HCT CO.,LTD
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FCC /ISED REPORT

Class II Permissive Change

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:
October 05, 2016

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

Report No.: HCT-R-1609-F008-1
HCT FRN: 0005866421
ISED Registration No.: 5944A-5

FCC ID:	**W6UHM80I85C**
IC:	**9354A-HM80I85C**
APPLICANT:	**SOLiD, Inc**

FCC/ IC Model(s):	MRDU-800IDEN/850CEL
EUT Type:	RDU(Remote Drive Unit)
Frequency Ranges:	800IDEN : 862 ~ 869 MHz (Downlink) 850CEL : 869 ~ 894 MHz (Downlink)
Conducted Output Power:	5.012 W (37 dBm)
Date of Test:	August 10, 2016 ~ October 04, 2016
FCC Rule Part(s):	CFR 47 Part 2, Part 22, 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 thisequipment 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
Test Engineer of RF Team

Approved by
: Jong Seok Lee
Manager of RF Team

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1609-F008	September 08, 2016	- First Approval Report
HCT-R-1609-F008-1	October 05, 2016	- Revise the test results for the rule part 90.691. - Add the test requirements for the rule part 90.691 & 90.213 - Revise the 850CEL Band low limit frequency on page 79. - Update the test equipment calibration date.

Table of Contents

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:	W6UHM80I85C
IC:	9354A-HM80I85C
EUT Type:	RDU(Remote Drive Unit)
FCC/ IC Model(s):	MRDU-800IDEN/850CEL
Frequency Ranges:	800IDEN : 862 ~ 869 MHz (Downlink) 850CEL : 869 ~ 894 MHz (Downlink)
Conducted Output Power:	5.012 W (37 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 v03r02, KDB 935210 D05 v01r01, RSS-GEN, RSS-131
FCC Rule Part(s):	CFR 47 Part 2, Part 22, 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 :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 24, RSS-GEN, RSS-131.

Description	Reference (FCC)	Reference (IC)	Results
Conducted RF Output Power	§2.1046, §22.913, §90.635	RSS-131, Section 4.3 RSS-131, Section 6.2 SRSP-502, SRSP-503	Compliant
Occupied Bandwidth	§2.1049	RSS-GEN, Section 6.6	Compliant
Passband Gain and Bandwidth & Out of Band Rejection	KDB 935210 D02 v03r02	RSS-131, Section 4.2 RSS-131, Section 6.1	Compliant
Spurious Emissions at Antenna Terminals	§2.1051, §22.917, §90.691	RSS-131, Section 4.4 RSS-131, Section 6.3 RSS-131, Section 6.4 SRSP-502, SRSP-503	Compliant
Radiated Spurious Emissions	§2.1053, §22.917 §90.691	-	Compliant
Frequency Stability	§2.1055, §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.

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	Calibration Date	Calibration Interval	Serial No.
Agilent	E4438C /Signal Generator	09/02/2016	Annual	MY42082646
Agilent	N5182A /Signal Generator	03/29/2016	Annual	MY50141649
Agilent	N5182A /Signal Generator	05/13/2016	Annual	MY47070230
Agilent	N9030A / Signal Analyzer	11/24/2015	Annual	MY49431210
Weinschel	67-30-33 / Fixed Attenuator	10/29/2015	Annual	BR5347
Weinschel	1506A / Power Divider	02/15/2016	Annual	MD793
DEAYOUNG ENT	DFSS60 / AC Power Supply	04/06/2016	Annual	1003030-1
AMETEK	XFR 60-20 / DC Power Supply	02/27/2016	Annual	1045A01016
NANGYEUL CO., LTD.	NY-THR18750 / Temperature and Humidity Chamber	10/27/2015	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	02/23/2016	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	04/15/2015	Biennial	255
Schwarzbeck	BBHA 9120D / Horn Antenna	12/11/2015	Biennial	9120D-1191
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	09/03/2015	Biennial	BBHA9170541
Rohde & Schwarz	FSP / Spectrum Analyzer	10/05/2015	Annual	836650/016
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/23/2016	Annual	101068-SZ
Wainwright Instruments	WHK1.2/15G-10EF / Highpass Filter	04/11/2016	Annual	4
Wainwright Instruments	WHK3.0/18G-10EF / Highpass Filter	06/24/2016	Annual	8
CERNEX	CBLU1183540 / Power Amplifier	02/01/2016	Annual	24614
CERNEX	CBL06185030 / Power Amplifier	02/01/2016	Annual	24615
CERNEX	CBL18265035 / Power Amplifier	07/11/2016	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.

§ 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.

§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).

Table—Equivalent Power and Antenna Heights for Base Stations in the 851-869 MHz and 935-940 MHz Bands Which Have a Requirement for a 32 km (20 mi) Service Area Radius

Antenna height (ATT) meters (feet)	Effective radiated power (watts)[1 2 4]
Above 1,372 (4,500)	65
Above 1,220 (4,000) to 1,372 (4,500)	70
Above 1,067 (3,500) to 1,220 (4,000)	75
Above 915 (3,000) to 1,067 (3,500)	100
Above 763 (2,500) to 915 (3,000)	140
Above 610 (2,000) to 763 (2,500)	200
Above 458 (1,500) to 610 (2,000)	350
Above 305 (1,000) to 458 (1,500)	600
Up to 305 (1,000)	[3]1,000

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.

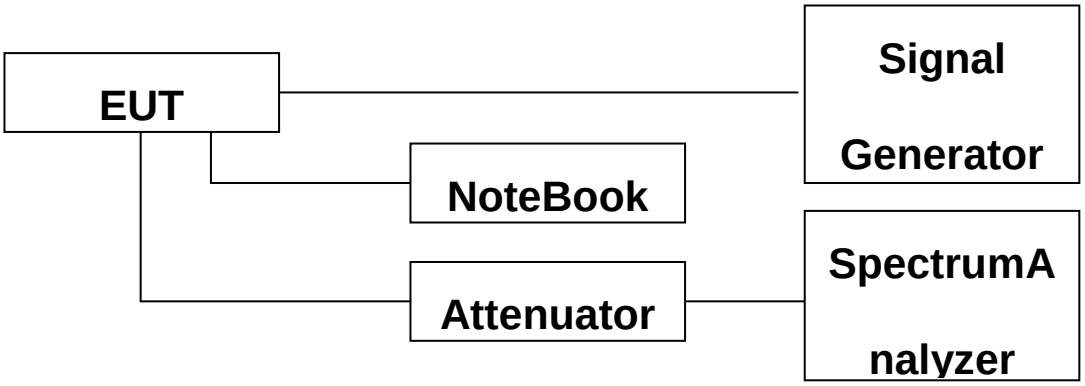
h) Repeat steps f) and g) with input signal amplitude set to 3 dB above the AGC threshold level.

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 C4of 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 Base stations for digital systems are limited to 1640 watts maximum equivalent isotropically radiated power (EIRP) with an antenna height above average terrain (HAAT) up to 150 m, except in urban areas where they are limited to a maximum allowable EIRP of 820 watts.

5.1.2 Base stations for analogue systems are limited to 820 watts maximum EIRP with an antenna height above average terrain (HAAT) up to 150 m, except in urban areas where they are limited to a maximum allowable EIRP of 164 watts.

5.1.3 The maximum EIRP shall be 11.5 watts for mobile stations.

5.1.4 The EIRP 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 EIRP from that specified in paragraphs 5.1.1 and 5.1.2 is required for base stations with antenna height above average terrain (HAAT) in excess of 150 m as follows:

$EIRP_{reduction} = 20\log_{10}HAAT/150$

In the above formula, the EIRP reduction is measured in dB and the HAAT is measured in metres.

RSS-131

6. Equipment Standard Specification

6.2 Output Power

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

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 apassband equal to one channel bandwidth. Another example of a single carrier operation is the useof an enhancer, before the connection to the antenna, to boost a low power transmitter (singlecarrier) to a higher power.

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

Examination: with 3 carrier signals (of assumed equal level), the peak voltage will be 3 times thesingle carrier voltage. The corresponding Peak Envelope Power (PEP) will be 3^2times 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. **$P_{permissible} = P_{rated} - 3.5$ dB).**

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

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 powerback-off may be required. This can be examined on a case-by-case basis.

Test Procedures:

RSS-131

4. Measurement Methods

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 f_1 and f_2 such that they and their third-order intermodulation product frequencies, $f_3 = 2f_1-f_2$ and $f_4 = 2f_2 - f_1$, are all within the passband of the DUT.
Raise the input level to the DUT while observing the output tone levels, P_{o1} and P_{o2}, and the intermodulation product levels, P_{o3} and P_{o4}.
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, P_{o3} or P_{o4}, 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, P_{o3} or P_{o4}, is 67 dB below the level of either output tone level, P_{o1} or P_{o2}.
Record all signal levels and their frequencies. Calculate the mean output power (P_{mean}) under this testing condition using $P_{mean} = P_{o1} + 3$ 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
800IDEN, 850CEL	-10 dBm	47 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] - 800IDEN

	Channel	Frequency (MHz)	Output Power	
			(dBm)	(W)
800IDEN Band _ CDMA AGC threshold	Low	863.25	37.69	5.872
	Middle	865.50	37.35	5.428
	High	867.75	37.43	5.536
800IDEN Band _ CDMA +3dBm above the AGC threshold	Low	863.25	37.66	5.829
	Middle	865.50	37.38	5.467
	High	867.75	37.42	5.523
800IDEN Band _ LTE 5 MHz AGC threshold	Low	864.50	37.81	6.044
	Middle	-	-	-
	High	866.50	37.40	5.491
800IDEN Band_ LTE 5 MHz +3dBm above the AGC threshold	Low	864.50	37.81	6.046
	Middle	-	-	
	High	866.50	37.44	5.550

[Downlink] - 850CEL

	Channel	Frequency (MHz)	Output Power	
			(dBm)	(W)
850CEL Band _ CDMA AGC threshold	Low	870.25	37.38	5.471
	Middle	881.50	37.41	5.510
	High	892.75	37.28	5.345
850CEL Band _ CDMA +3dBm above the AGC threshold	Low	870.25	37.80	6.028
	Middle	881.50	37.16	5.202
	High	892.75	37.74	5.946
850CEL Band _ WCDMA AGC threshold	Low	871.50	37.69	5.873
	Middle	881.50	37.45	5.556
	High	891.50	37.39	5.478
850CEL Band _ WCDMA +3dBm above the AGC threshold	Low	871.50	37.05	5.076
	Middle	881.50	37.52	5.650
	High	891.50	37.89	6.158

	Channel	Frequency (MHz)	Output Power	
			(dBm)	(W)
850CEL Band _ LTE 5 MHz AGC threshold	Low	871.50	37.44	5.545
	Middle	881.50	37.35	5.429
	High	891.50	37.17	5.208
850CEL Band_ LTE 5 MHz +3dBm above the AGC threshold	Low	871.50	37.78	6.001
	Middle	881.50	37.64	5.813
	High	891.50	37.79	6.016
850CEL Band _ LTE 10 MHz AGC threshold	Low	874.00	37.56	5.705
	Middle	881.50	37.19	5.239
	High	889.00	37.34	5.419
850CEL Band _ LTE 10 MHz +3dBm above the AGC threshold	Low	874.00	37.54	5.676
	Middle	881.50	37.14	5.181
	High	889.00	37.35	5.429

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)
800IDEN Band	Low	862.40	34.093	37.093
	Middle	865.50	34.072	37.072
	High	868.60	34.018	37.018

	Channel	Frequency (MHz)	Output Power	
			Po1(dBm)	Pmean(dBm)
850CEL Band	Low	869.40	34.124	37.124
	Middle	881.50	34.195	37.195
	High	893.60	34.088	37.088

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

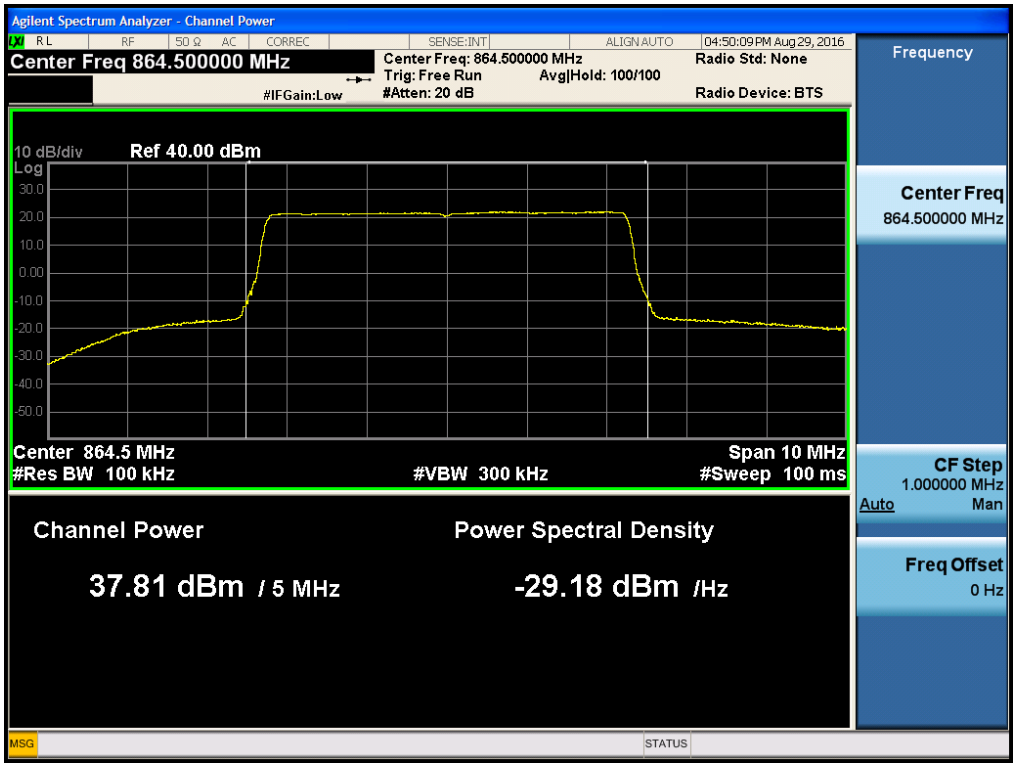
[Downlink]

	1 Carrier (dBm)	3 Carrier (dBm)	Power Back-off (dB)
800IDEN Band	37.35	32.57	4.78

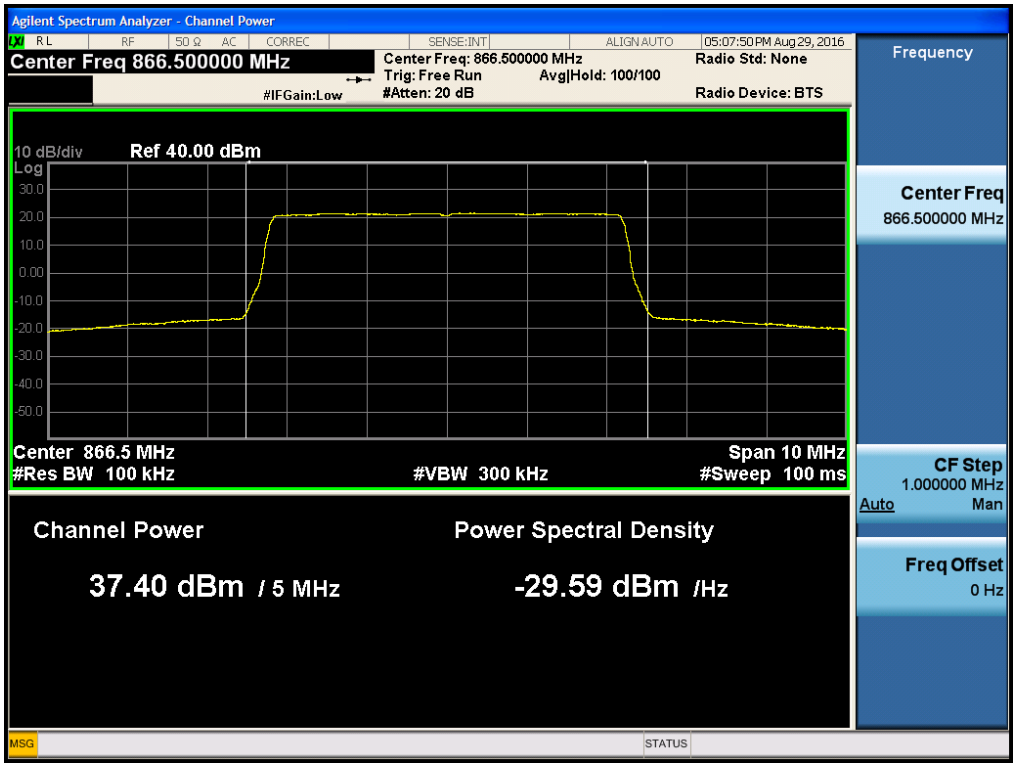
	1 Carrier (dBm)	3 Carrier (dBm)	Power Back-off (dB)
850CEL Band	37.35	32.29	5.06

Plots of RF Output Power for 800IDEN Band LTE 5 MHz

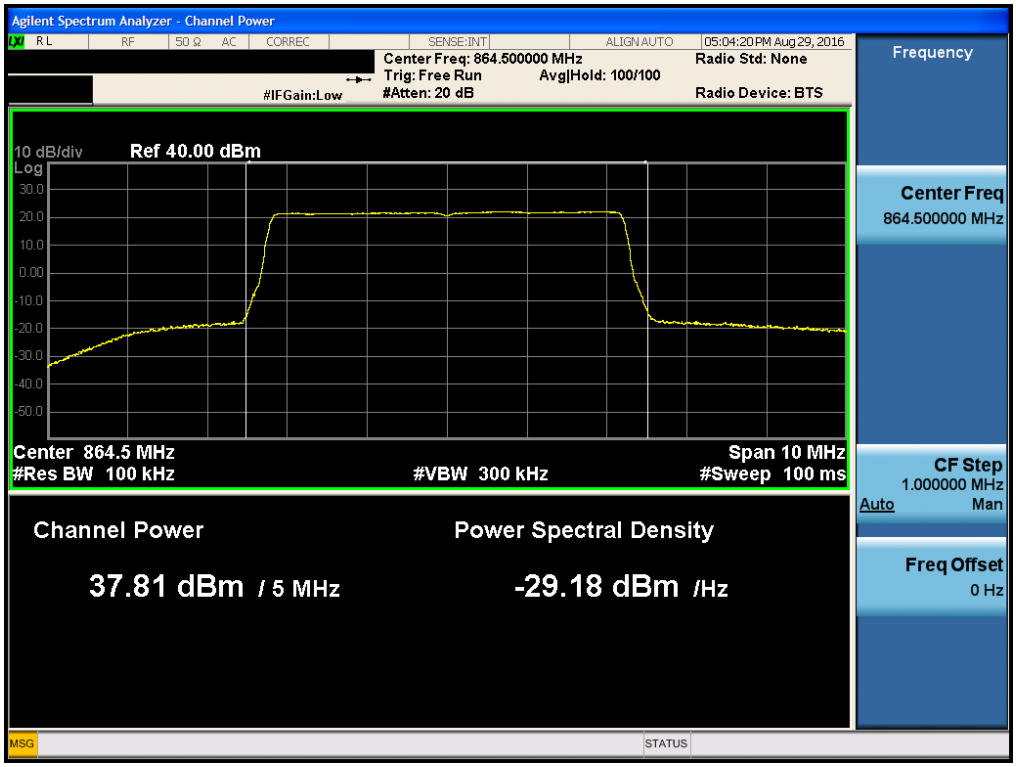
[AGC threshold Downlink Low]



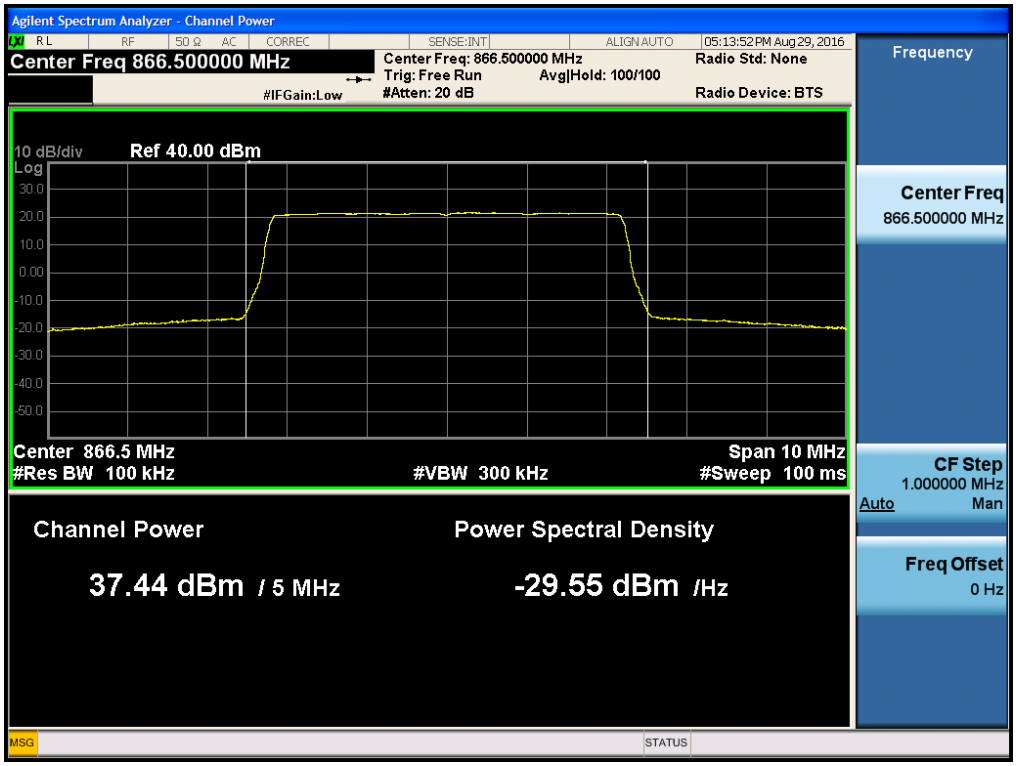
[AGC threshold Downlink High]



[+3dBm above AGC threshold Downlink Low]

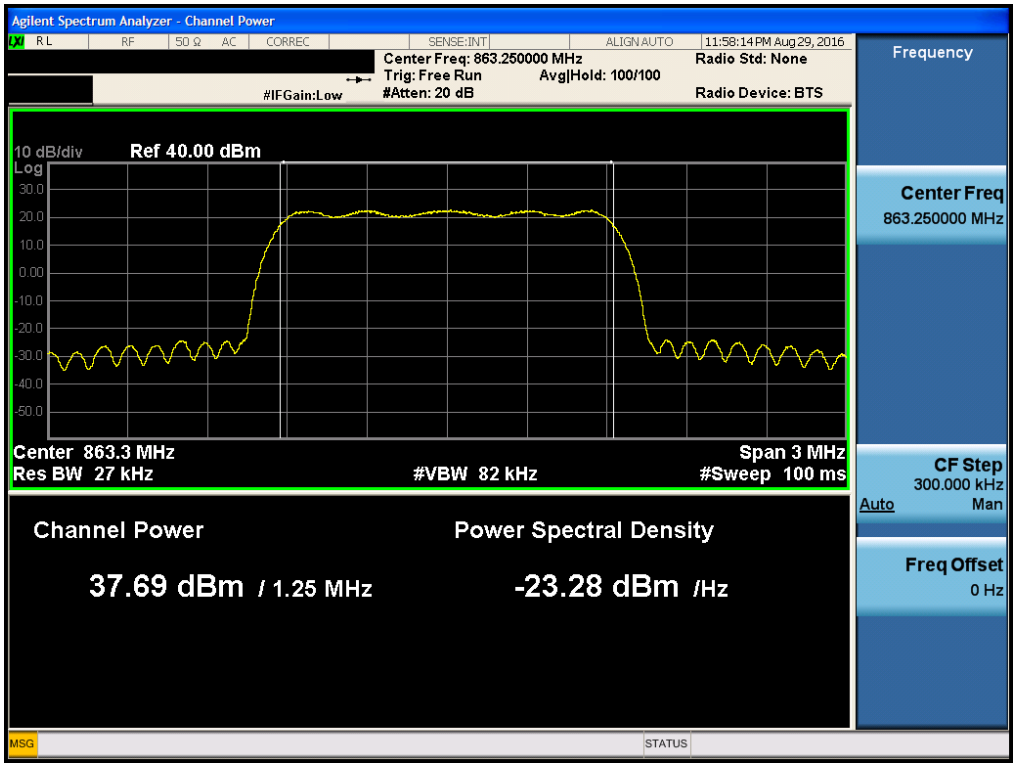


[+3dBm above AGC threshold Downlink High]

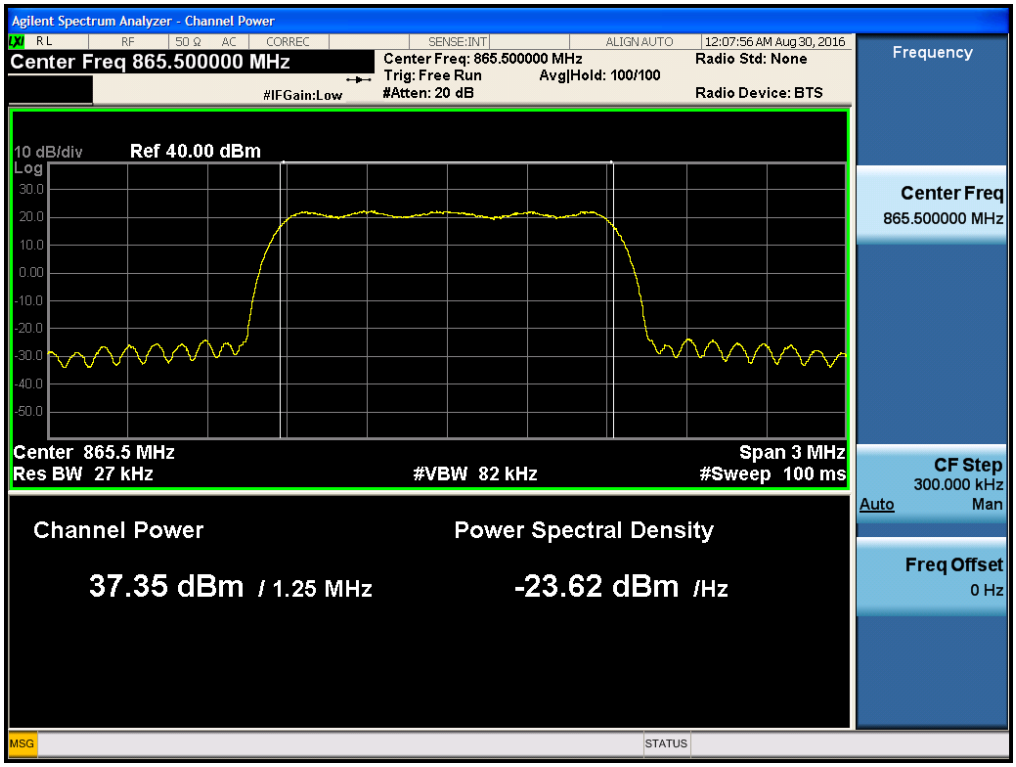


Plots of RF Output Power for 800IDEN Band CDMA

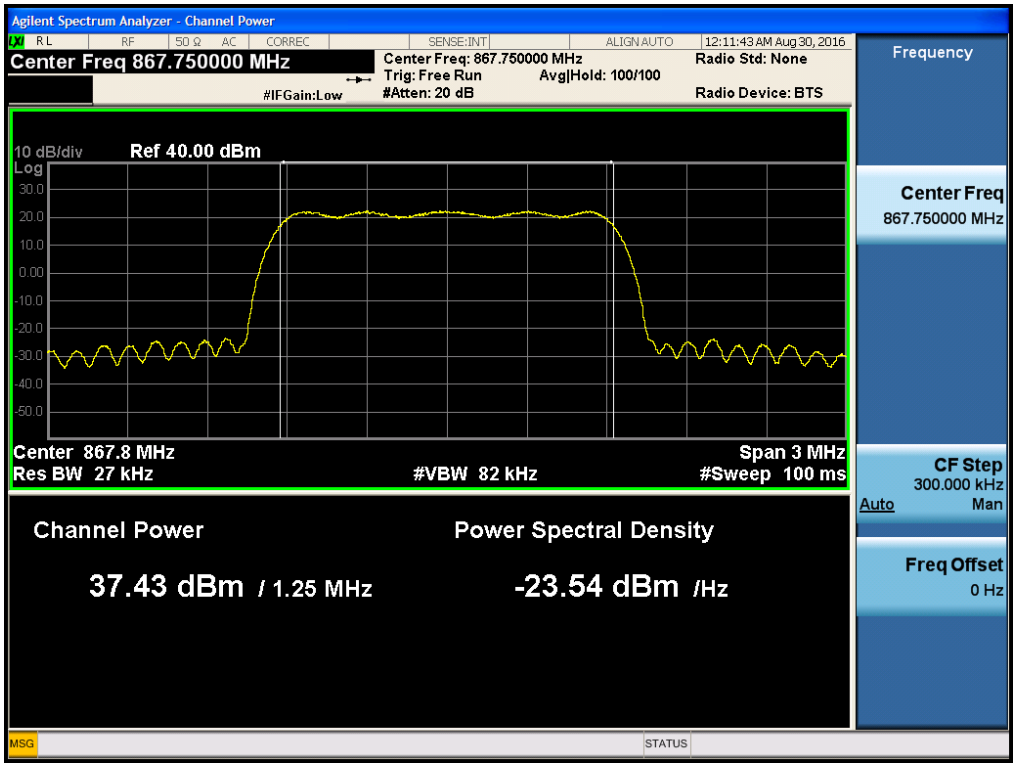
[AGC threshold Downlink Low]



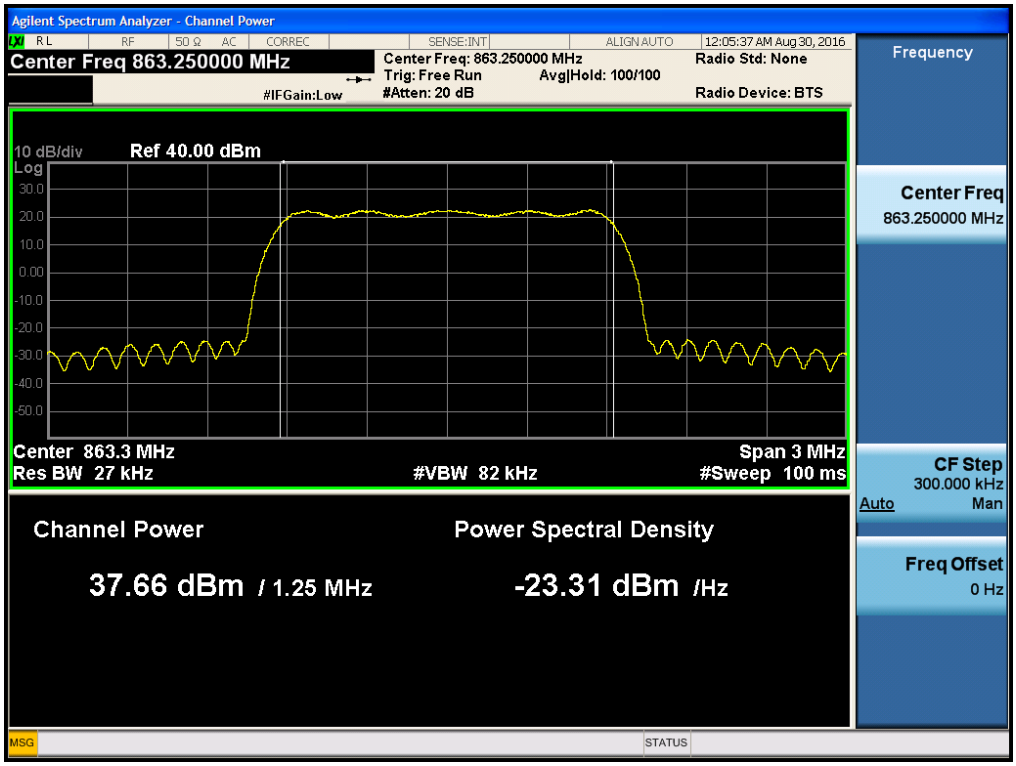
[AGC threshold Downlink Middle]



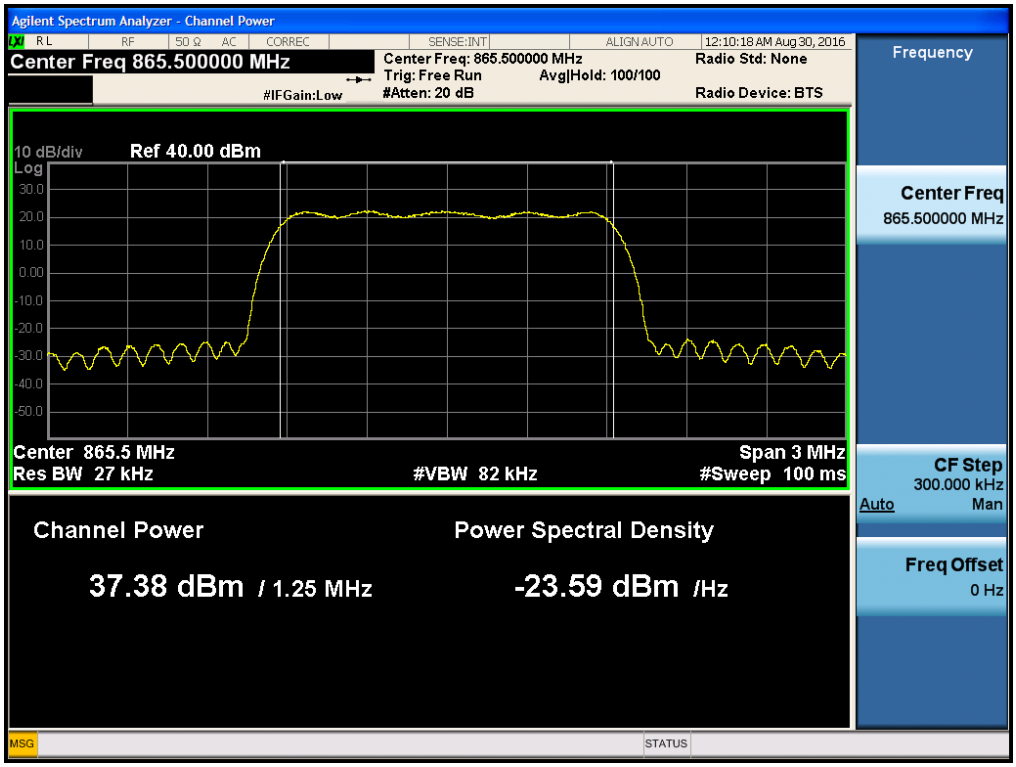
[AGC threshold Downlink High]



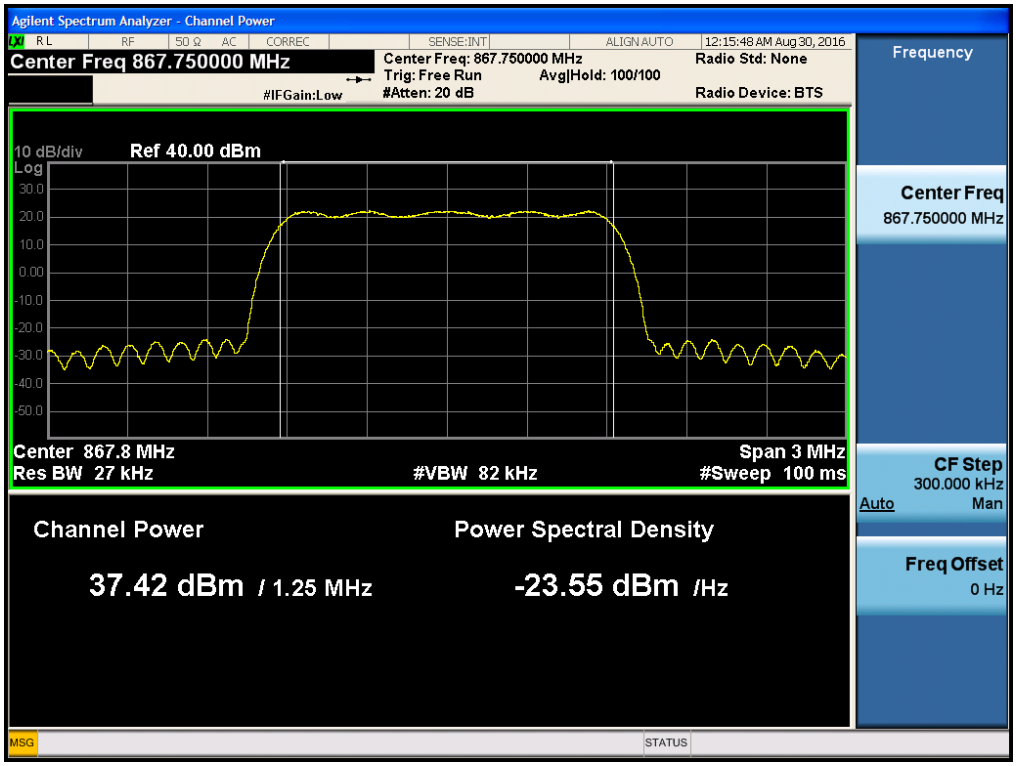
[+3dBm above AGC threshold Downlink Low]



[+3dBm above AGC threshold Downlink Middle]

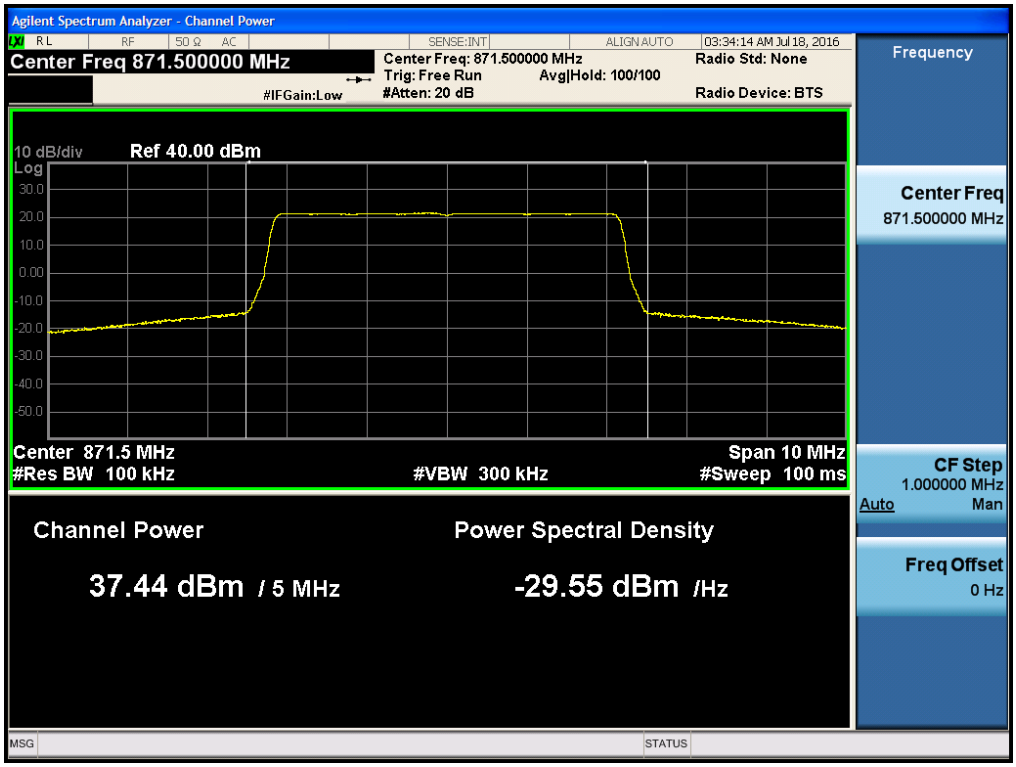


[+3dBm above AGC threshold Downlink High]

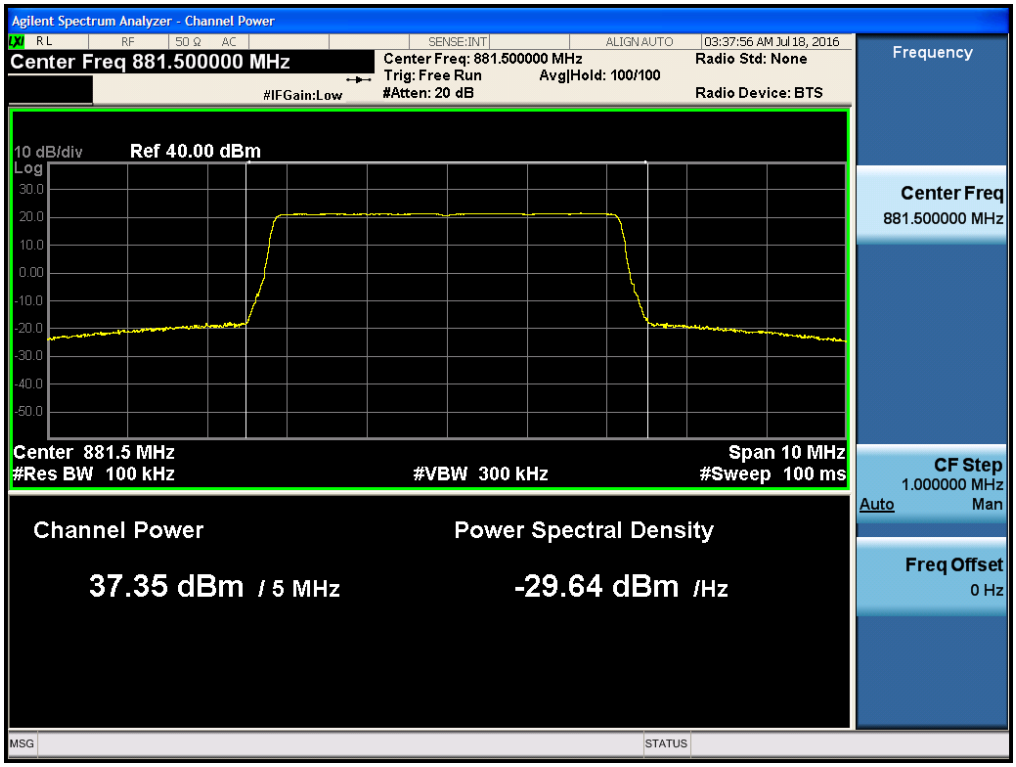


Plots of RF Output Power for 850CEL Band LTE 5 MHz

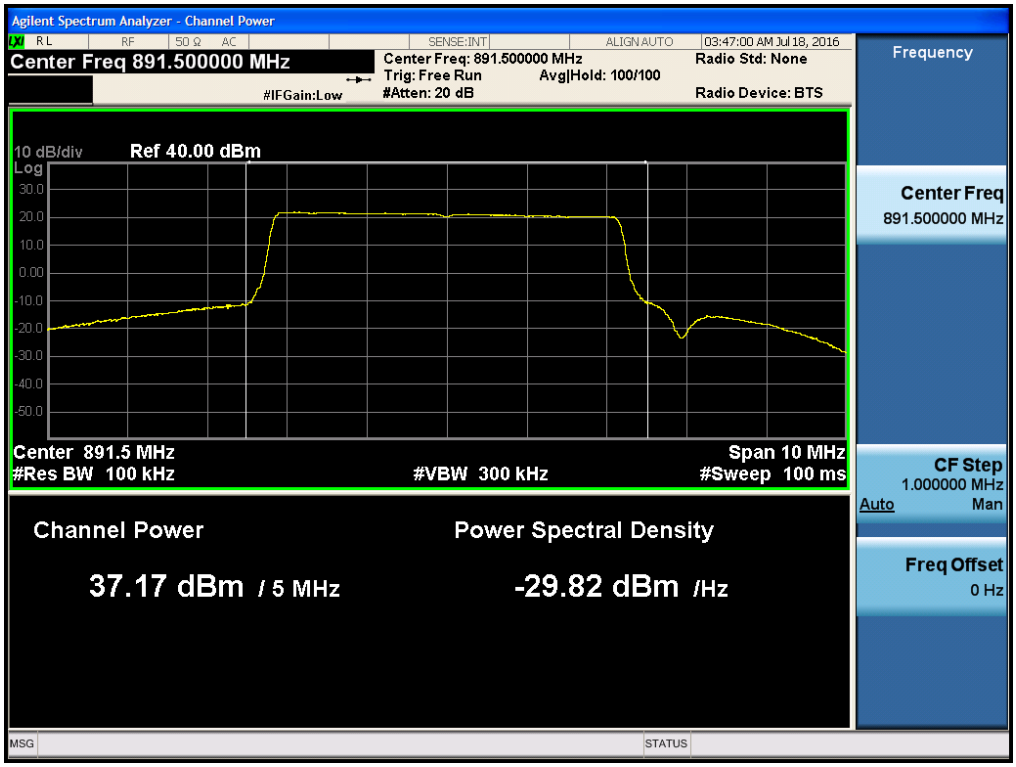
[AGC threshold Downlink Low]



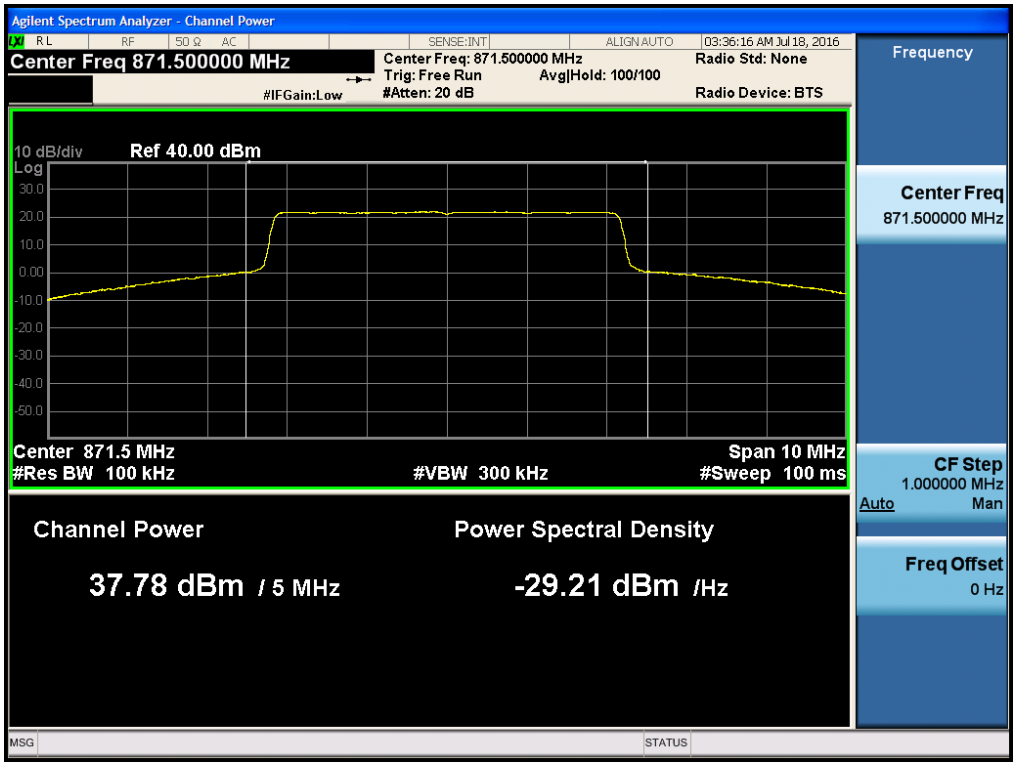
[AGC threshold Downlink Middle]



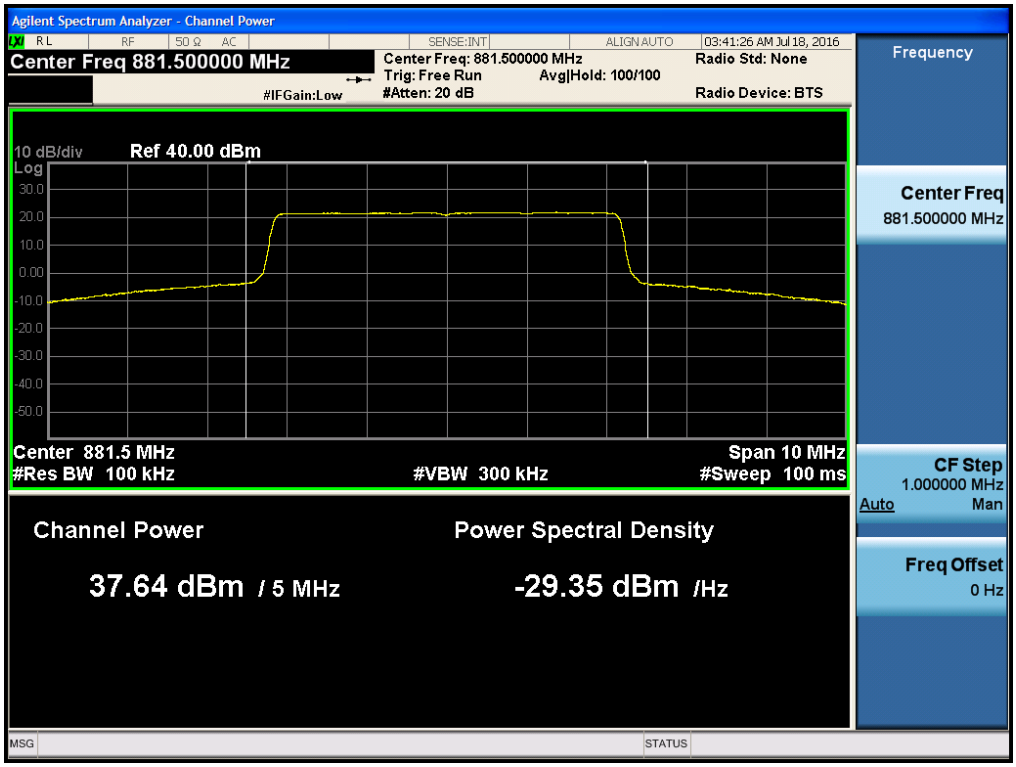
[AGC threshold Downlink High]



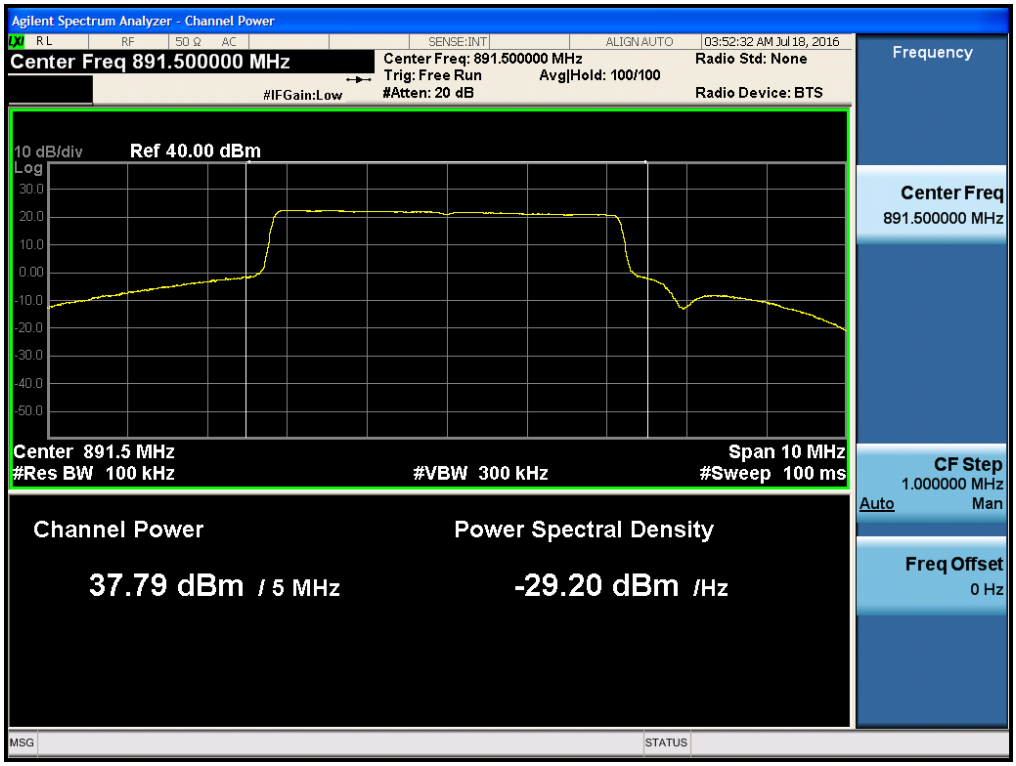
[+3dBm above AGC threshold Downlink Low]



[+3dBm above AGC threshold Downlink Middle]

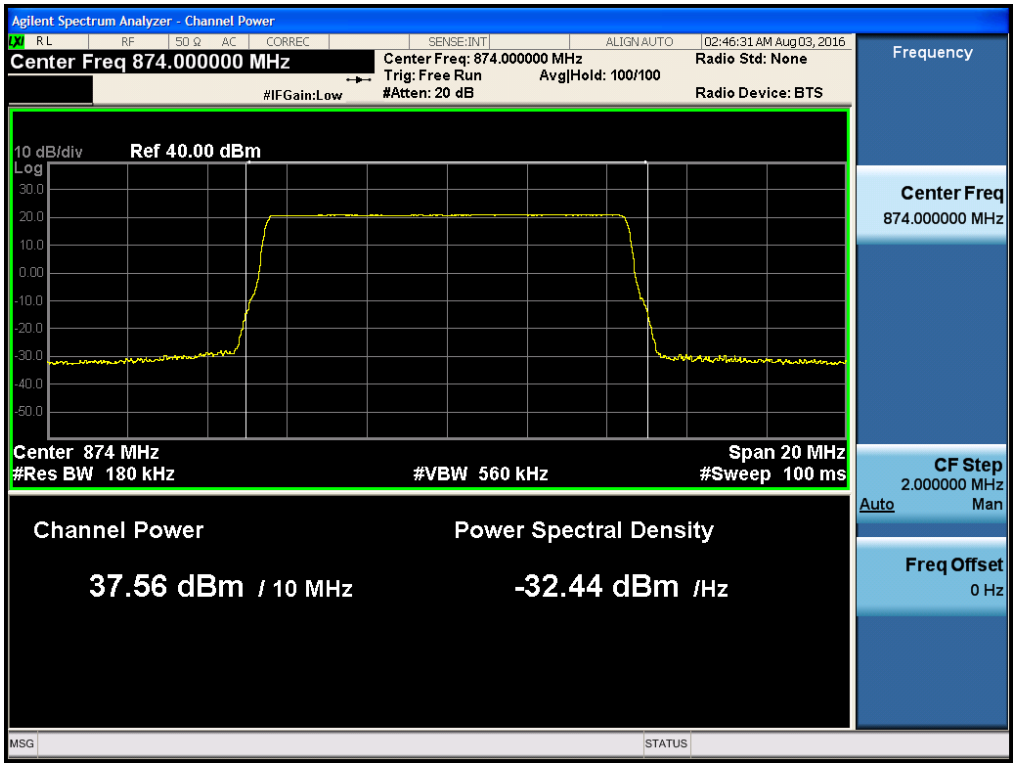


[+3dBm above AGC threshold Downlink High]

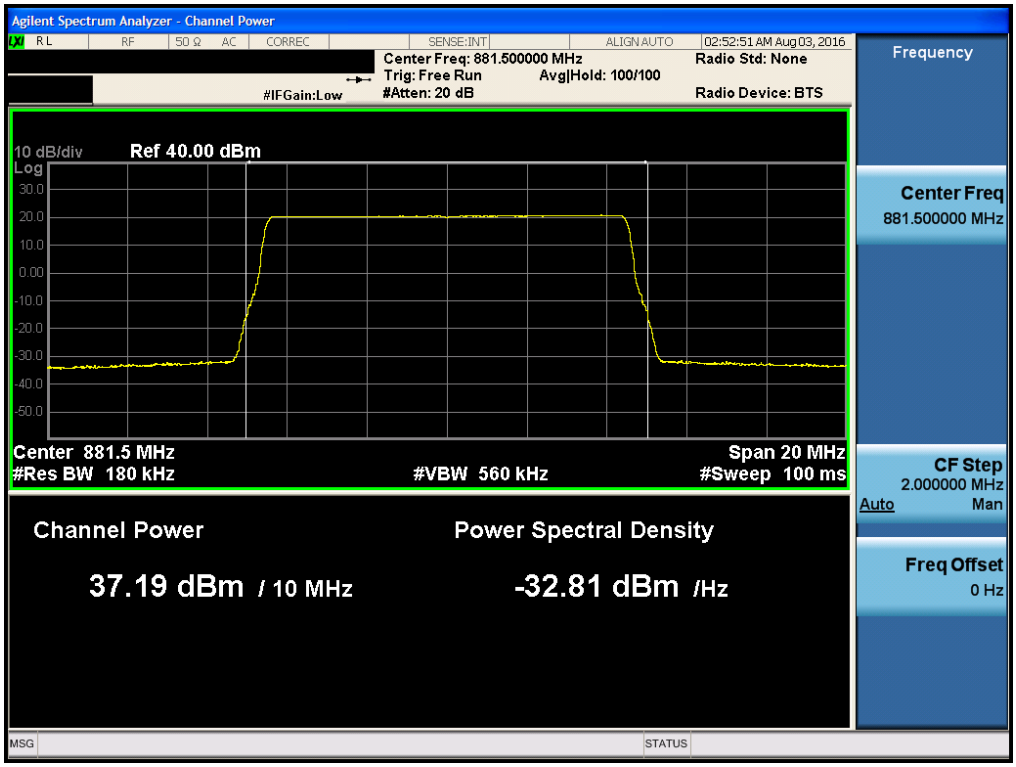


Plots of RF Output Power for 850CEL Band LTE 10 MHz

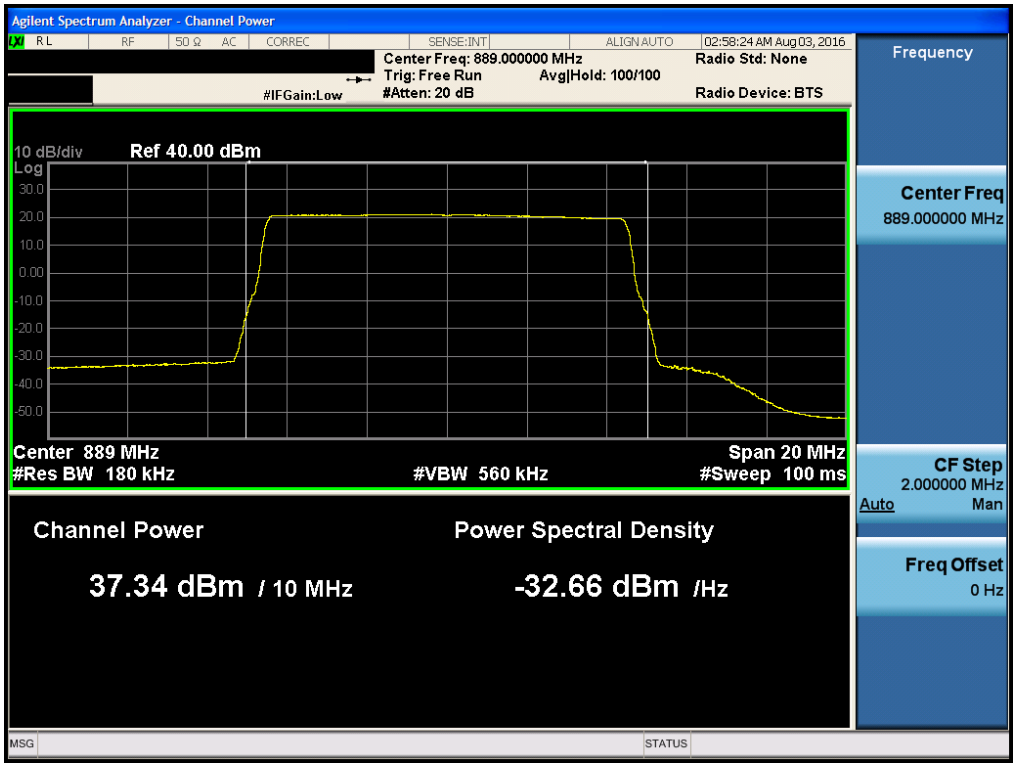
[AGC threshold Downlink Low]



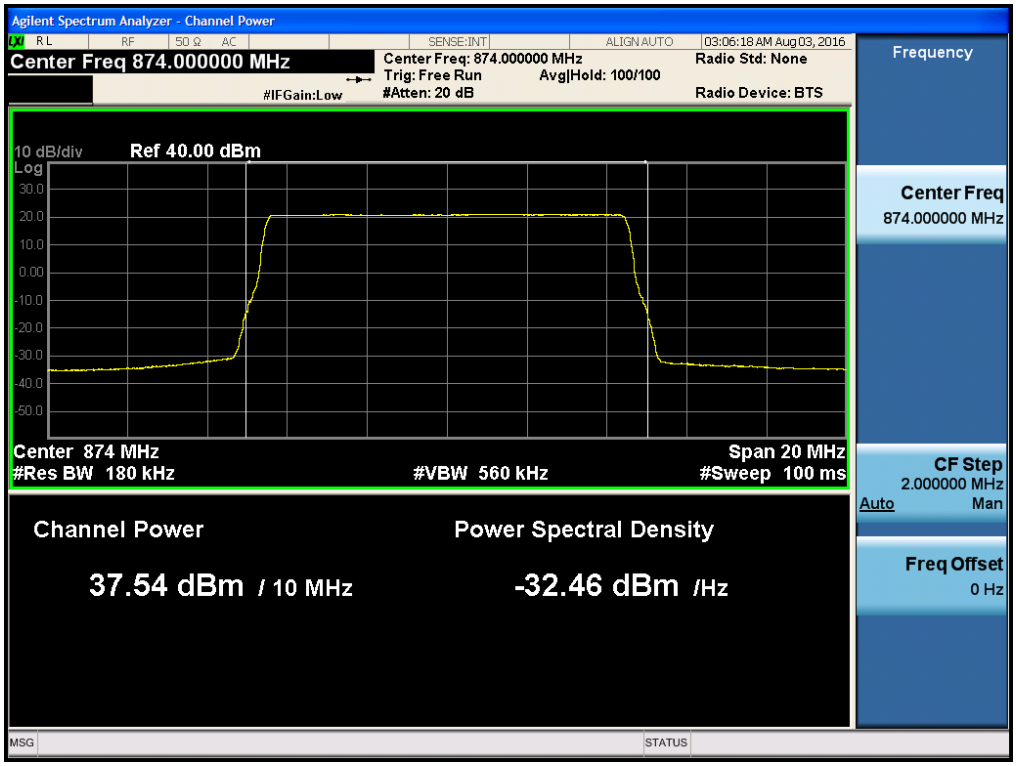
[AGC threshold Downlink Middle]



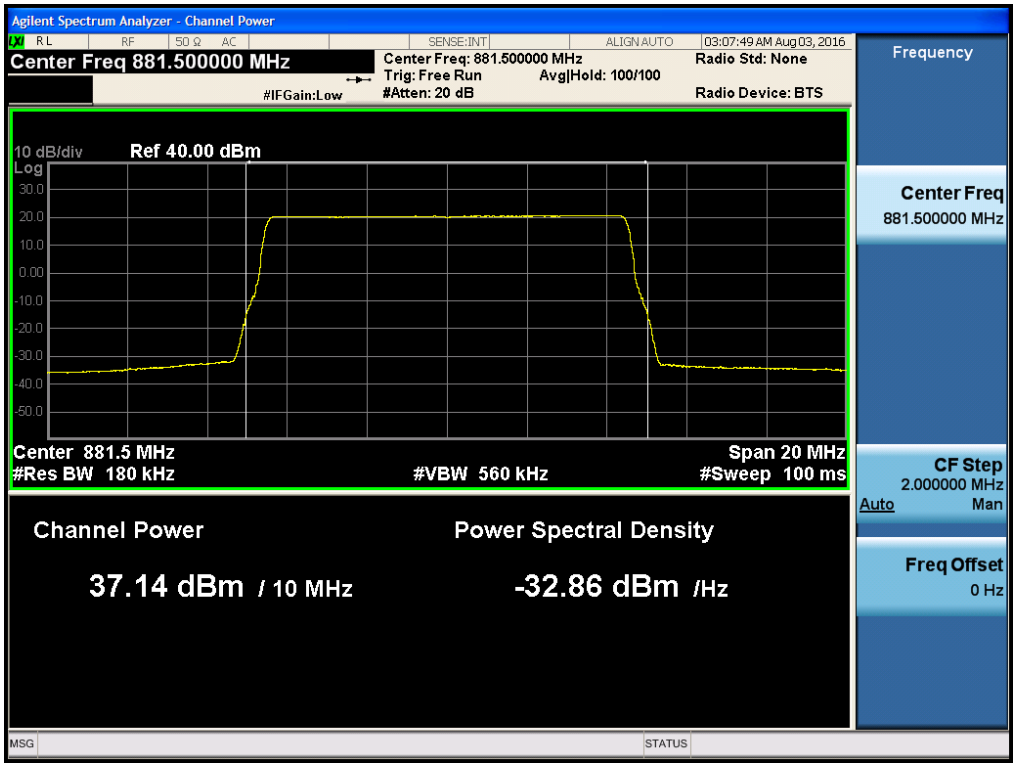
[AGC threshold Downlink High]



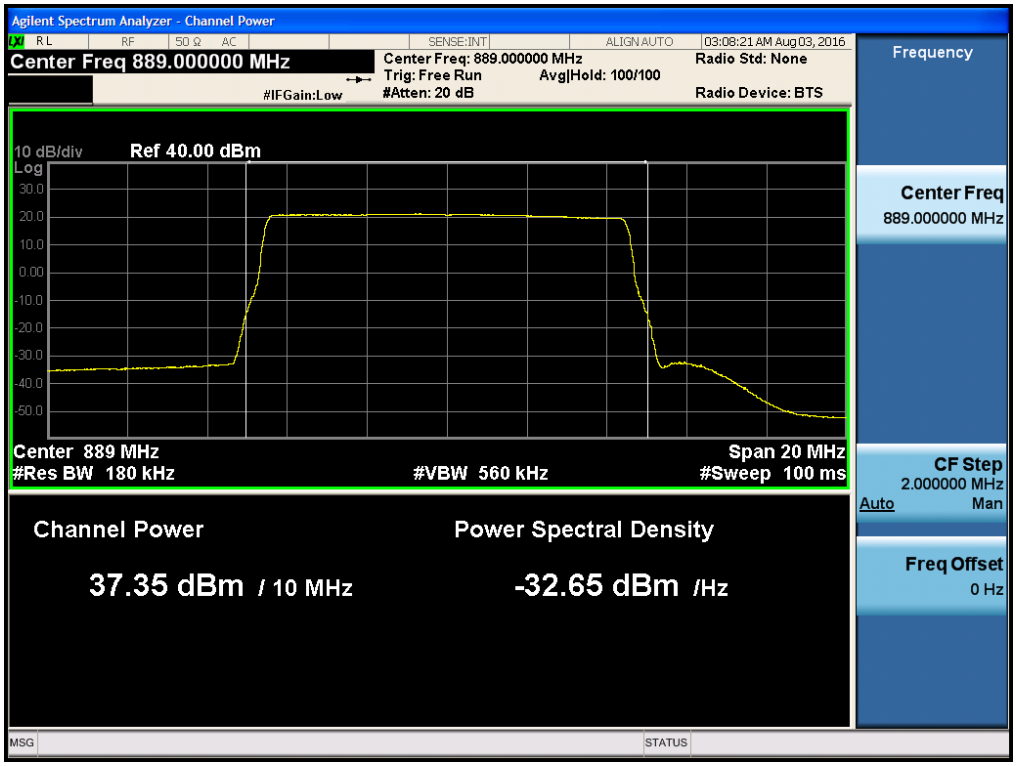
[+3dBm above AGC threshold Downlink Low]



[+3dBm above AGC threshold Downlink Middle]

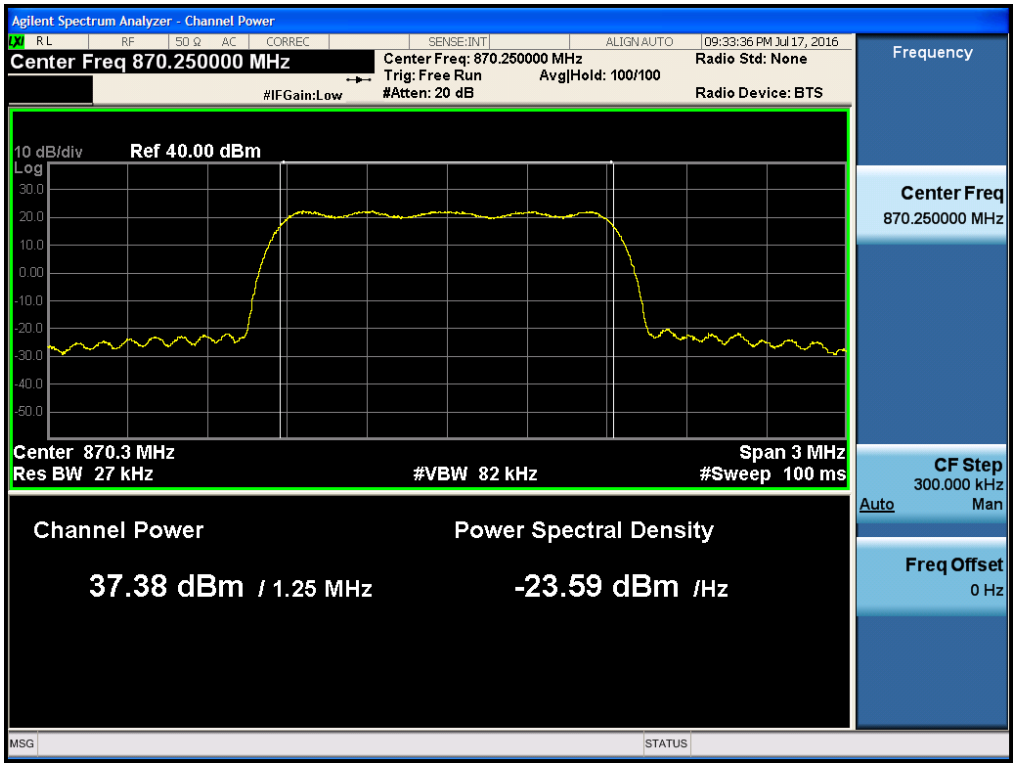


[+3dBm above AGC threshold Downlink High]

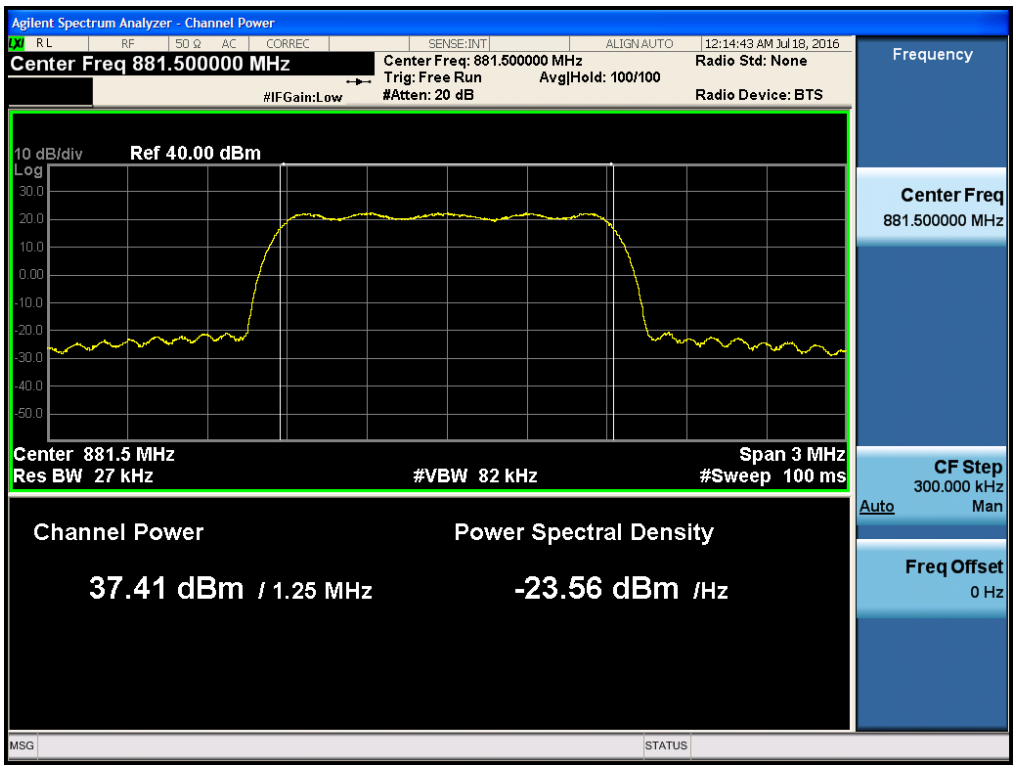


Plots of RF Output Power for 850CEL Band CDMA

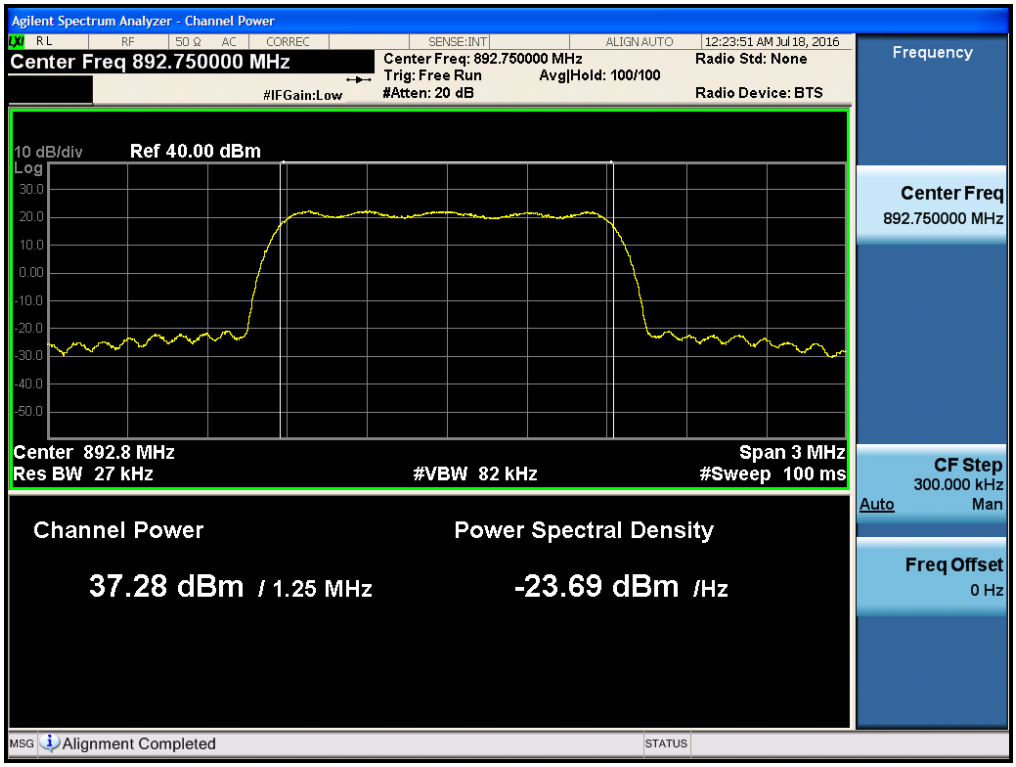
[AGC threshold Downlink Low]



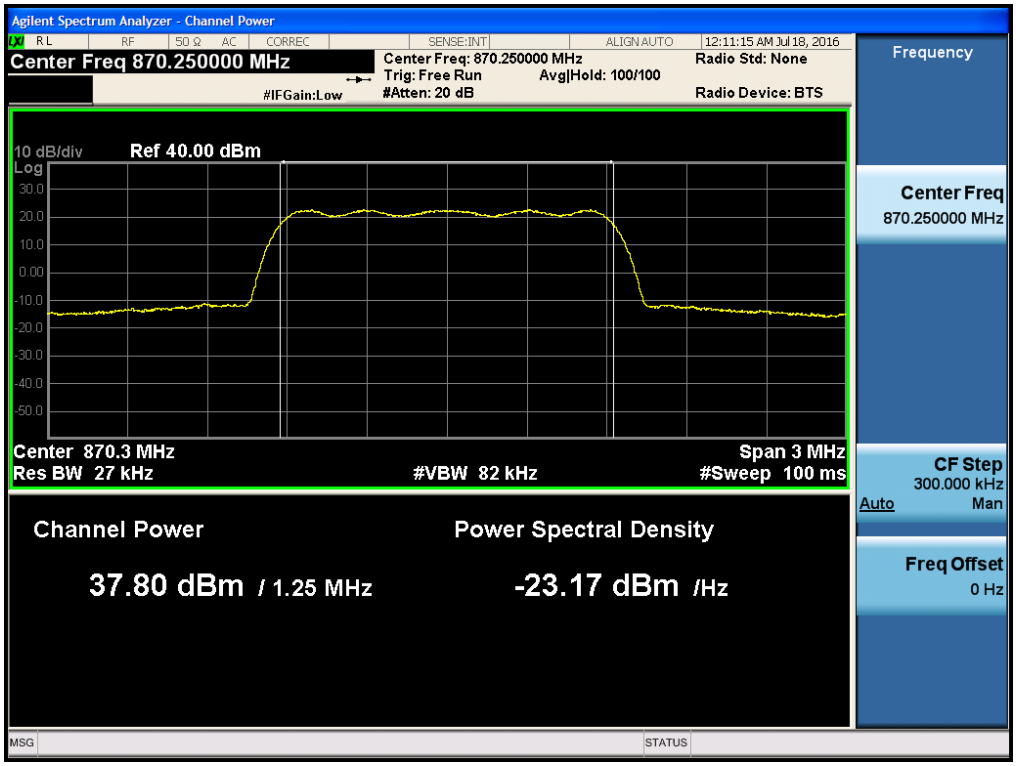
[AGC threshold Downlink Middle]



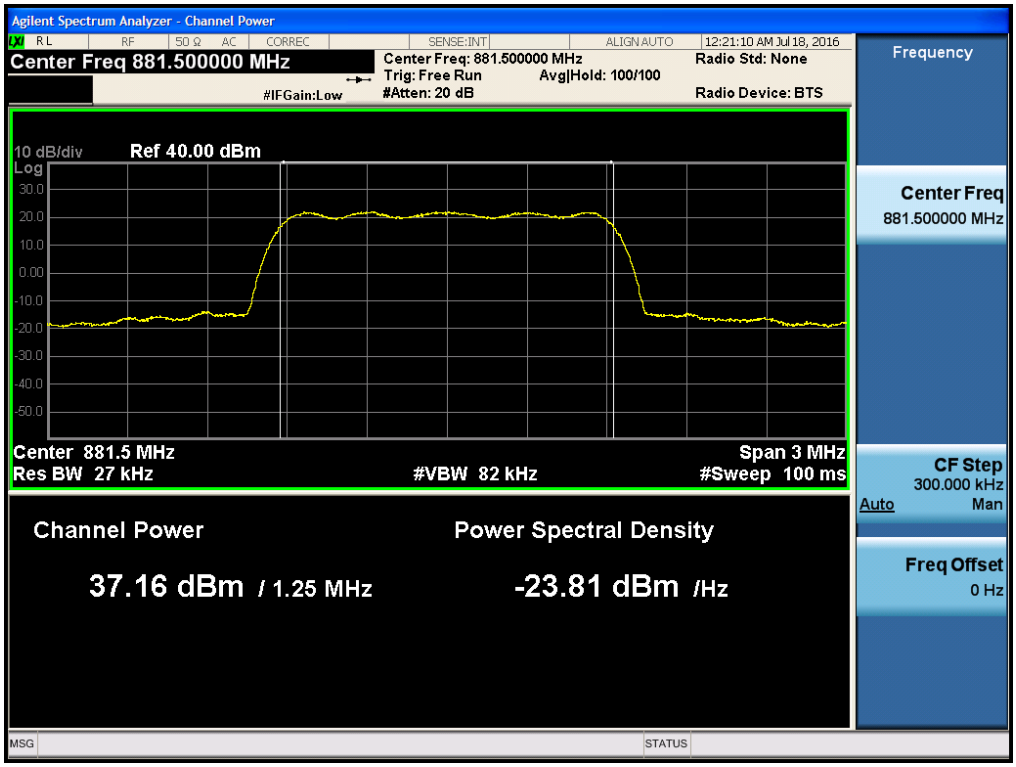
[AGC threshold Downlink High]



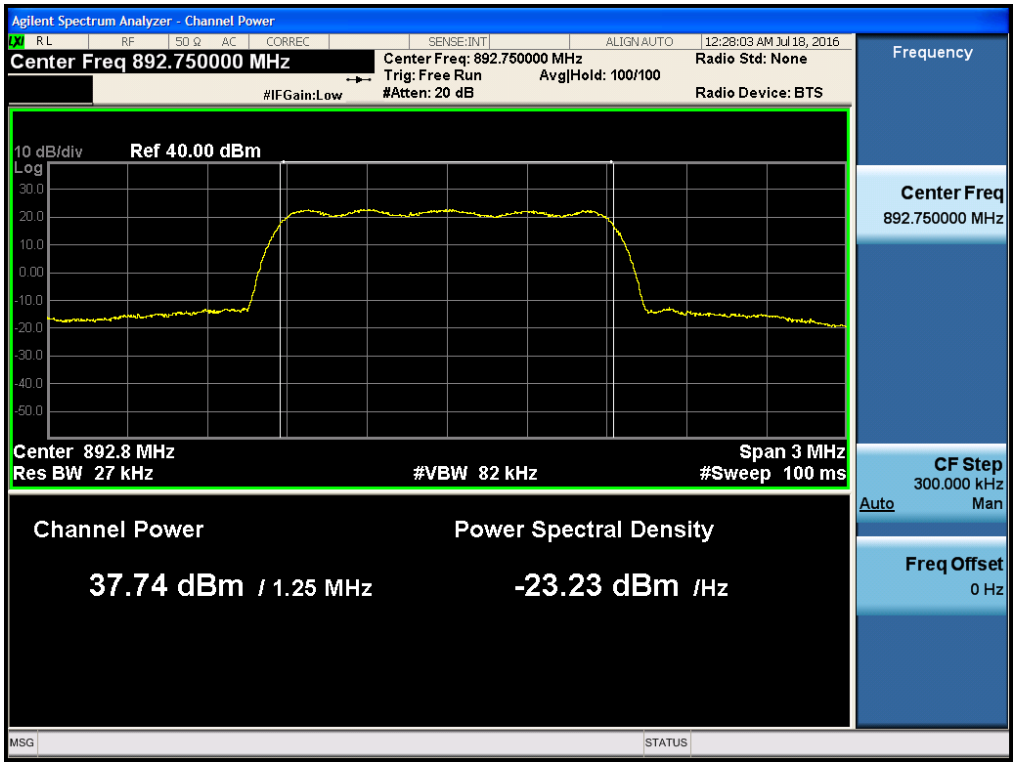
[+3dBm above AGC threshold Downlink Low]



[+3dBm above AGC threshold Downlink Middle]

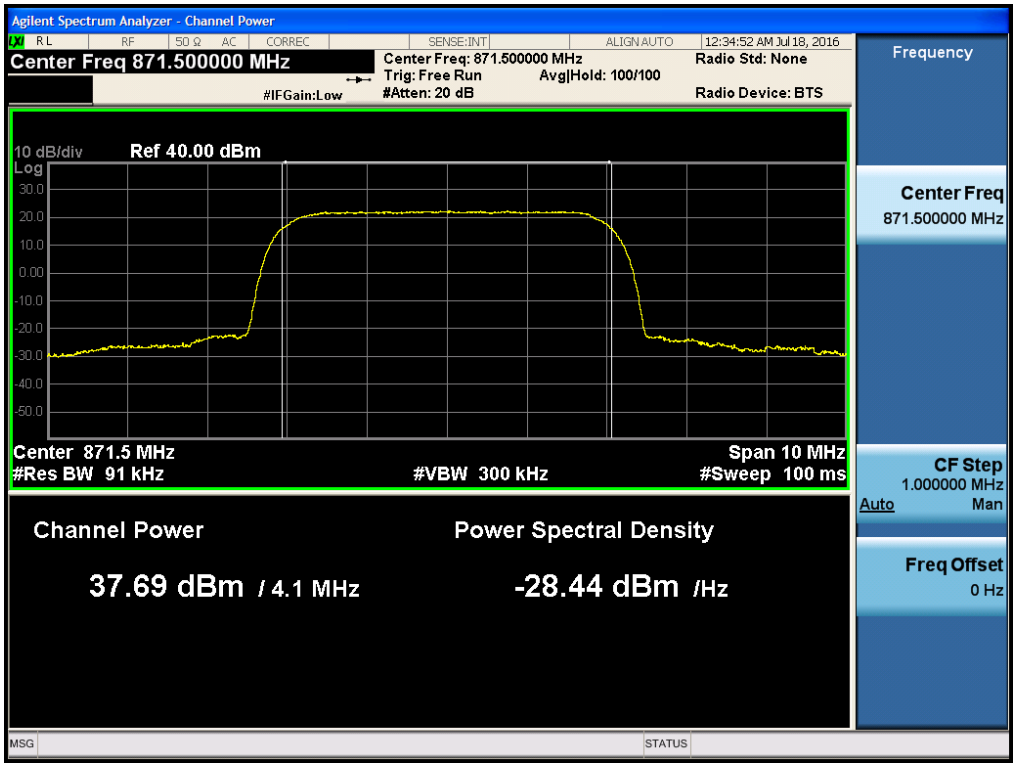


[+3dBm above AGC threshold Downlink High]

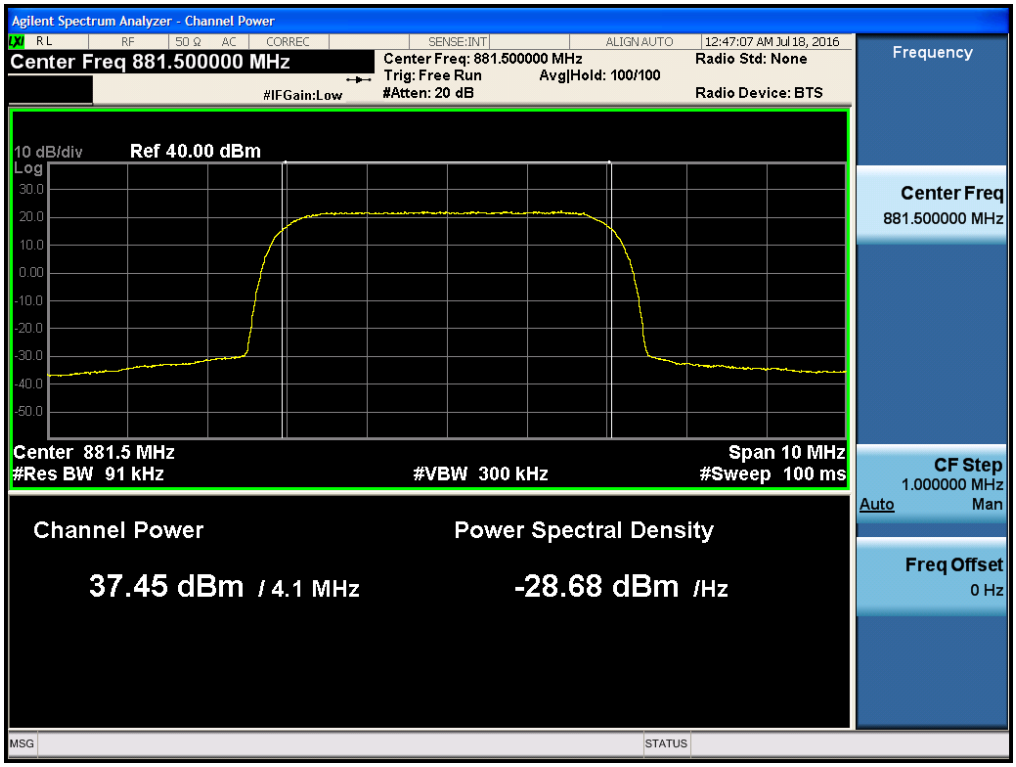


Plots of RF Output Power for 850CEL Band WCDMA

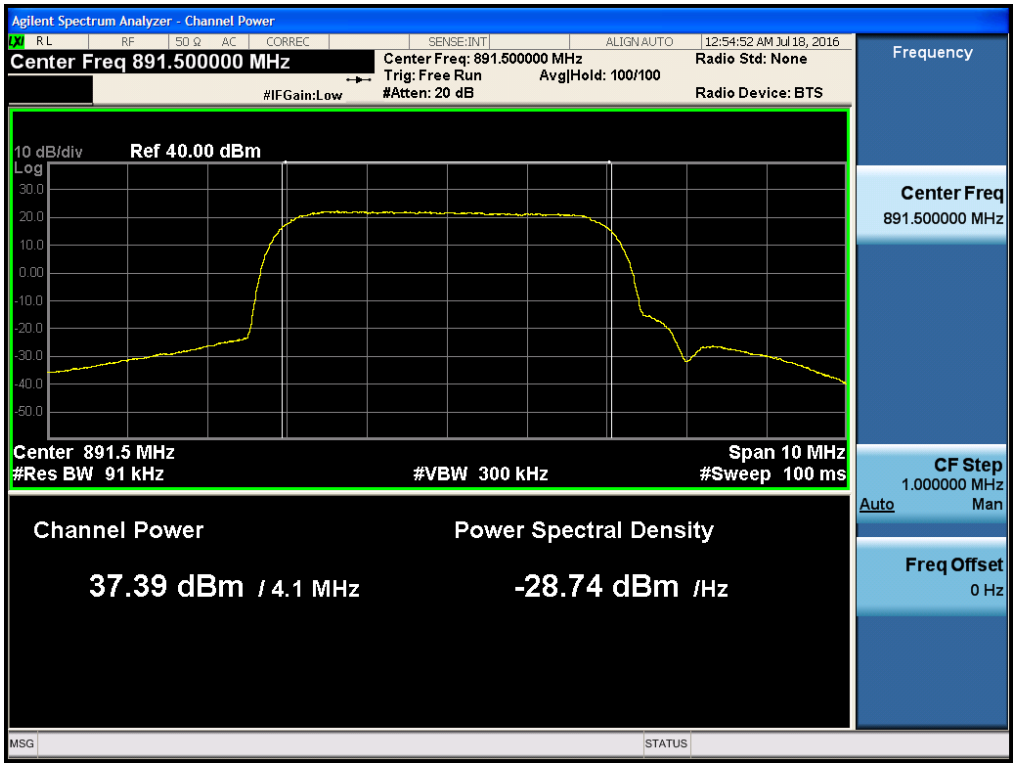
[AGC threshold Downlink Low]



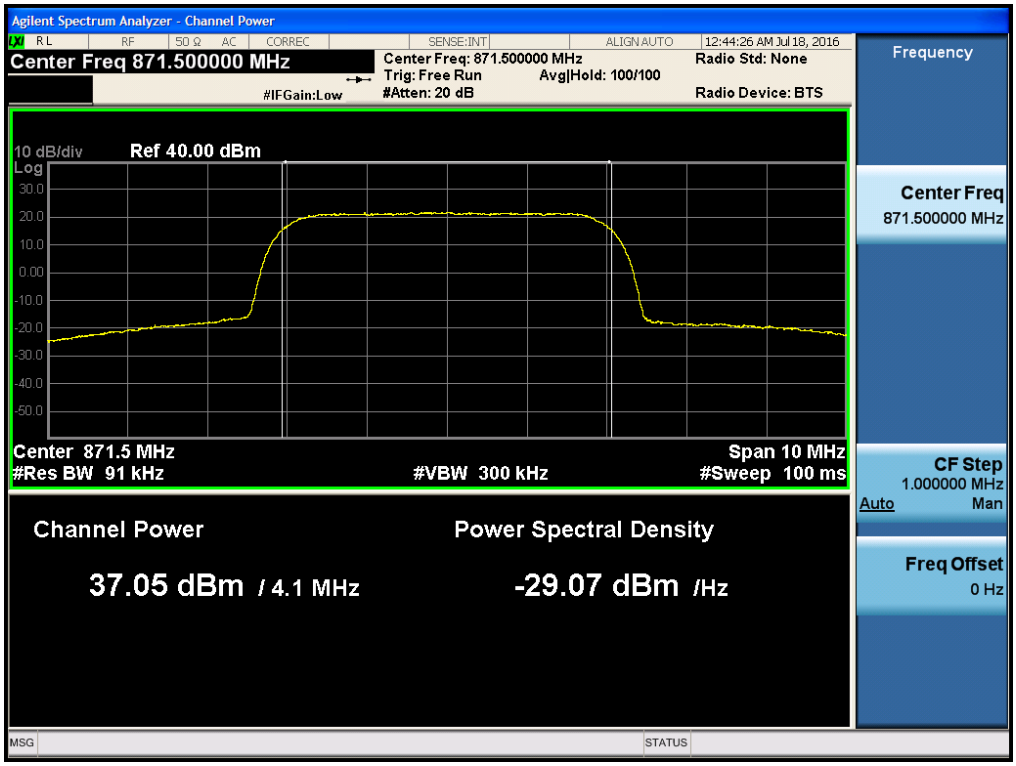
[AGC threshold Downlink Middle]



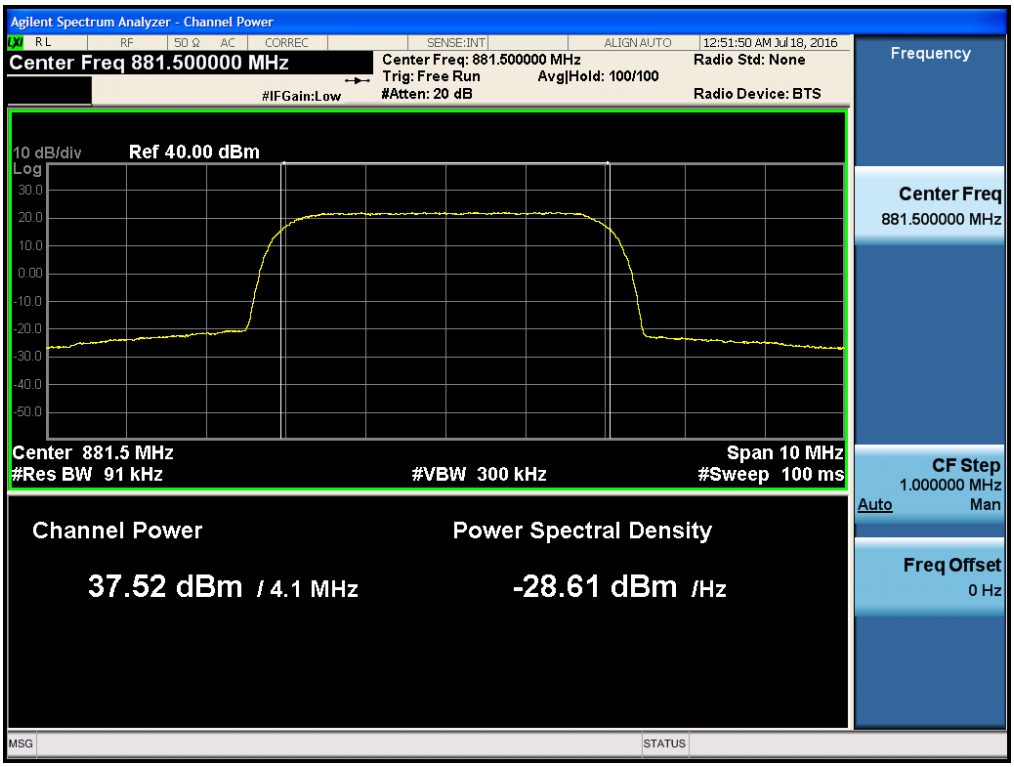
[AGC threshold Downlink High]



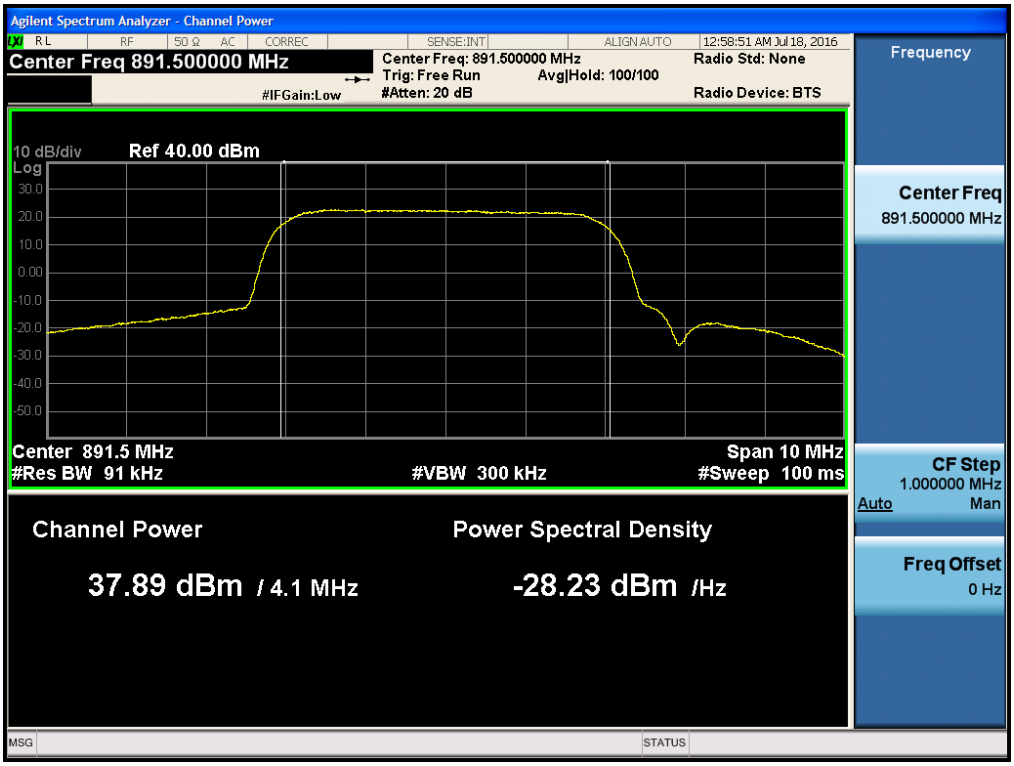
[+3dBm above AGC threshold Downlink Low]



[+3dBm above AGC threshold Downlink Middle]

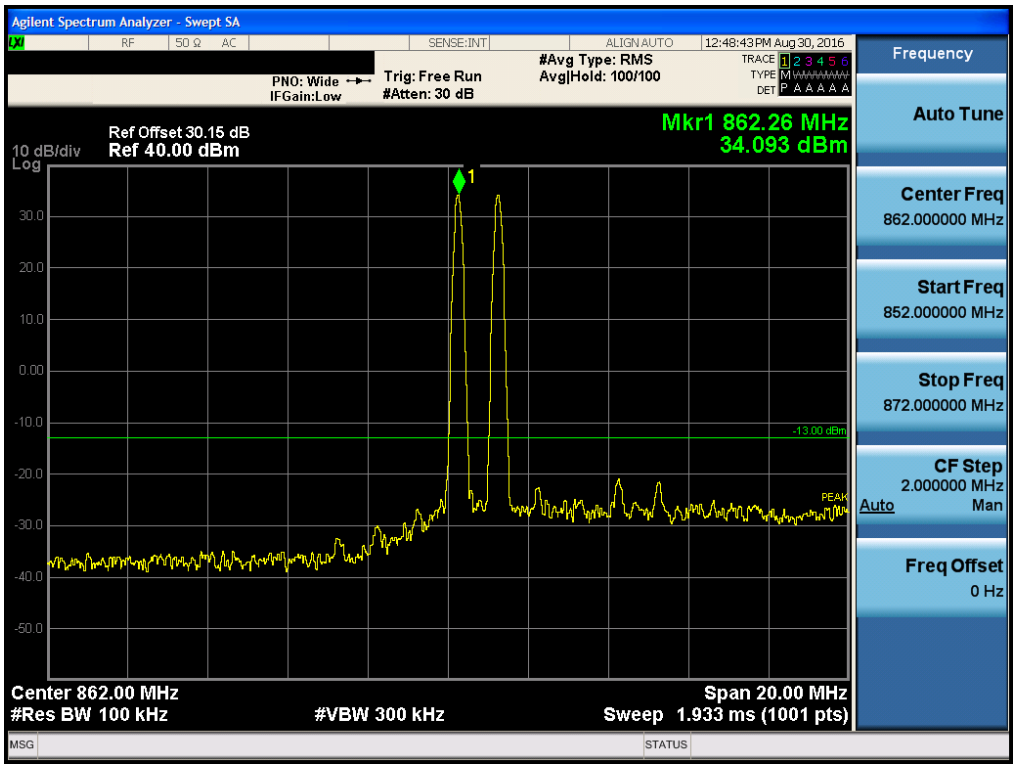


[+3dBm above AGC threshold Downlink High]

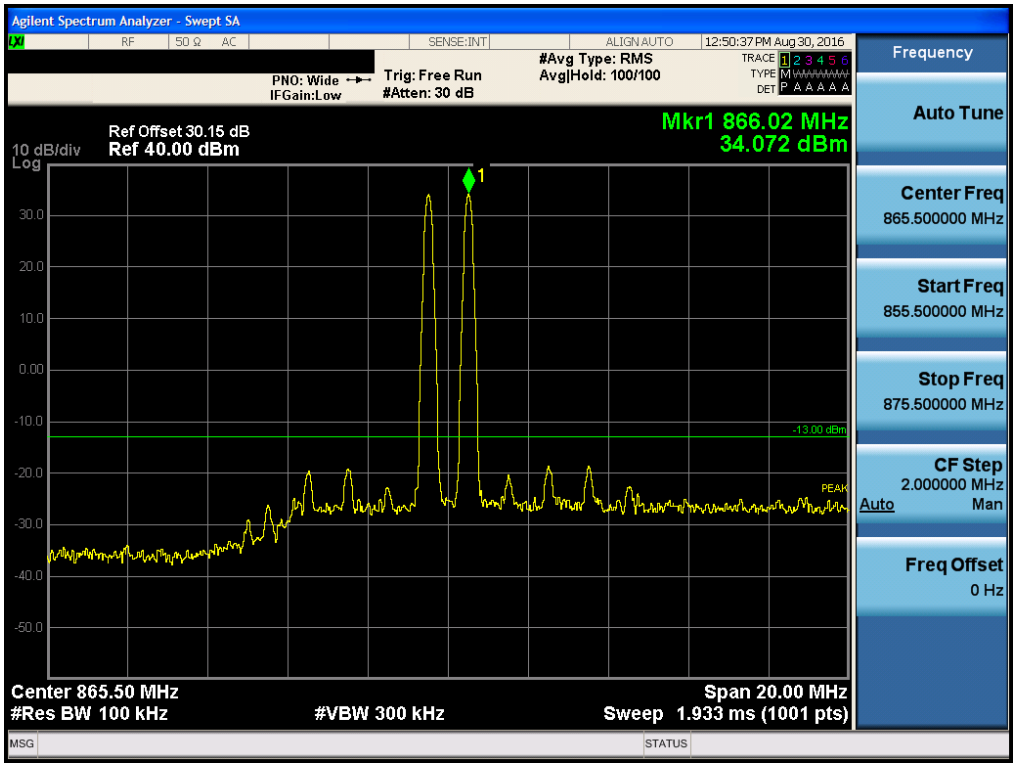


Multi-channel Enhancer for IC_ 800IDEN BAND

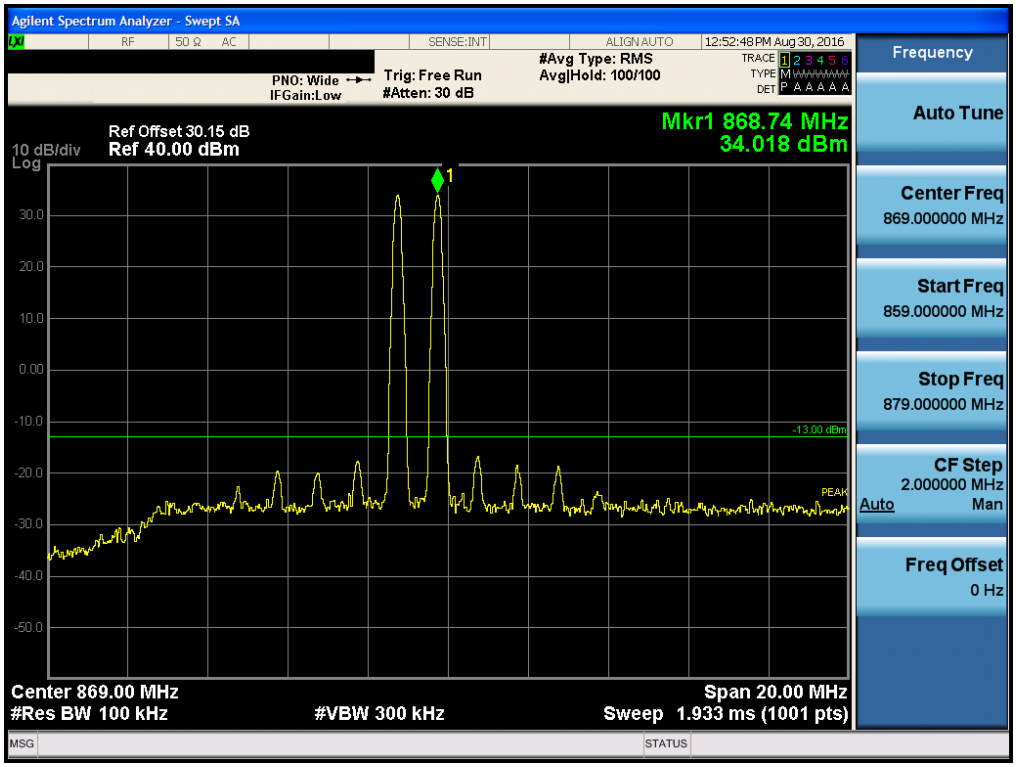
[Downlink Low]



[Downlink Middle]

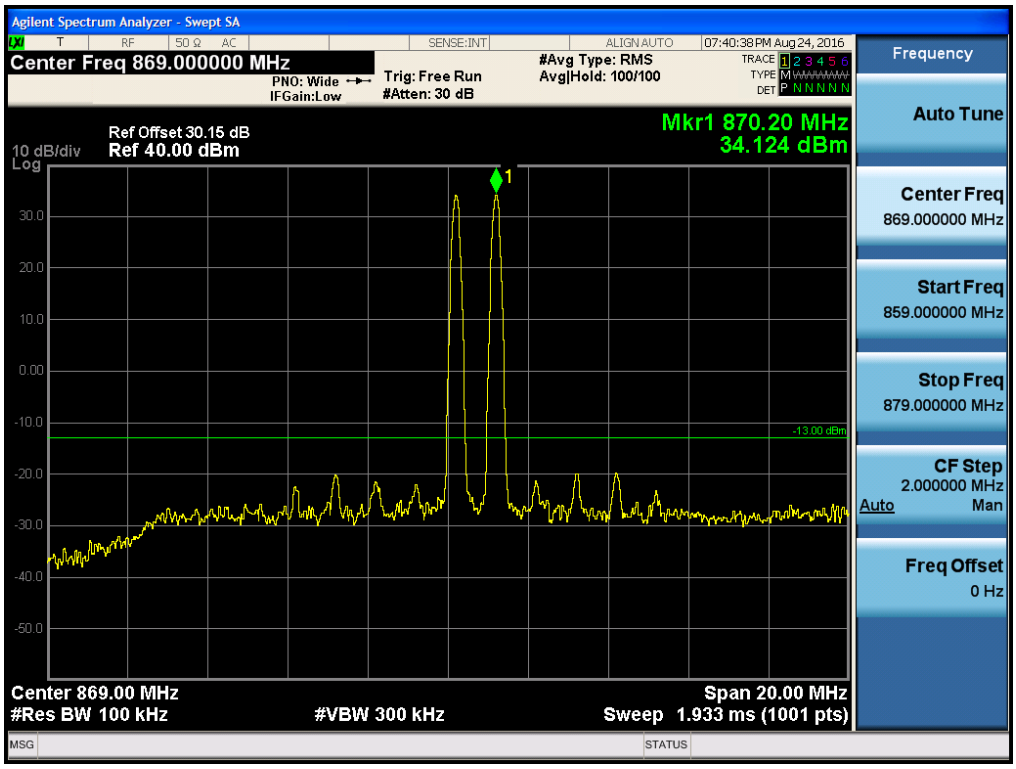


[Downlink High]

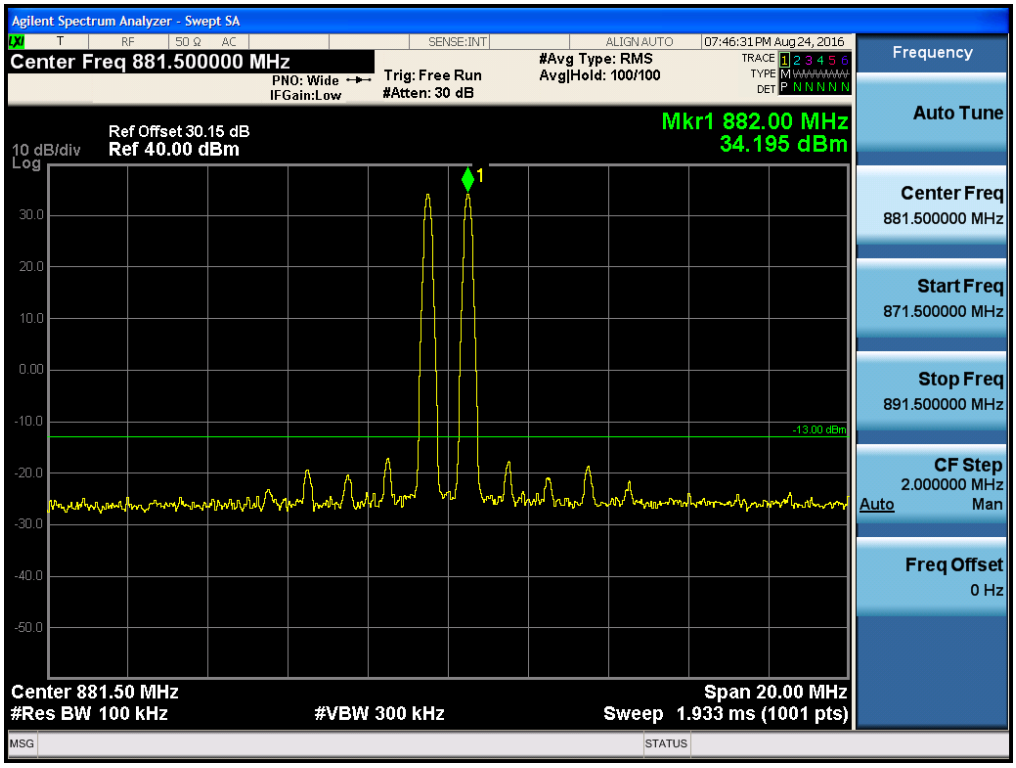


Multi-channel Enhancer for IC_ 850CEL BAND

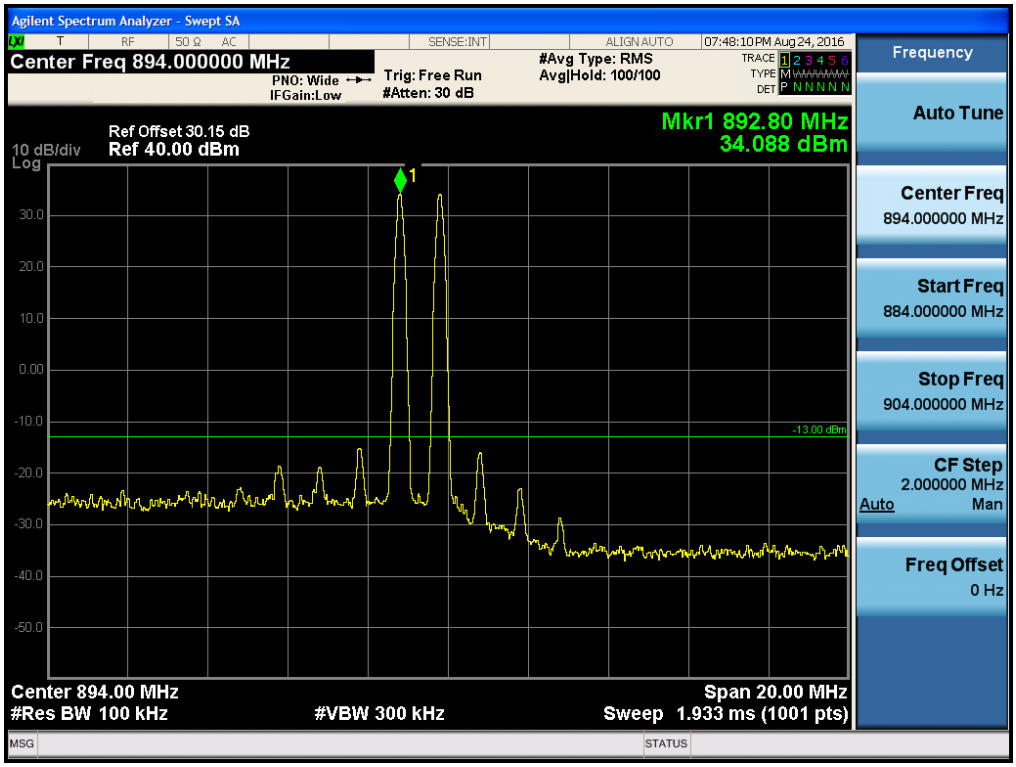
[Downlink Low]



[Downlink Middle]

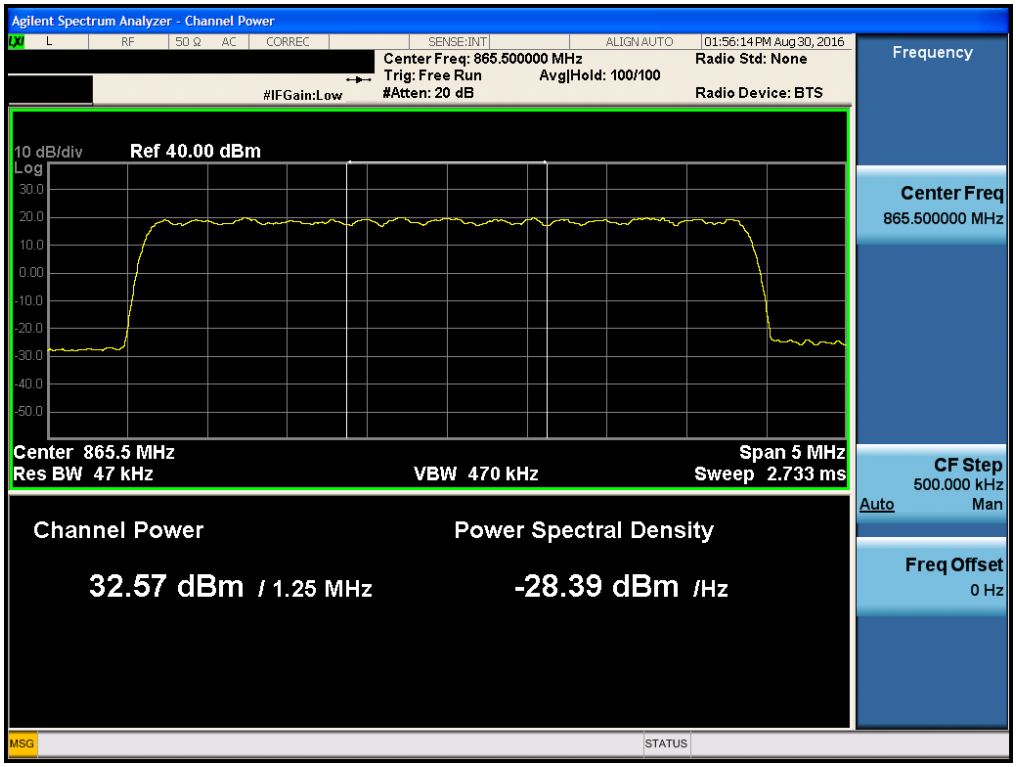


[Downlink High]

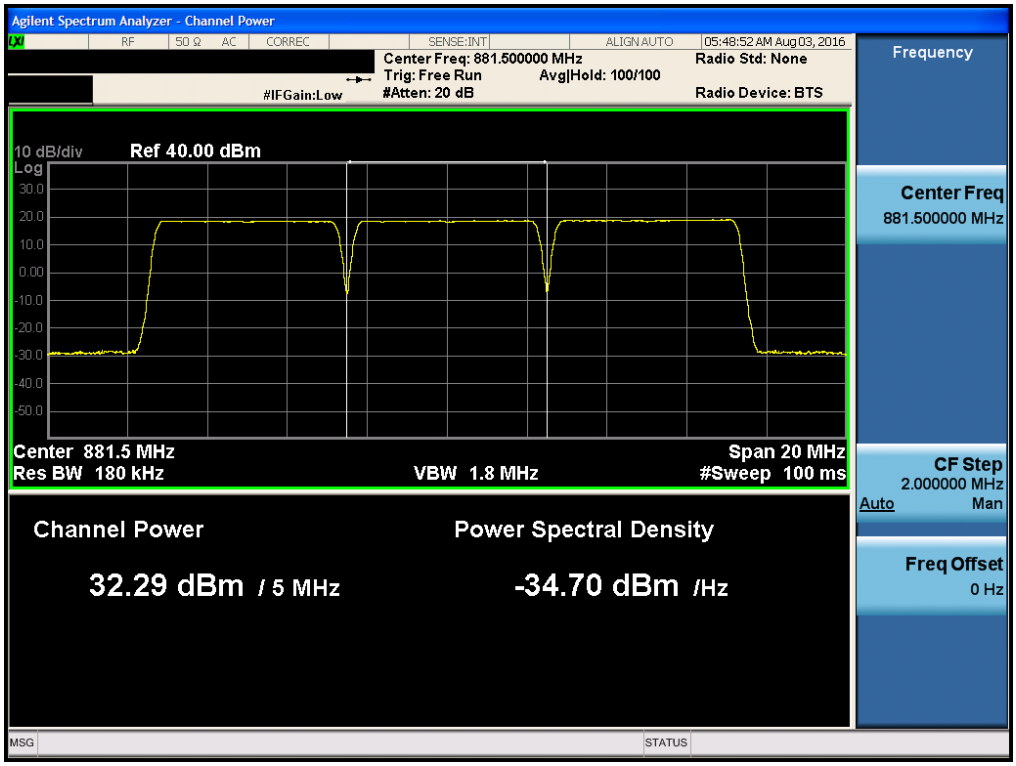


*** Power Back-off for IC_ 800IDEN, 850CEL BAND**

[Downlink 3 Carrier Middle] - 800IDEN



[Downlink 3 Carrier Middle] - 850CEL



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 pass band and roll off 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 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:

RSS-GEN

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:

The EUT complies with the requirements of this section.

Input Signal	Input Level (dBm)	Maximum Amp Gain
800IDEN 850CEL	-10 dBm	47 dB

[Downlink Output_800IDEN BAND]

	Channel	Frequency (MHz)	OBW (MHz)
800IDEN Band_ LTE 5 MHz AGC threshold	Low	864.50	4.515
	Middle	-	-
	High	866.50	4.409
800IDEN Band_ LTE 5 MHz +3dBm above the AGC threshold	Low	864.50	4.416
	Middle	-	-
	High	866.50	4.408
800IDEN Band_ CDMA AGC threshold	Low	863.25	1.277
	Middle	865.50	1.274
	High	867.75	1.272
800IDEN Band_ CDMA +3dBm above the AGC threshold	Low	863.25	1.275
	Middle	865.50	1.276
	High	867.75	1.271

[Downlink Output_850CEL BAND]

	Channel	Frequency (MHz)	OBW (MHz)
850CEL Band _ LTE 5 MHz AGC threshold	Low	871.50	4.341
	Middle	881.50	4.337
	High	891.50	4.342
850CEL Band _ LTE 5 MHz +3dBm above the AGC threshold	Low	871.50	4.557
	Middle	881.50	4.390
	High	891.50	4.386
850CEL Band_ LTE 10 MHz AGC threshold	Low	874.00	8.989
	Middle	881.50	8.996
	High	889.00	8.985
850CEL Band_ LTE 10 MHz +3dBm above the AGC threshold	Low	874.00	8.997
	Middle	881.50	9.007
	High	889.00	8.979

	Channel	Frequency (MHz)	OBW (MHz)
850CEL Band_ CDMA AGC threshold	Low	870.25	1.278
	Middle	881.50	1.273
	High	892.75	1.272
850CEL Band_ CDMA +3dBm above the AGC threshold	Low	870.25	1.274
	Middle	881.50	1.274
	High	892.75	1.278
850CEL Band_ WCDMA AGC threshold	Low	871.50	4.184
	Middle	881.50	4.181
	High	891.50	4.180
850CEL Band_ WCDMA +3dBm above the AGC threshold	Low	871.50	4.189
	Middle	881.50	4.185
	High	891.50	4.188

[Downlink Input_800IDEN BAND]

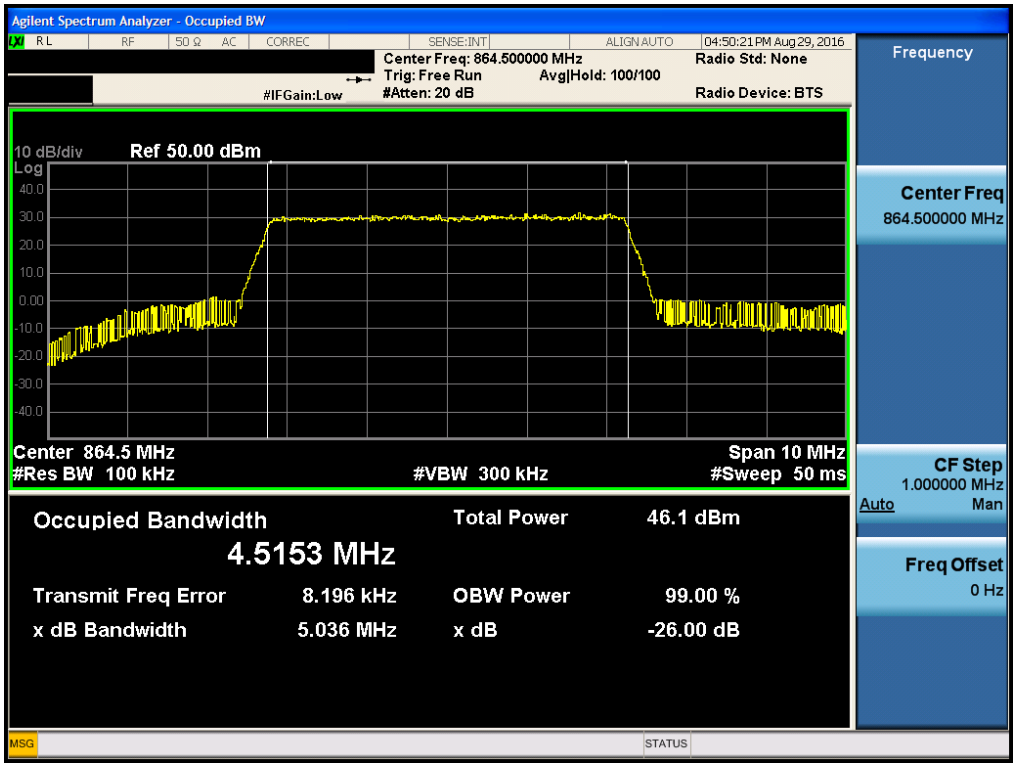
	Channel	Frequency (MHz)	OBW (MHz)
800IDEN Band_ LTE 5 MHz AGC threshold	Low	864.50	4.5119
	Middle	-	-
	High	866.50	4.5112
800IDEN Band_ CDMA AGC threshold	Low	863.25	1.2748
	Middle	865.50	1.2810
	High	867.75	1.2743

[Downlink Input_850CEL BAND]

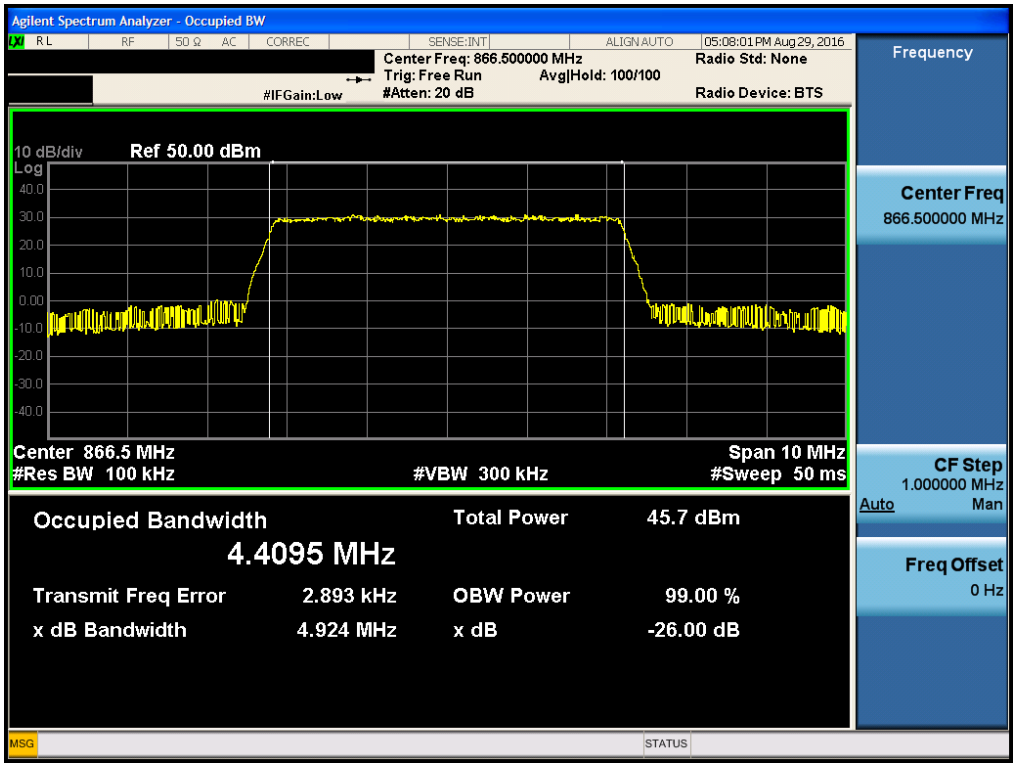
	Channel	Frequency (MHz)	OBW (MHz)
850CEL Band_ LTE 5 MHz AGC threshold	Low	871.50	4.510
	Middle	881.50	4.506
	High	891.50	4.507
850CEL Band_ LTE 10 MHz AGC threshold	Low	874.00	8.998
	Middle	881.50	8.983
	High	889.00	9.015
850CEL Band_ CDMA AGC threshold	Low	870.25	1.274
	Middle	881.50	1.270
	High	892.75	1.275
850CEL Band_ WCDMA AGC threshold	Low	871.50	4.177
	Middle	881.50	4.178
	High	891.50	4.176

Plots of Occupied Bandwidth_800IDEN BAND LTE 5 MHz

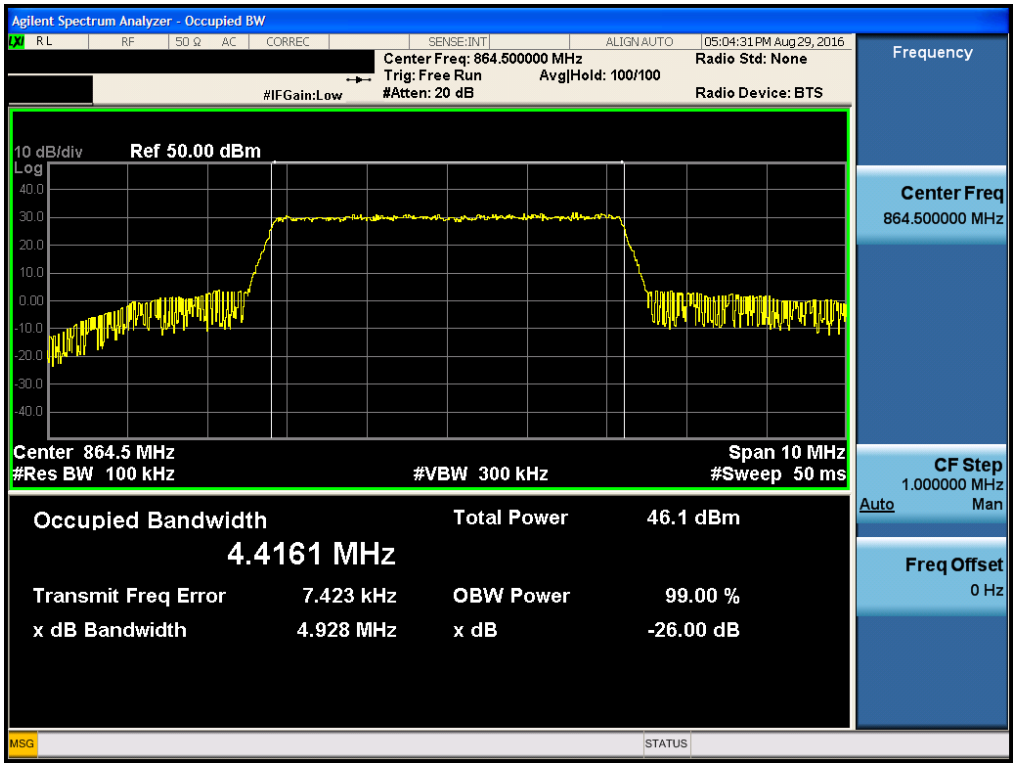
[AGC threshold Output Downlink Low]



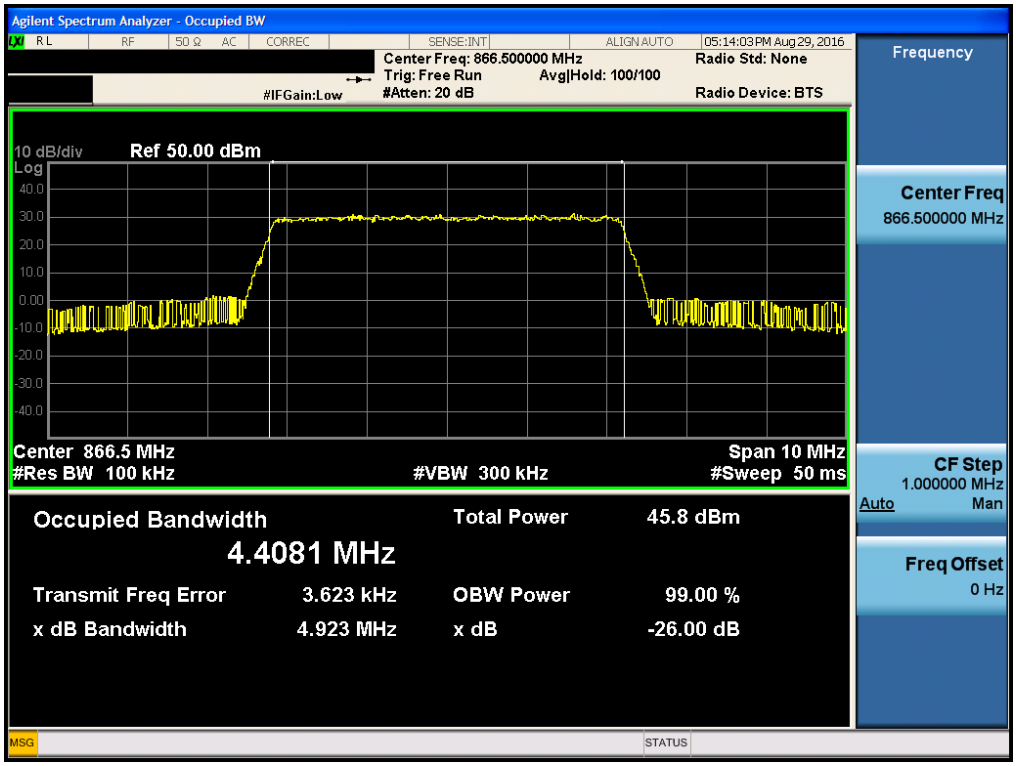
[AGC threshold Output Downlink High]



[+3dBmabove AGC threshold Output Downlink Low]

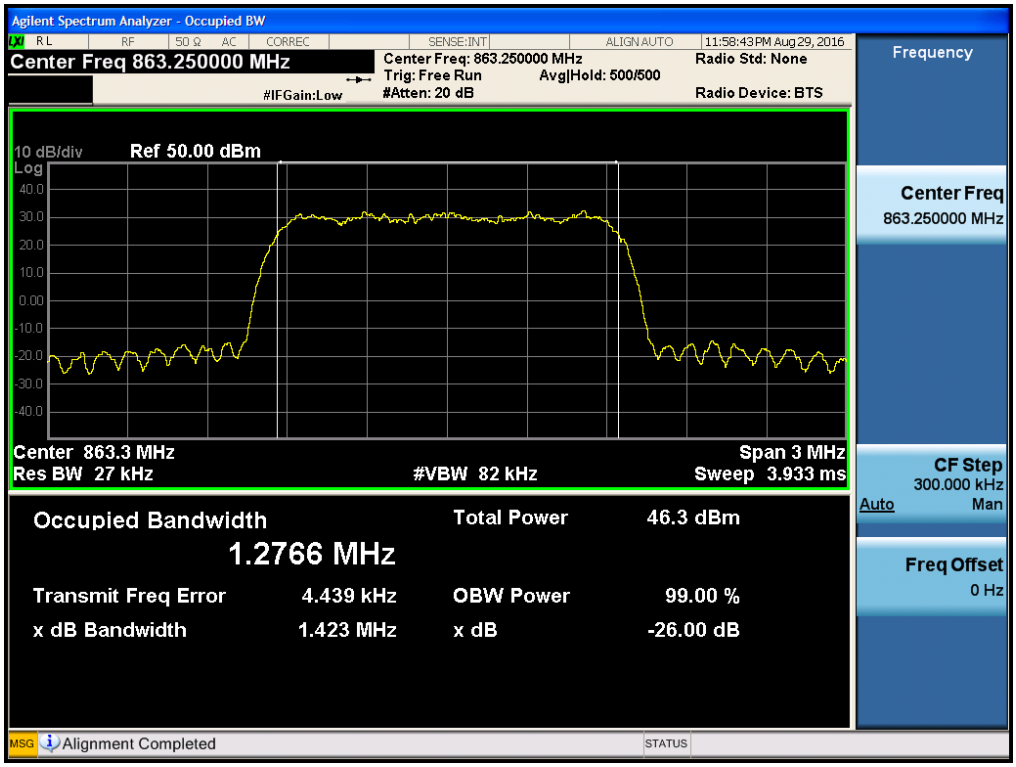


[+3dBm above AGC threshold Output Downlink High]

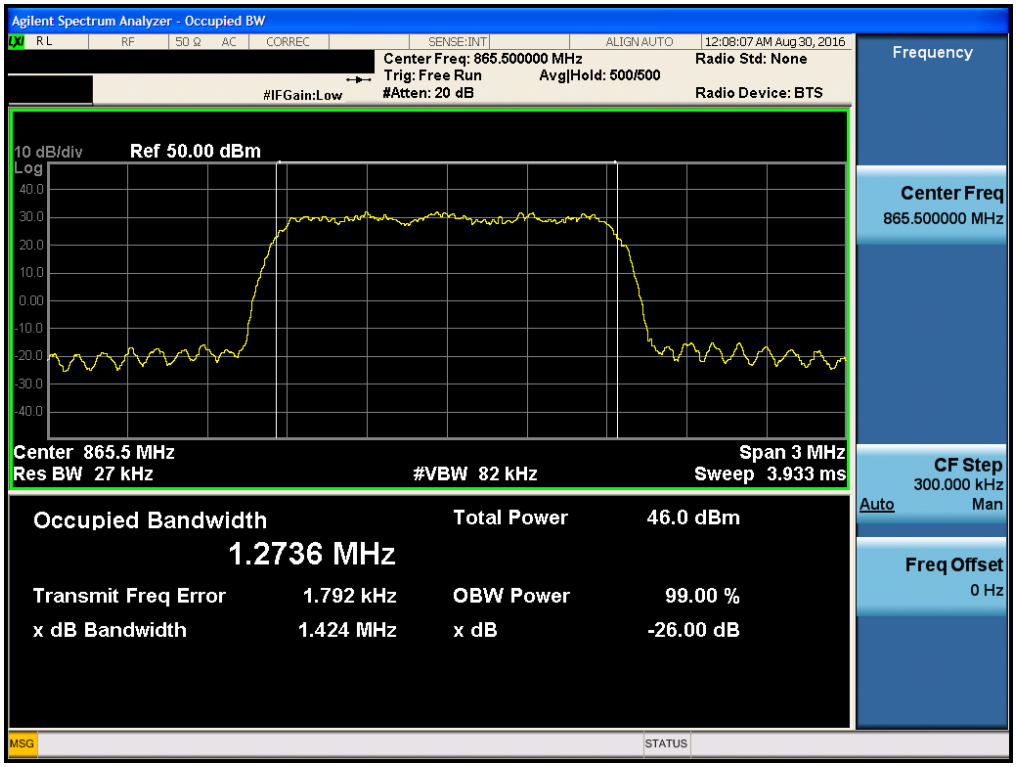


Plots of Occupied Bandwidth_ 800IDEN BAND CDMA

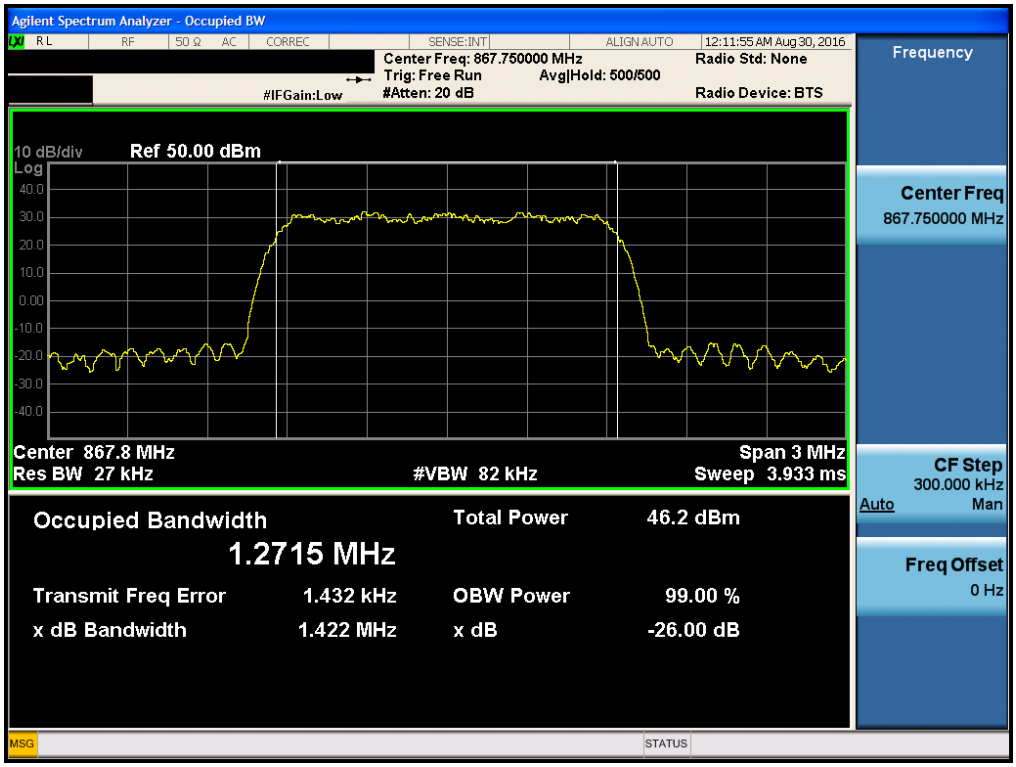
[AGC threshold Output Downlink Low]



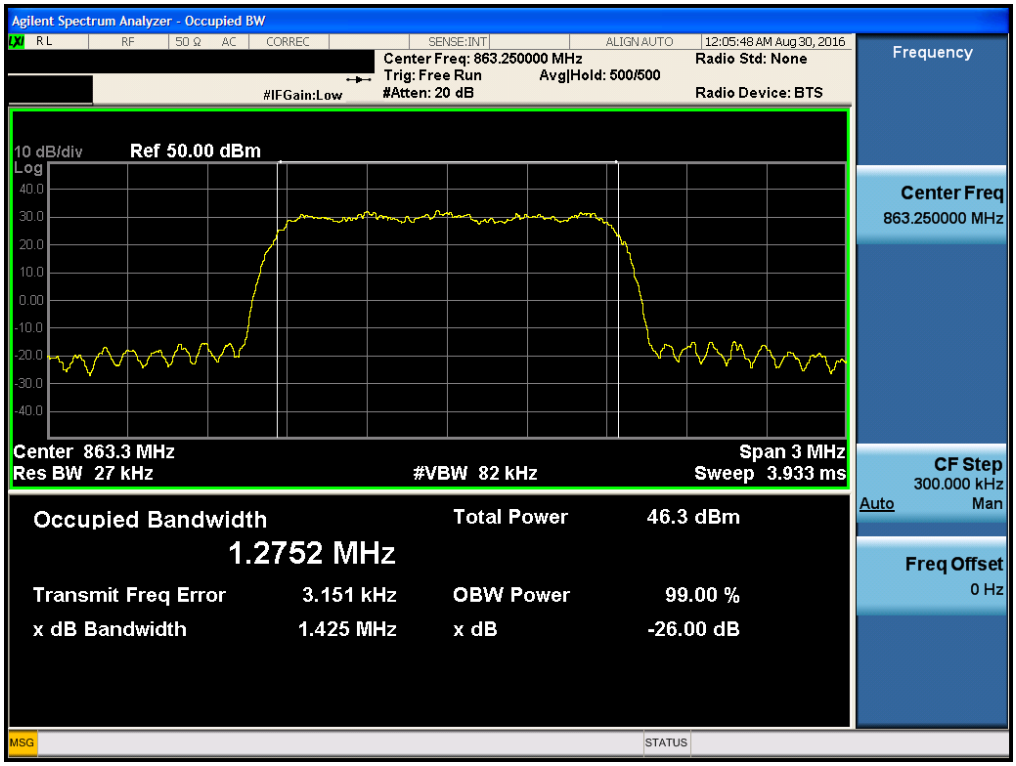
[AGC threshold Output Downlink Middle]



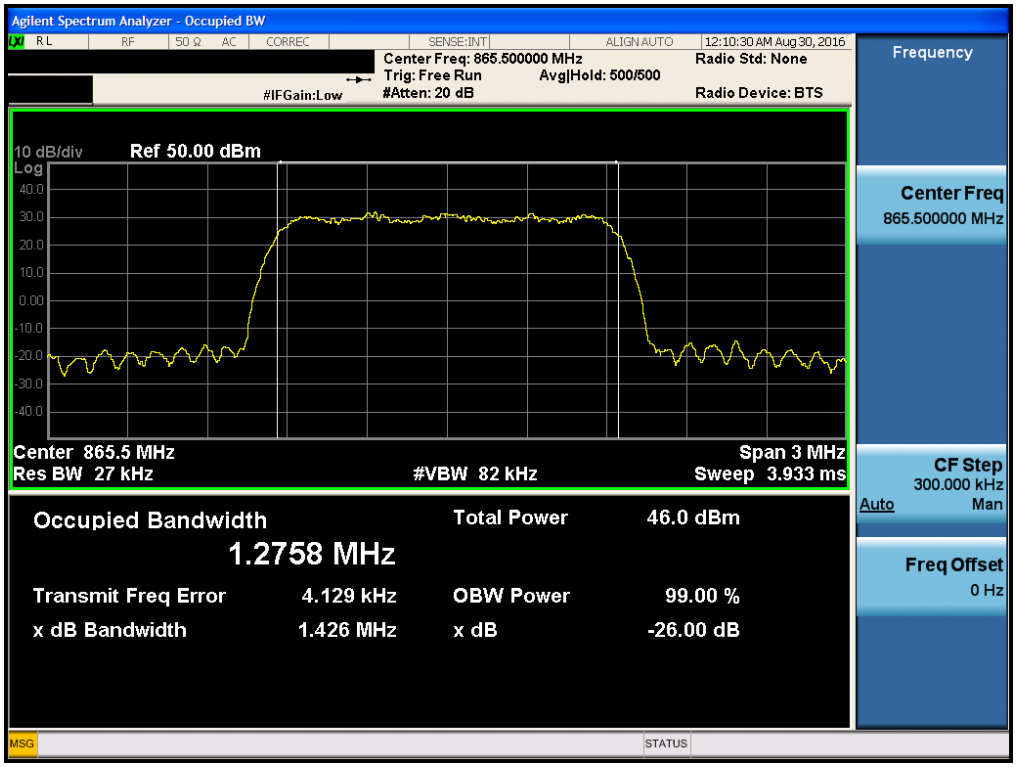
[AGC threshold Output Downlink High]



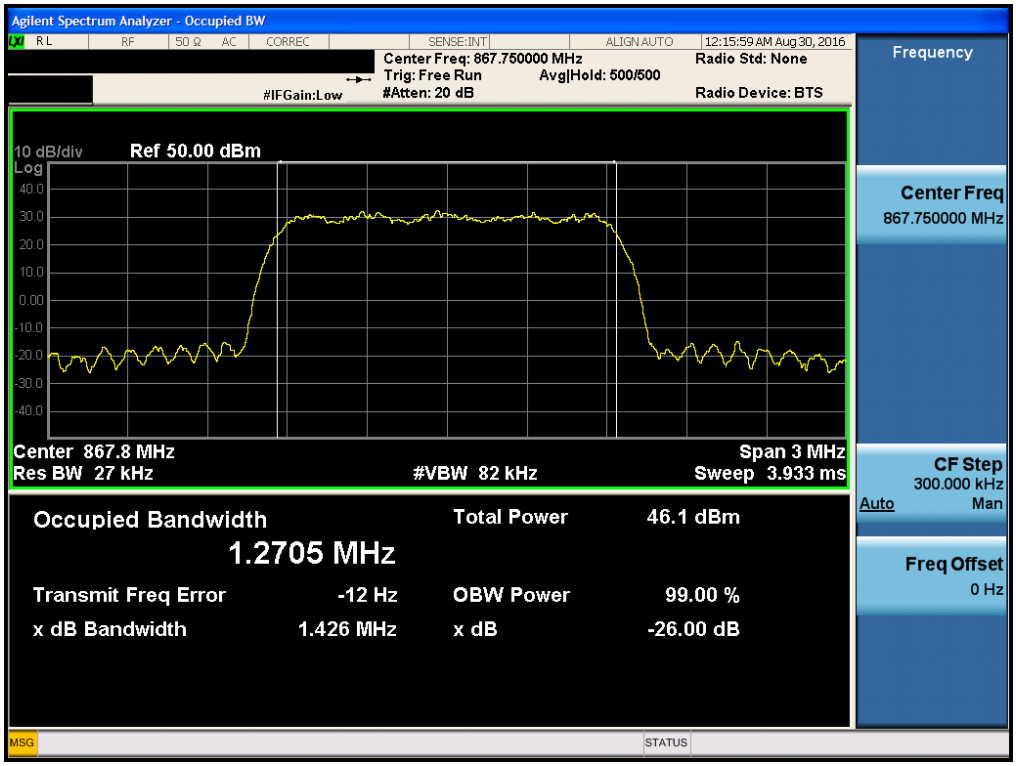
[+3dBmabove AGC threshold Output Downlink Low]



[+3dBm above AGC threshold Output Downlink Middle]

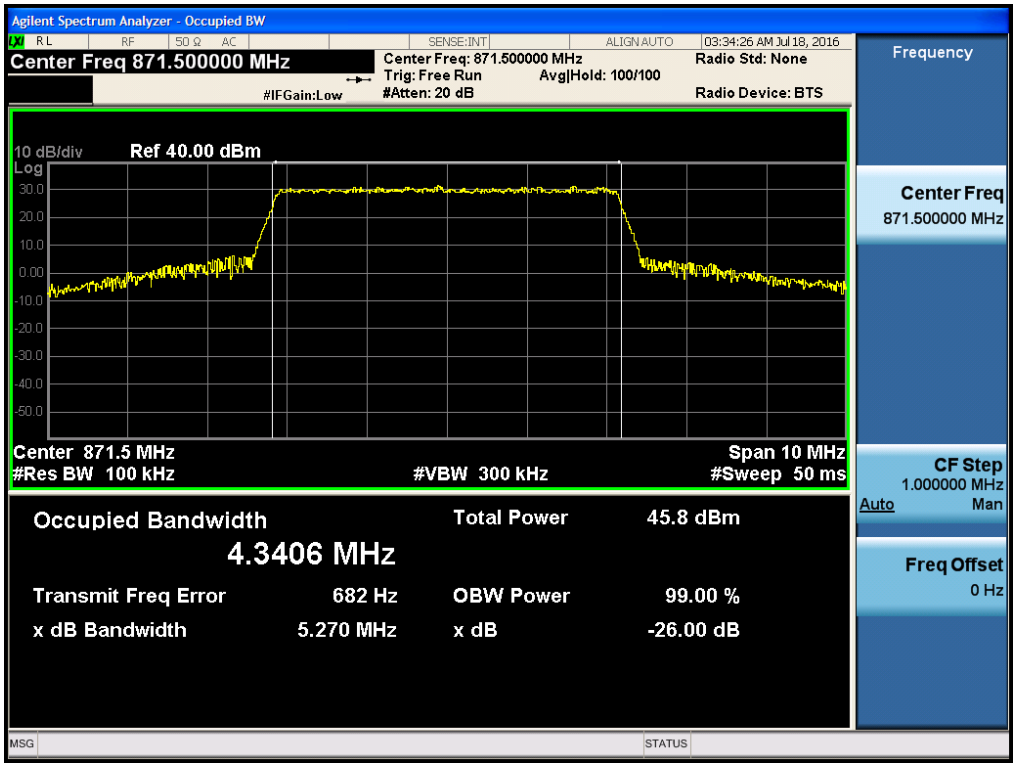


[+3dBm above AGC threshold Output Downlink High]

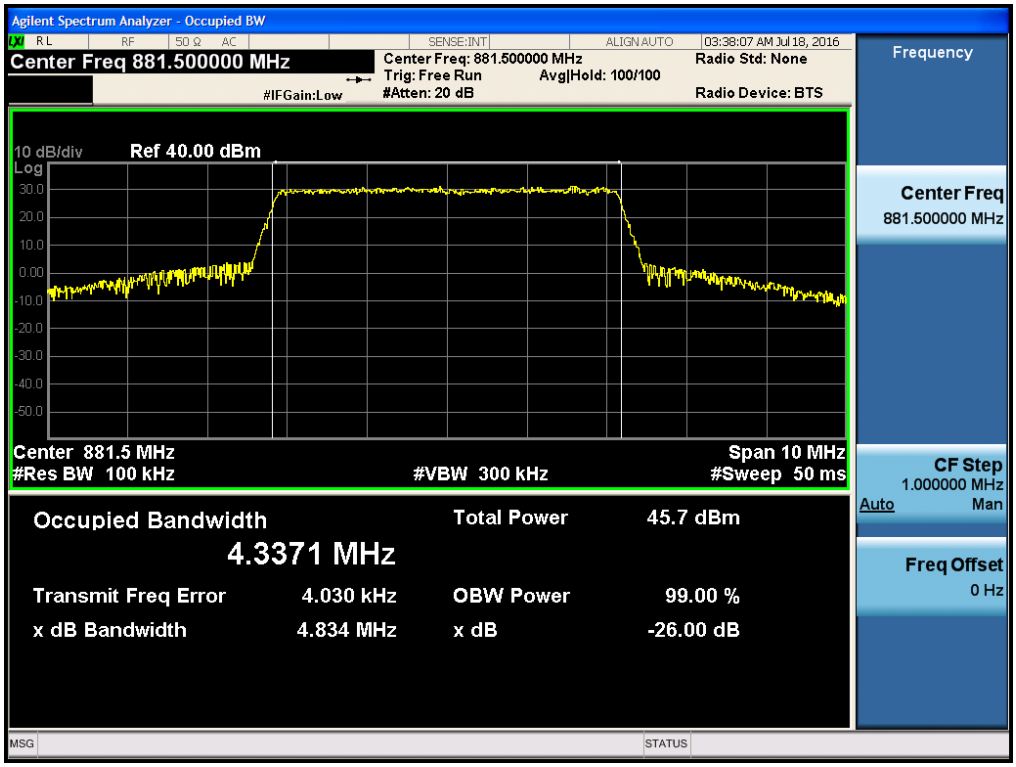


Plots of Occupied Bandwidth_850CEL BAND LTE 5 MHz

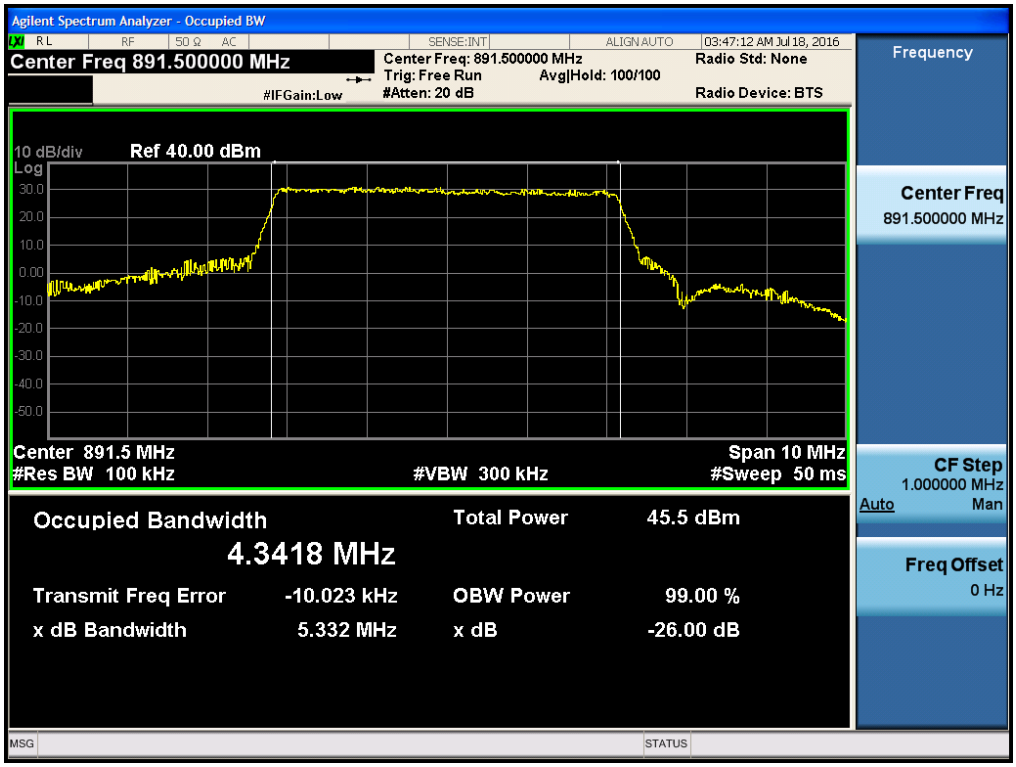
[AGC threshold Output Downlink Low]



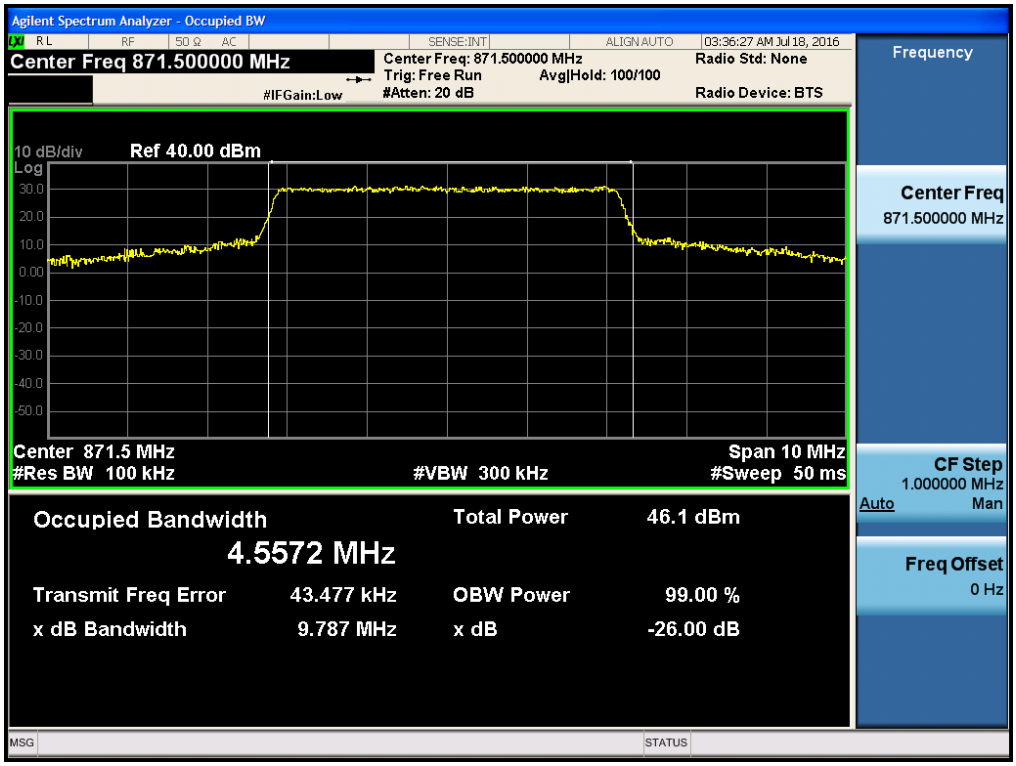
[AGC threshold Output Downlink Middle]



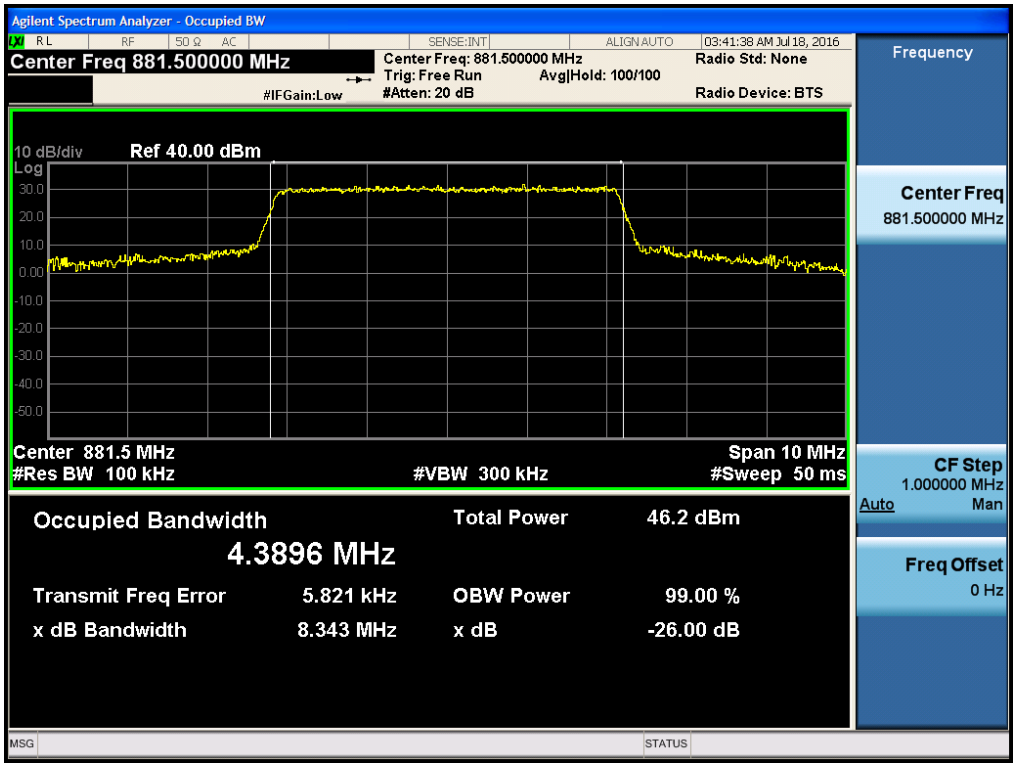
[AGC threshold Output Downlink High]



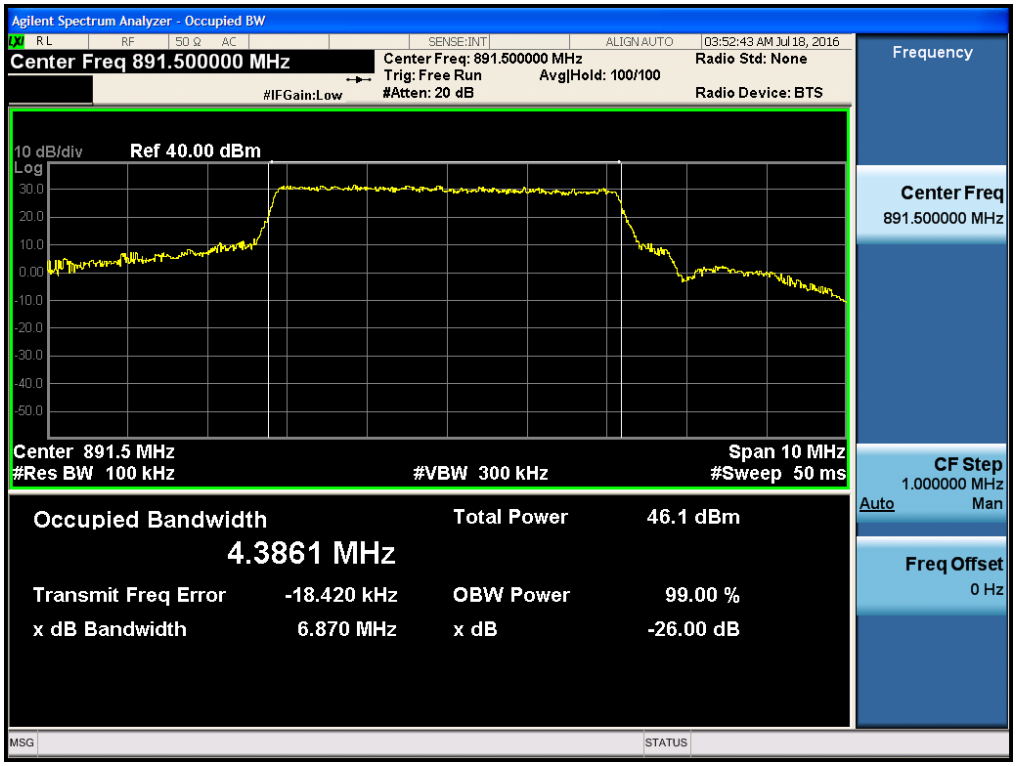
[+3dBmabove AGC threshold Output Downlink Low]



[+3dBm above AGC threshold Output Downlink Middle]

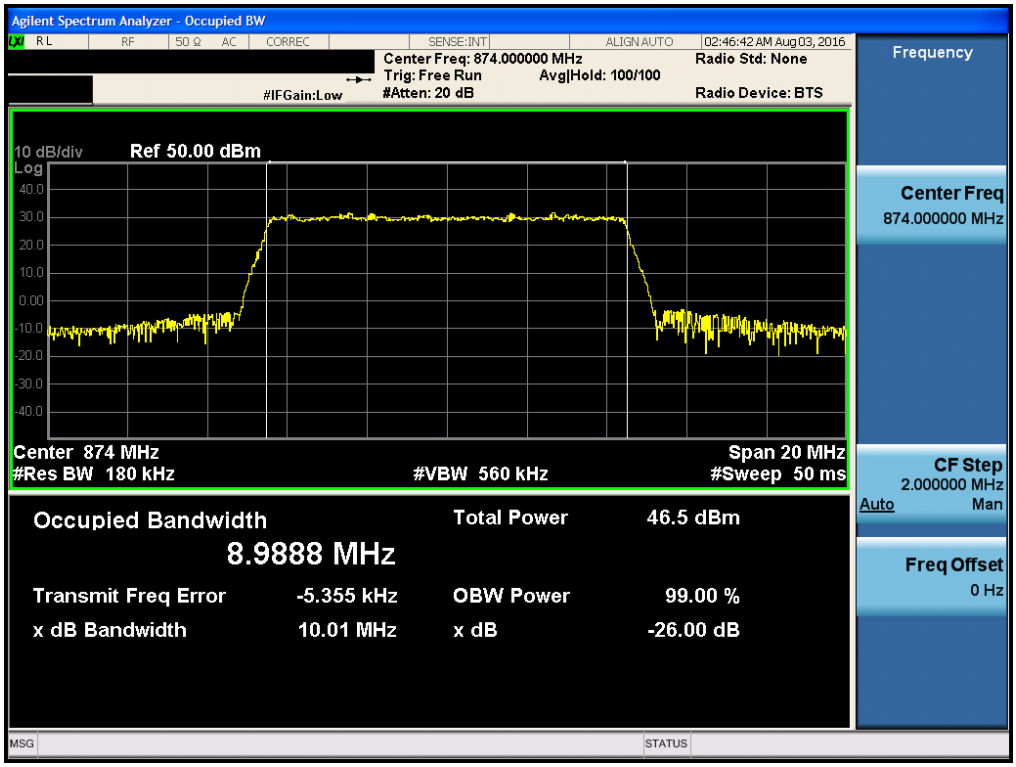


[+3dBm above AGC threshold Output Downlink High]

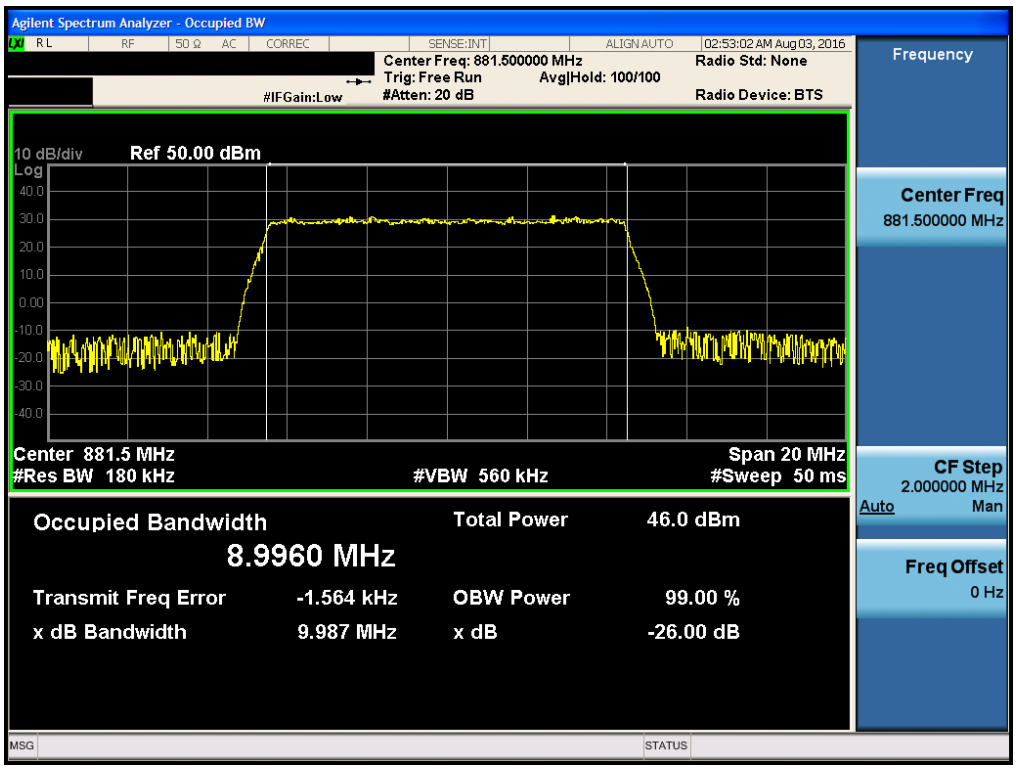


Plots of Occupied Bandwidth_ 800IDEN, 850CELBAND LTE 10 MHz

[AGC threshold Output Downlink Low]

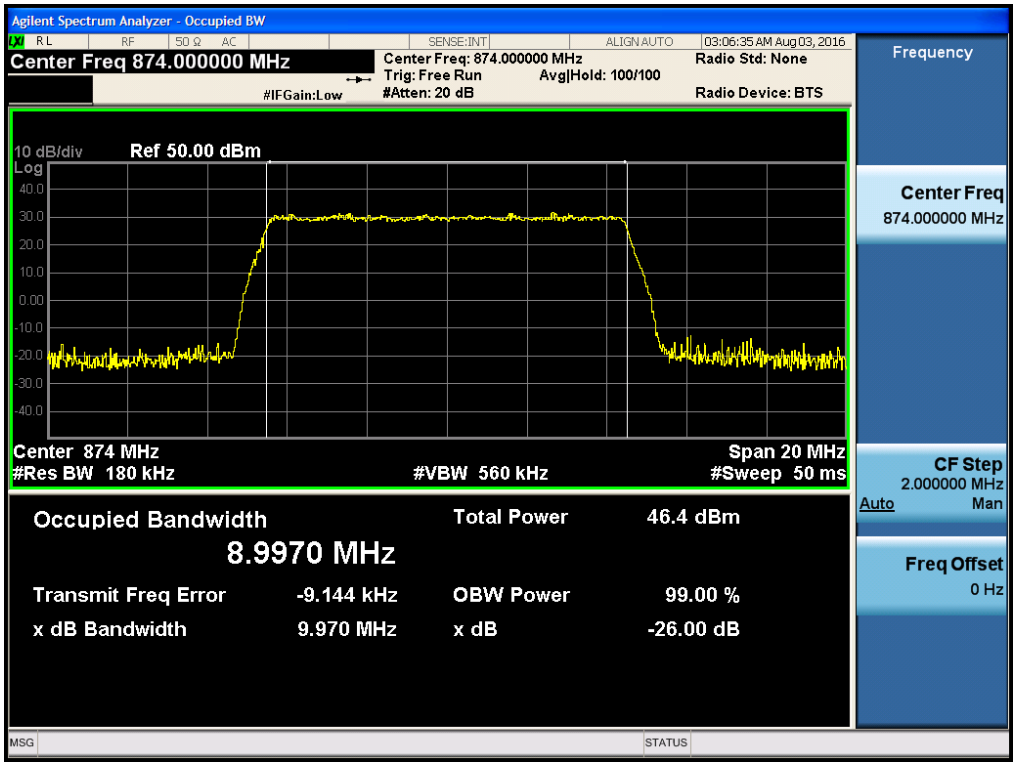


[AGC threshold Output Downlink Middle]

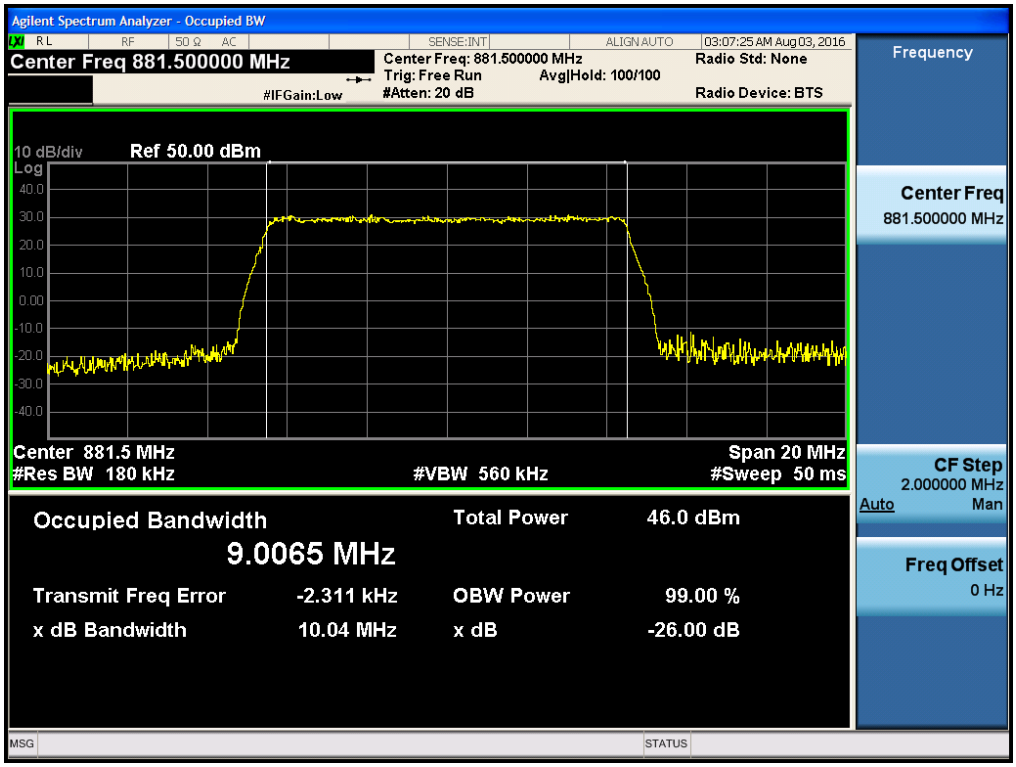


[AGC threshold Output Downlink High]

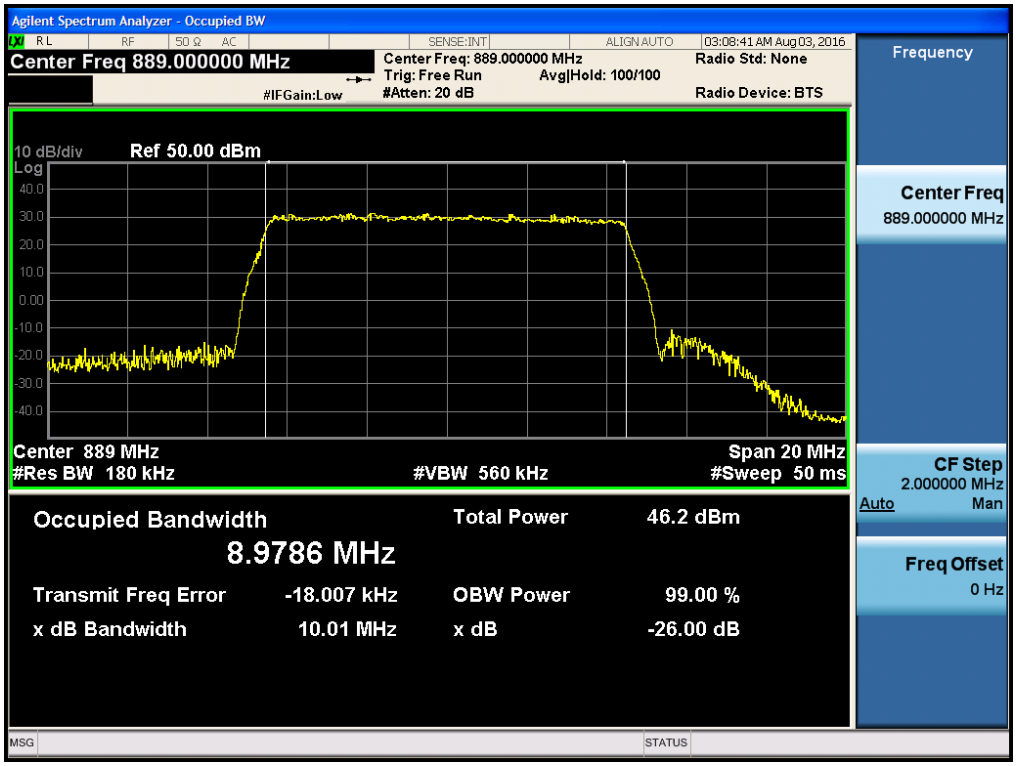
[+3dBmabove AGC threshold Output Downlink Low]



[+3dBm above AGC threshold Output Downlink Middle]

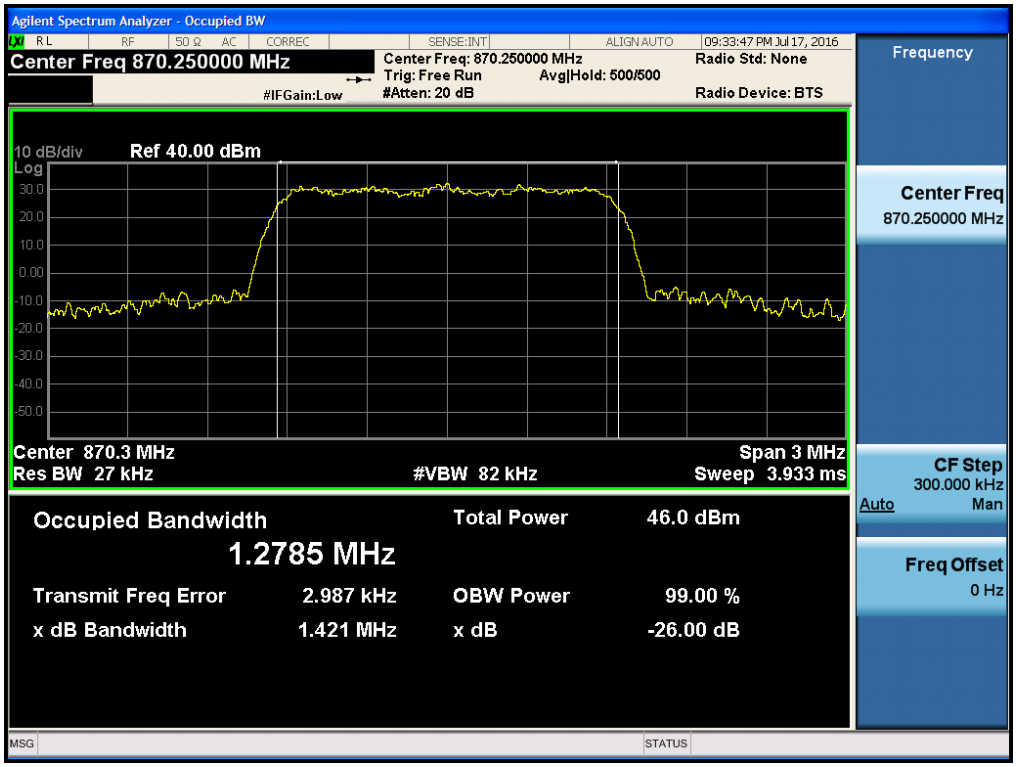


[+3dBm above AGC threshold Output Downlink High]

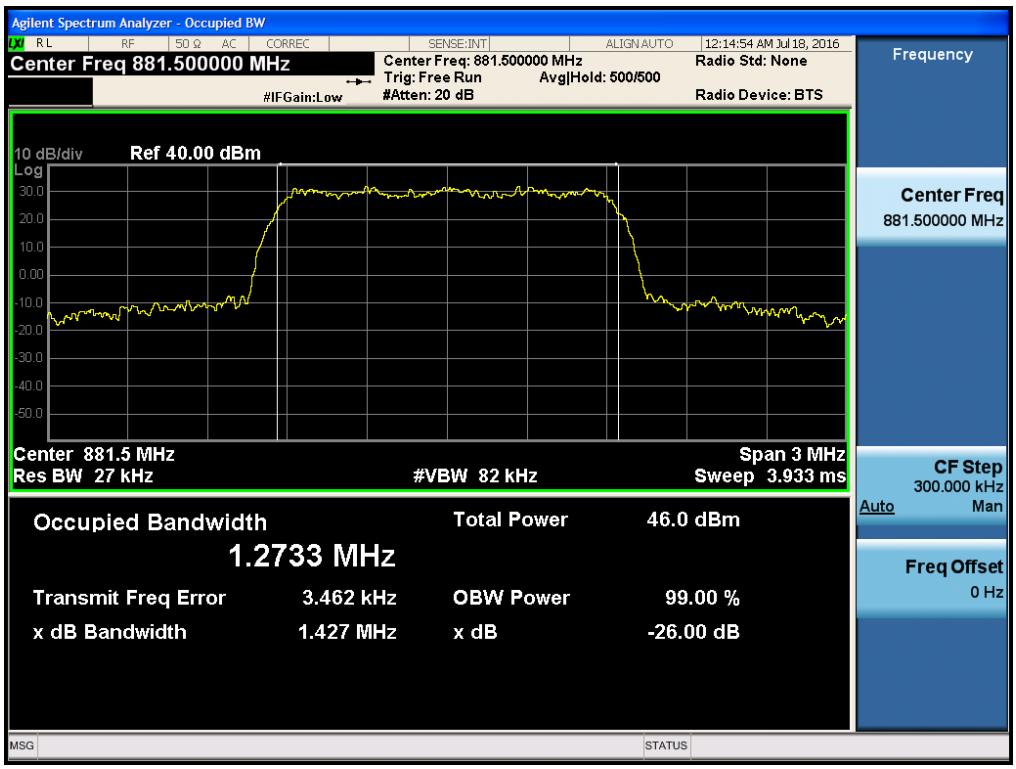


Plots of Occupied Bandwidth_ 850CEL BAND CDMA

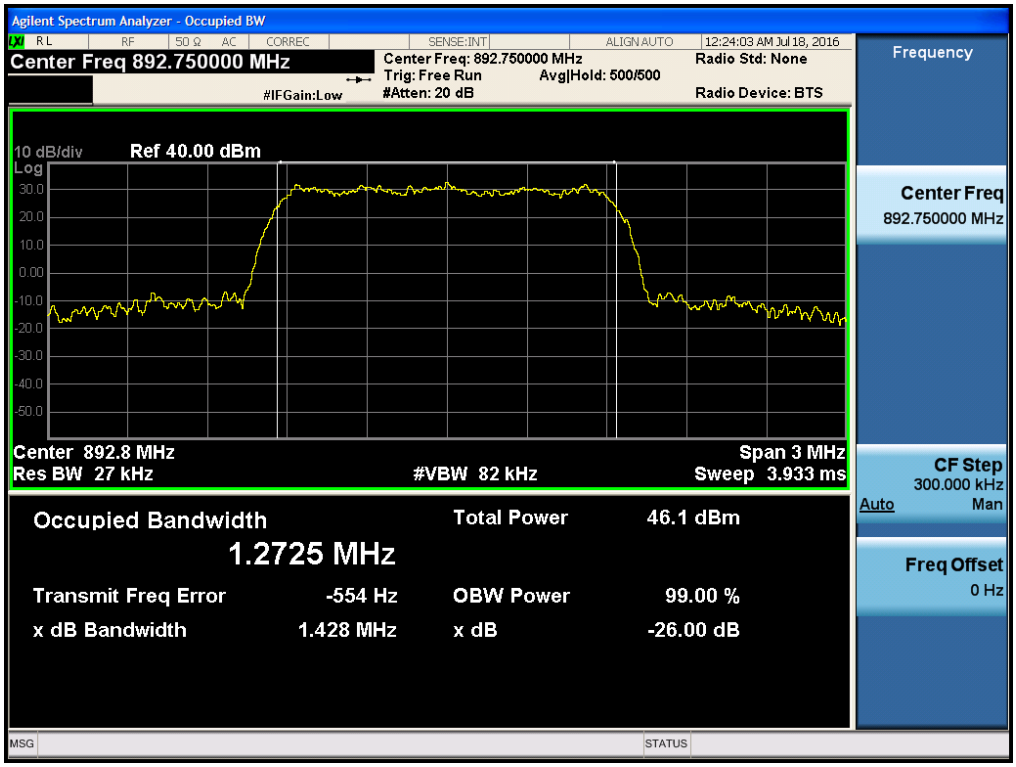
[AGC threshold Output Downlink Low]



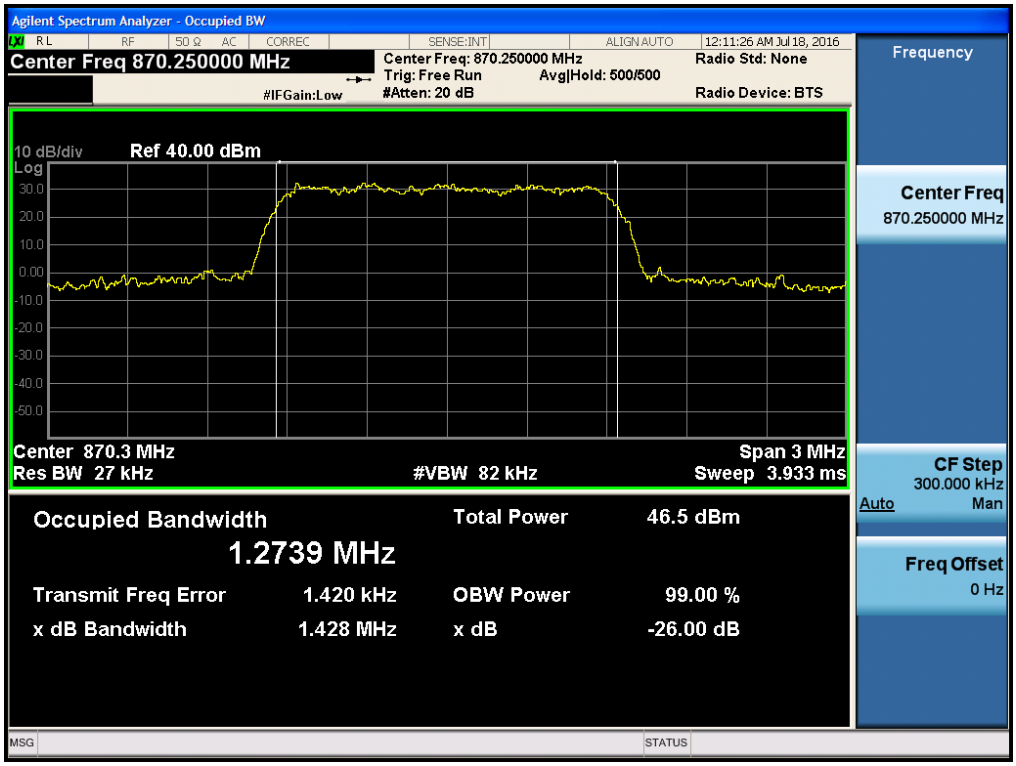
[AGC threshold Output Downlink Middle]



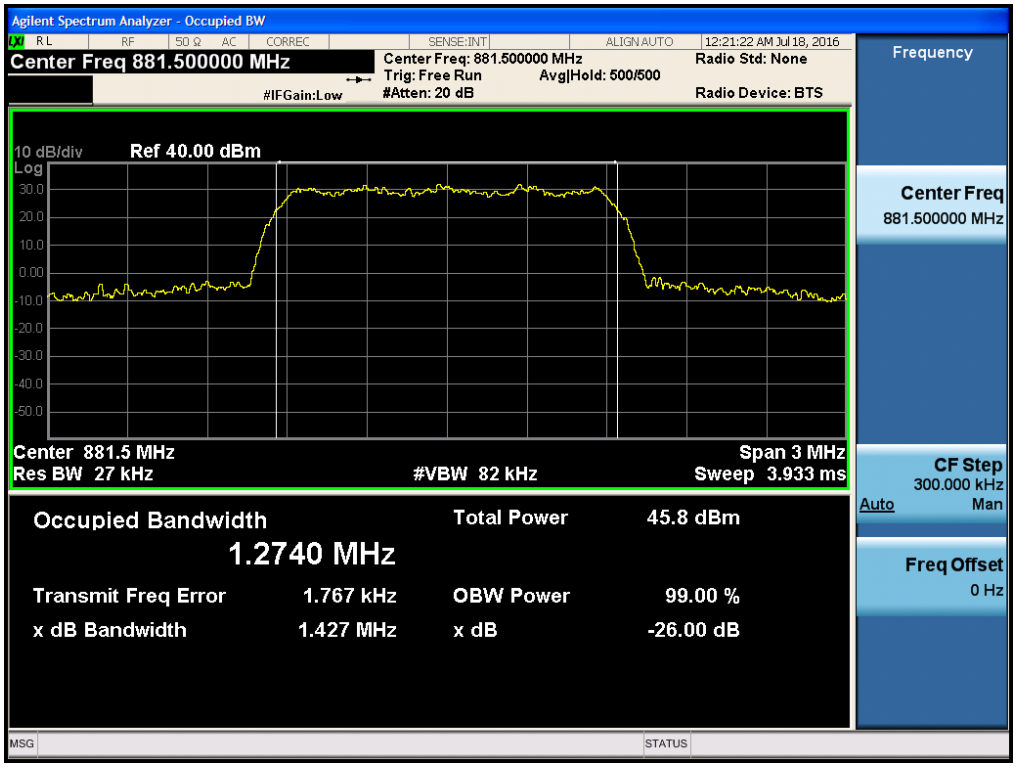
[AGC threshold Output Downlink High]



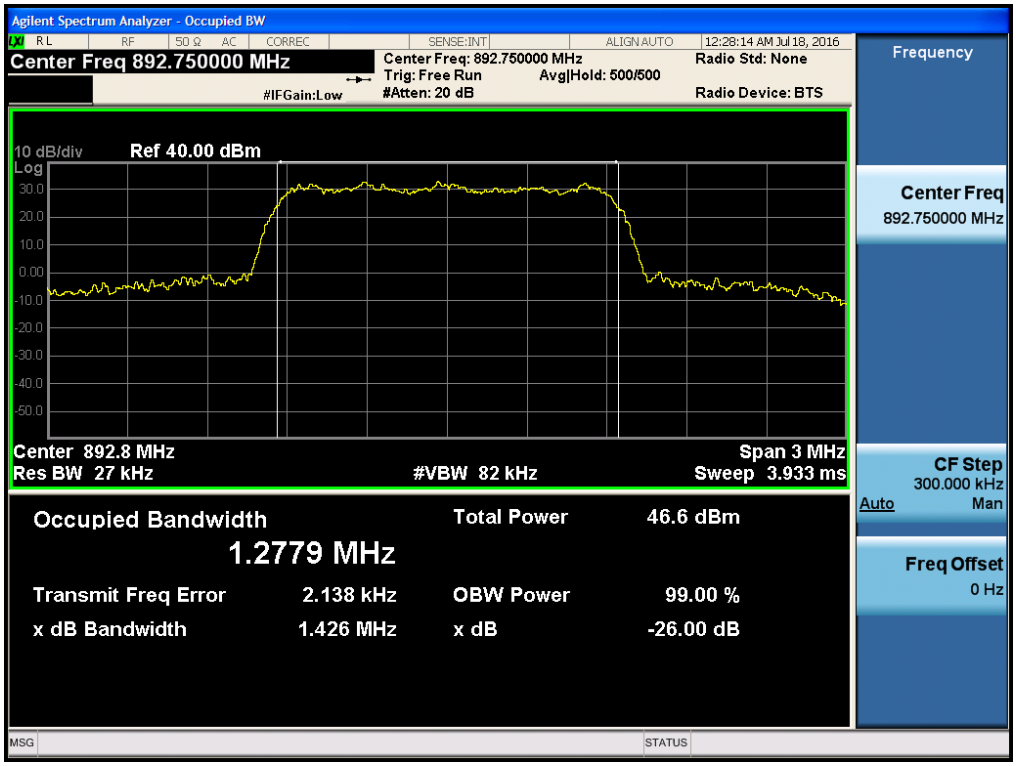
[+3dBmabove AGC threshold Output Downlink Low]



[+3dBm above AGC threshold Output Downlink Middle]

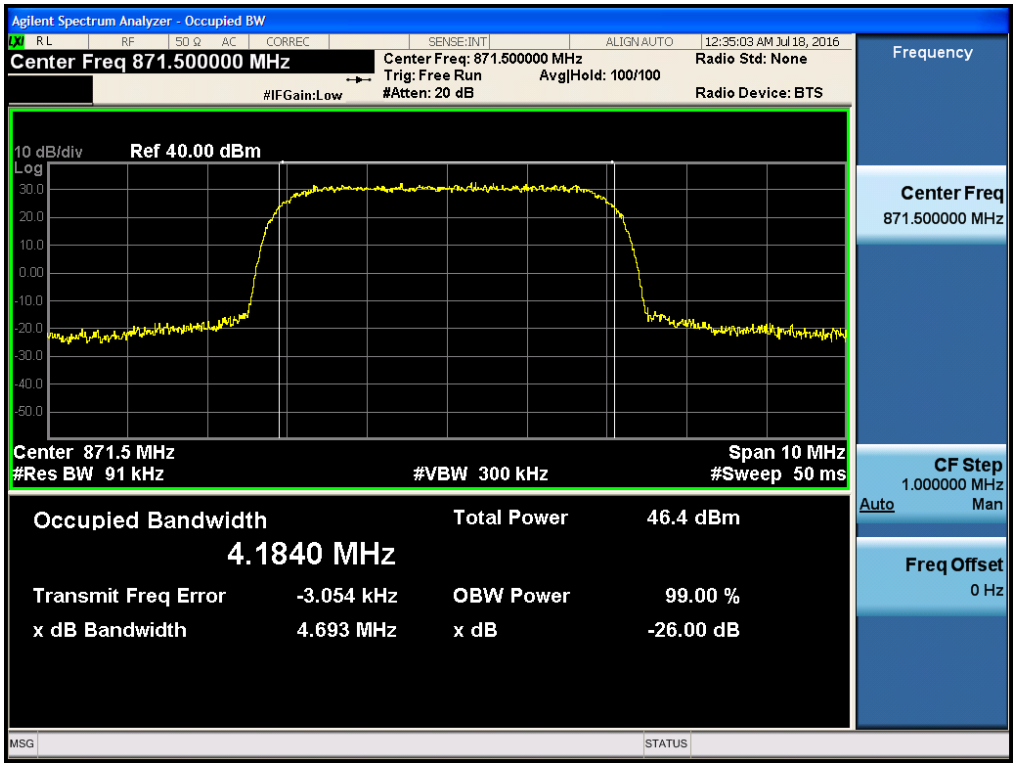


[+3dBm above AGC threshold Output Downlink High]

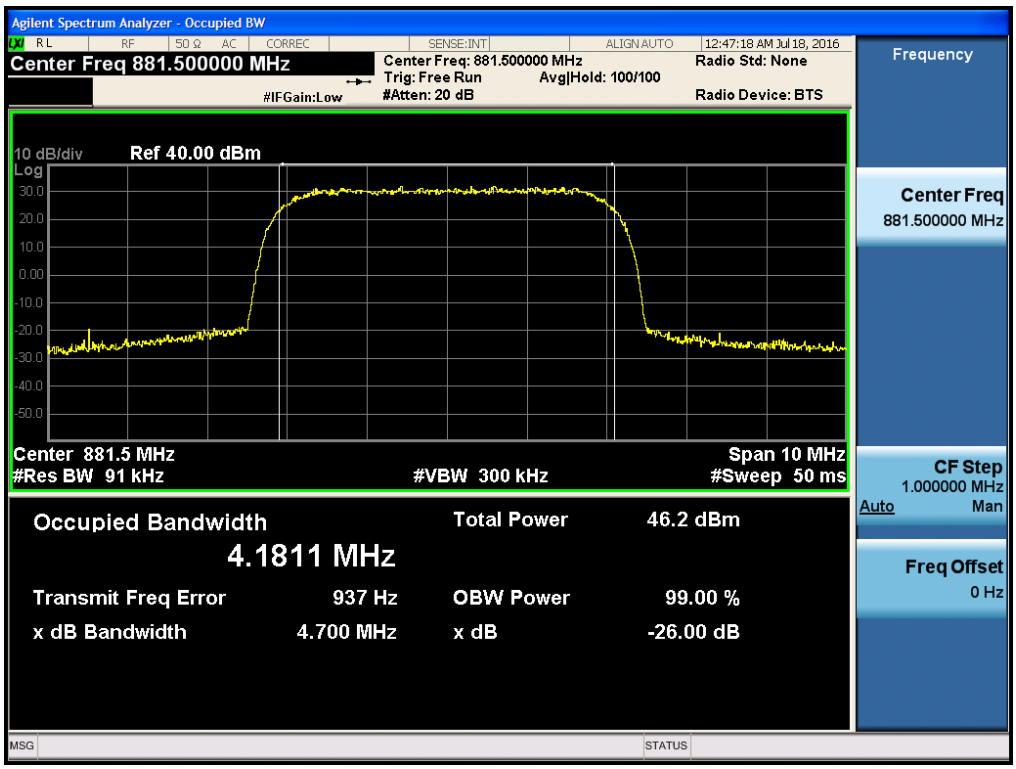


Plots of Occupied Bandwidth_850CEL BAND WCDMA

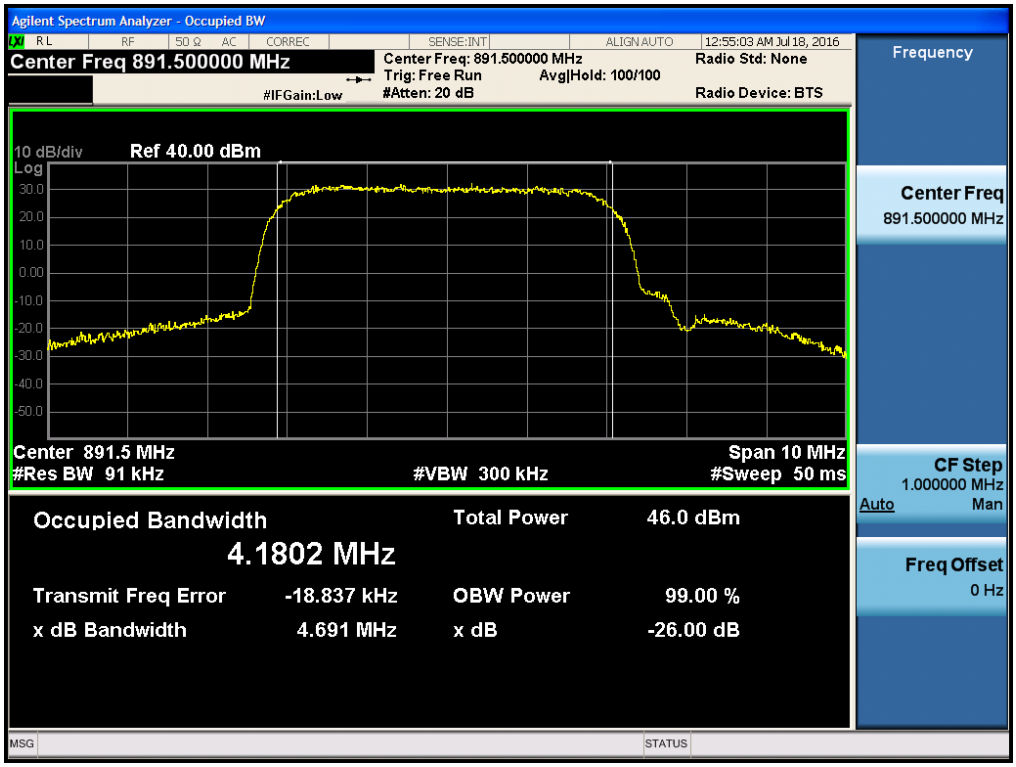
[AGC threshold Output Downlink Low]



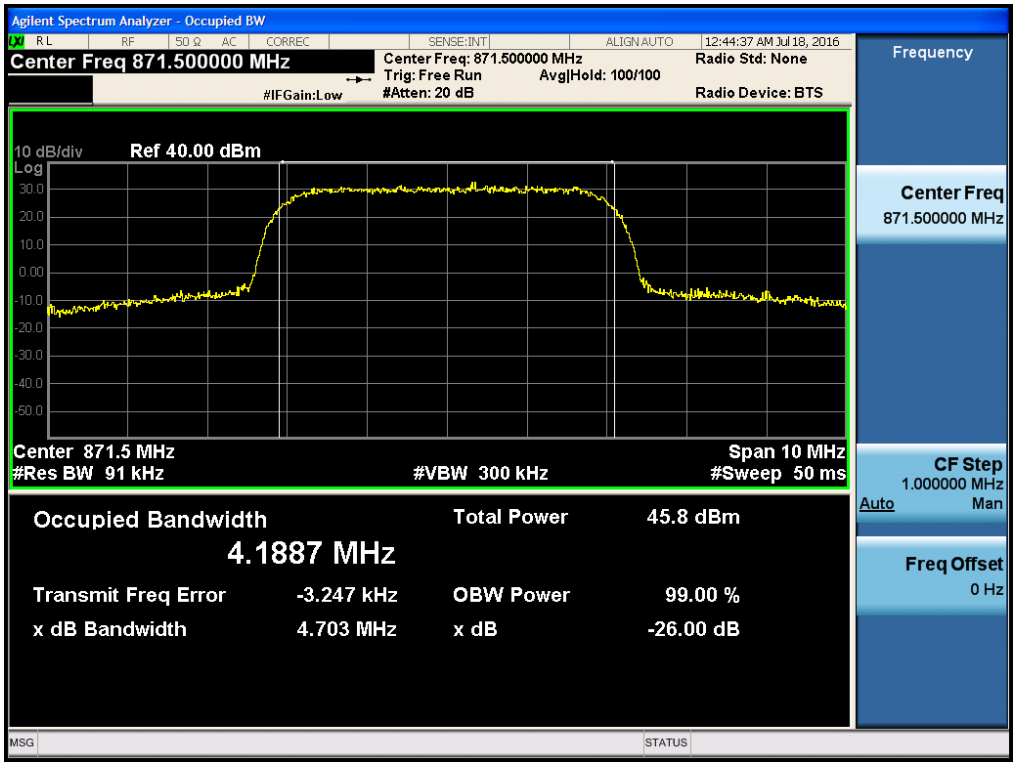
[AGC threshold Output Downlink Middle]



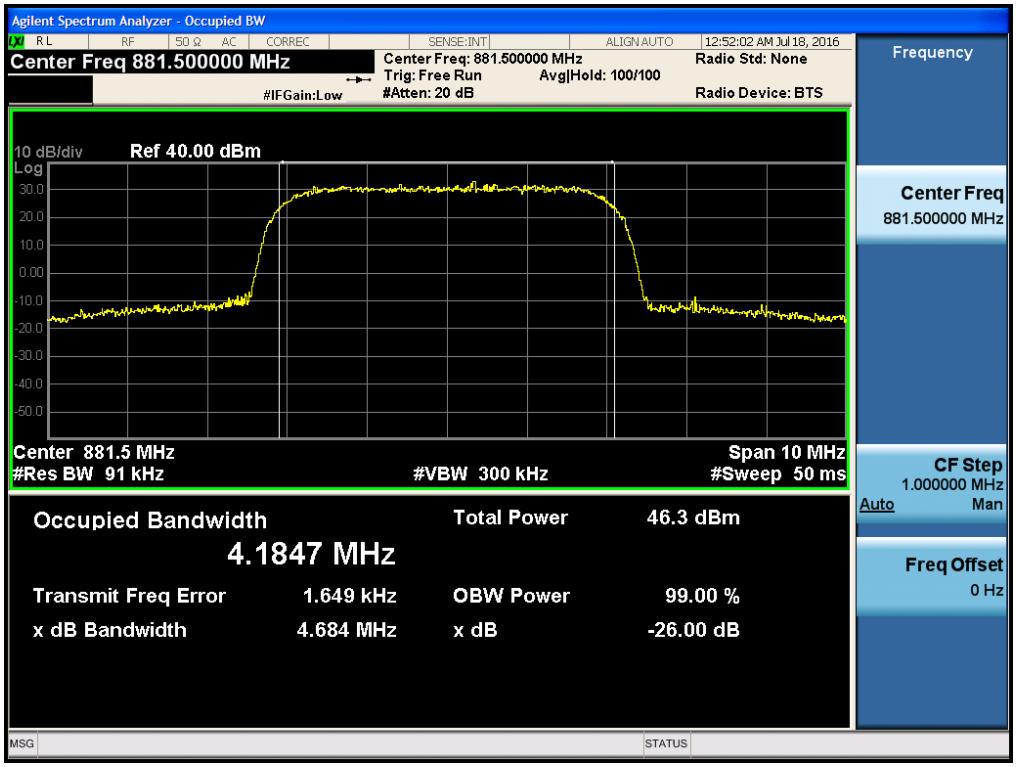
[AGC threshold Output Downlink High]



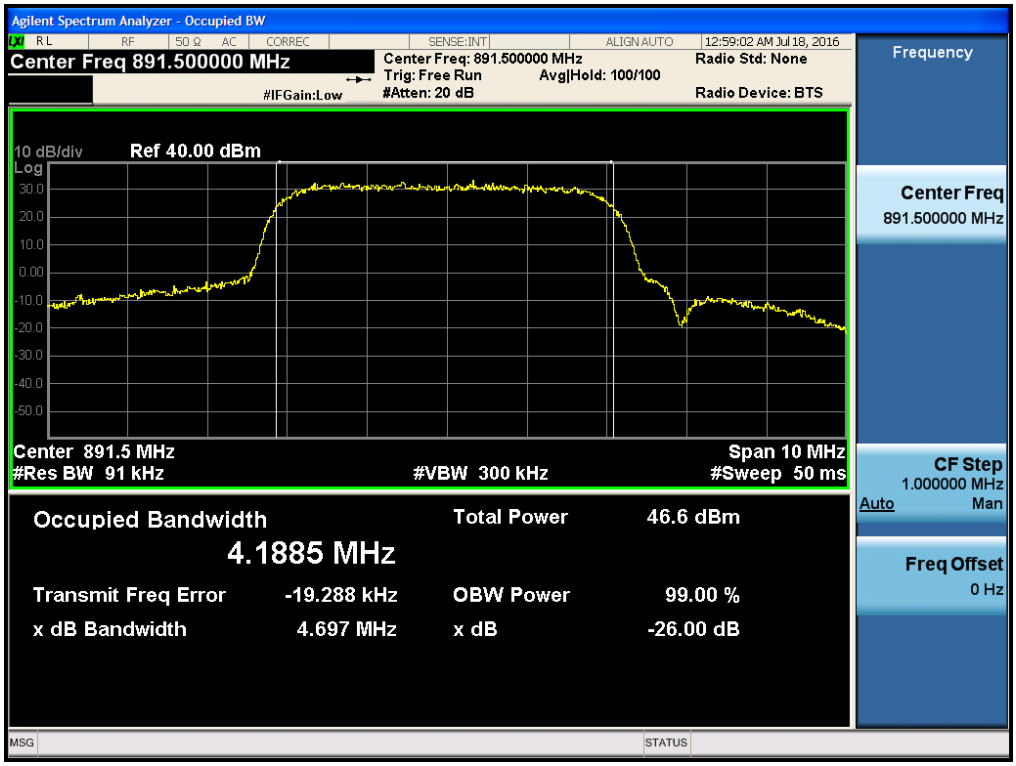
[+3dBmabove AGC threshold Output Downlink Low]



[+3dBm above AGC threshold Output Downlink Middle]

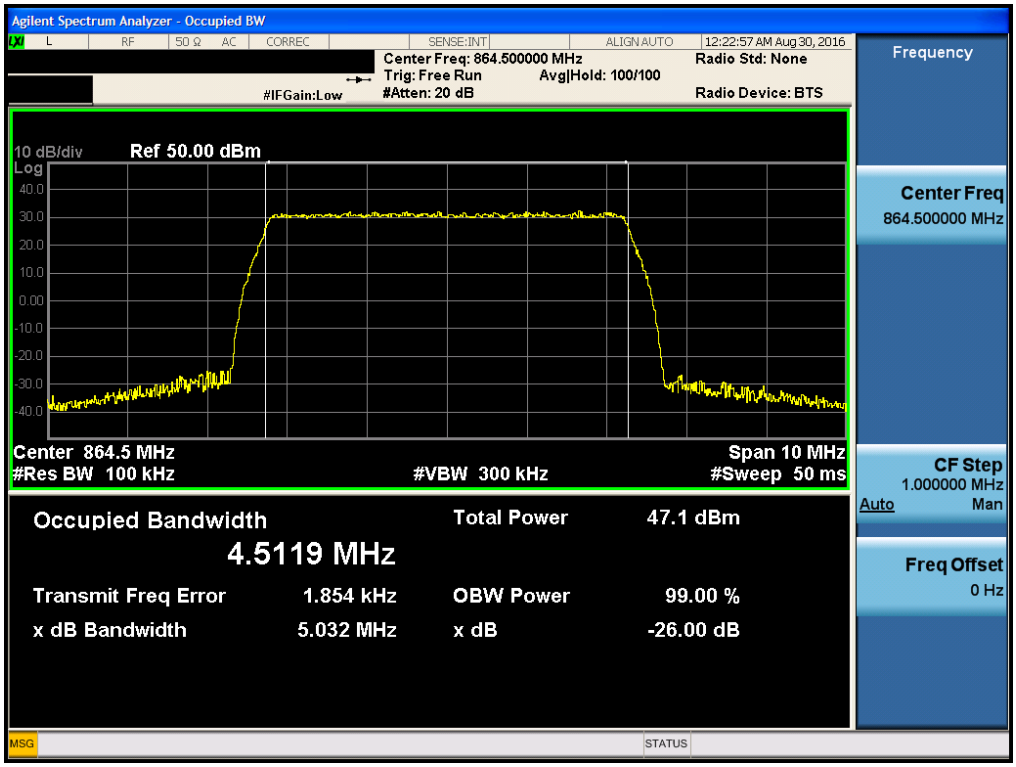


[+3dBm above AGC threshold Output Downlink High]

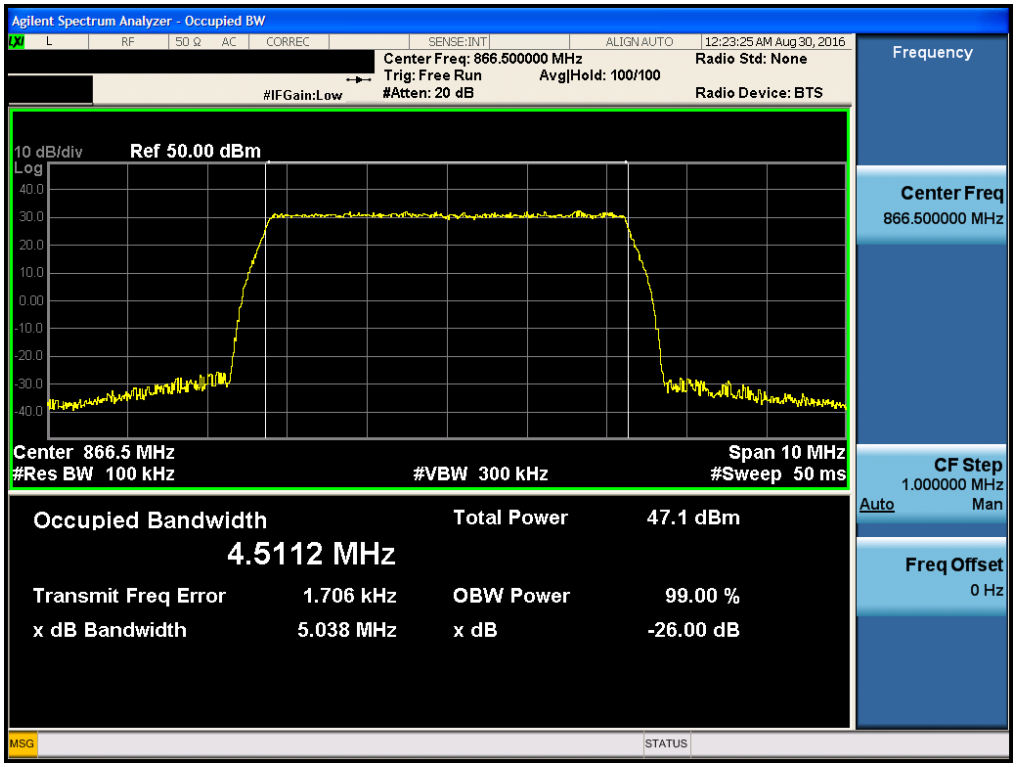


Plots of Occupied Bandwidth_800IDEN BAND LTE 5 MHz

[AGC threshold Input Downlink Low]

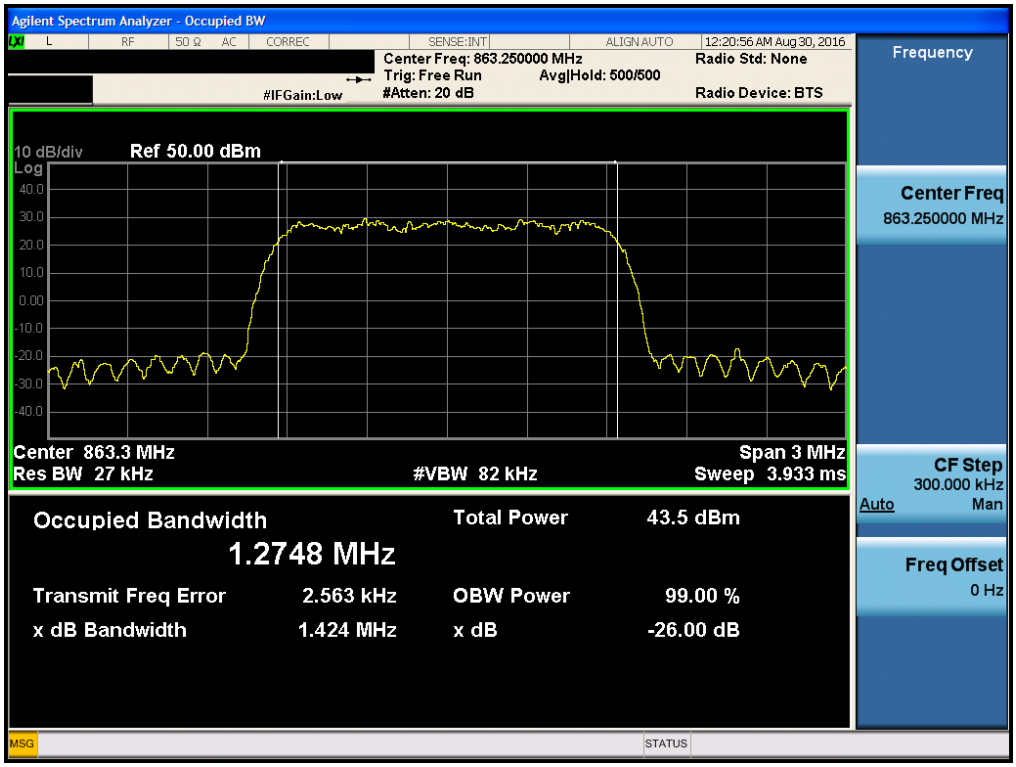


[AGC threshold Input Downlink High]

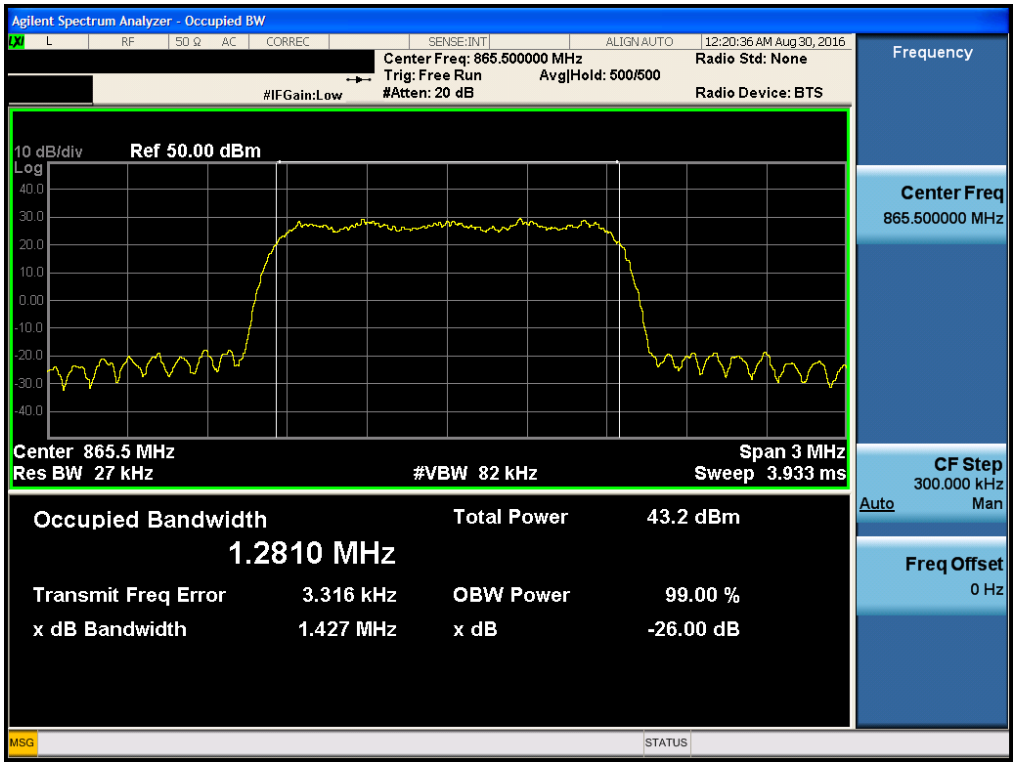


Plots of Occupied Bandwidth_800IDEN BAND CDMA

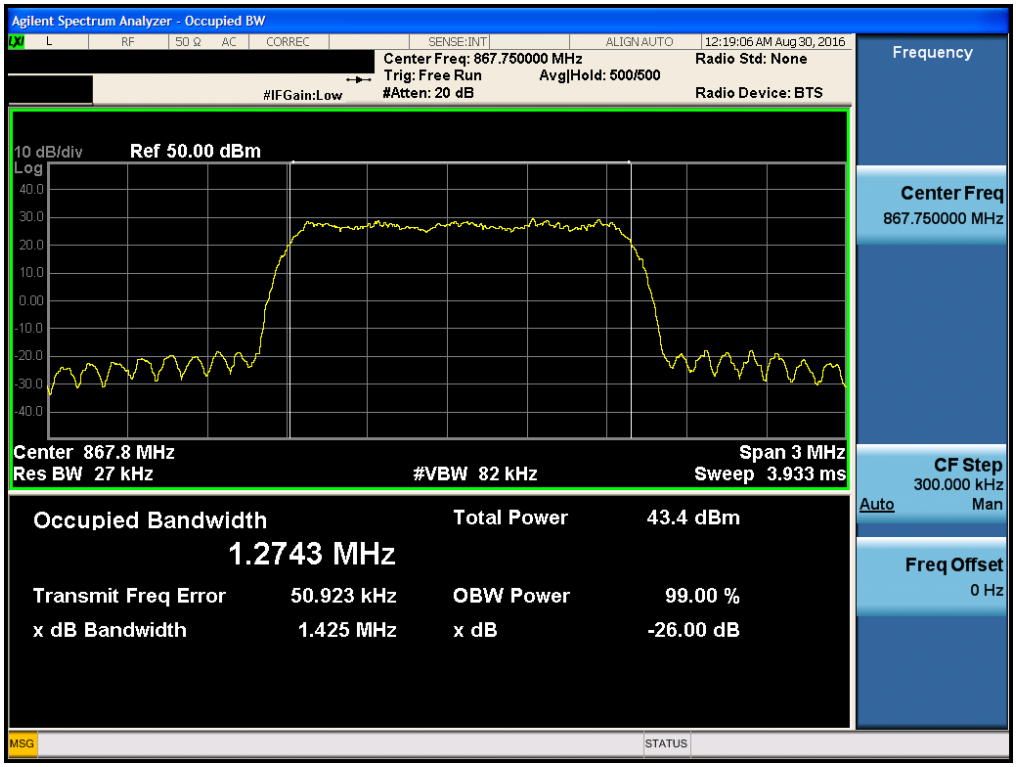
[AGC threshold Input Downlink Low]



[AGC threshold Input Downlink Middle]

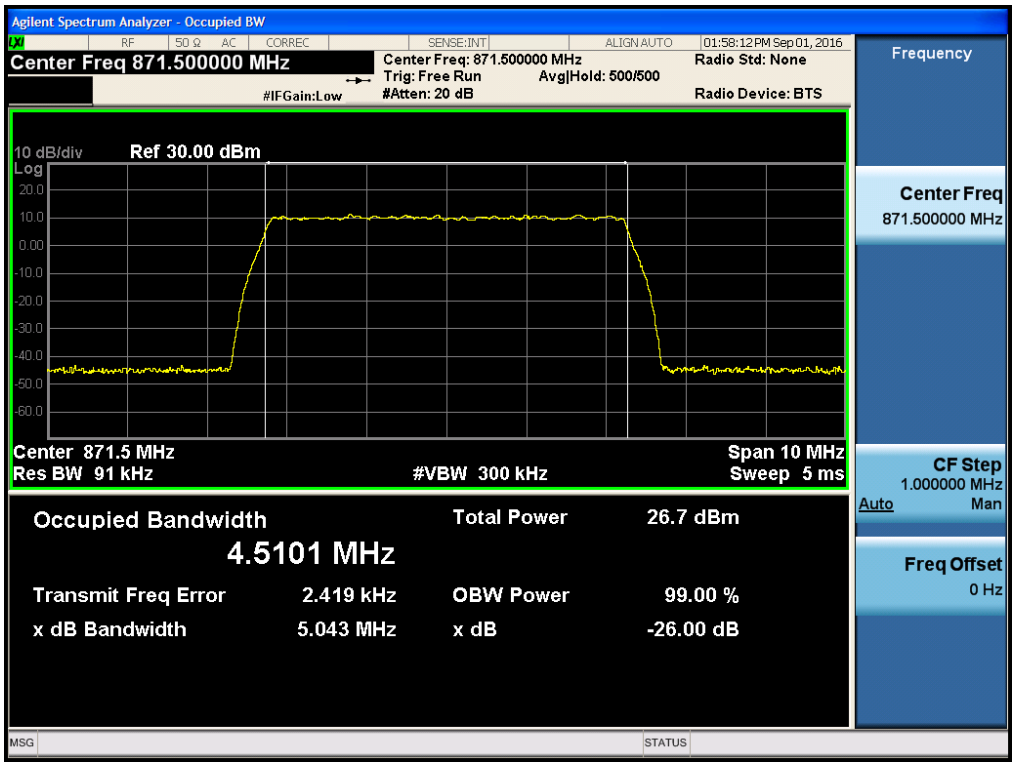


[AGC threshold Input Downlink High]

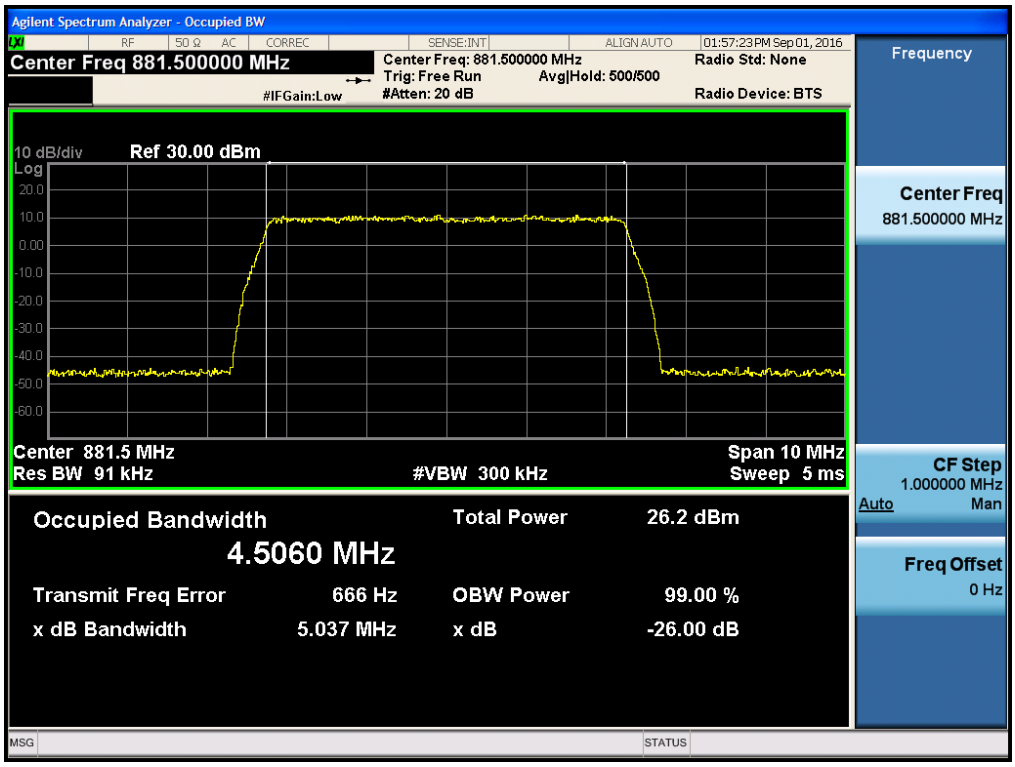


Plots of Occupied Bandwidth_850CEL BAND LTE 5 MHz

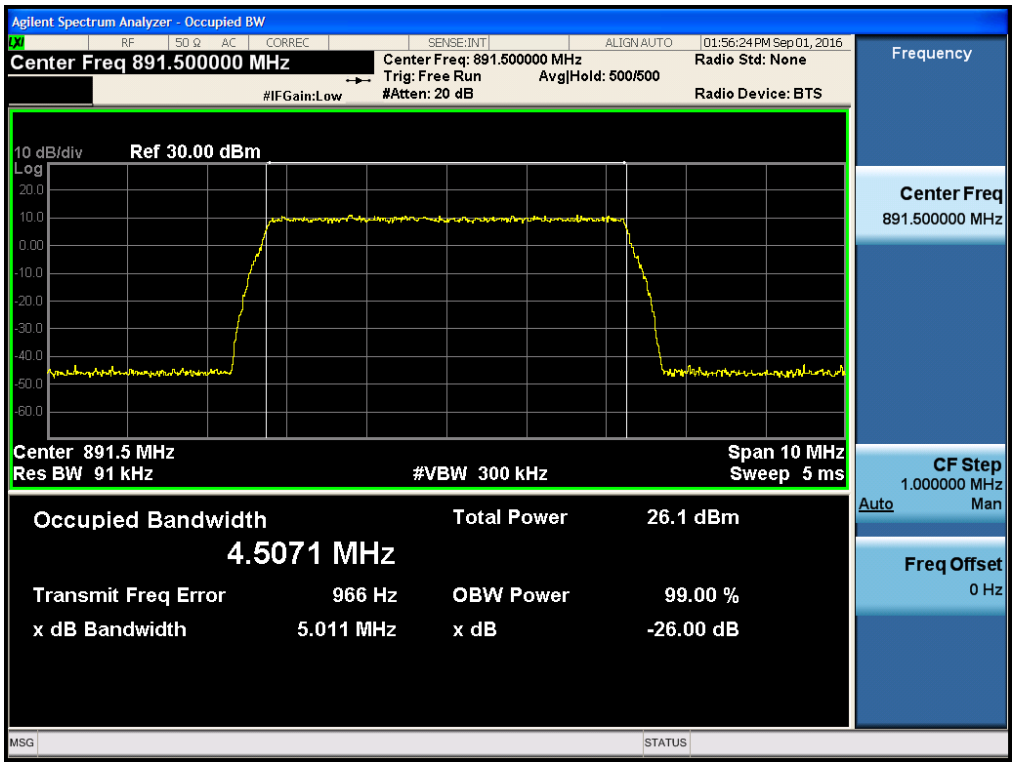
[AGC threshold Input Downlink Low]



[AGC threshold Input Downlink Middle]

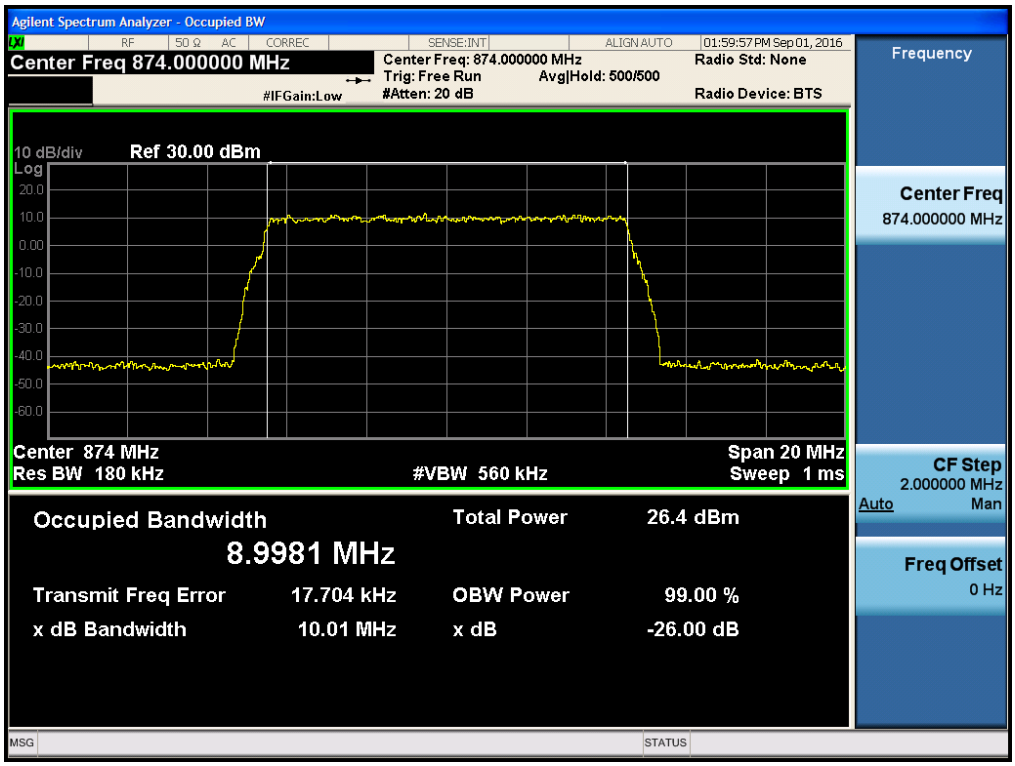


[AGC threshold Input Downlink High]

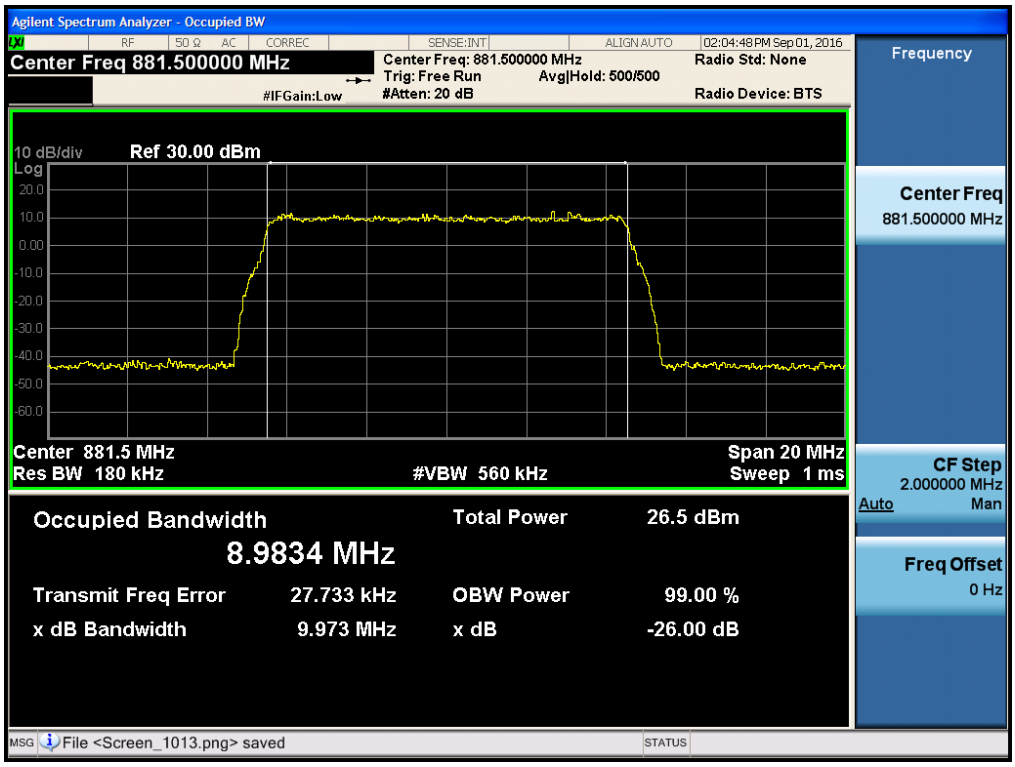


Plots of Occupied Bandwidth_850CEL BAND LTE 10 MHz

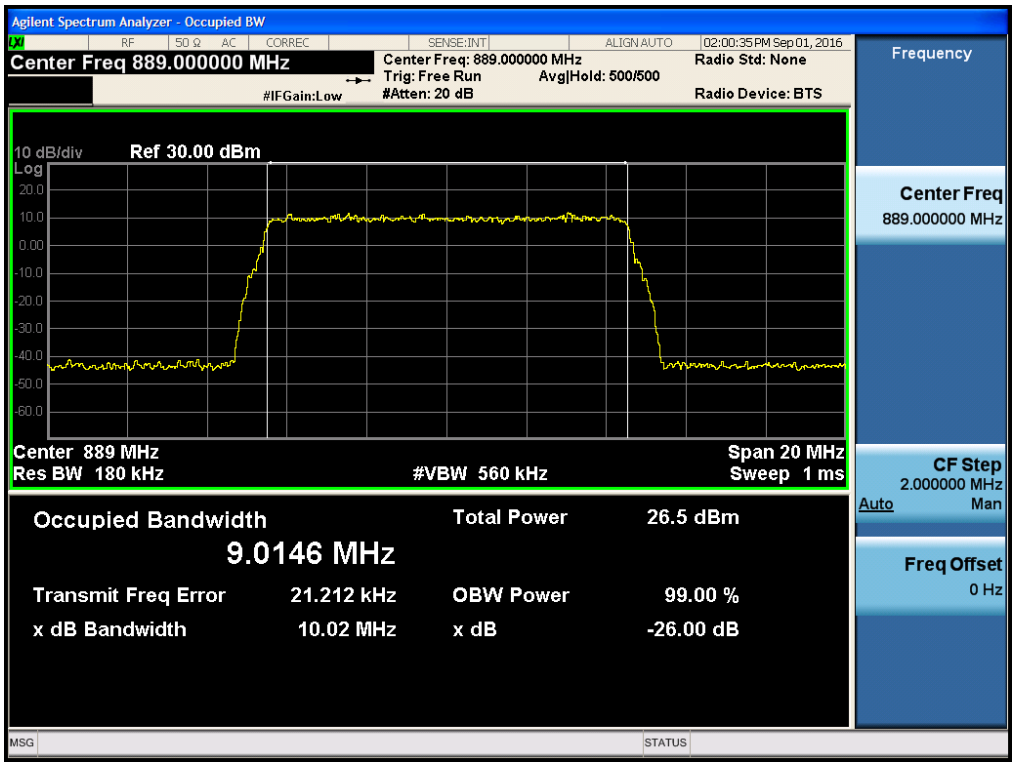
[AGC threshold Input Downlink Low]



[AGC threshold Input Downlink Middle]

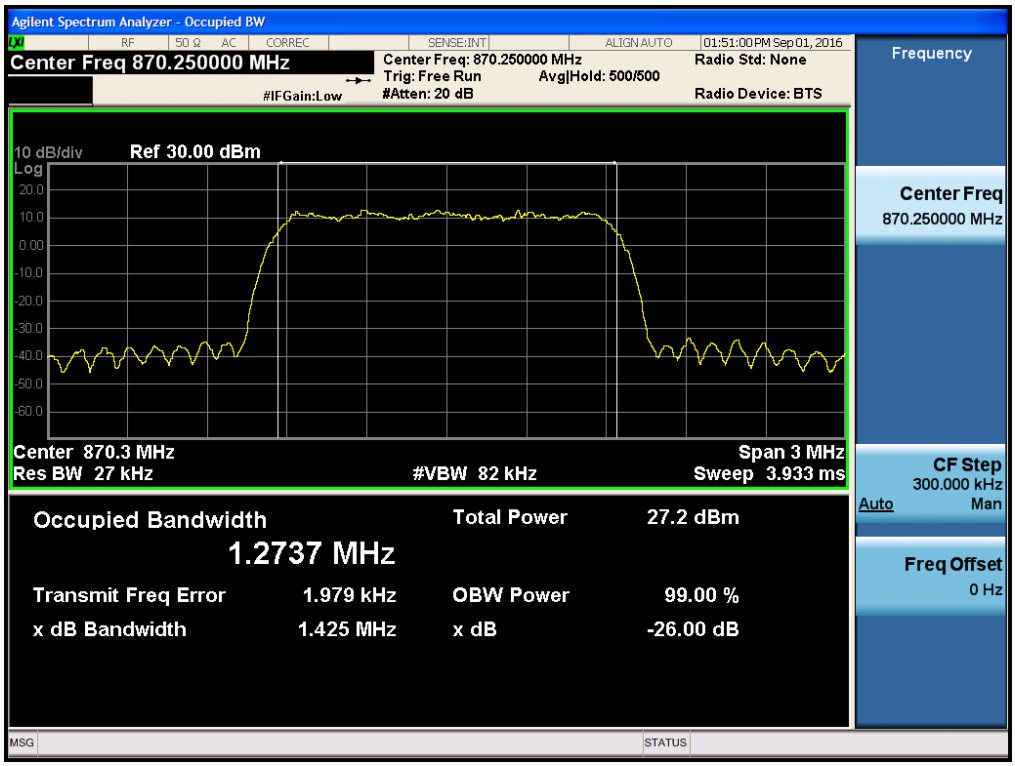


[AGC threshold Input Downlink High]

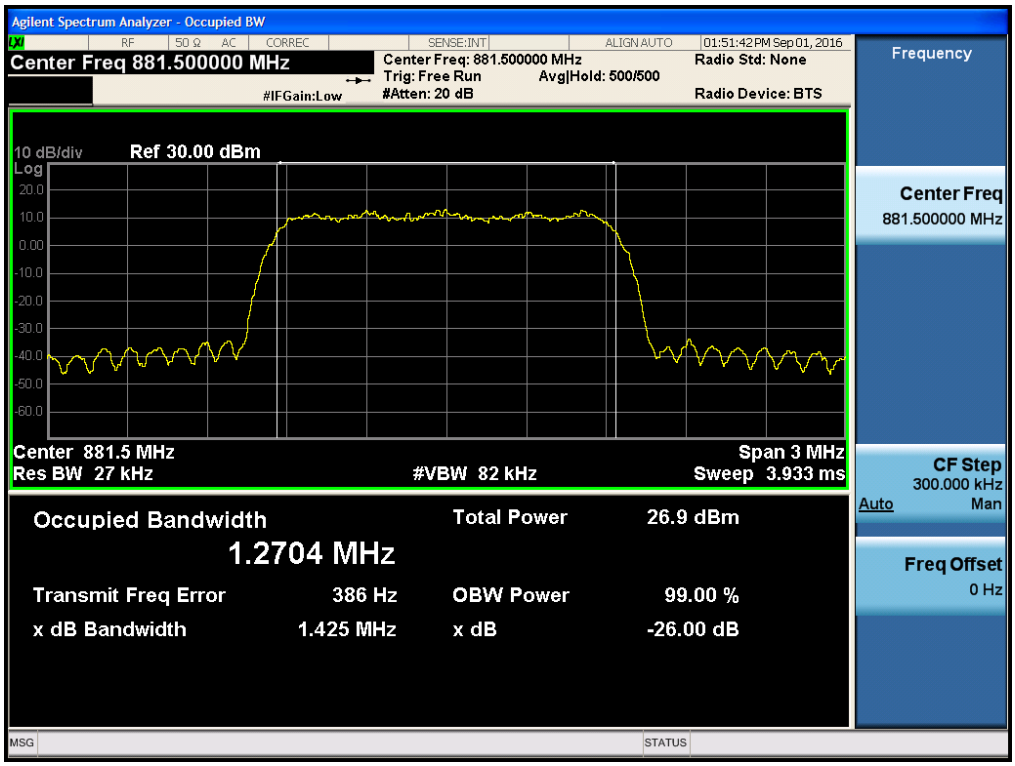


Plots of Occupied Bandwidth_850CEL BAND CDMA

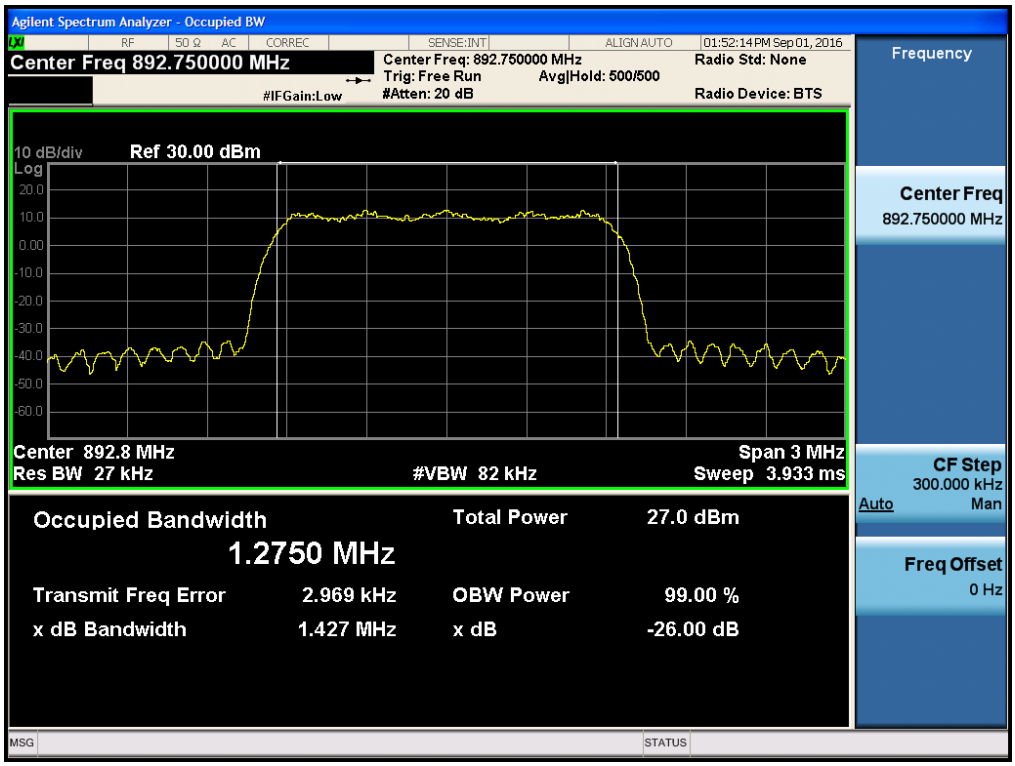
[AGC threshold Input Downlink Low]



[AGC threshold Input Downlink Middle]

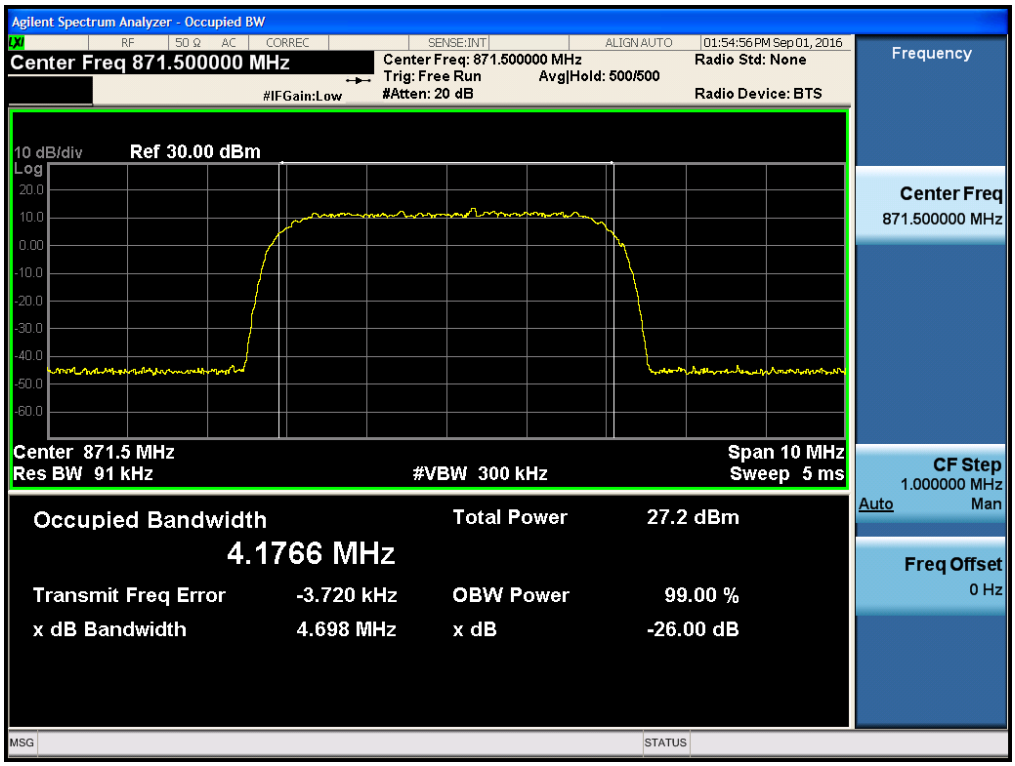


[AGC threshold Input Downlink High]



Plots of Occupied Bandwidth_850CEL BAND WCDMA

[AGC threshold Input Downlink Low]



[AGC threshold Input Downlink Middle]