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

FCC REPORT

Certification

Applicant Name:
SOLiD, Inc.

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

Date of Issue:
March 22, 2019

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

Report No.: HCT-RF-1903-FC008

FCC ID:	**W6UL78E1921**
APPLICANT:	**SOLiD, Inc.**

Model: N2RDU_78e1921

EUT Type: ALLIANCE_N2ROU

Frequency Range:

Band Name	Downlink (MHz)
700 LTE, FirstNet	729 ~ 768
PS; B/ILT; SMR	857.5 ~ 862
ESMR	862 ~ 869
Cellular	869 ~ 894
PCS	1 930 ~ 1 995
AWS	2 110 ~ 2 180

Output Power: 33 dBm

Date of Test: January 09, 2019 ~ March 22, 2019

FCC Rule Parts: CFR 47 Part 2, Part 22, Part 24, Part 27, Part 90

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 Rules under normal use and maintenance.

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

Approved by : Kwon Jeong
Manager of telecommunication testing center

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-1903-FC008	March 22, 2019	- First Approval Report

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1. GENERAL INFORMATION

1.1. APPLICANT INFORMATION

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

1.2. PRODUCT INFORMATION

EUT Type	ALLIANCE_N2ROU
Power Supply	120 V AC, -48 V DC
Frequency Range	Band Name / Downlink (MHz) 700 LTE, FirstNet: 729 ~ 768 PS; B/ILT; SMR: 857.5 ~ 862 ESMR: 862 ~ 869 Cellular: 869 ~ 894 PCS: 1 930 ~ 1 995 AWS: 2 110 ~ 2 180
Tx Output Power	33 dBm
Antenna Specification	Manufacturer does not provide an antenna.

1.3. TEST INFORMATION

FCC Rule Parts	CFR 47 Part 2, Part 22, Part 24, Part 27, Part 90
Measurement Standards	KDB 935210 D05 v01r02, ANSI C63.26-2015
Test Location	HCT CO., LTD. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

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 April 02, 2018 (Registration Number: KR0032).

2.2. EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

3. TEST SPECIFICATIONS

3.1. STANDARDS

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 2, Part 22 Part 24, Part 27 and Part 90.

Description	Reference	Results
AGC threshold	KDB 935210 D05 v01r02 3.2 KDB 935210 D05 v01r02 4.2	Compliant
Out-of-band rejection	KDB 935210 D05 v01r02 3.3 KDB 935210 D05 v01r02 4.3	Compliant
Input-versus-output signal comparison	§2.1049, §90.210, §90.219(e)(4)(ii),(iii)	Compliant
Input/output power and amplifier/booster gain	§2.1046, §22.913, §24.232, §27.50, §90.219(e)(1), §90.542, §90.635	Compliant
Noise figure	§90.219(e)(2)	Compliant
Out-of-band/out-of-block emissions and spurious emissions	§2.1051, §22.917, §24.238, §27.53 §90.219(e)(3), §90.543, §90.691	Compliant
Spurious emissions radiated	§2.1053, §22.917, §24.238, §27.53 §90.691	Compliant

3.2. ADDITIONAL DESCRIPTIONS ABOUT TEST

Except for the following cases, EUT was tested under normal operating conditions.

: Out-of-band rejection test requires maximum gain condition without AGC

The test was generally based on the method of KDB 935210 D05 v01r02 and only followed ANSI C63.26-2015 if there was no test method in KDB standard.

EUT was tested with following modulated signals provide by applicant.

Band Name	Tested signals
700 LTE, FirstNet	LTE 5 MHz, LTE 10 MHz
PS; B/ILT; SMR	P25(APCO25) Phase 2 (6.25 kHz)
ESMR	CDMA, LTE 5 MHz
Cellular	CDMA, WCDMA, LTE 5 MHz, LTE 10 MHz
PCS	GSM, CDMA, WCDMA, LTE 5 MHz , LTE 10 MHz, LTE 20 MHz
AWS	CDMA, WCDMA, LTE 5 MHz , LTE 10 MHz, LTE 20 MHz

Below channels greater than 6.25 kHz in EUT specification are not tested because it could consist of a combination of P25 Phase 2 signals.(Channelizing = 6.25 x n, n = 1 ~ 720)

Channelizing	P25 Phase 2 (6.25 kHz) combinations	Channelizing	P25 Phase 2 (6.25 kHz) combinations
12.5 kHz	n = 2	700 kHz	n =112
25 kHz	n = 4	800 kHz	n = 128
50 kHz	n = 8	900 kHz	n = 144
100 kHz	n = 16	1000 kHz	n = 160
200 kHz	n = 32	2000 kHz	n = 320
300 kHz	n = 48	3000 kHz	n = 480
400 kHz	n = 64	4000 kHz	n = 640
500 kHz	n = 80	4500 kHz	n = 720
600 kHz	n = 96		

The frequency stability measurement has been omitted in accordance with section 3.7 of KDB 935210 D05 v01r02.

: It can be confirmed through input-versus-output signal comparison test that EUT does not alter the input signal.

The tests results included actual loss value for attenuator and cable combination as shown in the table below.

: Input Path

Correction factor table			
Frequency (MHz)	**Factor (dB)**	**Frequency (MHz)**	**Factor (dB)**
500	0.508	1800	1.131
550	0.499	1850	1.103
600	0.584	1900	1.243
650	0.652	1950	1.215
700	0.701	2000	1.257
750	0.704	2050	1.280
800	0.750	2100	1.248
850	0.734	2150	1.337
900	0.764	2200	1.341
950	0.745	2250	1.384
1000	0.839	2300	1.432
1050	0.807	2350	1.421
1100	0.906	2400	1.358
1150	0.877	2450	1.358
1200	0.935	2500	1.415
1250	0.872	2550	1.462
1300	0.954	2600	1.356
1350	0.921	2650	1.409
1400	1.008	2700	1.329
1450	0.952	2750	1.296
1500	1.002	2800	1.362
1550	1.076	2850	1.345
1600	1.025	2900	1.450
1650	0.892	2950	1.346
1700	1.011	3000	1.498
1750	1.099		

: Output Path

Correction factor table			
Frequency (MHz)	**Factor (dB)**	**Frequency (MHz)**	**Factor (dB)**
2	31.154	2 000	31.558
10	30.706	2 500	31.731
30	30.632	3 000	31.941
50	30.615	3 500	32.168
100	30.698	4 000	32.848
200	30.848	4 500	32.993
300	31.205	5 000	33.504
400	31.388	5 500	33.584
500	31.497	6 000	33.884
600	31.613	6 500	34.082
700	31.747	7 000	34.345
750	31.755	7 500	34.509
800	31.764	8 000	34.159
850	31.783	8 500	35.029
900	31.792	9 000	34.527
1 000	31.843	9 500	34.497
1 500	32.321	10 000	34.086

3.3. MEASUREMENTUNCERTAINTY

The value of the measurement uncertainty for the each item.

Description	Reference	Results
AGC threshold	-	±0.87 dB
Out-of-band rejection		±0.58 MHz
Input-versus-output signal comparison	OBW > 5 MHz	±0.58 MHz
	OBW ≤ 25 kHz	±0.16 kHz
Input/output power and amplifier/booster gain	-	±0.87 dB
Noise figure	-	±0.67 dB
Out-of-band/out-of-block emissions and spurious emissions	-	±1.08 dB
Spurious emissions radiated	f ≤ 1 GHz	±4.80 dB
	f > 1 GHz	±6.07 dB

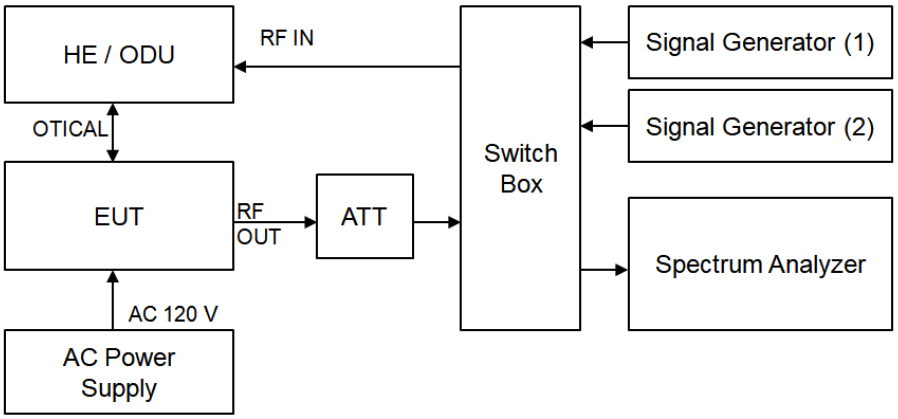
** Coverage factor k = 2, Confidence levels of 95 %*

3.4. STANDARDS ENVIRONMENTAL TEST CONDITIONS

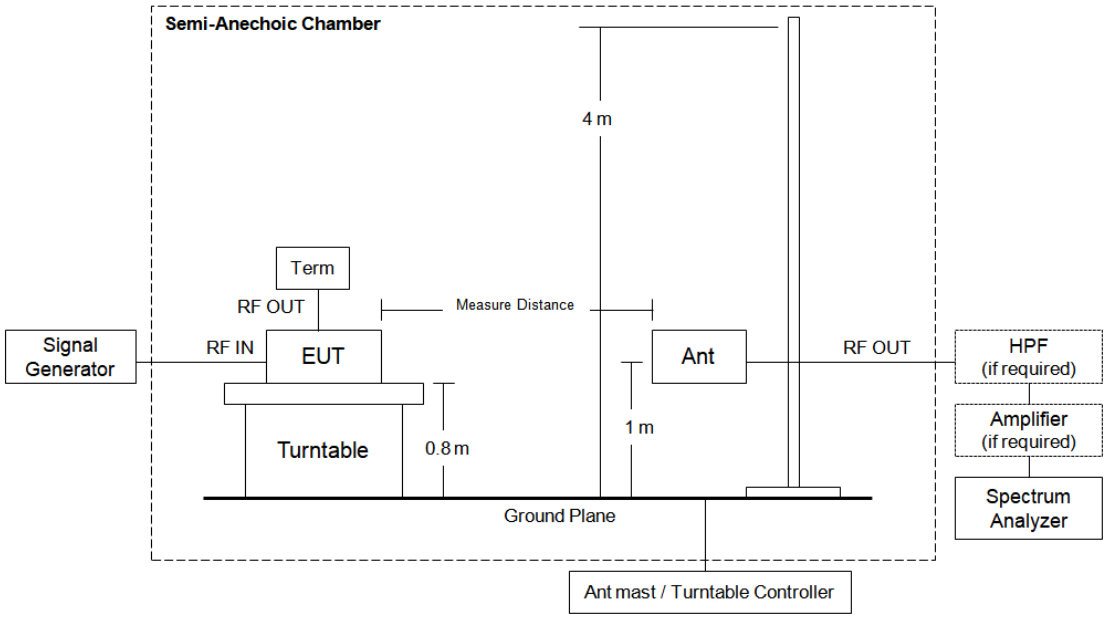
Temperature	+15 ℃ to +35 ℃
Relative humidity	30 % to 60 %
Air pressure	860 mbar to 1 060 mbar

3.5. TEST DIAGRAMS

Conducted Test



Radiated Test



※ EUT position is refer to placement of floor-standing refer to section 5.5.2.3.2 of ANSI C63.26-2015

4. TEST EQUIPMENTS

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Agilent	N9020A / MXA Signal Analyzer	08/29/2018	Annual	MY52440870
Agilent	N5182A / Signal Generator	08/09/2018	Annual	MY50140312
Agilent	N5182A / Signal Generator	08/30/2018	Annual	MY50142996
Agilent	8498A / High Power Attenuator	02/19/2018	Annual	51161
KEITHLEY	S46 / Switch	N/A	N/A	1088024
Deayoung ENT	DFSS60 / AC Power Supply	04/05/2018	Annual	1003030-1
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Emco	2090 / Controller	N/A	N/A	060520
Ets	- / Turn Table	N/A	N/A	N/A
Rohde&Schwarz	- / Loop Antenna	08/23/2018	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	04/06/2017	Biennial	760
Schwarzbeck	BBHA 9120D / Horn Antenna	06/30/2017	Biennial	9120D-1300
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	04/25/2017	Biennial	BBHA9170124
Rohde&Schwarz	FSP / Spectrum Analyzer	09/19/2018	Annual	836650/016
Wainwright Instruments	WHKX10-900-1000-15000-40SS / High Pass Filter	07/20/2018	Annual	5
Wainwright Instruments	WHKX10-2700-3000-18000-40SS / High Pass Filter	07/20/2018	Annual	3
CERNEX	CBLU1183540 / Power Amplifier	07/10/2018	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	07/10/2018	Annual	22965
CERNEX	CBL26405040 / Power Amplifier	07/10/2018	Annual	19660

*** The following equipment was calibrated during the test period.**

Agilent	8498A / High Power Attenuator	02/18/2018	Annual	51161

5. TEST RESULT

5.1. AGC THRESHOLD

Test Requirement:

KDB 935210 D05 v01r02

Testing at and above the AGC threshold is required.

Test Procedures:

Measurements were in accordance with the test methods section 3.2 of KDB 935210 D05 v01r02.

In the case of fiber-optic distribution systems, the RF input port of the equipment under test (EUT) refers to the RF input of the supporting equipment RF to optical convertor; see also descriptions and diagrams for typical DAS booster systems in KDB Publication 935210 D02 [R7].

Devices intended to be directly connected to an RF source (donor port) only need to be evaluated for any over-the-air transmit paths.

a) Connect a signal generator to the input of the EUT.
b) Connect a spectrum analyzer or power meter to the output of the EUT using appropriate attenuation as necessary.
c) The signal generator should initially be configured to produce either of the required test signals (i.e., broadband or narrowband).
d) Set the signal generator frequency to the center frequency of the EUT operating band.
e) While monitoring the output power of the EUT, measured using the methods of 3.5.3 or 3.5.4, increase the input level until a 1 dB increase in the input signal power no longer causes a 1 dB increase in the output signal power.
f) Record this level as the AGC threshold level.
g) Repeat the procedure with the remaining test signal.

Measurements were in accordance with the test methods section 4.2 of KDB 935210 D05 v01r02.

Testing at and above the AGC threshold will be required.6 The AGC threshold shall be determined by applying the procedure of 3.2, but with the signal generator configured to produce a test signal defined in Table 1, a CW input signal, or a digitally modulated signal, consistent with the discussion about signal types in 4.1.

Output power measurement in subclause 5.2.4.4.1 of ANSI C63.26

a) Set span to 2 × to 3 × the OBW.
b) Set RBW = 1% to 5% of the OBW.
c) Set VBW ≥ 3 × RBW.

d) Set number of measurement points in sweep ≥ 2 × span / RBW.

e) Sweep time: auto-couple

f) Detector = power averaging (rms).

g) If the EUT can be configured to transmit continuously, then set the trigger to free run.

h) Omit

i) Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over multiple symbols, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.

j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

Test Results:

Test Band	Link	Signal	Center Frequency (MHz)	AGC Threshold Level (dBm)	Output Level (dBm)
700 LTE	Downlink	LTE 5 MHz	742.00	-20	33.02
		LTE 10 MHz	741.00	-20	33.12
FirstNet	Downlink	LTE 5 MHz	763.00	-20	32.98
		LTE 10 MHz	763.00	-20	32.94
PS; B/ILT; SMR	Downlink	P25 Phase 2	859.75	-20	32.95
ESMR	Downlink	CDMA	865.50	-20	33.02
		LTE 5 MHz	865.50	-20	33.18
Cellular	Downlink	CDMA	881.50	-20	32.77
		WCDMA	881.50	-20	33.31
		LTE 5 MHz	881.50	-20	32.78
		LTE 10 MHz	881.50	-20	32.83
PCS	Downlink	GSM	1962.50	-20	33.00
		CDMA	1962.50	-20	33.13
		WCDMA	1962.50	-20	33.07
		LTE 5 MHz	1962.50	-20	32.98
		LTE 10 MHz	1962.50	-20	32.95
		LTE 20 MHz	1962.50	-20	32.92
AWS	Downlink	CDMA	2145.00	-20	33.01
		WCDMA	2145.00	-20	33.00
		LTE 5 MHz	2145.00	-20	32.98
		LTE 10 MHz	2145.00	-20	33.03
		LTE 20 MHz	2145.00	-20	33.02

5.2. OUT-OF-BAND REJECTION

Test Requirement:

KDB 935210 D05 v01r02

Out-of-band rejection required.

Test Procedures:

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

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

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

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

1) Frequency range = ±250 % of the passband, for each applicable CMRS band.

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 f_0.

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.

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

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

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

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

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

2) The CW amplitude shall be 3 dB below the AGC threshold and shall not activate the AGC threshold throughout the test.

3) Dwell time = approximately 10 ms.

4) Frequency step = 50 kHz.

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

d) Set the RBW of the spectrum analyzer to between 1 % and 5 % of the manufacturer's pass band with the VBW set to 3 × RBW.

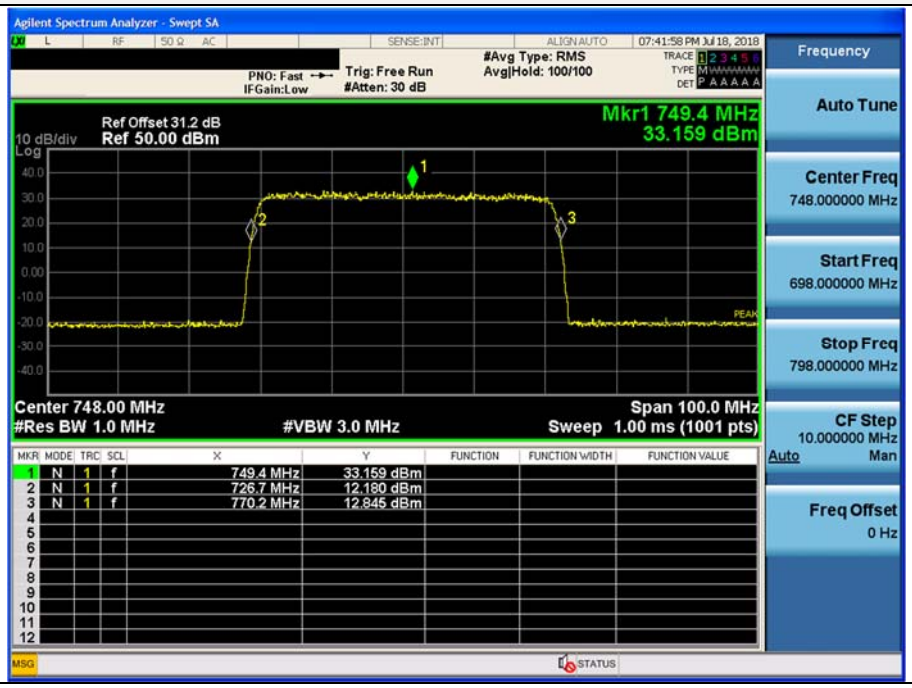
e) Set the detector to Peak and the trace to Max-Hold.

f) After the trace is completely filled place a marker at the peak amplitude which is designated as f_0, with two additional markers (use the marker delta method) at the 20 dB bandwidth (i.e., at the points where the level has fallen by 20 dB).

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

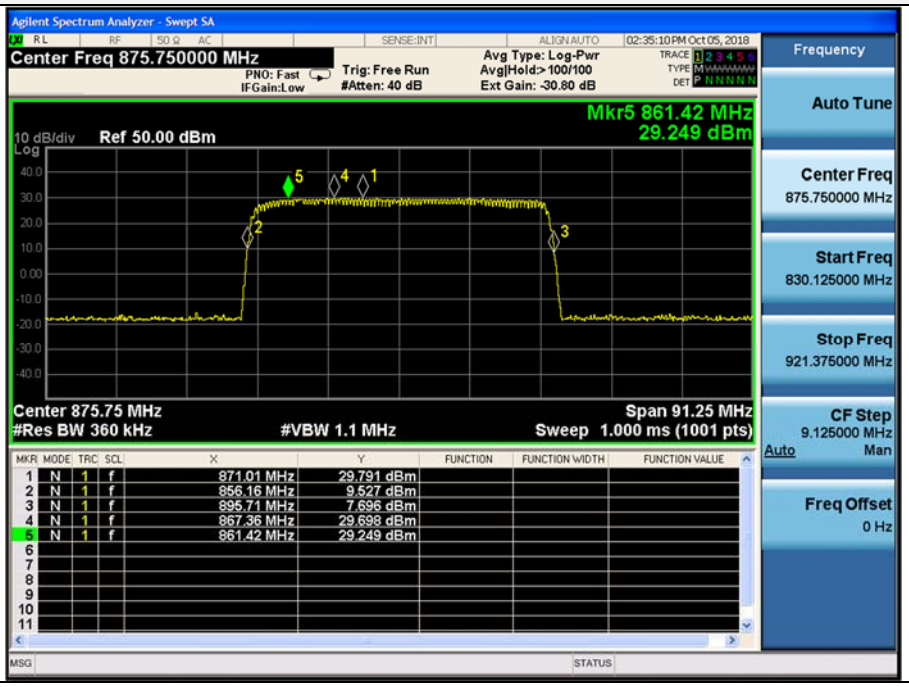
Test Results:

Plot of Out of Band Rejection_700 MHz Band

Downlink


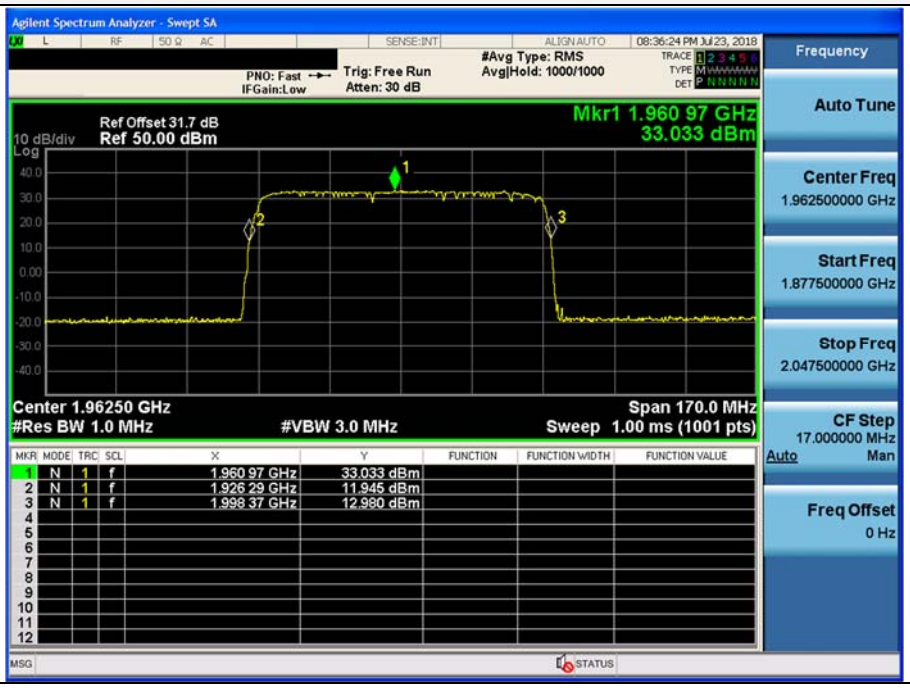
* 700 MHz module amplifies 700 LTE band(729 ~ 758 MHz) and FirstNet band(758 ~ 768 MHz) together.

Plot of Out of Band Rejection_800 MHz Band

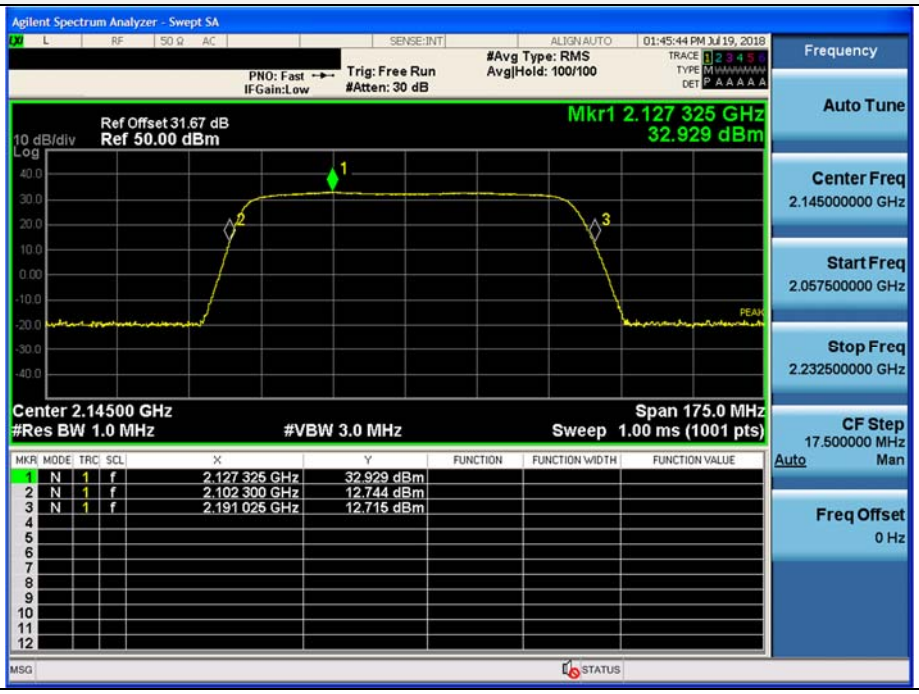
Downlink


* 800 MHz module amplifies PS; B/ILT; SMR band(857.5 ~ 862 MHz), ESMR band(862 ~ 869 MHz) and Cellular band(869 ~ 894 MHz) together.

Plot of Out of Band Rejection_PCS Band

Downlink


Plot of Out of Band Rejection_AWS Band

Downlink


5.3. INPUT-VERSUS-OUTPUT SIGNAL COMPARISON

Test Requirement:

§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.

§ 90.210 Emission masks.

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (o) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere in this part, the table in this section specifies the emission masks for equipment operating under this part.

APPLICABEL EMISSION MASKS

Frequency band (MHz)	Mask for equipment with audio Low pass filter	Mask for equipment without audio low pass filter
Below 25	A or B	A or C
25-50	B	C
72-76	B	C
150-174	B, D, or E	C, D or E
150 paging only	B	C
220-222	F	F
421-512	B, D, or E	C, D, or E
450 paging only	B	G
806-809/851-854	B	H
809-824/854-869	B	G
896-901/935-940	I	J
902-928	K	K
929-930	B	G
4940-4990	L or M	L or M
5850-5925		
All other bands	B	C

(g) Emission Mask G. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 10 kHz, but no more than 250 percent of the authorized bandwidth: At least 116 log (fd/6.1) dB, or 50 + 10 log (P) dB, or 70 dB, whichever is the lesser attenuation;

(2) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

§ 90.219 Use of signal boosters.

(e) Device Specifications. In addition to the general rules for equipment certification in §90.203(a)(2) and part 2, subpart J of this chapter, a signal booster must also meet the rules in this paragraph.

(4) A signal booster must be designed such that all signals that it retransmits meet the following requirements:

(ii) There is no change in the occupied bandwidth of the retransmitted signals.

(iii) The retransmitted signals continue to meet the unwanted emissions limits of §90.210 applicable to the corresponding received signals (assuming that these received signals meet the applicable unwanted emissions limits by a reasonable margin).

Test Procedures:

Measurements were in accordance with the test methods section 3.4 of KDB 935210 D05 v01r02.

A 26 dB bandwidth measurement shall be performed on the input signal and the output signal; alternatively, the 99% OBW can be measured and used. See KDB Publication 971168 [R8] for more information on measuring OBW.

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

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

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

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

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

f) The nominal RBW shall be in the range of 1 % to 5 % of the anticipated OBW, and the VBW shall be ≥ 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.

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

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

i) Set spectrum analyzer detection function to positive peak.

j) Set the trace mode to max hold.

k) Determine the reference value: Allow the trace to stabilize. Set the spectrum analyzer marker to the

highest amplitude level of the displayed trace (this is the reference value) and record the associated frequency as f_0.

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

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

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

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

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

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

Measurements were in accordance with the test methods section 4.4 of KDB 935210 D05 v01r02.

Compliance with the emission mask of the EUT output shall be measured for the public safety service signal types as specified in 4.1.

Refer to the applicable regulatory requirements (e.g., Section 90.210) for emission mask specifications.

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

b) Configure the signal generator to transmit the appropriate test signal associated with the public safety emission designation (see Table 1).

c) Configure the signal level to be just below the AGC threshold (see results from 4.2).

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

e) Set the spectrum analyzer center frequency to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between 2 times to 5 times the EBW (or OBW).

f) The nominal RBW shall be 300 Hz for 16K0F3E, and 100 Hz for all other emissions types.

g) Set the reference level of the spectrum analyzer to accommodate the maximum input amplitude level, i.e., the level at f0 per 4.2.

h) Set spectrum analyzer detection mode to peak, and trace mode to max hold.

i) Allow the trace to fully stabilize.

j) Confirm that the signal is contained within the appropriate emissions mask.

k) Use the marker function to determine the maximum emission level and record the associated frequency as f0.

l) Capture the emissions mask plot for inclusion in the test report (output signal spectra).

m) Measure the EUT input signal power (signal generator output signal) directly from the signal generator using power measurement guidance provided in KDB Publication 971168 [R8] (input signal spectra).

n) Compare the spectral plot of the output signal (determined in step k), to the input signal (determined in step l) to affirm they are similar (in passband and rolloff characteristic features and relative spectral locations).

o) Repeat steps d) to n) with the input signal amplitude set 3 dB above the AGC threshold.

p) Repeat steps b) to o) for all authorized operational bands and emissions types (see applicable regulatory specifications, e.g., Section 90.210).

q) Include all accumulated spectral plots depicting EUT input signal and EUT output signal in the test report, and note any observed dissimilarities.

Because KDB 935210 D05 procedure does not provide this requirement, measurements were in accordance with the test methods section 5.4.4 of ANSI C63.26-2015.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of 1.5 × OBW is sufficient).

b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.

NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.

d) Set the detection mode to peak, and the trace mode to max-hold.

e) Omit

f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

Test Results:

Tabular data of Output Occupied Bandwidth_700 MHz Band

Test Band	Link	Signal	Center Frequency (MHz)	99 % OBW (MHz)	26 dB OBW (MHz)
700 LTE	Downlink	LTE 5 MHz	742.00	4.5146	5.032
		LTE 10 MHz	741.00	9.0064	9.982
FirstNet	Downlink	LTE 5 MHz	760.50	4.5169	5.035
			765.50	4.5036	5.031
		LTE 10 MHz	763.00	8.9996	9.995

Tabular data of 3 dB above the AGC threshold Output Occupied Bandwidth_700 MHz Band

Test Band	Link	Signal	Center Frequency (MHz)	99 % OBW (MHz)	26 dB OBW (MHz)
700 LTE	Downlink	LTE 5 MHz	742.00	4.5189	5.040
		LTE 10 MHz	741.00	9.0069	10.02
FirstNet	Downlink	LTE 5 MHz	760.50	4.5186	5.058
			765.50	4.5020	5.032
		LTE 10 MHz	763.00	8.9982	9.952

Tabular data of Input Occupied Bandwidth_700 MHz Band

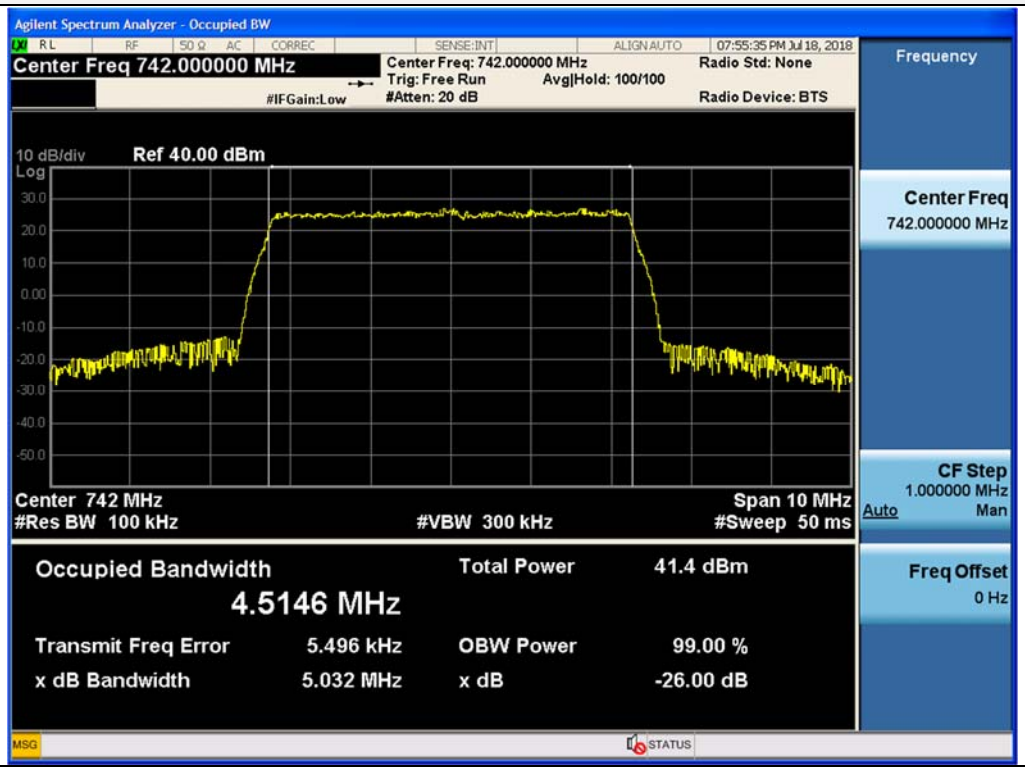
Test Band	Link	Signal	Center Frequency (MHz)	99 % OBW (MHz)	26 dB OBW (MHz)
700 LTE	Downlink	LTE 5 MHz	742.00	4.5110	5.040
		LTE 10 MHz	741.00	8.9992	10.00
FirstNet	Downlink	LTE 5 MHz	760.50	4.5078	5.039
			765.50	4.5101	5.033
		LTE 10 MHz	763.00	8.9963	10.01

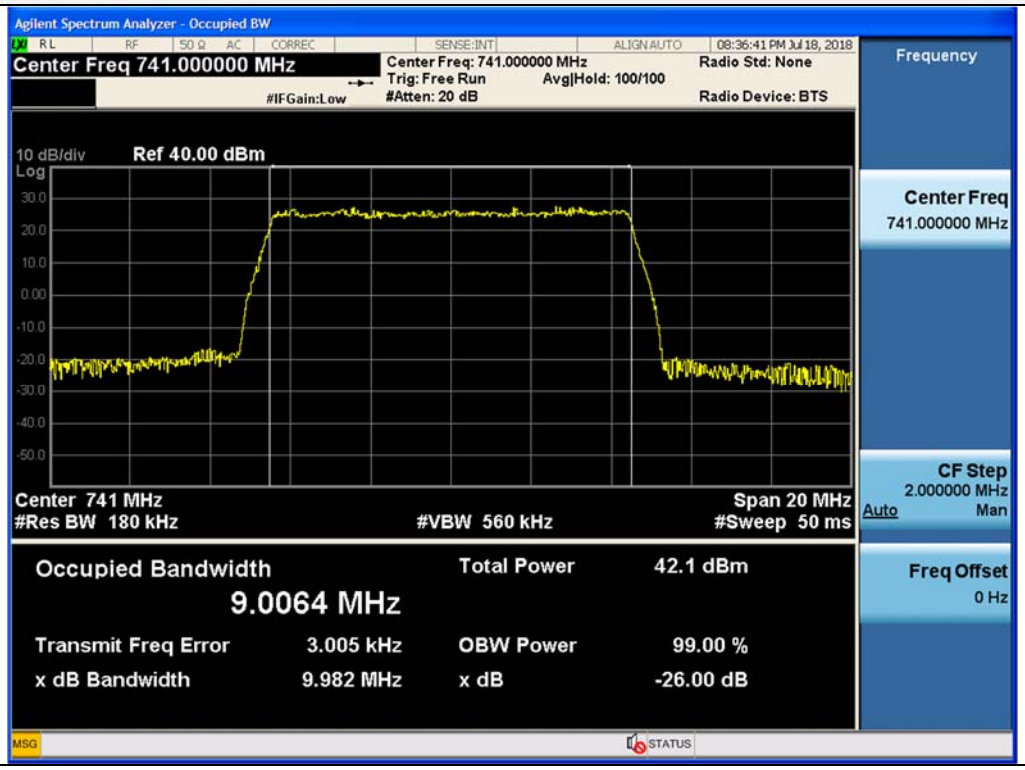
Measured Occupied Bandwidth Comparison_700 MHz Band

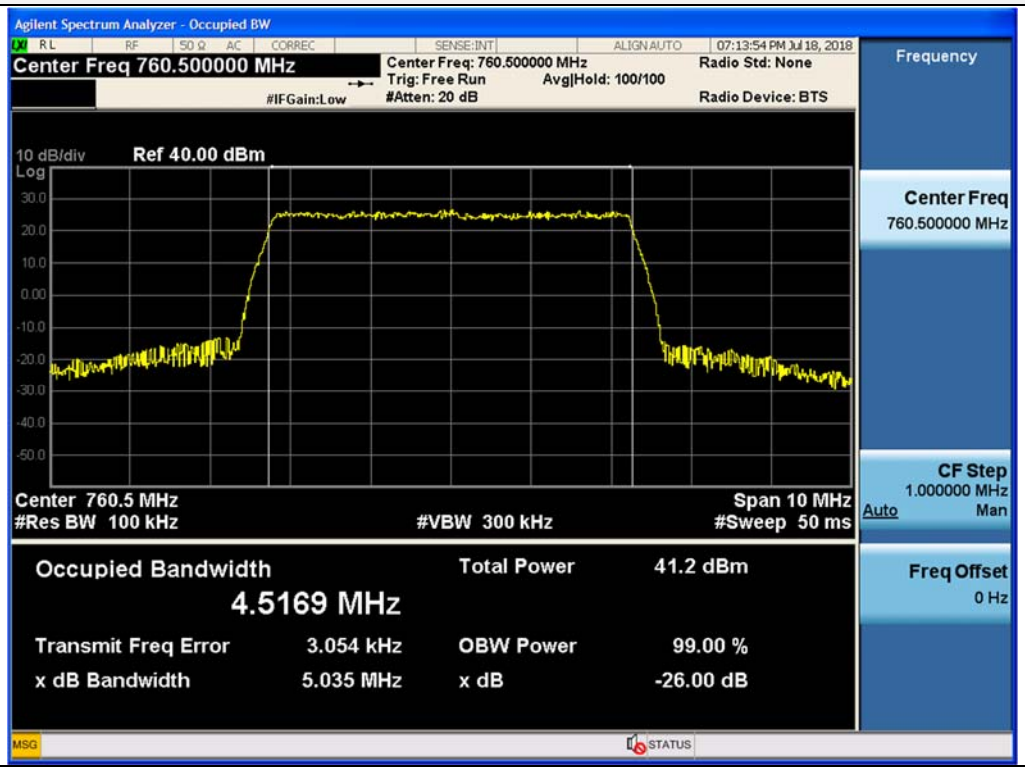
Test Band	Link	Signal	Variant of Input and output Occupied Bandwidth (%)	Variant of Input and 3 dB above the AGC threshold output Occupied Bandwidth (%)
700 LTE	Downlink	LTE 5 MHz	-0.159	0.000
		LTE 10 MHz	-0.180	0.200
FirstNet	Downlink	LTE 5 MHz	-0.079	0.377
			-0.040	-0.020
		LTE 10 MHz	-0.150	-0.579

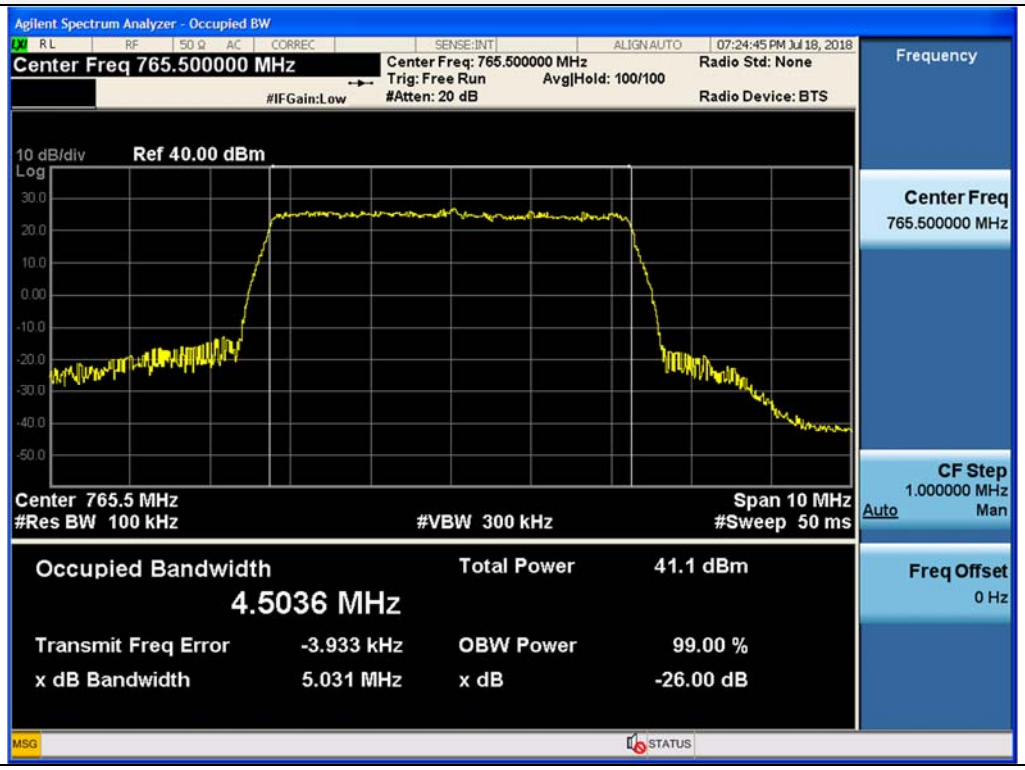
** Change in input-output OBW is less than ±5 %.*

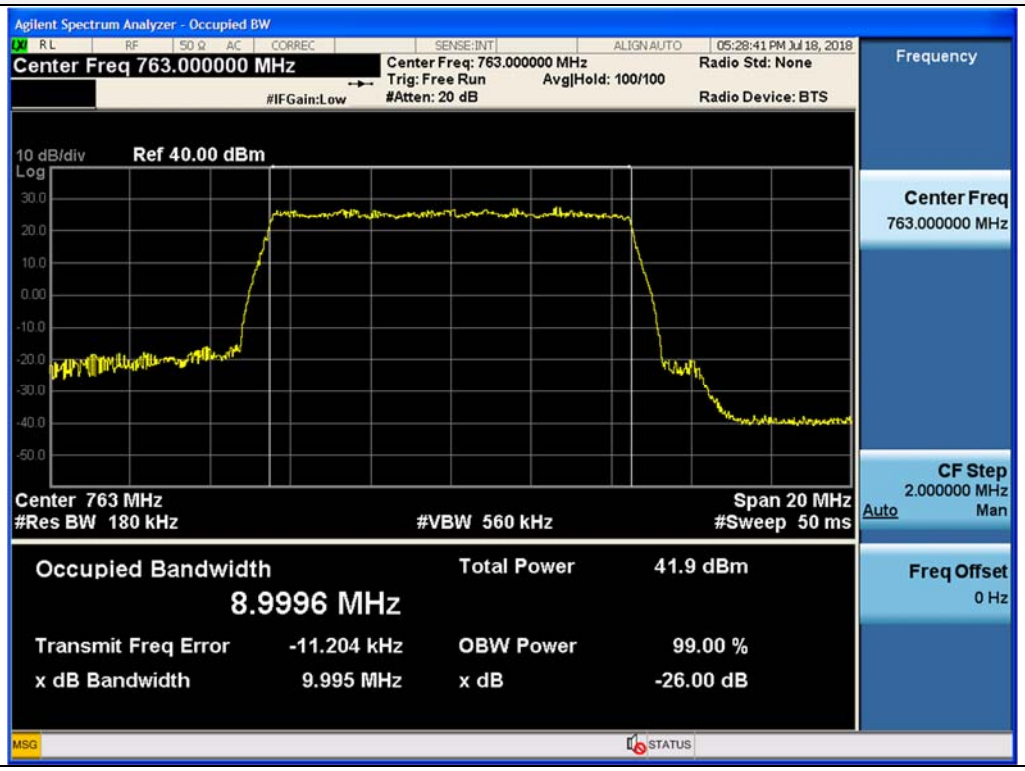
Plot data of Occupied Bandwidth_700 MHz Band

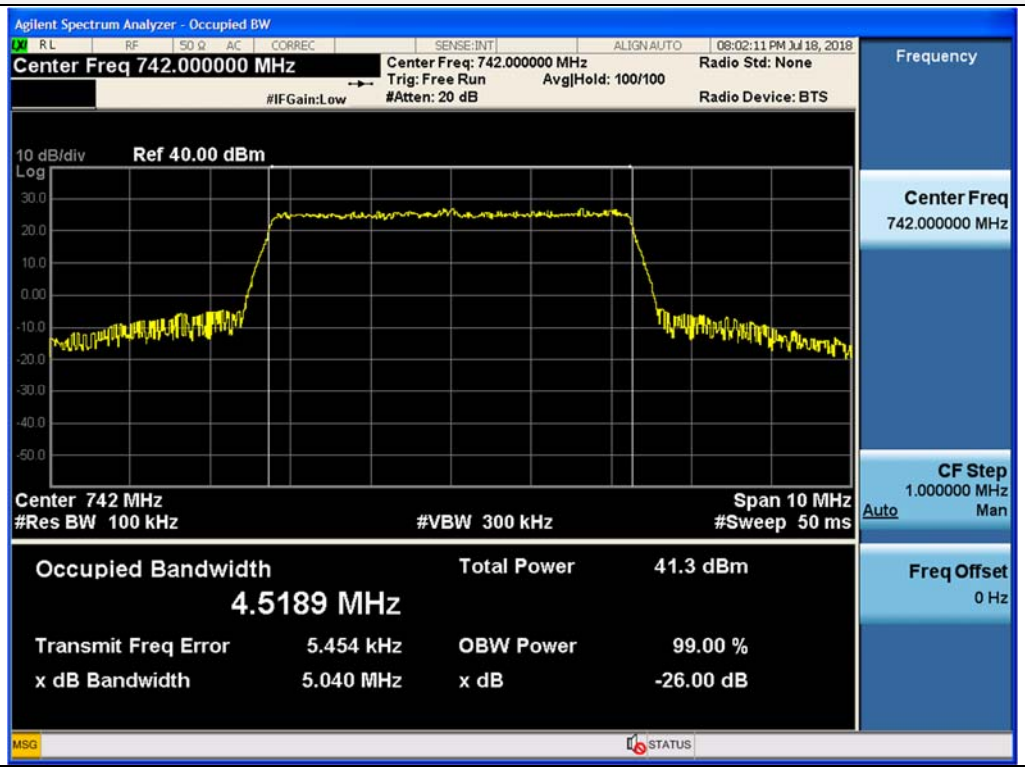
Output / 700 LTE / Downlink / LTE 5 MHz


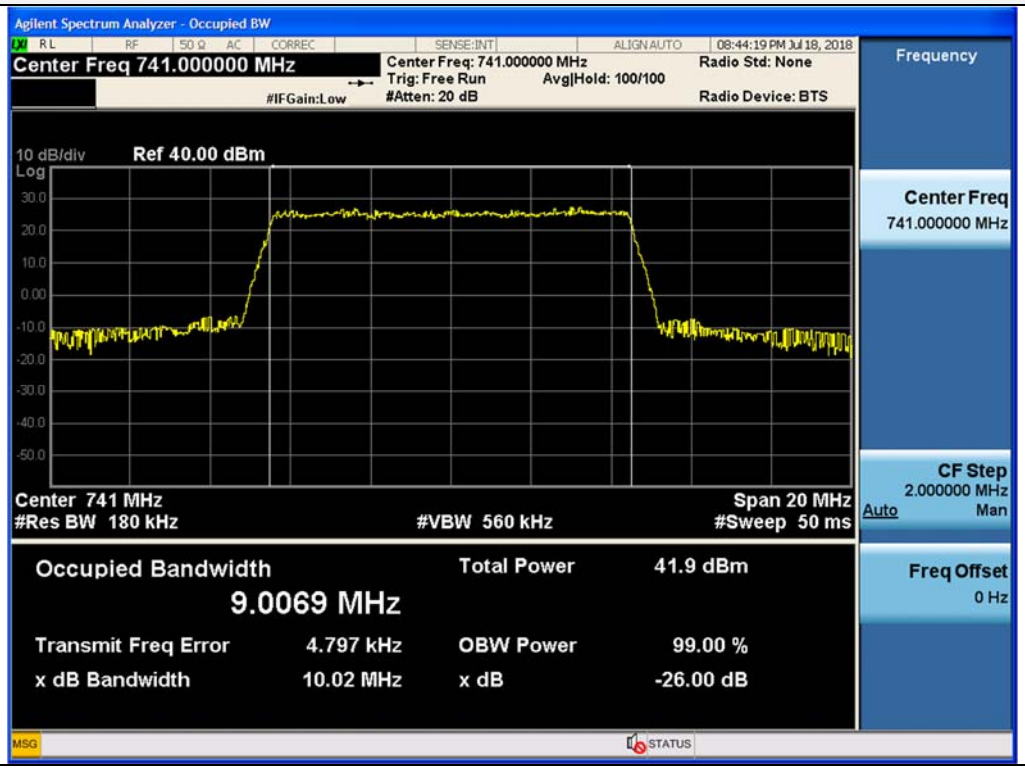
Output / 700 LTE / Downlink / LTE 10 MHz


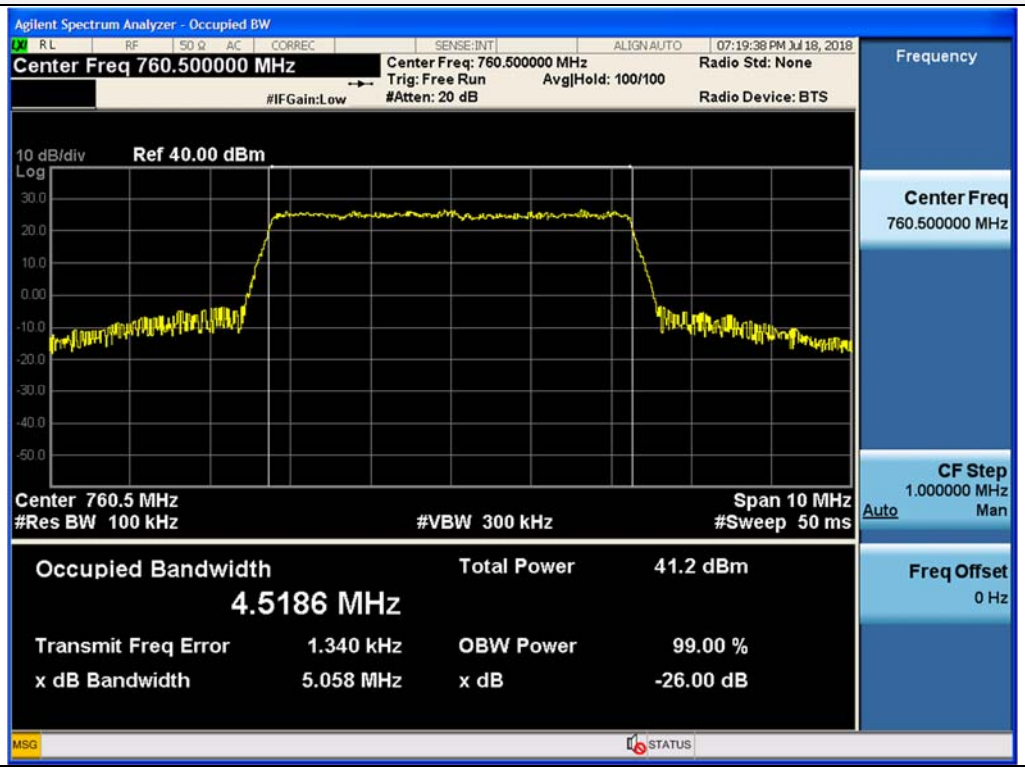
Output / FirstNet / Downlink / LTE 5 MHz / Low Channel


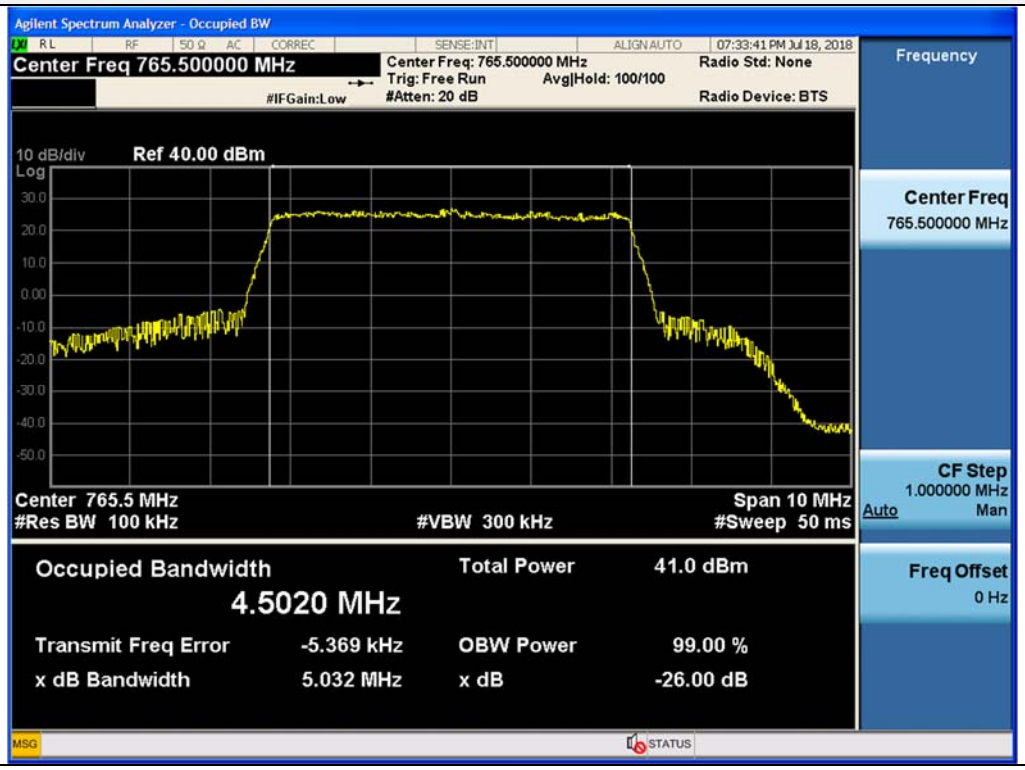
Output / FirstNet / Downlink / LTE 5 MHz / High Channel


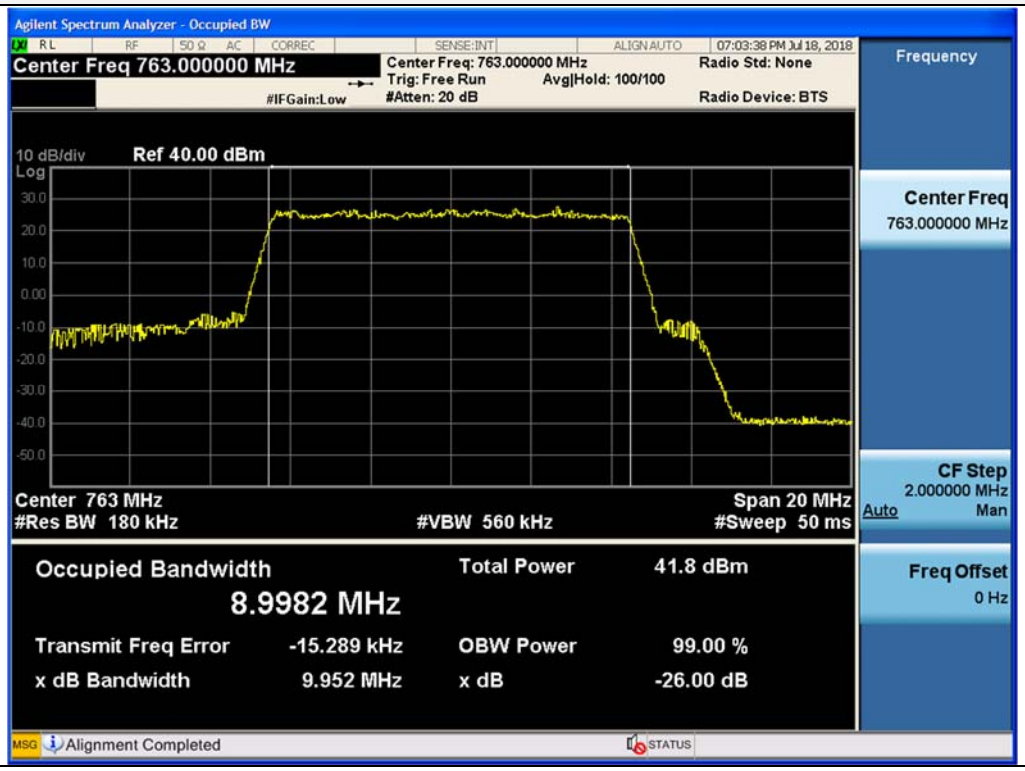
Output / FirstNet / Downlink / LTE 10 MHz


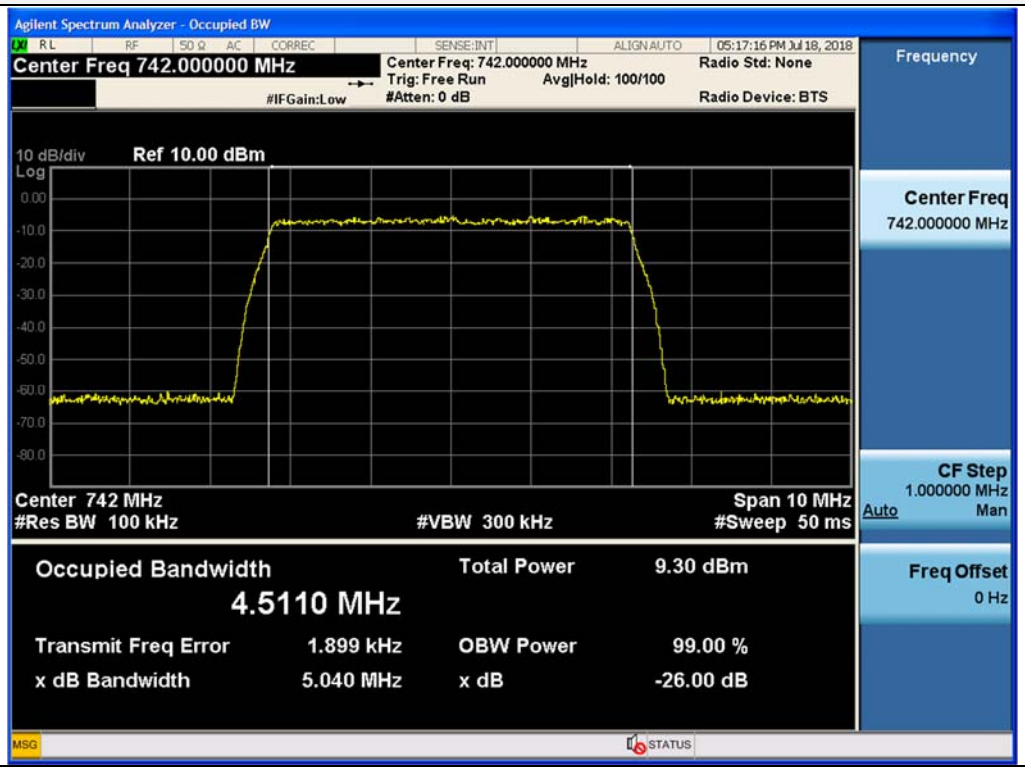
3 dB above the AGC threshold output / 700 LTE / Downlink / LTE 5 MHz


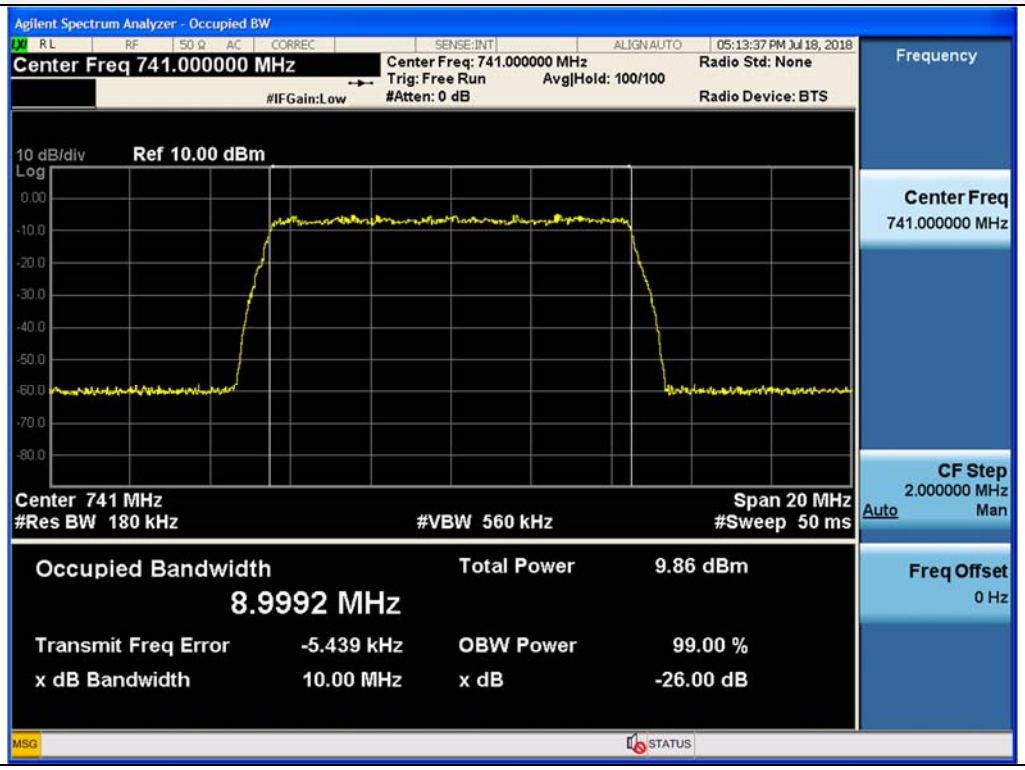
3 dB above the AGC threshold output / 700 LTE / Downlink / LTE 10 MHz


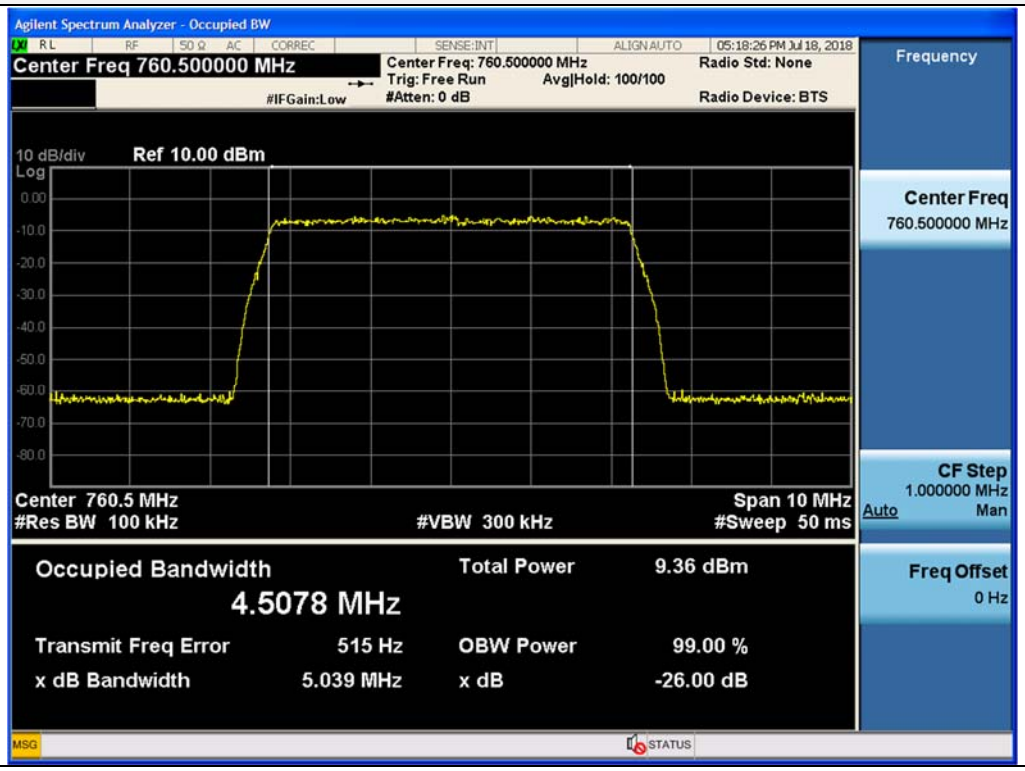
3 dB above the AGC threshold output / FirstNet / Downlink / LTE 5 MHz / Low Channel


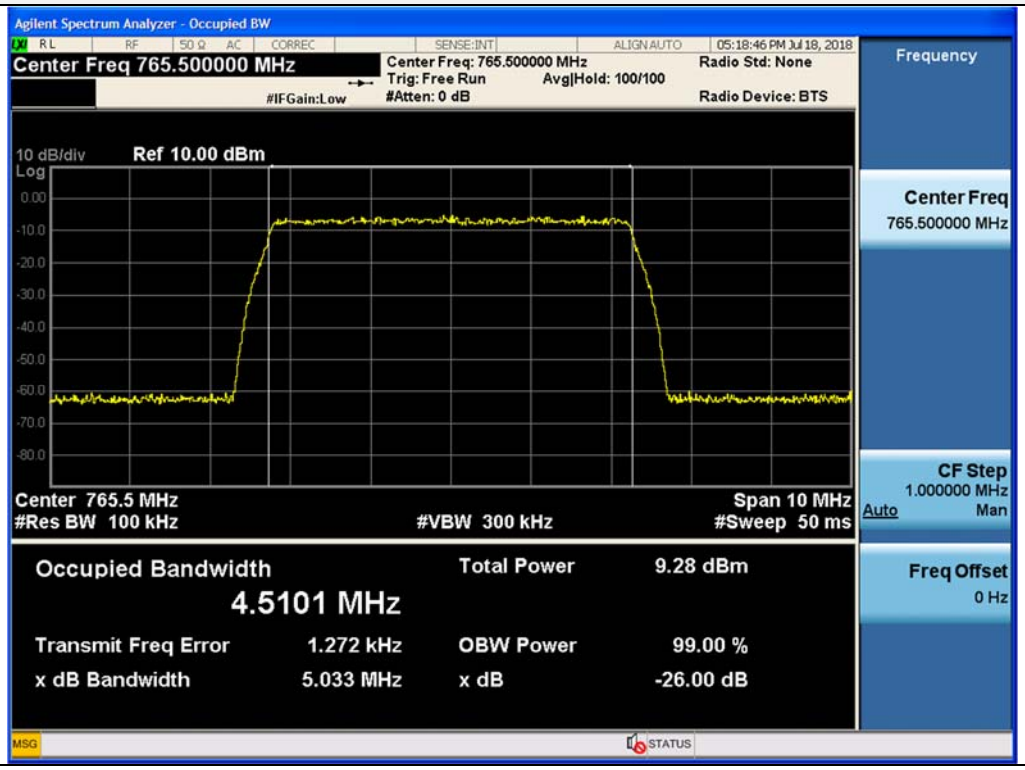
3 dB above the AGC threshold output / FirstNet / Downlink / LTE 5 MHz / High Channel


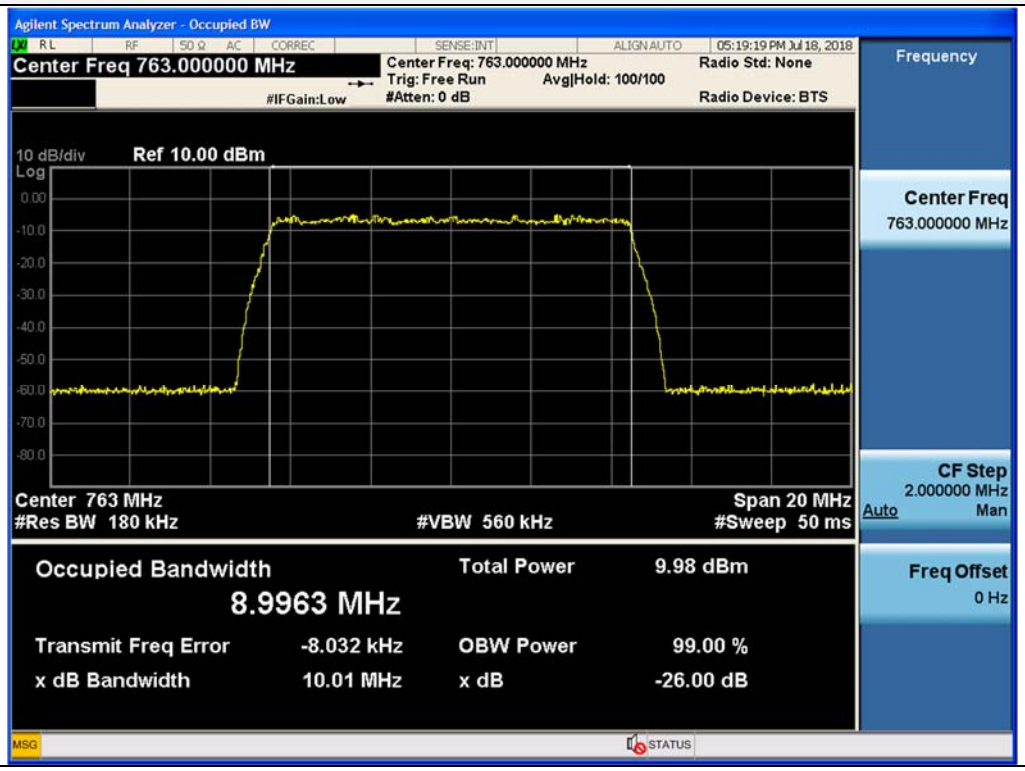
3 dB above the AGC threshold output / FirstNet / Downlink / LTE 10 MHz


Input / 700 LTE / Downlink / LTE 5 MHz


Input / 700 LTE / Downlink / LTE 10 MHz


Input / FirstNet / Downlink / LTE 5 MHz / Low Channel


Input / FirstNet / Downlink / LTE 5 MHz / High Channel


Input / FirstNet / Downlink / LTE 10 MHz


Tabular data of Output Occupied Bandwidth_800 MHz Band

Test Band	Link	Signal	Center Frequency (MHz)	99 % OBW (kHz)	26 dB OBW (kHz)
PS; B/ILT; SMR	Downlink	P25 Phase 2	859.75	4.864	5.451
Test Band	Link	Signal	Center Frequency (MHz)	99 % OBW (MHz)	26 dB OBW (MHz)
ESMR	Downlink	CDMA	865.50	1.2371	1.367
		LTE 5 MHz	865.50	4.5301	5.028
Cellular	Downlink	CDMA	881.50	1.2400	1.367
		WCDMA	881.50	4.2010	4.733
		LTE 5 MHz	881.50	4.5059	5.022
		LTE 10 MHz	881.50	8.9894	9.977

Tabular data of 3 dB above the AGC threshold Output Occupied Bandwidth_800 MHz Band

Test Band	Link	Signal	Center Frequency (MHz)	99 % OBW (kHz)	26 dB OBW (kHz)
PS; B/ILT; SMR	Downlink	P25 Phase 2	859.75	4.822	5.459
Test Band	Link	Signal	Center Frequency (MHz)	99 % OBW (MHz)	26 dB OBW (MHz)
ESMR	Downlink	CDMA	865.50	1.2397	1.366
		LTE 5 MHz	865.50	4.5114	4.972
Cellular	Downlink	CDMA	881.50	1.2380	1.361
		WCDMA	881.50	4.1614	4.716
		LTE 5 MHz	881.50	4.5158	5.011
		LTE 10 MHz	881.50	9.0092	9.924

Tabular data of Input Occupied Bandwidth_800 MHz Band

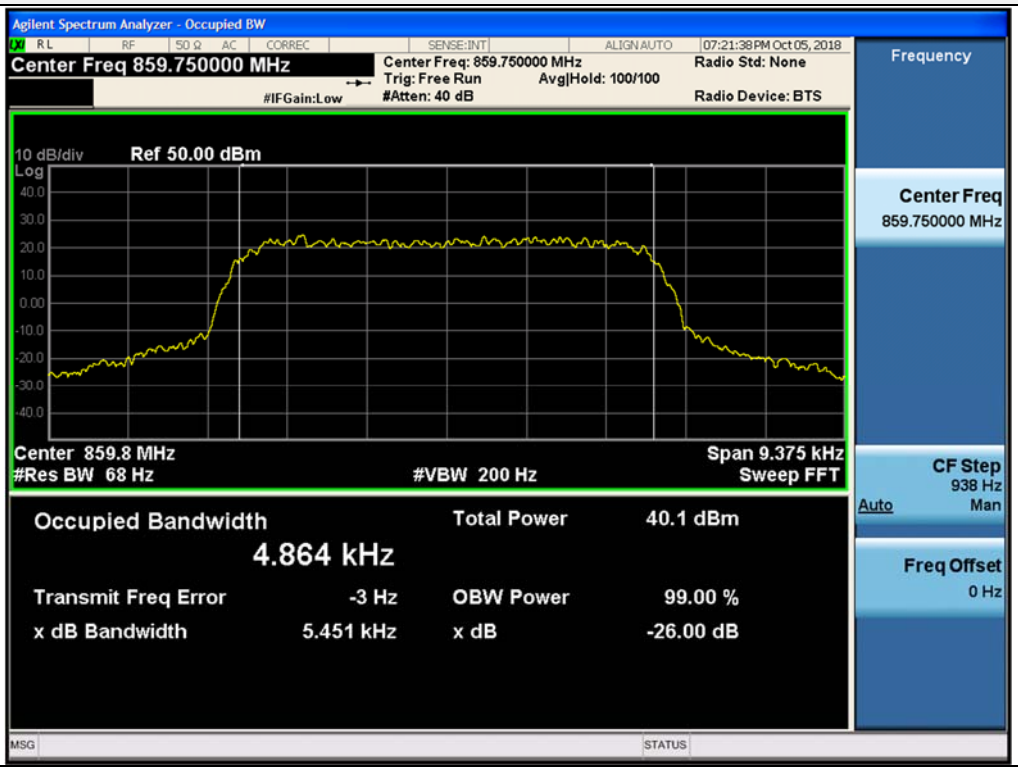
Test Band	Link	Signal	Center Frequency (MHz)	99 % OBW (kHz)	26 dB OBW (kHz)
PS; B/ILT; SMR	Downlink	P25 Phase 2	859.75	4.831	5.444
Test Band	Link	Signal	Center Frequency (MHz)	99 % OBW (MHz)	26 dB OBW (MHz)
ESMR	Downlink	CDMA	865.50	1.2388	1.360
		LTE 5 MHz	865.50	4.5147	5.038
Cellular	Downlink	CDMA	881.50	1.2403	1.360
		WCDMA	881.50	4.2038	4.728
		LTE 5 MHz	881.50	4.5136	4.959
		LTE 10 MHz	881.50	9.0003	9.939

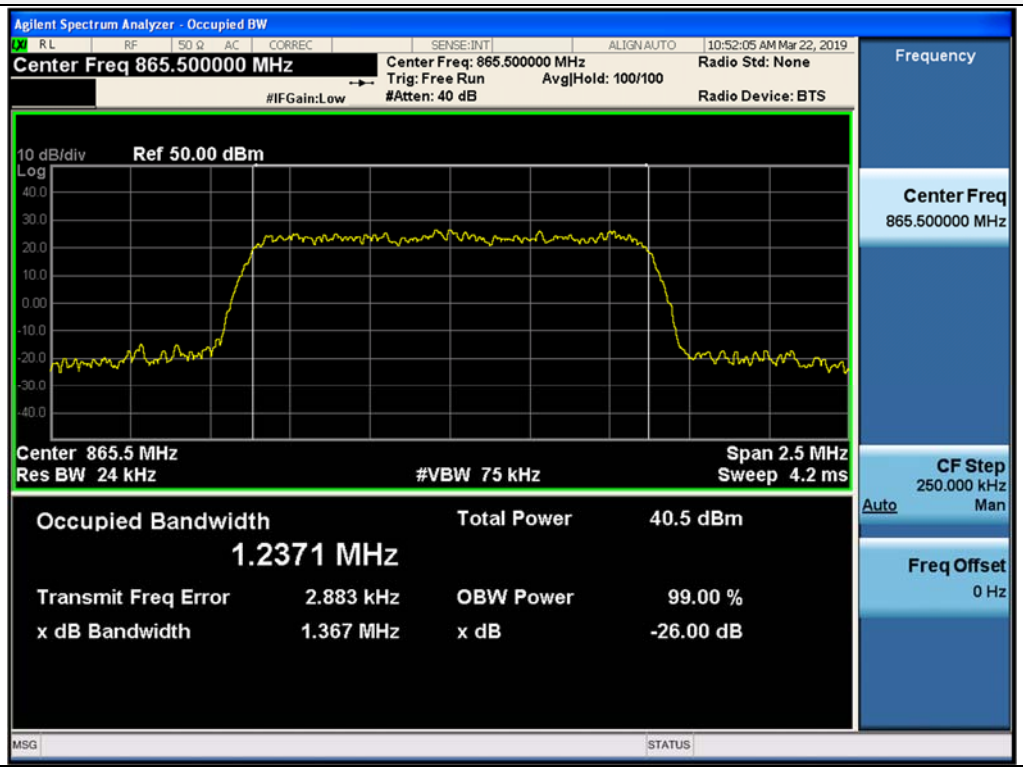
Measured Occupied Bandwidth Comparison_800 MHz Band

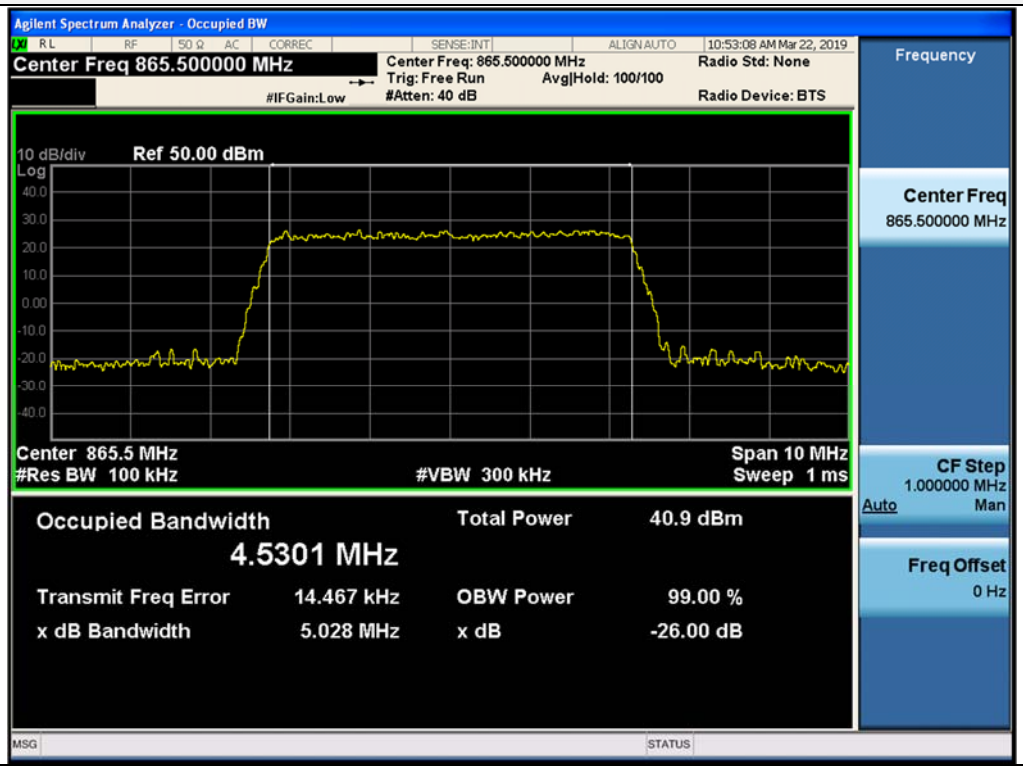
Test Band	Link	Signal	Variant of Input and output Occupied Bandwidth (%)	Variant of Input and 3 dB above the AGC threshold output Occupied Bandwidth (%)
PS; B/ILT; SMR	Downlink	P25 Phase 2	0.129	0.276
ESMR	Downlink	CDMA	0.515	0.441
		LTE 5 MHz	-0.198	-1.310
Cellular	Downlink	CDMA	0.515	0.074
		WCDMA	0.106	-0.254
		LTE 5 MHz	1.270	1.049
		LTE 10 MHz	0.382	-0.151

** Change in input-output OBW is less than ±5 %.*

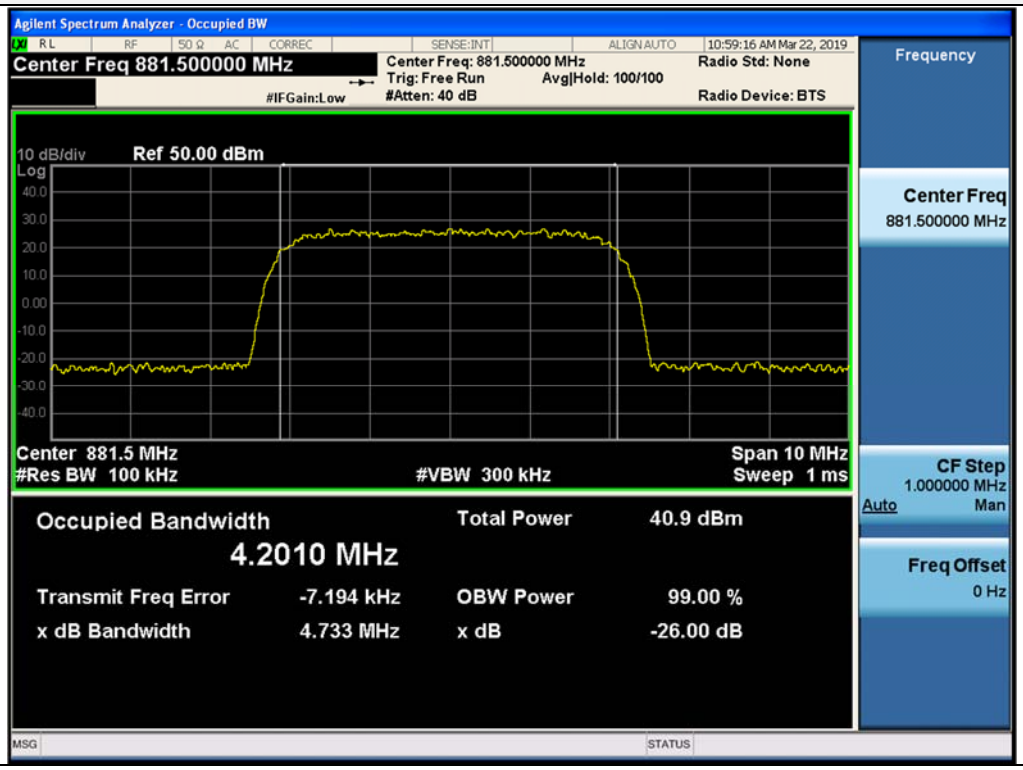
Plot data of Occupied Bandwidth_800 MHz Band

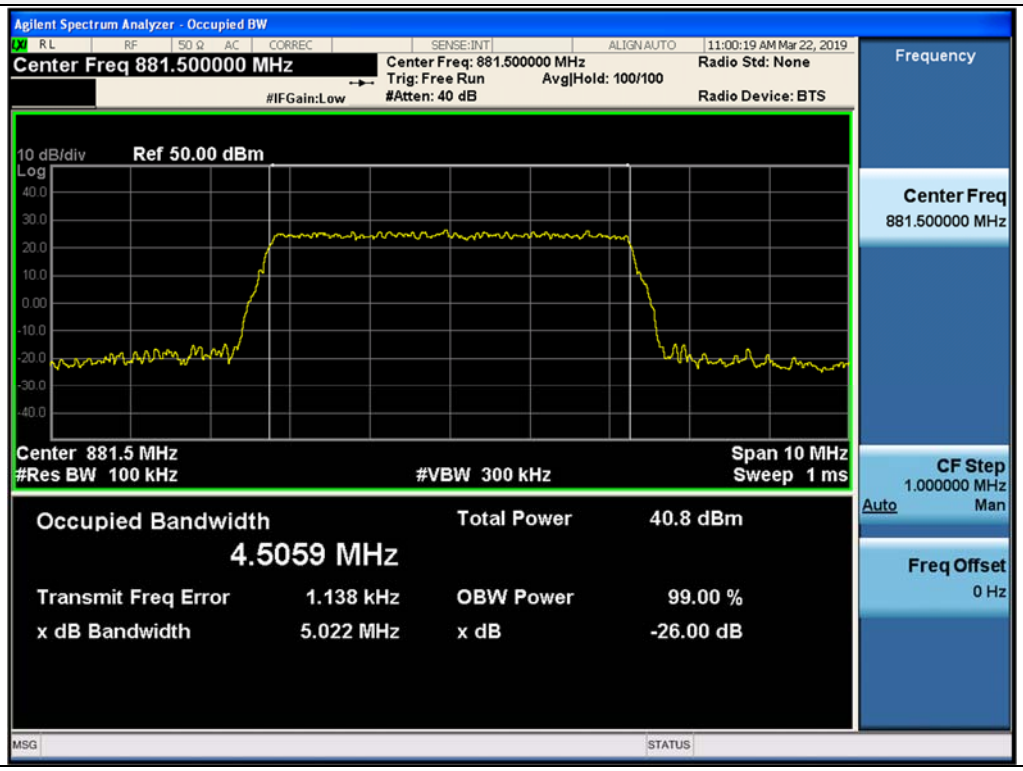
Output / PS; B/ILT; SMR / Downlink / P25 Phase 2


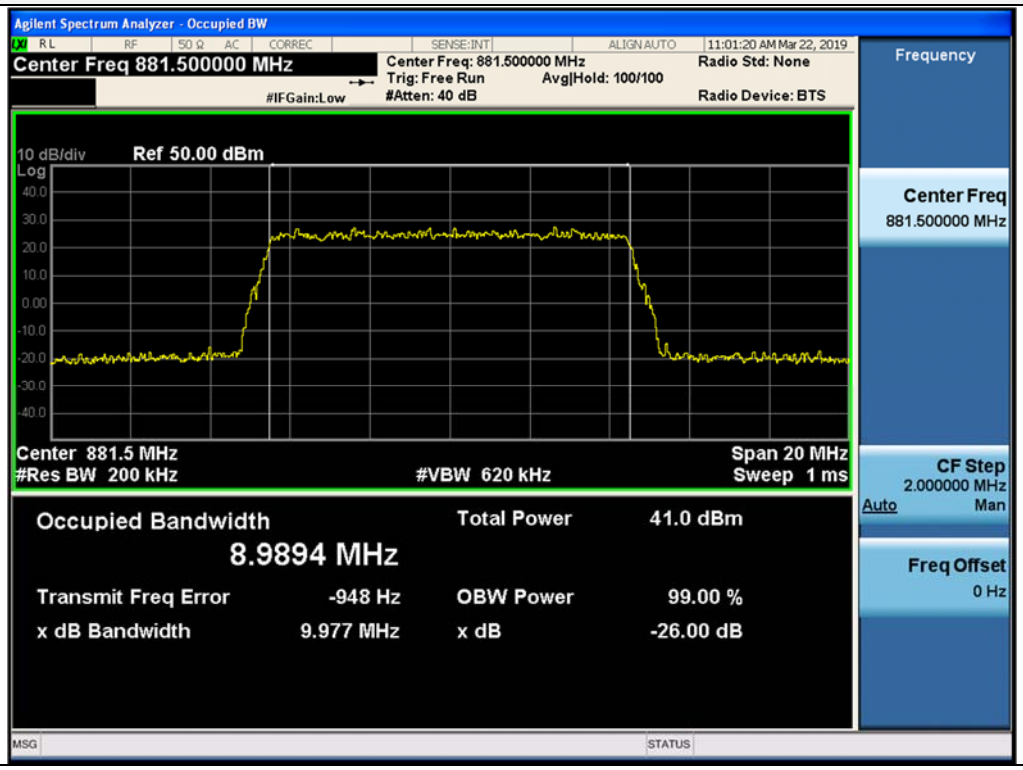
Output / ESMR / Downlink / CDMA


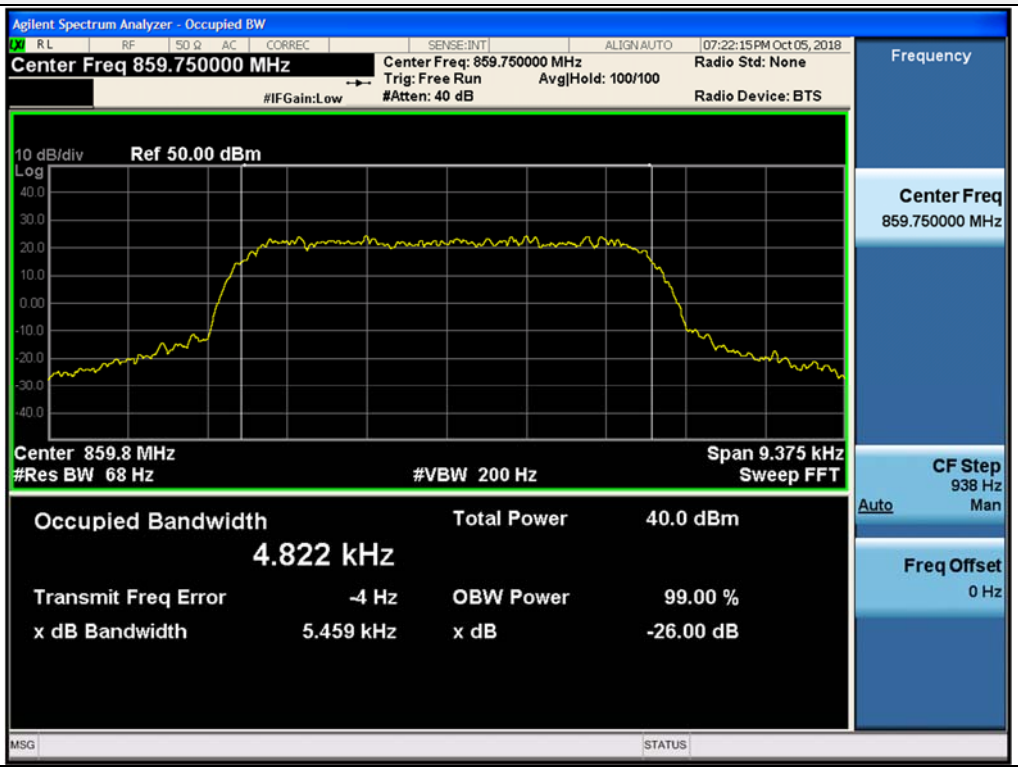
Output / ESMR / Downlink / LTE 5 MHz


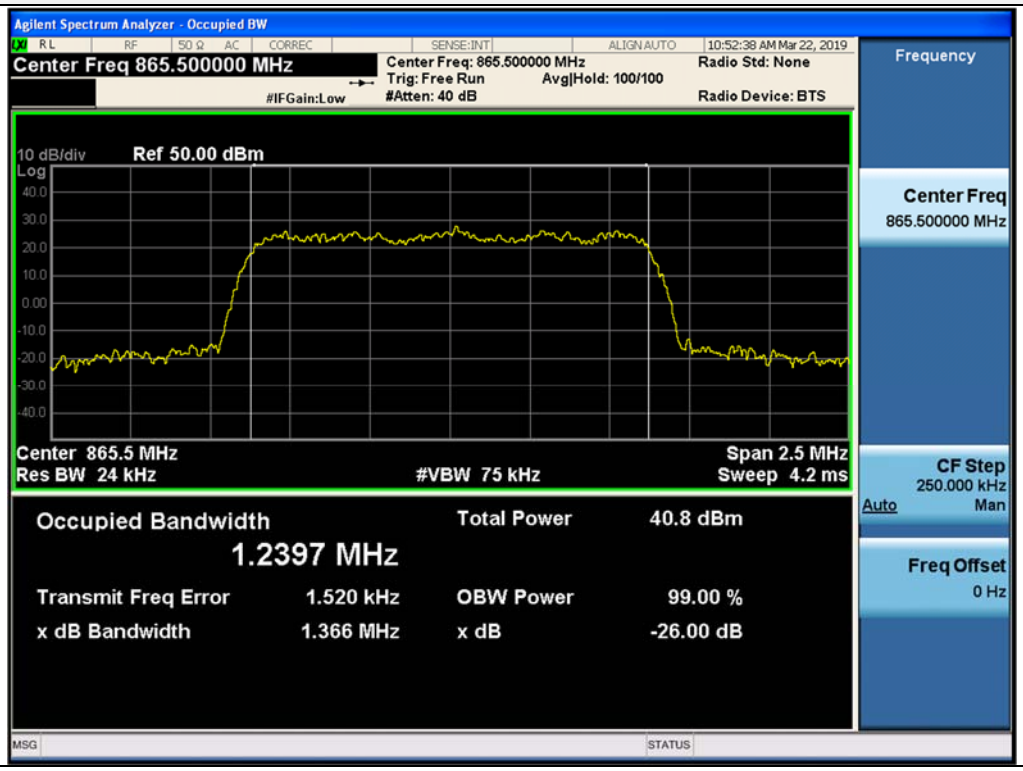
Output / Cellular / Downlink / CDMA

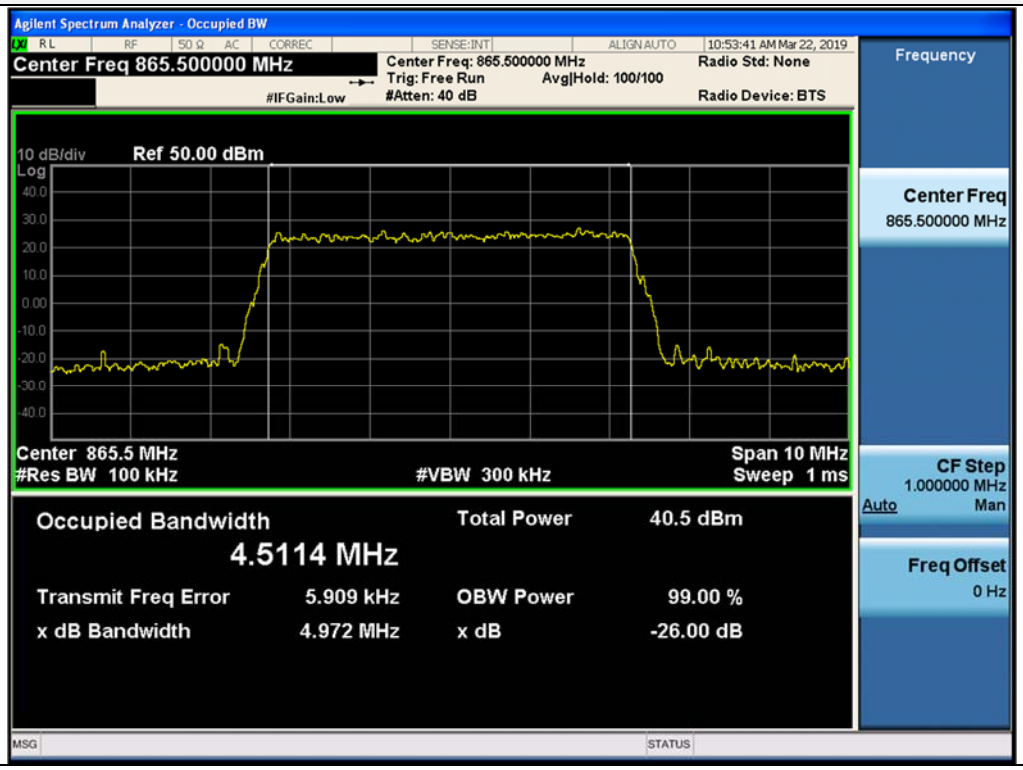

Output / Cellular / Downlink / WCDMA


Output / Cellular / Downlink / LTE 5 MHz


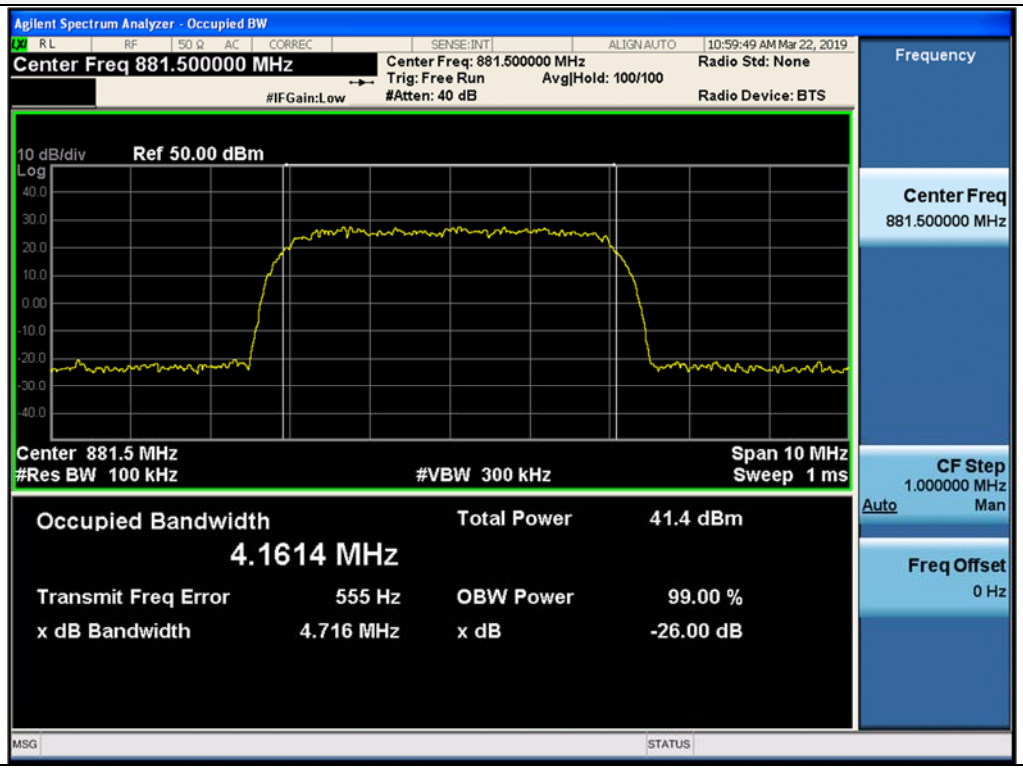
Output / Cellular / Downlink / LTE 10 MHz


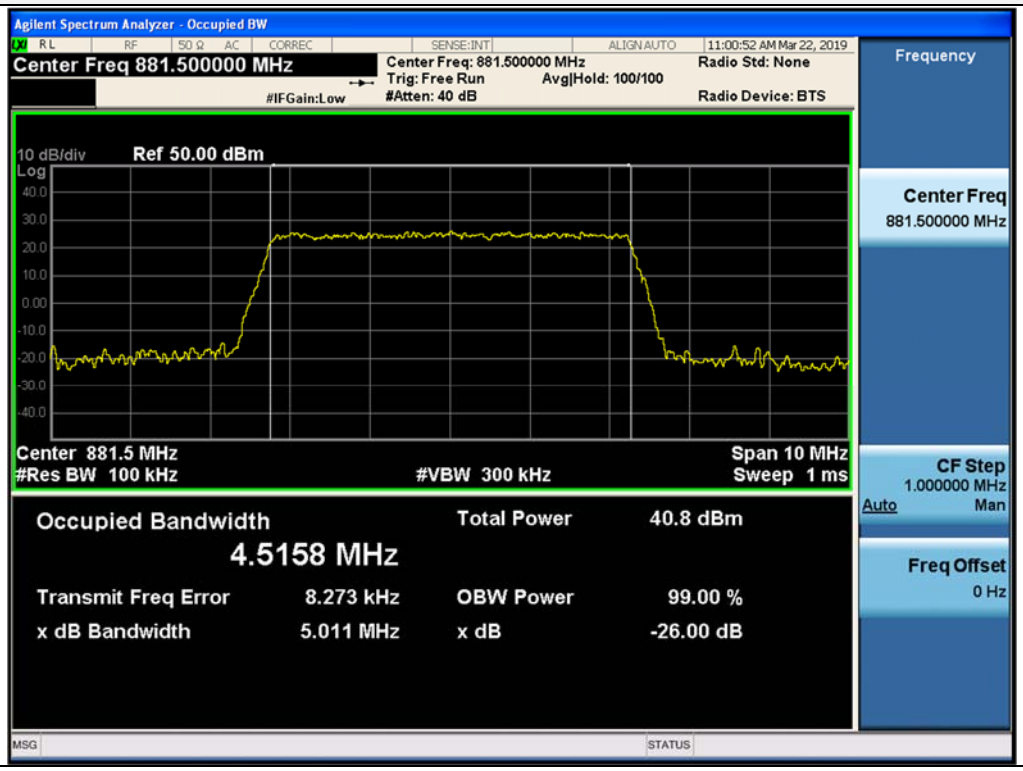
3 dB above the AGC threshold output / PS; B/ILT; SMR / Downlink / P25 Phase 2


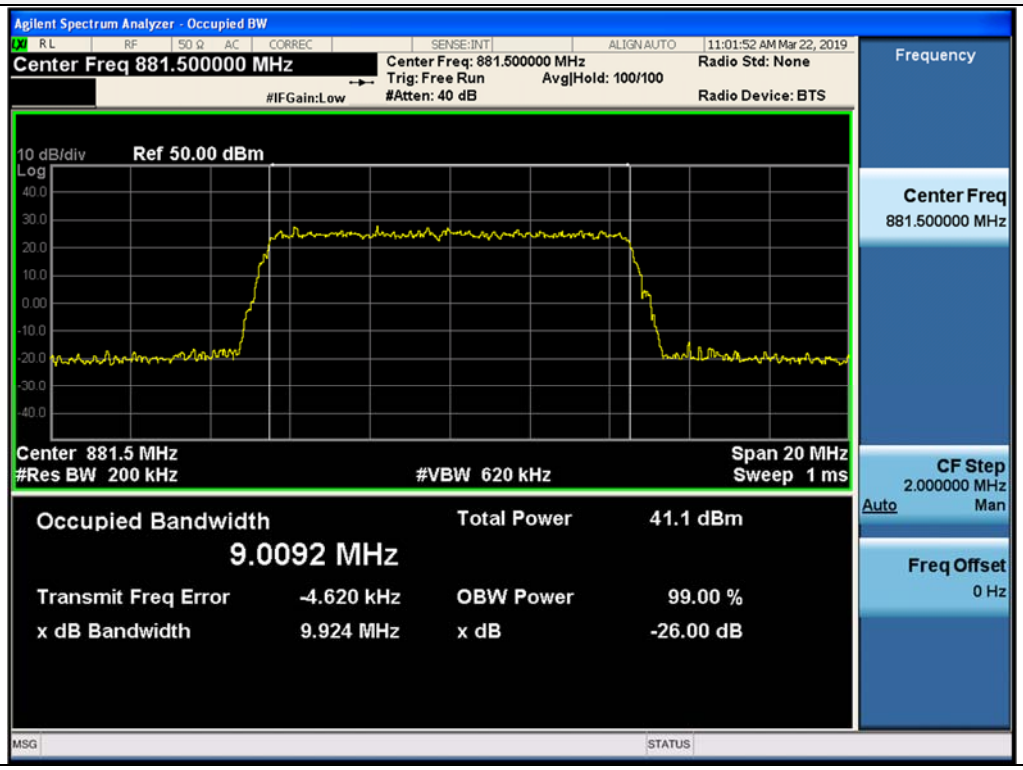
3 dB above the AGC threshold output / ESMR / Downlink / CDMA


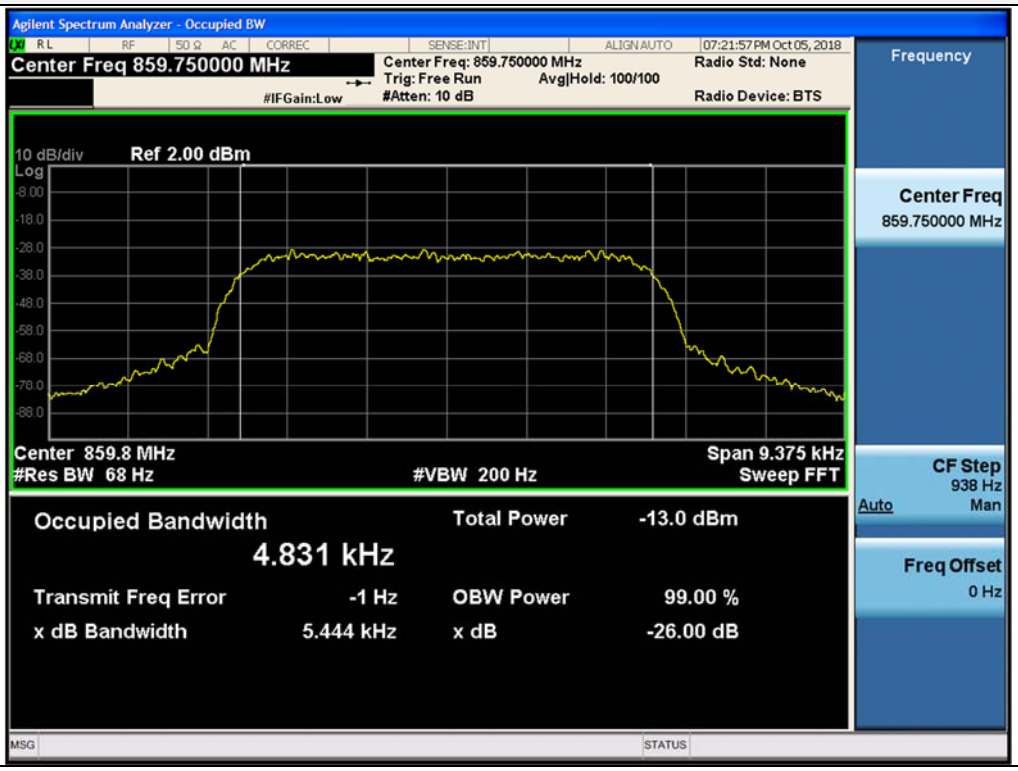
3 dB above the AGC threshold output / ESMR / Downlink / LTE 5 MHz


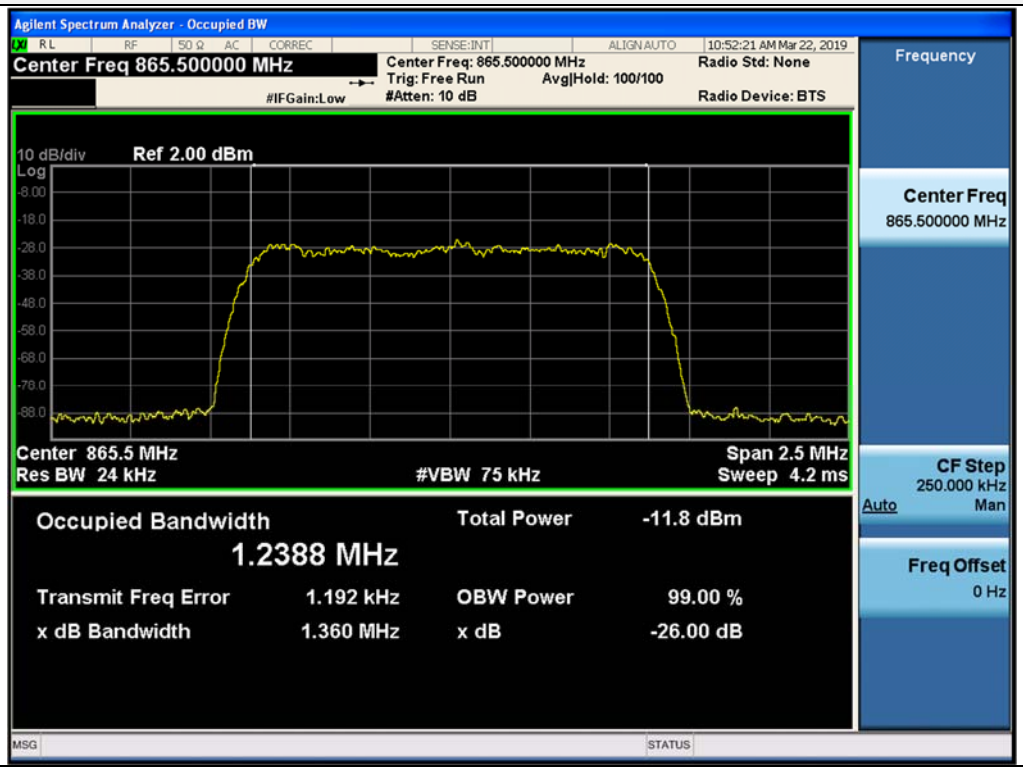
3 dB above the AGC threshold output / Cellular / Downlink / CDMA


3 dB above the AGC threshold output / Cellular / Downlink / WCDMA


3 dB above the AGC threshold output / Cellular / Downlink / LTE 5 MHz


3 dB above the AGC threshold output / Cellular / Downlink / LTE 10 MHz


Input / PS; B/ILT; SMR / Downlink / P25 Phase 2


Input / ESMR / Downlink / CDMA


Input / ESMR / Downlink / LTE 5 MHz