	863.25	33.06	2.021
	Middle	-	-	-
	High	867.75	33.06	2.022
850 CEL CDMA AGC threshold	Low	869.88	33.04	2.012
	Middle	-	-	
	High	893.10	33.07	2.028
850 CEL CDMA +3dBm above the AGC threshold	Low	869.88	33.07	2.029
	Middle	-	-	-
	High	893.10	33.08	2.033

	Channel	Frequency (MHz)	Output Power	
			(dBm)	(W)
850CEL_ WCDMA AGC threshold	Low	871.50	33.03	2.008
	Middle	881.50	33.04	2.014
	High	891.50	33.05	2.016
850CEL_ WCDMA +3dBm above the AGC threshold	Low	871.50	33.02	2.003
	Middle	881.50	33.07	2.026
	High	891.50	33.06	2.025

Multi-channel Enhancer for IC

* 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	
			Po1(dBm)	Pmean(dBm)
700 LTE	Low	729.40	30.37	33.37
	Middle	742.50	30.35	33.35
	High	755.60	30.18	33.18
800 IDEN	Low	862.40	30.29	33.29
	Middle	865.50	30.41	33.41
	High	868.60	30.44	33.44
850 CEL	Low	869.40	30.00	33.00
	Middle	881.50	30.21	33.21
	High	893.60	30.07	33.07

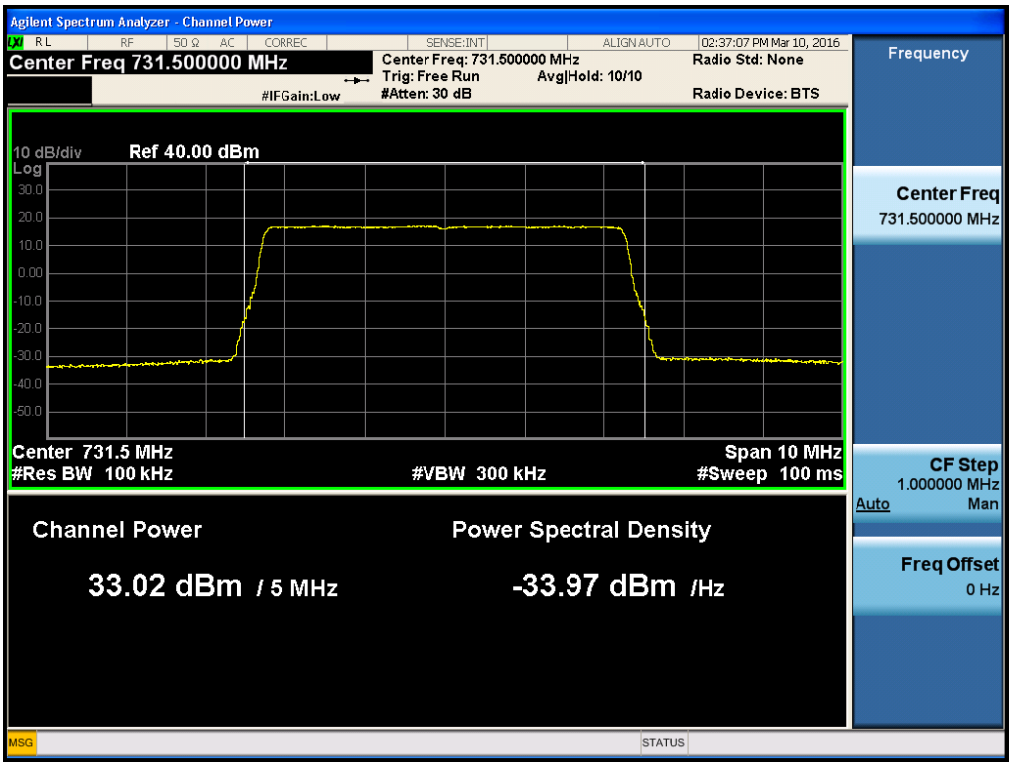
Additional Power Back-off Condition for Multiple Carrier Operations for IC

[Downlink]

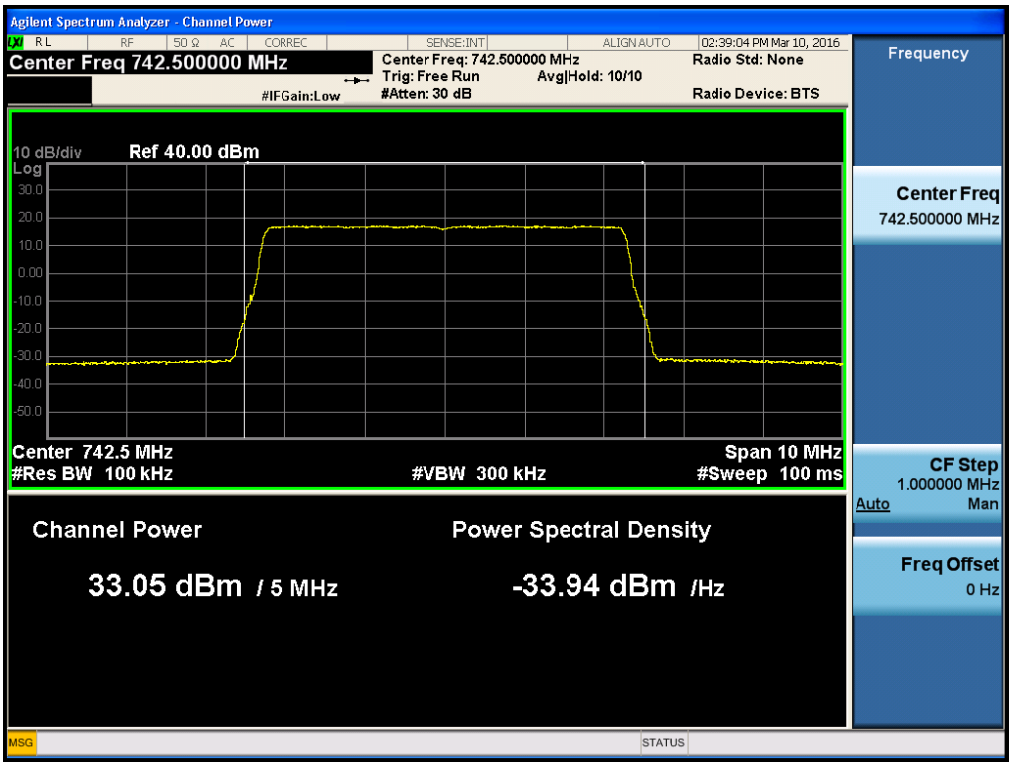
	1 Carrier (dBm)	3 Carrier (dBm)	Power Back-off (dB)
700 LTE	33.05	28.30	4.75
800 IDEN	33.01	28.31	4.70
850 CEL	33.02	28.24	4.78

Plots of RF Output Power_ 700 LTE _LTE5 MHz

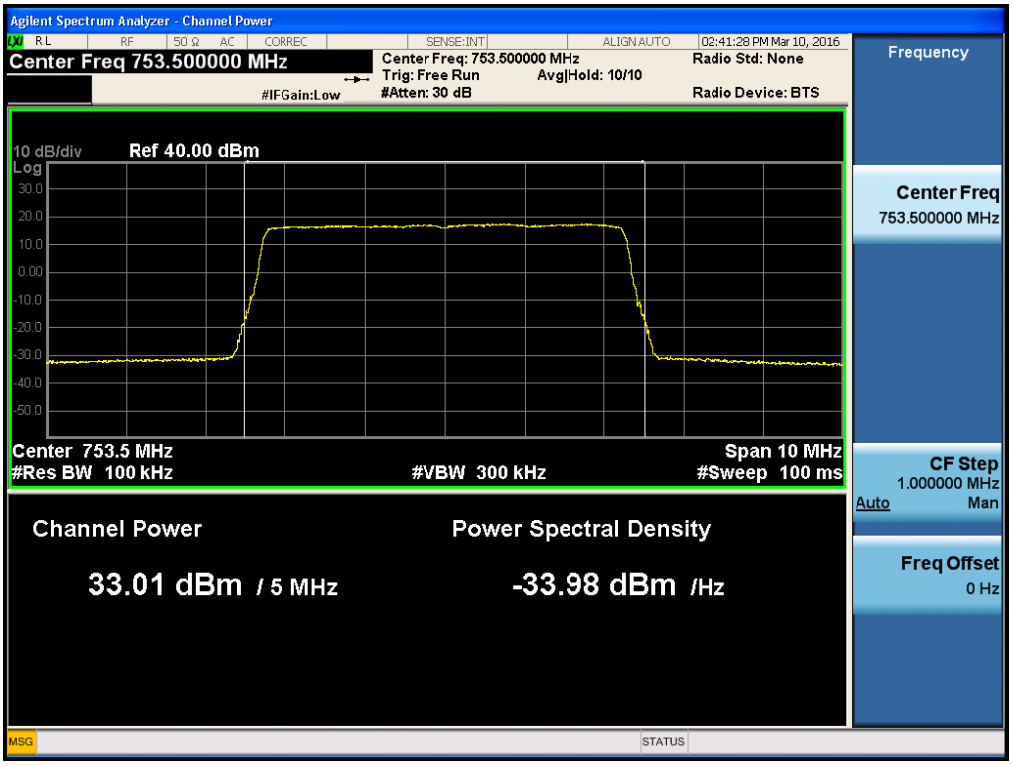
[AGC threshold Downlink Low]



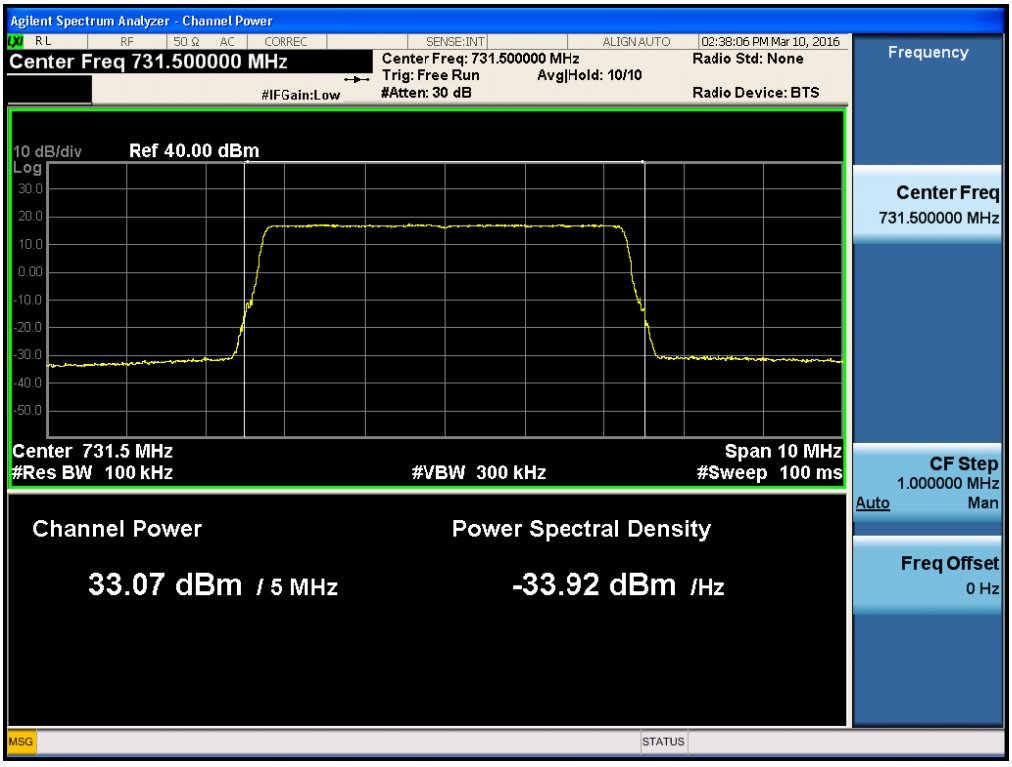
[AGC threshold Downlink Middle]



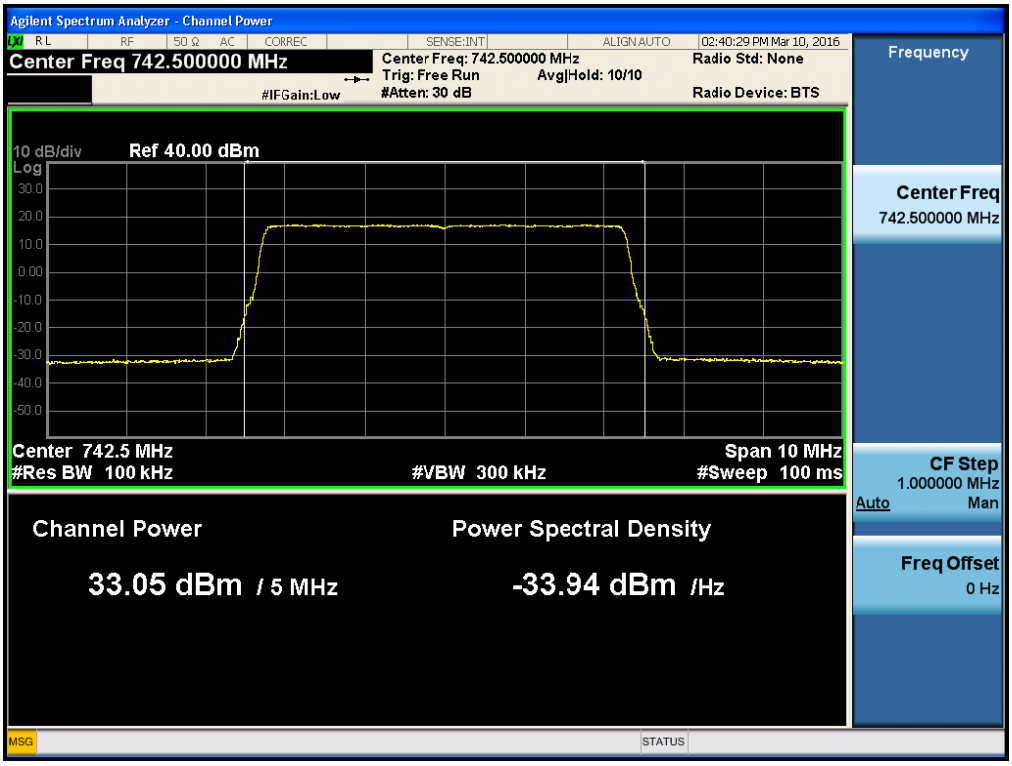
[AGC threshold Downlink High]



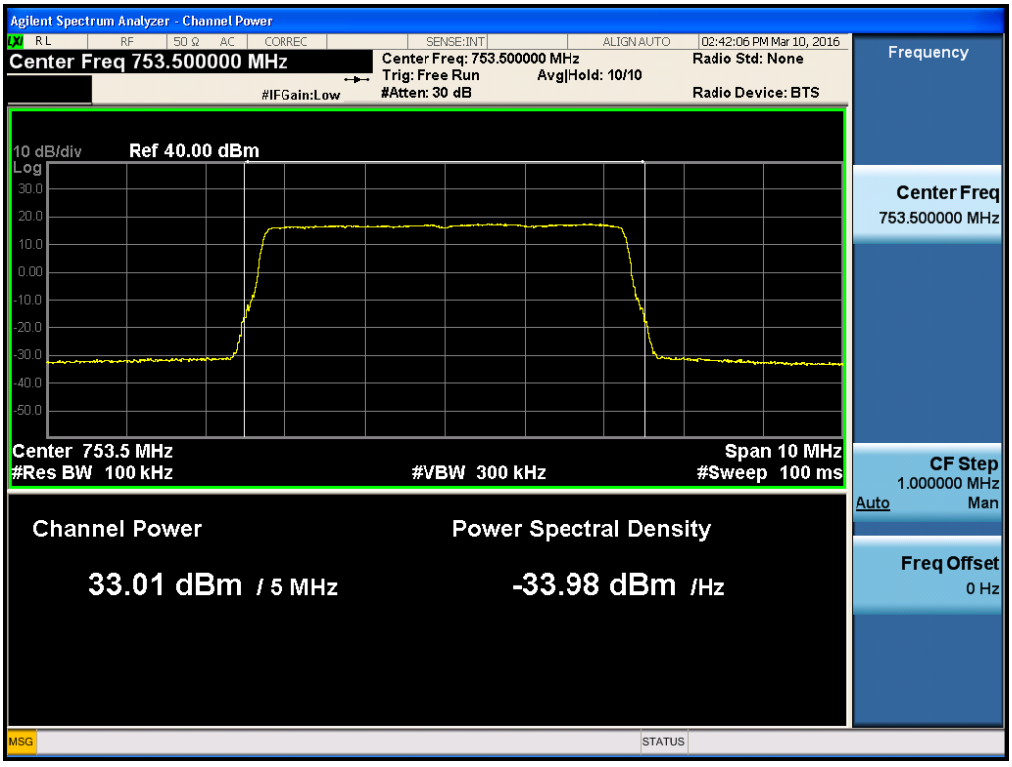
[+3dBm above AGC threshold Downlink Low]



[+3dBm above AGC threshold Downlink Middle]

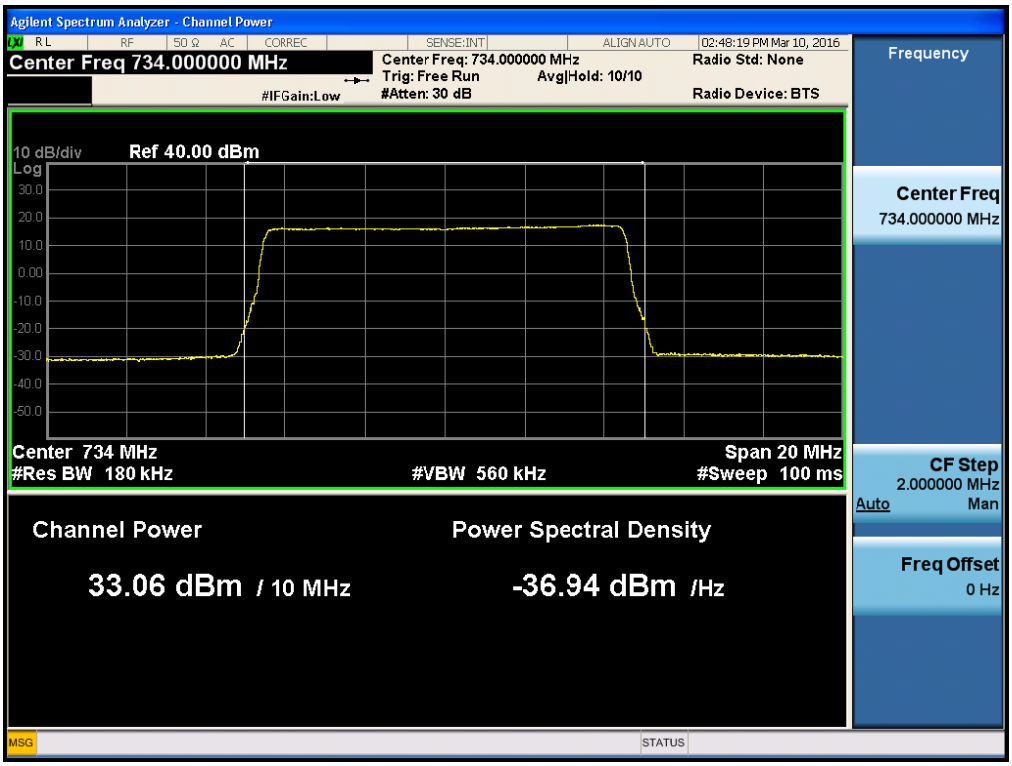


[+3dBm above AGC threshold Downlink High]

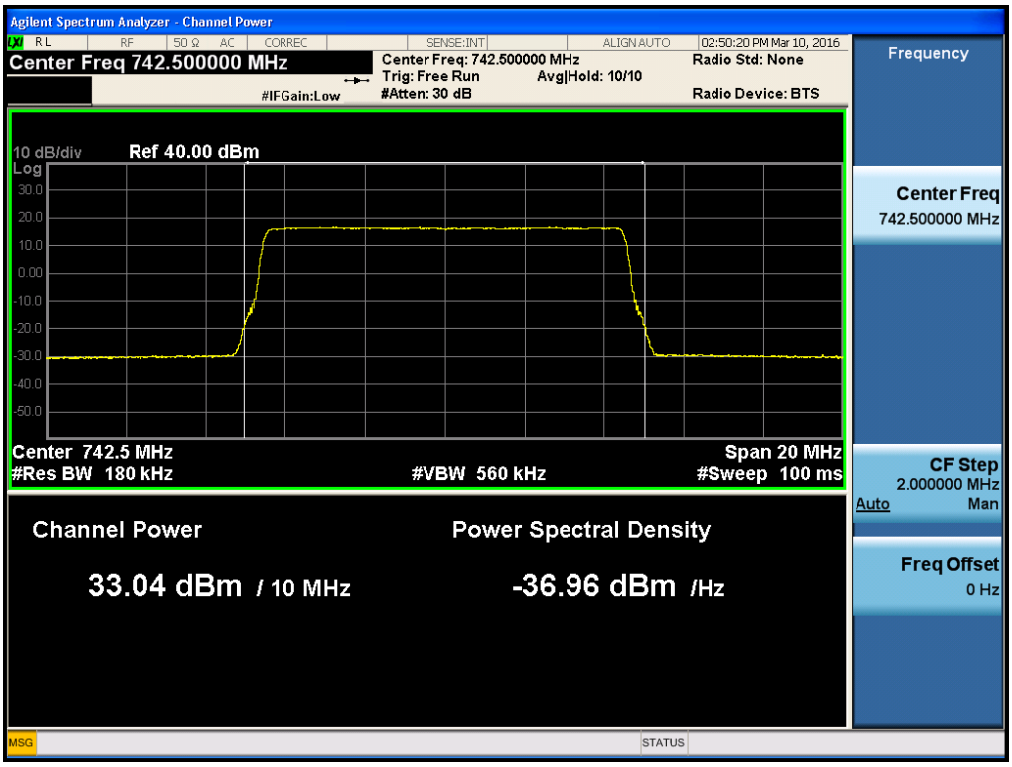


Plots of RF Output Power_ 700 LTE _LTE10 MHz

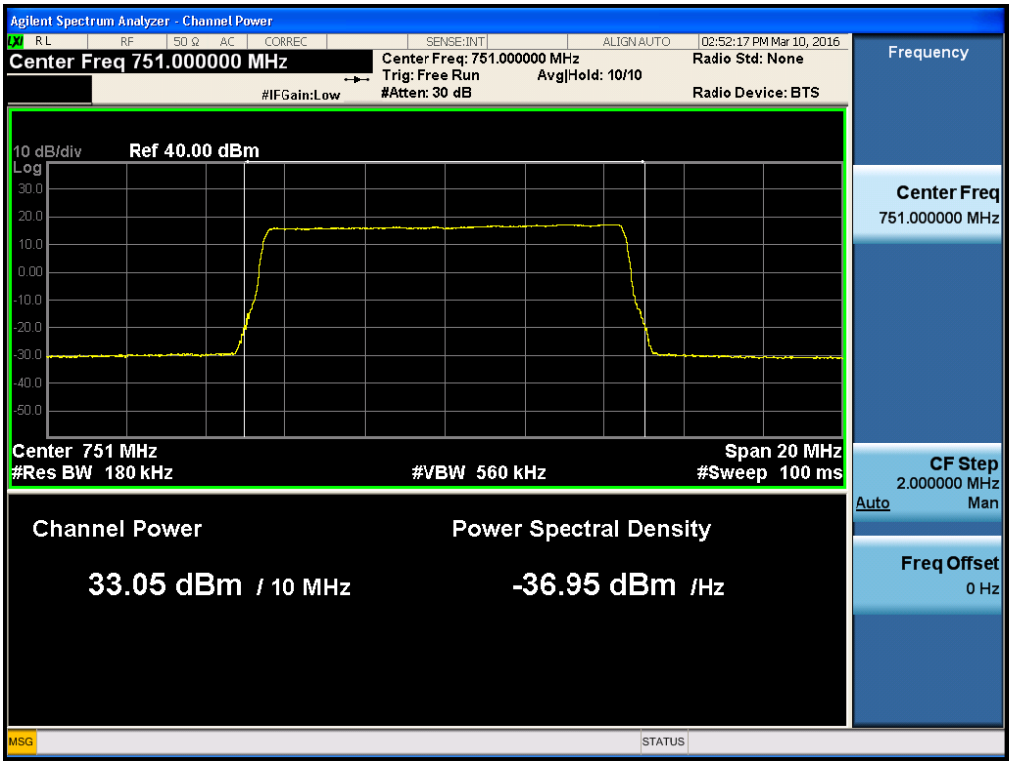
[AGC threshold Downlink Low]



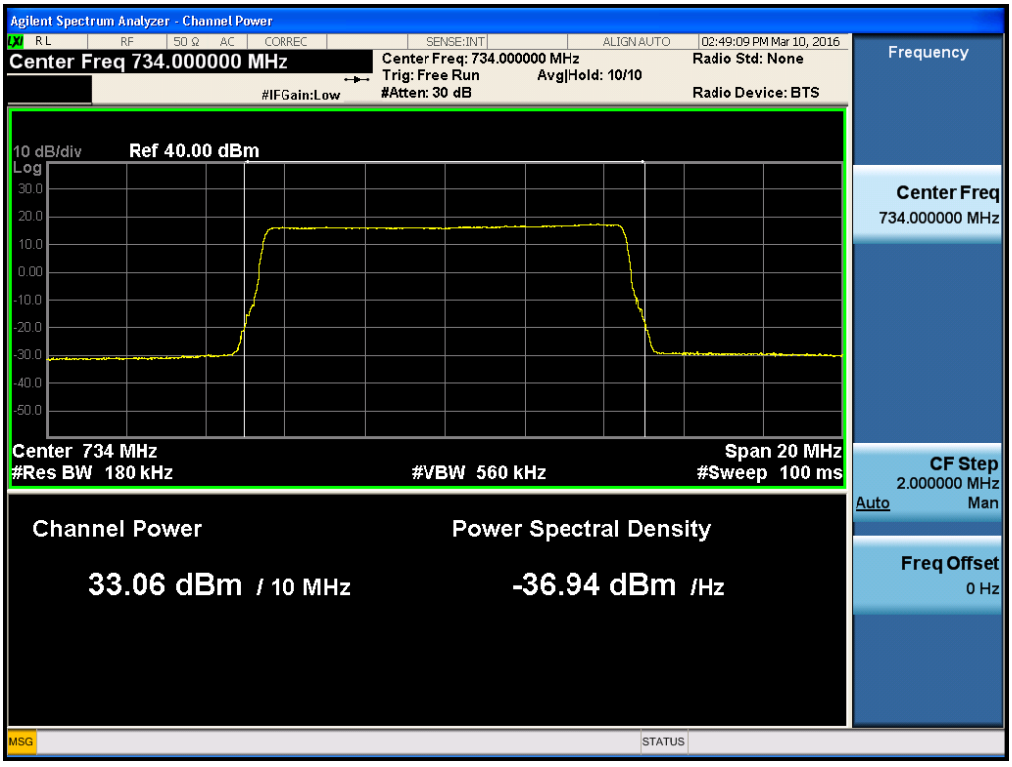
[AGC threshold Downlink Middle]



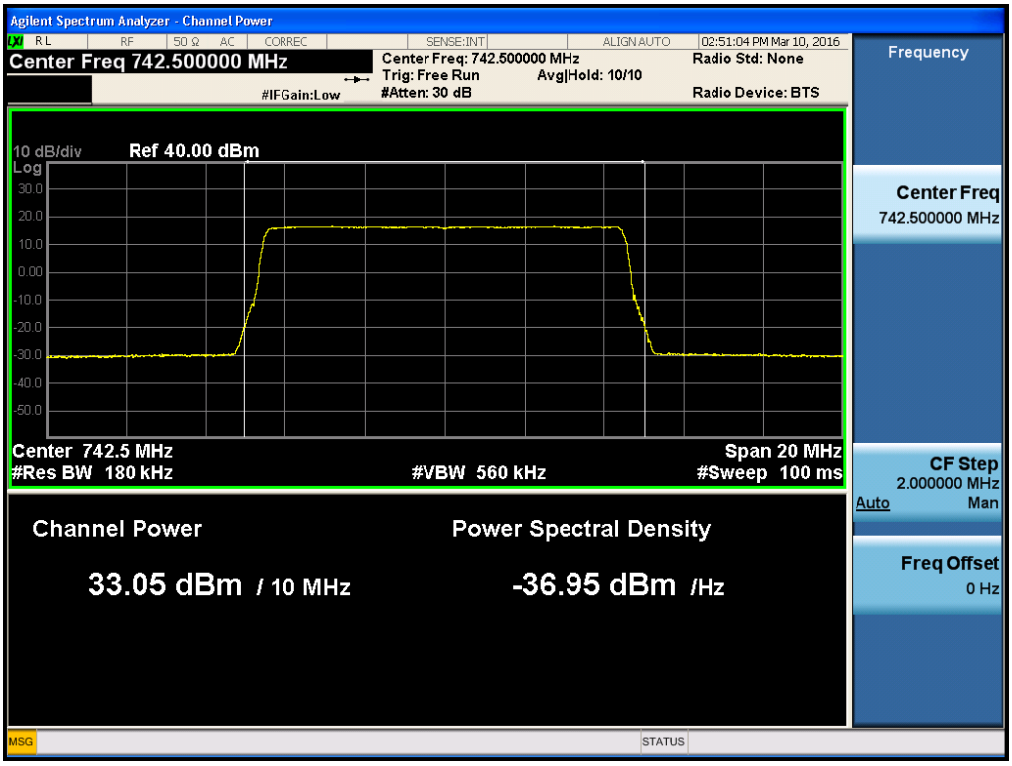
[AGC threshold Downlink High]



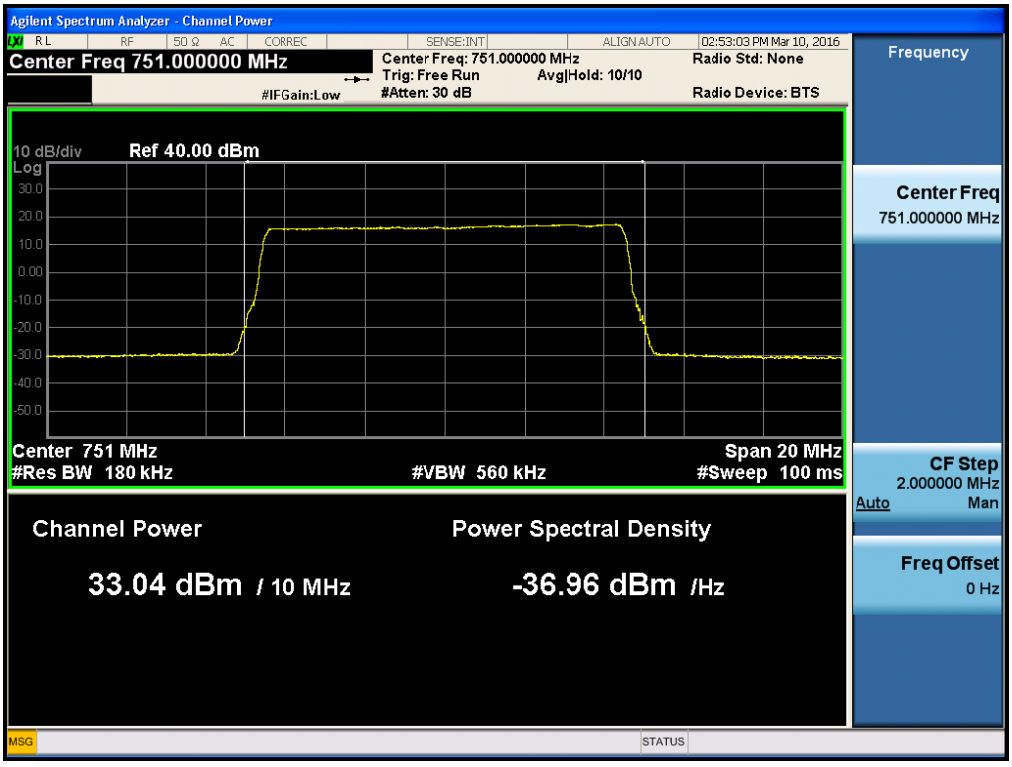
[+3dBm above AGC threshold Downlink Low]



[+3dBm above AGC threshold Downlink Middle]

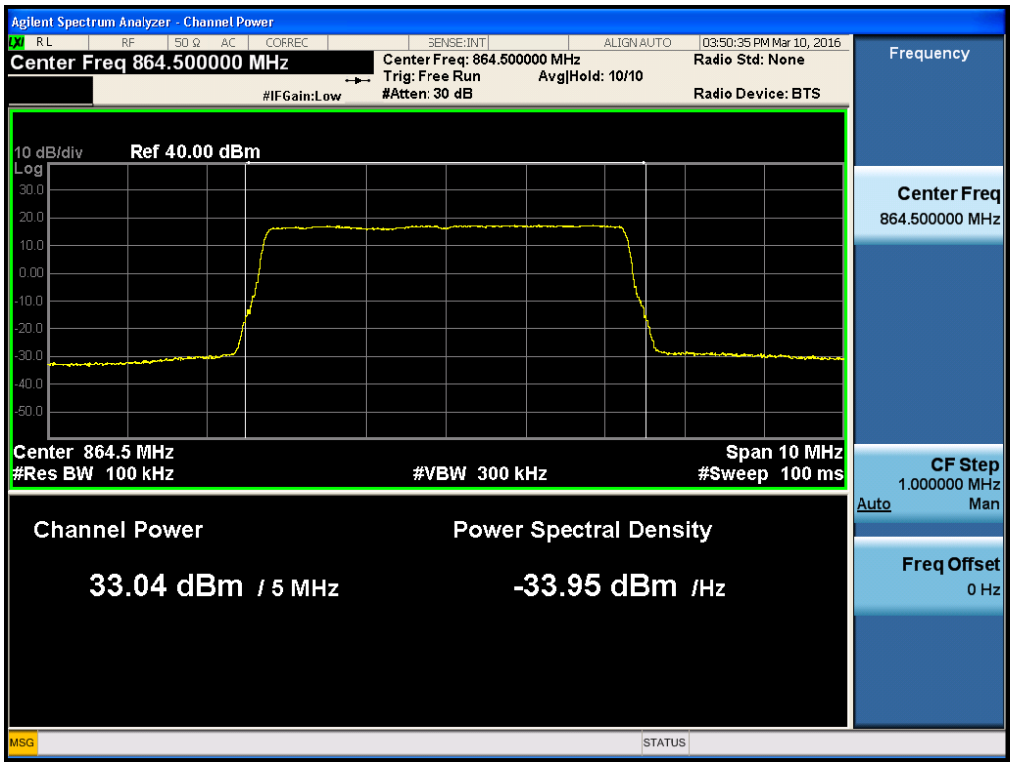


[+3dBm above AGC threshold Downlink High]

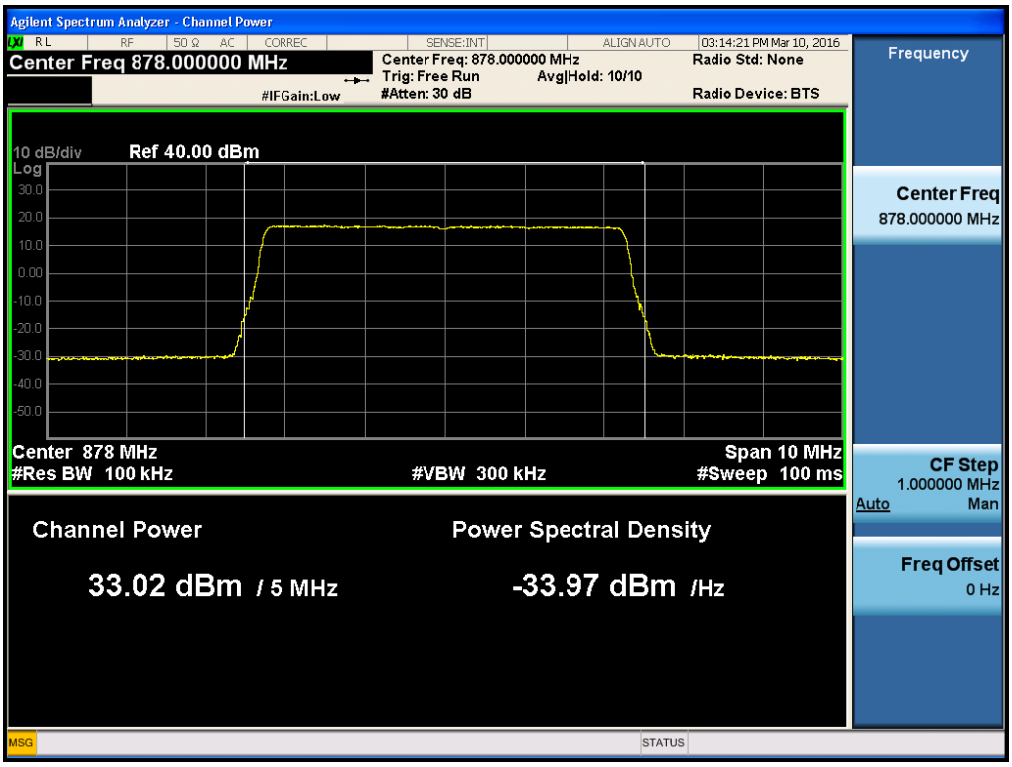


Plots of RF Output Power_800IDEN/850CEL _LTE5 MHz

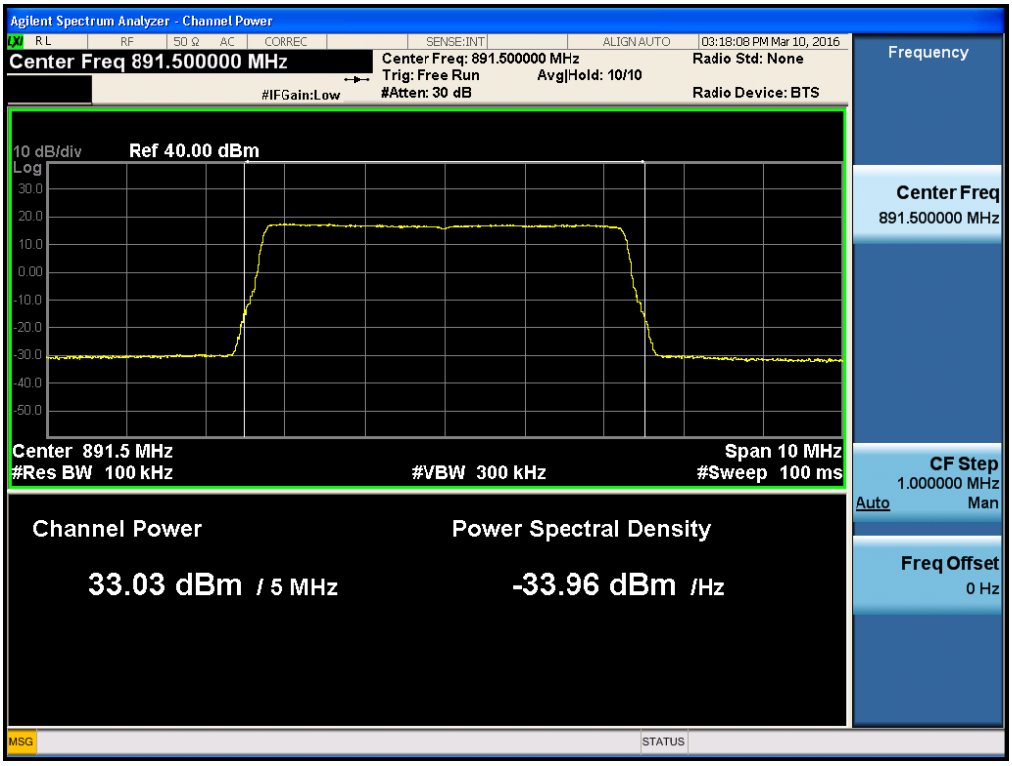
[AGC threshold Downlink Low]



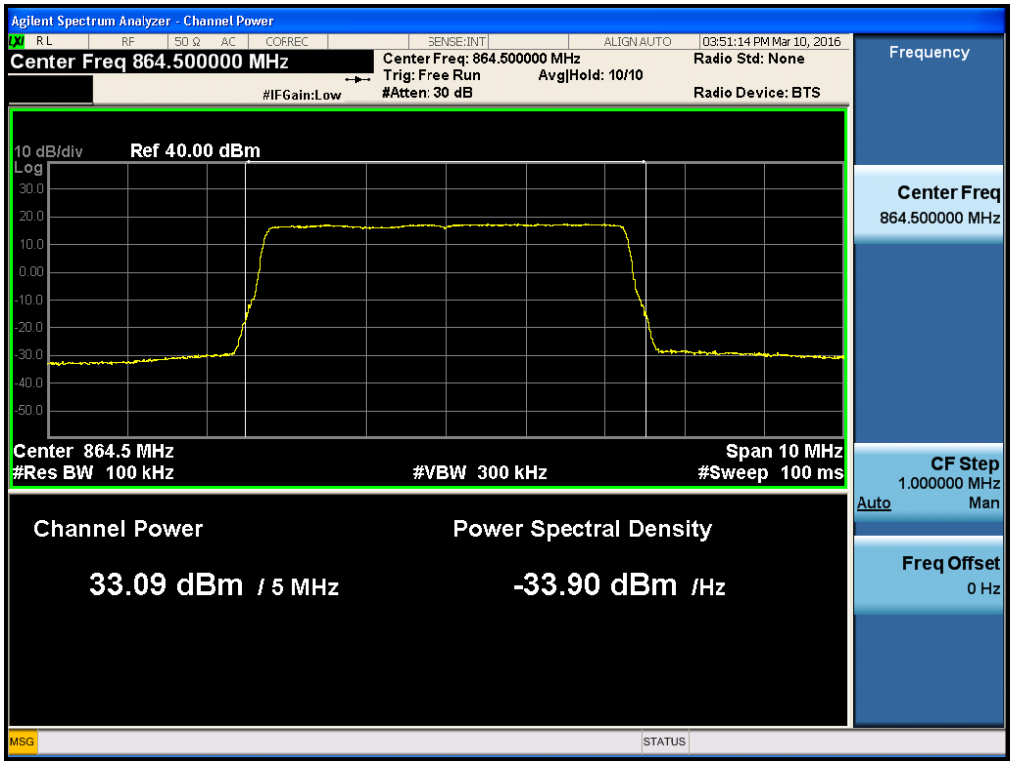
[AGC threshold Downlink Middle]



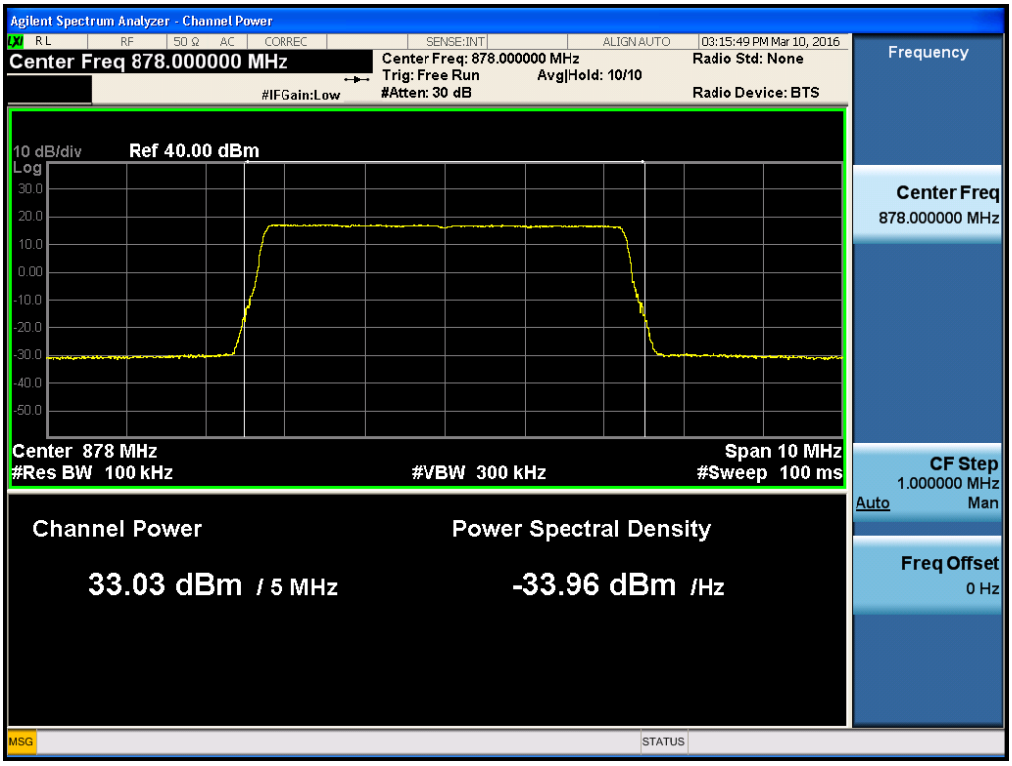
[AGC threshold Downlink High]



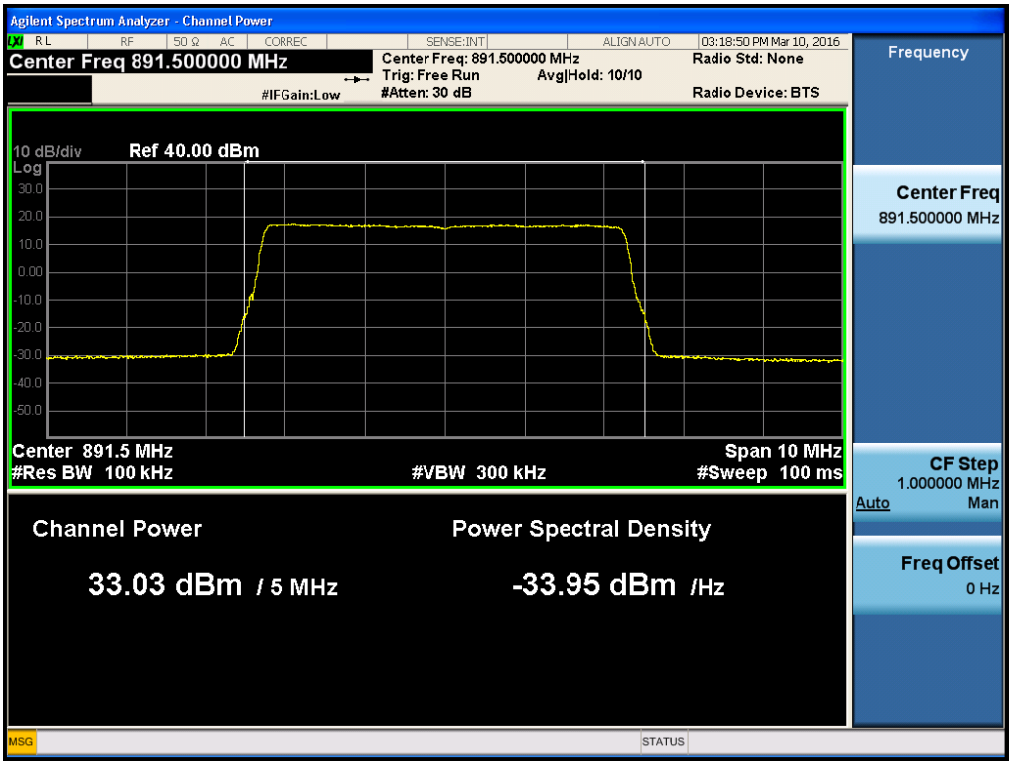
[+3dBm above AGC threshold Downlink Low]



[+3dBm above AGC threshold Downlink Middle]

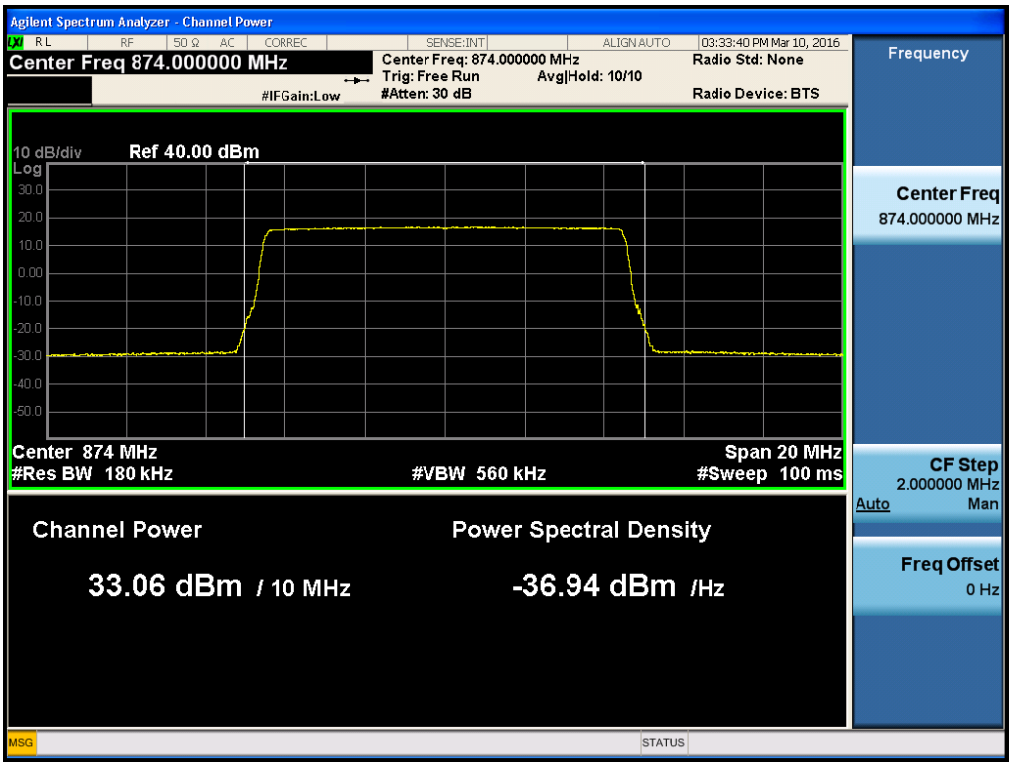


[+3dBm above AGC threshold Downlink High]

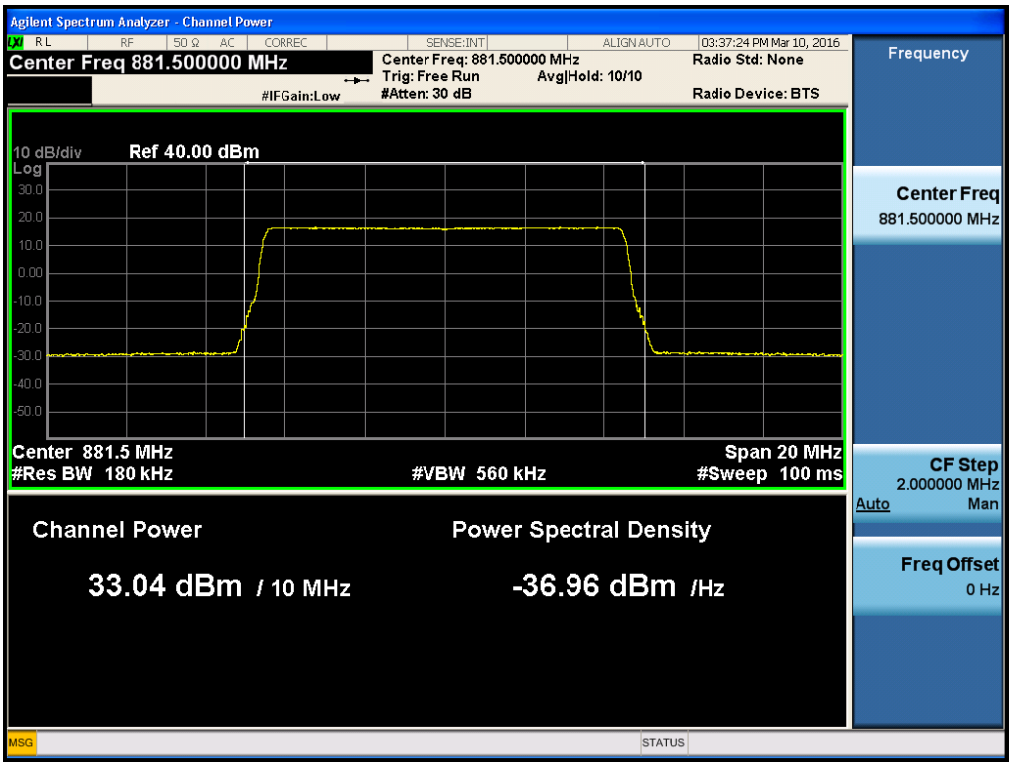


Plots of RF Output Power_850CEL _LTE10 MHz

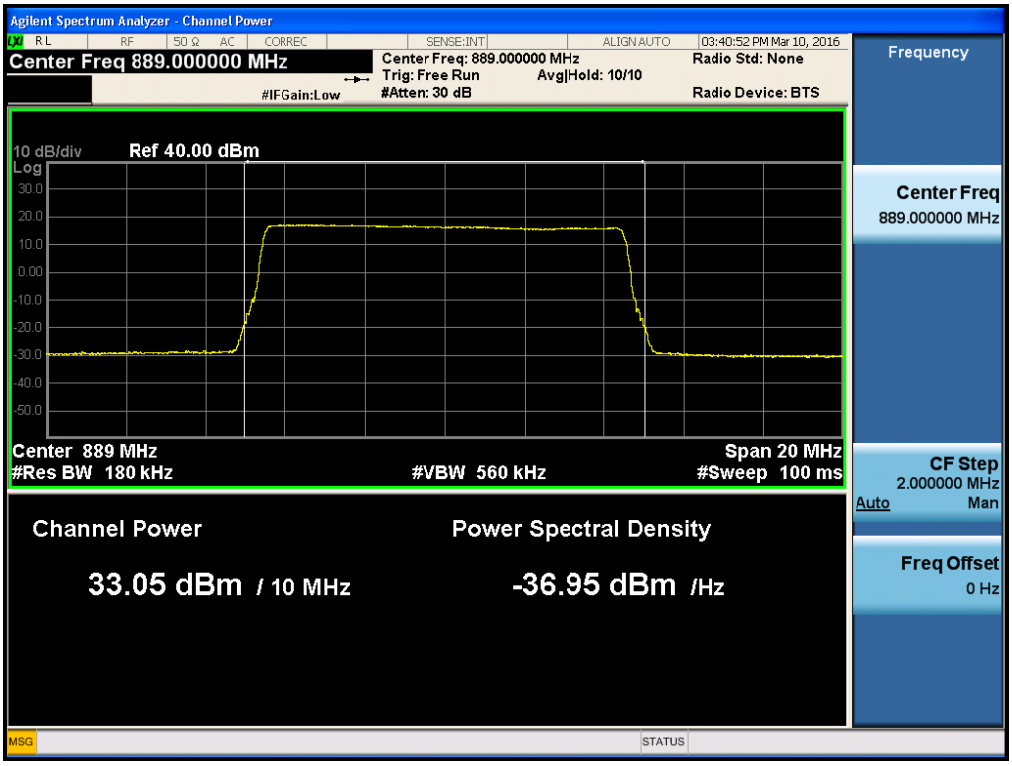
[AGC threshold Downlink Low]



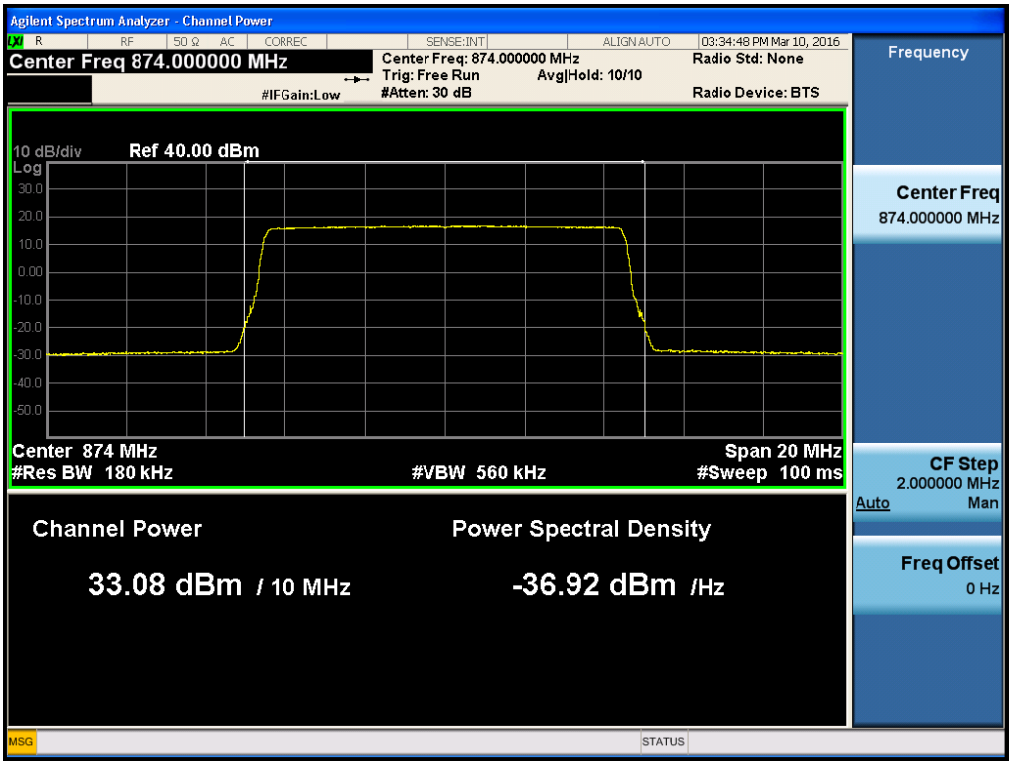
[AGC threshold Downlink Middle]



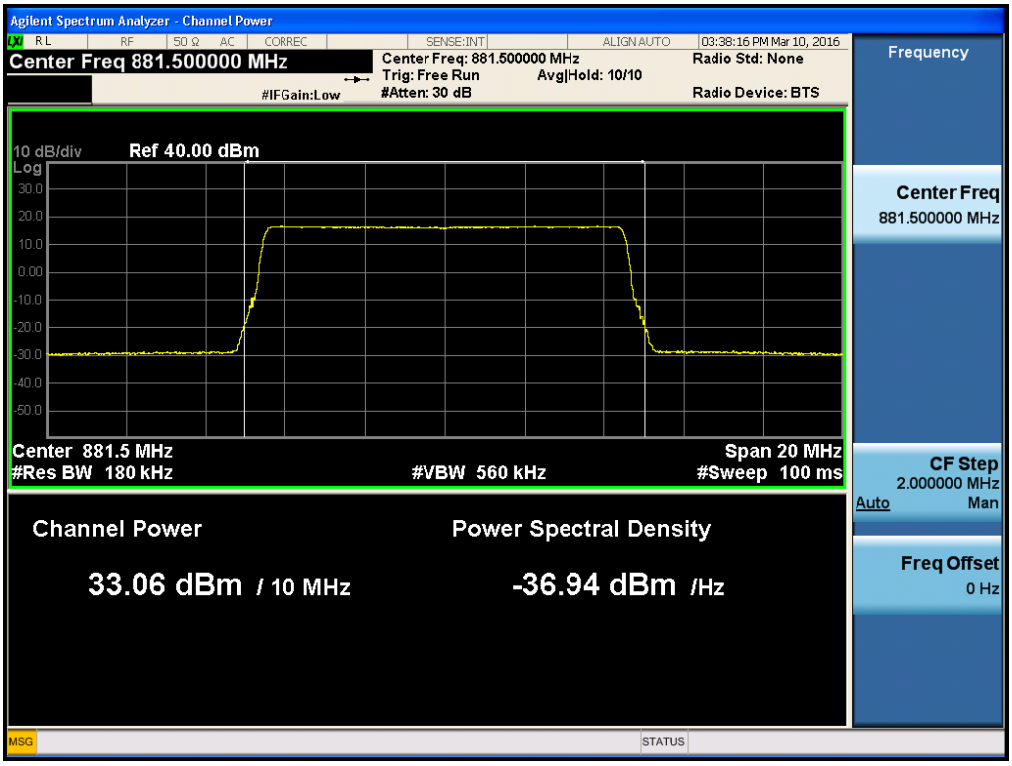
[AGC threshold Downlink High]



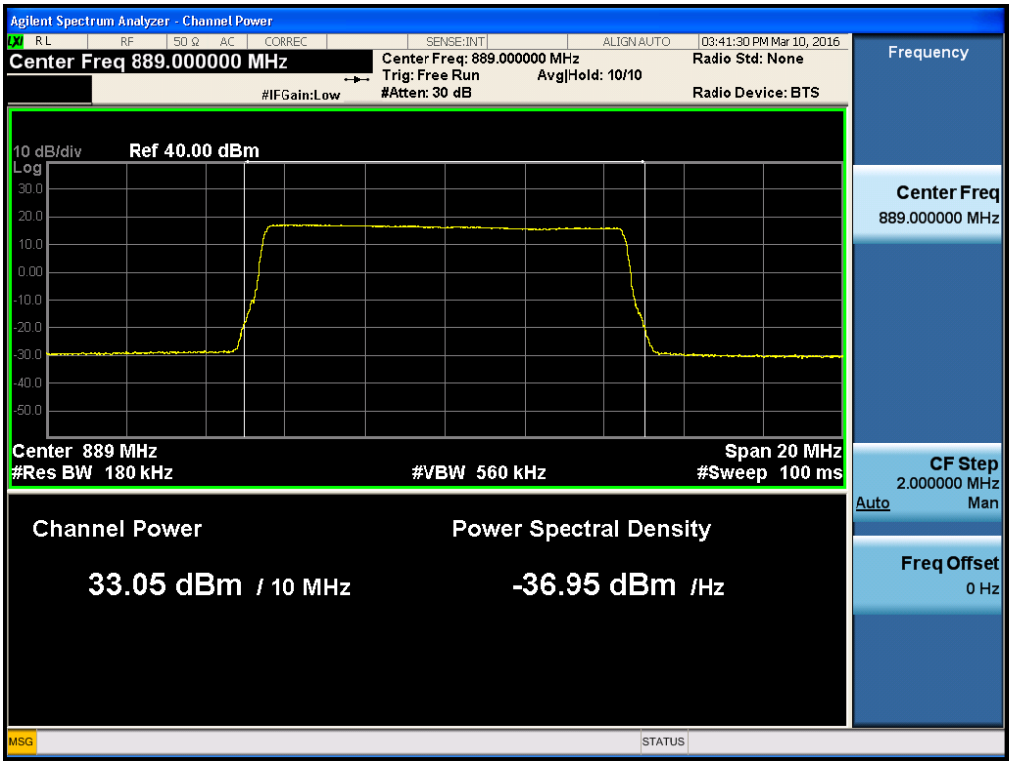
[+3dBm above AGC threshold Downlink Low]



[+3dBm above AGC threshold Downlink Middle]

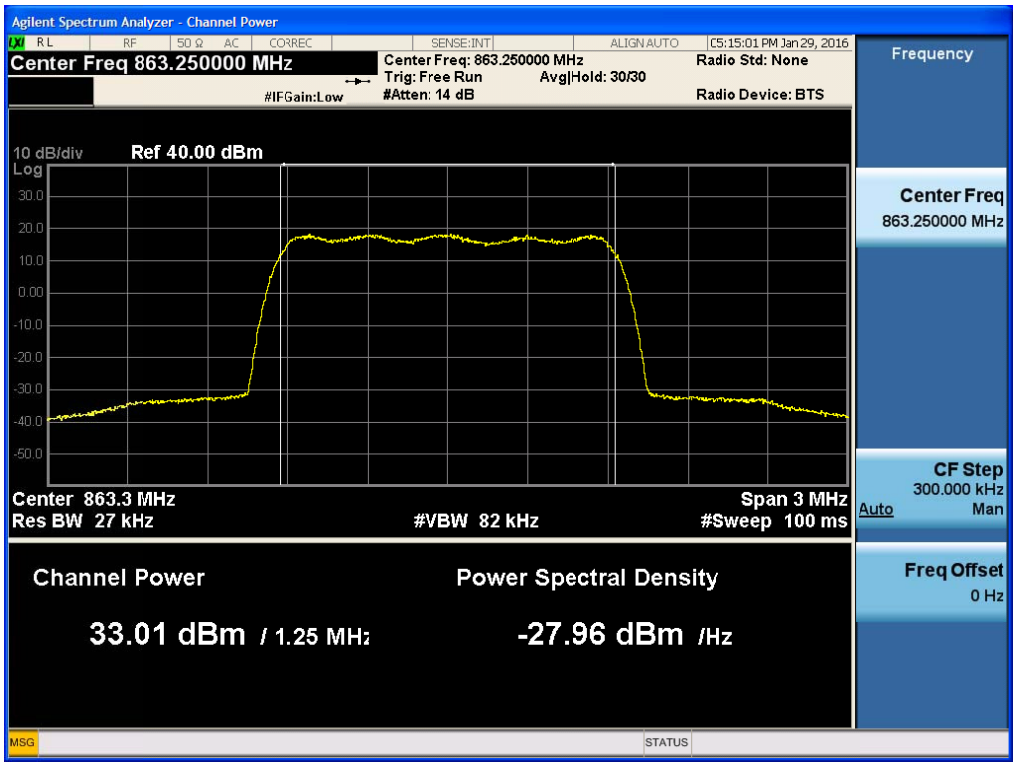


[+3dBm above AGC threshold Downlink High]

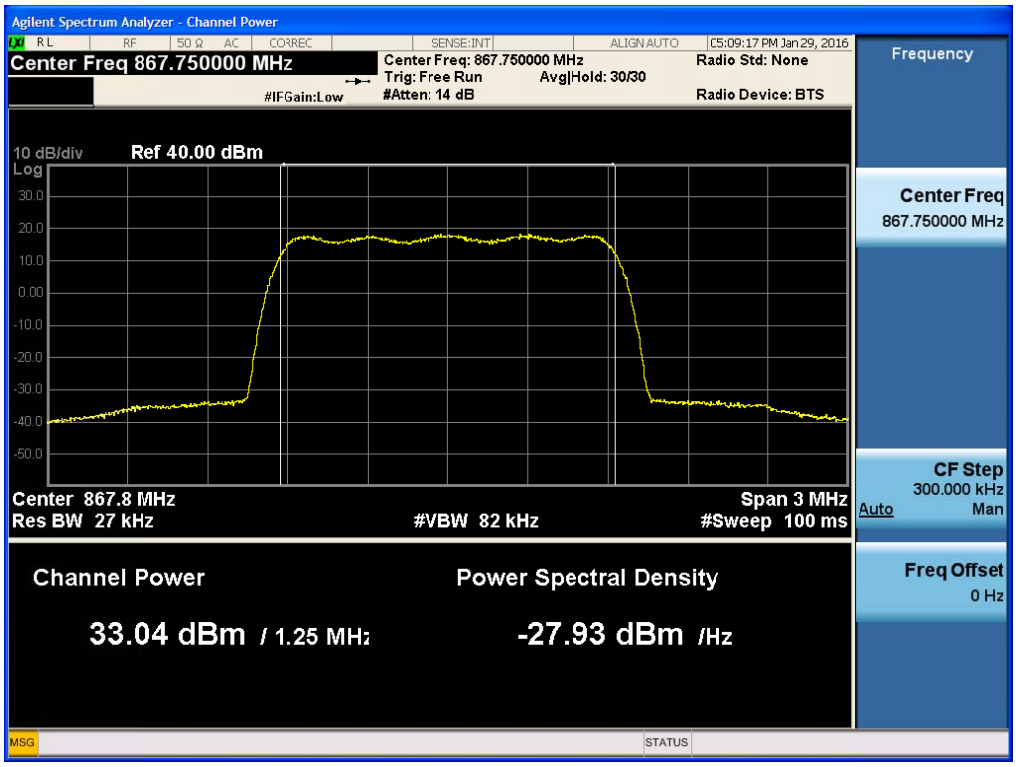


Plots of RF Output Power_800IDEN _CDMA

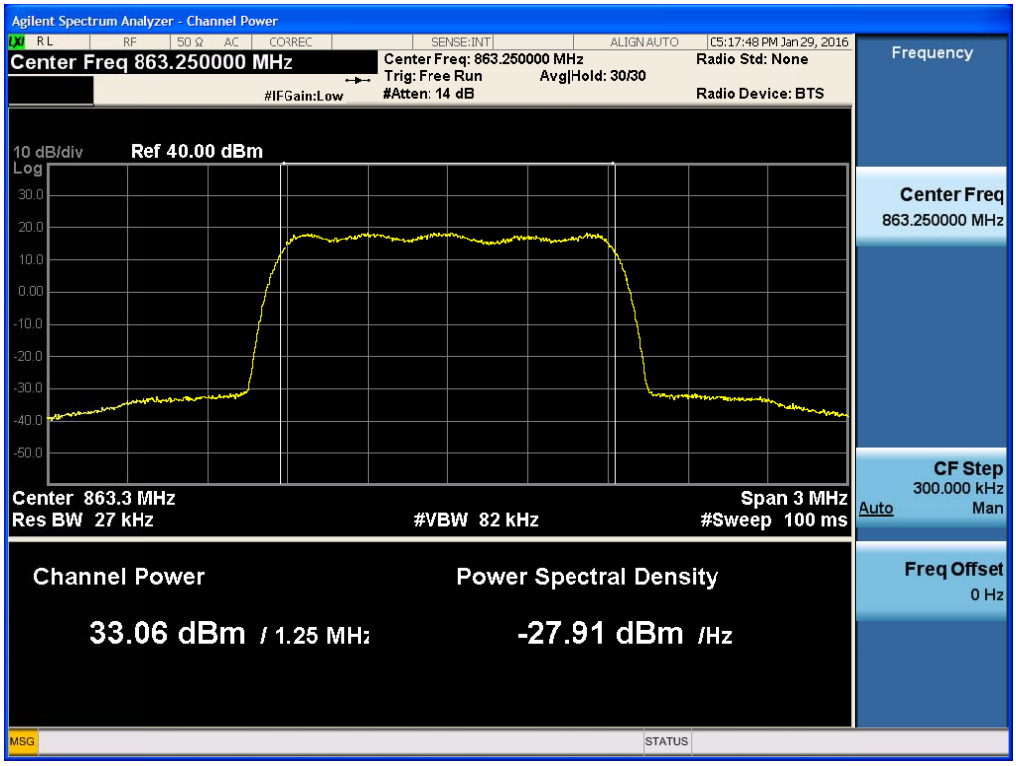
[AGC threshold Downlink Low]



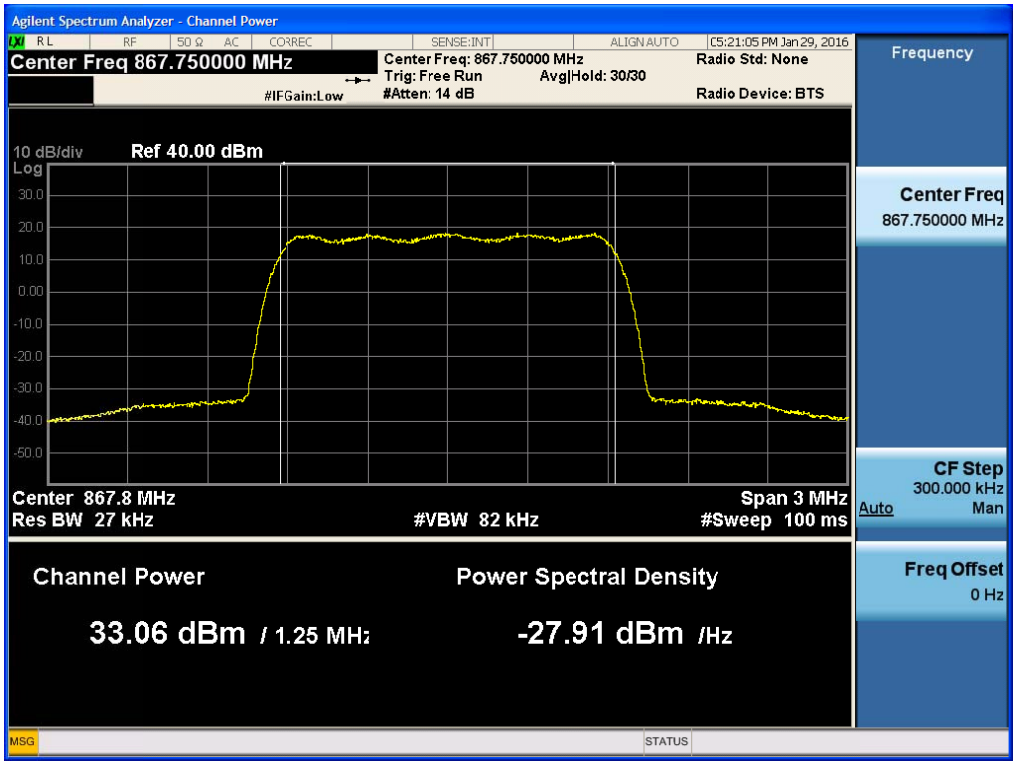
[AGC threshold Downlink High]



[+3dBm above AGC threshold Downlink Low]

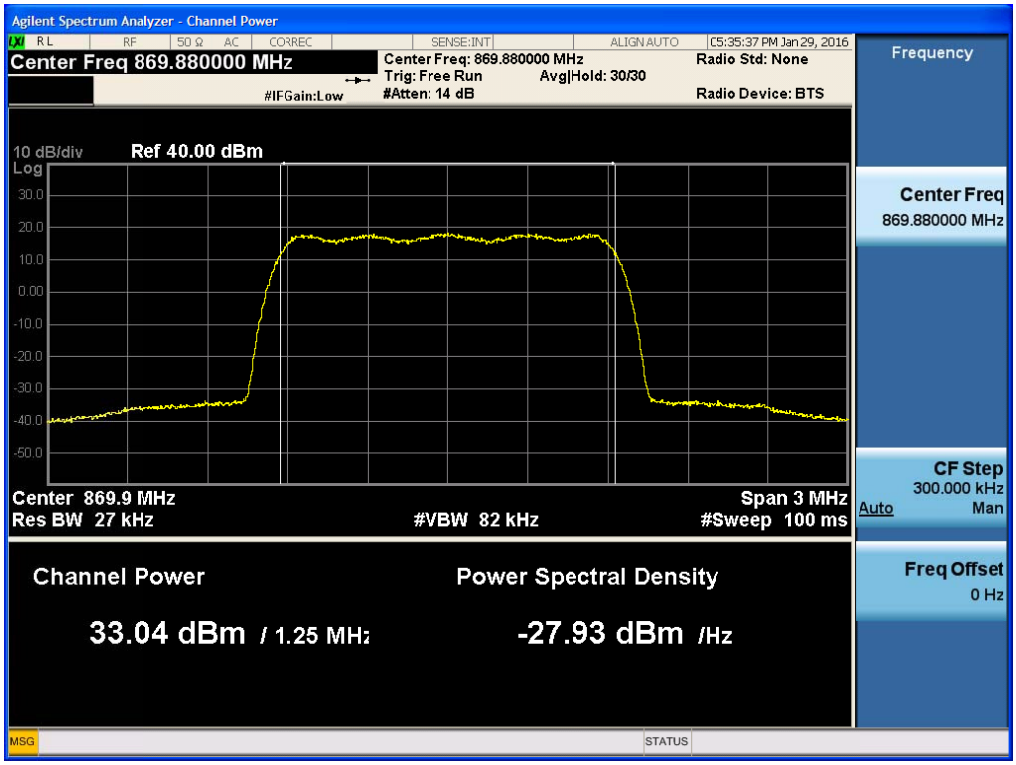


[+3dBm above AGC threshold Downlink High]

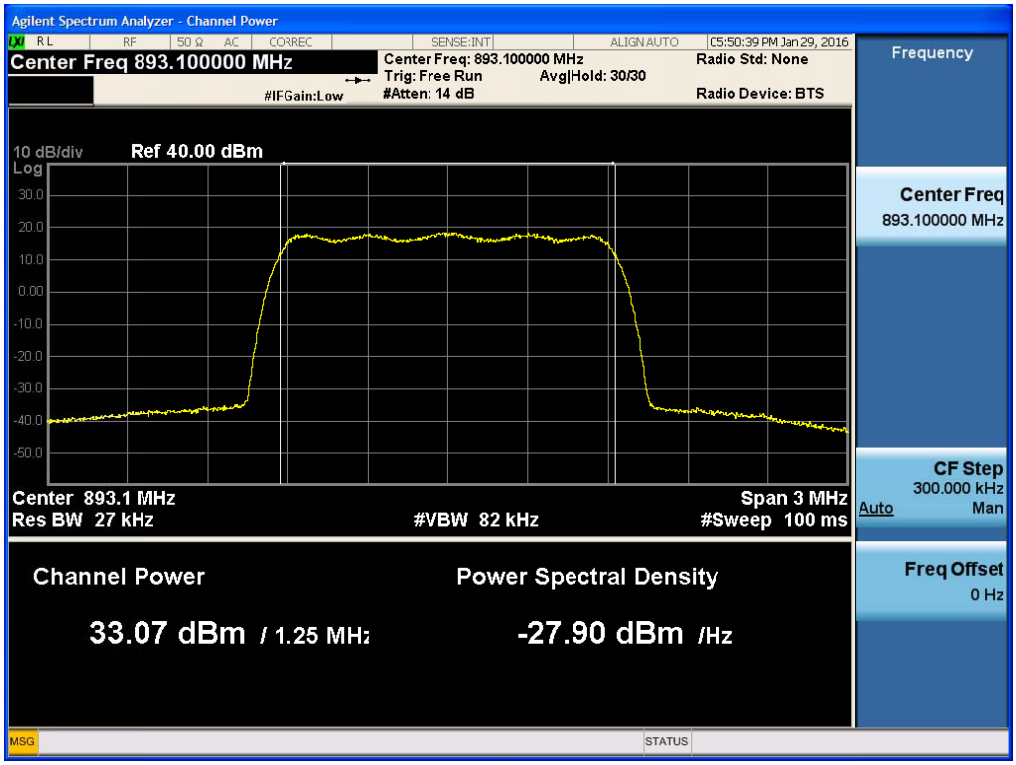


Plots of RF Output Power_850CEL _CDMA

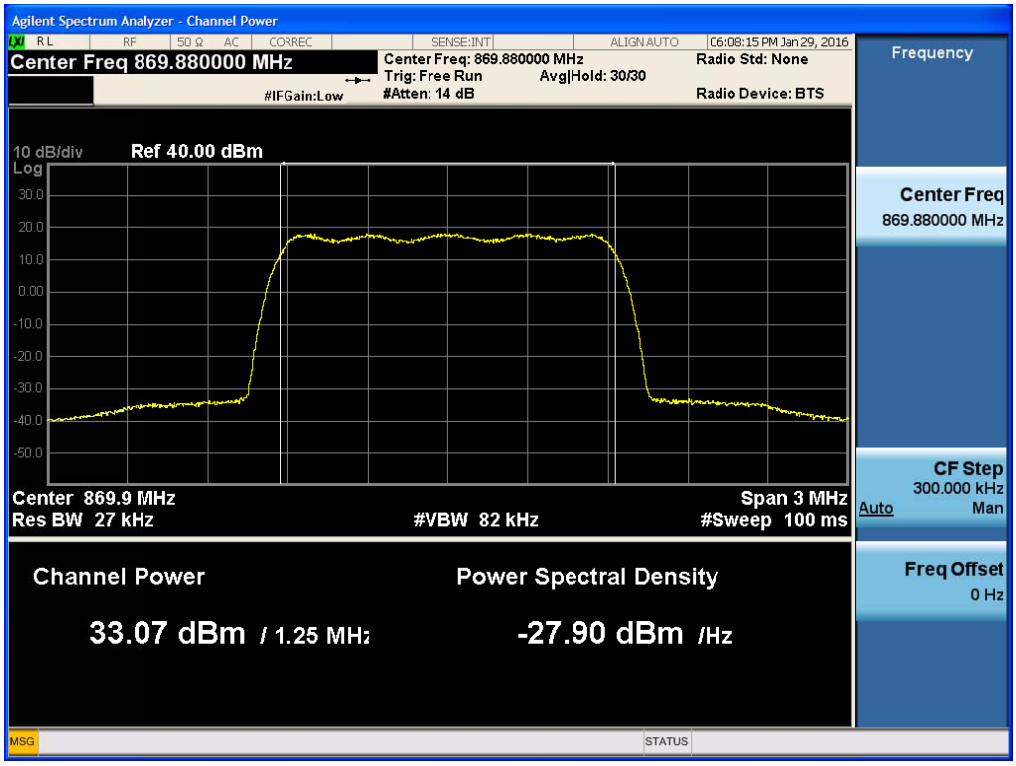
[AGC threshold Downlink Low]



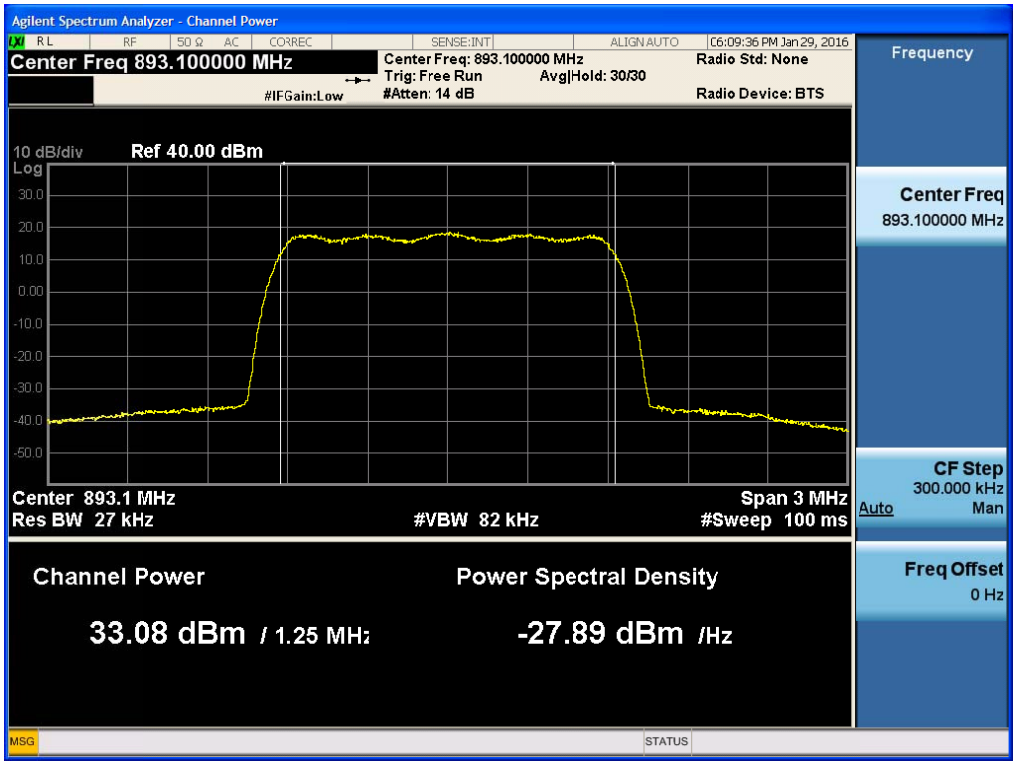
[AGC threshold Downlink High]



[+3dBm above AGC threshold Downlink Low]

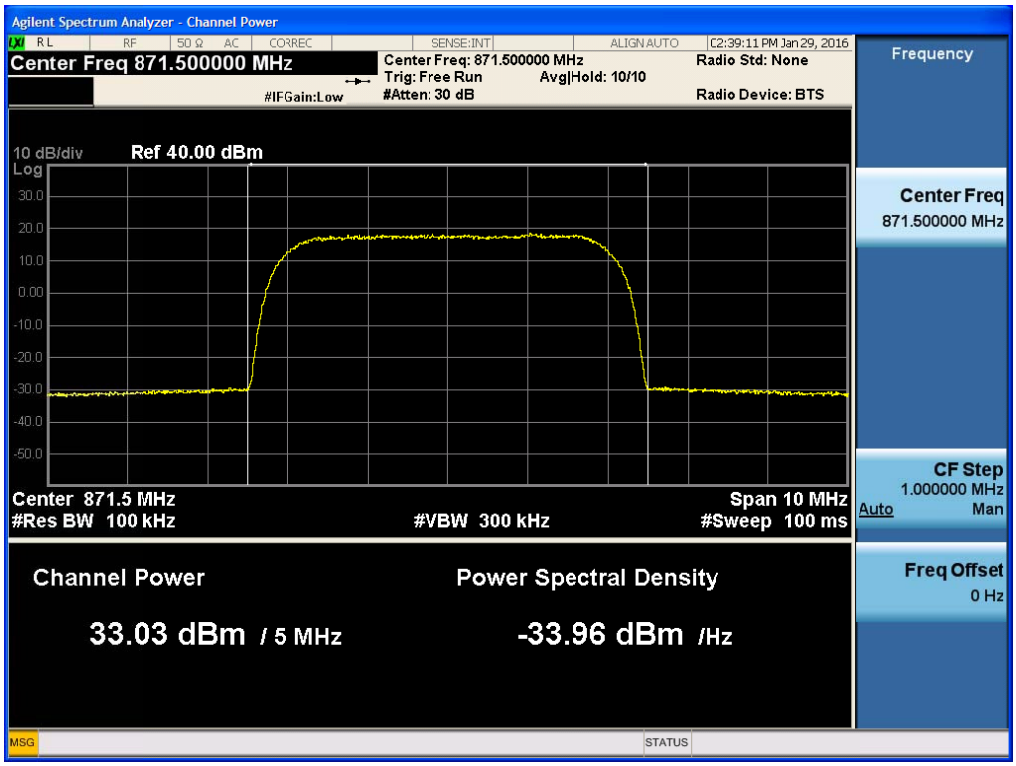


[+3dBm above AGC threshold Downlink High]

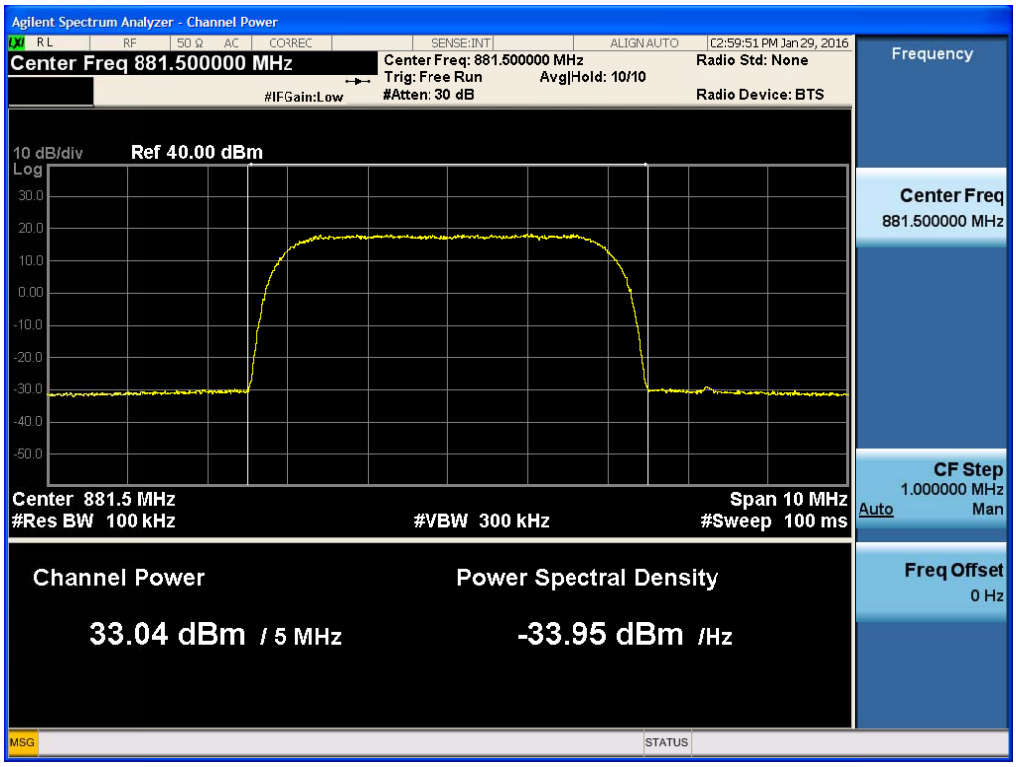


Plots of RF Output Power_850CEL _WCDMA

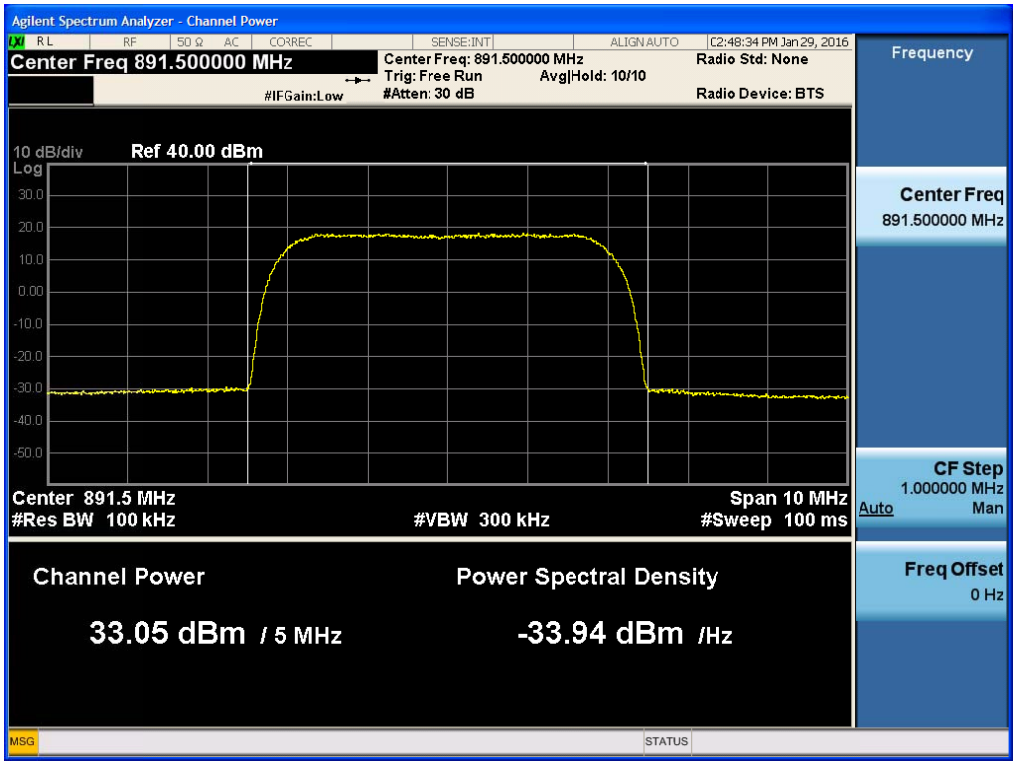
[AGC threshold Downlink Low]



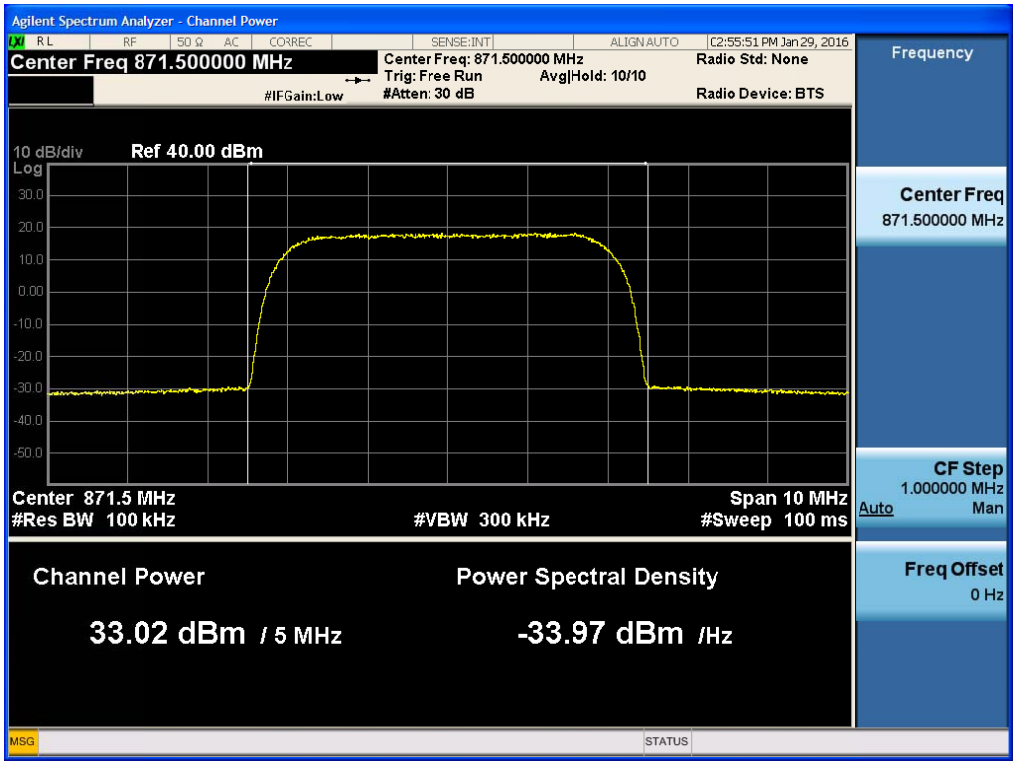
[AGC threshold Downlink Middle]



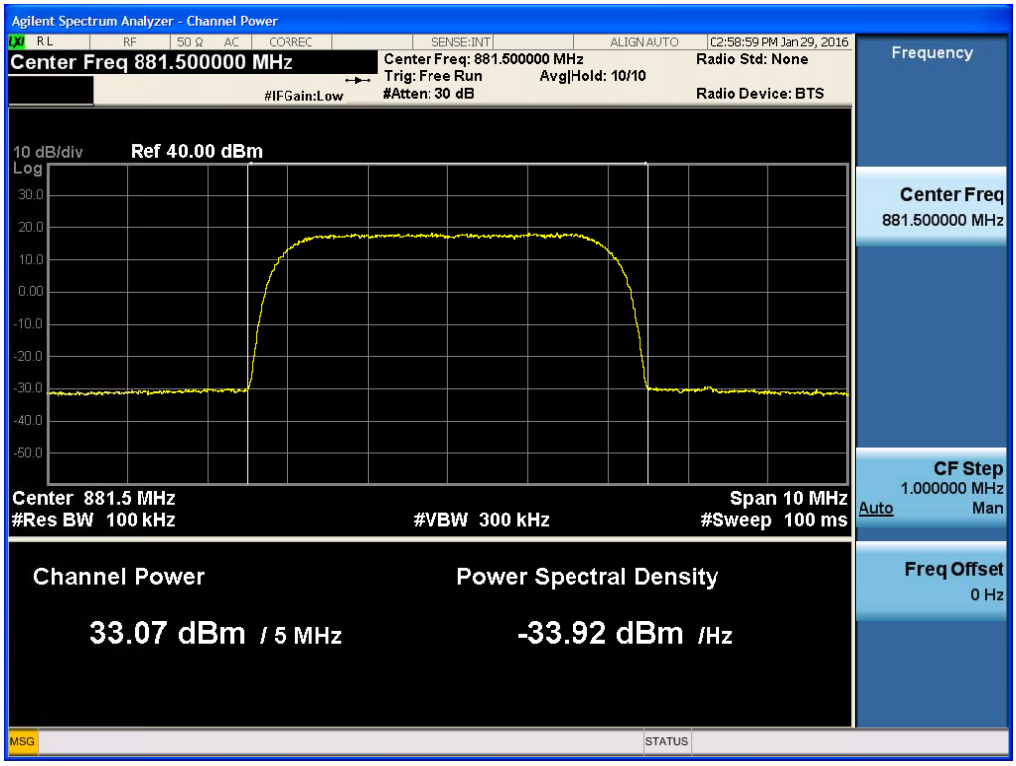
[AGC threshold Downlink High]



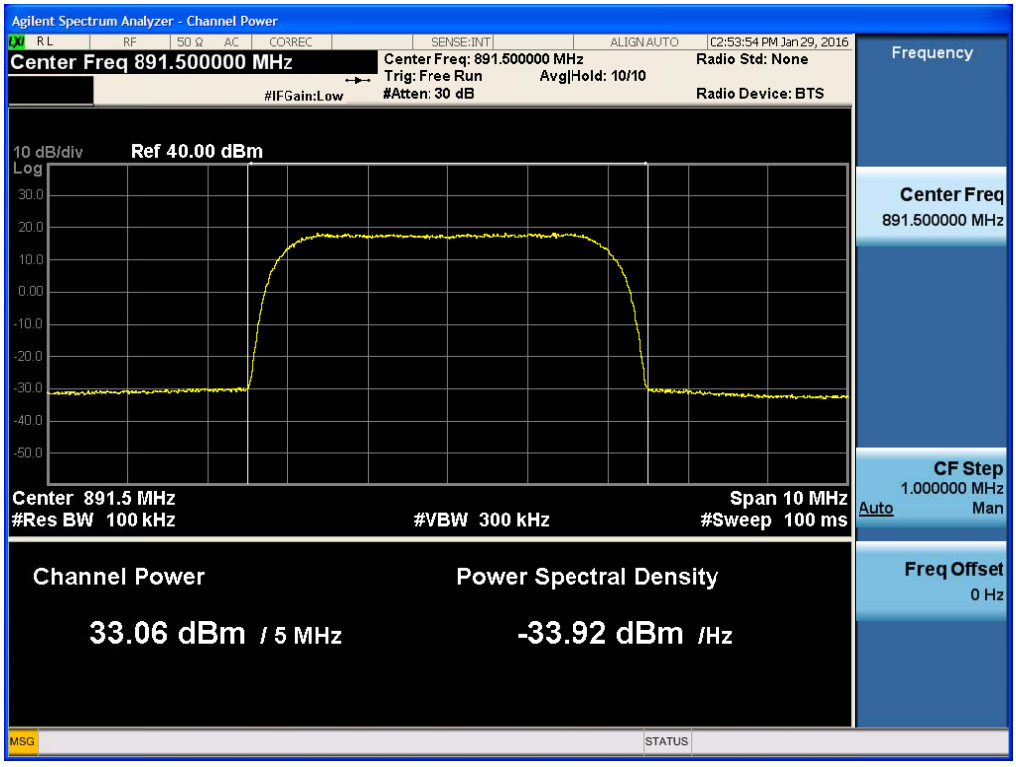
[+3dBm above AGC threshold Downlink Low]



[+3dBm above AGC threshold Downlink Middle]

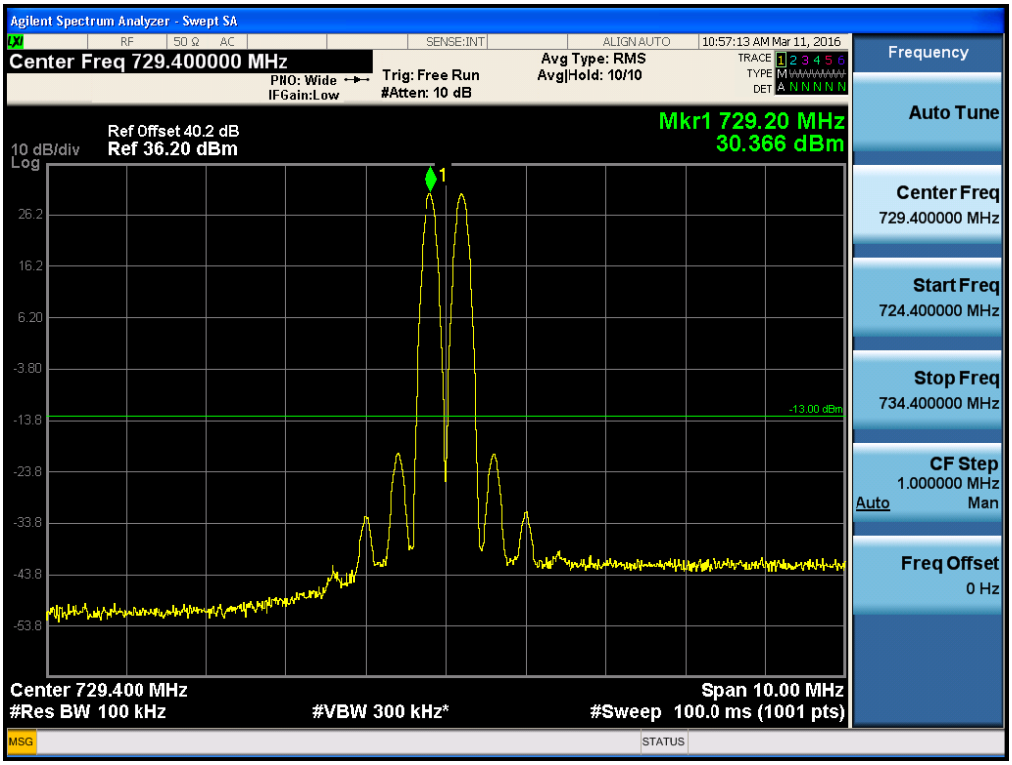


[+3dBm above AGC threshold Downlink High]

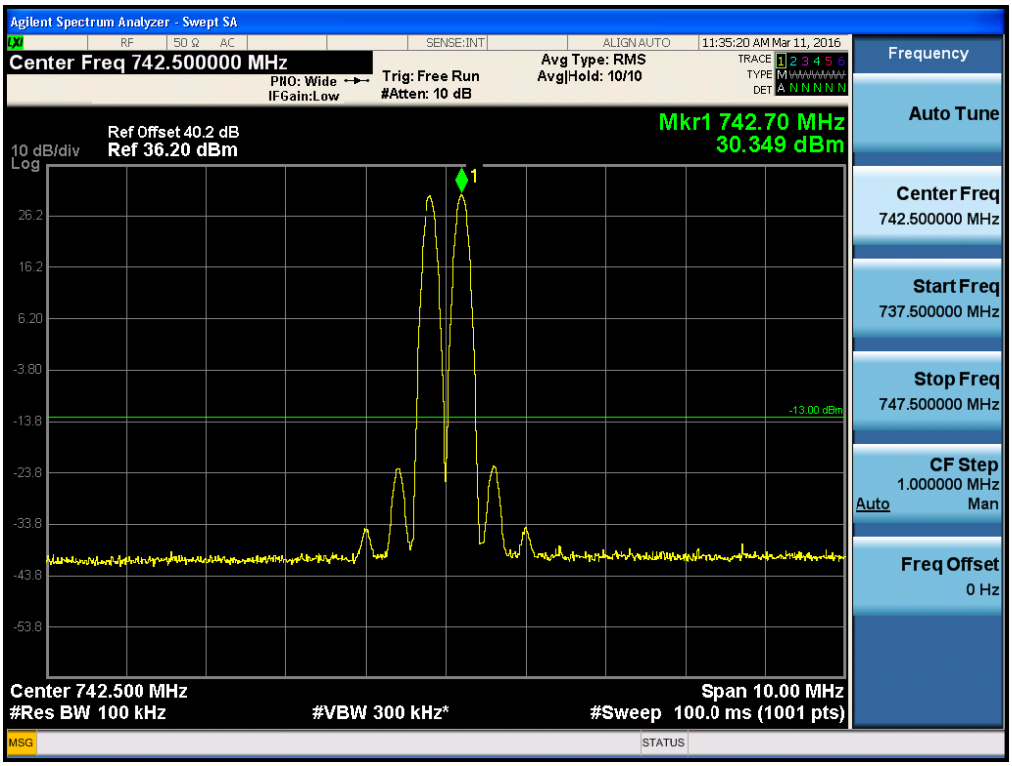


Multi-channel Enhancer for IC_700 LTE

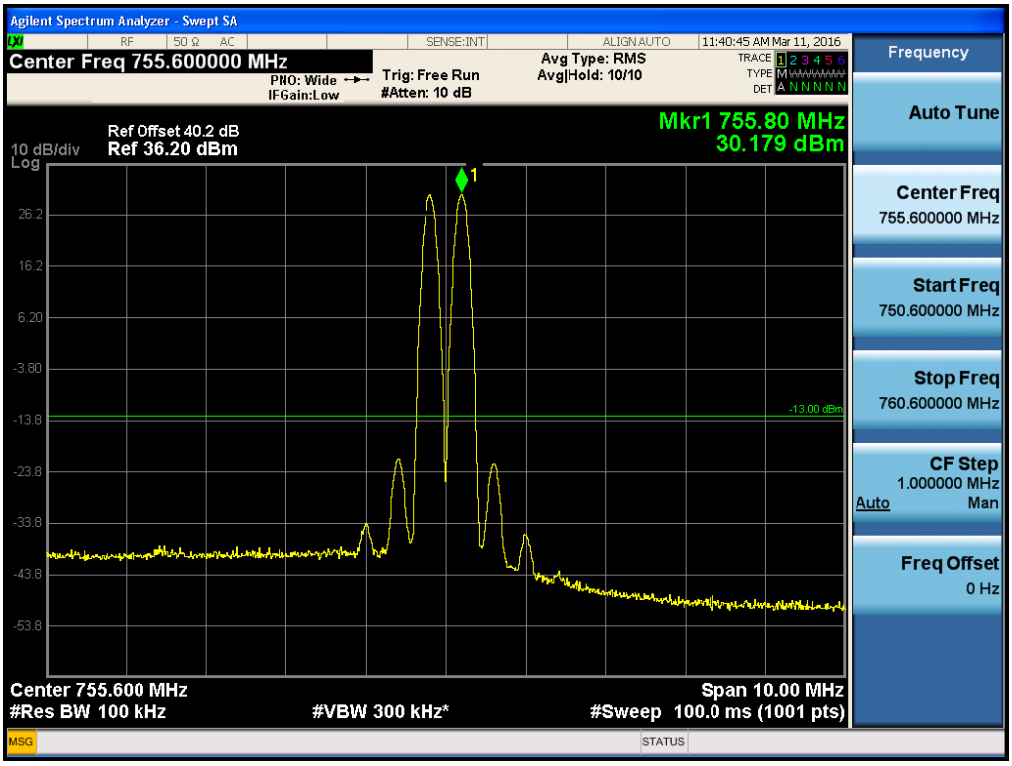
[Downlink Low]



[Downlink Middle]

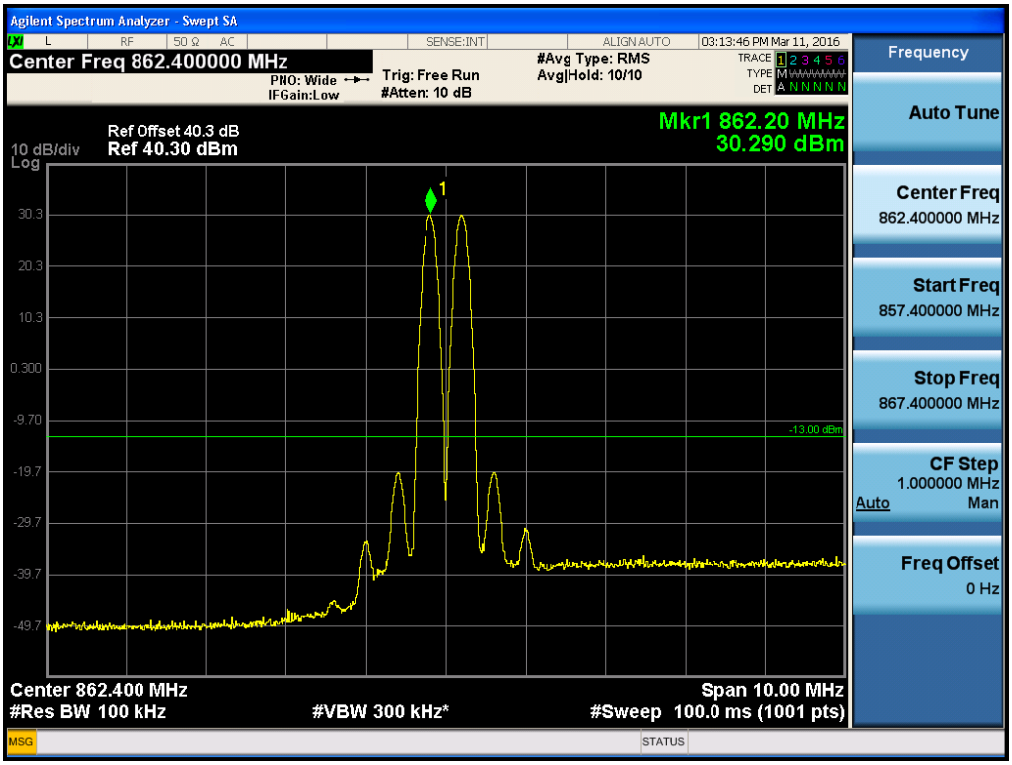


[Downlink High]

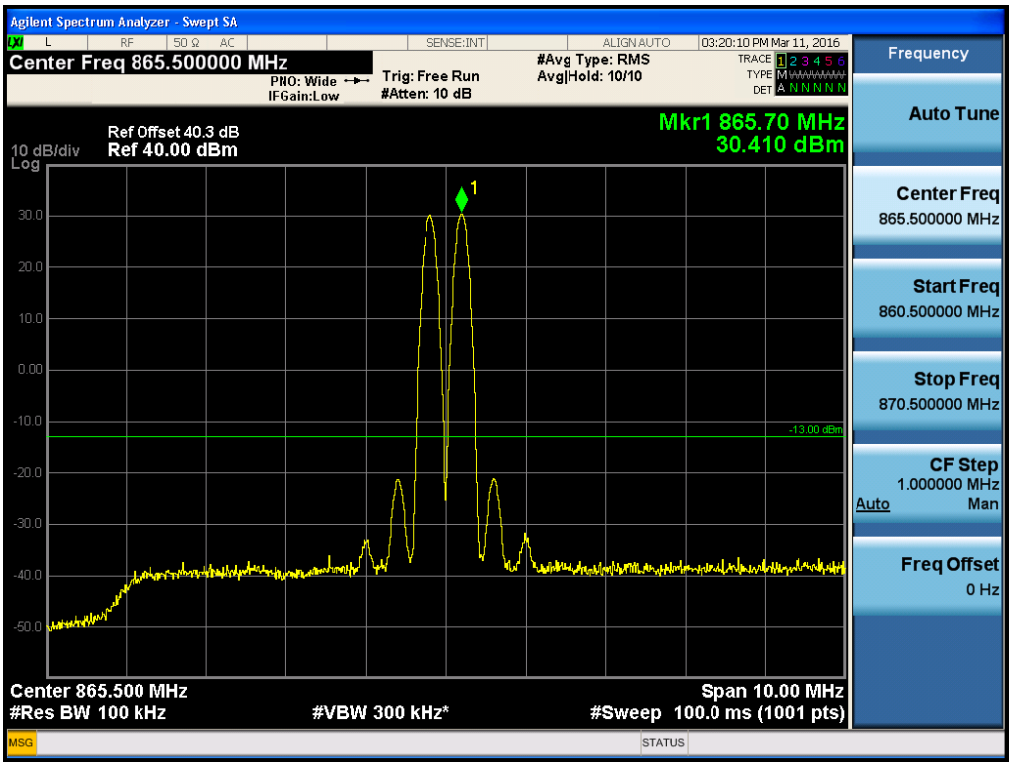


Multi-channel Enhancer for IC_800 IDEN

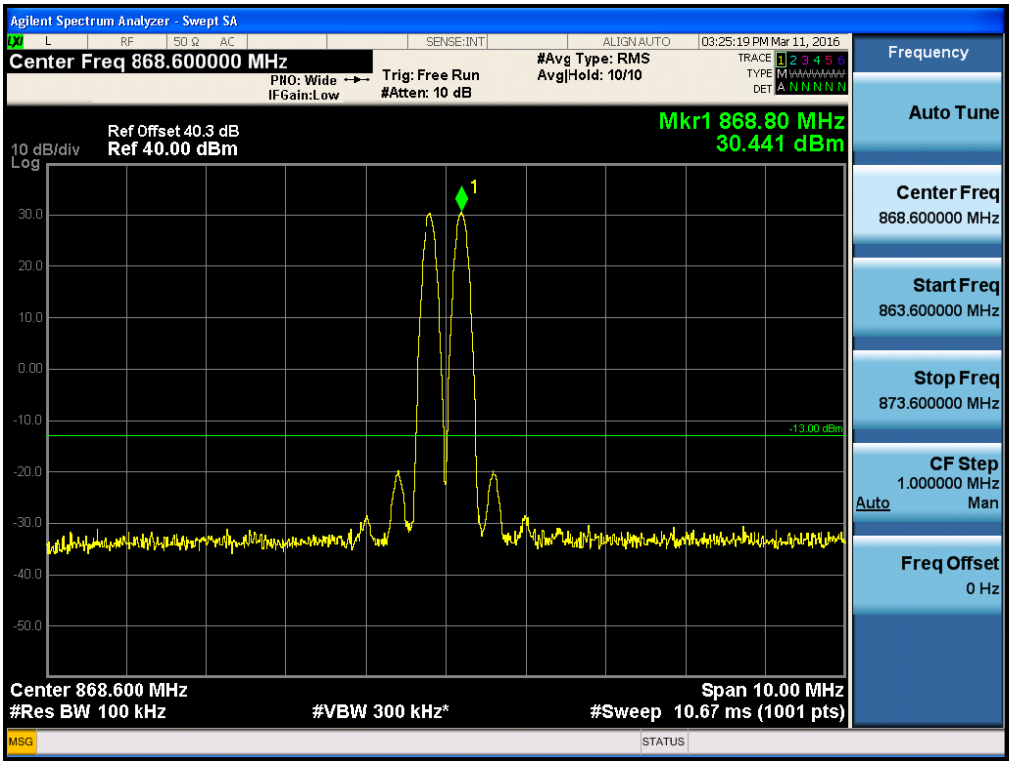
[Downlink Low]



[Downlink Middle]

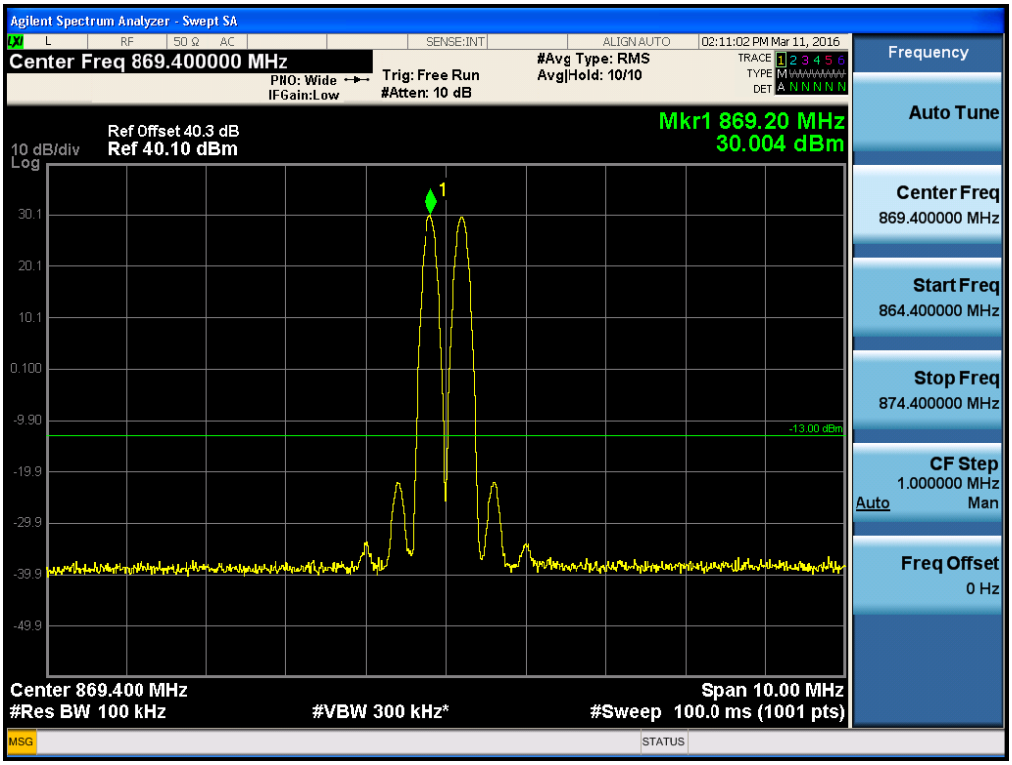


[Downlink High]

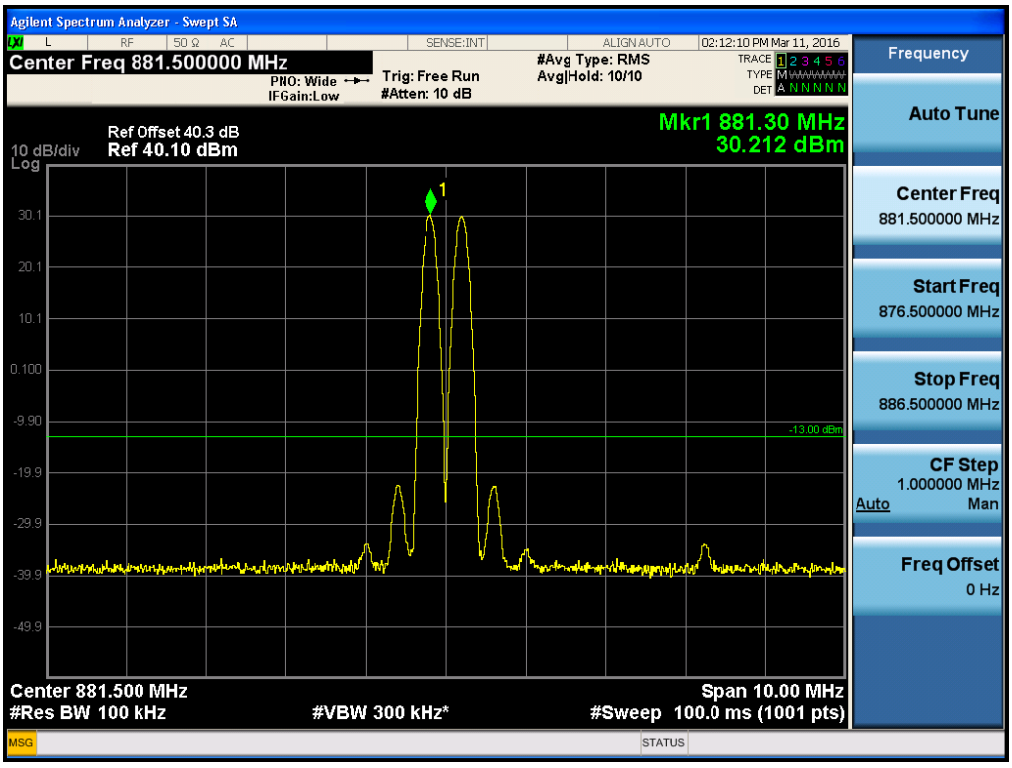


Multi-channel Enhancer for IC_850 CEL

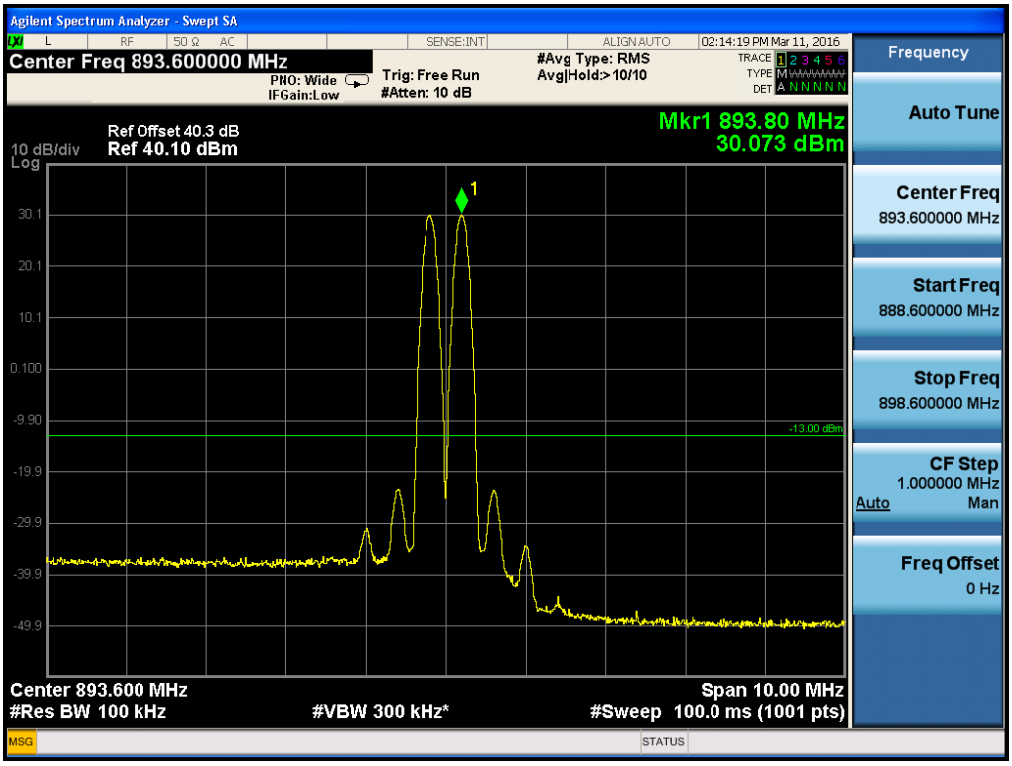
[Downlink Low]



[Downlink Middle]

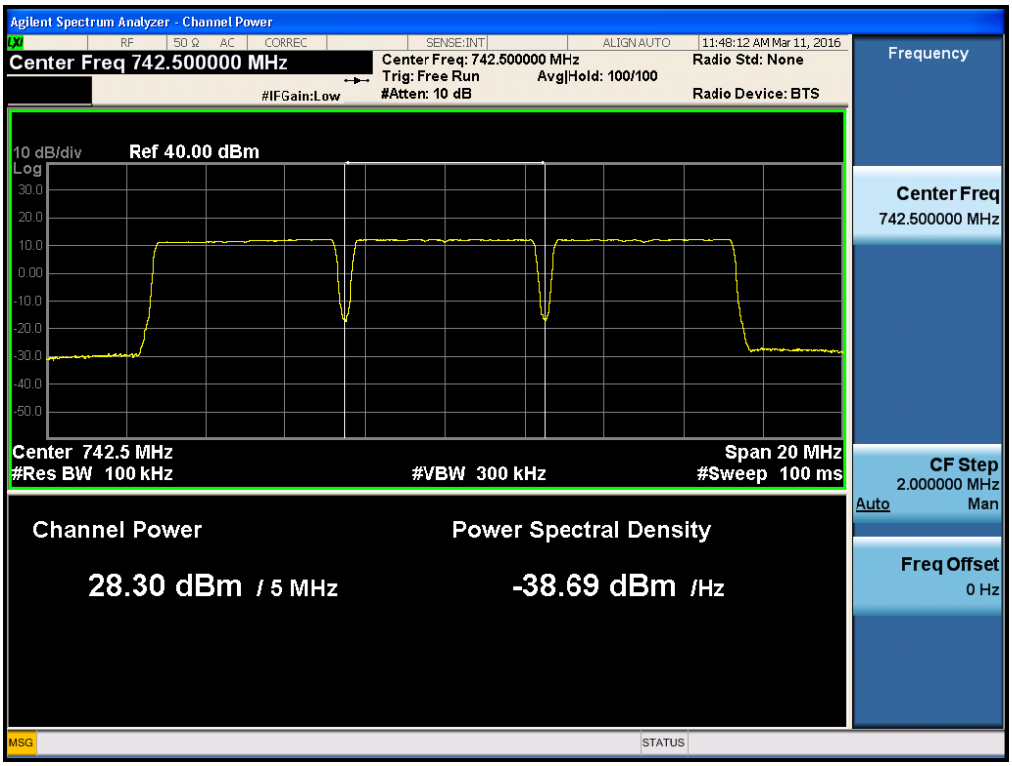


[Downlink High]



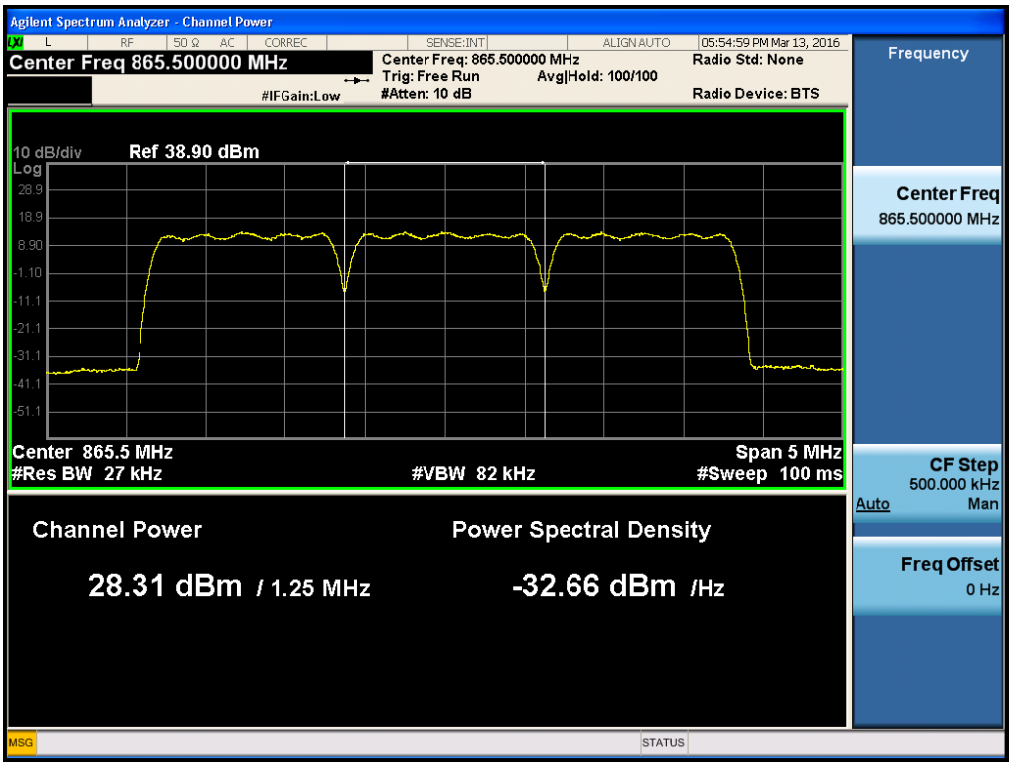
*** Power Back-off for IC_ 700 LTE**

[Downlink 3 Carrier Middle]



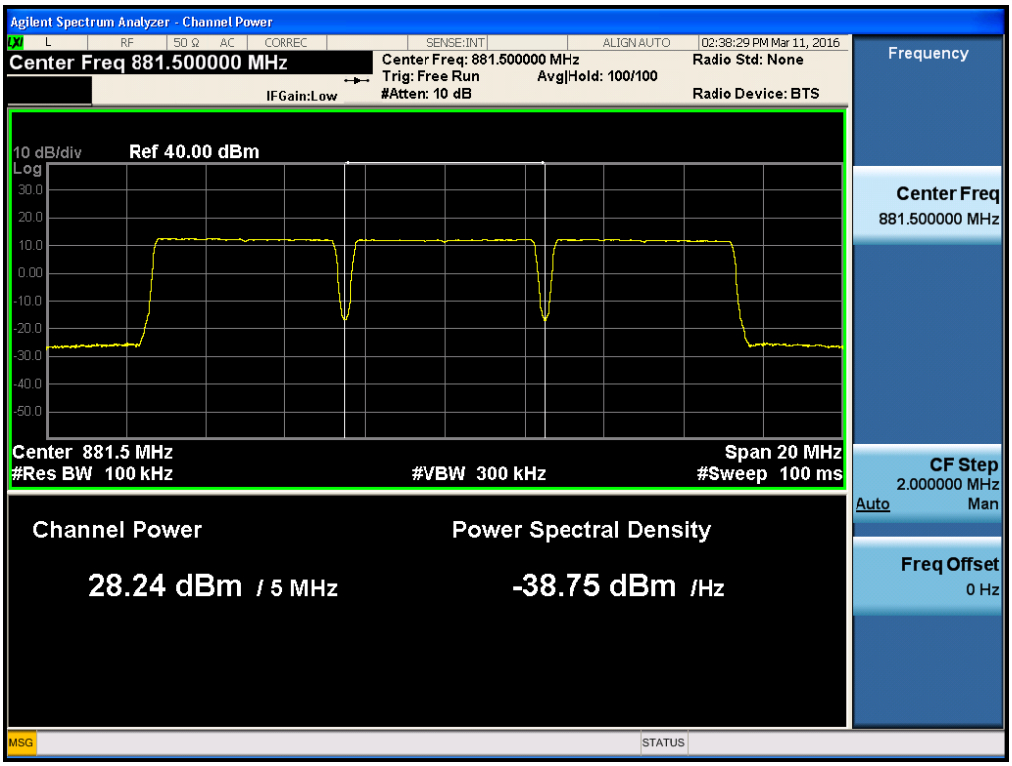
*** Power Back-off for IC_ 800 IDEN**

[Downlink 3 Carrier Middle]



*** Power Back-off for IC_ 850 CEL**

[Downlink 3 Carrier Middle]



7. OCCUPIED BANDWIDTH

FCC Rules

Test Requirement(s): § 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.

Test Procedures:

Measurements were in accordance with the test methods section 3.4 of KDB 935210 D05 v01r01 and section 4.2 of KDB 971168 D01 v02r02.
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 OBW.
f) The nominal resolution bandwidth (RBW) shall be in the range of 1% to 5 % of the anticipated OBW, and the VBW shall be ≥ 3 × 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.
NOTE—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) Use the 99 % power bandwidth function of the spectrum analyzer (if available) and report the measured bandwidth.
l) Repeat steps e) to k) with the input signal connected directly to the spectrum analyzer (i.e., input signal measurement).
m) Compare the spectral plot of the input signal (determined from step l) to the output signal (determined from step k) 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.
n) Repeat for all frequency bands authorized for use by the EUT.

IC Rules

Test Requirements: RSS-GEN 6.6

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: RSS-GEN 6.6

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 3x RBW.

Video averaging is not permitted. A peak, or peak hold, maybe used in place of the sampling detector as this may produce a wider bandwidth than the actual bandwidth(worst-case measurement).Use of 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%ofthe 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 the99% occupied bandwidth.

Test Results: The EUT complies with the requirements of this section.

Input Signal	Input Level (dBm)	Maximum Amp Gain
700 LTE Lower	-10 dBm	43 dB
700 LTE Upper	-10 dBm	43 dB
800 IDEN	-10 dBm	43 dB
850 CEL	-10 dBm	43 dB

[Downlink Output]

	Channel	Frequency (MHz)	OBW (MHz)
700LTE_5MHz AGC threshold	Low	731.50	4.515
	Middle	742.50	4.516
	High	753.50	4.499
700LTE_5MHz +3dBm above the AGC threshold	Low	731.50	4.509
	Middle	742.50	4.516
	High	753.50	4.497
700LTE_10MHz AGC threshold	Low	734.00	9.007
	Middle	742.50	8.987
	High	751.00	9.001
700LTE_10MHz +3dBm above the AGC threshold	Low	734.00	9.018
	Middle	742.50	8.994
	High	751.00	9.000

	Channel	Frequency (MHz)	OBW (MHz)
800IDEN/850CEL_ LTE 5 MHz AGC threshold	Low	864.50	4.511
	Middle	878.00	4.513
	High	891.50	4.514
800IDEN/850CEL_ LTE 5 MHz +3dBm above the AGC threshold	Low	864.50	4.509
	Middle	878.00	4.513
	High	891.50	4.514

	Channel	Frequency (MHz)	OBW (MHz)
850CEL_ LTE 10 MHz AGC threshold	Low	874.00	8.983
	Middle	881.50	9.009
	High	889.00	9.013
850CEL_ LTE 10 MHz +3dBm above the AGC threshold	Low	874.00	8.971
	Middle	881.50	9.001
	High	889.00	8.993
800 IDEN CDMA AGC threshold	Low	863.25	1.262
	Middle	-	-
	High	867.75	1.267
800 IDEN CDMA +3dBm above the AGC threshold	Low	863.25	1.260
	Middle	-	-
	High	867.75	1.264

	Channel	Frequency (MHz)	OBW (MHz)
850 CEL CDMA AGC threshold	Low	869.88	1.265
	Middle	-	-
	High	893.10	1.264
850 CEL CDMA +3dBm above the AGC threshold	Low	869.88	1.261
	Middle	-	-
	High	893.10	1.267
850CEL_ WCDMA AGC threshold	Low	871.50	4.160
	Middle	881.50	4.170
	High	891.50	4.168
850CEL_ WCDMA +3dBm above the AGC threshold	Low	871.50	4.161
	Middle	881.50	4.171
	High	891.50	4.165

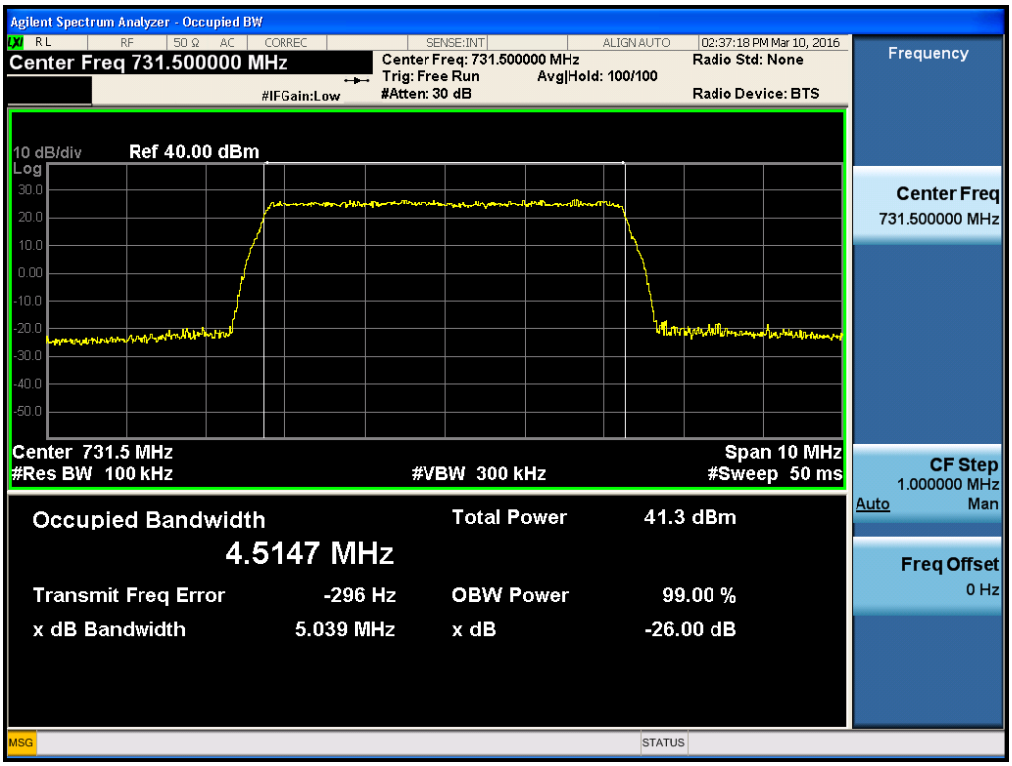
[Downlink Input]

	Channel	Frequency (MHz)	OBW (MHz)
700LTE_5MHz AGC threshold	Low	731.50	4.516
	Middle	742.50	4.515
	High	753.50	4.512
700LTE_10MHz AGC threshold	Low	734.00	9.019
	Middle	742.50	9.015
	High	751.00	9.004

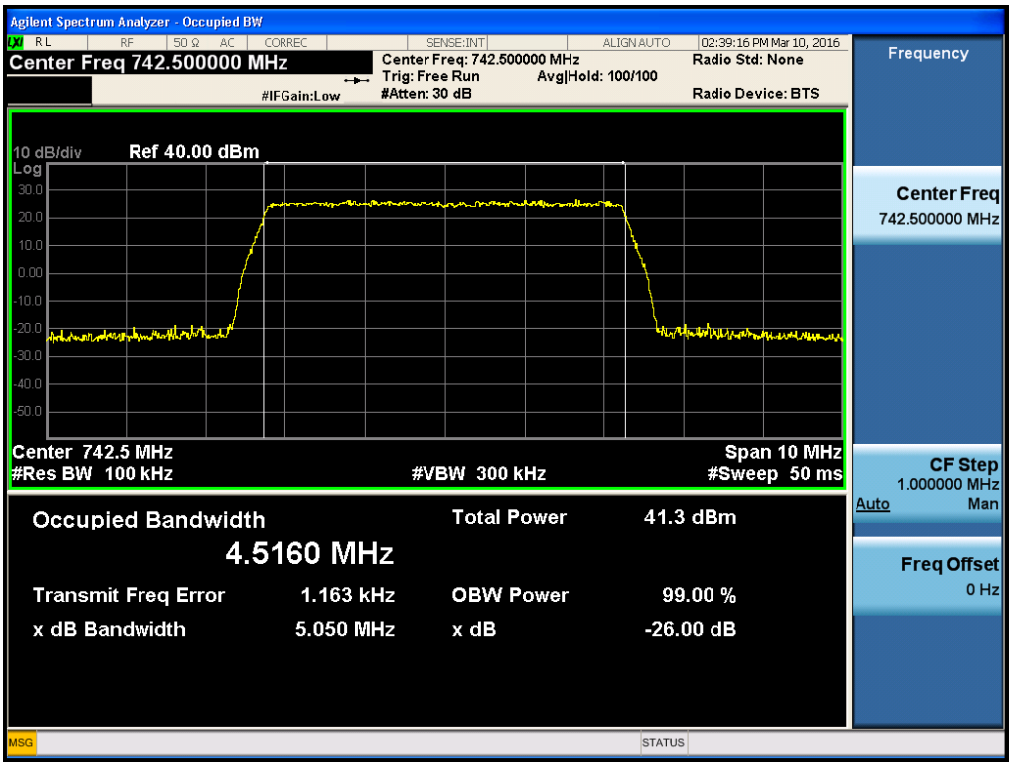
	Channel	Frequency (MHz)	OBW (MHz)
800IDEN /850CEL_ LTE 5 MHz AGC threshold	Low	864.50	4.515
	Middle	878.00	4.513
	High	891.50	4.511
850CEL_ LTE 10 MHz AGC threshold	Low	874.00	9.004
	Middle	881.50	9.009
	High	889.00	9.012
800 IDEN CDMA AGC threshold	Low	863.25	1.266
	Middle	-	
	High	867.75	1.264
850 CEL CDMA AGC threshold	Low	869.88	1.260
	Middle	-	
	High	893.10	1.267
850CEL_ WCDMA AGC threshold	Low	871.50	4.163
	Middle	881.50	4.166
	High	891.50	4.166

Plots of Occupied Bandwidth_700LTE_LTE 5MHz_Output

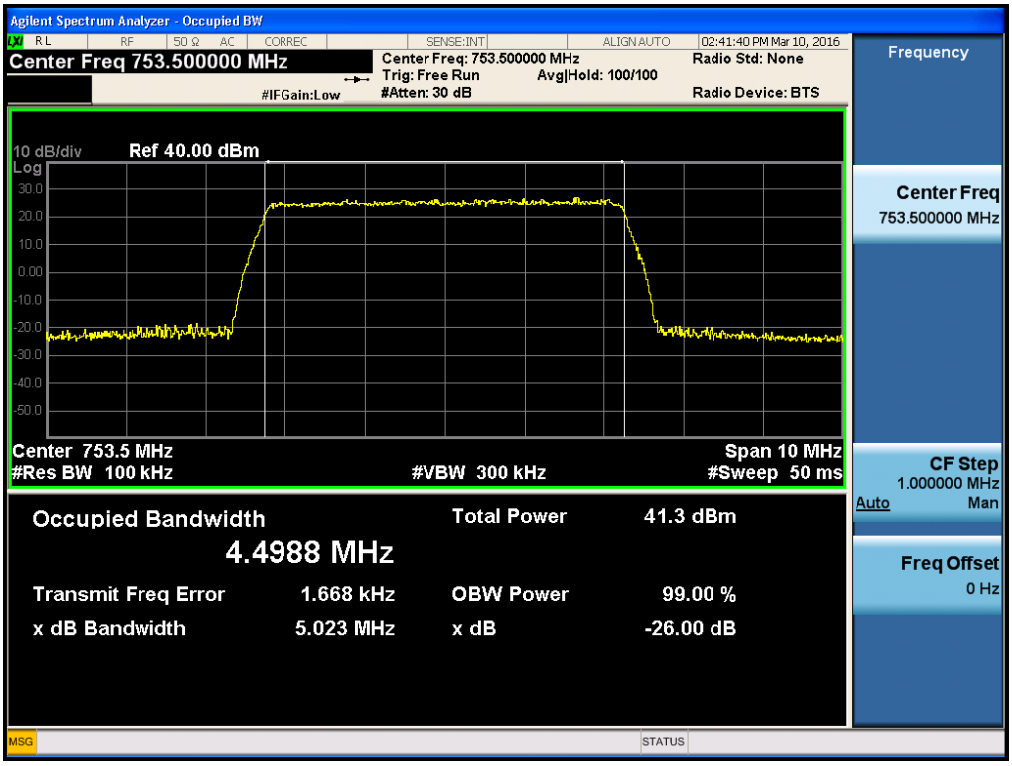
[AGC threshold Output Downlink Low]



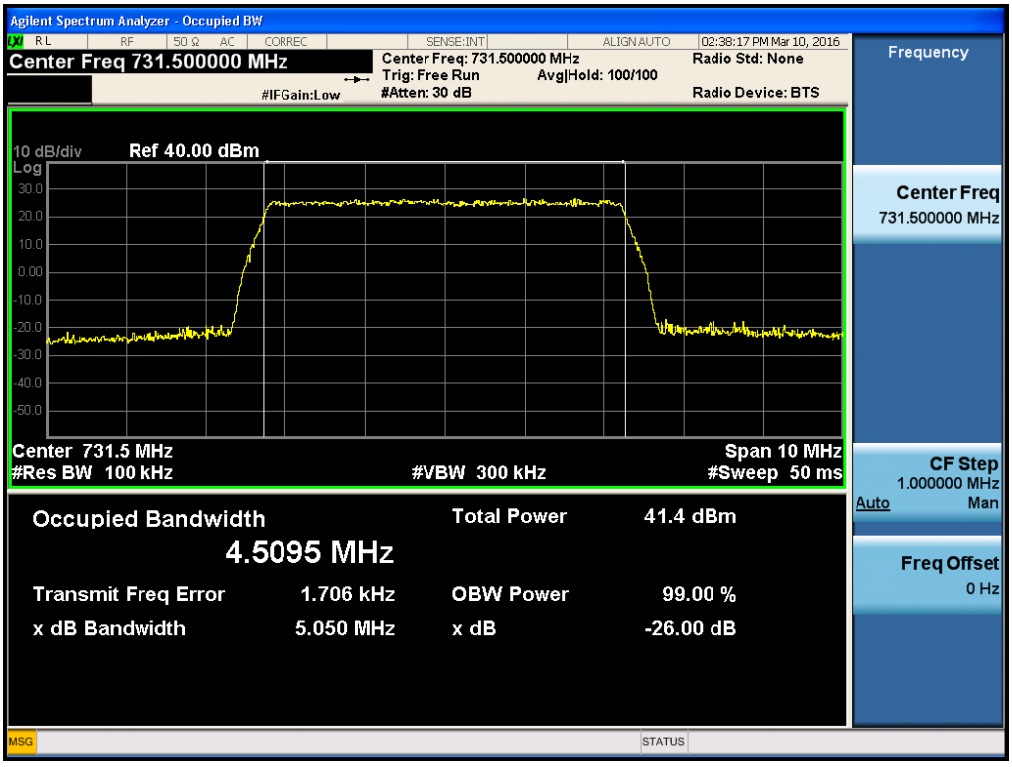
[AGC threshold Output Downlink Middle]



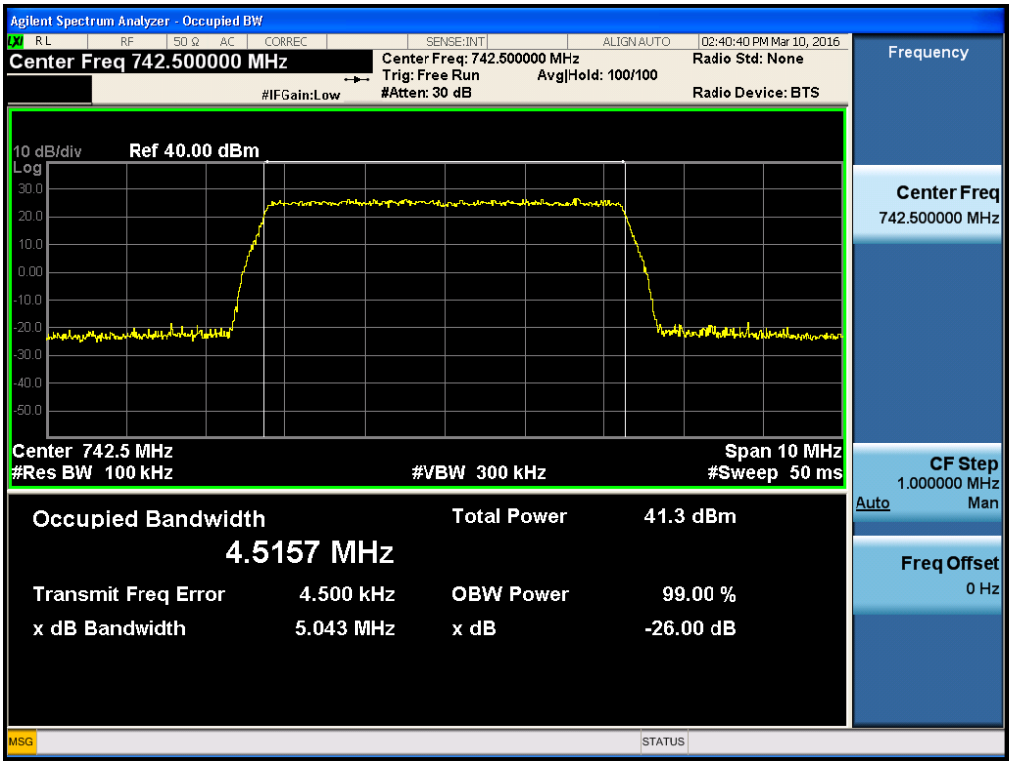
[AGC threshold Output Downlink High]



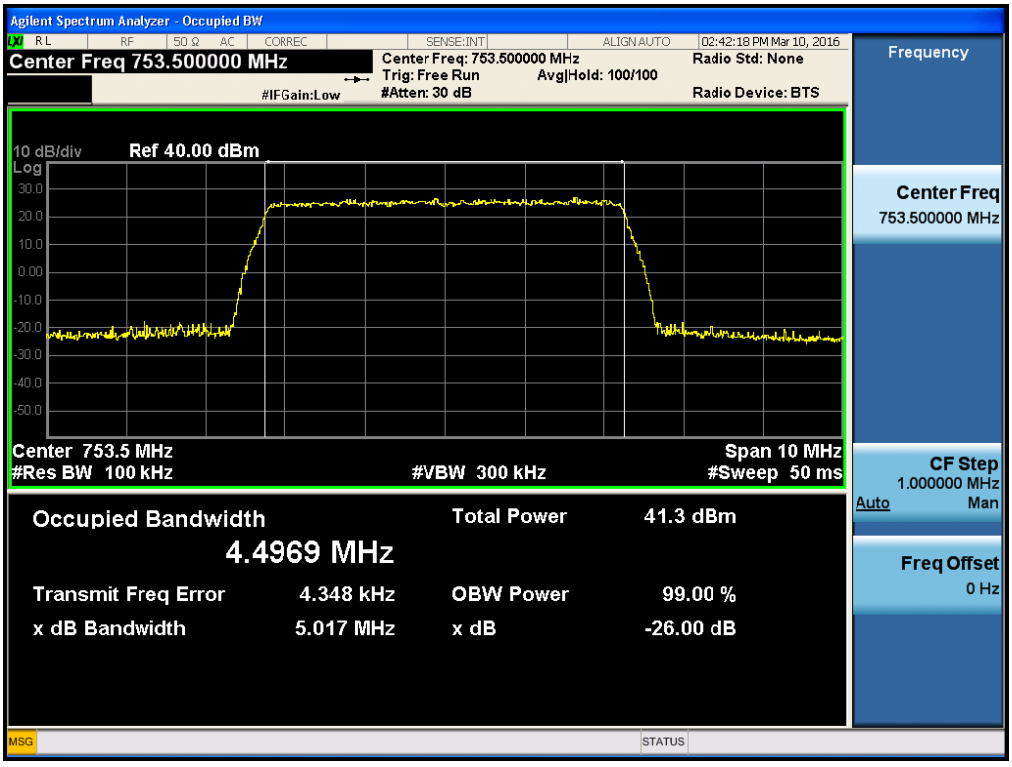
[+3dBm above AGC threshold Output Downlink Low]



[+3dBm above AGC threshold Output Downlink Middle]

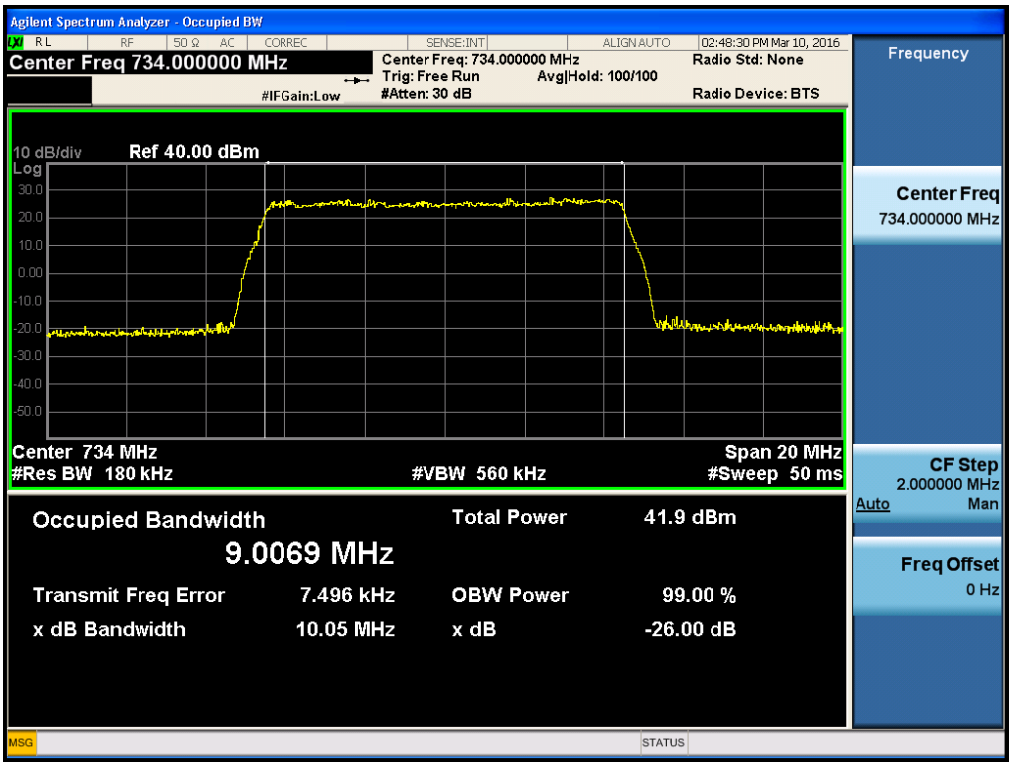


[+3dBm above AGC threshold Output Downlink High]

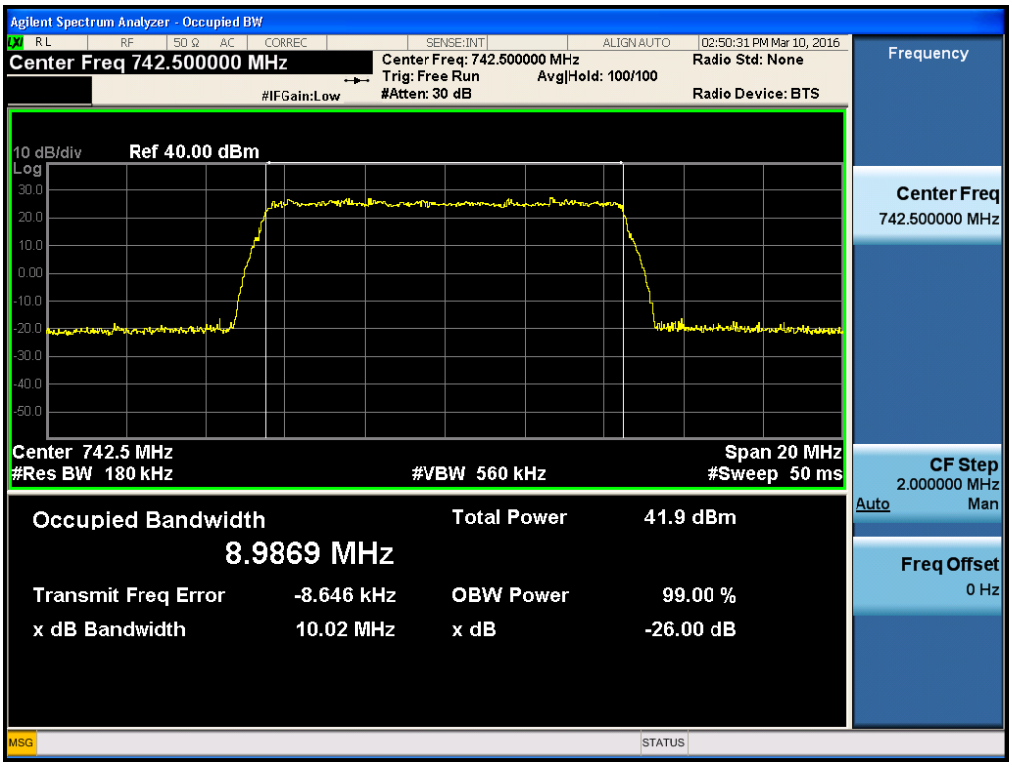


Plots of Occupied Bandwidth_700LTE_LTE 10MHz_Output

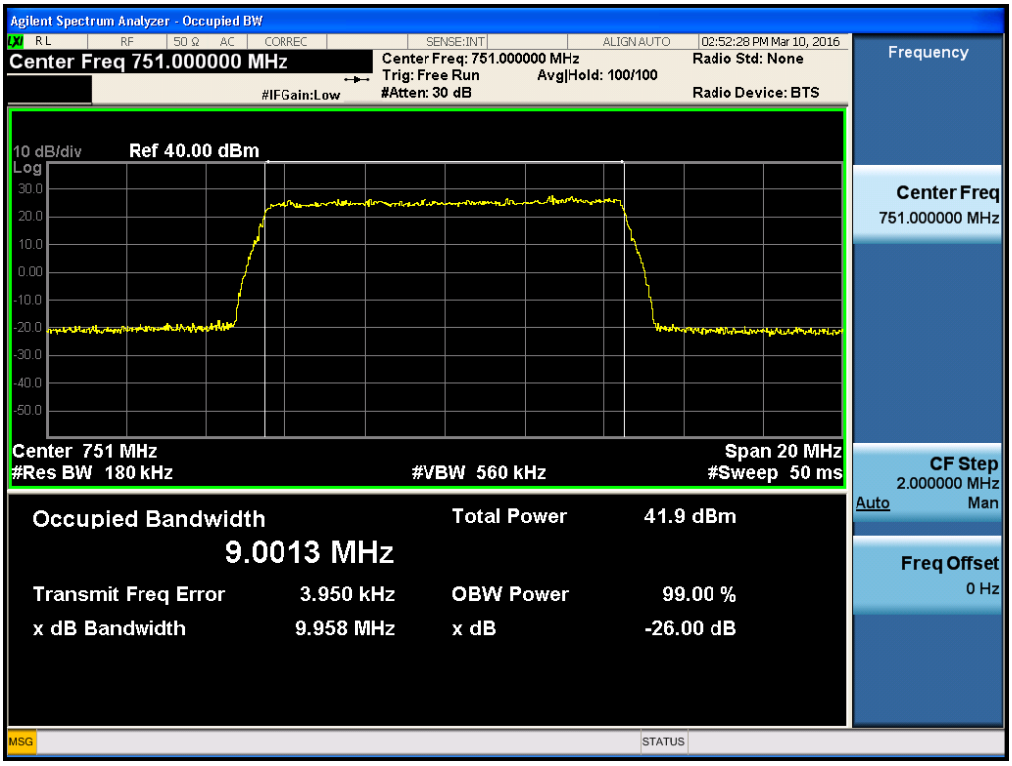
[AGC threshold Output Downlink Low]



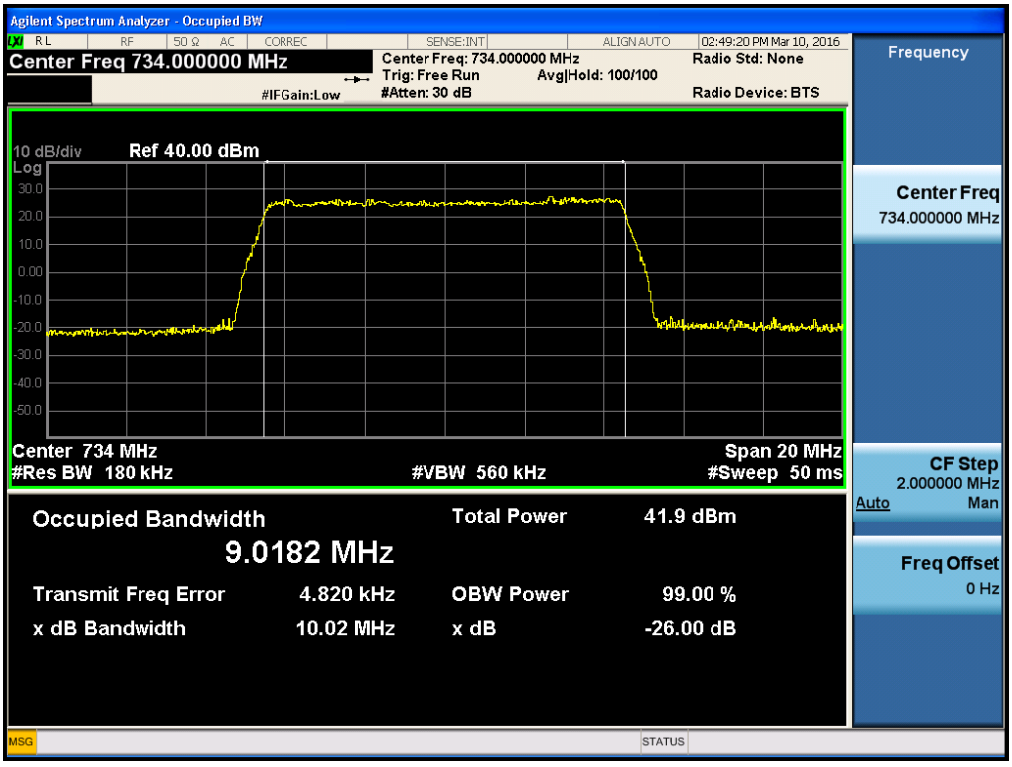
[AGC threshold Output Downlink Middle]



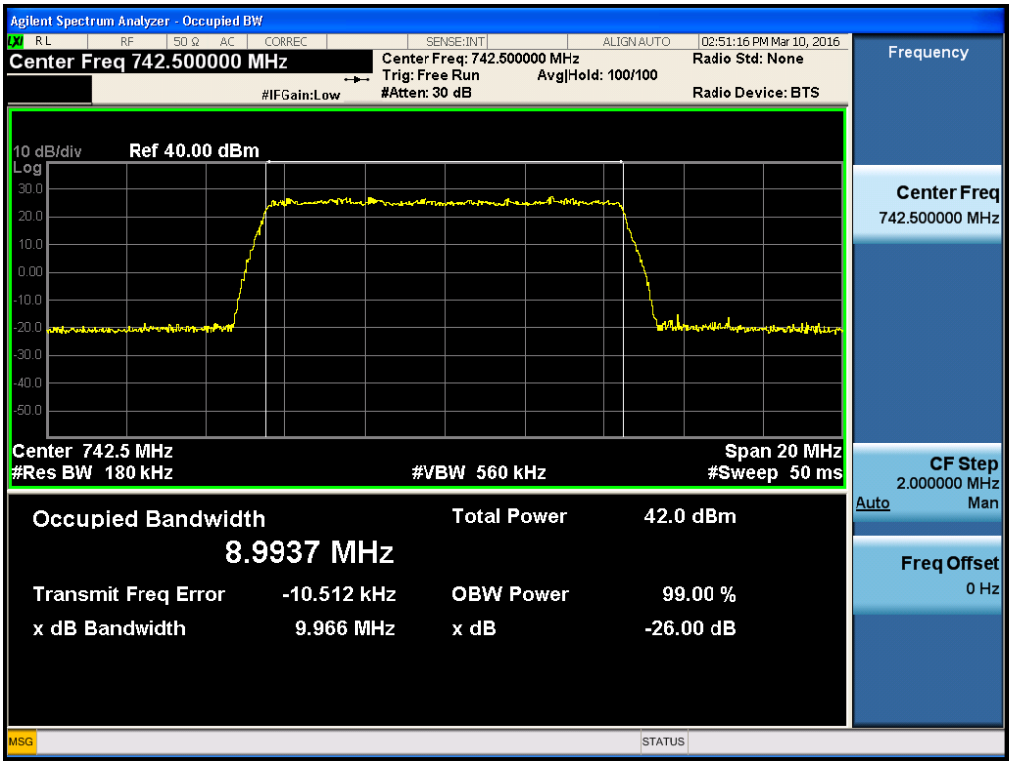
[AGC threshold Output Downlink High]



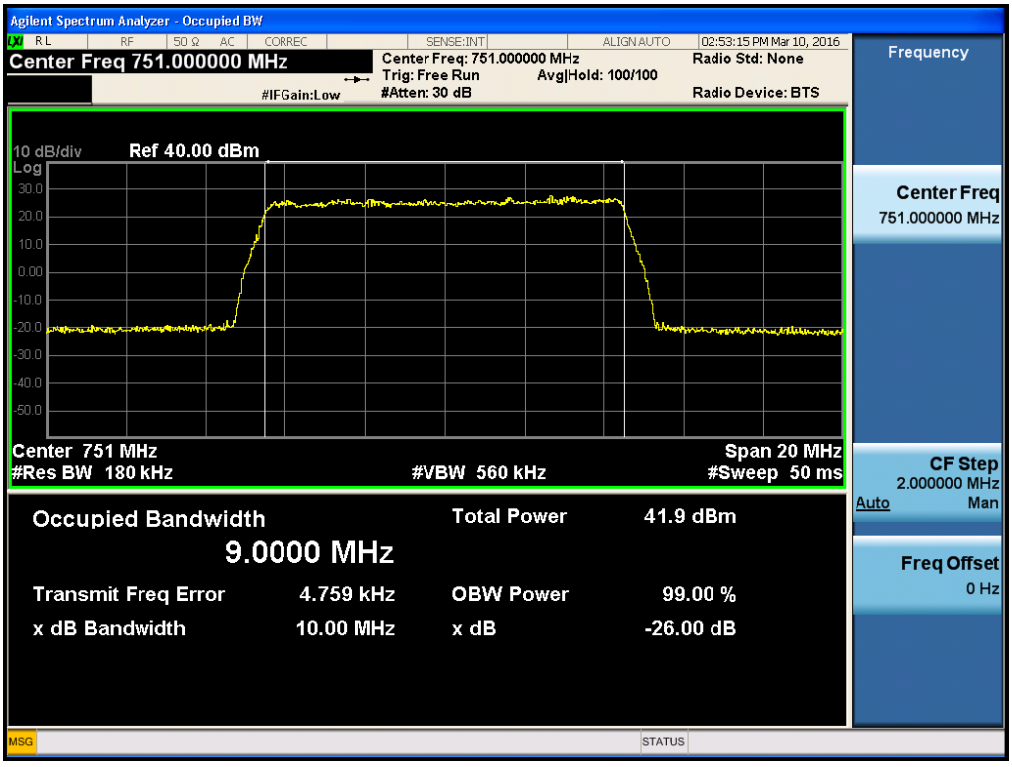
[+3dBm above AGC threshold Output Downlink Low]



[+3dBm above AGC threshold Output Downlink Middle]

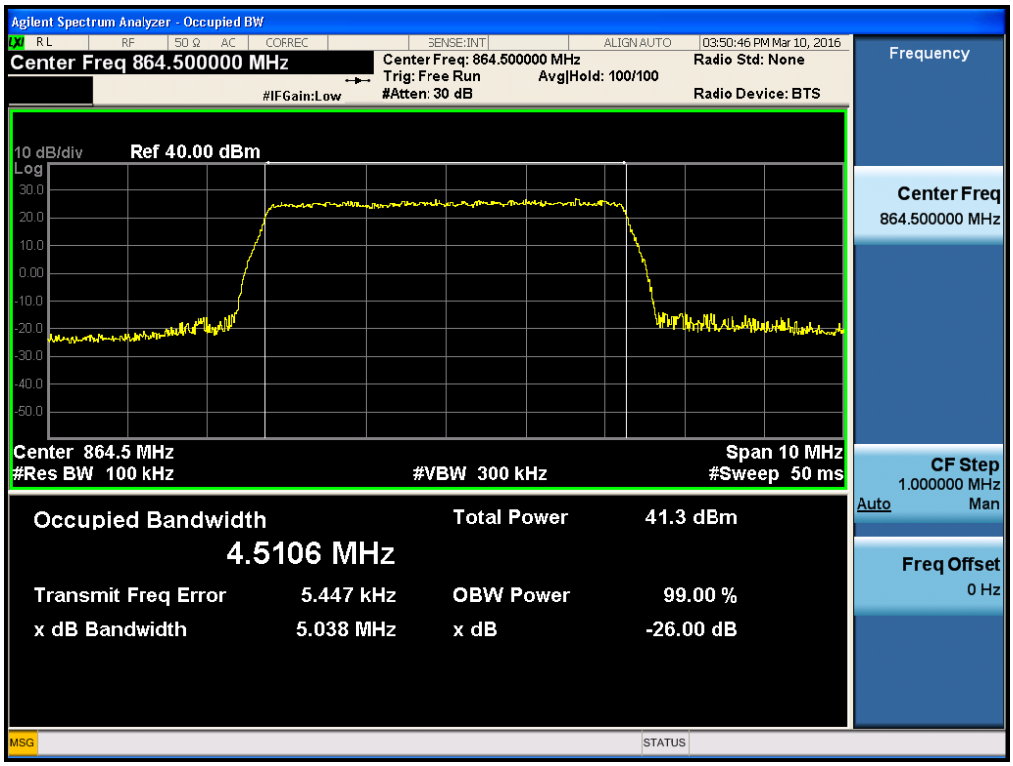


[+3dBm above AGC threshold Output Downlink High]

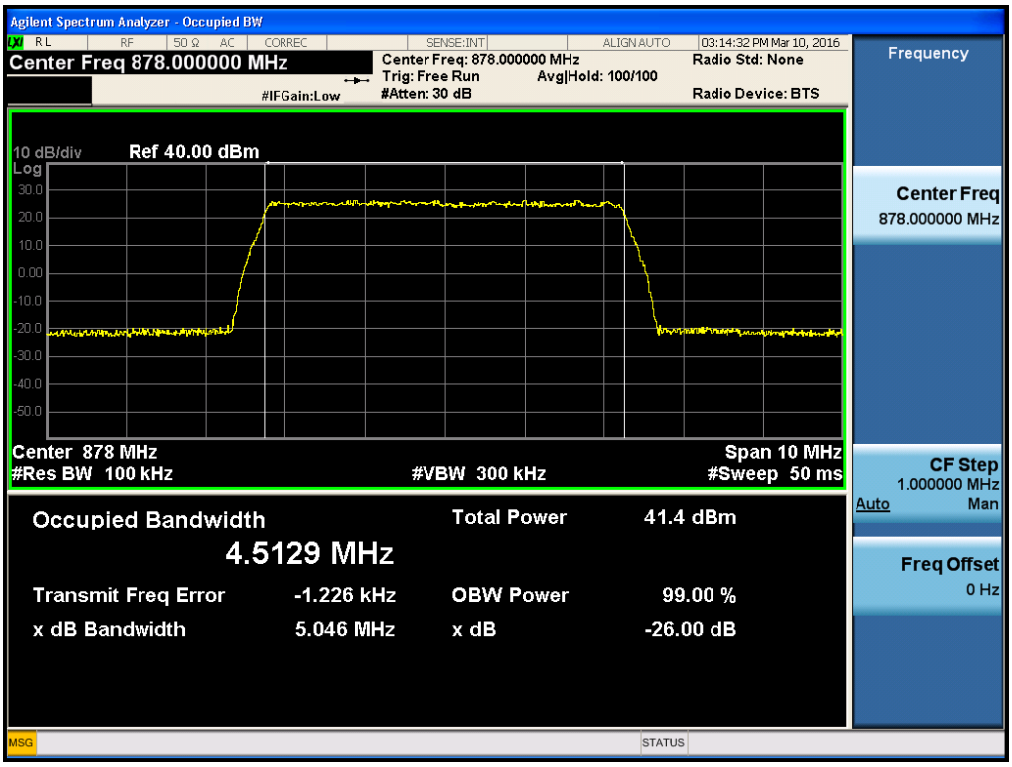


Plots of Occupied Bandwidth_800IDEN/850CEL_LTE 5MHz_Output

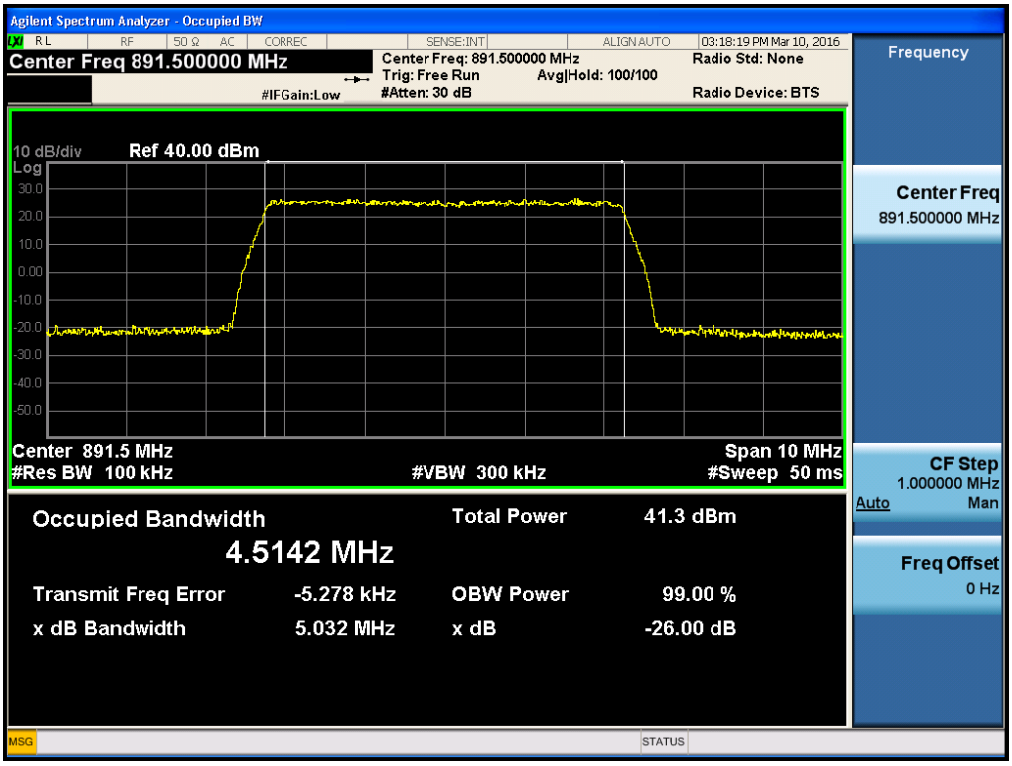
[AGC threshold Output Downlink Low]



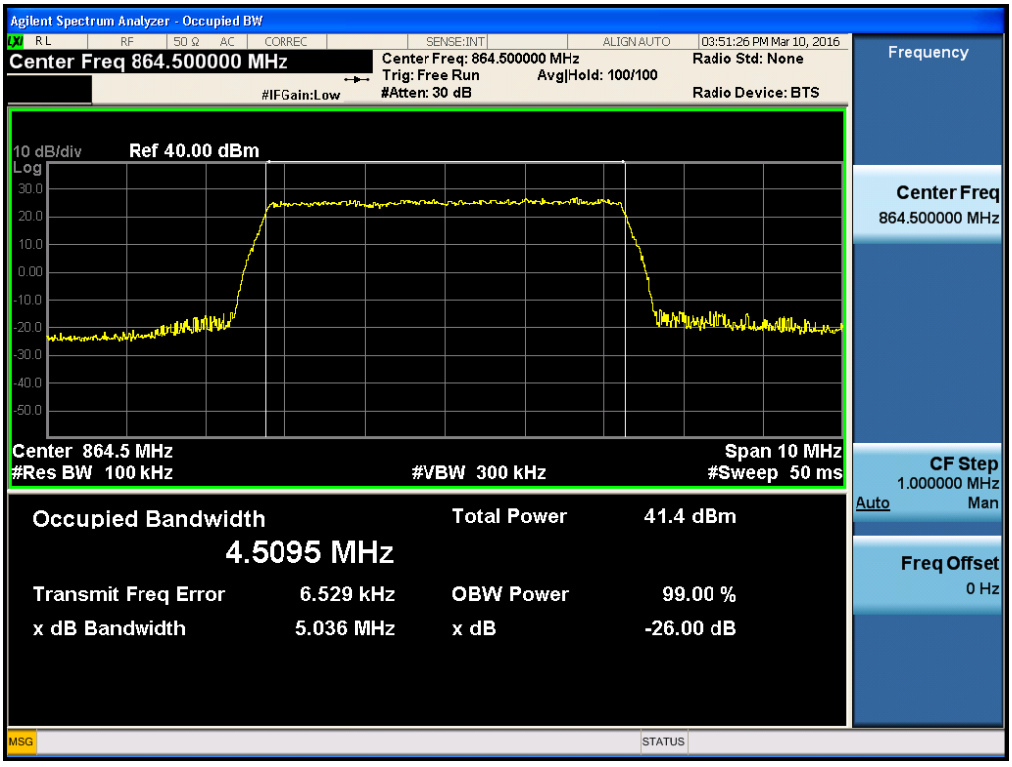
[AGC threshold Output Downlink Middle]



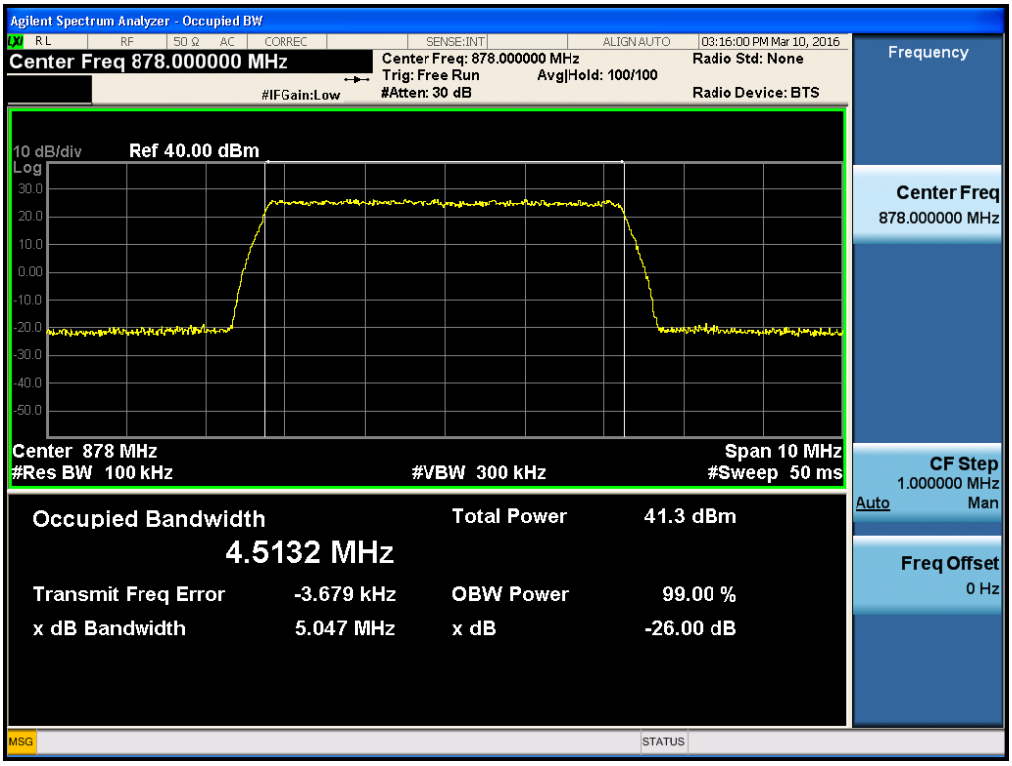
[AGC threshold Output Downlink High]



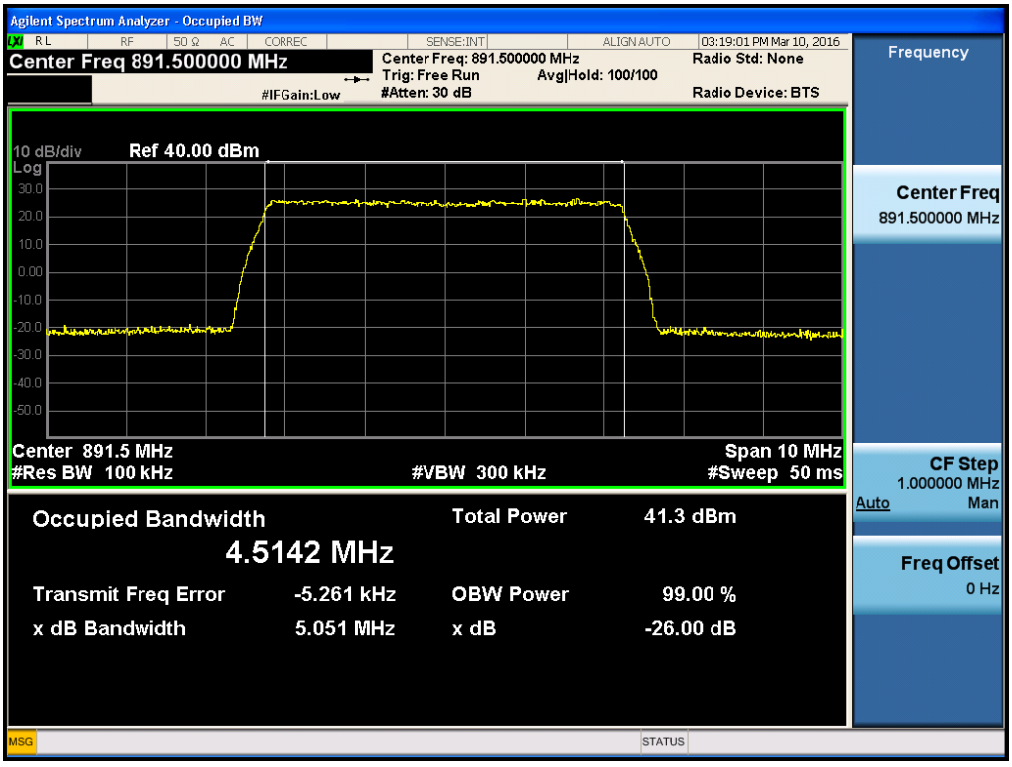
[+3dBm above AGC threshold Output Downlink Low]



[+3dBm above AGC threshold Output Downlink Middle]

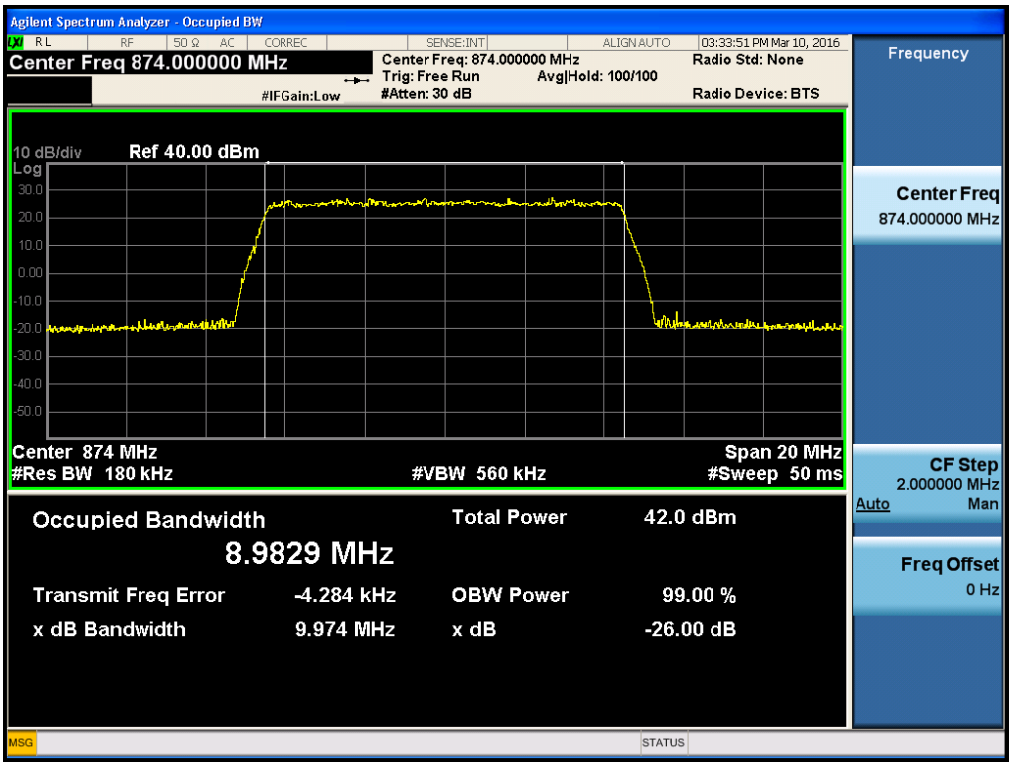


[+3dBm above AGC threshold Output Downlink High]

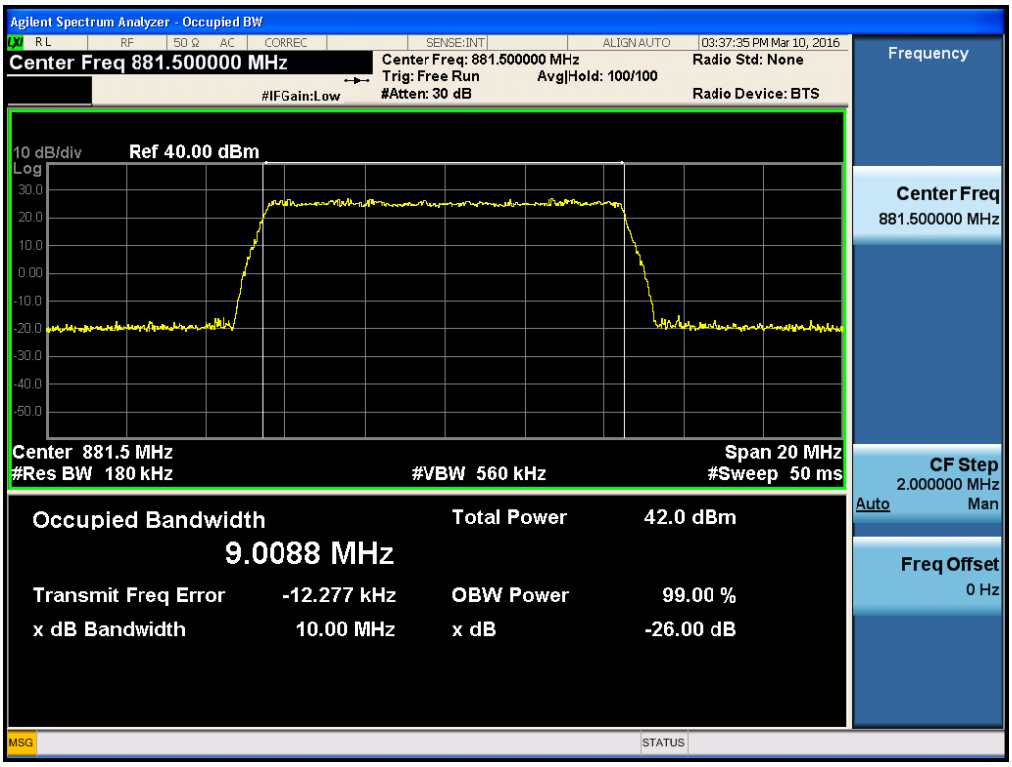


Plots of Occupied Bandwidth_850CEL_LTE 10MHz_Output

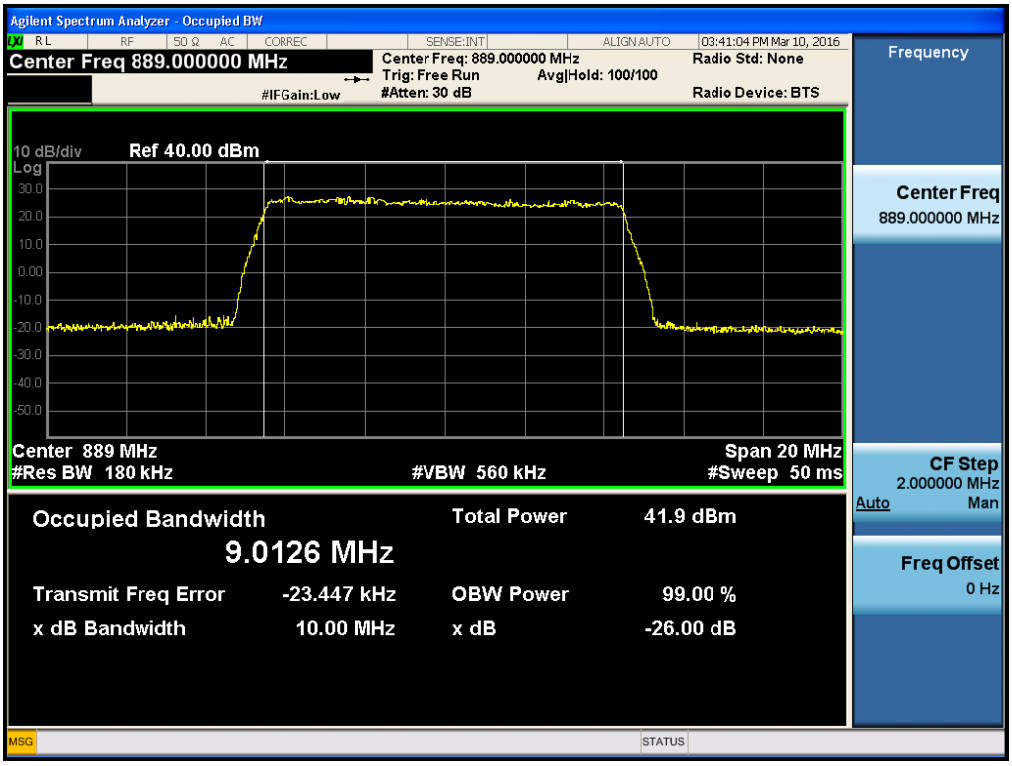
[AGC threshold Output Downlink Low]



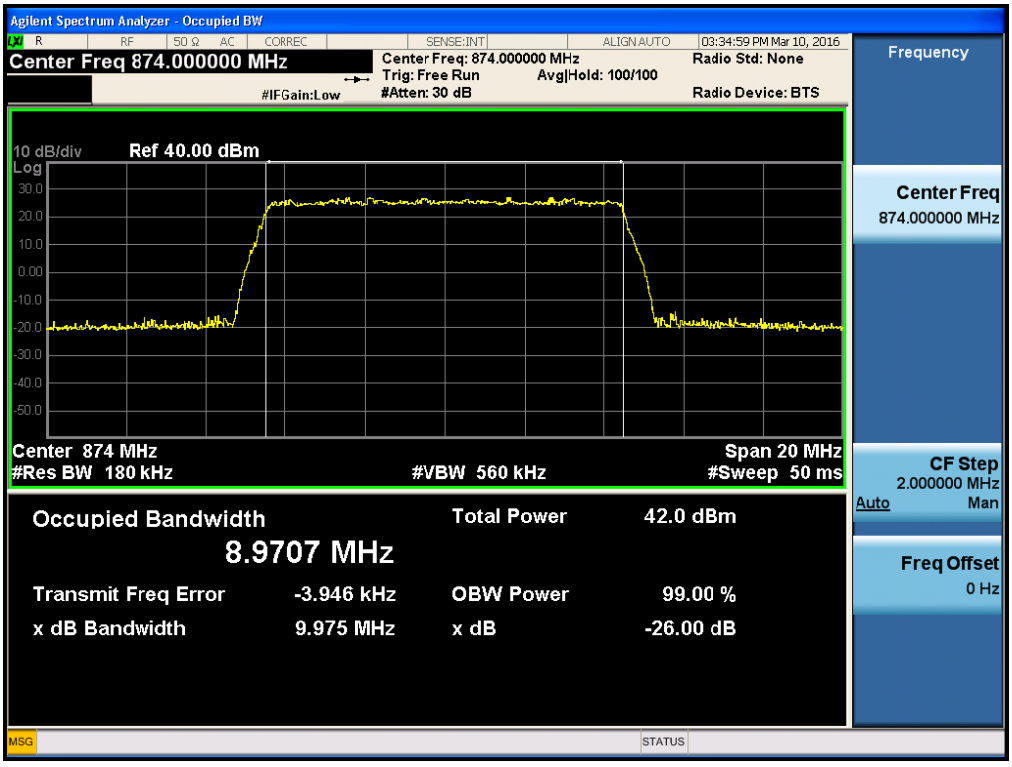
[AGC threshold Output Downlink Middle]



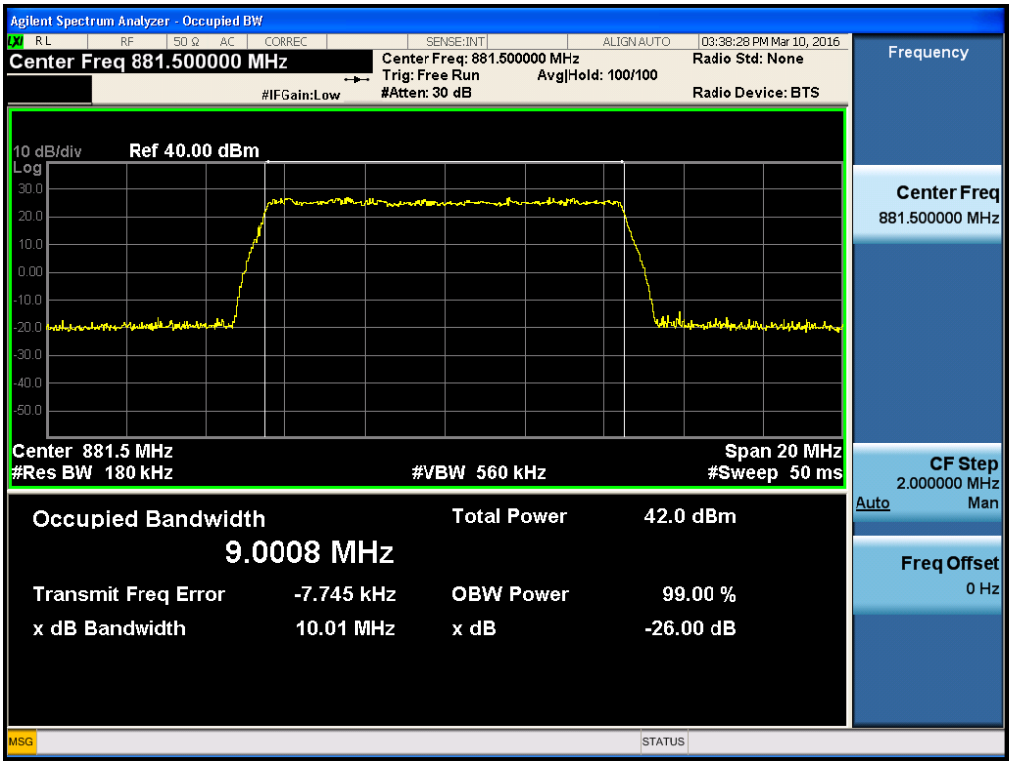
[AGC threshold Output Downlink High]



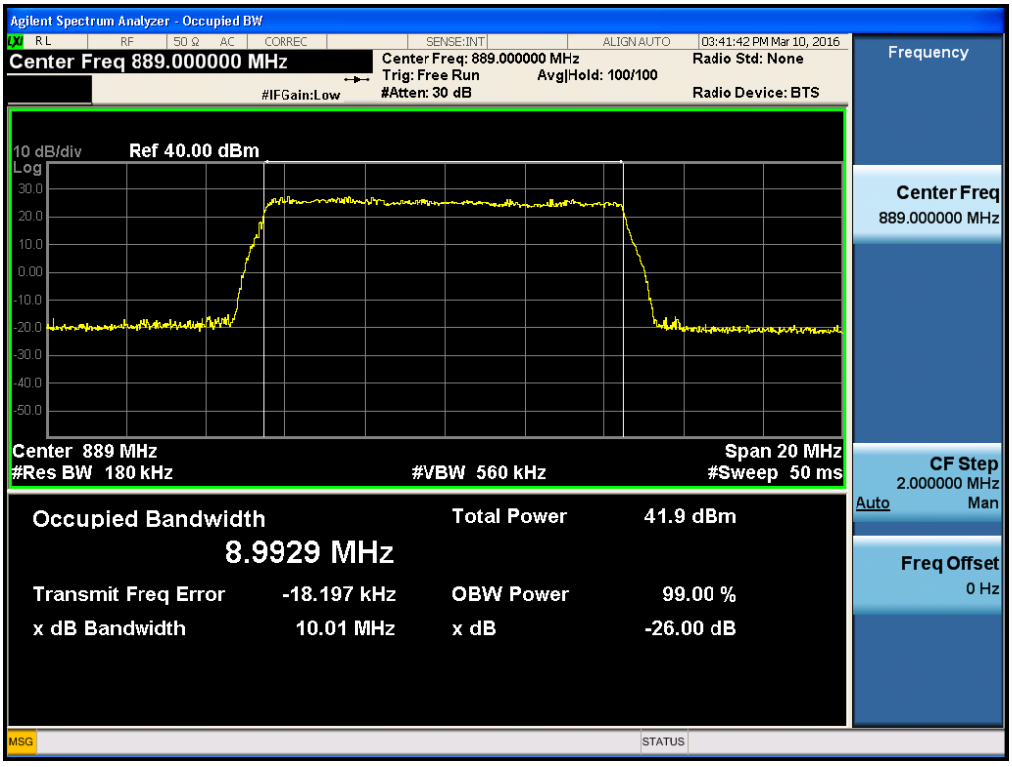
[+3dBm above AGC threshold Output Downlink Low]



[+3dBm above AGC threshold Output Downlink Middle]

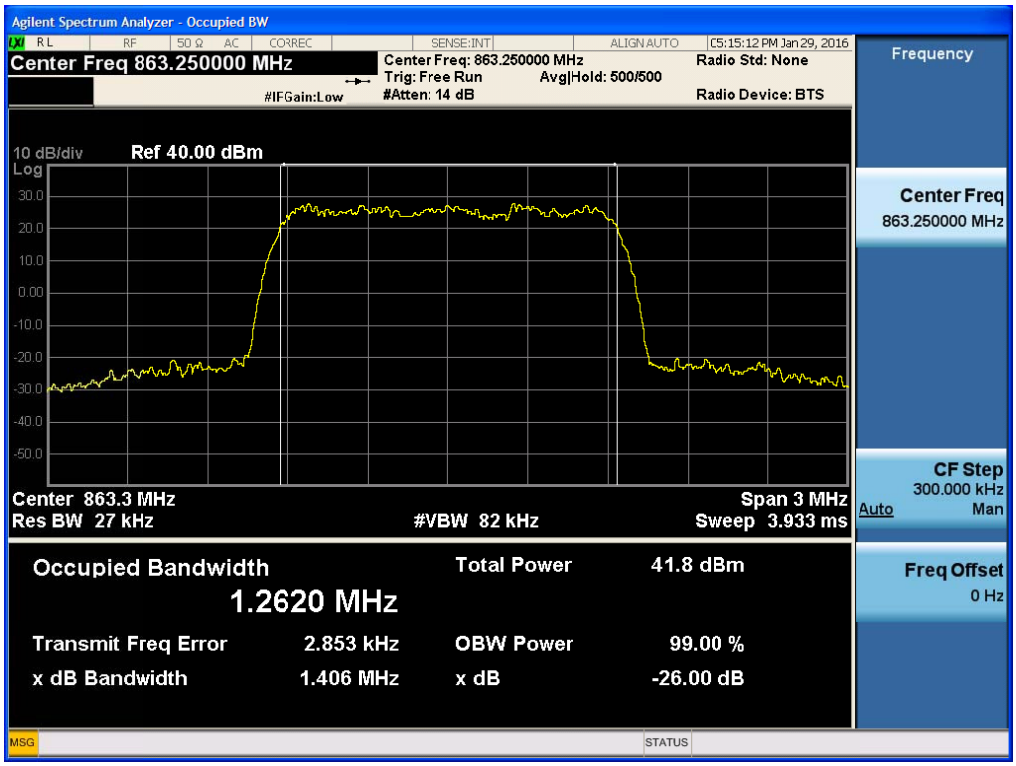


[+3dBm above AGC threshold Output Downlink High]

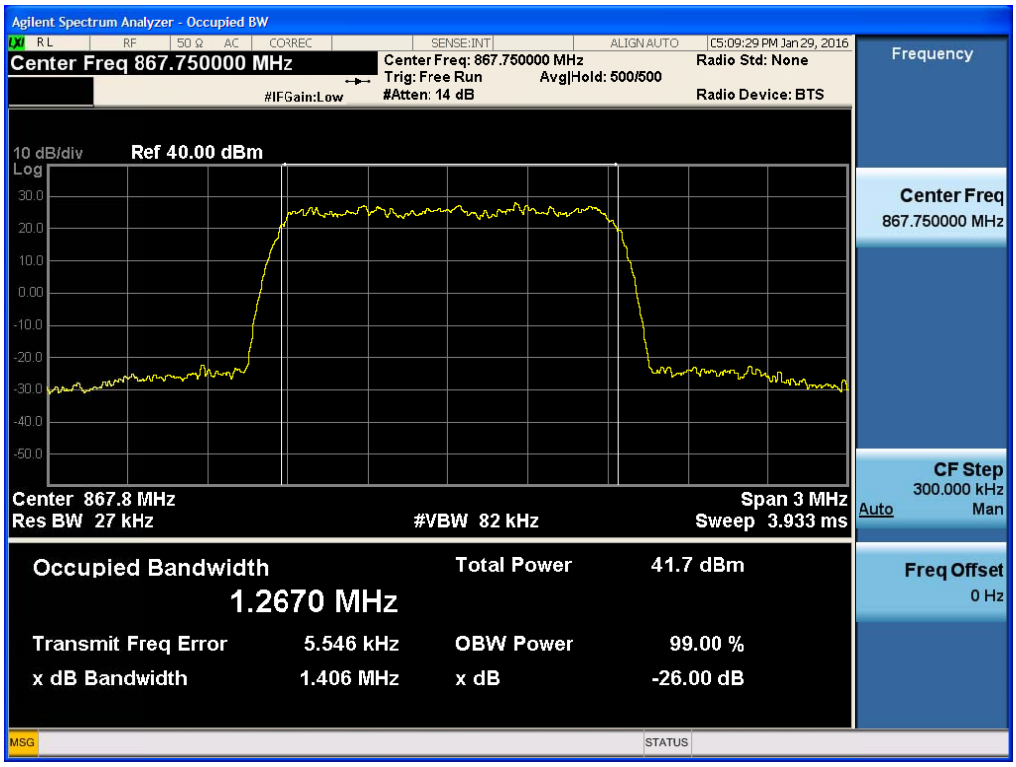


Plots of Occupied Bandwidth_800 IDEN_CDMA_Output

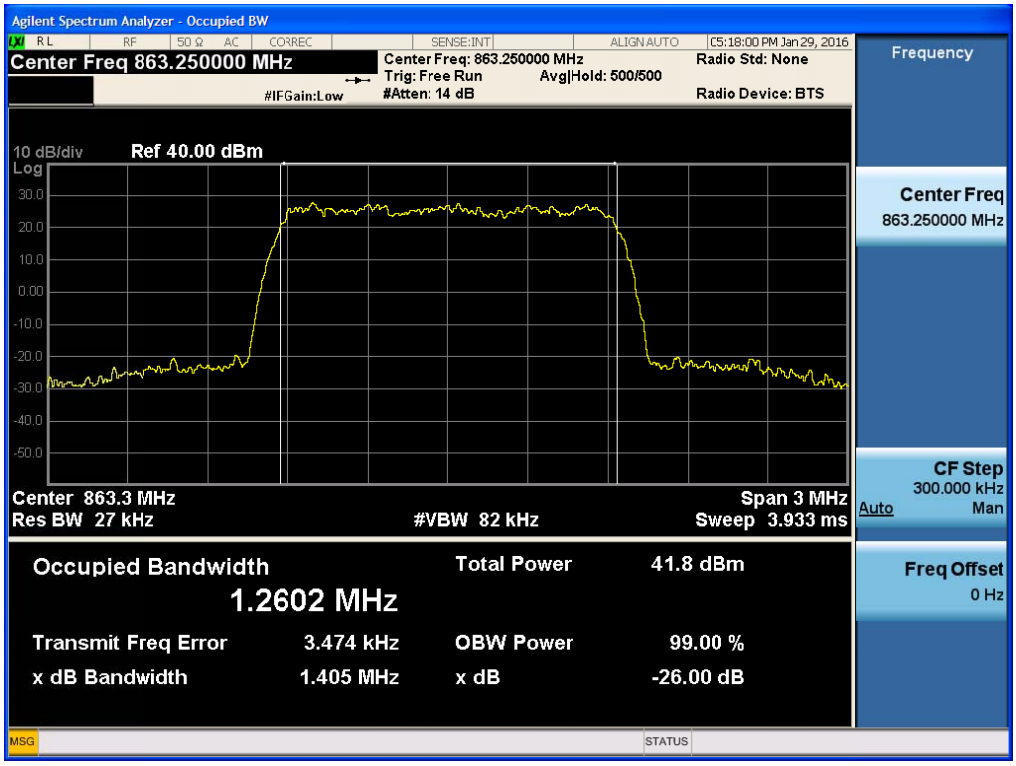
[AGC threshold Output Downlink Low]



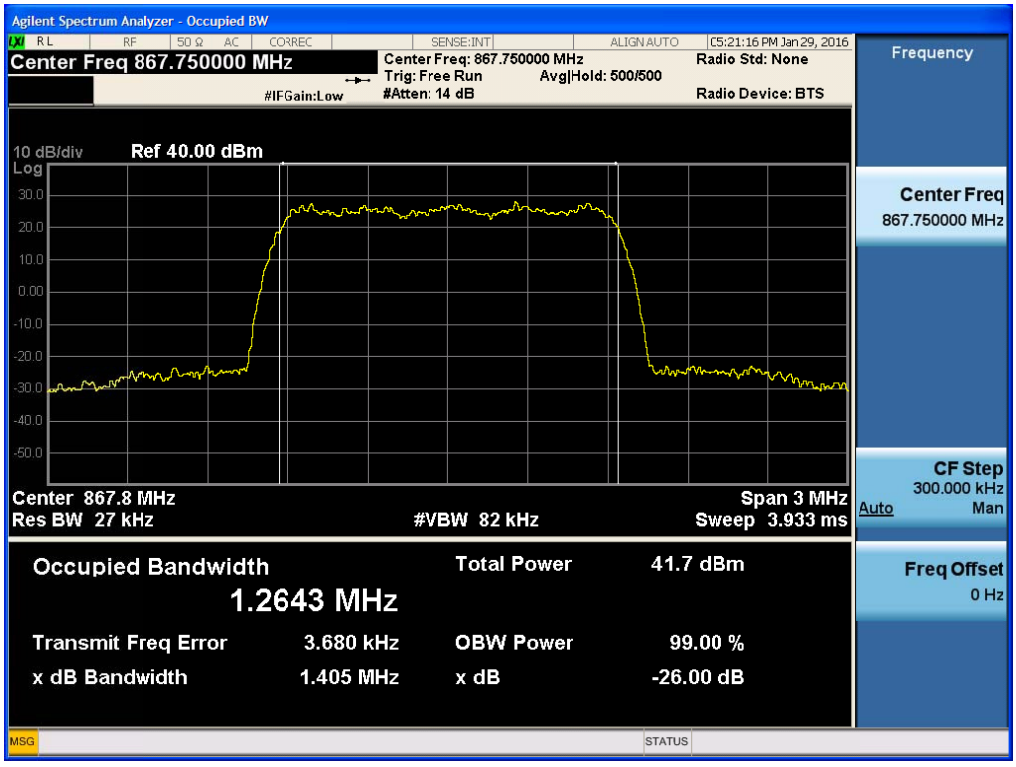
[AGC threshold Output Downlink High]



[+3dBm above AGC threshold Output Downlink Low]

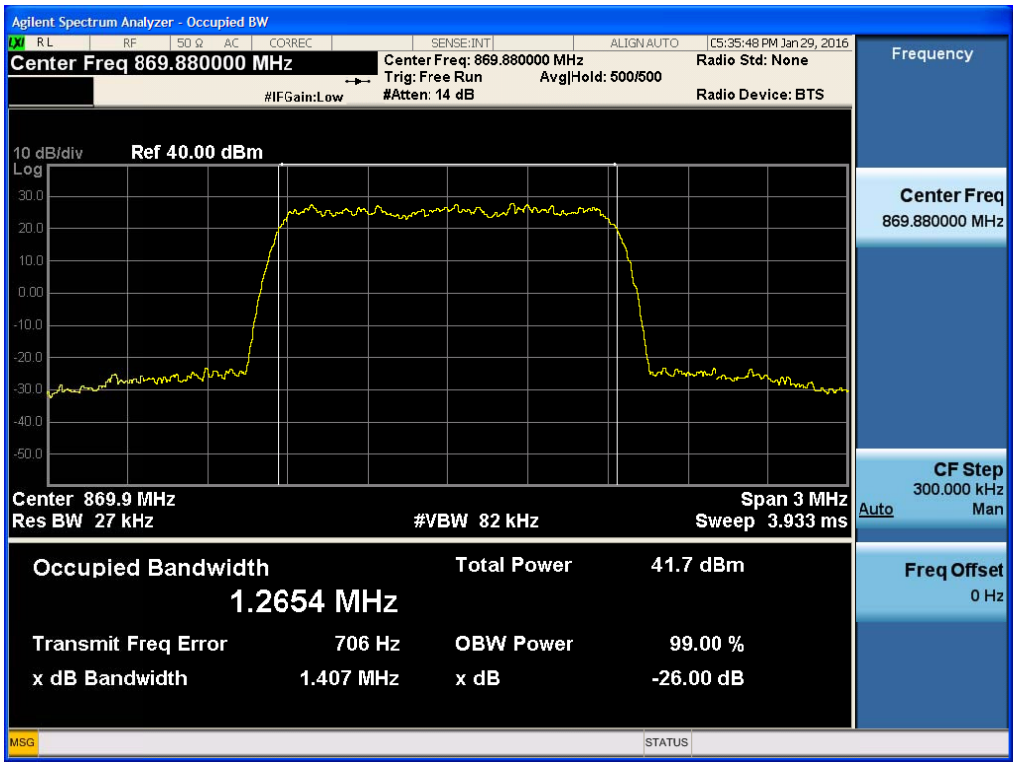


[+3dBm above AGC threshold Output Downlink High]

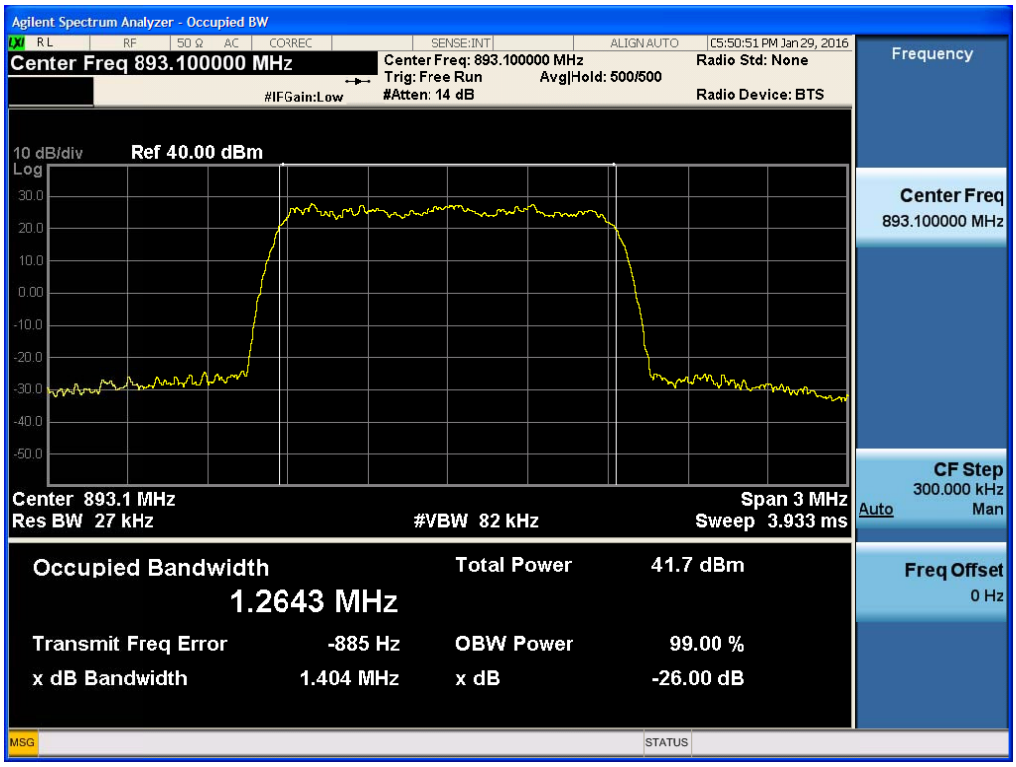


Plots of Occupied Bandwidth_850 CEL_CDMA_Output

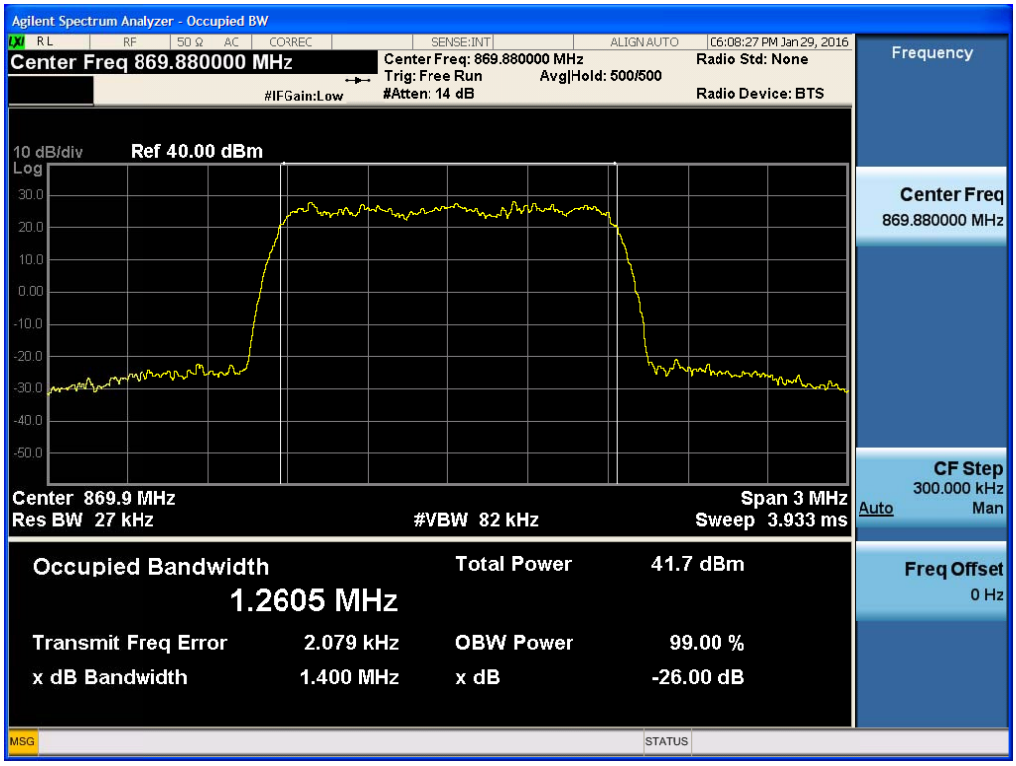
[AGC threshold Output Downlink Low]



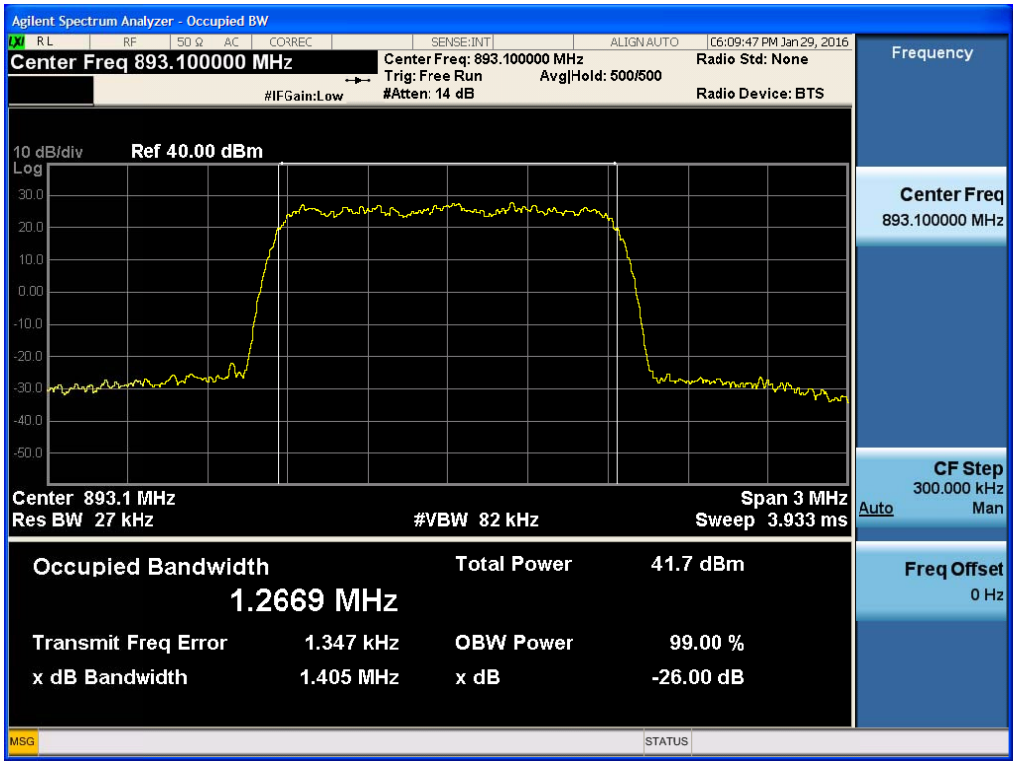
[AGC threshold Output Downlink High]



[+3dBm above AGC threshold Output Downlink Low]

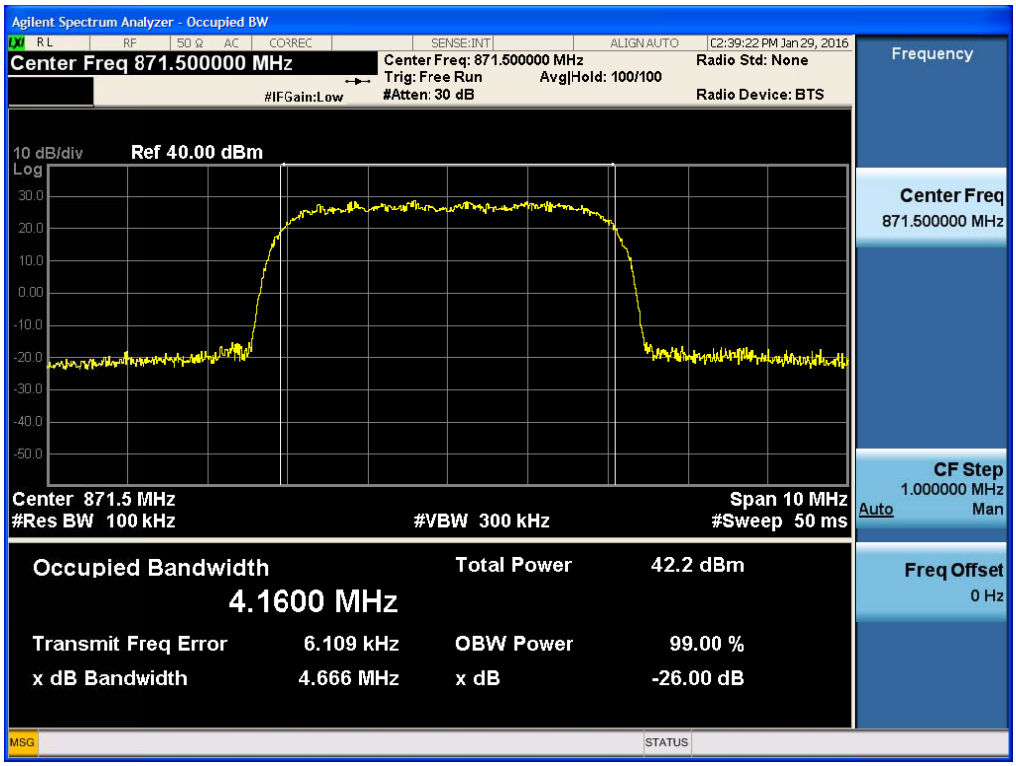


[+3dBm above AGC threshold Output Downlink High]

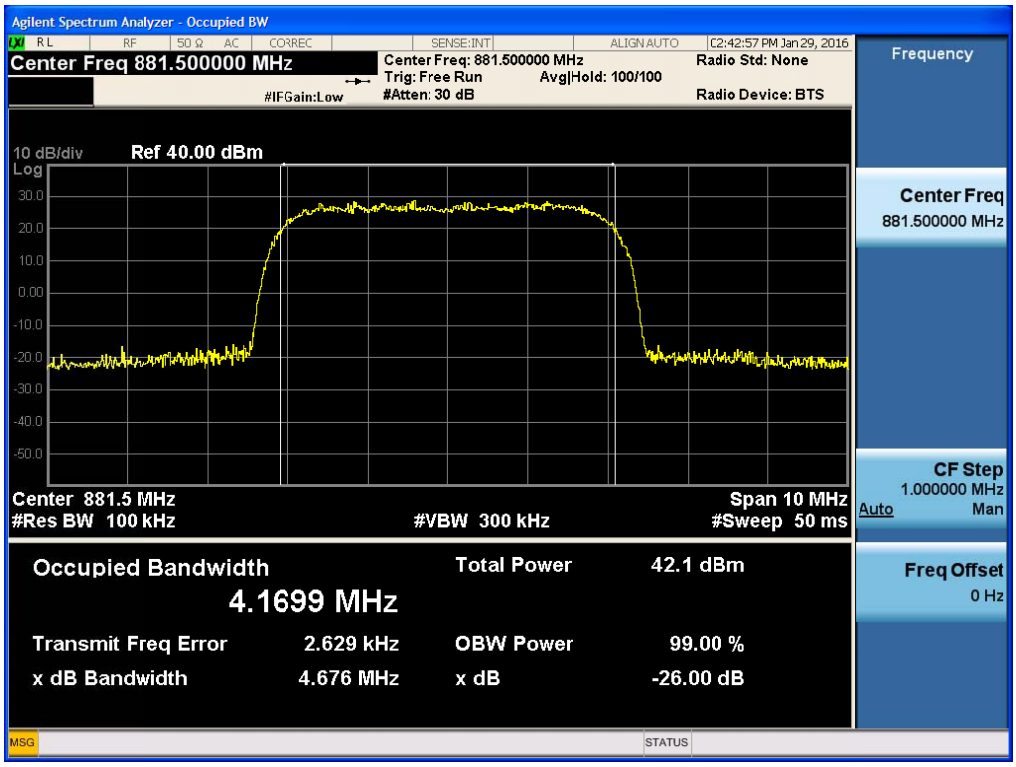


Plots of Occupied Bandwidth_850CEL_WCDMA_Output

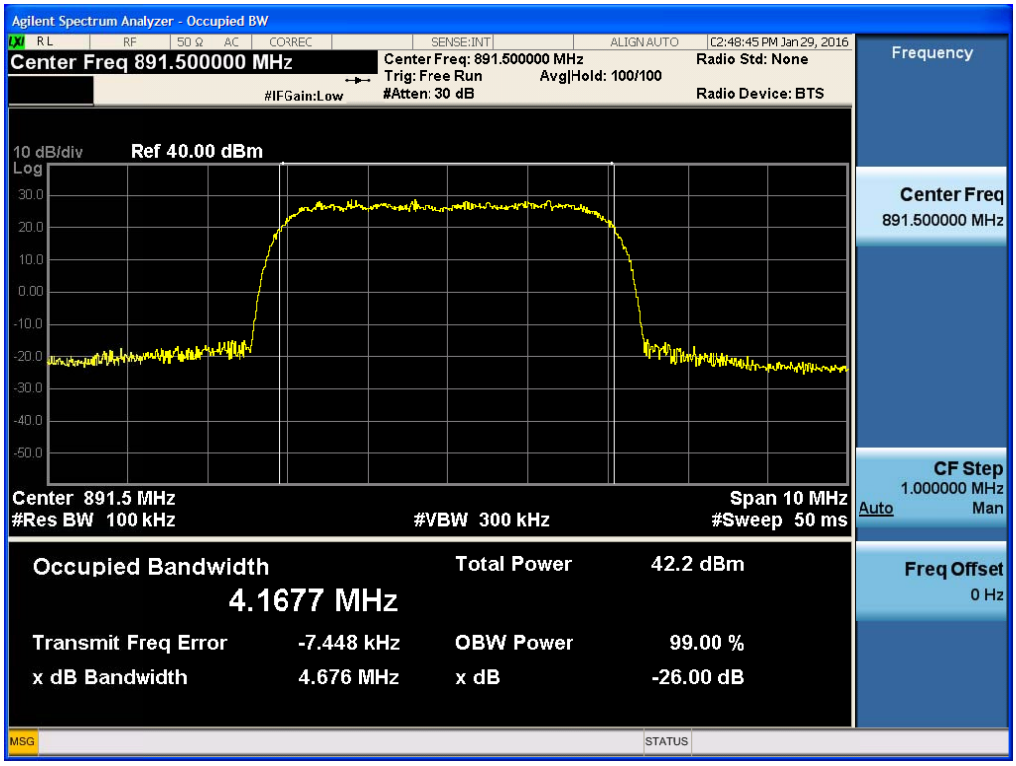
[AGC threshold Output Downlink Low]



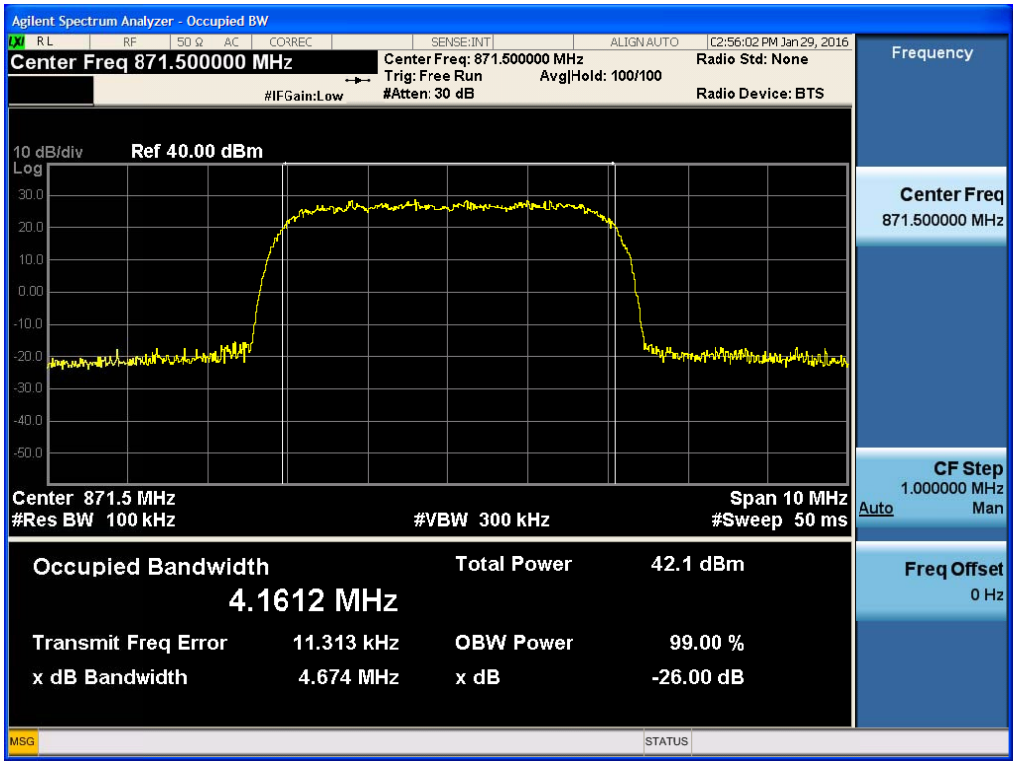
[AGC threshold Output Downlink Middle]



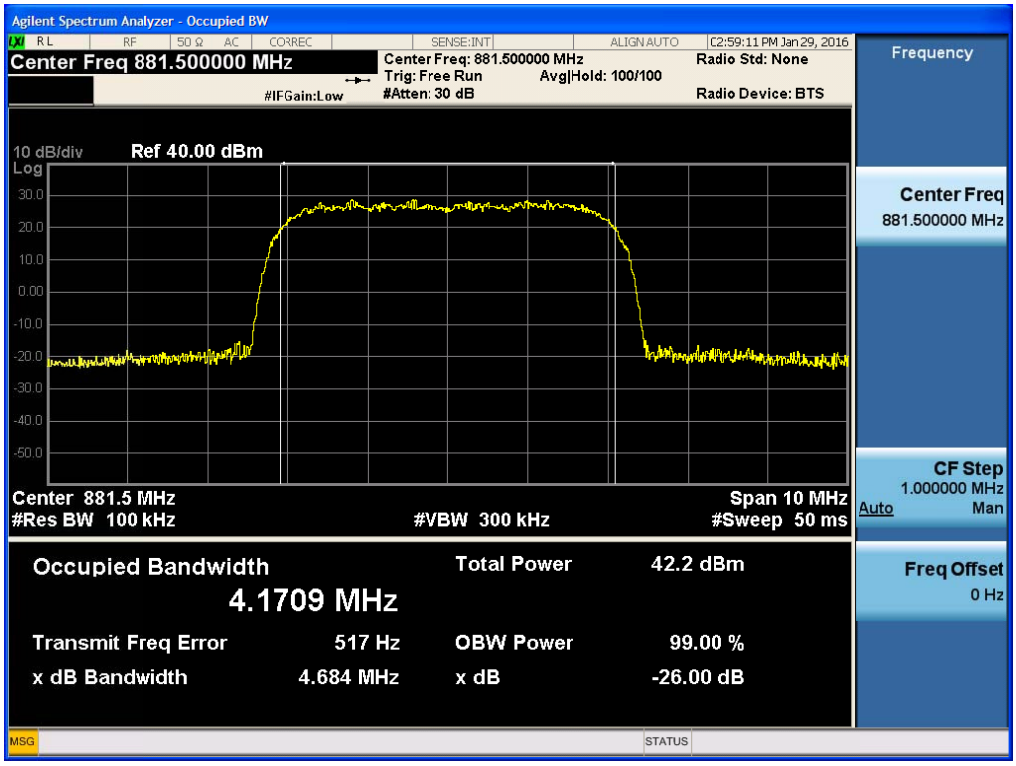
[AGC threshold Output Downlink High]



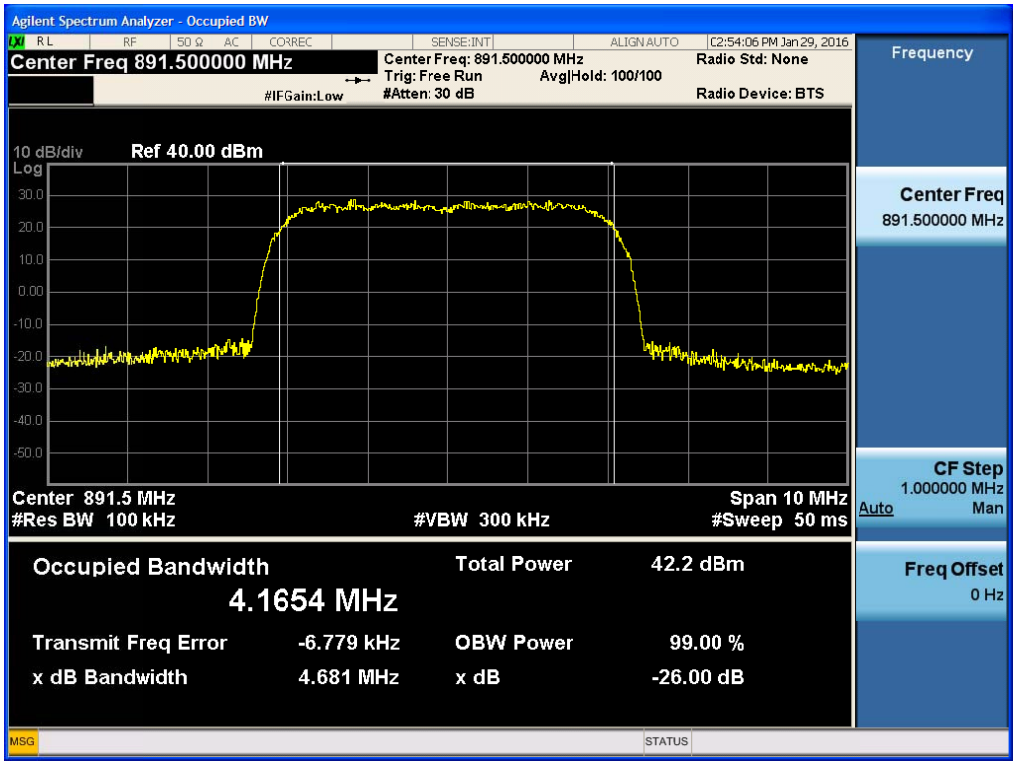
[+3dBm above AGC threshold Output Downlink Low]



[+3dBm above AGC threshold Output Downlink Middle]

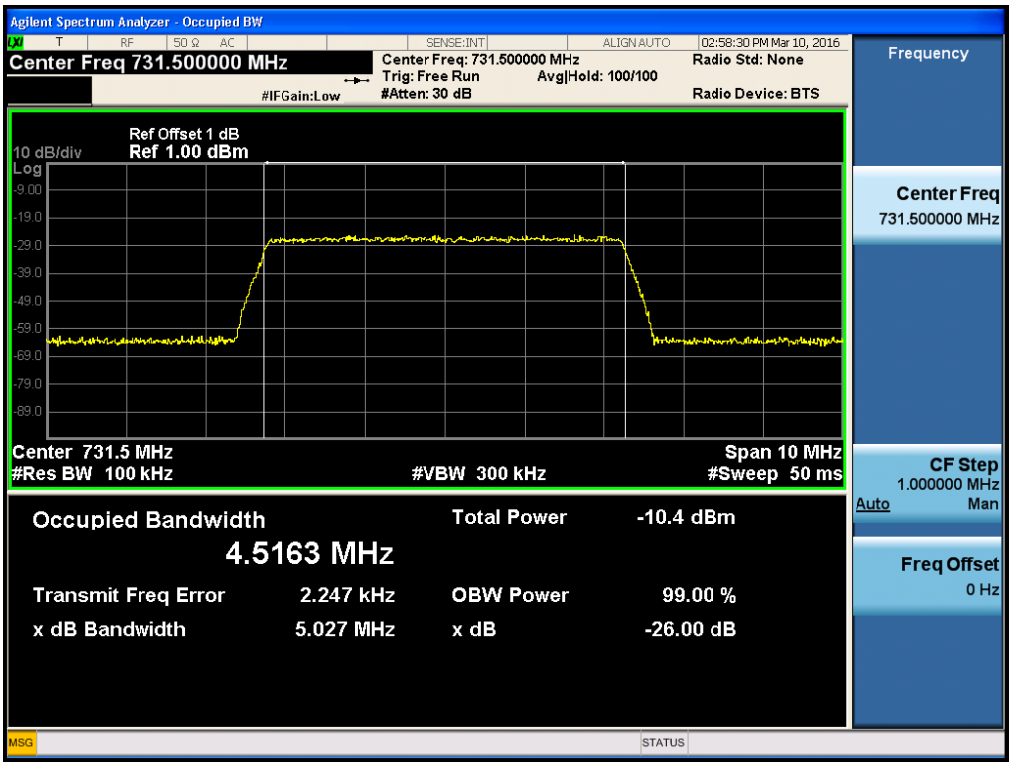


[+3dBm above AGC threshold Output Downlink High]

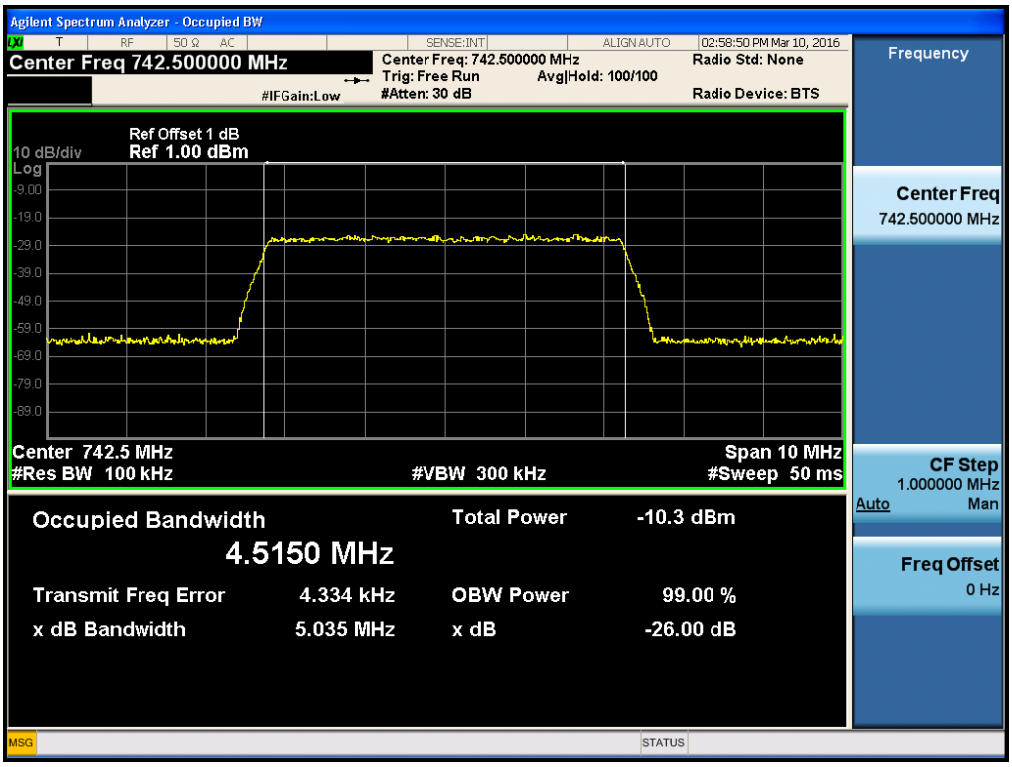


Plots of Occupied Bandwidth_700LTE_LTE 5MHz_Input

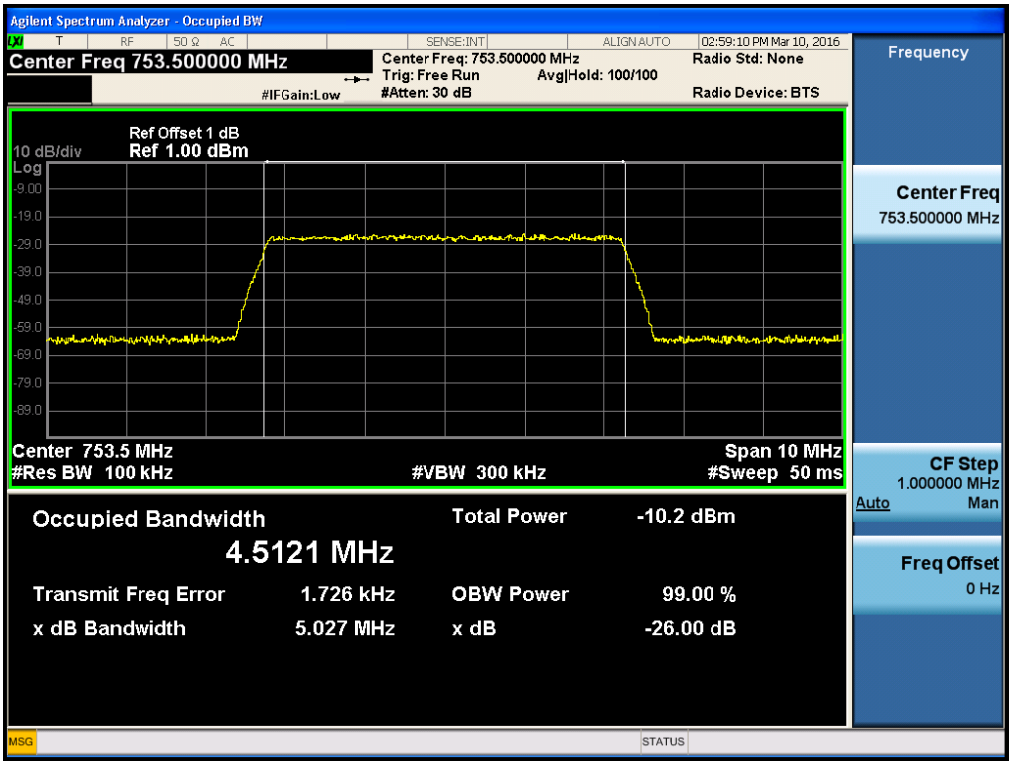
[AGC threshold Input Downlink Low]



[AGC threshold Input Downlink Middle]

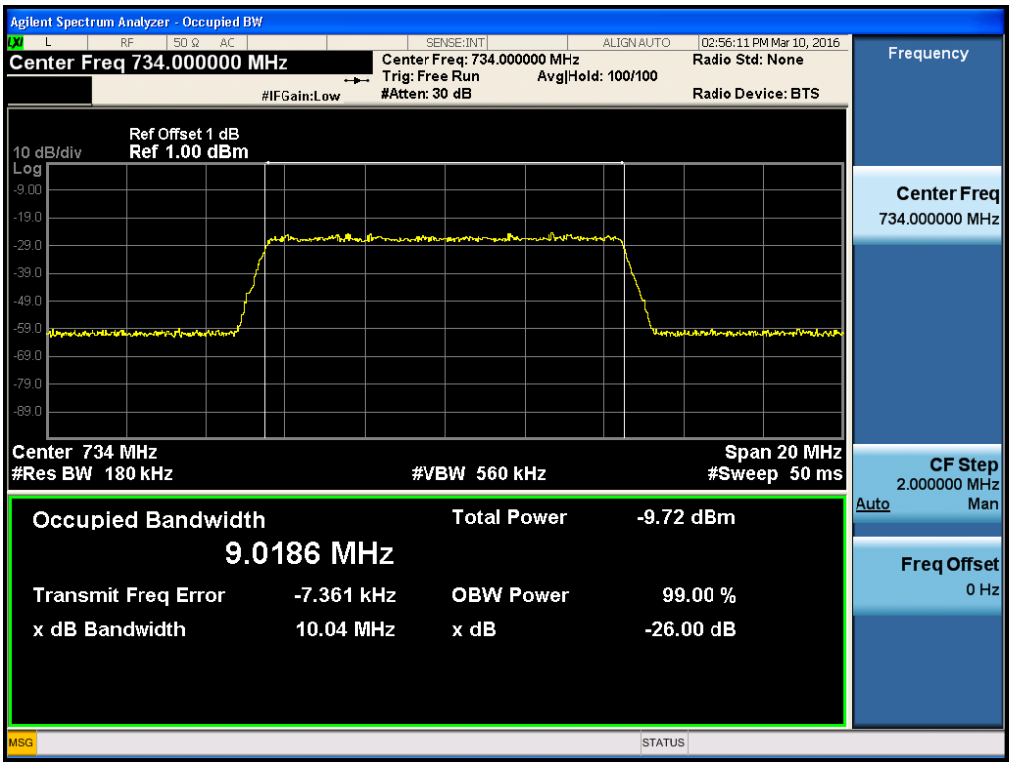


[AGC threshold Input Downlink High]

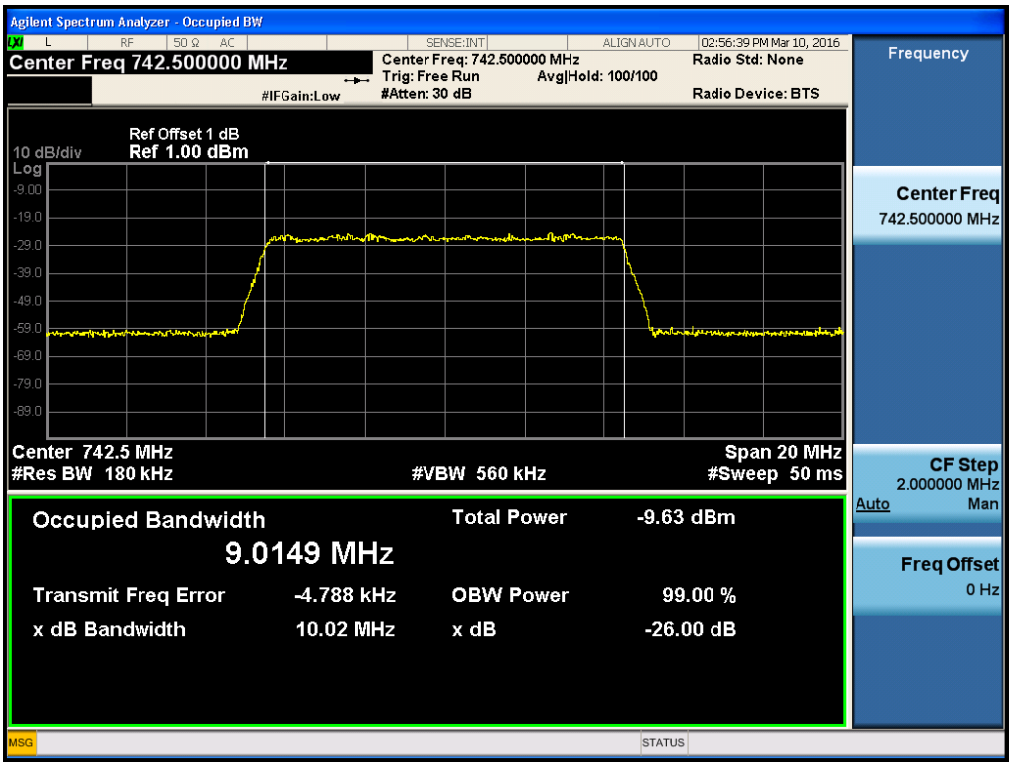


Plots of Occupied Bandwidth_700LTE_LTE 10MHz_Input

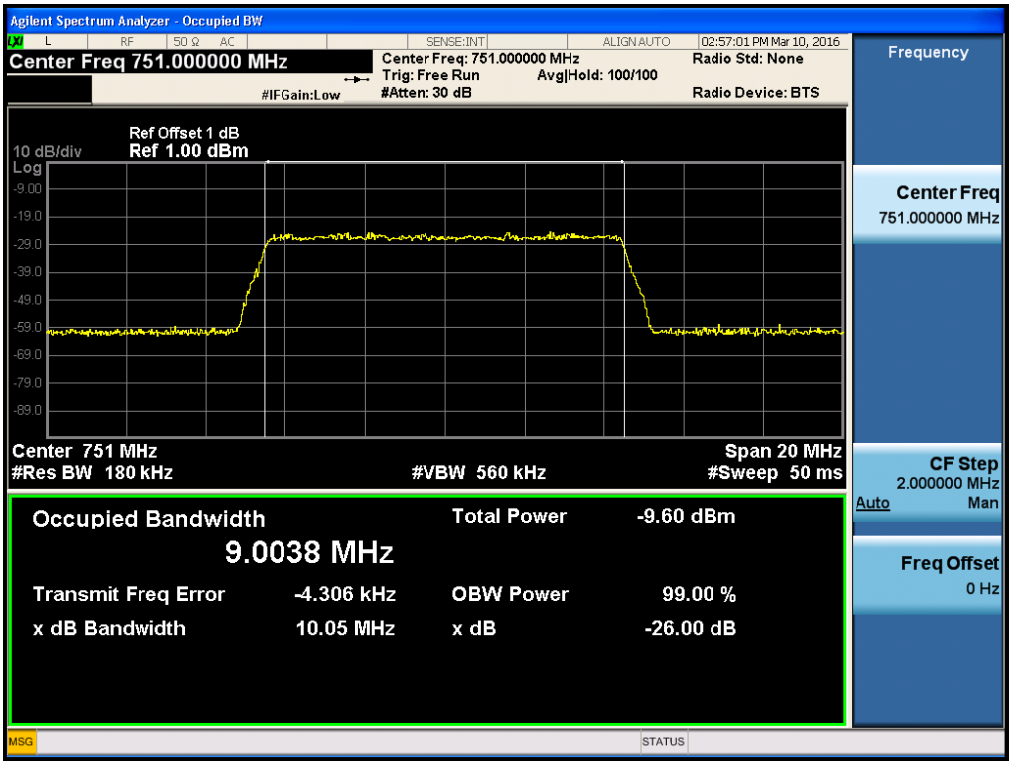
[AGC threshold Input Downlink Low]



[AGC threshold Input Downlink Middle]

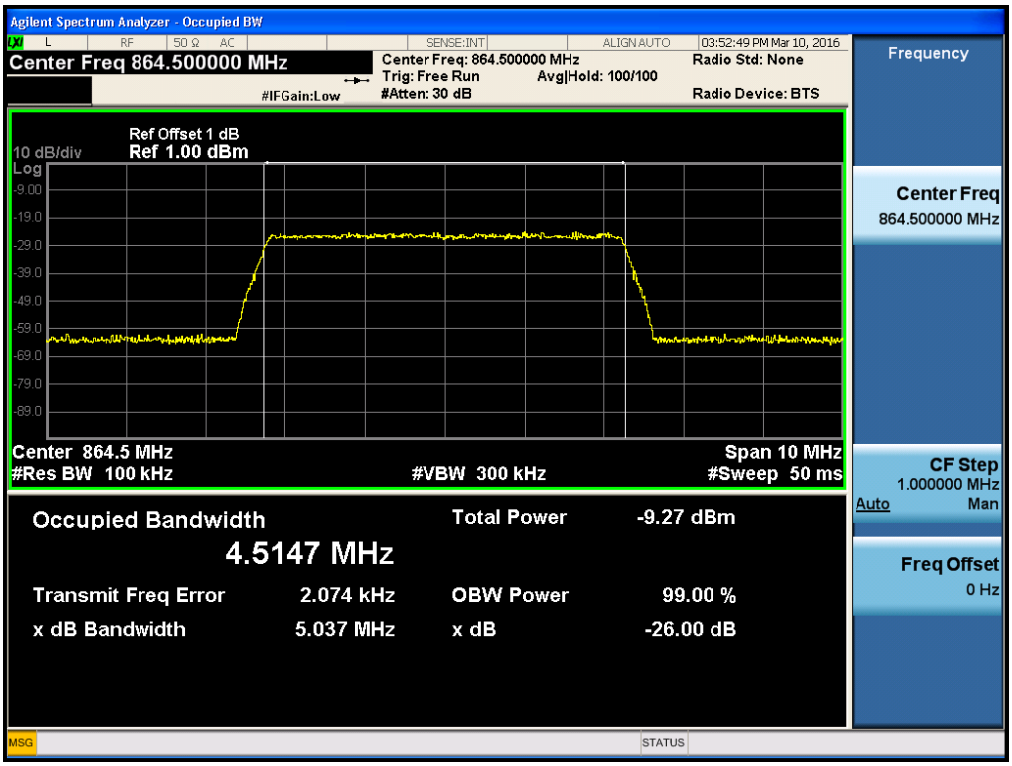


[AGC threshold Input Downlink High]

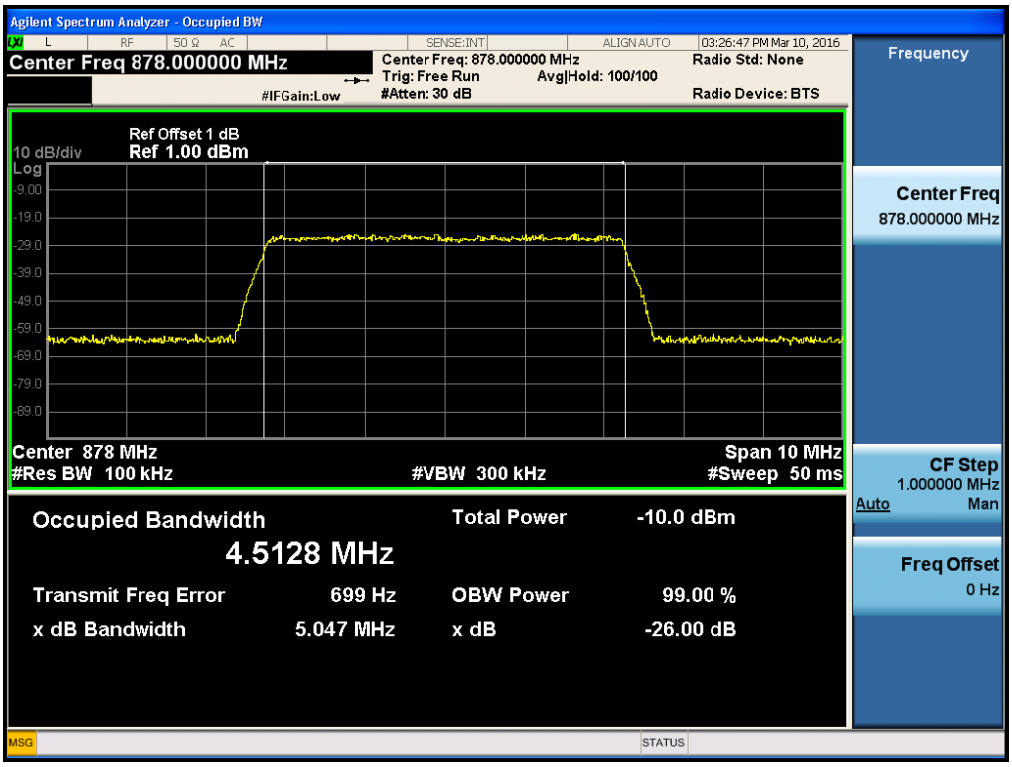


Plots of Occupied Bandwidth_800IDEN/850CEL_LTE 5MHz_Input

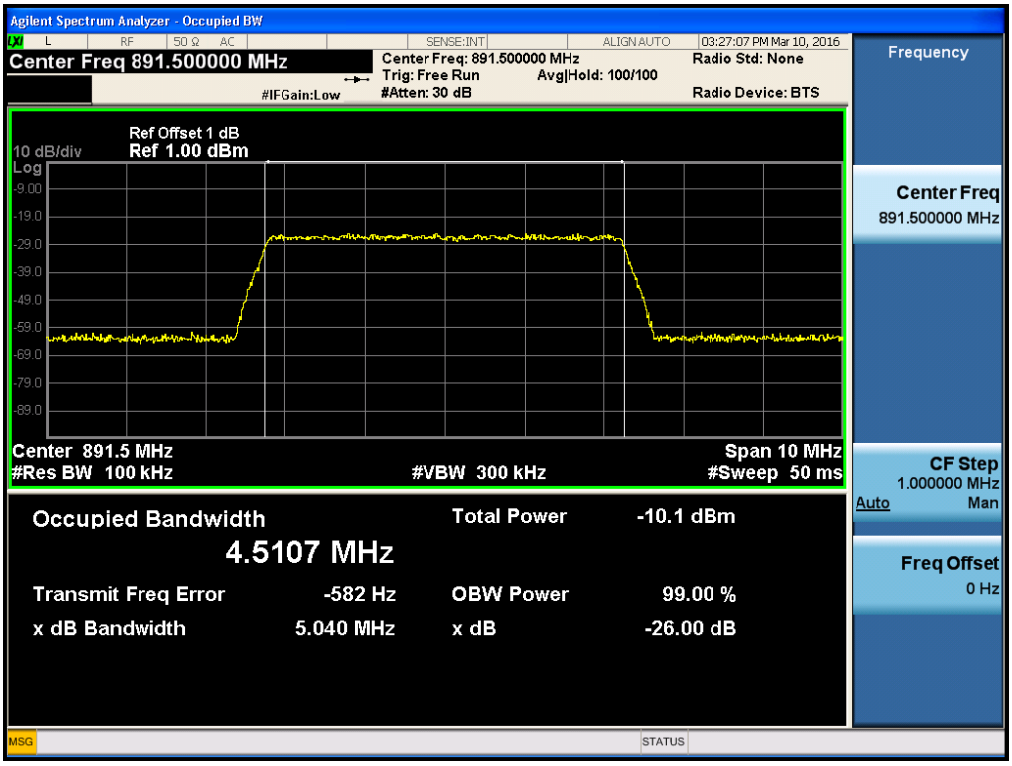
[AGC threshold Input Downlink Low]



[AGC threshold Input Downlink Middle]

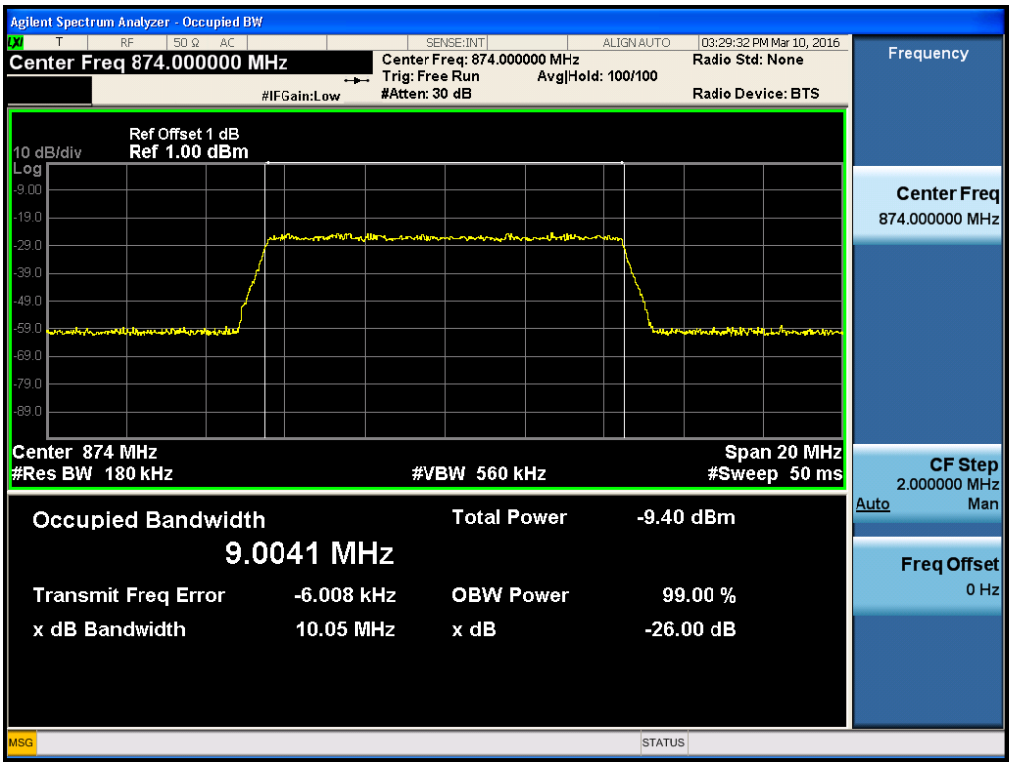


[AGC threshold Input Downlink High]



Plots of Occupied Bandwidth_850CEL_LTE 10MHz_Input

[AGC threshold Input Downlink Low]



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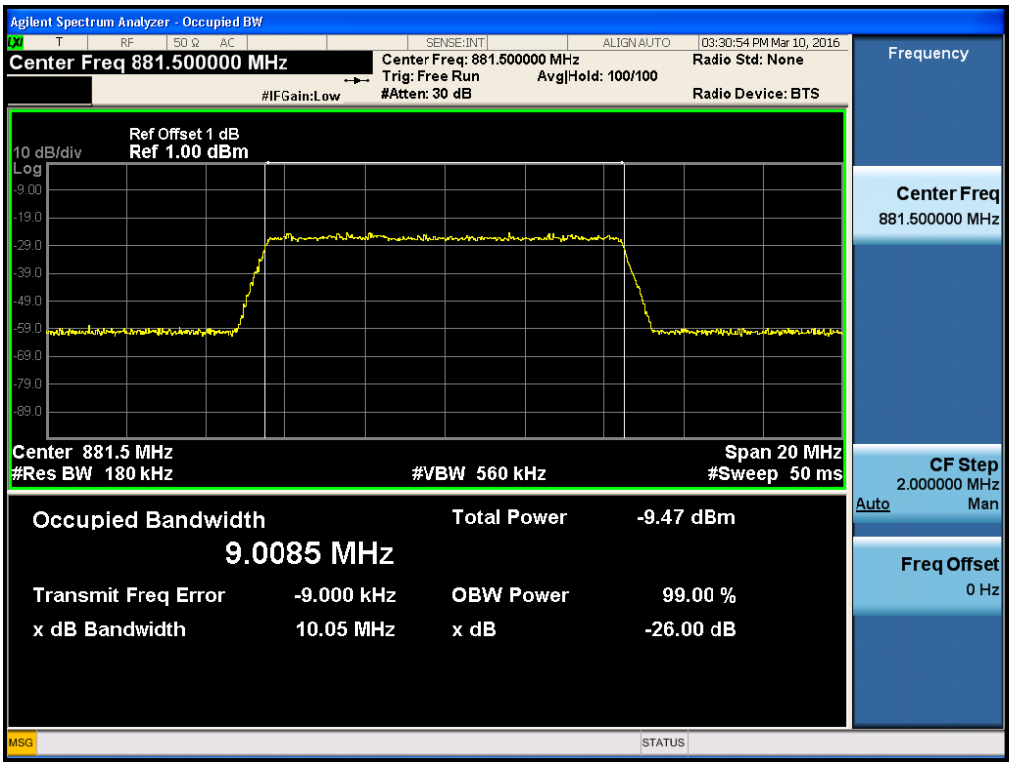

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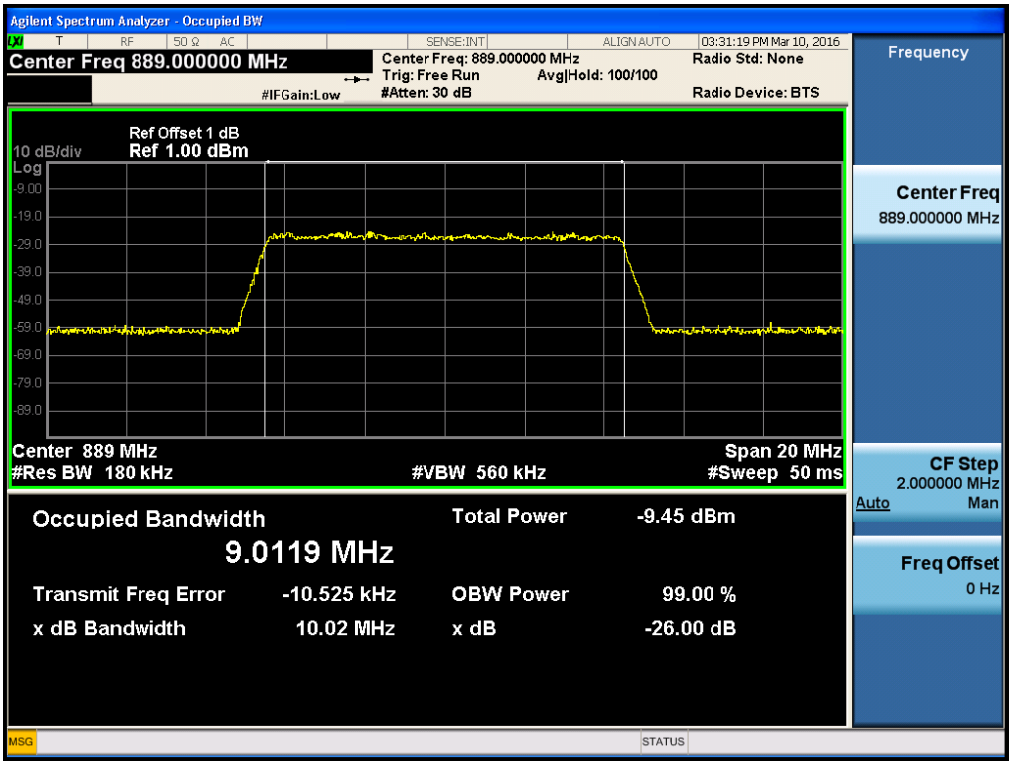
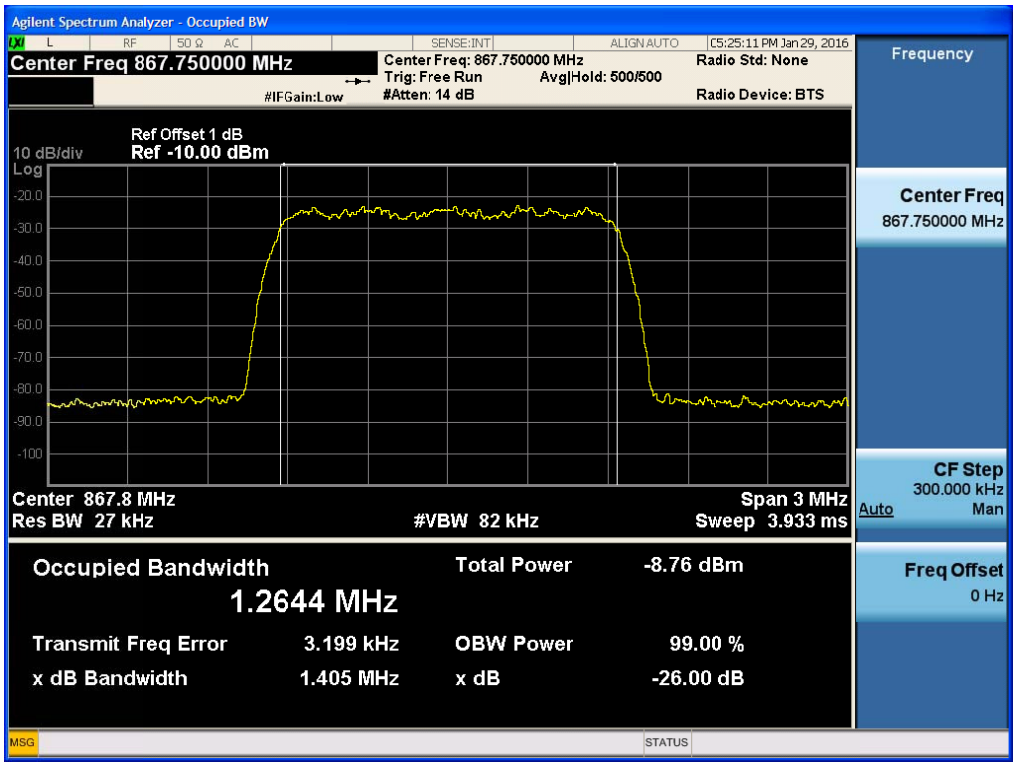


Plots of Occupied Bandwidth_800 IDEN_CDMA_Input

[AGC threshold Input Downlink Low]



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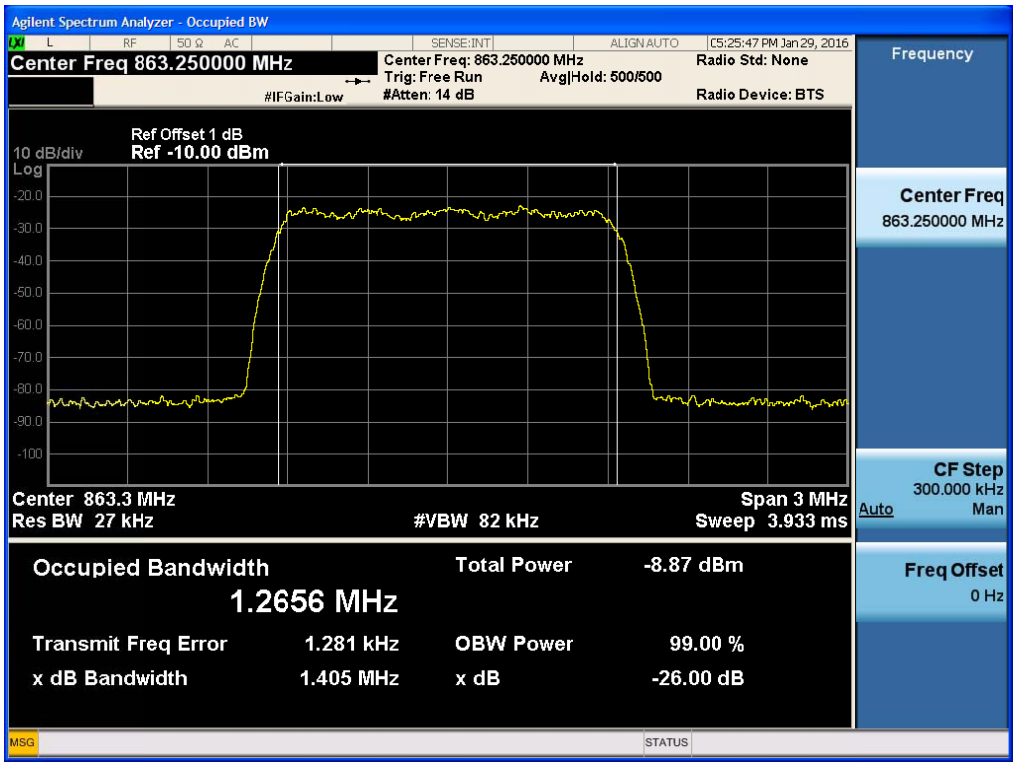

Plots of Occupied Bandwidth_850 CEL_CDMA_Input

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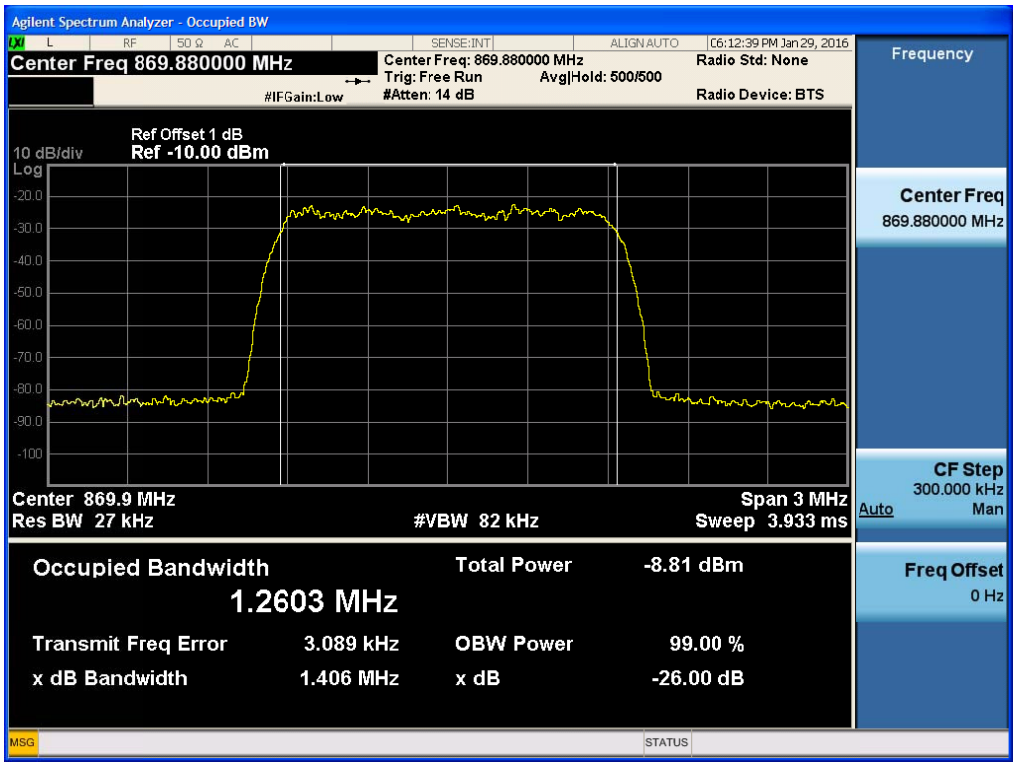

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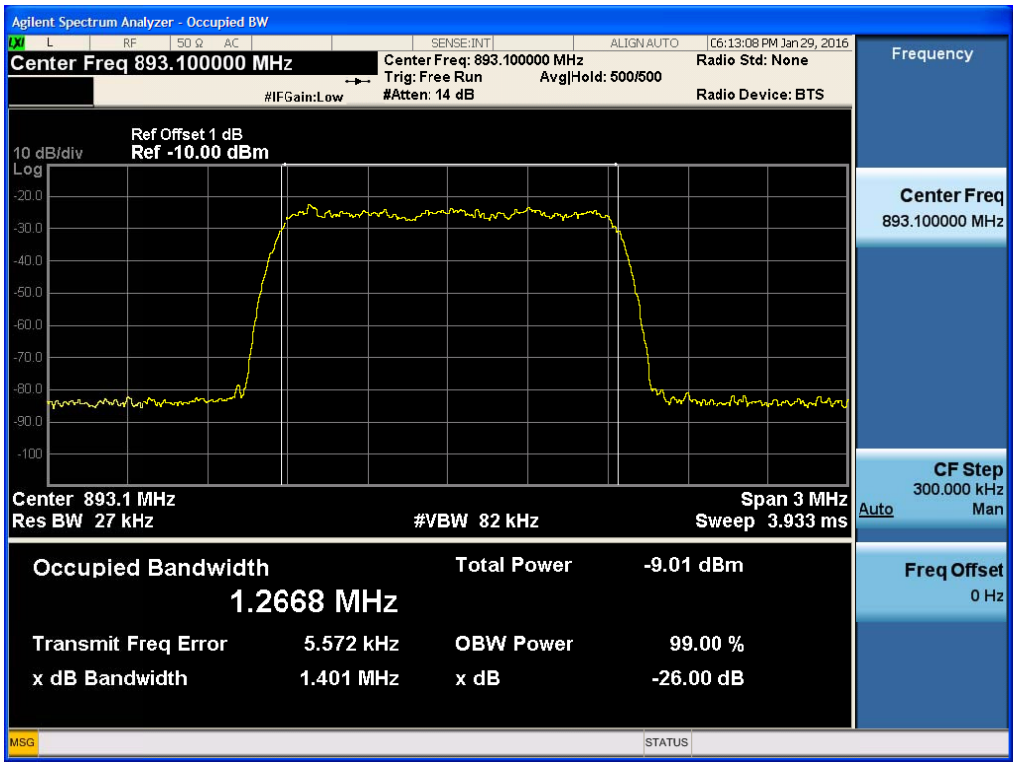
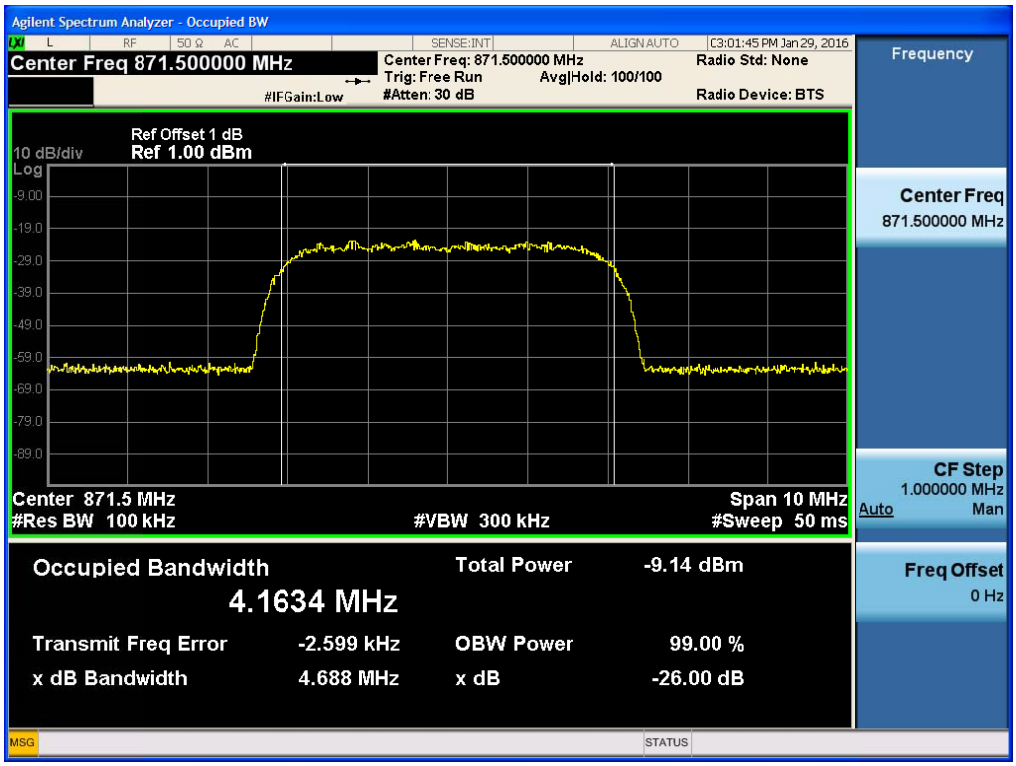


Plots of Occupied Bandwidth_850CEL_WCDMA_Input

[AGC threshold Input Downlink Low]



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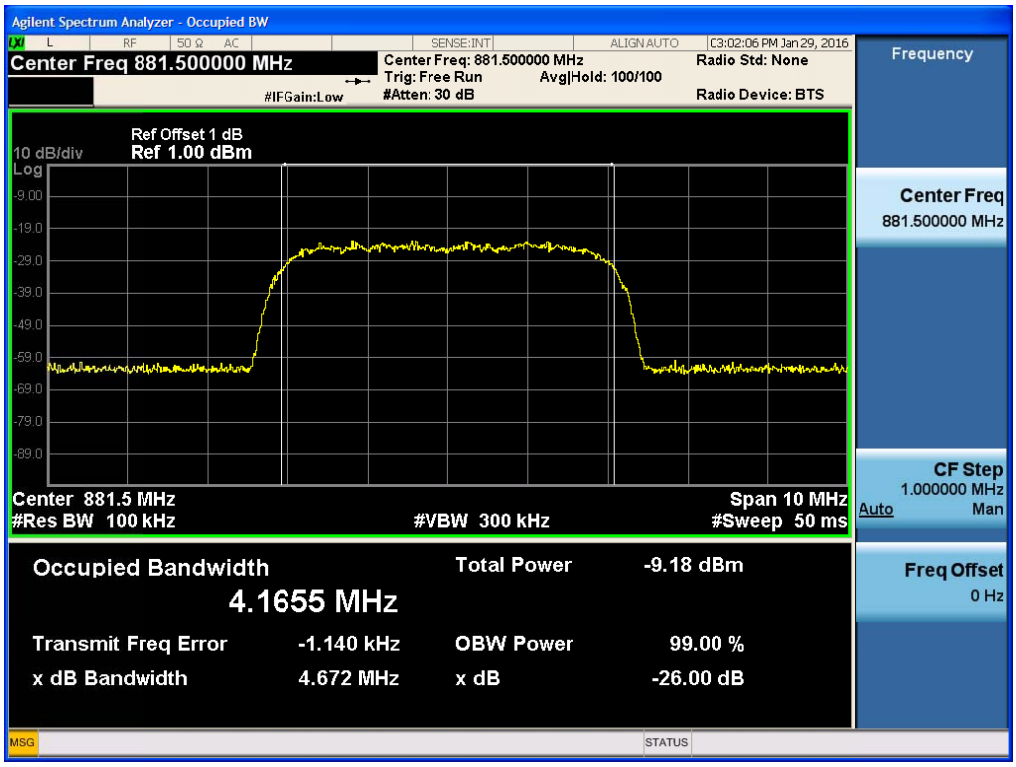

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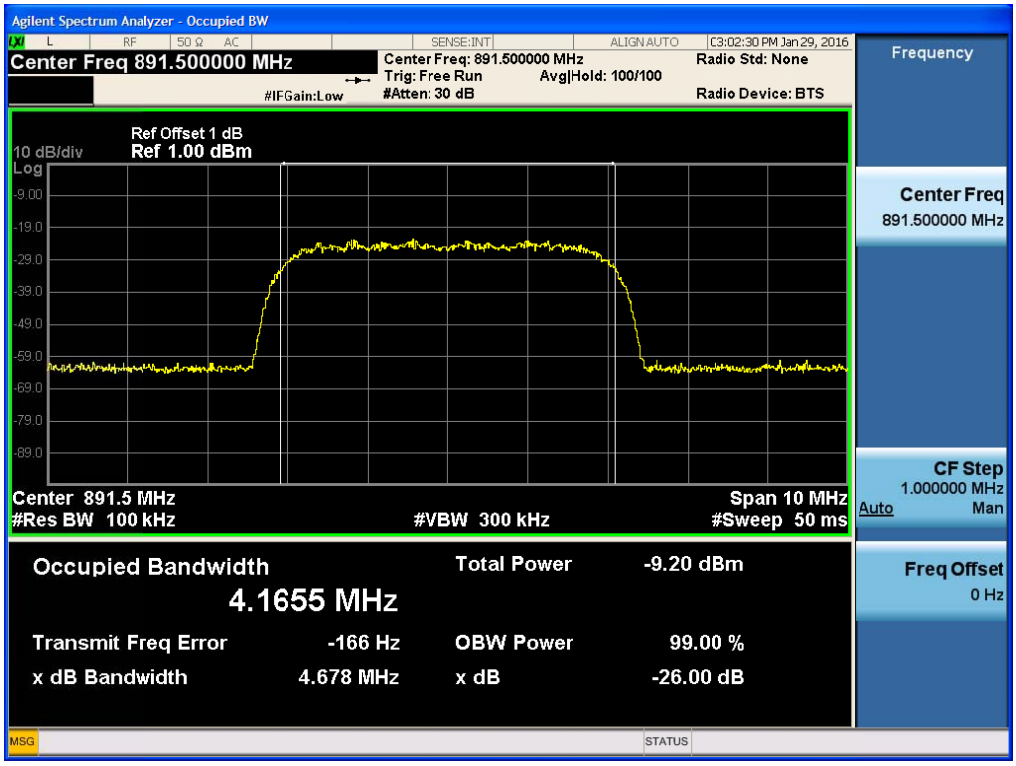


8. PASSBAND GAIN AND BANDWIDTH & OUT OF BAND REJECTION

FCC Rules

Test Requirement(s): KDB 935210 D02 v03r01

Out of Band Rejection – Test for rejection of out of band signals. Filter freq. response plots are acceptable.

Test Procedures:

Measurements were in accordance with the test methods section 3.3 of KDB 935210 D05 v01r01.

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, for each applicable CMRS band (see also KDB Publication 935210 D02 [R7] and KDB Publication 634817 [R5] about selection of frequencies for testing and for grant listings).

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 = approximately 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 (RBW) of the spectrum analyzer to be 1 % to 5 % of the EUT passband, and the video bandwidth (VBW) 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.

i) Capture the frequency response of the EUT.

j) Repeat for all frequency bands applicable for use by the EUT.

IC Rules

Test Requirements: RSS-131 6.1

The passband gain shall not exceed the nominal gain by more than 1.0 dB. The 20 dB bandwidth shall not exceed the nominal bandwidth that is stated by the manufacturer. Outside of the 20 dB bandwidth, the gain shall not exceed the gain at the 20 dB point.

Test Procedures: RSS-131 4.2

Adjust the internal gain control of the equipment under test to the nominal gain for which

equipment certification is sought.
With the aid of a signal generator and spectrum analyzer, measure the 20 dB bandwidth of the amplifier (i.e. at the point where the gain has fallen by 20 dB). Measure the gain-versus-frequency response of the amplifier from the midband frequency f0 of the passband up to at least f0 + 250% of the 20 dB bandwidth.
Signal generator sweep from the frequency more lower than the low frequency -250% to the frequency more higher than high frequency +250%.

Test Results: The EUT complies with the requirements of this section.

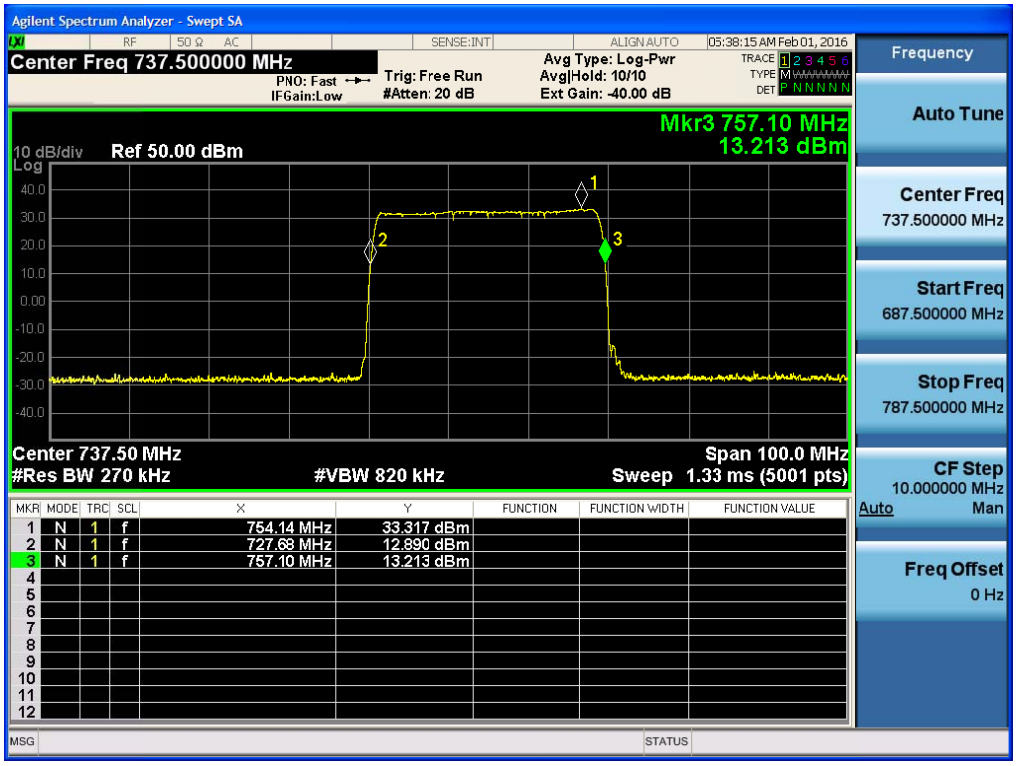
	Input Level (dBm) Input Signal : Sinusoidal	Maximum Amp Gain
700 LTE Lower	-10 dBm	43 dB
700 LTE Upper	-10 dBm	43 dB
800 IDEN	-10 dBm	43 dB
850 CEL	-10 dBm	43 dB

[Downlink]

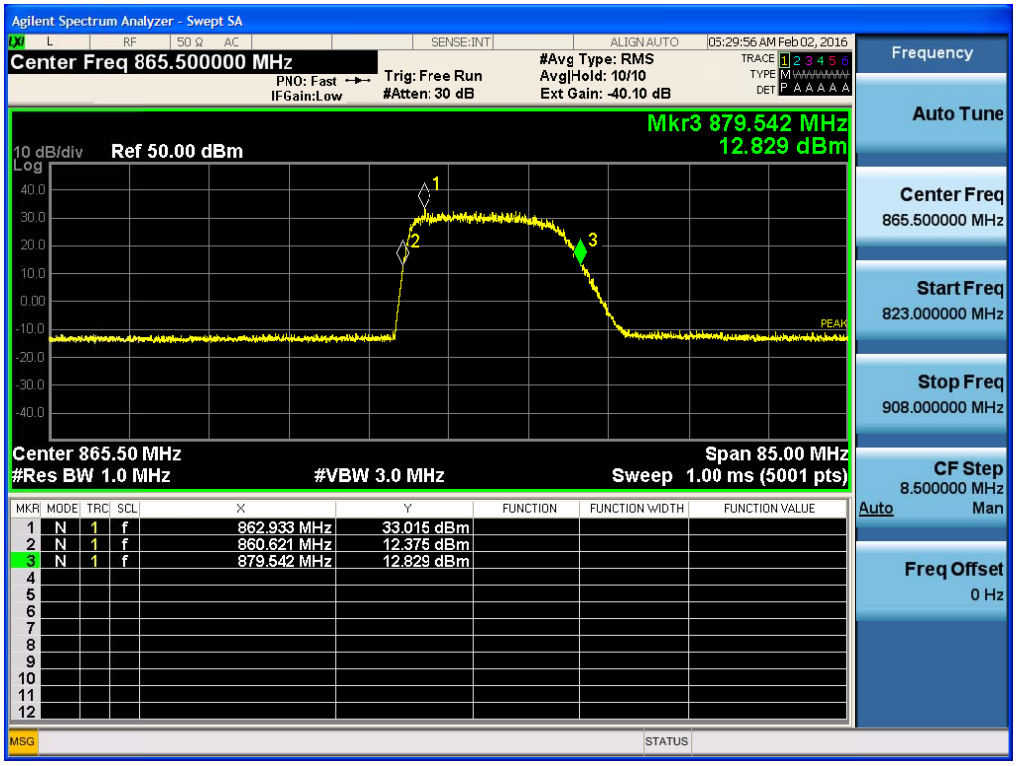
	20 dB point frequency (MHz)	**Output power (dBm)**	**Gain (dB)**
700 LTE	727.68 MHz ~ 757.10 MHz	33.317	43.317
800 IDEN	860.621 MHz ~ 879.542 MHz	33.015	43.015
850 CEL	860.72 MHz ~ 895.28 MHz	33.343	43.343

Plots of Passband Gain and Bandwidth & Out of Band Rejection

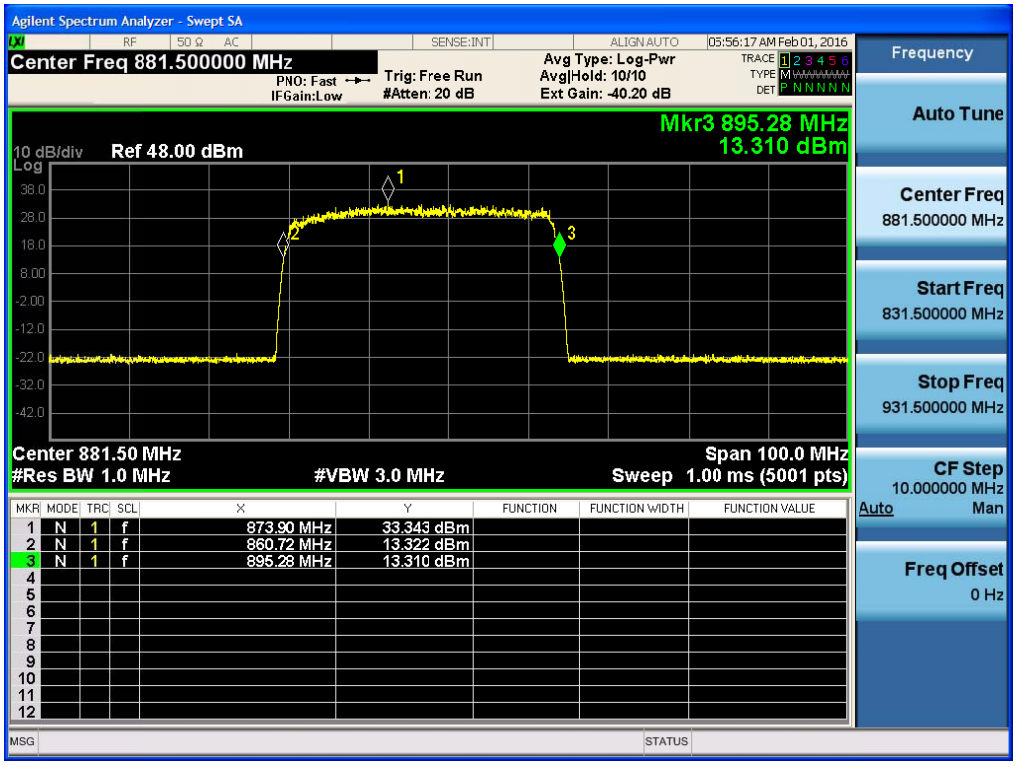
[700 LTE Band]



[800 IDEN Band]



[850CEL Band]



9. SPURIOUS AND HARMONIC EMISSION AT ANTENNA TERMINAL

FCC Rules

Test Requirement(s): § 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.

§ 22.917 Emission limitations for cellular equipment.

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). 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.

(c) Alternative out of band emission limit. Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas, in lieu of that set forth in this section, pursuant to a private contractual arrangement of all affected licensees and applicants. In this event, each party to such contract shall maintain a copy of the contract in their station files and disclose it to prospective assignees or transferees and, upon request, to the FCC.

(d) Interference caused by out of band emissions. If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

§ 27.53 Emission limits

(c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;

(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

(6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

§ 90.691 Emission mask requirements for EA-based systems.

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log_{10}(f/6.1) decibels or 50 + 10 Log_{10}(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log_{10}(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

*** Note**
Test (a)-(1) was replaced by a band edge test.(Page 239)

Test Procedures: Measurements were in accordance with the test methods section 3.6 and 4.7 of KDB 935210 D05 v01r01.
3.6.1. General
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/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, can be excluded from the test stipulated in step a).

3.6.2. EUT out-of-band/block emissions conducted measurement
a) Connect a signal generator to the input of the EUT.
NOTE—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 the two-tone 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 of interest.
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 emission bandwidth, 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 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 (i.e., 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 the procedure with the composite input power level set to 3 dB above the AGC threshold.
o) Reset the input signals frequencies to the lower edge of the frequency block or band under examination.
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. EUT spurious emissions conducted measurement
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 (e.g., 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 analyzer start frequency to the lowest radio frequency 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.
NOTE—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.
j) Select the power averaging (rms) detector function.
k) Trace average at least 10 traces in power averaging (i.e., 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 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 analyzer stop frequency to 10 times the highest frequency of the fundamental emission (see §2.1057). Note that 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 (i.e., 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 and provide tabular data, if required.
p) Repeat the procedure with the input test signals tuned to a middle band/block frequency/channel and then a high band/block frequency/channel.
q) Repeat entire procedure with the narrowband test signal.
r) Repeat for all authorized frequency bands/blocks used by the EUT.

IC Rules

Test Requirement(s): RSS-131 6.4

Spurious emissions of zone enhancers and translators shall be suppressed as much as possible. Spurious emissions shall be attenuated below the rated power of the enhancer by at least:

43 + 10 Log10(Prated in watts), or 70 dB, whichever is less stringent.

Note: If the minimum standard is not met, check to see if the input signal generators have a high harmonic content.

Test Procedures: RSS-131 4.4

4.4.1 Multi-channel Enhancer

The spurious emissions of the equipment under test shall be measured using the two-tone method in section 4.3.1, with the two tones Po1 and Po2 set to the required levels.

Using a spectrum analyser with a resolution bandwidth set at 100 kHz, search for spurious emissions from 30 MHz to at least 5 times the highest RF passband frequency. The search may omit the band that contains the test tones and intermodulation products.

4.4.2 Single channel Enhancer

The enhancer shall be operated as described in section 4.3.2 during the search for spurious emissions.

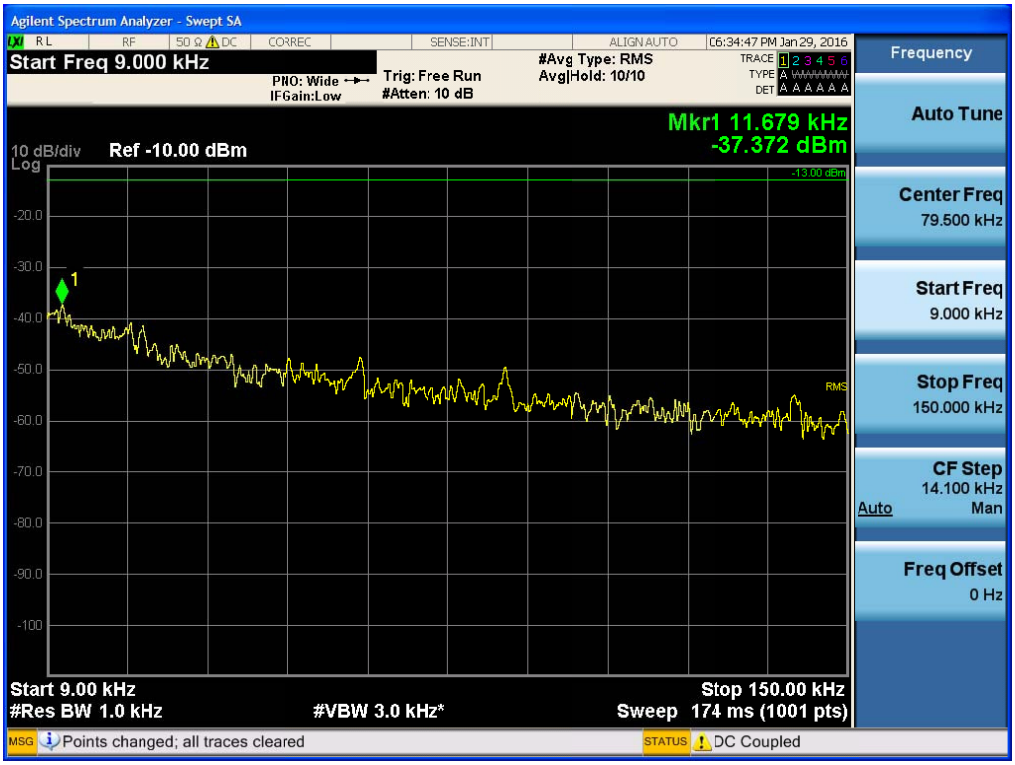
Using a spectrum analyser with a resolution bandwidth set at 100 kHz, search for spurious emissions from 30 MHz to at least 5 times the highest RF passband frequency. The search may omit the band that contains the input signal.

Test Results: The EUT complies with the requirements of this section. There were no Detectable Spurious emissions for this EUT.

Single channel Enhancer Plots of Spurious Emission _ 700 LTE_ LTE 5MHz

Conducted Spurious Emissions (9 kHz – 150 kHz)

[Downlink Low]



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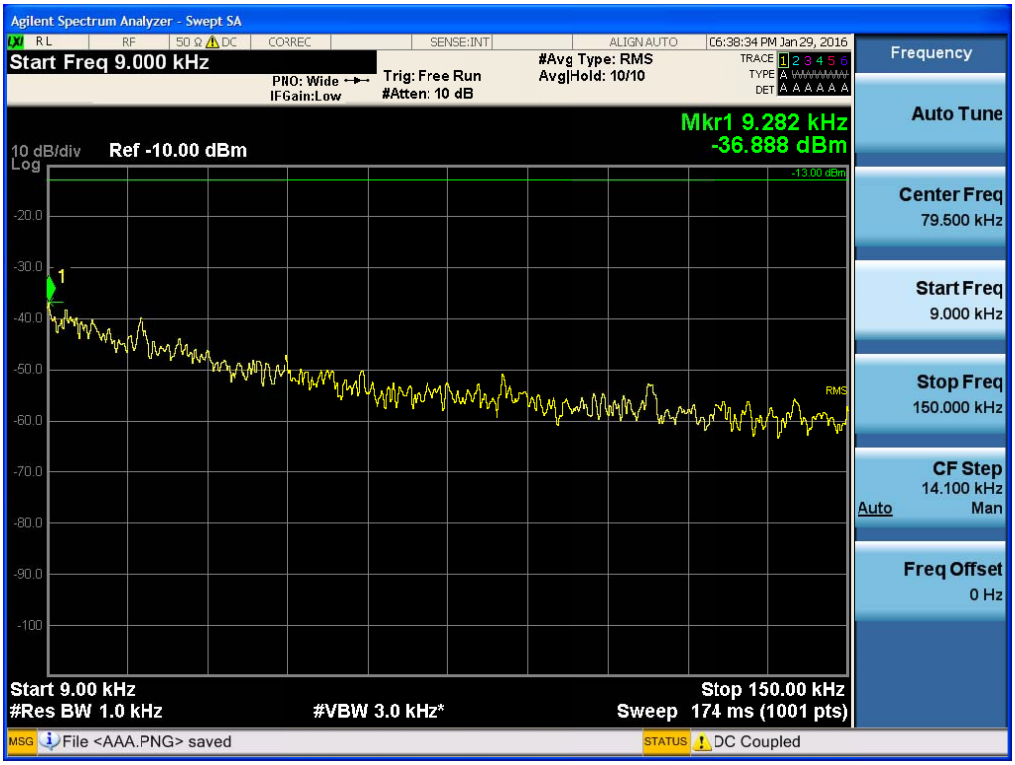

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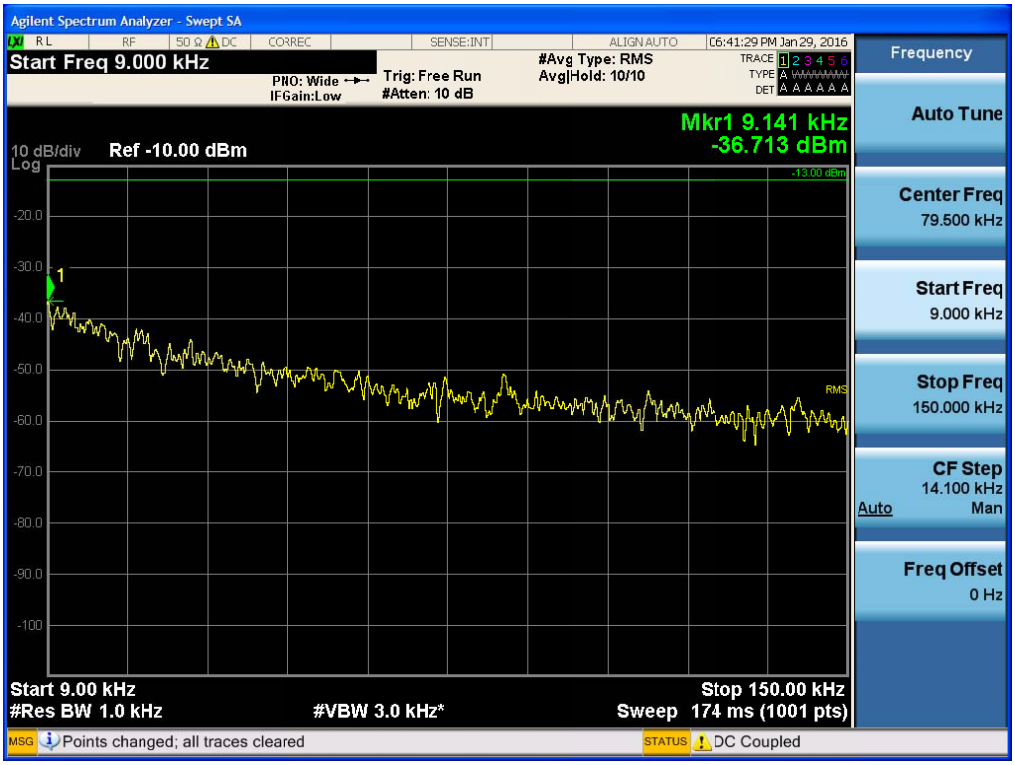
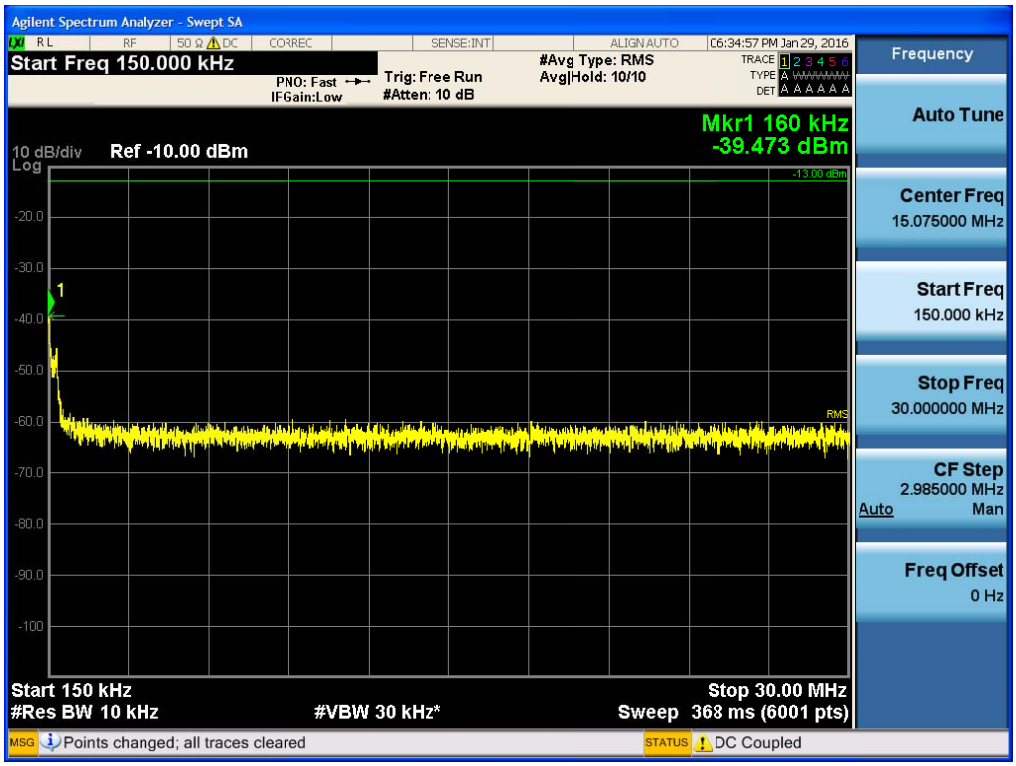


Conducted Spurious Emissions (150 kHz – 30 MHz)

[Downlink Low]



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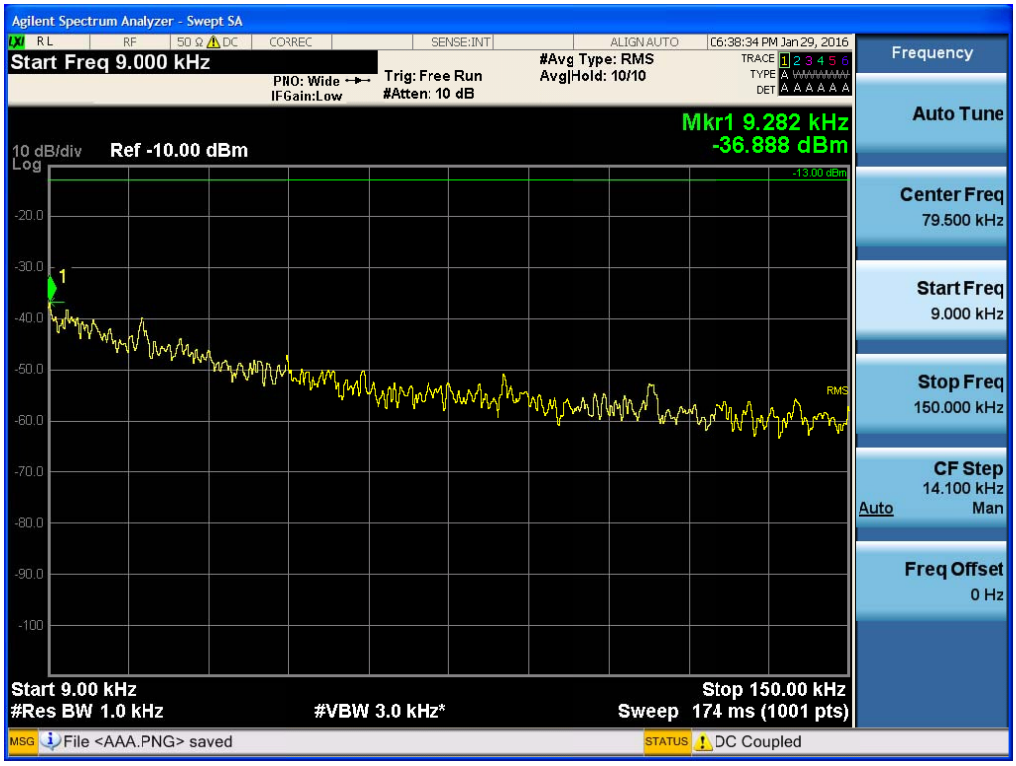

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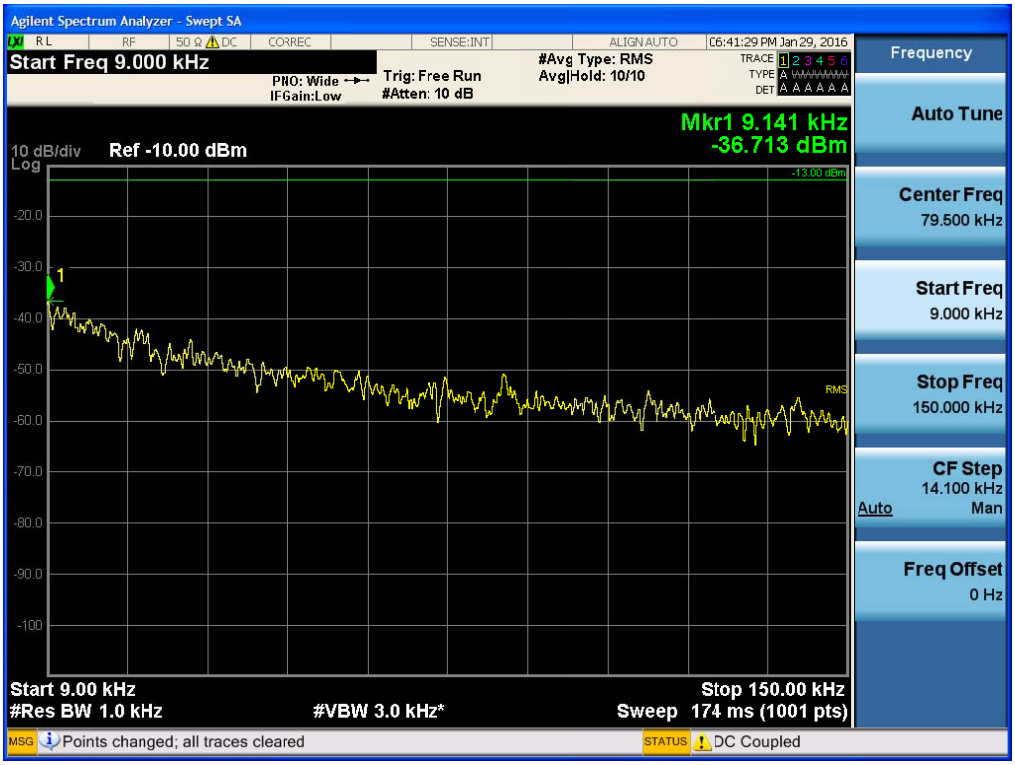
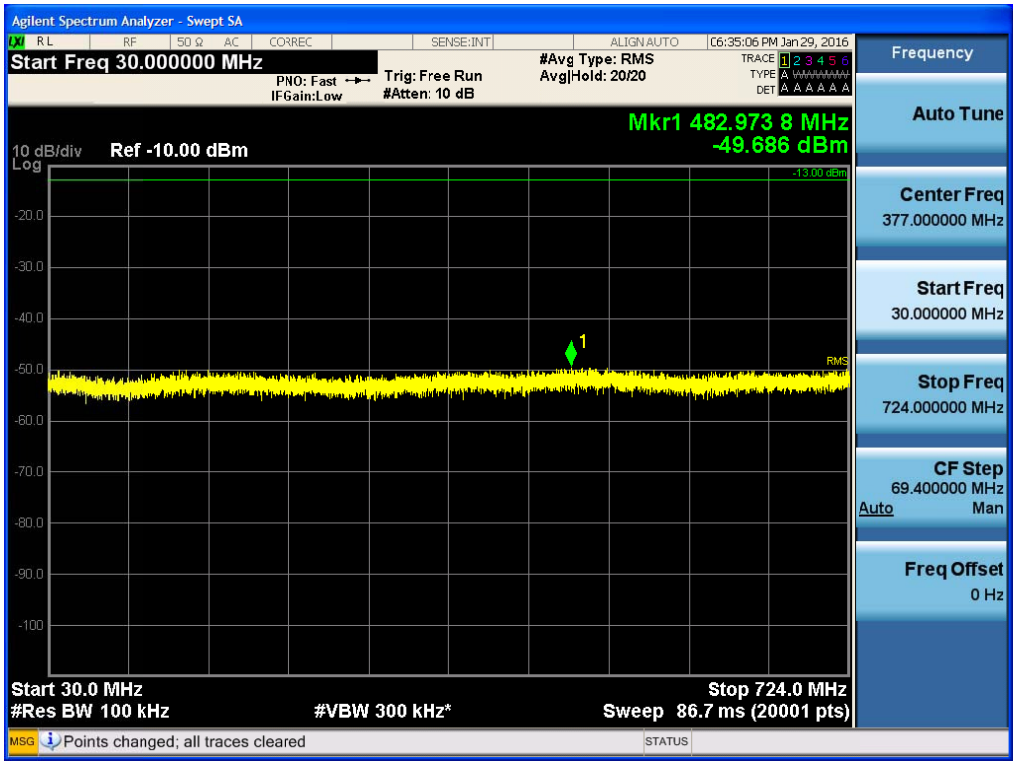


Conducted Spurious Emissions (30 MHz – 1 GHz)

[Downlink Low]-1



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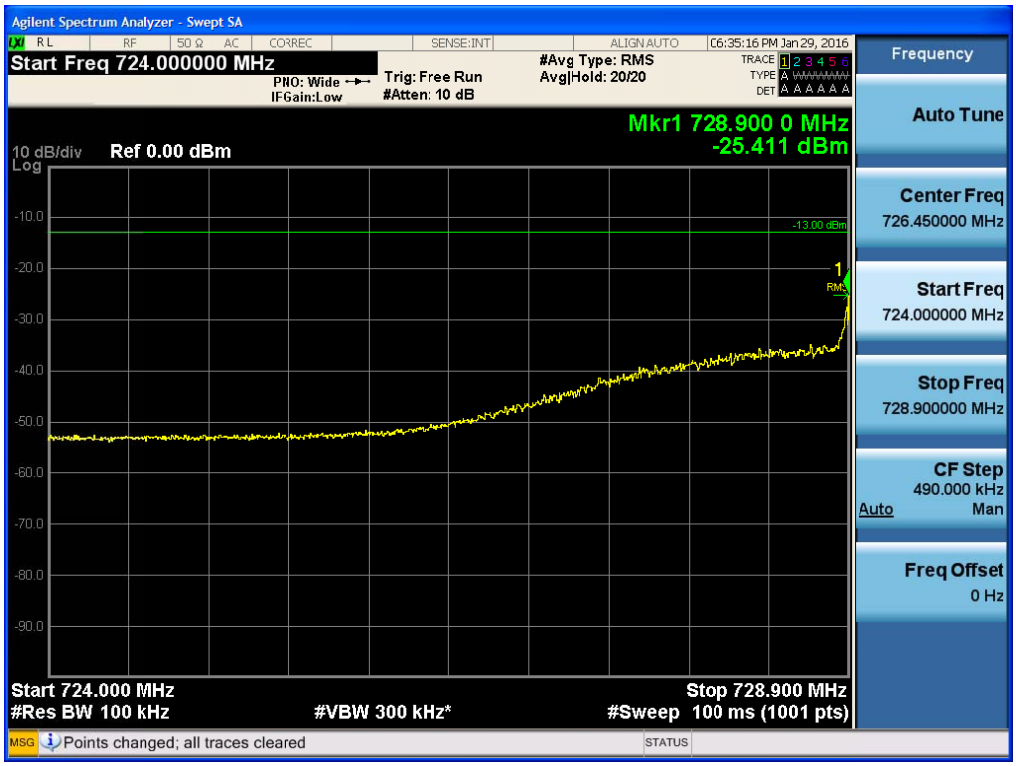

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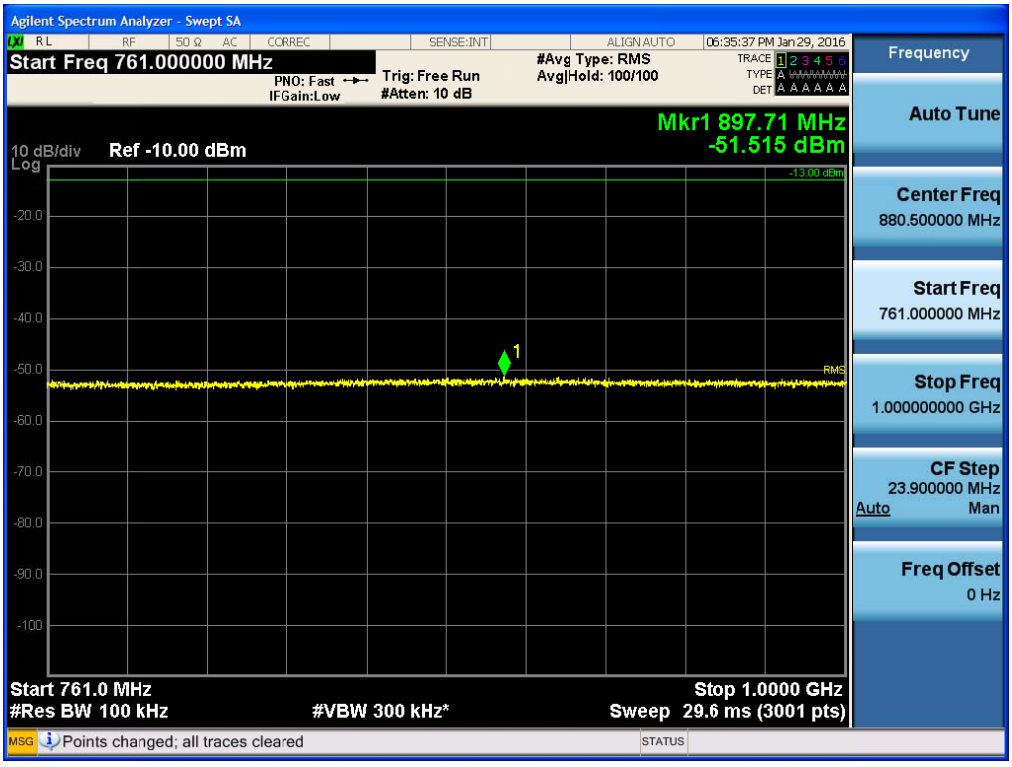
[Downlink Low]-4



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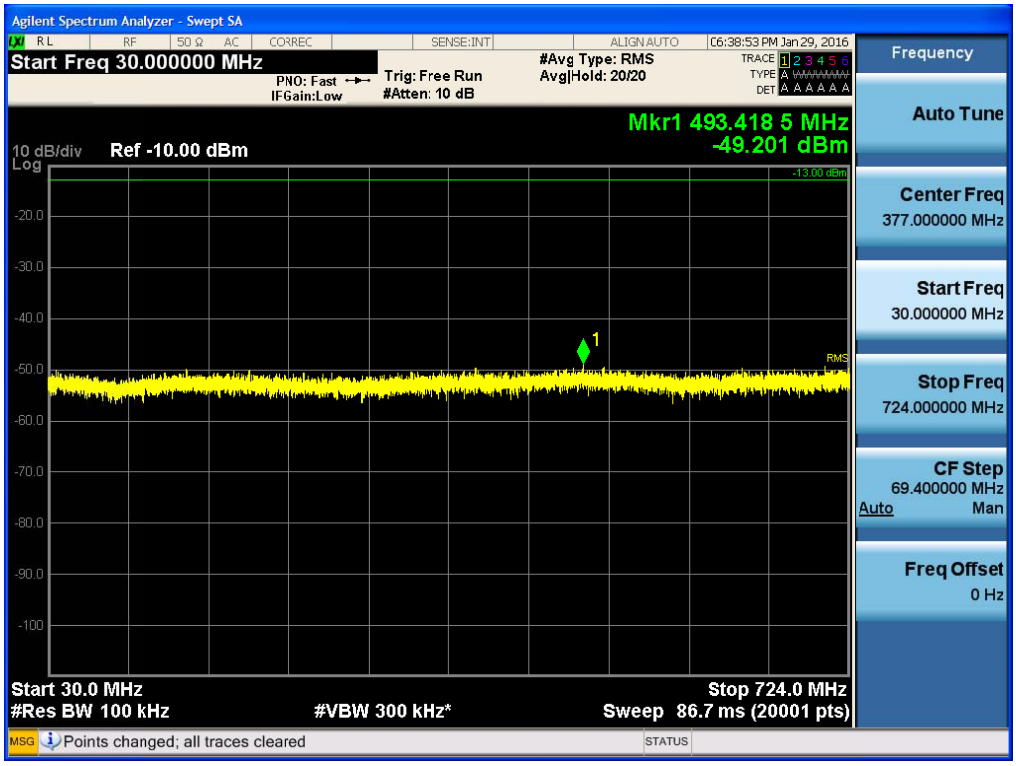

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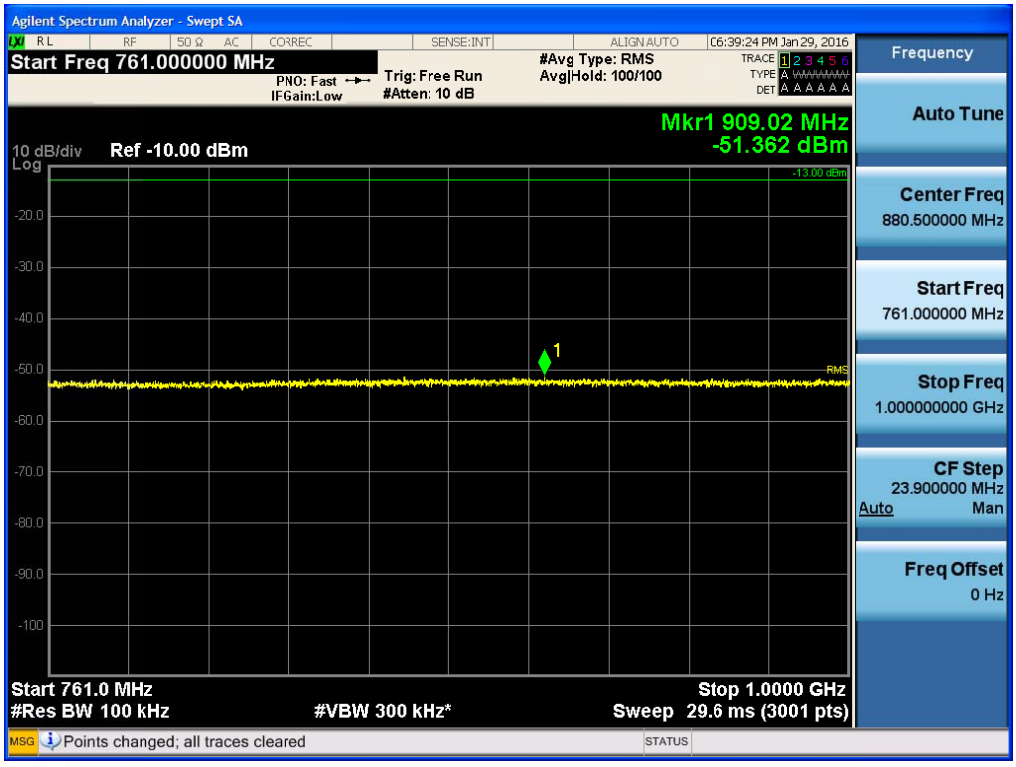

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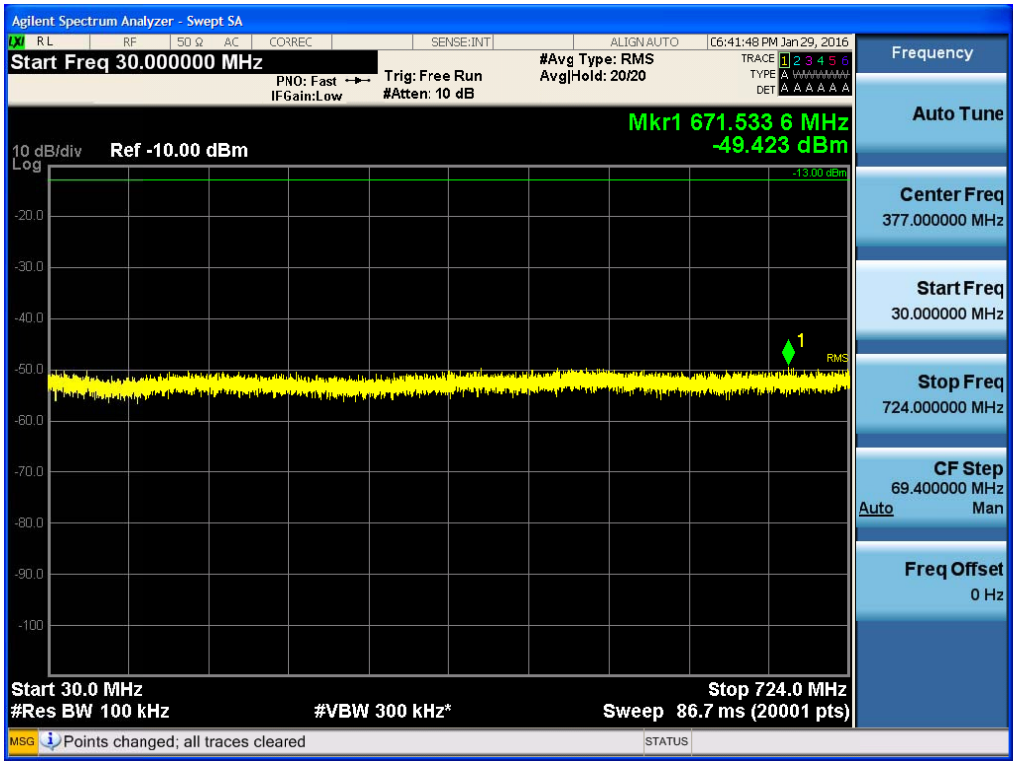

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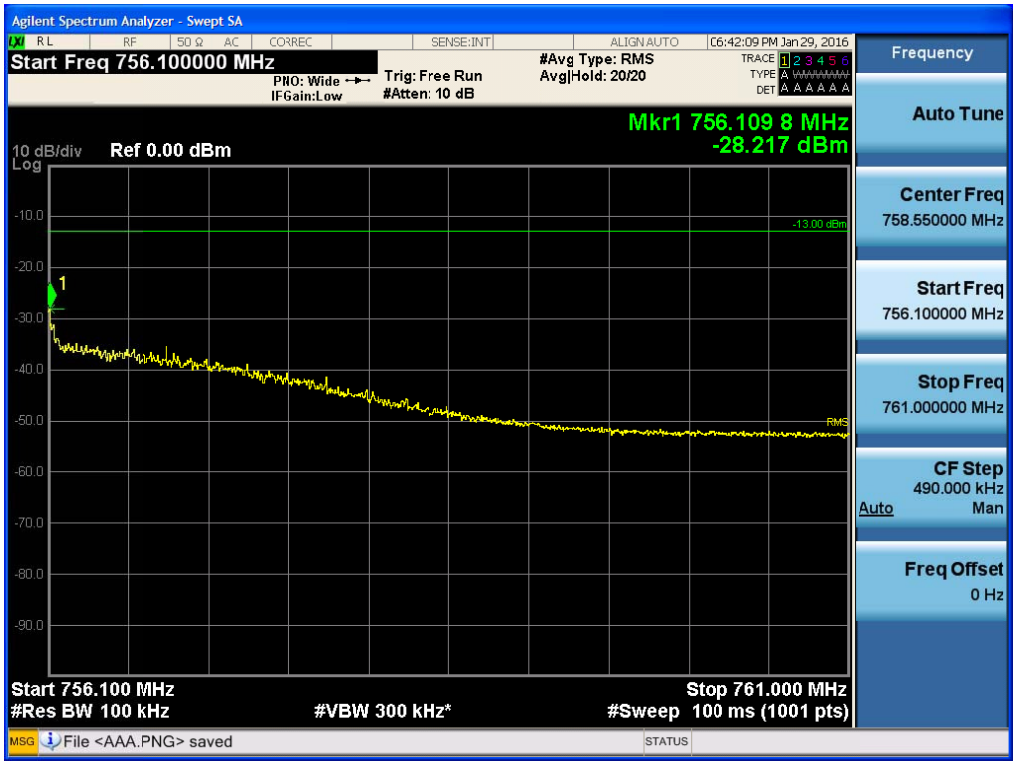

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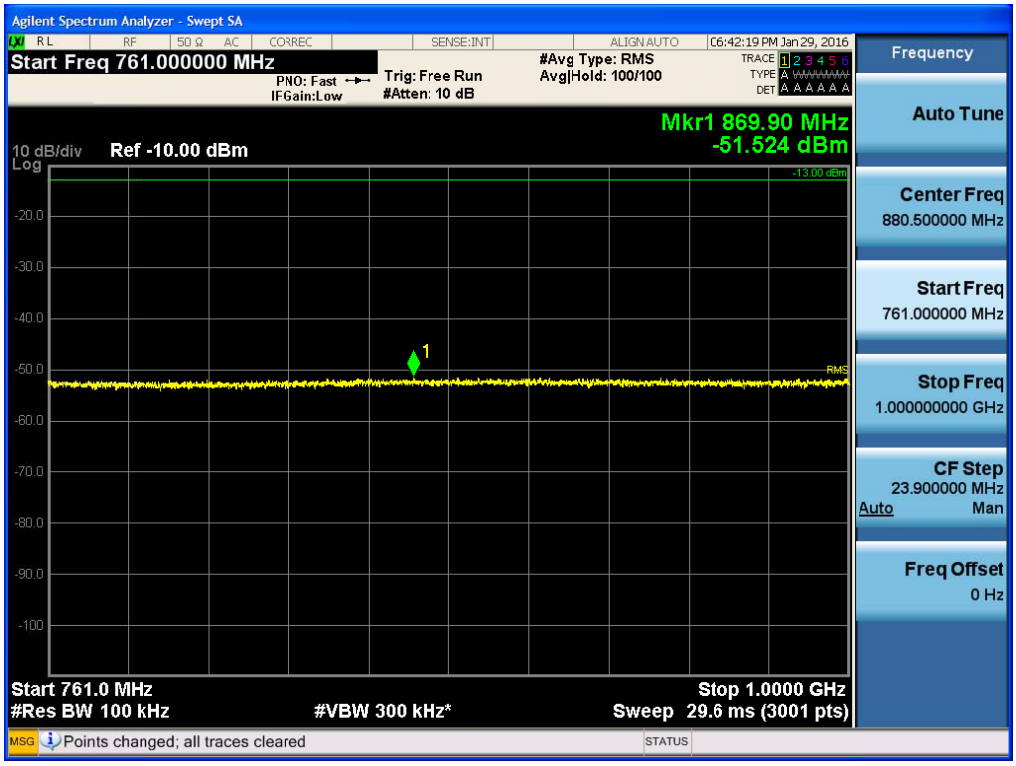
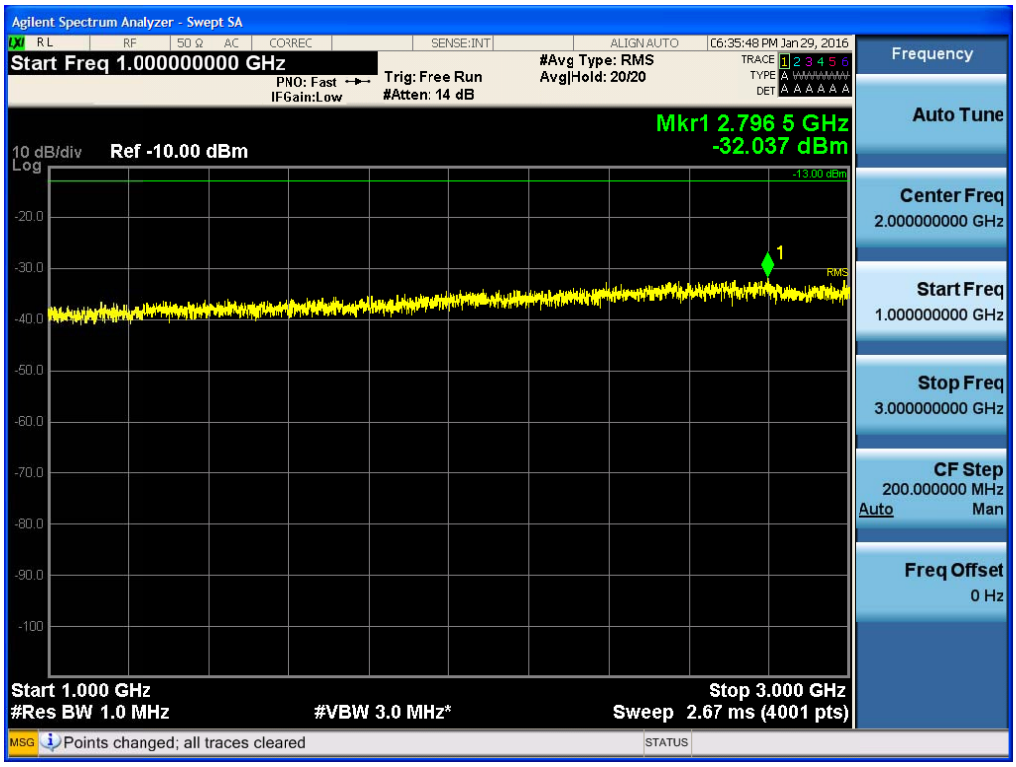
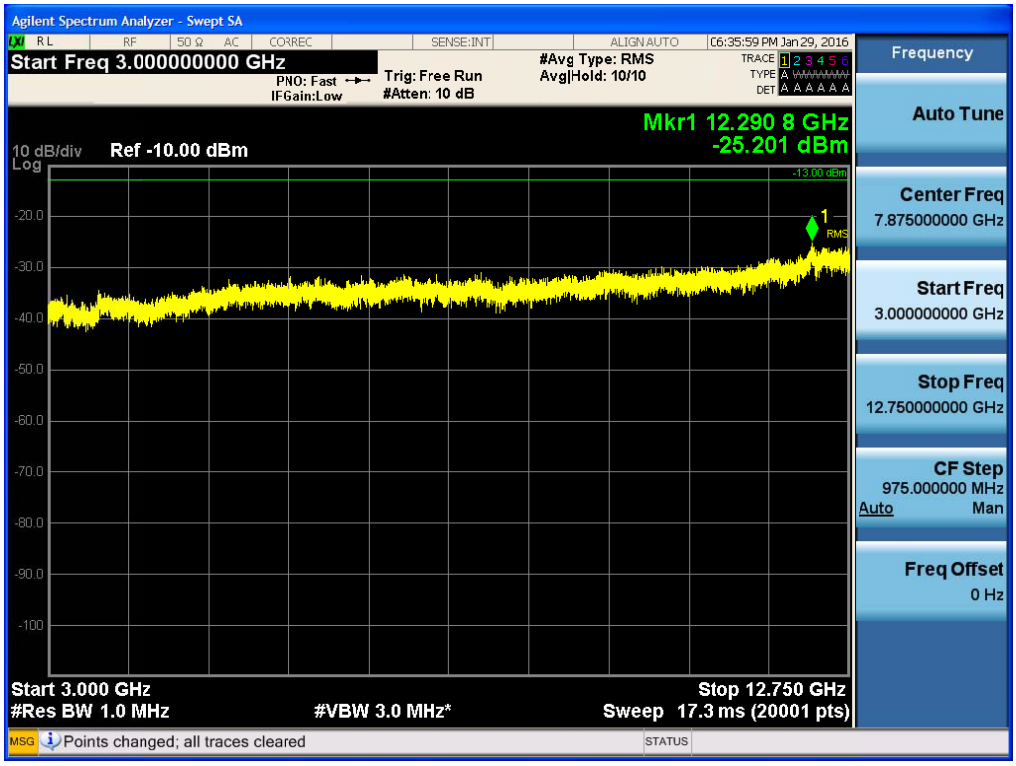


Conducted Spurious Emissions (1 GHz – 12.75 GHz)

[Downlink Low]-1



[Downlink Low]-2



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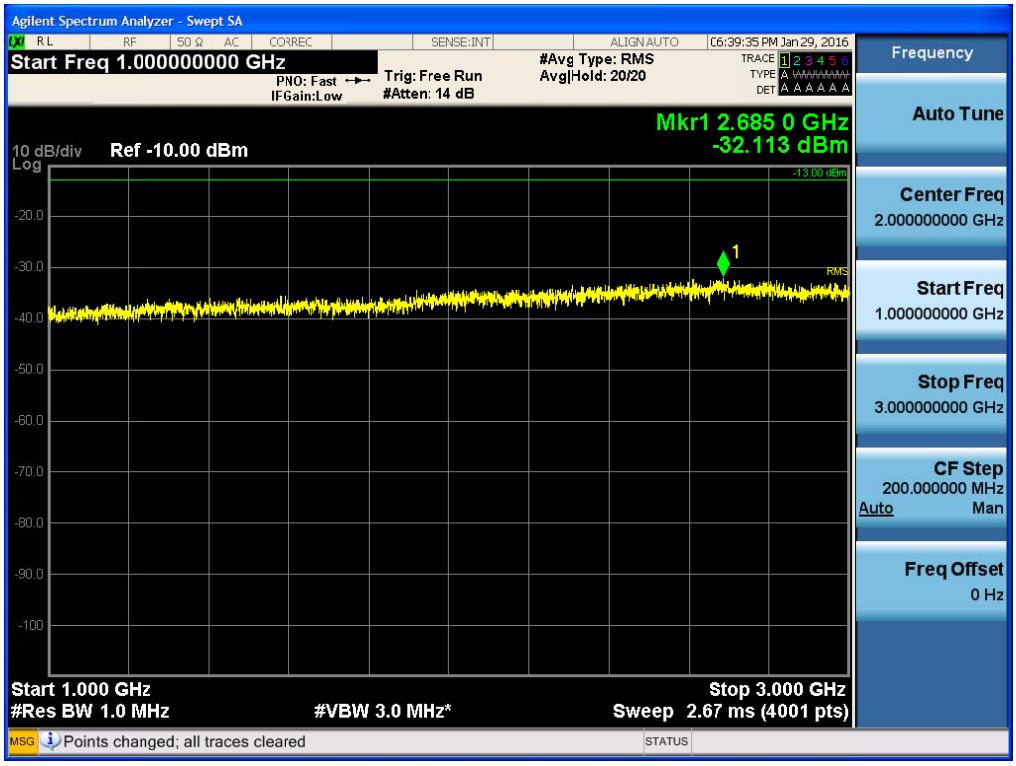

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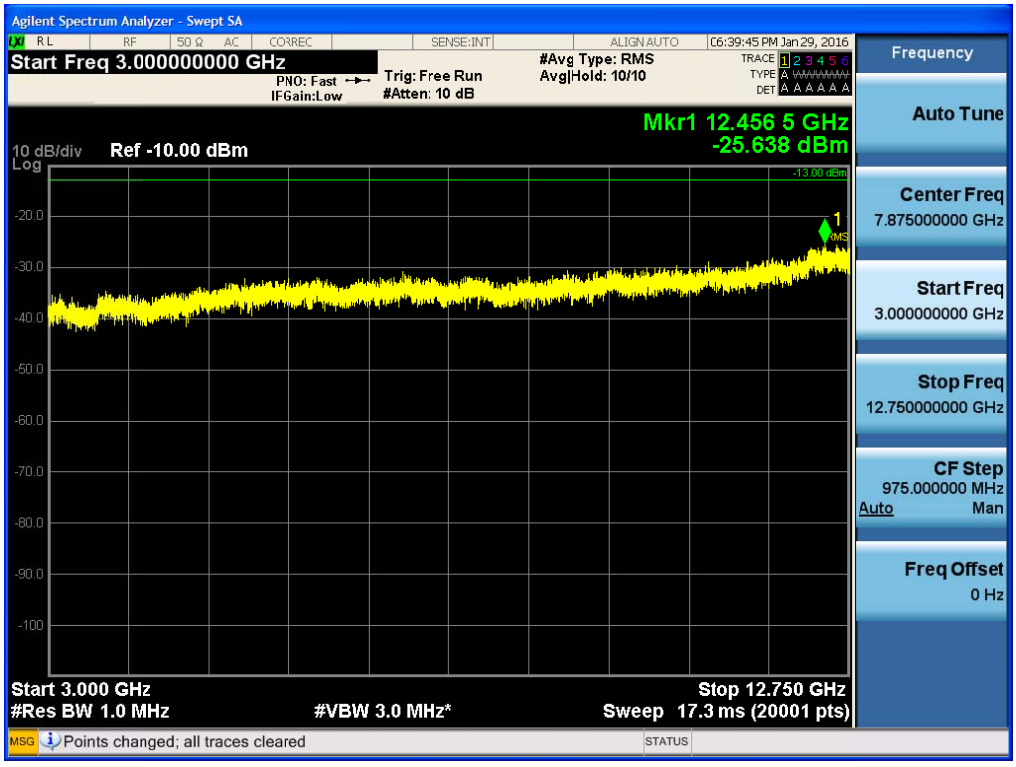

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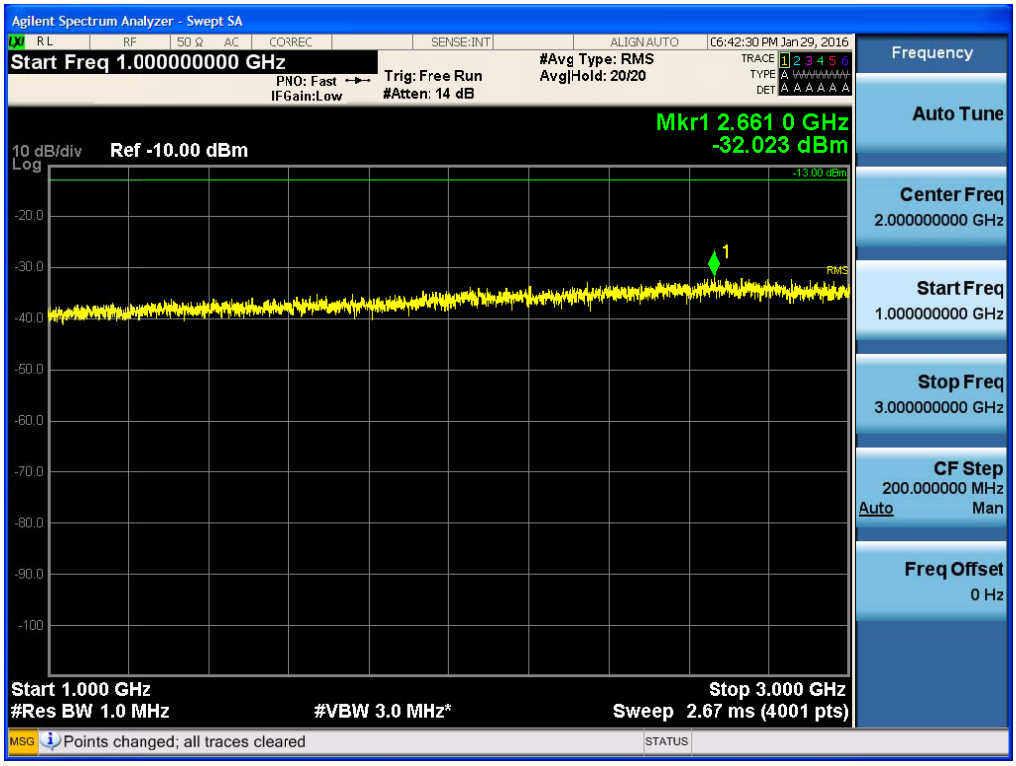

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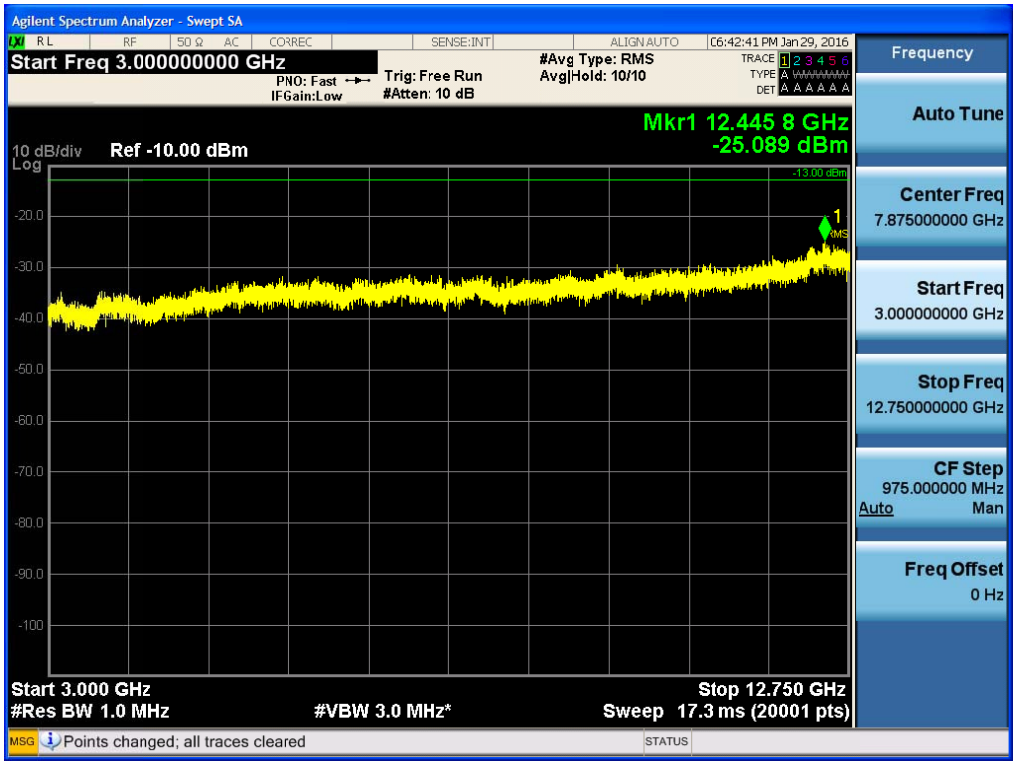
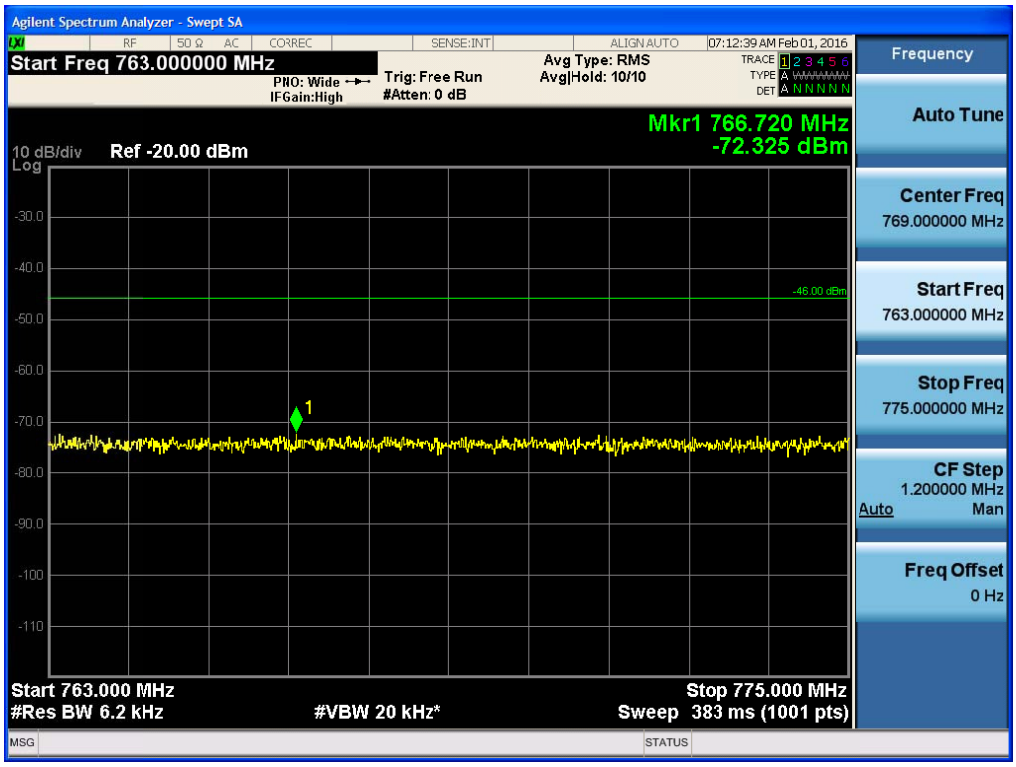


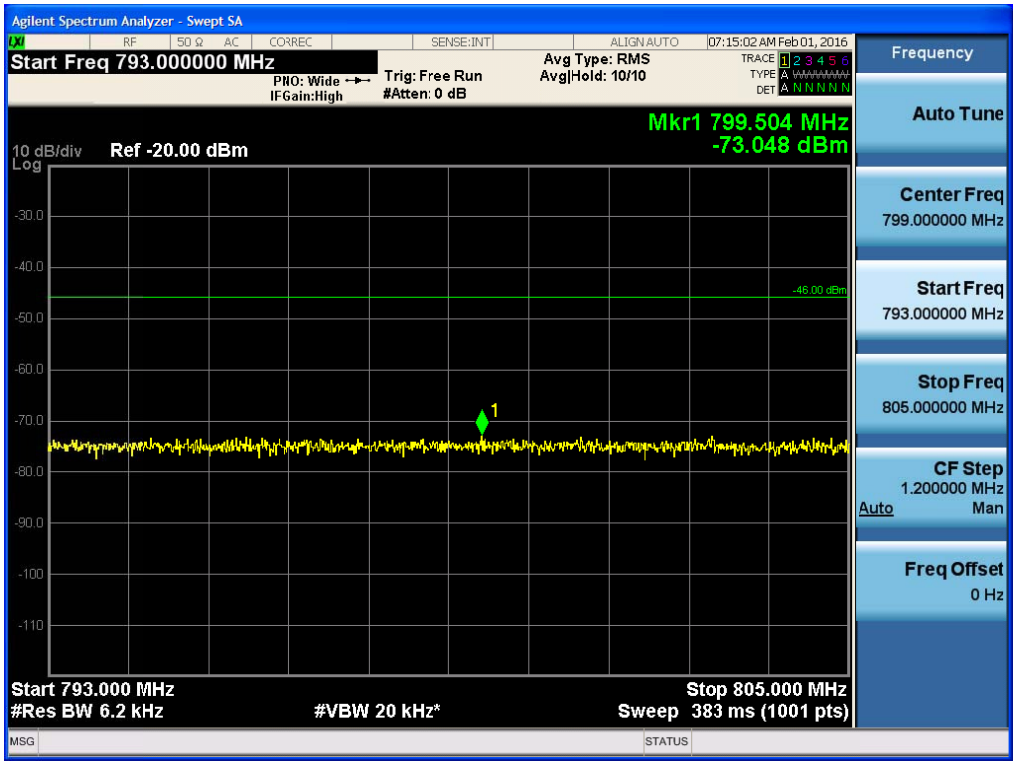
Additional Conducted Spurious Emissions

[Downlink High]



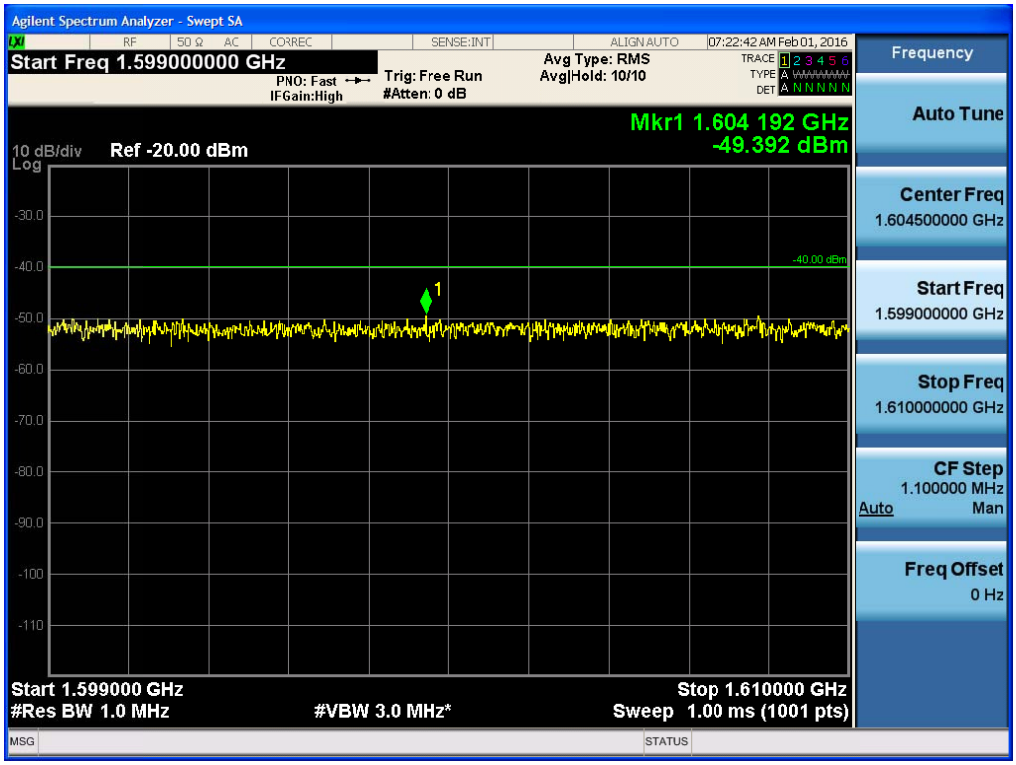
(763MHz~775MHz)

[Downlink High]



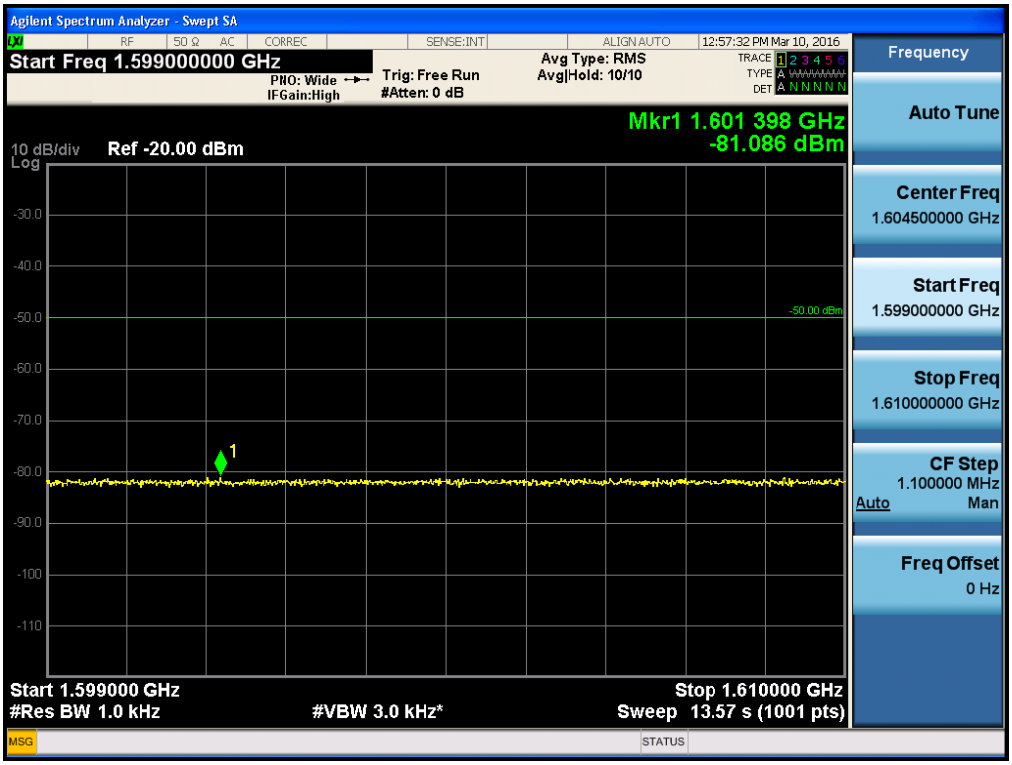
(793MHz~805MHz)

[Downlink High]



(1599MHz~1610MHz)-1

[Downlink High]

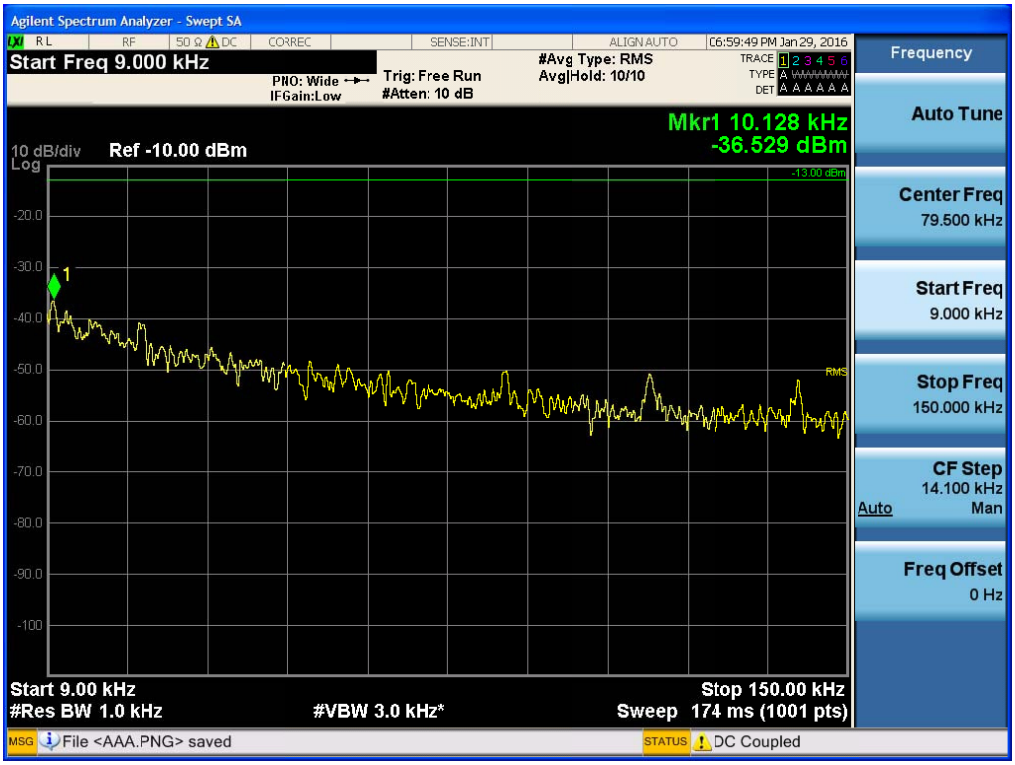


(1599MHz~1610MHz)-2

Single channel Enhancer Plots of Spurious Emission _ 700 LTE_LTE 10MHz

Conducted Spurious Emissions (9 kHz – 150 kHz)

[Downlink Low]



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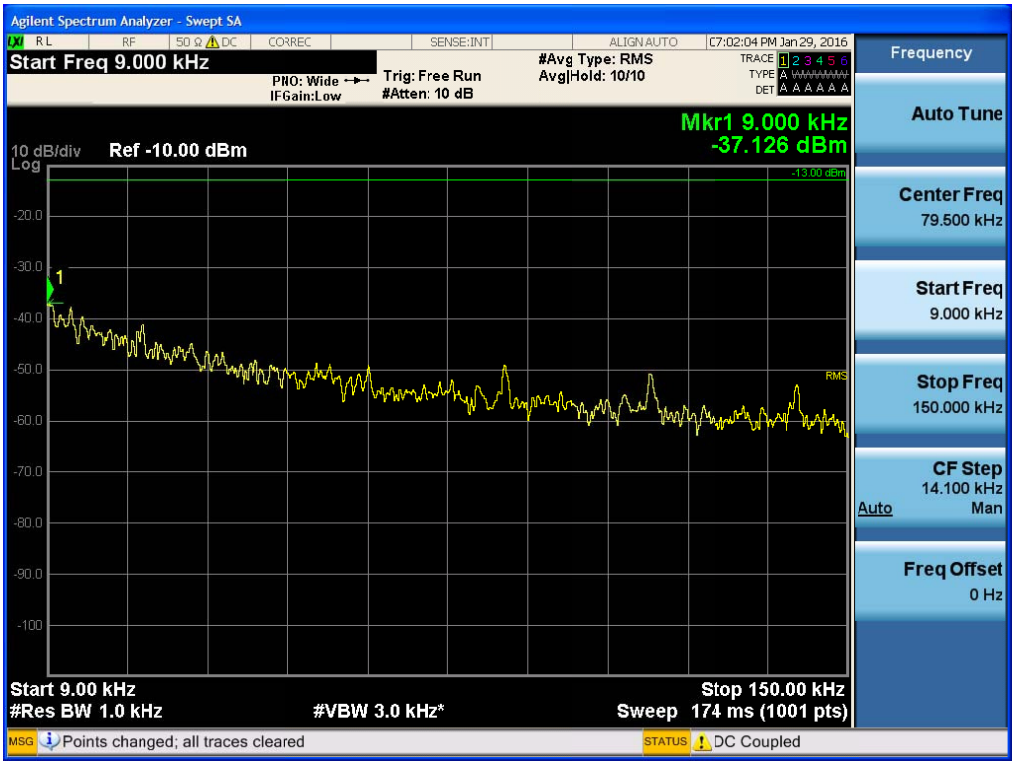

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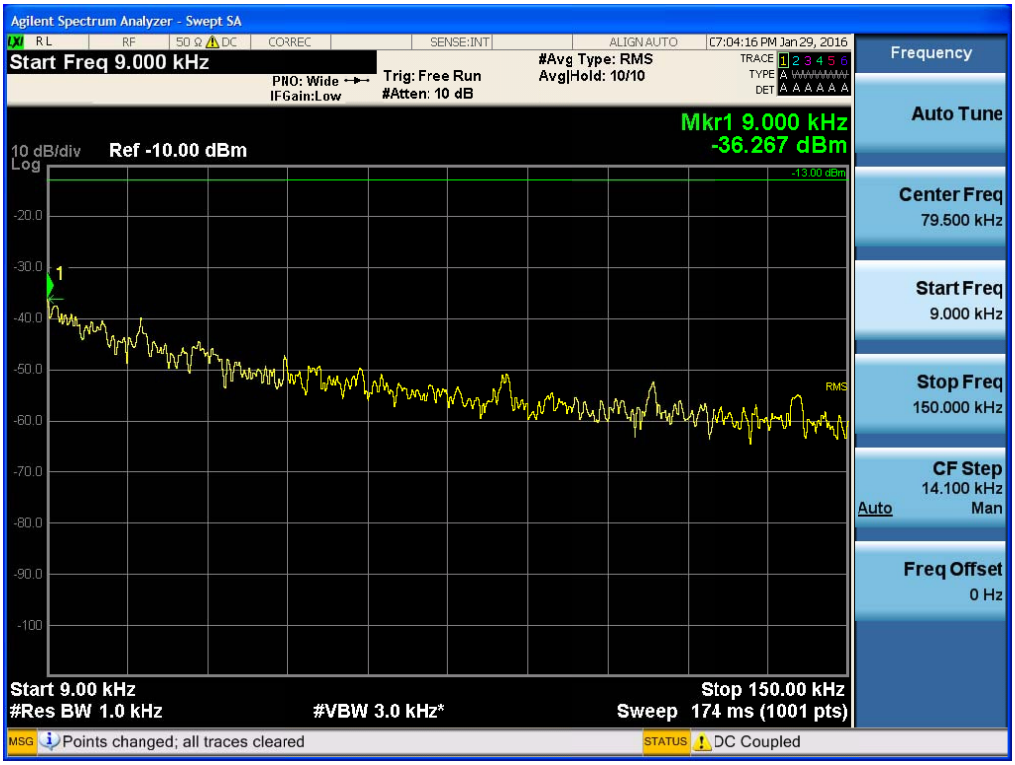
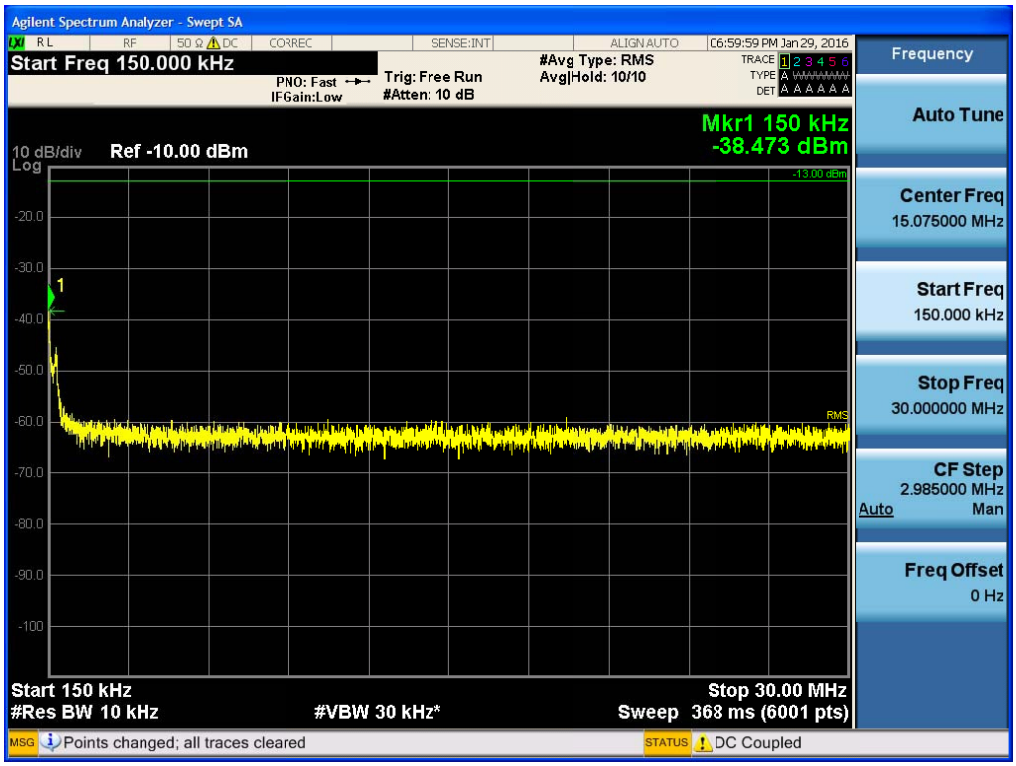


Conducted Spurious Emissions (150 kHz – 30 MHz)

[Downlink Low]



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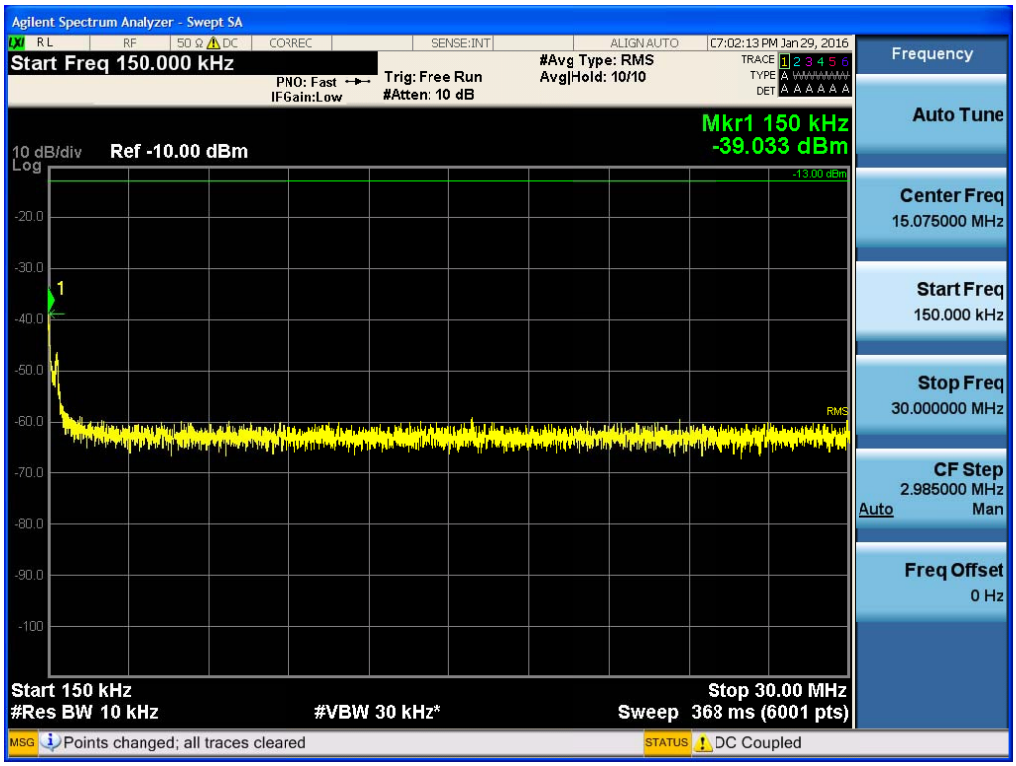

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