HCT CO.,LTD
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TEL: +82-31-645-6300 FAX: +82-31-645-6401

FCC REPORT

Certification

Applicant Name:
GS Instech Co., Ltd.

Address:
70, Gilpa-ro 71beon-gil, Nam-gu, Inchen, Korea

Date of Issue:
September 06, 2018

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

Report No.: HCT-RF-1809-FC017

FCC ID:	**U88CC-I13**
APPLICANT:	**GS Instech Co., Ltd.**

Model:	CC-I13
EUT Type:	Industrial RF Repeater
Frequency Range:	862 MHz ~ 894 MHz (DL) / 817 MHz ~ 849 MHz (UL)
Output Power:	DL : 13 dBm (0.02 W) UL : 18 dBm (0.06 W)
Date of Test:	July 23, 2018 ~ August 08, 2018
FCC Rule Part(s):	CFR 47 Part 2, Part 22, 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 : Kwang Il Yoon
Engineer of telecommunication testing center

Approved by : Jong Seok Lee
Manager of telecommunication testing center

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-1809-FC017	September 06, 2018	- First Approval Report

Table of Contents

1. GENERAL INFORMATION

1.1. APPLICANT INFORMATION

Company Name	GS Instech Co., Ltd.
Company Address	70, Gilpa-ro 71beon-gil, Nam-gu, Inchen, Korea

1.2. PRODUCT INFORMATION

EUT Type	Industrial RF Repeater
Power Supply	AC-DC Adapter (Input : AC 90 ~ 264V, Output : DC 12V)
Frequency Range	862 MHz ~ 894 MHz (DL) / 817 MHz ~ 849 MHz (UL)
Output Power	DL : 13 dBm (0.02 W) UL : 18 dBm (0.06 W)
Supporting Technologies	LTE 5 MHz, CDMA, 1xEVDO
Antenna Specification	Manufacturer does not provide an antenna.

1.3. TEST INFORMATION

FCC Rule Parts	CFR 47 Part 2, Part 22, Part 90
Measurement standards	ANSI C63.26-2015, KDB 971168 D01 v03r01, KDB 935210 D05 v01r02
Place of Test	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 90

Description	Reference	Results
RF Output Power	§2.1046, §22.913, §90.635	Compliant
Occupied Bandwidth	§2.1049	Compliant
Out of Band Rejection	KDB 935210 D05 v01r02	Compliant
Noise Figure	§90.219	Compliant
Unwanted Conducted Emissions	§2.1051, §22.917, §90.691	Compliant
Radiated Emissions	§2.1053, §22.917, §90.691	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.
* Since EUT does not alter the input signal, frequency stability test did not proceed according to section 4.8 of KDB935210 D05 v01r02.
* The tests results in plots are already including the actual value of loss for the attenuator and cable combination. Please check correction factors below table.

▣ Correction Factor

Freq(MHz)	Factor(dB)
50	20.014
100	19.929
200	20.130
300	20.199
400	20.327
500	20.119
600	20.254
700	20.373
800	20.397
900	20.397
1000	20.414
2000	20.836
3000	20.743
4000	21.265
5000	21.408
6000	21.558
7000	21.863
8000	22.118
9000	21.590
10000	21.884
20000	23.124
26000	24.212

3.3. MAXIMUM MEASUREMENTUNCERTAINTY

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

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

Description	Condition	Uncertainty
RF Output Power	-	± 0.72 dB
Occupied Bandwidth	OBW ≤ 20 MHz	± 52 kHz
Out of Band Rejection	Gain 20 dB bandwidth	± 0.89 dB ± 0.58 MHz
Noise Figure	-	± 0.89 dB
Unwanted Conducted Emissions	-	± 1.08 dB
Radiated Emissions	f ≤ 1 GHz f > 1 GHz	± 4.80 dB ± 6.07 dB

3.4. STANDARDS ENVIRONMENTAL TEST CONDITIONS

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

4. TEST EQUIPMENTS

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Agilent	N9020A / Spectrum Analyzer	09/15/2017	Annual	MY46471250
Agilent	N5128A / Signal Generator	03/05/2018	Annual	MY50141649
Agilent	N5128A / Signal Generator	02/17/2018	Annual	MY46240523
Agilent	11636A / Power Divider	07/26/2018	Annual	09109
Changwoo	18N-20dB / Attenuator	02/22/2018	Annual	4
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	04/19/2017	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	FSP30 / Spectrum Analyzer	09/06/2017	Annual	100688
Wainwright Instruments	WHKX10-900-1000-15000-40SS	07/20/2018	Annual	5
Wainwright Instruments	WHKX10-2700-3000-18000-40SS / High Pass Filter	07/16/2018	Annual	4
CERNEX	CBLU1183540 / Power Amplifier	01/03/2018	Annual	24613
CERNEX	CBL06185030 / Power Amplifier	01/03/2018	Annual	24615
CERNEX	CBL18265035 / Power Amplifier	01/10/2018	Annual	22966

5. 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 radiotelephone 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 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.

Licensees in the Cellular Radiotelephone Service are subject to the effective radiated power (ERP) limits and other requirements in this Section. See also §22.169.

(a) *Maximum ERP*. The ERP of transmitters in the Cellular Radiotelephone Service must not exceed the limits in this section.

(1) Except as described in paragraphs (a)(2), (3), and (4) of this section, the ERP of base stations and repeaters must not exceed—

(i) 500 watts per emission; or

(ii) 400 watts/MHz (PSD) per sector.

(d) Power measurement. Measurement of the ERP of Cellular base transmitters and repeaters must be made using an average power measurement technique. The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB. Power measurements for base transmitters and repeaters must be made in accordance with either of the following:

(1) A Commission-approved average power technique (see FCC Laboratory's Knowledge Database); or

(2) For purposes of this section, peak transmit power must be measured over an interval of

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

§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)
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)	1,000

Test Procedures:

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

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

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

c) The frequency of the signal generator shall be set to the frequency f_0 as determined from 3.3.

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

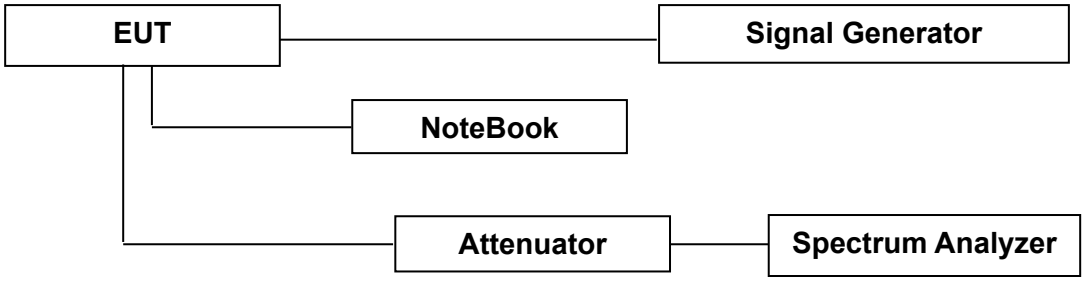
e) Set the signal generator output power to a level that produces an EUT output level that is just below the AGC threshold (see 3.2), but not more than 0.5 dB below.

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

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

h) Repeat steps f) and g) with input signal amplitude set to 3 dB above the AGC threshold level.
i) Repeat steps e) to h) with the narrowband test signal.
j) Repeat steps e) to i) for all frequency bands authorized for use by the EUT.

Power measurement Method:
Guidance for performing input/output power measurements using a spectrum or signal analyzer is provided in 5.2 of KDB Publication 971168 D01 v03r01.



Block Diagram 1. RF Power Output Test Setup

Test Results:

Input Signal	Link	Input Level (dBm)	Maximum Amp Gain (dB)
800	Downlink	-62	75
	Uplink	-57	

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

Data of Output Power – FCC Part 90 Band

Downlink	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
LTE 5 MHz AGC threshold	Low	864.500	12.89	0.019
	Middle	865.500	13.02	0.020
	High	866.500	13.14	0.021
LTE 5 MHz +3 dB above the AGC threshold	Low	864.500	13.02	0.020
	Middle	865.500	13.20	0.021
	High	866.500	13.18	0.021
CDMA AGC threshold	Low	863.250	12.85	0.019
	Middle	865.500	12.94	0.020
	High	867.750	13.25	0.021
CDMA +3 dB above the AGC threshold	Low	863.250	12.96	0.020
	Middle	865.500	12.89	0.019
	High	867.750	13.21	0.021

Uplink	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
LTE 5 MHz AGC threshold	Low	819.500	18.08	0.064
	Middle	820.500	18.07	0.064
	High	821.500	18.15	0.065
LTE 5 MHz +3 dB above the AGC threshold	Low	819.500	18.02	0.063
	Middle	820.500	18.05	0.064
	High	821.500	18.19	0.066
CDMA AGC threshold	Low	818.250	18.20	0.066
	Middle	820.500	18.10	0.065
	High	822.750	18.17	0.066
CDMA +3 dB above the AGC threshold	Low	818.250	18.00	0.063
	Middle	820.500	18.11	0.065
	High	822.750	18.14	0.065

Data of Output Power – FCC Part 22 Band

Downlink	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
LTE 5 MHz AGC threshold	Low	871.500	12.83	0.019
	Middle	881.500	13.19	0.021
	High	891.500	12.78	0.019
LTE 5 MHz +3 dB above the AGC threshold	Low	871.500	12.87	0.019
	Middle	881.500	13.27	0.021
	High	891.500	12.83	0.019
CDMA AGC threshold	Low	870.250	12.88	0.019
	Middle	881.500	13.07	0.020
	High	892.750	13.24	0.021
CDMA +3 dB above the AGC threshold	Low	870.250	12.85	0.019
	Middle	881.500	13.05	0.020
	High	892.750	13.29	0.021

Uplink	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
LTE 5 MHz AGC threshold	Low	826.500	18.18	0.066
	Middle	836.500	18.01	0.063
	High	846.500	18.02	0.063
LTE 5 MHz +3 dB above the AGC threshold	Low	826.500	18.12	0.065
	Middle	836.500	17.99	0.063
	High	846.500	18.03	0.064
CDMA AGC threshold	Low	825.250	18.16	0.065
	Middle	836.500	18.05	0.064
	High	847.750	18.07	0.064
CDMA +3 dB above the AGC threshold	Low	825.250	18.14	0.065
	Middle	836.500	18.15	0.065
	High	847.750	18.31	0.068

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

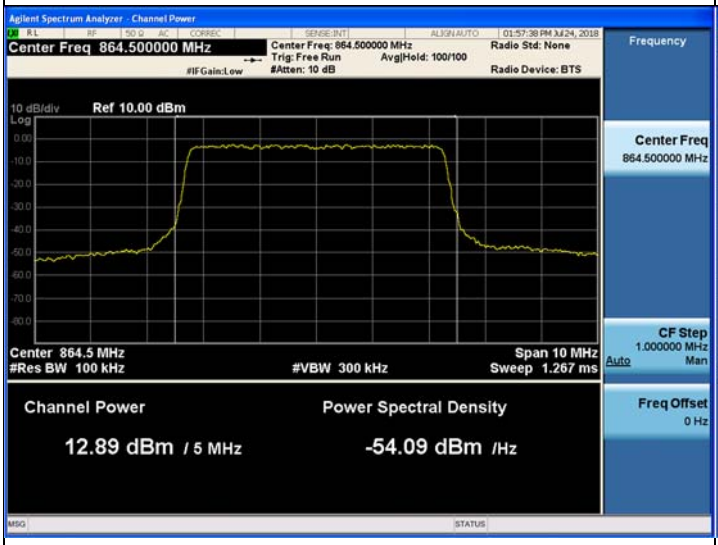
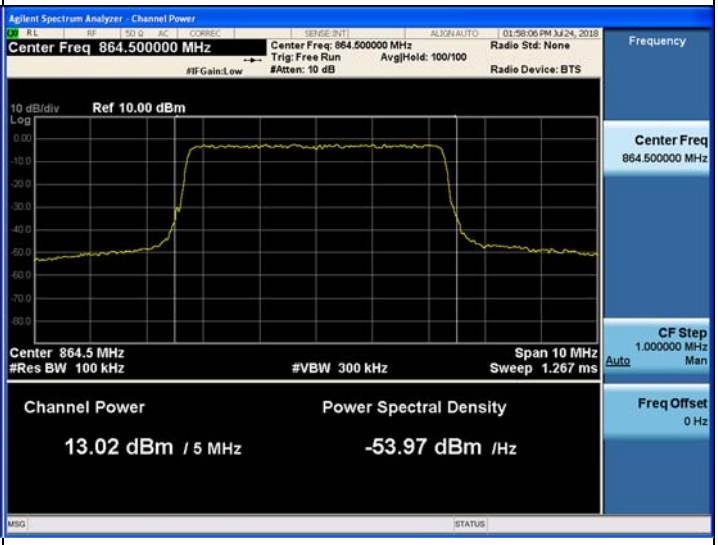
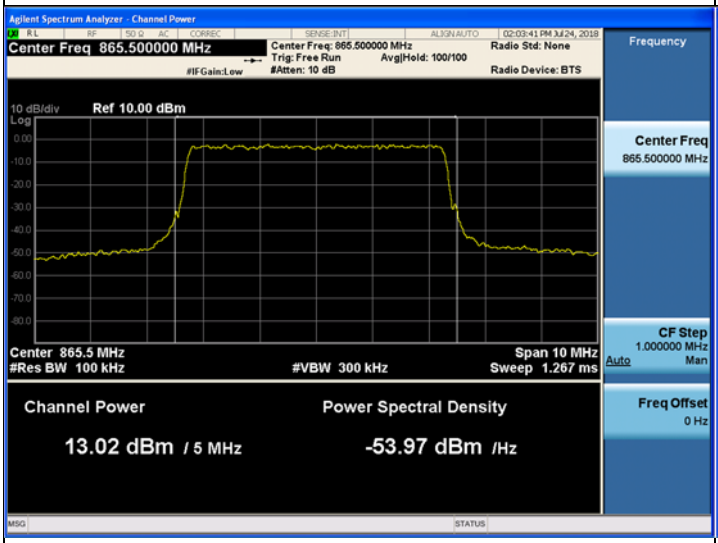
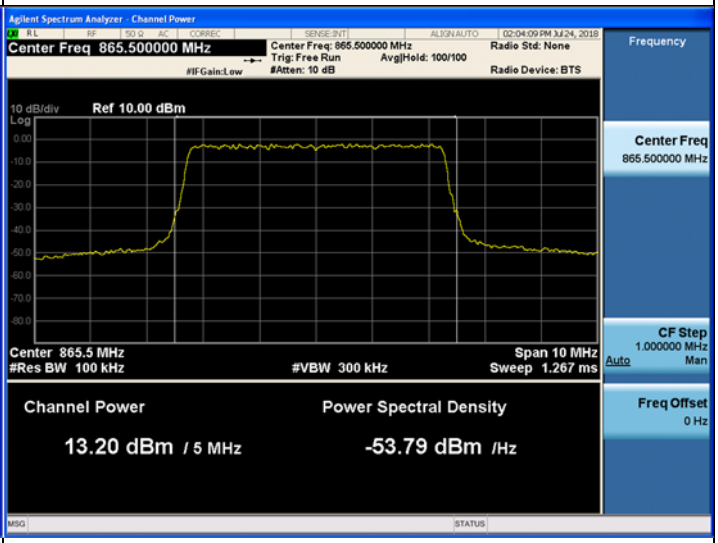
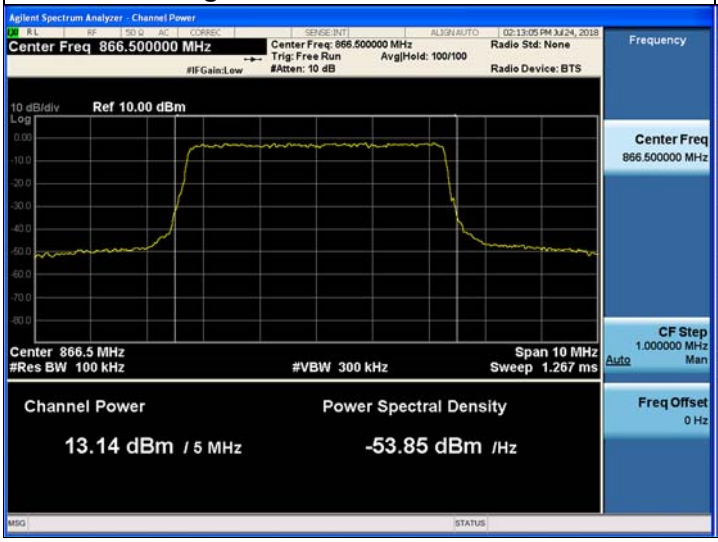
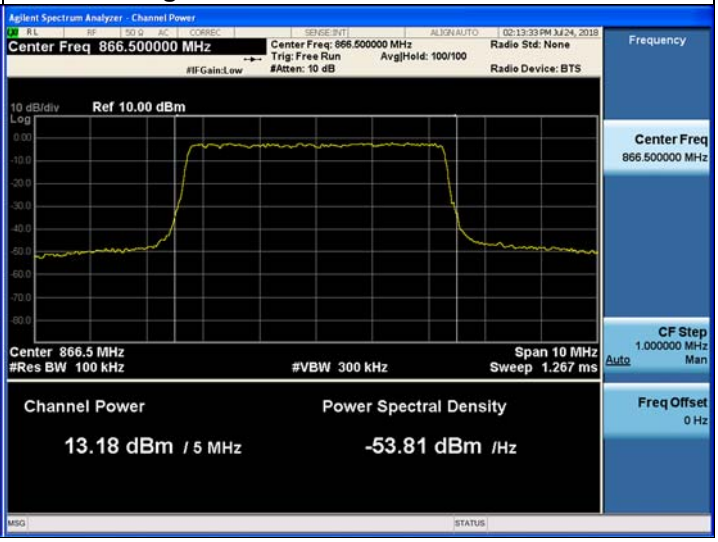
Data of Peak-to-Average Ratio (PAR) – FCC Part 22 Band

Downlink	Channel	Frequency (MHz)	Measured PAR (dB)
LTE 5 MHz AGC threshold	Middle	881.5	8.26
LTE 5 MHz +3 dB above the AGC threshold			8.28
CDMA AGC threshold			7.89
CDMA +3 dB above the AGC threshold			7.89

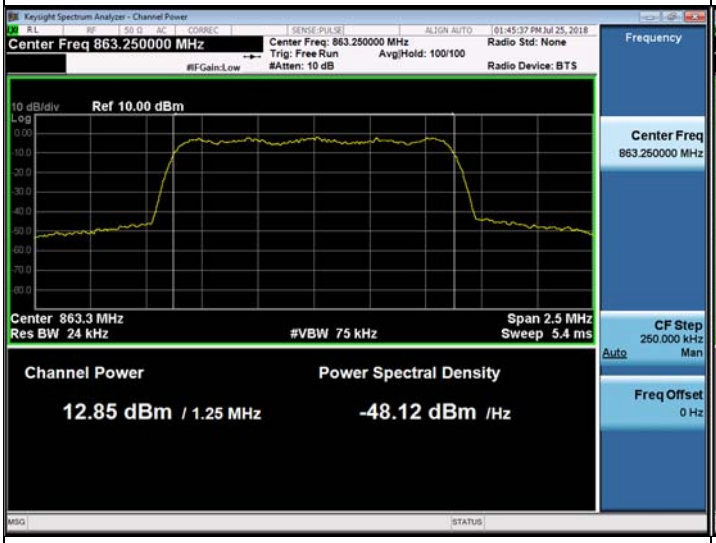
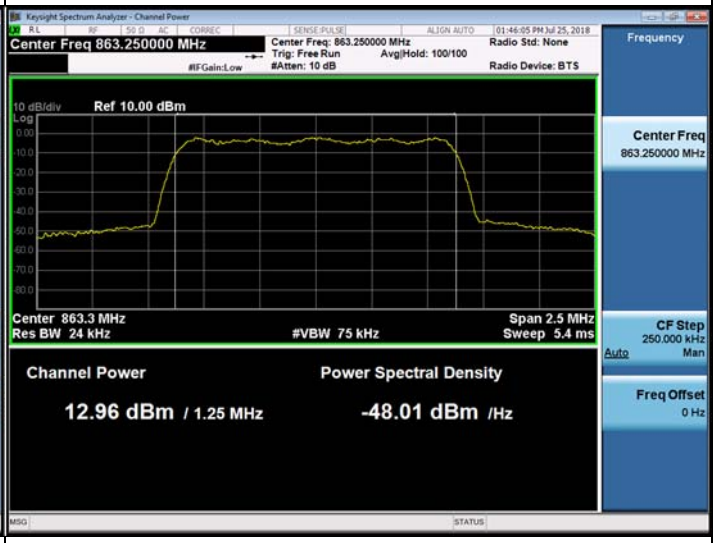
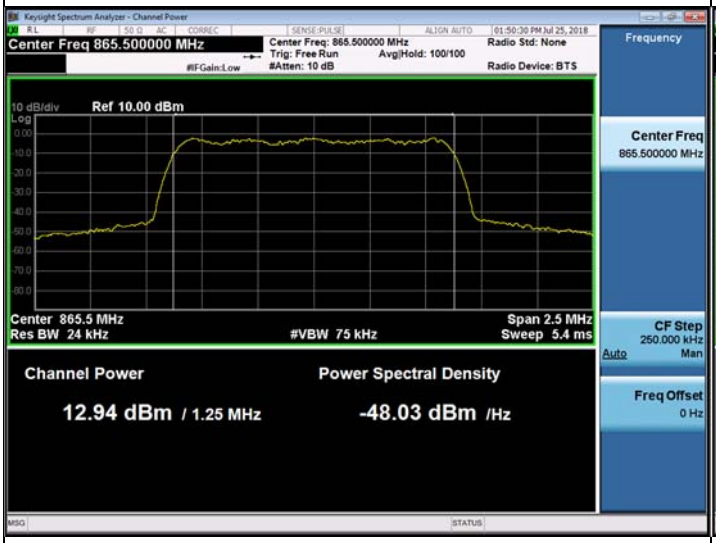
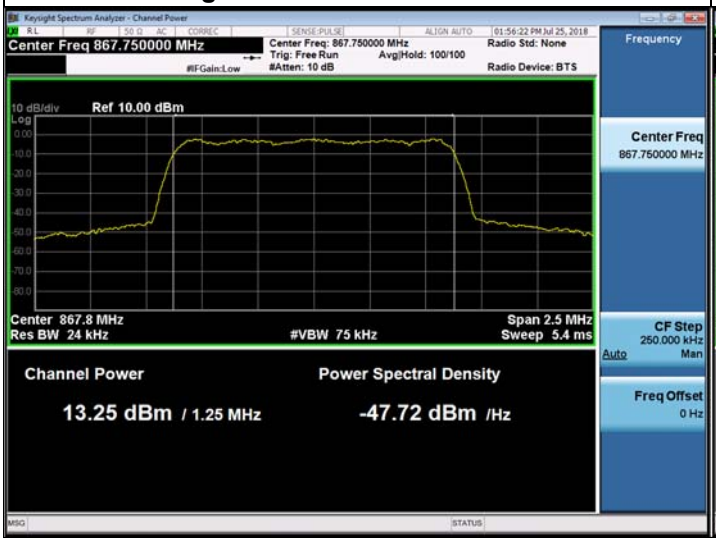
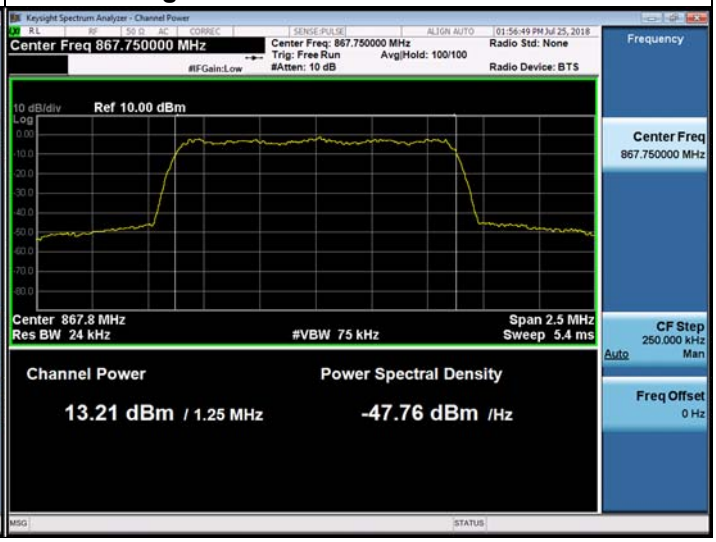
Uplink	Channel	Frequency (MHz)	Measured PAR (dB)
LTE 5 MHz AGC threshold	Middle	836.5	8.47
LTE 5 MHz +3 dB above the AGC threshold			8.70
CDMA AGC threshold			8.03
CDMA +3 dB above the AGC threshold			8.25

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

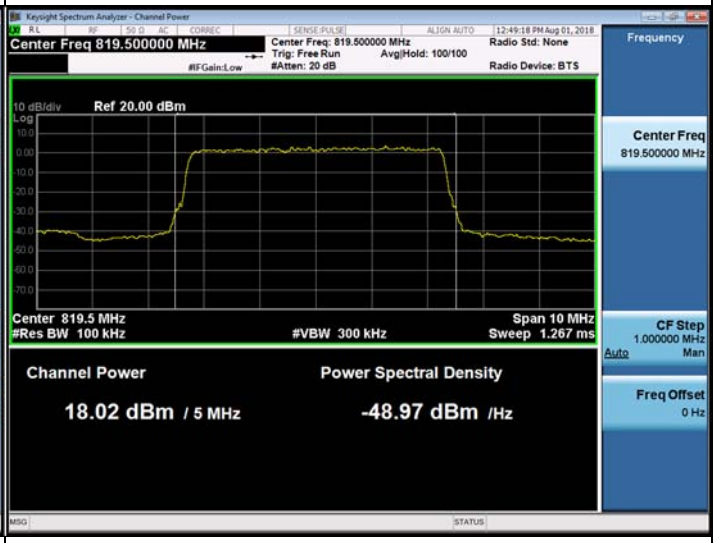
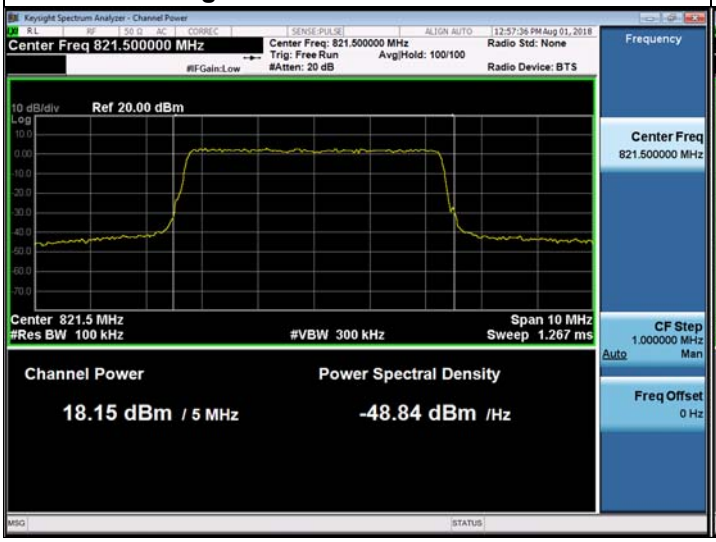
Plot of Output Power for LTE 5 MHz – FCC Part 90 Band_Downlink

Low Channel AGC threshold	Low Channel +3 dB AGC threshold
	
Middle Channel AGC threshold	**Middle Channel +3 dB AGC threshold**
	
High Channel AGC threshold	**High Channel +3 dB AGC threshold**
	

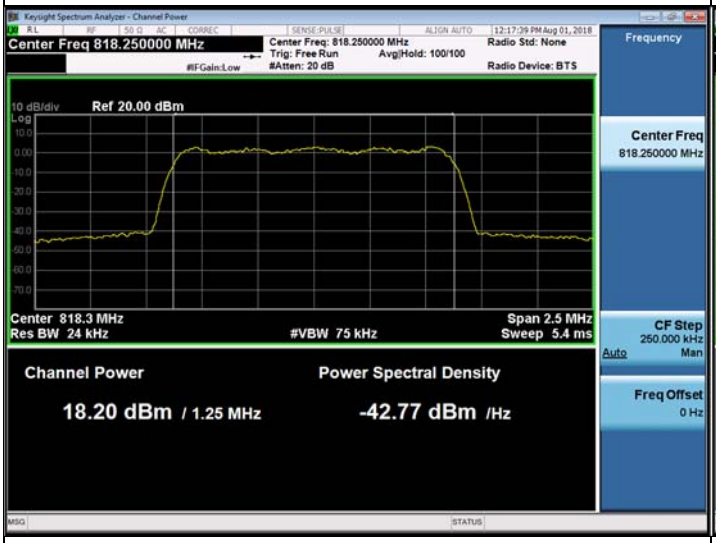
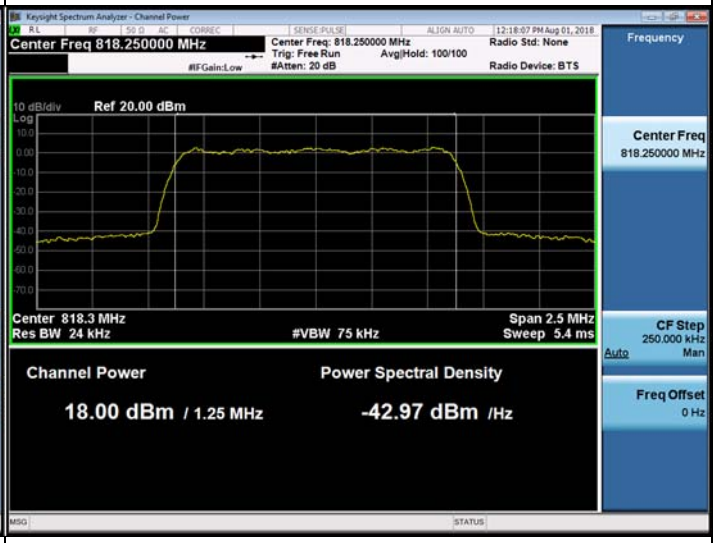
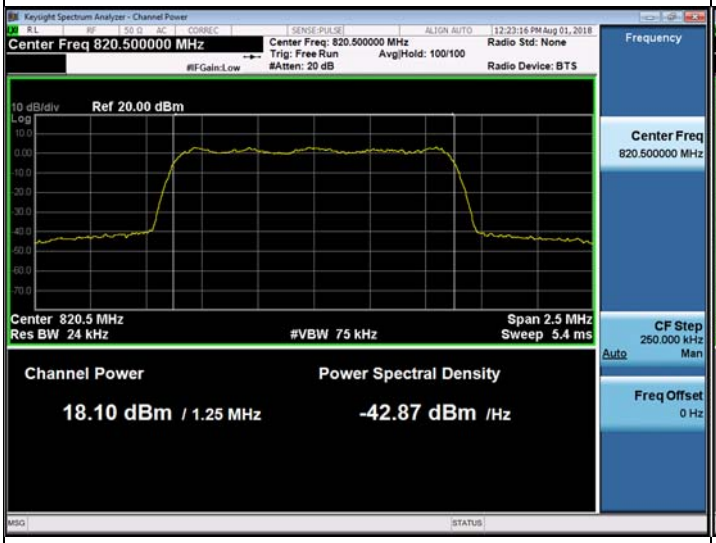
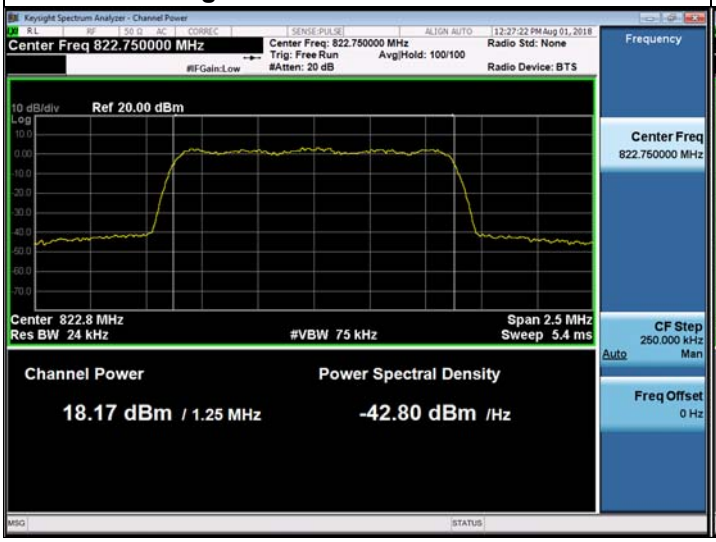
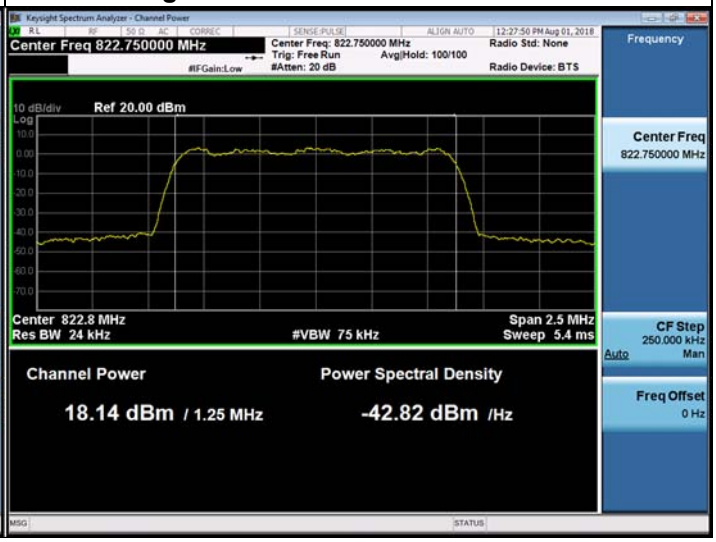
Plot of Output Power for CDMA – FCC Part 90 Band_Downlink

Low Channel AGC threshold	Low Channel +3 dB AGC threshold
	
Middle Channel AGC threshold	**Middle Channel +3 dB AGC threshold**
	
High Channel AGC threshold	**High Channel +3 dB AGC threshold**
	

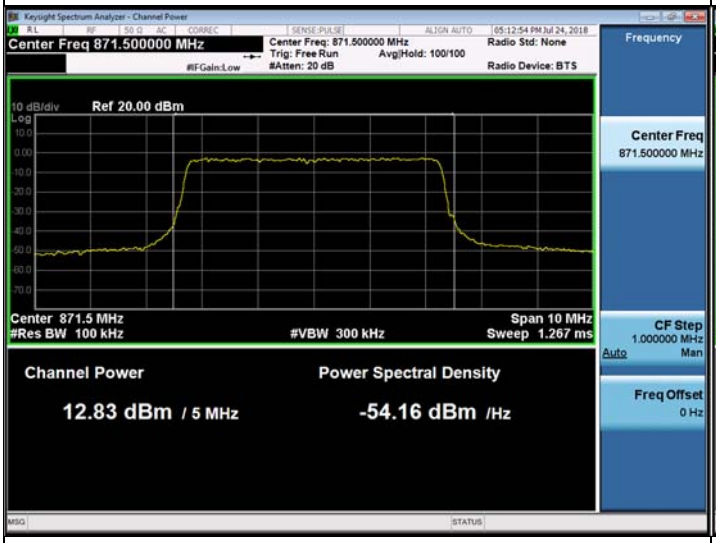
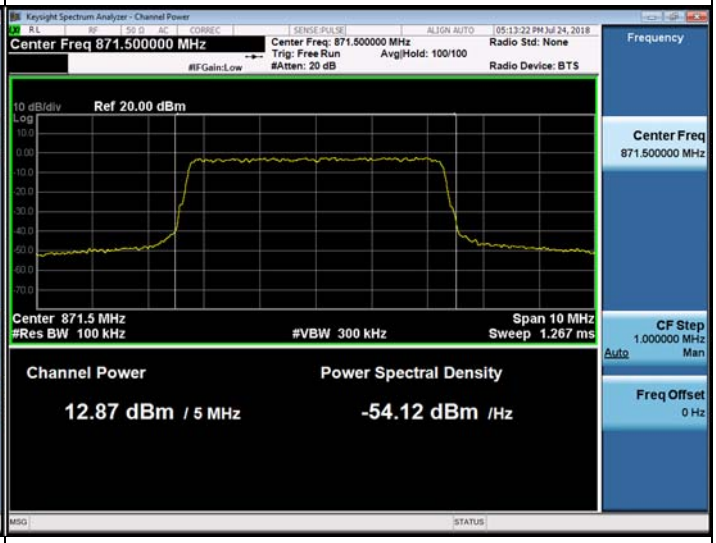
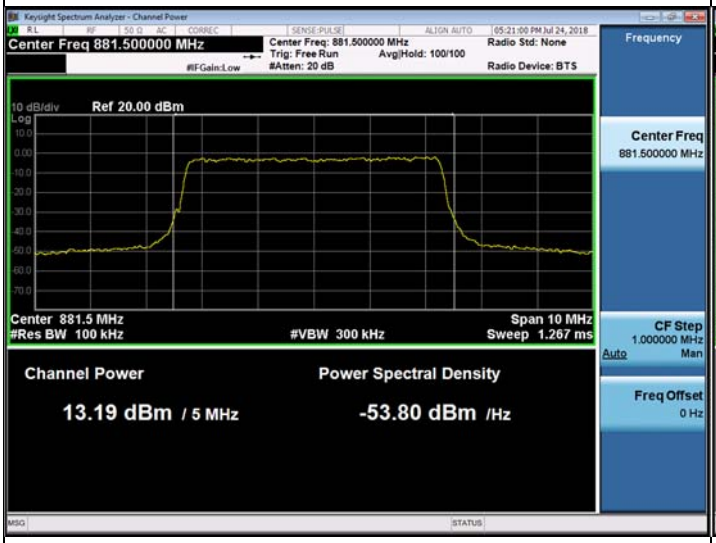
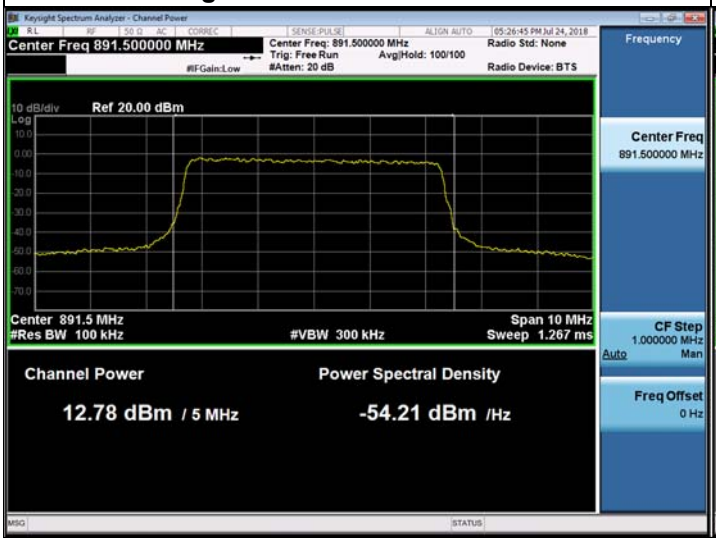
Plot of Output Power for LTE 5 MHz – FCC Part 90 Band_Uplink

Low Channel AGC threshold	Low Channel +3 dB AGC threshold
	
Middle Channel AGC threshold	**Middle Channel +3 dB AGC threshold**
	
High Channel AGC threshold	**High Channel +3 dB AGC threshold**
	

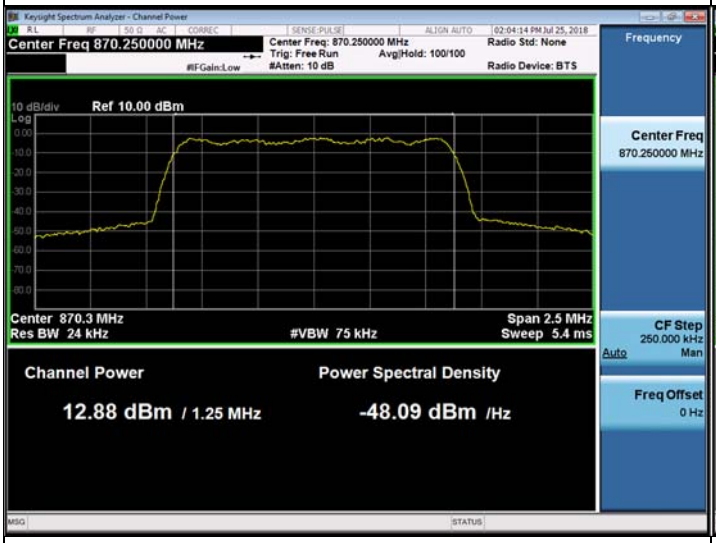
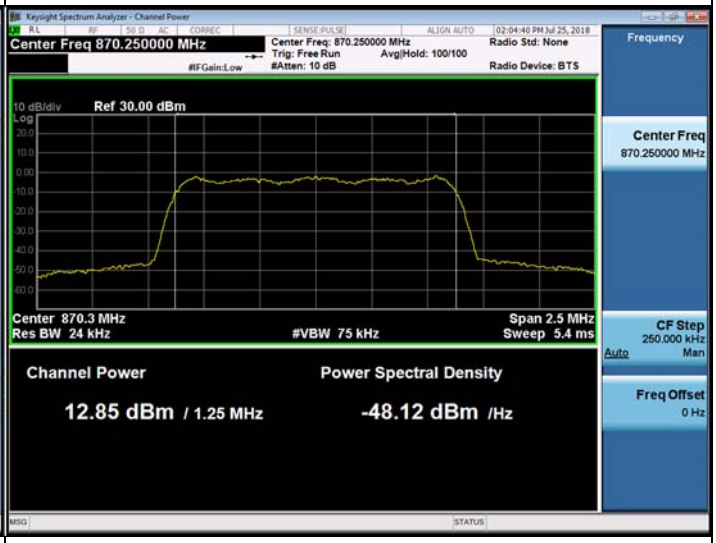
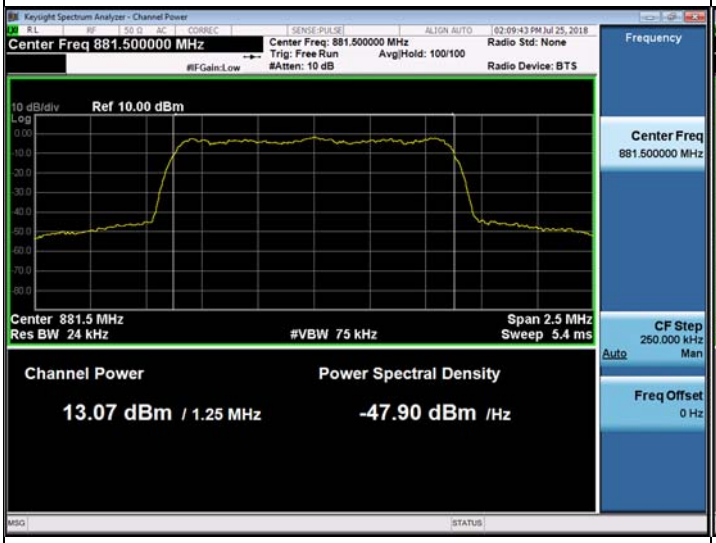
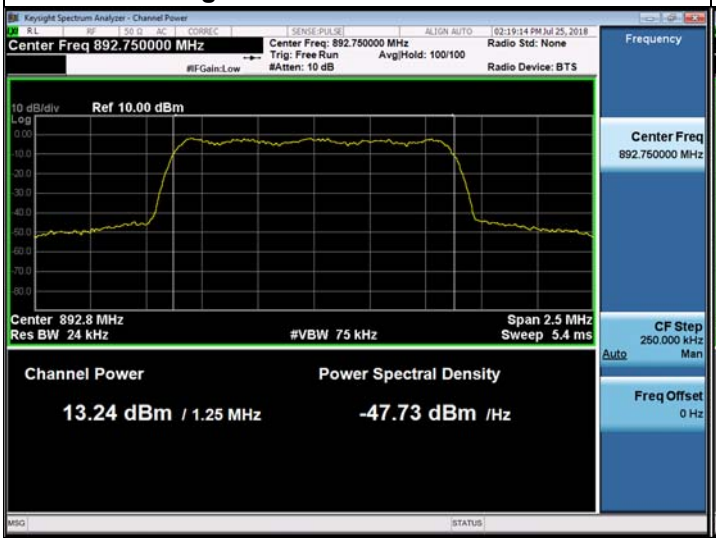
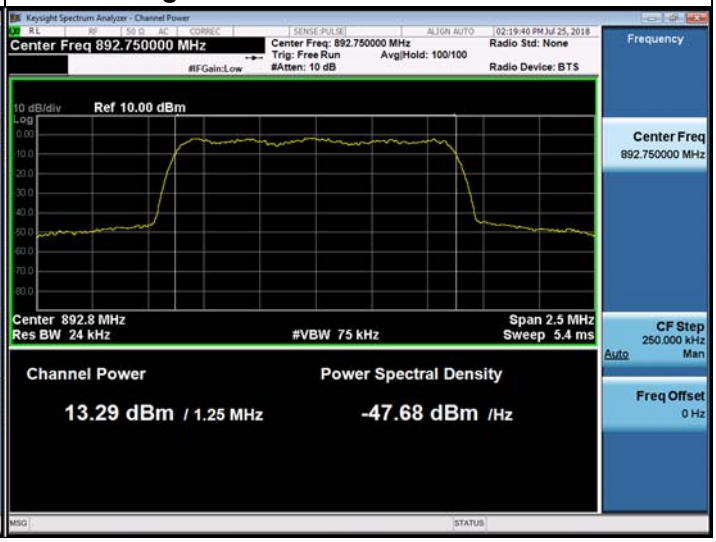
Plot of Output Power for CDMA – FCC Part 90 Band_Uplink

Low Channel AGC threshold	Low Channel +3 dB AGC threshold
	
Middle Channel AGC threshold	**Middle Channel +3 dB AGC threshold**
	
High Channel AGC threshold	**High Channel +3 dB AGC threshold**
	

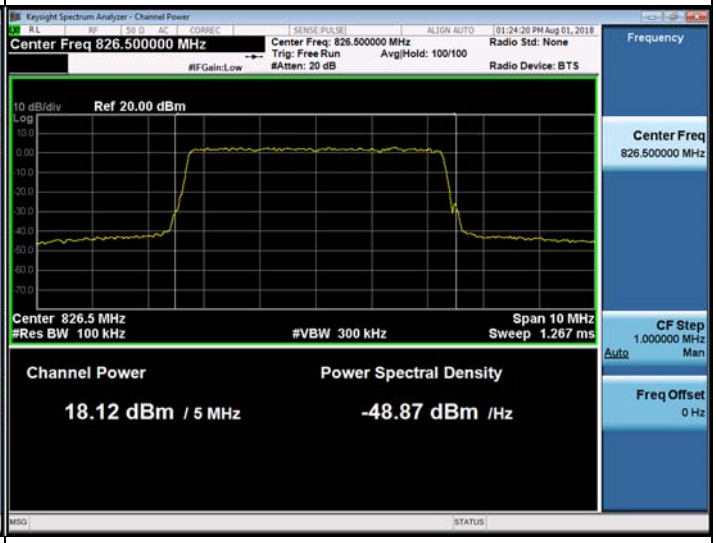
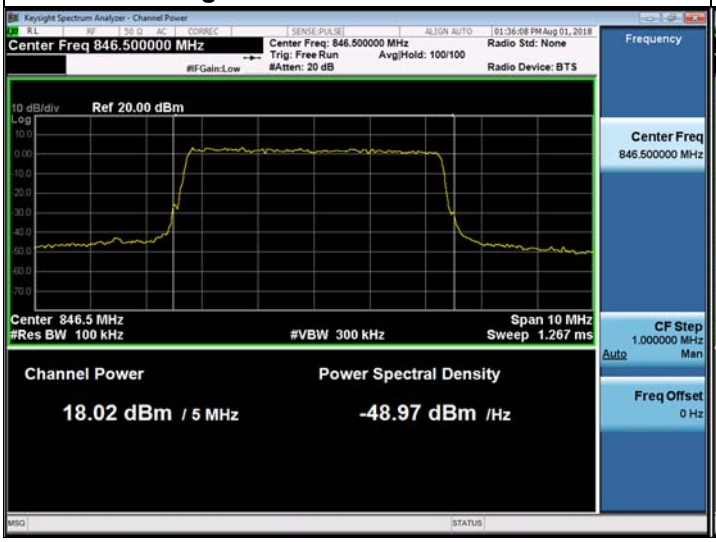
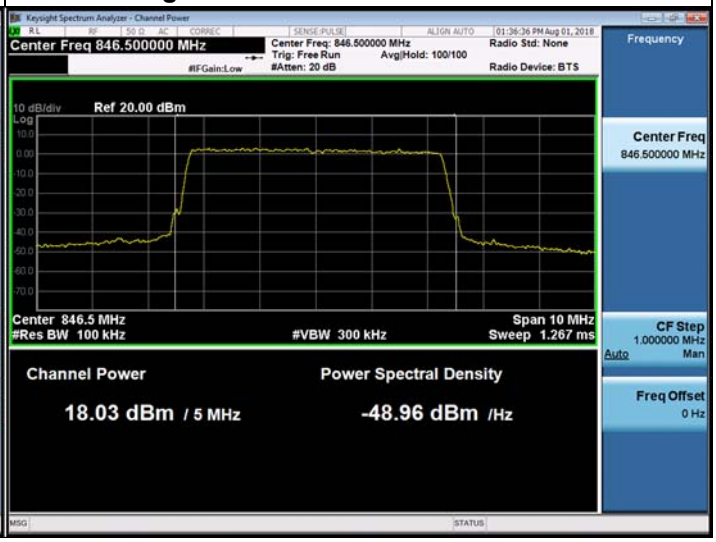
Plot of Output Power for LTE 5 MHz – FCC Part 22 Band_Downlink

Low Channel AGC threshold	Low Channel +3 dB AGC threshold
	
Middle Channel AGC threshold	**Middle Channel +3 dB AGC threshold**
	
High Channel AGC threshold	**High Channel +3 dB AGC threshold**
	

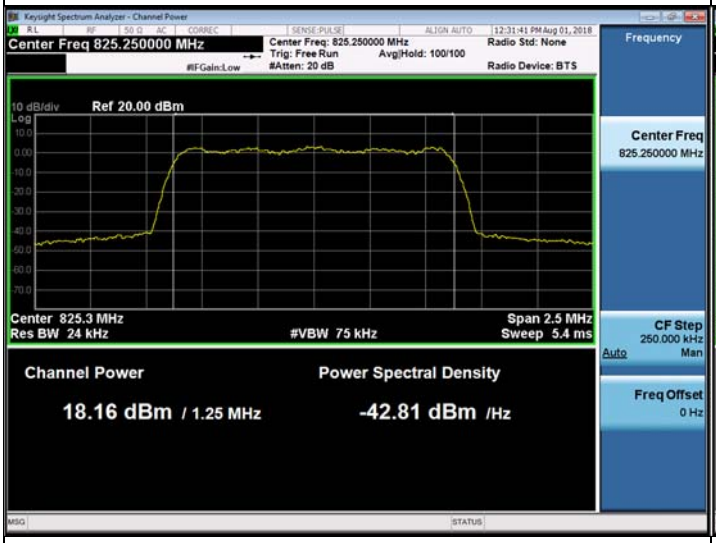
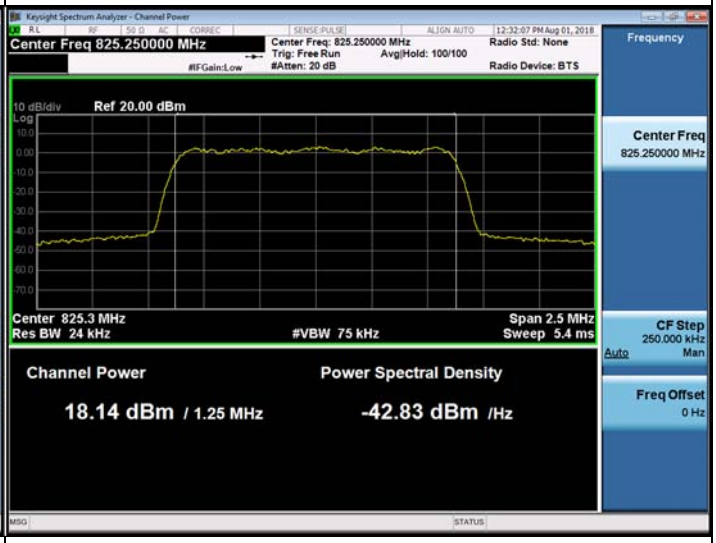
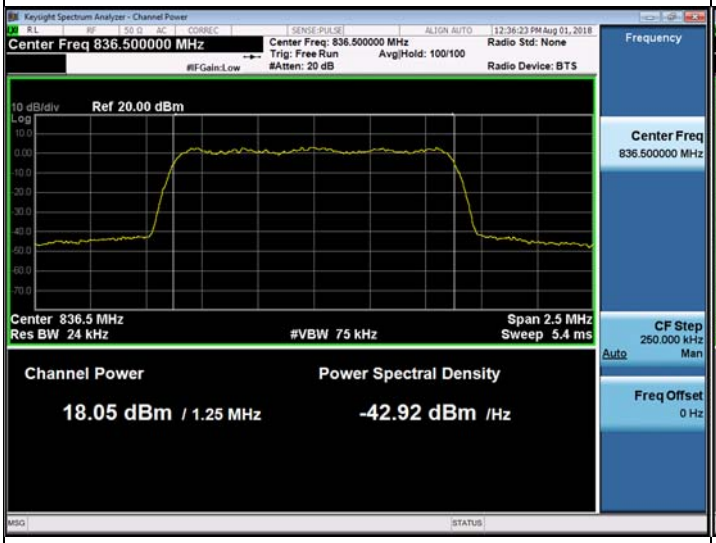
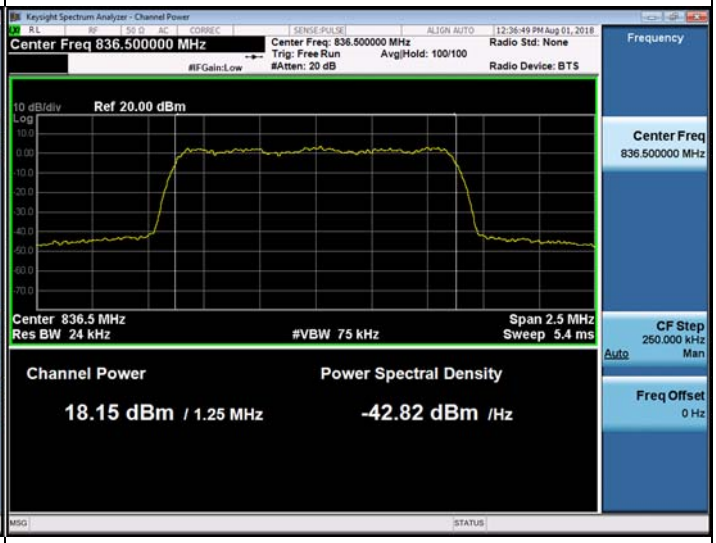
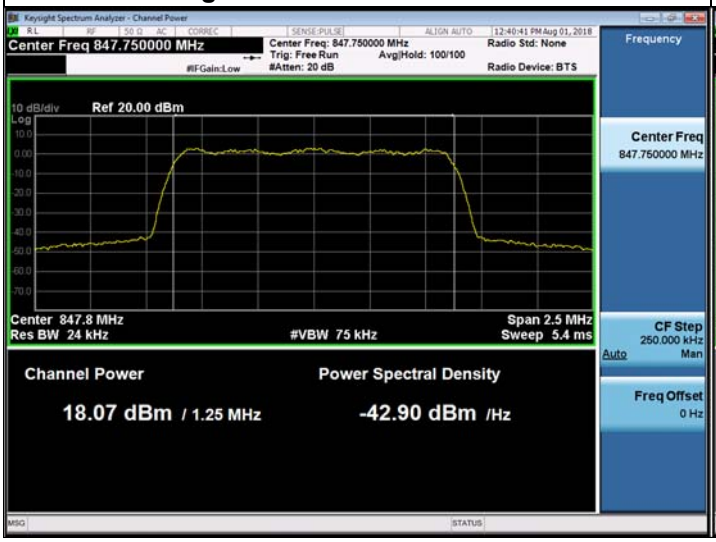
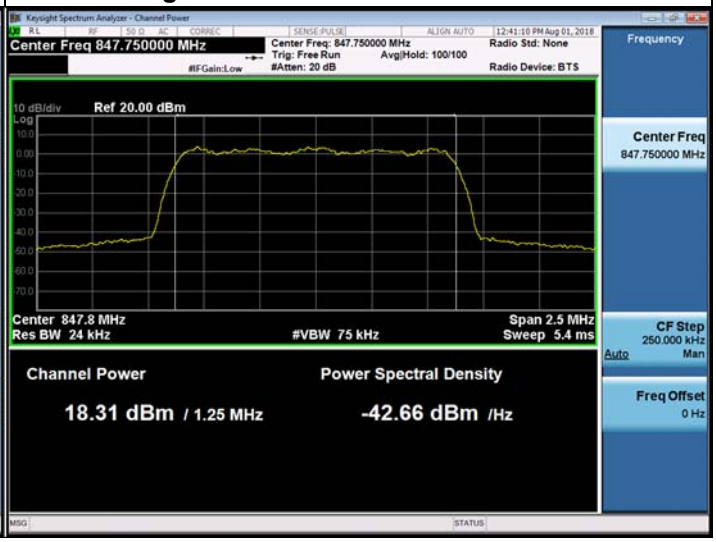
Plot of Output Power for CDMA – FCC Part 22 Band_Downlink

Low Channel AGC threshold	Low Channel +3 dB AGC threshold
	
Middle Channel AGC threshold	**Middle Channel +3 dB AGC threshold**
	
High Channel AGC threshold	**High Channel +3 dB AGC threshold**
	

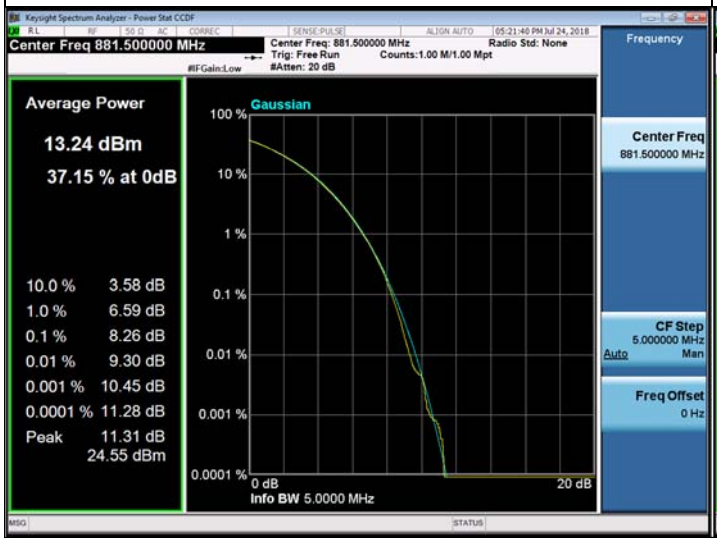
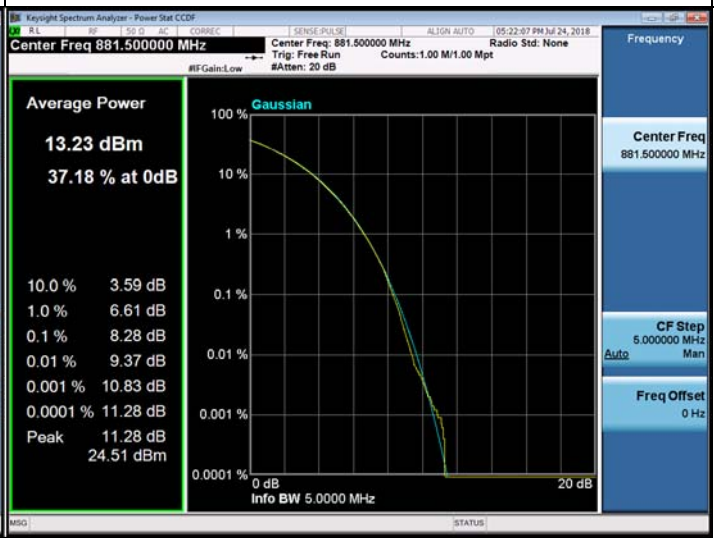
Plot of Output Power for LTE 5 MHz – FCC Part 22 Band_Uplink

Low Channel AGC threshold	Low Channel +3 dB AGC threshold
	
Middle Channel AGC threshold	**Middle Channel +3 dB AGC threshold**
	
High Channel AGC threshold	**High Channel +3 dB AGC threshold**
	

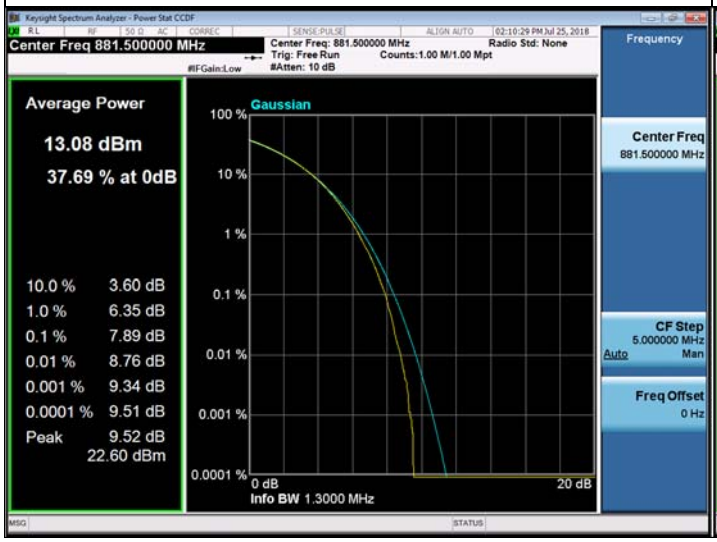
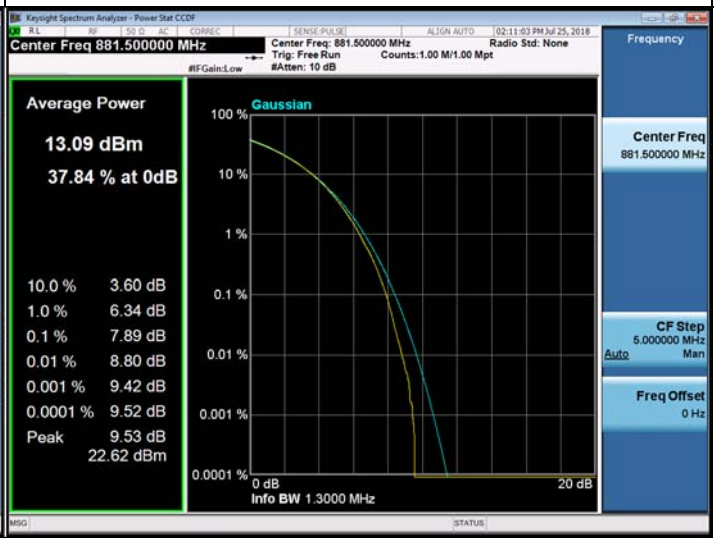
Plot of Output Power for CDMA – FCC Part 22 Band_Uplink

Low Channel AGC threshold	Low Channel +3 dB AGC threshold
	
Middle Channel AGC threshold	**Middle Channel +3 dB AGC threshold**
	
High Channel AGC threshold	**High Channel +3 dB AGC threshold**
	

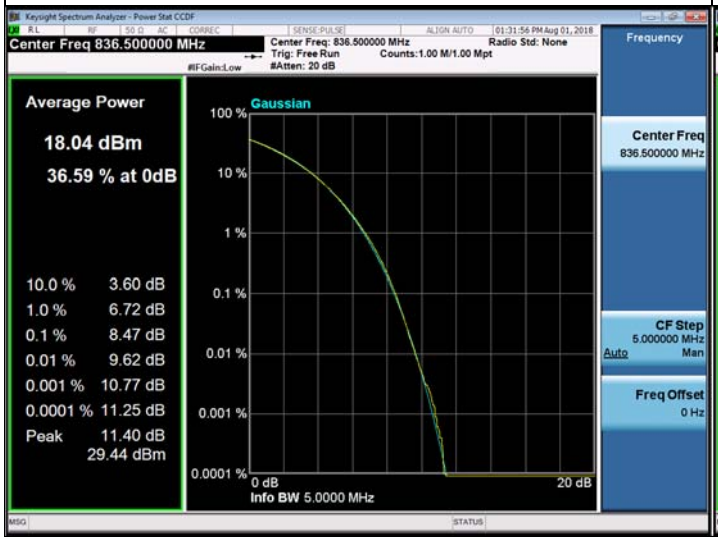
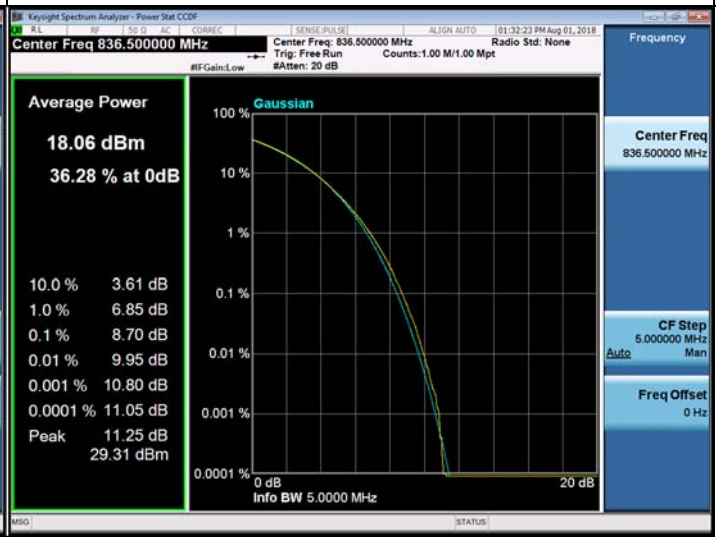
Plot of PAR for LTE 5 MHz – FCC Part 22 Band_Downlink

Middle Channel AGC threshold	Middle Channel +3 dB AGC threshold
	

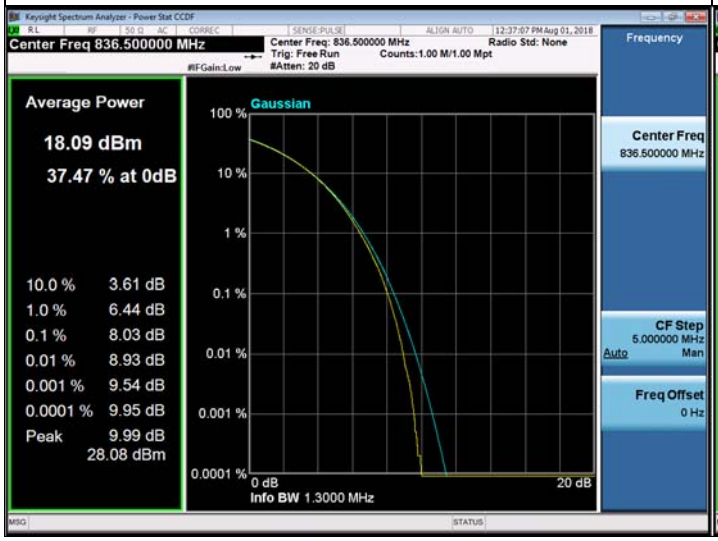
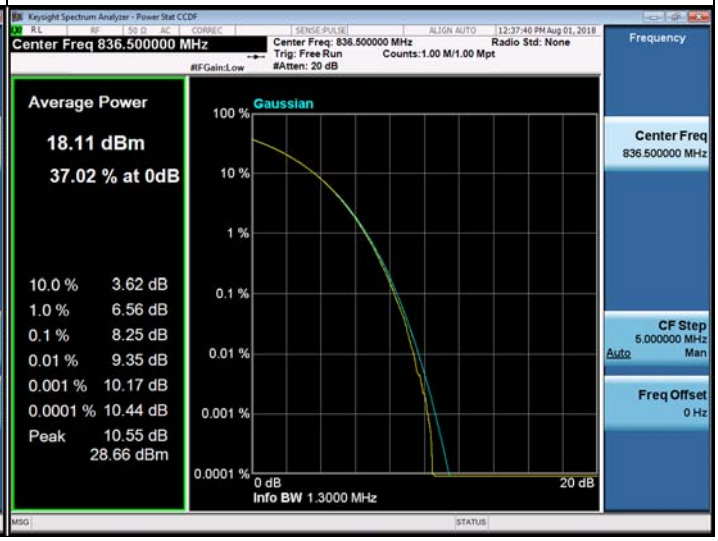
Plot of PAR for CDMA – FCC Part 22 Band_Downlink

Middle Channel AGC threshold	Middle Channel +3 dB AGC threshold
	

Plot of PAR for LTE 5 MHz – FCC Part 22 Band_Uplink

Middle Channel AGC threshold	Middle Channel +3 dB AGC threshold
	

Plot of PAR for CDMA – FCC Part 22 Band_Uplink

Middle Channel AGC threshold	Middle Channel +3 dB AGC threshold
	

6. OCCUPIED BANDWIDTH

FCC Rules

Test Requirements:

§ 2.1049 Measurements required: Occupied bandwidth.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of § 2.1049 (a) through (i) as applicable.

Test Procedures:

Measurements were in accordance with the test methods section 3.4 of KDB 935210 D05 v01r02 and section 4.2 of KDB 971168 D01 v03r01.

Test is 99% OBW measured and used.

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

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

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

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

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

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

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

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

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

i) Set spectrum analyzer detection function to positive peak.

j) Set the trace mode to max hold.

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

Test Results:

Data of Output Occupied bandwidth – FCC Part 90 Band

Downlink	Channel	Frequency (MHz)	Measured OBW (MHz)
LTE 5 MHz AGC threshold	Low	864.500	4.5169
	Middle	865.500	4.5115
	High	866.500	4.5120
LTE 5 MHz +3 dB above the AGC threshold	Low	864.500	4.5105
	Middle	865.500	4.5186
	High	866.500	4.5287
CDMA AGC threshold	Low	863.250	1.2373
	Middle	865.500	1.2404
	High	867.750	1.2424
CDMA +3 dB above the AGC threshold	Low	863.250	1.2353
	Middle	865.500	1.2351
	High	867.750	1.2371

Uplink	Channel	Frequency (MHz)	Measured OBW (MHz)
LTE 5 MHz AGC threshold	Low	819.500	4.5042
	Middle	820.500	4.5161
	High	821.500	4.5116
LTE 5 MHz +3 dB above the AGC threshold	Low	819.500	4.5081
	Middle	820.500	4.5035
	High	821.500	4.5146
CDMA AGC threshold	Low	818.250	1.2400
	Middle	820.500	1.2386
	High	822.750	1.2393
CDMA +3 dB above the AGC threshold	Low	818.250	1.2406
	Middle	820.500	1.2423
	High	822.750	1.2425

Data of Output Occupied bandwidth – FCC Part 22 Band

Downlink	Channel	Frequency (MHz)	Measured OBW (MHz)
LTE 5 MHz AGC threshold	Low	871.500	4.5160
	Middle	881.500	4.5239
	High	891.500	4.5144
LTE 5 MHz +3 dB above the AGC threshold	Low	871.500	4.5178
	Middle	881.500	4.5303
	High	891.500	4.5240
CDMA AGC threshold	Low	870.250	1.2385
	Middle	881.500	1.2369
	High	892.750	1.2378
CDMA +3 dB above the AGC threshold	Low	870.250	1.2405
	Middle	881.500	1.2406
	High	892.750	1.2398

Uplink	Channel	Frequency (MHz)	Measured OBW (MHz)
LTE 5 MHz AGC threshold	Low	826.500	4.5146
	Middle	836.500	4.5184
	High	846.500	4.5213
LTE 5 MHz +3 dB above the AGC threshold	Low	826.500	4.5227
	Middle	836.500	4.5099
	High	846.500	4.5156
CDMA AGC threshold	Low	825.250	1.2359
	Middle	836.500	1.2354
	High	847.750	1.2372
CDMA +3 dB above the AGC threshold	Low	825.250	1.2385
	Middle	836.500	1.2387
	High	847.750	1.2381

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

Data of Input Occupied bandwidth – FCC Part 90 Band

Downlink	Channel	Frequency (MHz)	Measured OBW (MHz)
LTE 5 MHz AGC threshold	Low	864.500	4.5068
	Middle	865.500	4.5210
	High	866.500	4.5121
CDMA AGC threshold	Low	863.250	1.2411
	Middle	865.500	1.2395
	High	867.750	1.2442

Uplink	Channel	Frequency (MHz)	Measured OBW (MHz)
LTE 5 MHz AGC threshold	Low	819.500	4.5147
	Middle	820.500	4.5160
	High	821.500	4.5149
CDMA AGC threshold	Low	818.250	1.2391
	Middle	820.500	1.2406
	High	822.750	1.2391

Data of Input Occupied bandwidth – FCC Part 22 Band

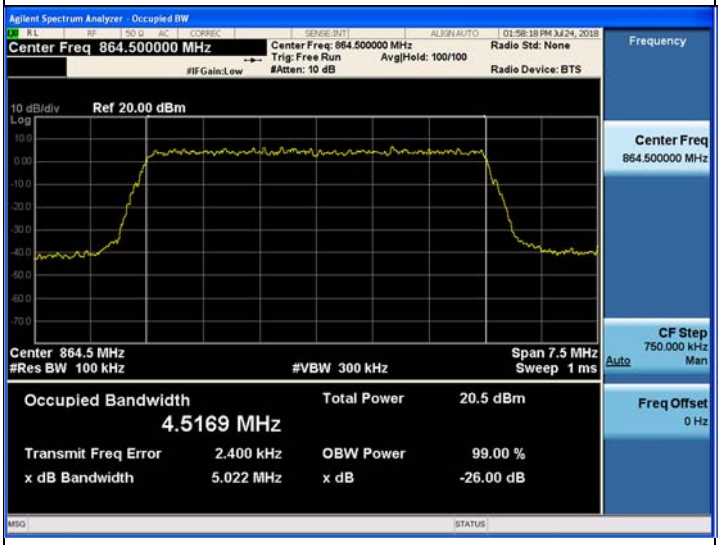
Downlink	Channel	Frequency (MHz)	Measured OBW (MHz)
LTE 5 MHz AGC threshold	Low	871.500	4.5254
	Middle	881.500	4.5207
	High	891.500	4.5185
CDMA AGC threshold	Low	870.250	1.2424
	Middle	881.500	1.2438
	High	892.750	1.2391

Uplink	Channel	Frequency (MHz)	Measured OBW (MHz)
LTE 5 MHz AGC threshold	Low	826.500	4.5220
	Middle	836.500	4.5251
	High	846.500	4.5118
CDMA AGC threshold	Low	825.250	1.2414
	Middle	836.500	1.2425
	High	847.750	1.2403

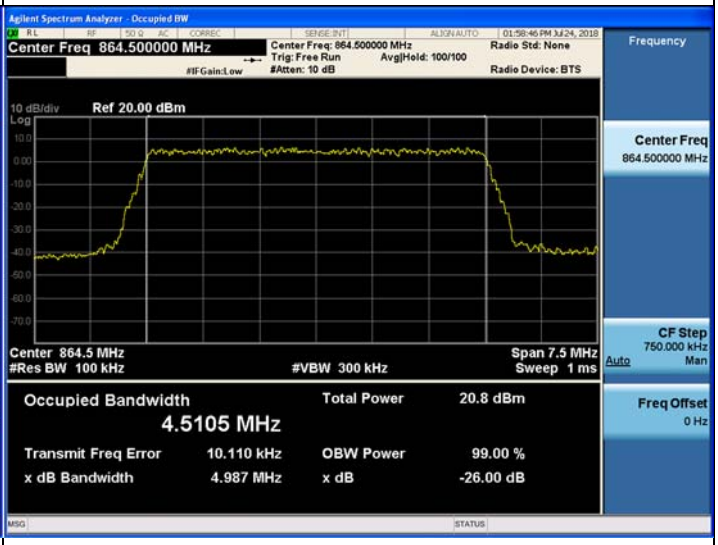
*Note: We have done CDMA and 1xEVDO modulation test in technology. Test results are only attached worst cases.

Plot of Output Occupied Bandwidth for LTE 5 MHz – FCC Part 90 Band_Downlink

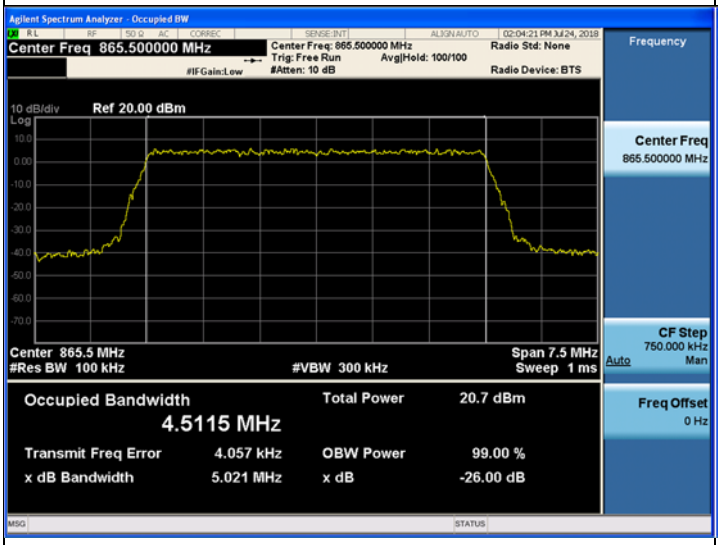
Low Channel AGC threshold



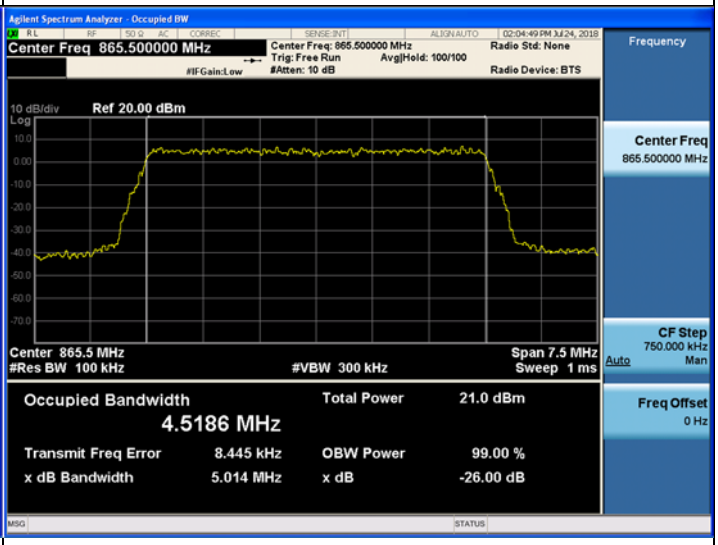
Low Channel +3 dB AGC threshold



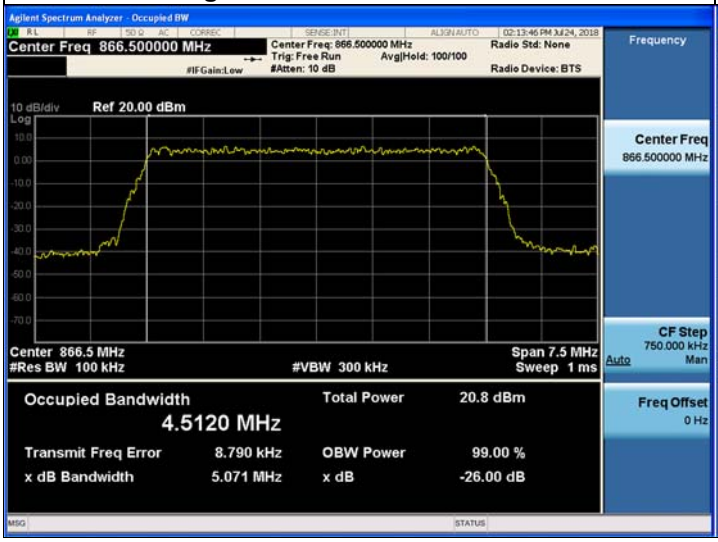
Middle Channel AGC threshold



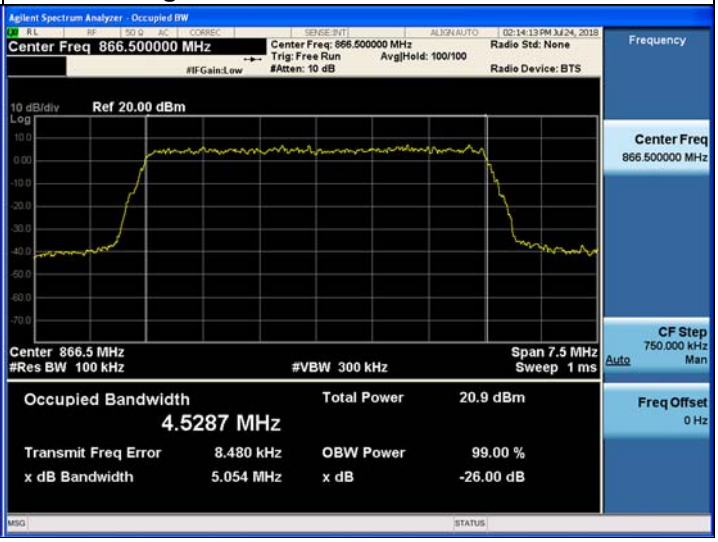
Middle Channel +3 dB AGC threshold



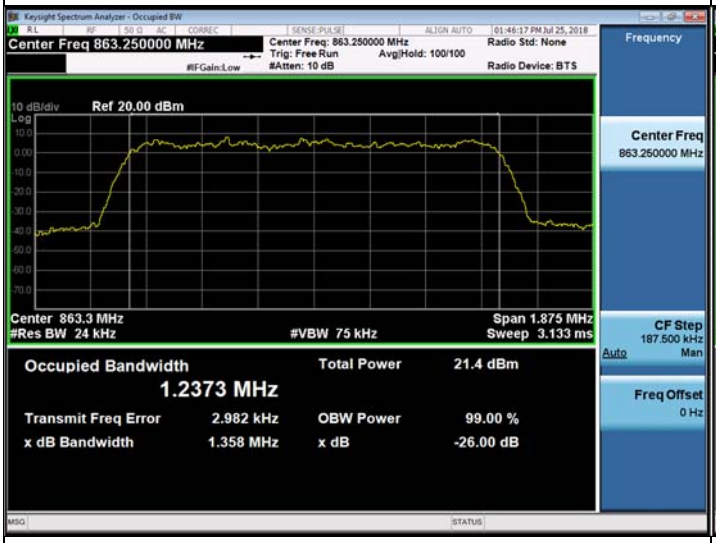
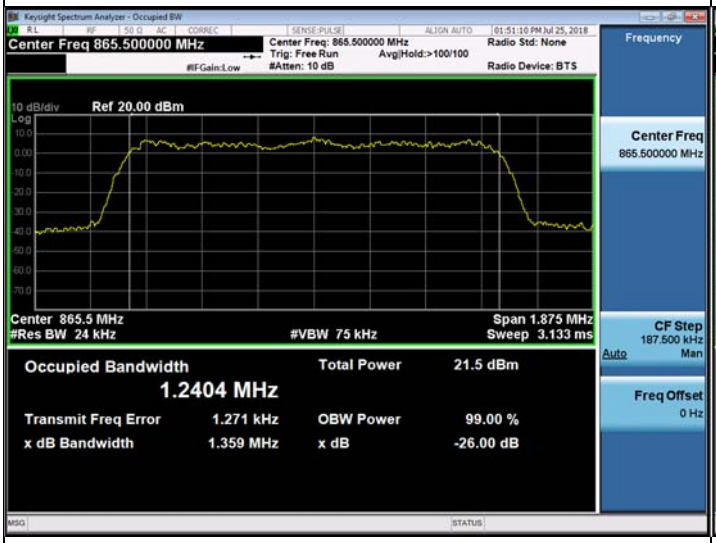
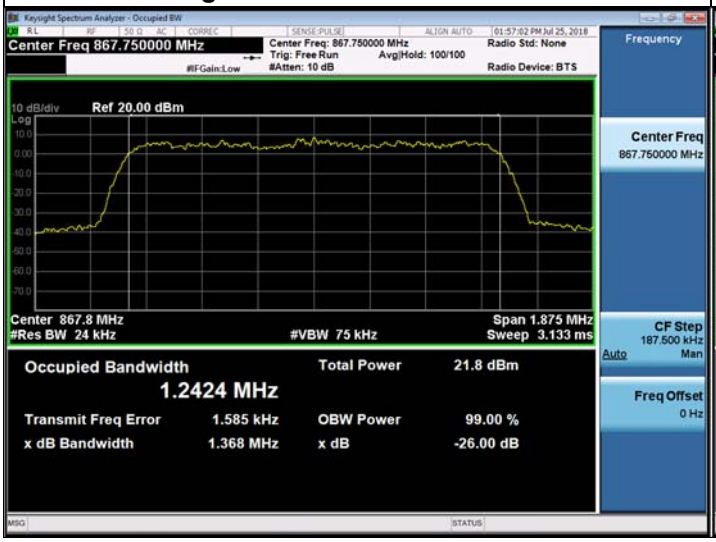
High Channel AGC threshold



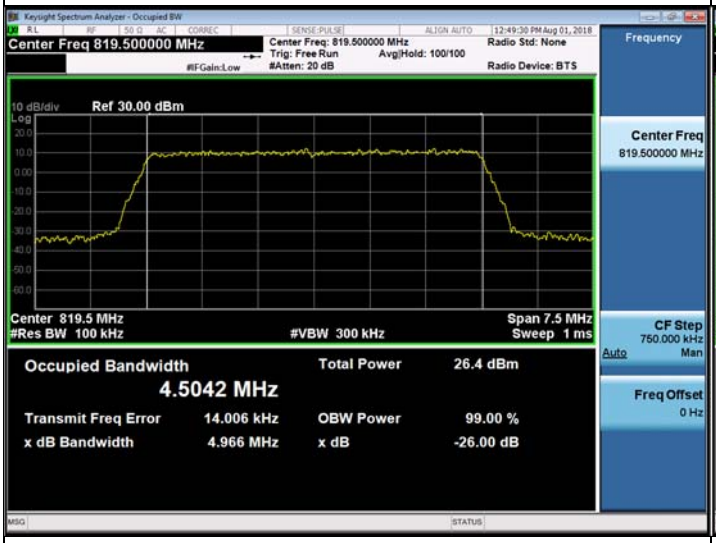
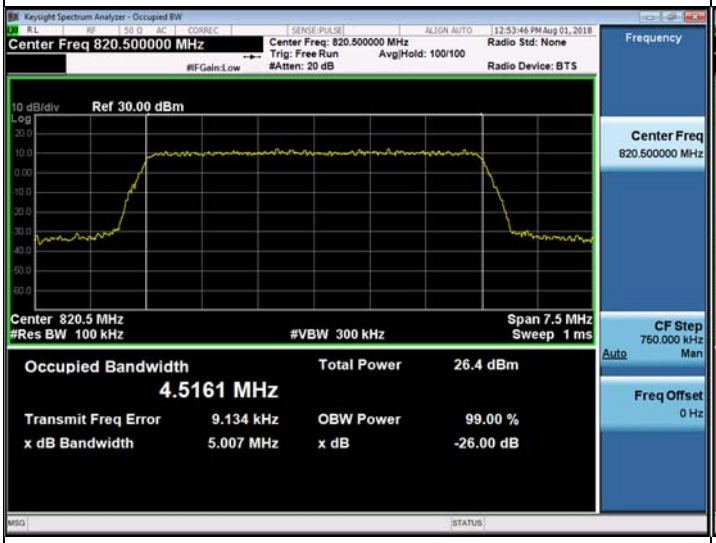
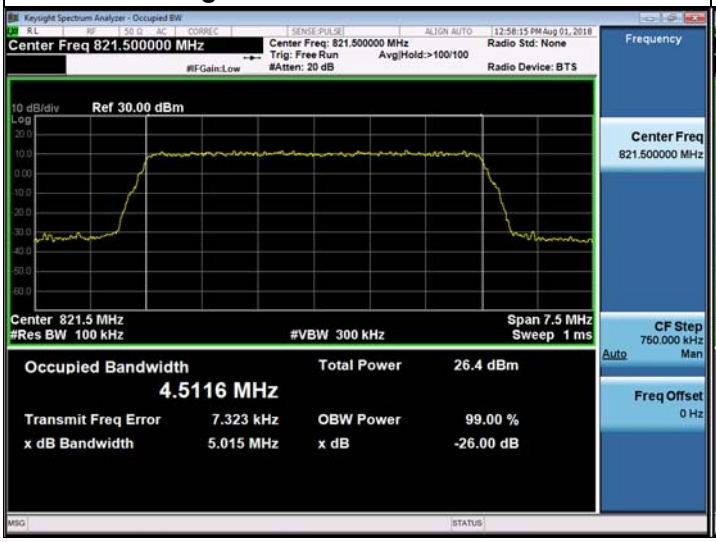
High Channel +3 dB AGC threshold



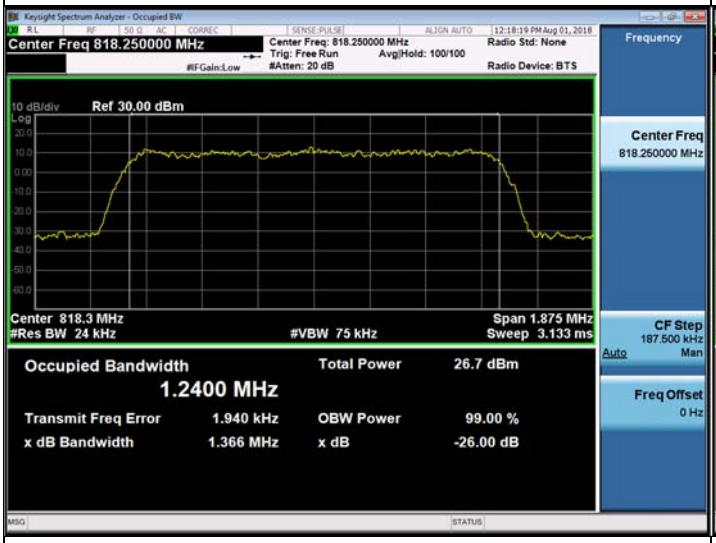
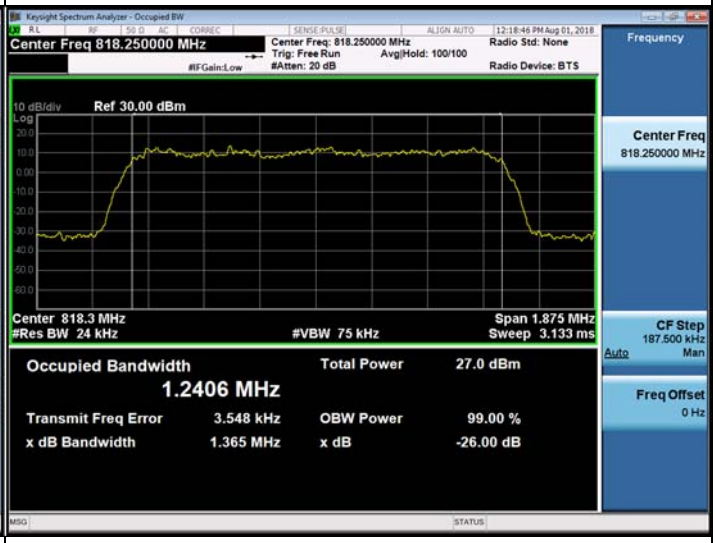
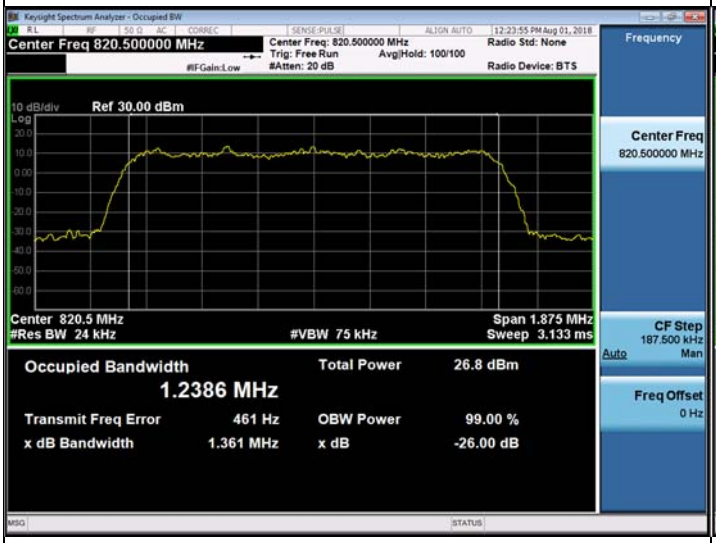
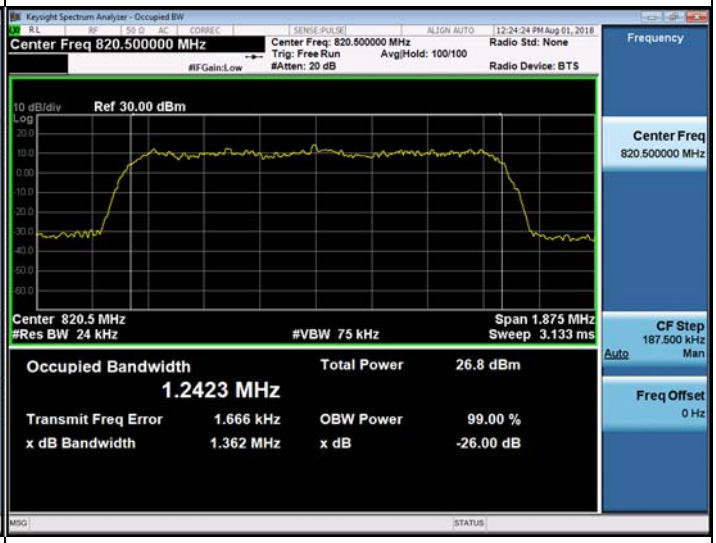
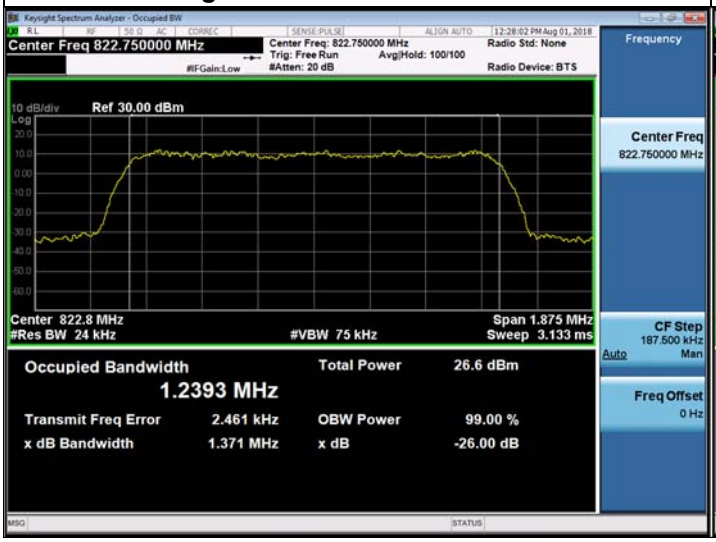
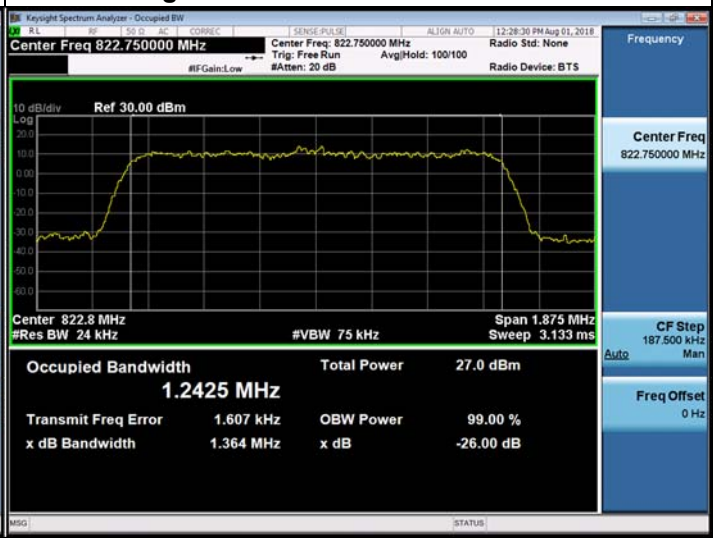
Plot of Output Occupied Bandwidth for CDMA – FCC Part 90 Band_Downlink

Low Channel AGC threshold	Low Channel +3 dB AGC threshold
	
Middle Channel AGC threshold	**Middle Channel +3 dB AGC threshold**
	
High Channel AGC threshold	**High Channel +3 dB AGC threshold**
	

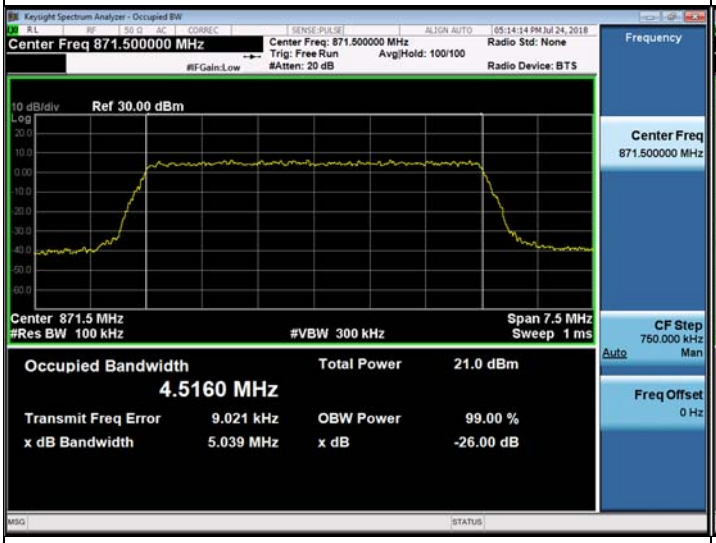
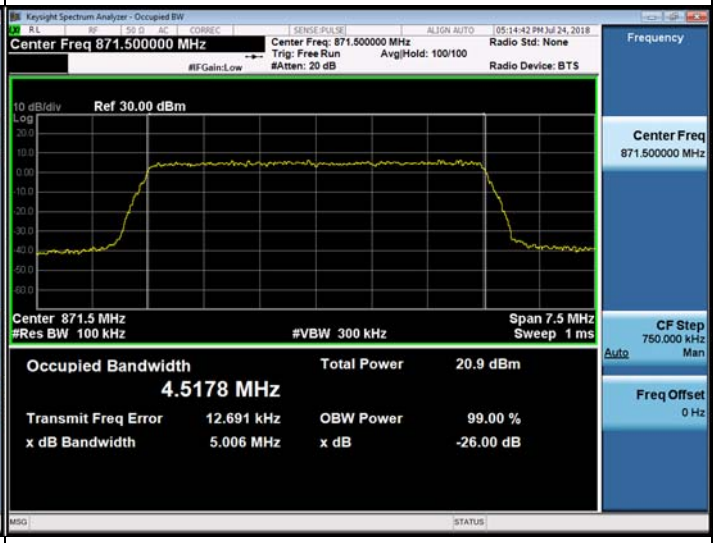
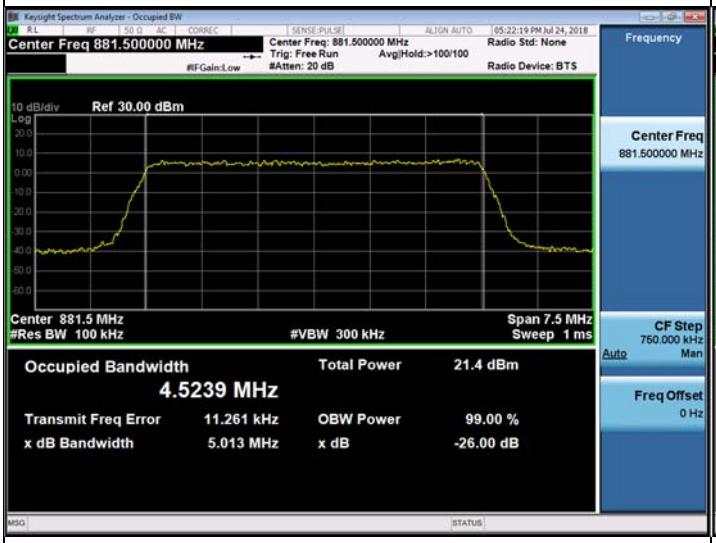
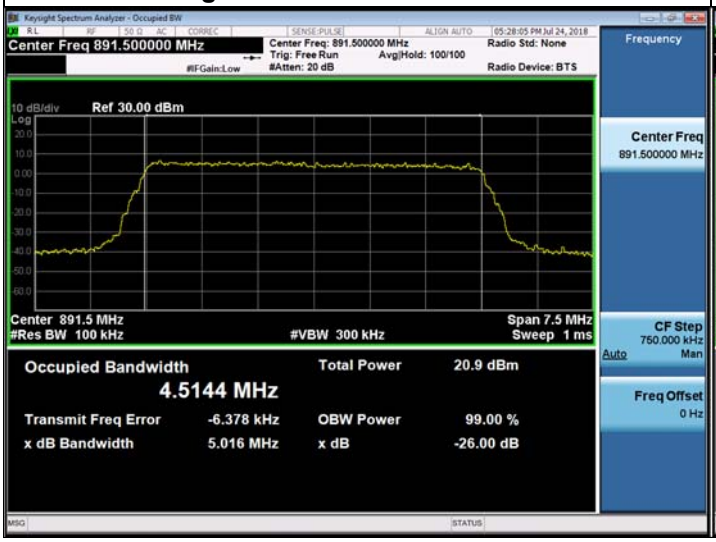
Plot of Output Occupied Bandwidth for LTE 5 MHz – FCC Part 90 Band_Uplink

Low Channel AGC threshold	Low Channel +3 dB AGC threshold
	
Middle Channel AGC threshold	**Middle Channel +3 dB AGC threshold**
	
High Channel AGC threshold	**High Channel +3 dB AGC threshold**
	

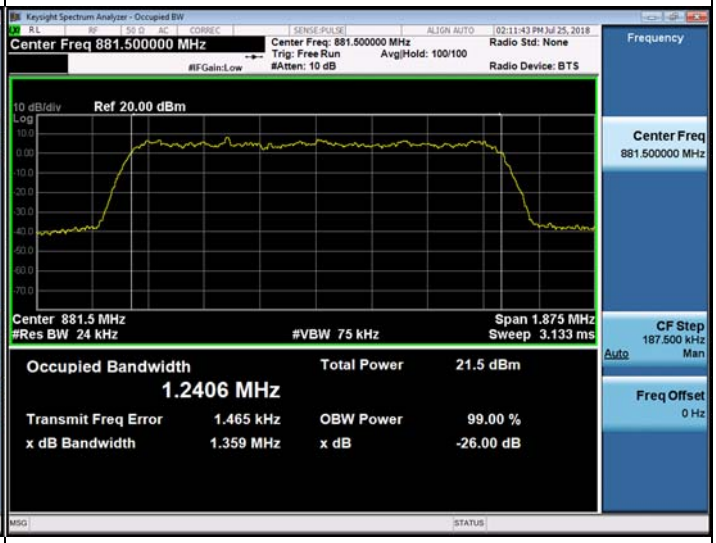
Plot of Output Occupied Bandwidth for CDMA – FCC Part 90 Band_Uplink

Low Channel AGC threshold	Low Channel +3 dB AGC threshold
	
Middle Channel AGC threshold	**Middle Channel +3 dB AGC threshold**
	
High Channel AGC threshold	**High Channel +3 dB AGC threshold**
	

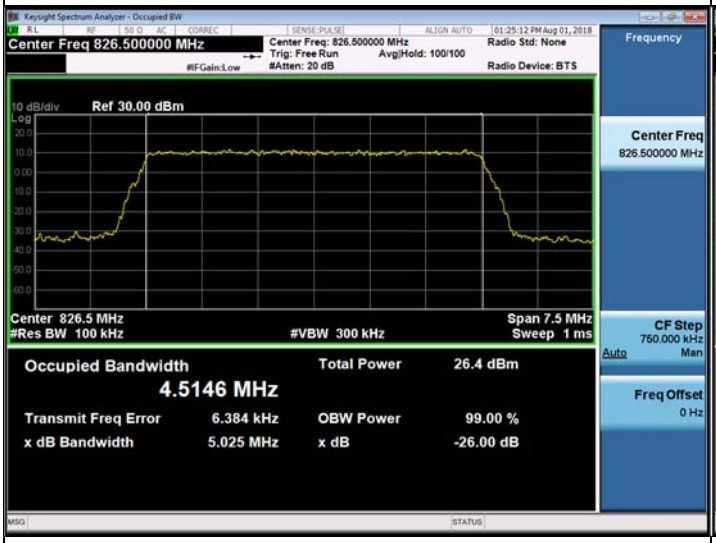
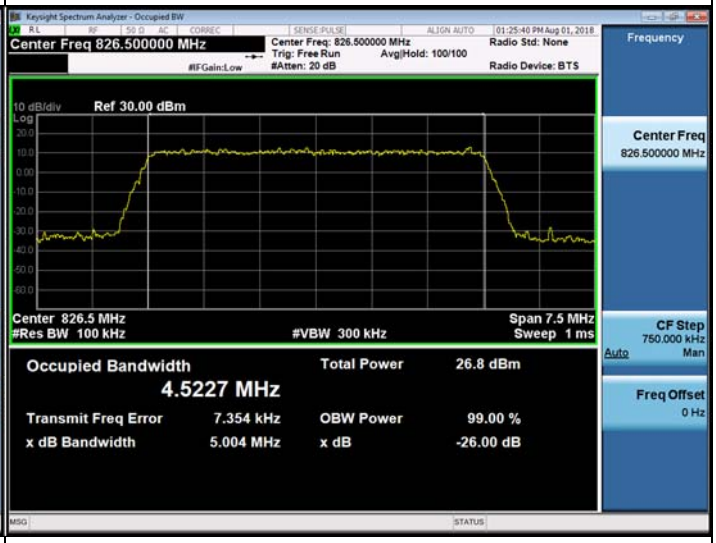
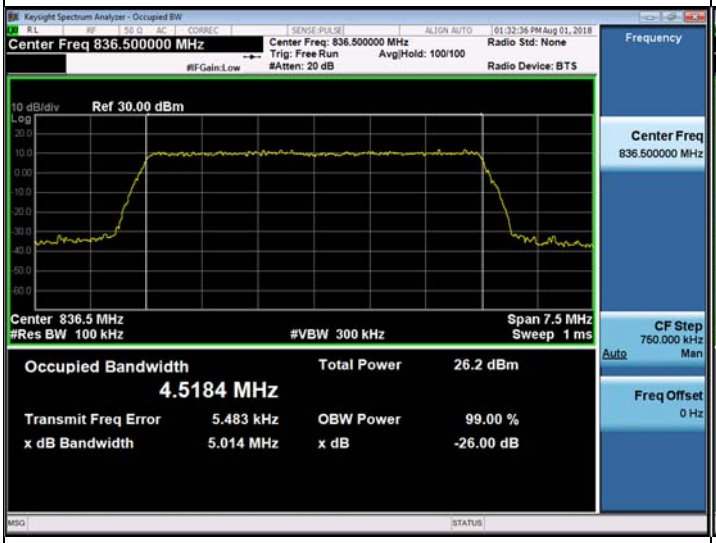
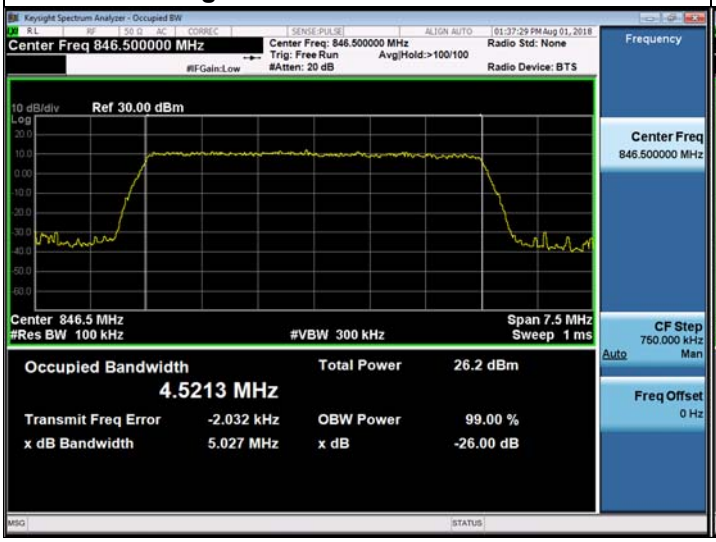
Plot of Output Occupied Bandwidth for LTE 5 MHz – FCC Part 22 Band_Downlink

Low Channel AGC threshold	Low Channel +3 dB AGC threshold
	
Middle Channel AGC threshold	**Middle Channel +3 dB AGC threshold**
	
High Channel AGC threshold	**High Channel +3 dB AGC threshold**
	

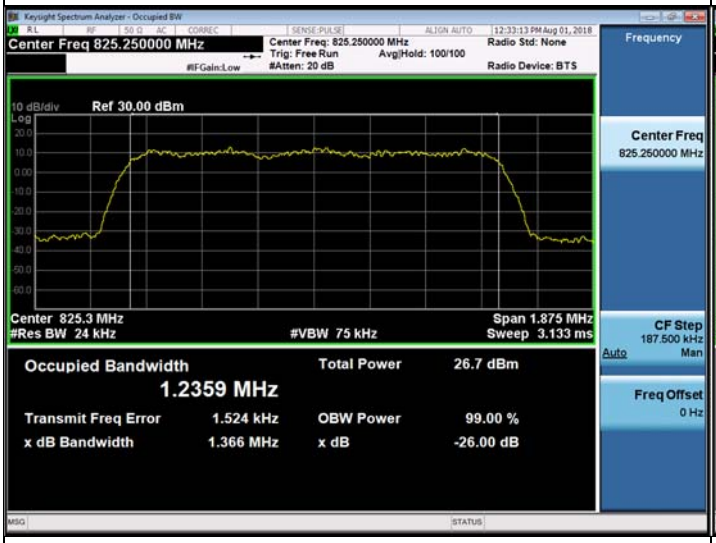
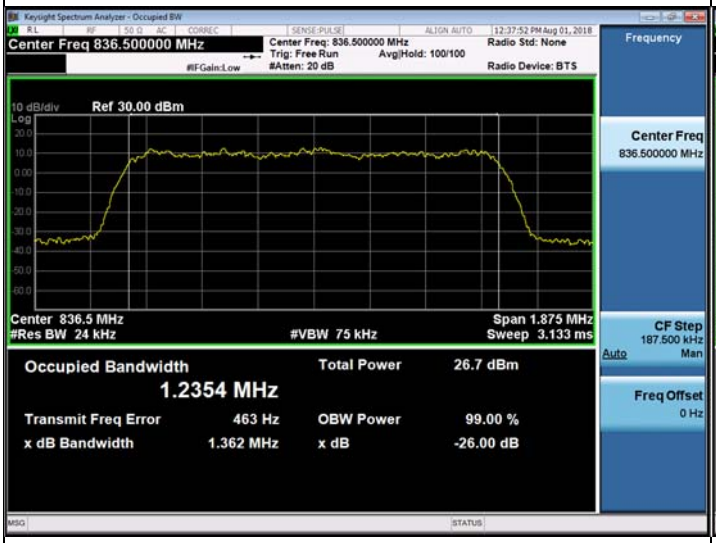
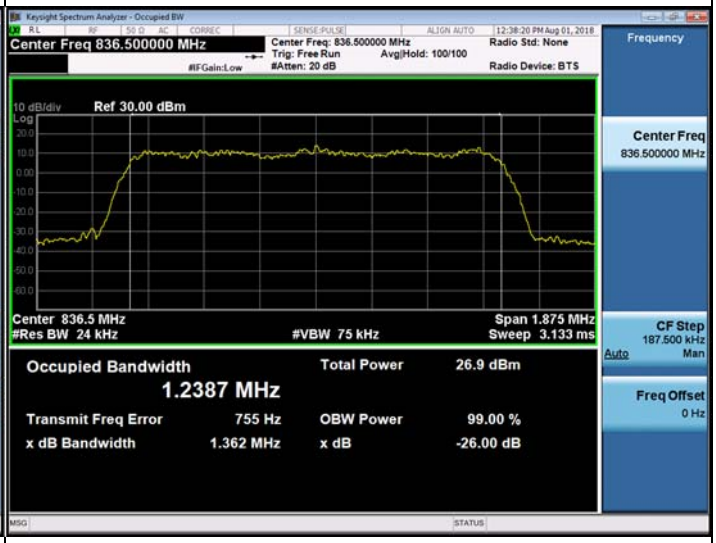
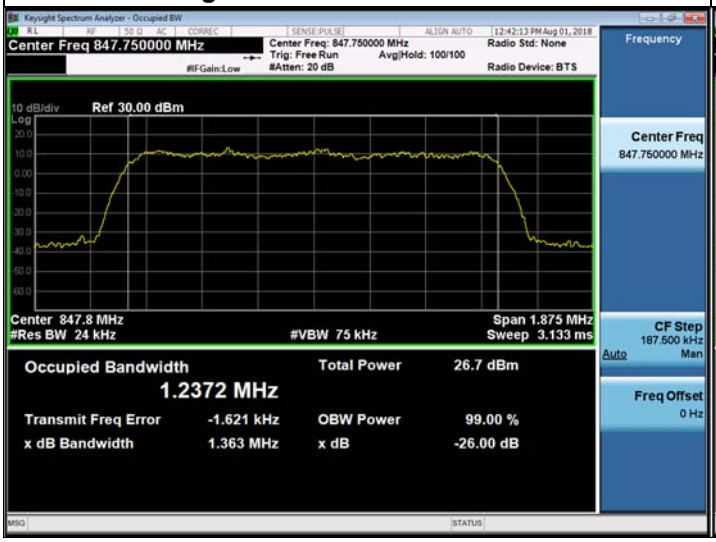
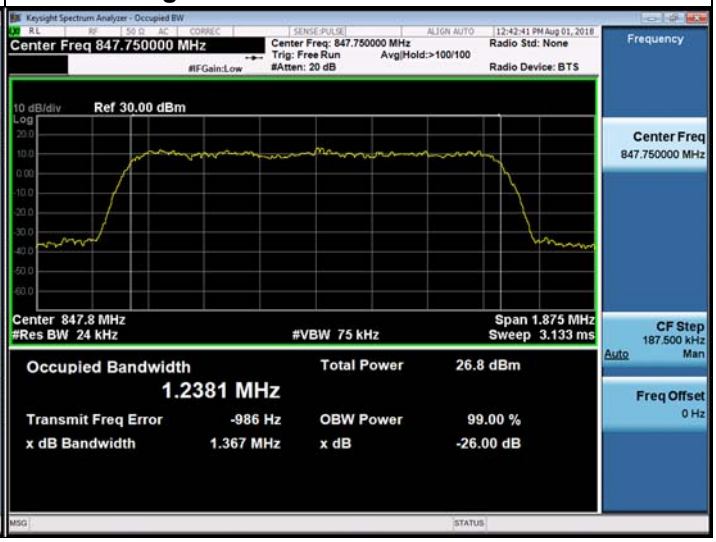
Plot of Output Occupied Bandwidth for CDMA – FCC Part 22 Band_Downlink

Low Channel AGC threshold	Low Channel +3 dB AGC threshold
	
Middle Channel AGC threshold	**Middle Channel +3 dB AGC threshold**
	
High Channel AGC threshold	**High Channel +3 dB AGC threshold**
	

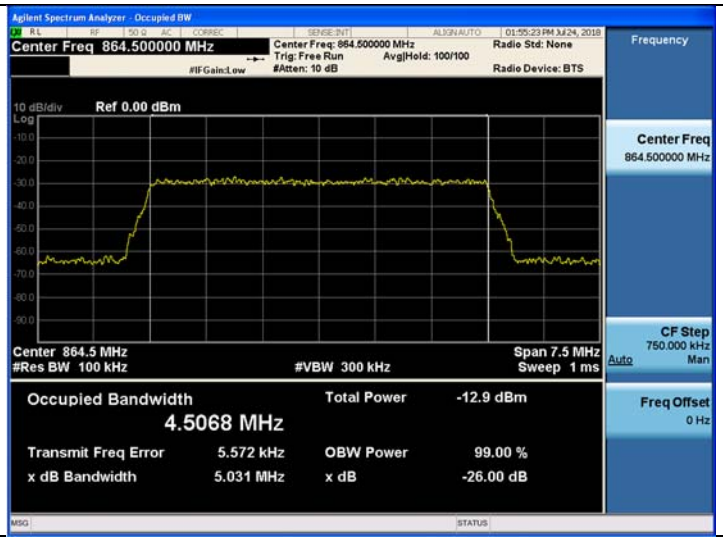
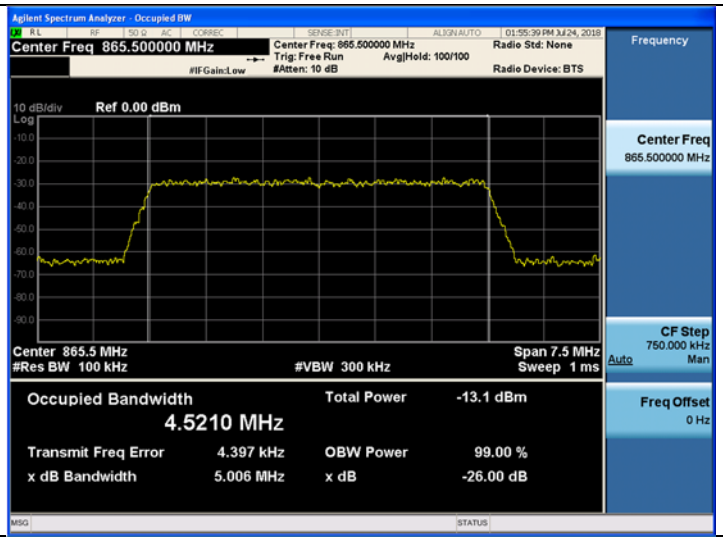
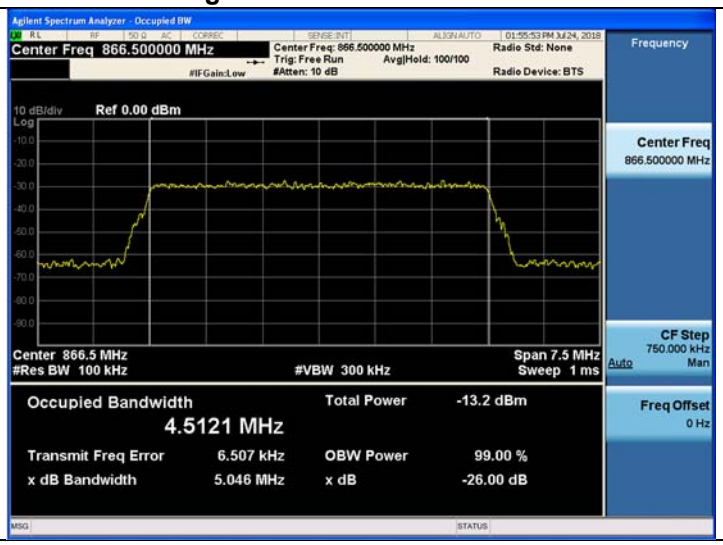
Plot of Output Occupied Bandwidth for LTE 5 MHz – FCC Part 22 Band_Uplink

Low Channel AGC threshold	Low Channel +3 dB AGC threshold
	
Middle Channel AGC threshold	**Middle Channel +3 dB AGC threshold**
	
High Channel AGC threshold	**High Channel +3 dB AGC threshold**
	

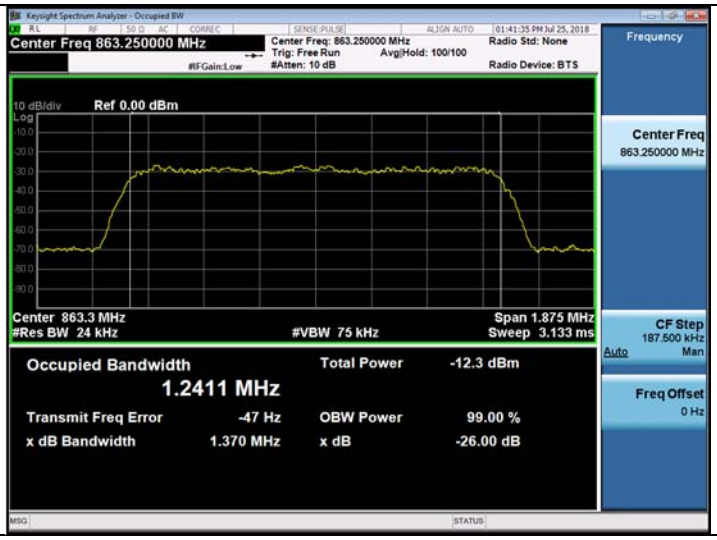
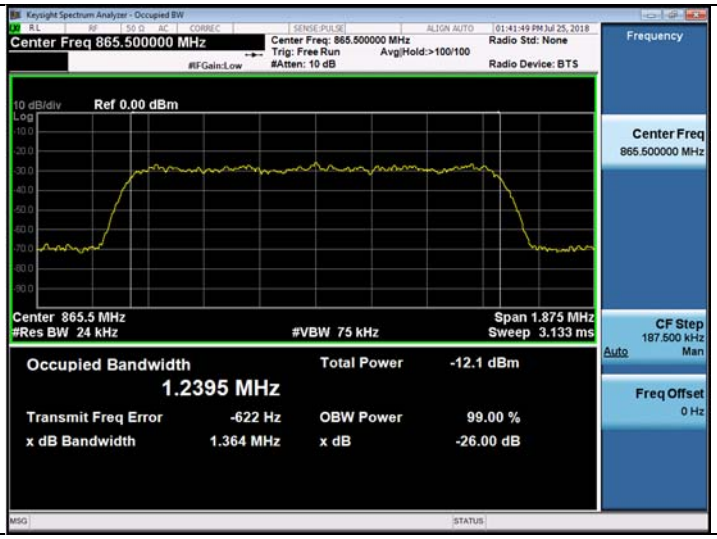
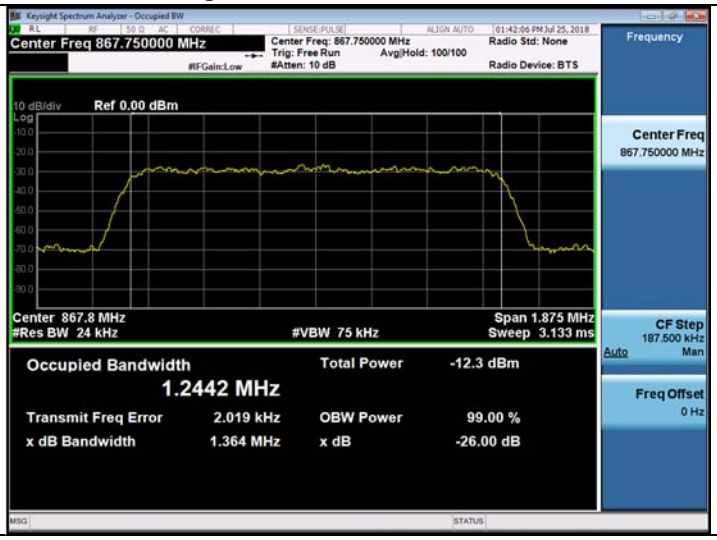
Plot of Output Occupied Bandwidth for CDMA – FCC Part 22 Band_Uplink

Low Channel AGC threshold	Low Channel +3 dB AGC threshold
	
Middle Channel AGC threshold	**Middle Channel +3 dB AGC threshold**
	
High Channel AGC threshold	**High Channel +3 dB AGC threshold**
	

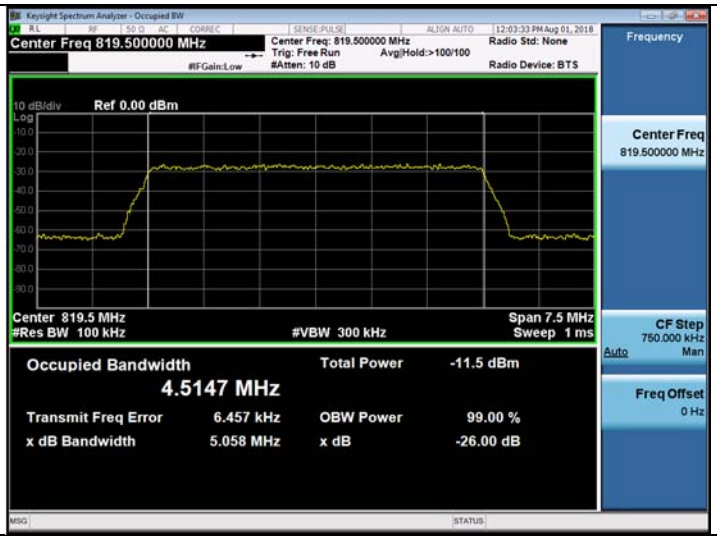
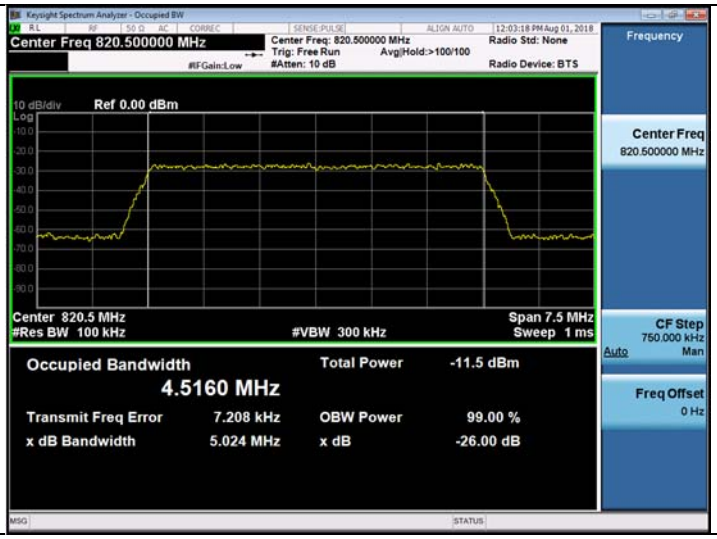
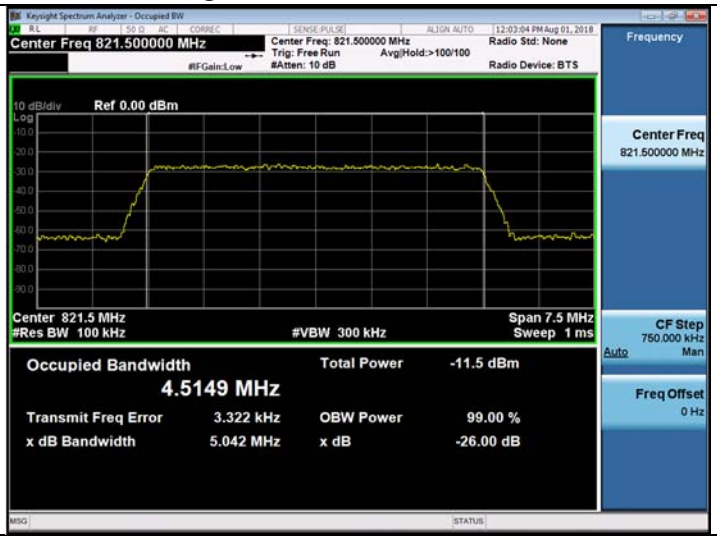
Plot of Input Occupied Bandwidth for LTE 5 MHz – FCC Part 90 Band_Downlink

Low Channel AGC threshold

Middle Channel AGC threshold

High Channel AGC threshold


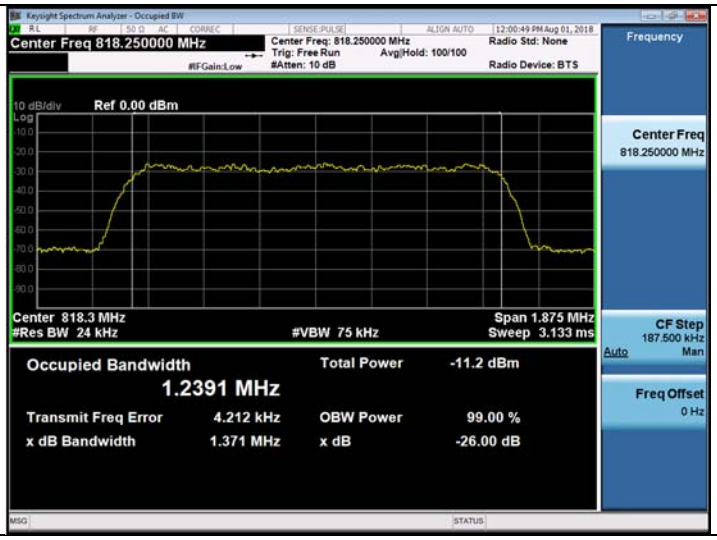
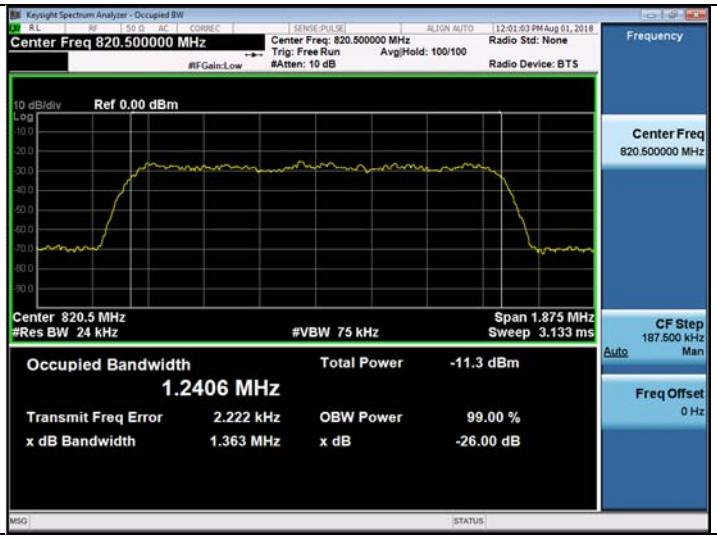
Plot of Input Occupied Bandwidth for CDMA – FCC Part 90 Band_Downlink

Low Channel AGC threshold

Middle Channel AGC threshold

High Channel AGC threshold


Plot of Input Occupied Bandwidth for LTE 5 MHz – FCC Part 90 Band_Uplink

Low Channel AGC threshold

Middle Channel AGC threshold

High Channel AGC threshold


Plot of Input Occupied Bandwidth for CDMA – FCC Part 90 Band_Uplink

Low Channel AGC threshold

Middle Channel AGC threshold

High Channel AGC threshold