

REPORT

FCC/IC Certification

Applicant Name:
KMW U.S.A., INC.**Address:**
1818 E. Orangethorpe Ave. Fullerton,
CA 92831**Date of Issue:**

January 29, 2016

Test Site/Location:HCT CO., LTD., 74, Seoicheon-ro 578beon-gil,
Majang-myeon, Icheon-si, Gyeonggi-do, 17383,
Rep. of KOREA**Report No.:** HCT-R-1601-F042-1**HCT FRN:** 0005866421**IC Recognition No.:** 5944A-5

FCC ID:	ZUQR-P78-27
IC:	12124A-P7827
APPLICANT:	KMW U.S.A., INC.

FCC/IC Model(s): POD-R-P78-27-AC

FCC/IC Additional Model(s): POD-R-P7-27-AC , POD-R-P8-27-AC

EUT Type: DAS 2-Band Remote Unit for Public Safety(SMR)

Frequency Ranges 758 MHz ~ 775 MHz (768 MHz ~ 769 MHz Guard band)

For FCC certification : 851 MHz ~ 869 MHz (861 MHz ~ 862 MHz Guard band)

Frequency Ranges 768 MHz ~ 775 MHz

For IC certification : 851 MHz ~ 869 MHz

Conducted Output Power: 0.5 W (27 dBm)

Date of Test: December 07, 2015 ~ January 11, 2016

FCC Rule Part(s): CFR 47, Part 90

IC Rules: RSS-Gen (Issue 4, November 2014), RSS-131 (Issue 2, July 2003)

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 90 of the FCC Rules under normal use and maintenance.

Report prepared by
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Approved by
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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1601-F042	January 19, 2016	- First Approval Report
HCT-R-1601-F042-1	January 29, 2016	- Revised Typographical errors.

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1. CLIENT INFORMATION

The EUT has been tested by request of

Company	KMW U.S.A.,INC. 1818 E. Orangethorpe Ave. Fullerton, CA 92831
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FCC ID: ZUQR-P78-27
IC: 12124A-P7827
EUT Type: DAS 2-Band Remote Unit for Public Safety(SMR)
FCC/IC Model(s): POD-R-P78-27-AC
FCC/IC Additional Model(s): POD-R-P7-27-AC , POD-R-P8-27-AC
Frequency Ranges For FCC certification : 758 MHz ~ 775 MHz (768 MHz ~ 769 MHz Guard band)
851 MHz ~ 869 MHz (861 MHz ~ 862 MHz Guard band)
Frequency Ranges For IC certification : 768 MHz ~ 775 MHz
851 MHz ~ 869 MHz
Conducted Output Power: 0.5 W (27 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 v03, KDB 935210 D05 v01
RSS-GEN, RSS-131
FCC Rule Part(s): CFR 47, Part 90
IC Rules: RSS-Gen (Issue 4, November 2014), RSS-131 (Issue 2, July 2003)
Place of Tests: HCT CO., LTD.,
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
(IC Recognition No. : 5944A-5)

2. FACILITIES AND ACCREDITATIONS

2.1. FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2003) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 07, 2015 (Registration Number: 90661).

2.2. EQUIPMENT

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

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

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

3. TEST SPECIFICATIONS

3.1. STANDARDS

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 90, RSS-GEN, RSS-131.

Description	Reference (FCC)	Reference (IC)	Results
Conducted RF Output Power	§2.1046; §90.541, §90.542, §90.635	RSS-131, Section 4.3 RSS-131, Section 6.2 SRSP-502, SRSP-511	Compliant
Occupied Bandwidth	§2.1049	RSS-GEN, Sectin 4.6.1	Compliant
Passband Gain and Bandwidth & Out of Band Rejection	KDB 935210 D02 v03	RSS-131, Section 4.2 RSS-131, Section 6.1	Compliant
Noise Figure	§90.219	-	Compliant
Emission Masks	§90.210	-	Compliant
Spurious Emissions at Antenna Terminals	§2.1051, §90.543, §90.691	RSS-131, Section 4.4 RSS-131, Section 6.3 RSS-131, Section 6.4	Compliant
Radiated Spurious Emissions	§2.1053, §90.543 §90.691	-	Compliant
Frequency Stability	§2.1055, §90.213 §90.539	RSS-131, Section 4.5 RSS-131, Section 6.5	N/A The EUT does not perform frequency translation

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.

Frequency	Modulation
758 MHz ~ 768 MHz	LTE(5 MHz), LTE(10 MHz)
763 MHz ~ 775 MHz (768 MHz ~ 769 MHz Guard band)	P25(12.5 kHz), FM
851 MHz ~ 862 MHz (861 MHz ~ 862 MHz Guard band)	P25(12.5 kHz) FM
862 MHz~869 MHz	LTE(5 MHz), CDMA(1.25 MHz)

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	$OBW \leq 20$ 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
Noise Figure, Emission Masks	-	± 0.89 dB
Radiated Spurious Emissions	$f \leq 1$ GHz $f > 1$ GHz	± 4.80 dB ± 6.07 dB

4. STANDARDS ENVIRONMENTAL TEST CONDITIONS

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

5. TEST EQUIPMENT

Manufacturer	Model / Equipment	Cal Interval	Calibration Date	Serial No.
Agilent	E4438C /Signal Generator	Annual	09/02/2015	MY42082646
Agilent	N5182A /Signal Generator	Annual	04/07/2015	MY50141649
Agilent	N5182A /Signal Generator	Annual	05/13/2015	MY47070230
NANGYEUL CO., LTD.	NY-THR18750/ Temperature and Humidity Chamber	Annual	10/27/2015	NY-2009012201A
Agilent	N9020A /Signal Analyzer	Annual	07/15/2015	MY51110068
WEINSCHEL	67-30-33 / Fixed Attenuator	Annual	10/29/2015	BR0530
DEAYOUNG ENT	DFSS60 / AC Power Supply	Annual	04/01/2015	1003030-1
Rohde & Schwarz	FSP / Spectrum Analyzer	Annual	09/24/2015	100688
CERNEX, Inc	CBLU1183540/AMP	Annual	07/21/2015	22964
WEINSCHEL	1506A/Power Divider	Annual	10/21/2015	MD793
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	07/30/2015	1151
Schwarzbeck	VULB 9160/TRILOG Antenna	Biennial	10/10/2014	9160-3368
HD	MA240 / Antenna Position Tower	N/A	N/A	556
EMCO	1050 / Turn Table	N/A	N/A	114
HD GmbH	HD 100 / Controller	N/A	N/A	13
HD GmbH	KMS 560/ SlideBar	N/A	N/A	12

6. RF OUTPUT POWER

FCC Rules

Test Requirements:

§ 2.1046 Measurements required: RF power output:

§ 2.1046 (a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

§ 2.1046 (b) For single sideband, independent sideband, and single channel, controlled carrier 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 as applicable in § 2.1046 (b) (1-5). In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.

§ 2.1046 (c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

§ 90.541 Transmitting power and antenna height limits.

The transmitting power and antenna height of base, mobile, portable and control stations operating in the 769-775 MHz and 799-805 MHz frequency bands must not exceed the maximum limits in this section. Power limits are listed in effective radiated power (ERP).

- (a) The transmitting power and antenna height of base stations must not exceed the limits given in paragraph (a) of §90.635.
- (b) The transmitting power of a control station must not exceed 200 watts ERP.
- (c) The transmitting power of a mobile unit must not exceed 100 watts ERP.
- (d) The transmitting power of a portable (hand-held) unit must not exceed 3 watts ERP.
- (e) Transmitters operating on the narrowband low power channels listed in §90.531(b)(3) and (4), must not exceed 2 watts ERP.

§ 90.542 Broadband transmitting power limits.

- (a) The following power limits apply to the 758-768/788-798 MHz band:

- (1) Fixed and base stations transmitting a signal in the 758-768 MHz band with an emission bandwidth of 1 MHz or less must not exceed an ERP of 1000 watts and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power

levels are reduced below 1000 watts ERP in accordance with Table 1 of this section. (2) Fixed and base stations located in a county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, and transmitting a signal in the 758-768 MHz band with an emission bandwidth of 1 MHz or less must not exceed an ERP of 2000 watts and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 2000 watts ERP in accordance with Table 2 of this section. (3) Fixed and base stations transmitting a signal in the 758-768 MHz band with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz ERP accordance with Table 3 of this section. (4) Fixed and base stations located in a county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, and transmitting a signal in the 758-768 MHz band with an emission bandwidth greater than 1 MHz must not exceed an ERP of 2000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 2000 watts/MHz ERP in accordance with Table 4 of this section. (5) Licensees of fixed or base stations transmitting a signal in the 758-768 MHz band at an ERP greater than 1000 watts must comply with the provisions set forth in paragraph (b) of this section. (6) Control stations and mobile stations transmitting in the 758-768 MHz band and the 788-798 MHz band are limited to 30 watts ERP. (7) Portable stations (hand-held devices) transmitting in the 758-768 MHz band and the 788-798 MHz band are limited to 3 watts ERP. (8) For transmissions in the 758-768 MHz and 788-798 MHz bands, licensees may employ equipment operating in compliance with either of the following measurement techniques:

- (i) The maximum composite transmit power shall be measured over any interval of continuous transmission using instrumentation calibrated in terms of 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, etc., so as to obtain a true maximum composite measurement for the emission in question over the full bandwidth of the channel.
- (ii) A Commission-approved average power technique.

TABLE 1 TO §90.542(a)—PERMISSIBLE POWER AND ANTENNA HEIGHTS FOR BASE AND FIXED STATIONS IN THE 758-768 MHz BAND TRANSMITTING A SIGNAL WITH AN EMISSION BANDWIDTH OF 1 MHz OR LESS

Antenna height (AAT) in meters (feet)	Effective radiated power (ERP) (watts)
Above 1372 (4500)	65
Above 1220 (4000) To 1372 (4500)	70
Above 1067 (3500) To 1220 (4000)	75
Above 915 (3000) To 1067 (3500)	100
Above 763 (2500) To 915 (3000)	140
Above 610 (2000) To 763 (2500)	200
Above 458 (1500) To 610 (2000)	350
Above 305 (1000) To 458 (1500)	600
Up to 305 (1000)	1000

TABLE 2 TO §90.542(a)—PERMISSIBLE POWER AND ANTENNA HEIGHTS FOR BASE AND FIXED STATIONS IN THE 758-768 MHz BAND TRANSMITTING A SIGNAL WITH AN EMISSION BANDWIDTH OF 1 MHz OR LESS

Antenna height (AAT) in meters (feet)	Effective radiated power (ERP) (watts)
Above 1372 (4500)	130
Above 1220 (4000) To 1372 (4500)	140
Above 1067 (3500) To 1220 (4000)	150
Above 915 (3000) To 1067 (3500)	200
Above 763 (2500) To 915 (3000)	280
Above 610 (2000) To 763 (2500)	400
Above 458 (1500) To 610 (2000)	700
Above 305 (1000) To 458 (1500)	1200
Up to 305 (1000)	2000

TABLE 3 TO §90.542(a)—PERMISSIBLE POWER AND ANTENNA HEIGHTS FOR BASE AND FIXED STATIONS IN THE 758-768 MHz BAND TRANSMITTING A SIGNAL WITH AN EMISSION BANDWIDTH GREATER THAN 1 MHz

Antenna height (AAT) in meters (feet)	Effective radiated power (ERP) per MHz (watts/MHz)
Above 1372 (4500)	65
Above 1220 (4000) To 1372 (4500)	70
Above 1067 (3500) To 1220 (4000)	75
Above 915 (3000) To 1067 (3500)	100
Above 763 (2500) To 915 (3000)	140
Above 610 (2000) To 763 (2500)	200
Above 458 (1500) To 610 (2000)	350
Above 305 (1000) To 458 (1500)	600
Up to 305 (1000)	1000

TABLE 4 TO §90.542(a)—PERMISSIBLE POWER AND ANTENNA HEIGHTS FOR BASE AND FIXED STATIONS IN THE 758-768 MHz BAND TRANSMITTING A SIGNAL WITH AN EMISSION BANDWIDTH GREATER THAN 1 MHz

Antenna height (AAT) in meters (feet)	Effective radiated power (ERP) per MHz (watts/MHz)
Above 1372 (4500)	130
Above 1220 (4000) To 1372 (4500)	140
Above 1067 (3500) To 1220 (4000)	150
Above 915 (3000) To 1067 (3500)	200
Above 763 (2500) To 915 (3000)	280
Above 610 (2000) To 763 (2500)	400
Above 458 (1500) To 610 (2000)	700
Above 305 (1000) To 458 (1500)	1200
Up to 305 (1000)	2000

(b) For base and fixed stations operating in the 758-768 MHz band in accordance with the provisions of paragraph (a)(5) of this section, the power flux density that would be produced by such stations through a combination of antenna height and vertical gain pattern must not exceed 3000 microwatts per square meter on the ground over the area extending to 1 km from the base of the antenna mounting structure.

§ 90.635 Power and antenna height limits. (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.

Antenna height (AAT) in meters (feet)	Effective radiated power (watts)
Above 1372 (4500)	65
Above 1220 (4000) To 1372 (4500)	70
Above 1067 (3500) To 1220 (4000)	75
Above 915 (3000) To 1067 (3500)	100
Above 763 (2500) To 915 (3000)	140
Above 610 (2000) To 763 (2500)	200
Above 458 (1500) To 610 (2000)	350
Above 305 (1000) To 458 (1500)	600
Up to 305 (1000)	1000

Test Procedures:

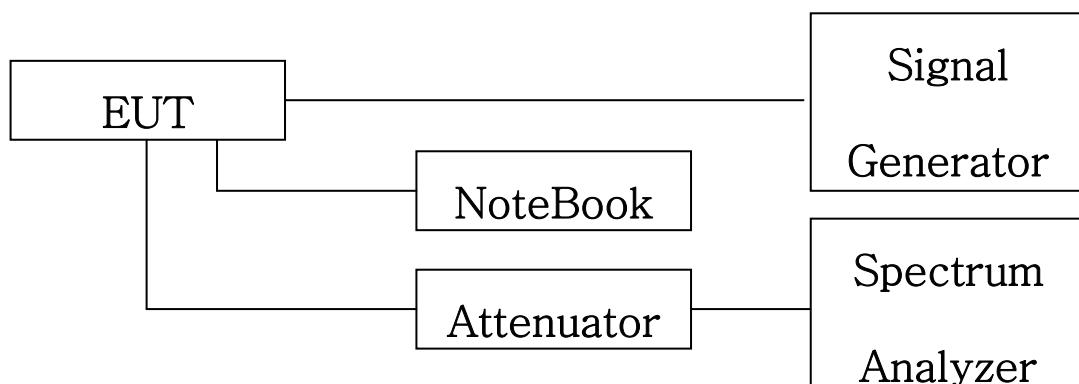
Measurements were in accordance with the test methods section 3.5.2 of KDB 935210 D05 v01.

- 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 of (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 the output power of the EUT and record (Power measurement with a spectrum analyzer).
- g) Remove the EUT from the measurement setup and using the same signal generator settings, repeat the power measurement on the input signal to the EUT and record as input power.

- h) Repeat the procedure with the narrowband test signal.
- i) Repeat the procedure for both test signals with input signal amplitude set to 3 dB above the AGC threshold level.
- j) Repeat 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****Test Results:**

Input Signal	Input Level (dBm)	Maximum Amp Gain
LTE 5 MHz		
LTE 10 MHz		
CDMA 1.25 MHz	DL : -40 dBm UL : -42 dBm	DL : 67 dB UL : 37 dB
P25 12.5 kHz		
FM		

IC Rules**Test Requirements:****SRSP-502****6.3 Technical Requirements****6.3.1 Radiated Power and Antenna Height Limits**

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

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

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

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

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

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

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

Table C4 — Limits of Effective Radiated Power (ERP) Corresponding to Antenna Heights Above Mean Sea Level of Base Stations in Sharing Zone II

Antenna Height Above Mean Sea Level (AMSL) in Metres	ERP Watts (Maximum)
Up to 504	500
Above 504 to 610	350
Above 610 to 763	200
Above 763 to 915	140
Above 915 to 1067	100
Above 1067 to 1220	75
Above 1220 to 1372	70
Above 1372 to 1523	65
Above 1523	5

SRSP-511**B3. Limits of Effective Radiated Power (e.r.p.) and
Antenna Height Along the Canada-United States Border**

E.r.p. 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.

B3.1 For base stations in Sharing Zones I and III, Sectors 1 and 2 and the Protection Zones, Table B4 lists the limits of e.r.p. corresponding to the effective antenna height (EAH) ranges shown. In this case, EAH is calculated by subtracting the assumed average terrain elevation given in Table B6 from the antenna height above mean sea level.

**Table B4: Limits of e.r.p.
Corresponding to EAH of Base
Stations in Sharing Zones I and III,
Sectors 1 and 2 and the Protection
Zones**

EAH		e.r.p. watts (Maximum)
Metres	Feet	
0-152	0-500	500
153-305	501-1000	125
306-457	1001-1500	40
458-609	1501-2000	20
610-914	2001-3000	10
915-1066	3001-3500	6
Above 1067	Above 3501	5

B3.2 For base stations in Sharing Zone II, Table B5 lists the limits of e.r.p. corresponding to the antenna height above mean sea level ranges shown.

**Table B5: Limits of e.r.p. Corresponding to
Antenna Heights Above Mean Sea Level of Base
Stations in Sharing Zone II**

Antenna Height Above Mean Sea Level		e.r.p. watts (Maximum)
Metres	Feet	
0-503	0-1650	500
504-609	1651-2000	350
610-762	2001-2500	200
763-914	2501-3000	140
915-1066	3001-3500	100
1067-1219	3501-4000	75
1220-1371	4001-4500	70
1372-1523	4501-5000	65
Above 1523	Above 5000	5

RSS-131 6.2

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

Additional Power Back-off Condition for Multiple Carrier Operations:

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

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

Examination: with 3 carrier signals (of assumed equal level), the peak voltage will be 3 times the single carrier voltage. The corresponding Peak Envelope Power (PEP) will be 3^2 times greater than a single carrier or $9/4 = 2.25$ times greater than 2 tones PEP.

Therefore the permissible wanted signal operating point has to be backed off by 3.5 dB (i.e. **Ppermissible = Prated - 3.5 dB**).

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

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

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

Test Procedures: RSS-131 4.3**4.3.1 Multi-channel Enhancer**

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

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

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

Set the two generator frequencies 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 $P_{mean} = P_{o1} + 3 \text{ dB}$.

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.

Single channel Enhancer

* Due to EUT's ALC function (Auto Level Control), even if input signal is increased,

The same output power is transmit.

[Downlink]

	Channel	Frequency (MHz)	Output Power	
			(dBm)	(W)
700 Band_ LTE 5 MHz AGC threshold	Low	760.5000	27.10	0.513
	Middle	-	-	-
	High	765.5000	27.07	0.509
700 Band_ LTE 10 MHz AGC threshold	Low	-	-	-
	Middle	763.0000	27.02	0.504
	High	-	-	-
700 Band_P25 AGC threshold	Low	763.0125	27.15	0.519
	Middle	769.0125	27.12	0.525
	High	774.9875	27.05	0.507
700 Band_FM AGC threshold	Low	763.0125	27.26	0.532
	Middle	769.0125	27.03	0.504
	High	774.9875	27.10	0.512

	Channel	Frequency (MHz)	Output Power	
			(dBm)	(W)
700 Band_ LTE 5 MHz +3dB above AGC threshold	Low	760.5000	27.07	0.510
	Middle	-	-	-
	High	765.5000	27.18	0.523
700 Band_ LTE 10 MHz +3dB above AGC threshold	Low	-	-	-
	Middle	763.0000	27.15	0.519
	High	-	-	-
700 Band_P25 +3dB above AGC threshold	Low	763.0125	27.26	0.532
	Middle	769.0125	27.20	0.525
	High	774.9875	27.19	0.523
700 Band_FM +3dB above AGC threshold	Low	763.0125	27.28	0.534
	Middle	769.0125	27.02	0.504
	High	774.9875	27.18	0.522

	Channel	Frequency (MHz)	Output Power	
			(dBm)	(W)
800 Band_ LTE 5 MHz AGC threshold	Low	864.5000	27.04	0.506
	Middle	-	-	-
	High	866.5000	27.09	0.511
800 Band_ CDMA 1.25 MHz AGC threshold	Low	863.2500	27.21	0.526
	Middle	865.5000	27.18	0.523
	High	867.7500	27.12	0.515
800 Band_P25 AGC threshold	Low	851.0125	27.04	0.505
	Middle	856.0000	27.18	0.522
	High	860.9875	27.18	0.522
800 Band_FM AGC threshold	Low	851.0125	27.09	0.512
	Middle	856.0000	27.07	0.506
	High	860.9875	27.02	0.504

	Channel	Frequency (MHz)	Output Power	
			(dBm)	(W)
800 Band_ LTE 5 MHz +3dB above AGC threshold	Low	864.5000	27.04	0.506
	Middle	-	-	-
	High	866.5000	27.15	0.519
800 Band_ CDMA 1.25 MHz +3dB above AGC threshold	Low	863.2500	27.22	0.527
	Middle	865.5000	27.16	0.520
	High	867.7500	27.13	0.517
800 Band_P25 +3dB above AGC threshold	Low	851.0125	27.01	0.502
	Middle	856.0000	27.14	0.517
	High	860.9875	27.19	0.524
800 Band_FM +3dB above AGC threshold	Low	851.0125	27.13	0.516
	Middle	856.0000	27.04	0.506
	High	860.9875	27.10	0.513

[Uplink]

	Channel	Frequency (MHz)	Output Power	
			(dBm)	(mW)
700 Band_ LTE 5 MHz AGC threshold	Low	790.5000	-5.07	0.311
	Middle	-	-	-
	High	795.5000	-5.08	0.310
700 Band_ LTE 10 MHz AGC threshold	Low	-	-	-
	Middle	793.0000	-5.01	0.316
	High	-	-	-
700 Band_P25 AGC threshold	Low	793.0125	-5.00	0.316
	Middle	799.0125	-5.02	0.315
	High	804.9875	-5.00	0.316
700 Band_FM AGC threshold	Low	793.0125	-5.07	0.311
	Middle	799.0125	-5.05	0.313
	High	804.9875	-5.06	0.312

	Channel	Frequency (MHz)	Output Power	
			(dBm)	(mW)
700 Band_ LTE 5 MHz +3dB above AGC threshold	Low	790.5000	-5.01	0.315
	Middle	-	-	-
	High	795.5000	-5.00	0.316
700 Band_ LTE 10 MHz +3dB above AGC threshold	Low	-	-	-
	Middle	793.0000	-5.04	0.313
	High	-	-	-
700 Band_P25 +3dB above AGC threshold	Low	793.0125	-4.99	0.317
	Middle	799.0125	-5.02	0.315
	High	804.9875	-5.06	0.312
700 Band_FM +3dB above AGC threshold	Low	793.0125	-5.05	0.312
	Middle	799.0125	-5.01	0.315
	High	804.9875	-5.02	0.315

	Channel	Frequency (MHz)	Output Power	
			(dBm)	(mW)
800 Band_ LTE 5 MHz AGC threshold	Low	819.5000	-5.06	0.312
	Middle	-	-	-
	High	821.5000	-5.09	0.310
800 Band_ CDMA 1.25 MHz AGC threshold	Low	818.2500	-5.03	0.314
	Middle	820.5000	-5.08	0.311
	High	822.7500	-5.08	0.310
800 Band_P25 AGC threshold	Low	806.0125	-5.02	0.315
	Middle	811.0000	-5.02	0.315
	High	815.9875	-5.02	0.315
800 Band_FM AGC threshold	Low	806.0125	-5.01	0.316
	Middle	811.0000	-5.02	0.315
	High	815.9875	-5.02	0.315

	Channel	Frequency (MHz)	Output Power	
			(dBm)	(mW)
800 Band_ LTE 5 MHz +3dB above AGC threshold	Low	819.5000	-5.04	0.313
	Middle	-	-	-
	High	821.5000	-5.12	0.308
800 Band_ CDMA 1.25 MHz +3dB above AGC threshold	Low	818.2500	-5.01	0.315
	Middle	820.5000	-5.12	0.307
	High	822.7500	-5.08	0.311
800 Band_P25 +3dB above AGC threshold	Low	806.0125	-5.05	0.313
	Middle	811.0000	-5.00	0.316
	High	815.9875	-5.05	0.313
800 Band_FM +3dB above AGC threshold	Low	806.0125	-5.07	0.311
	Middle	811.0000	-5.02	0.315
	High	815.9875	-5.14	0.307

Multi-channel Enhancer for IC

* Due to EUT's ALC function (Auto Level Control), even if input signal is increased,

The same output power is transmit.

[Downlink]

	Channel	Frequency (MHz)	Output Power	
			Po1(dBm)	Pmean(dBm)
700 MHz Band	Low	768.40	24.10	27.10
	Middle	771.50	24.07	27.07
	High	774.60	24.17	27.17
800 MHz Band	Low	851.40	24.17	27.17
	Middle	860.00	24.03	27.03
	High	868.60	24.09	27.09

[Uplink]

	Channel	Frequency (MHz)	Output Power	
			Po1(dBm)	Pmean(dBm)
700 MHz Band	Low	798.40	-7.98	-4.98
	Middle	801.50	-7.95	-4.95
	High	804.60	-7.98	-4.98
800 MHz Band	Low	804.40	-7.95	-4.95
	Middle	815.00	-7.94	-4.94
	High	823.60	-7.96	-4.96

Additional Power Back-off Condition for Multiple Carrier Operations for IC**[Downlink]**

	1 Carrier (dBm)	3 Carrier (dBm)	Power Back-off (dB)
700 MHz Band	27.02	22.26	4.76
800 MHz Band	27.05	22.28	4.77

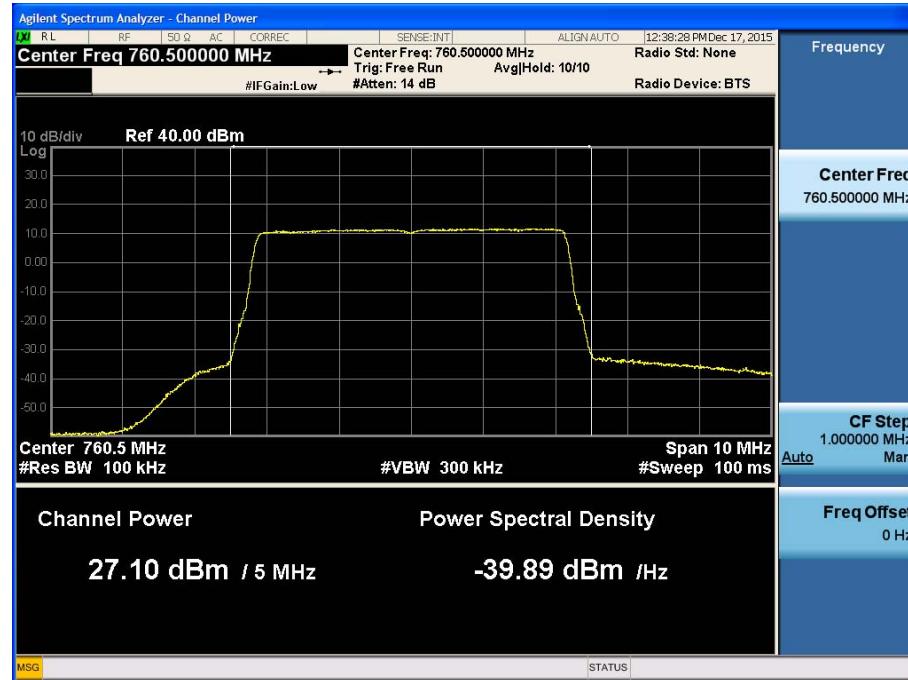
[Uplink]

	1 Carrier (dBm)	3 Carrier (dBm)	Power Back-off (dB)
700 MHz Band	-4.976	-9.75	4.774
800 MHz Band	-4.895	-9.68	4.785

Single channel Enhancer Plots of RF Output Power

700MHz LTE Band DL

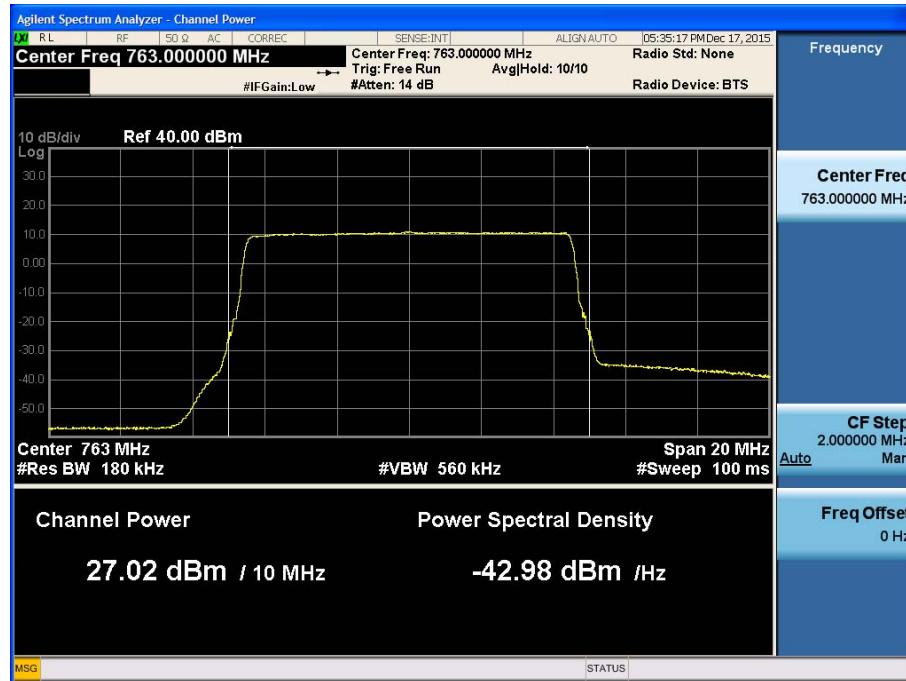
[700 Band AGC threshold Downlink LTE 5 MHz Low]



[700 Band AGC threshold Downlink LTE 5 MHz High]



[700 Band AGC threshold Downlink LTE 10 MHz Middle]



[700 Band +3dB above the AGC threshold Downlink LTE 5 MHz Low]



[700 Band +3dB above the AGC threshold Downlink LTE 5 MHz High]

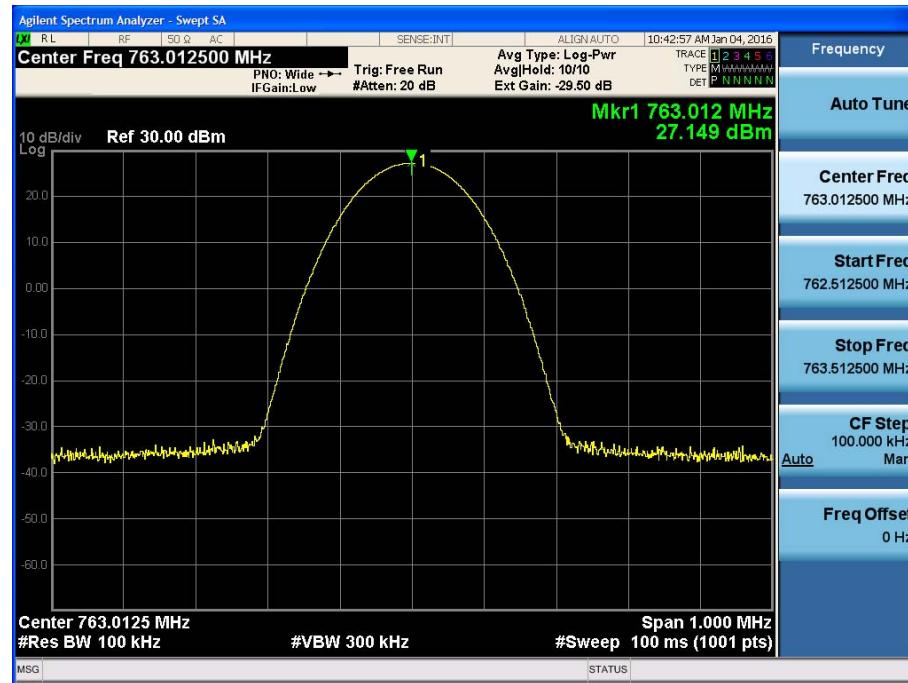


[700 Band +3dB above the AGC threshold Downlink LTE 10 MHz Middle]

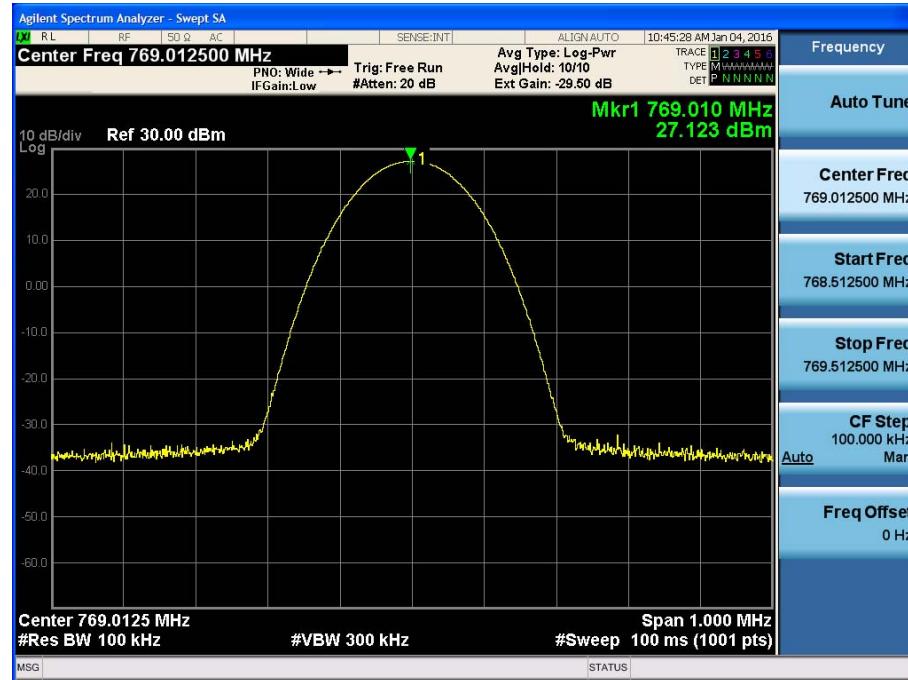


700MHz Band_P25, FM DL

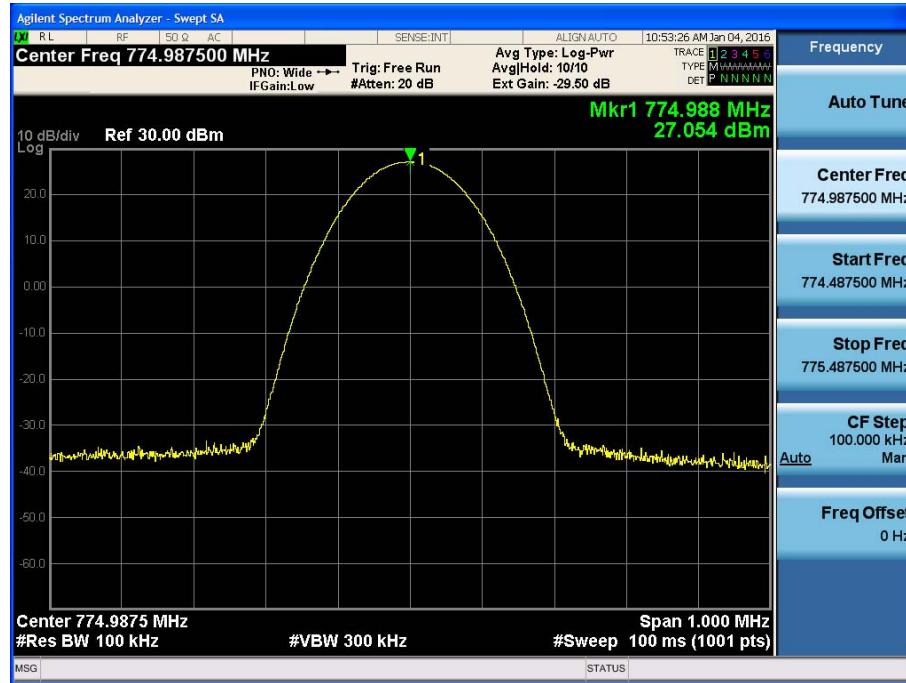
[700 Band AGC threshold Downlink P25 Low]



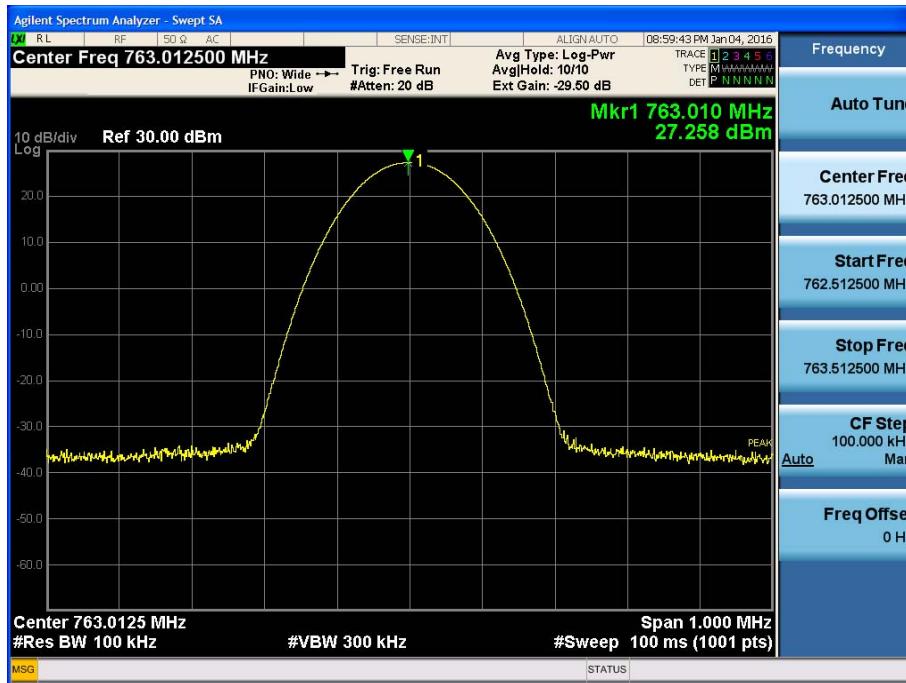
[700 Band AGC threshold Downlink P25 Middle]



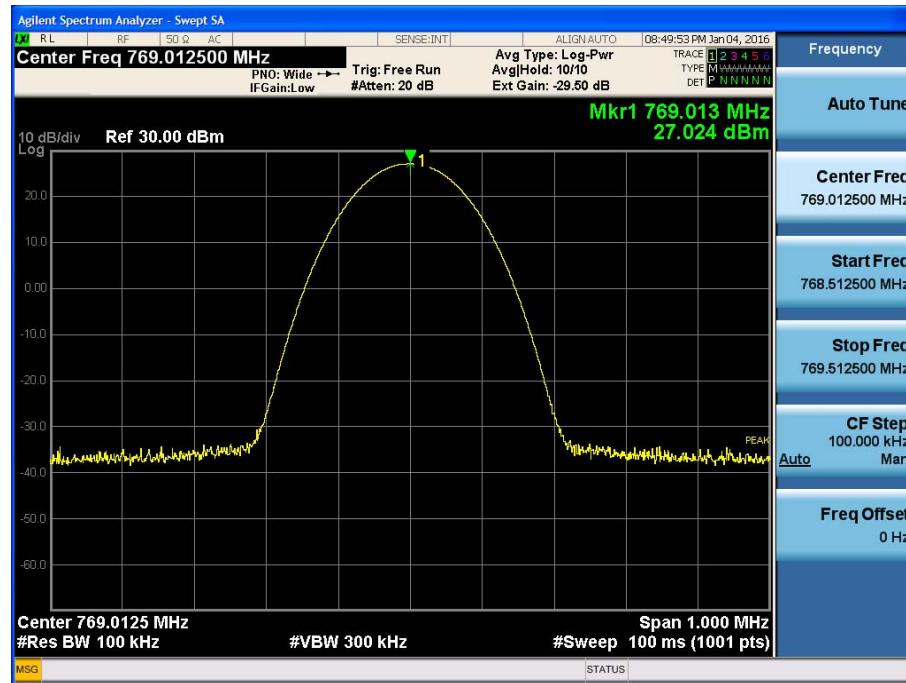
[700 Band AGC threshold Downlink P25 High]



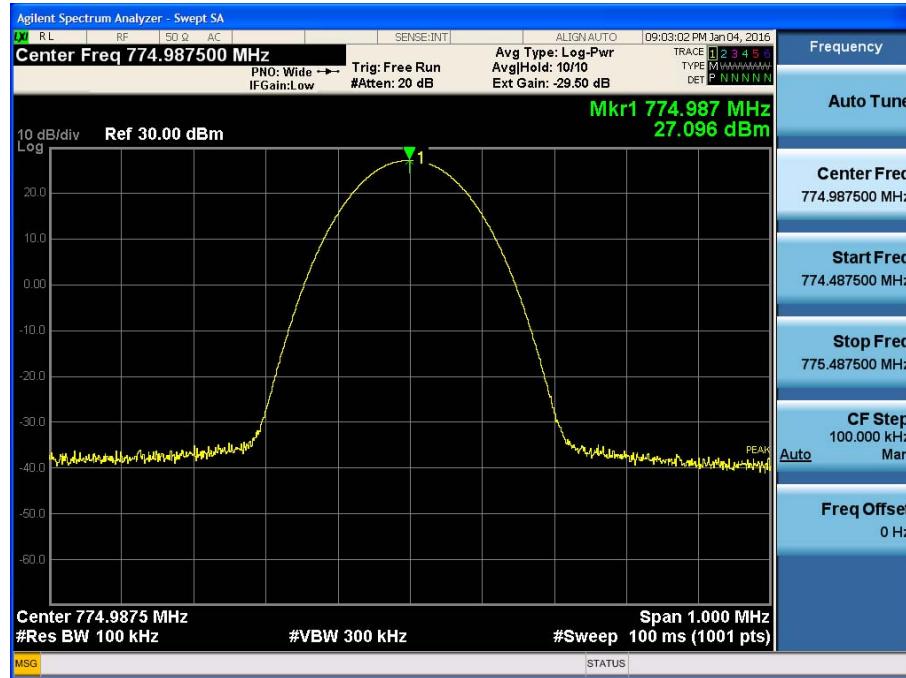
[700 Band AGC threshold Downlink FM Low]



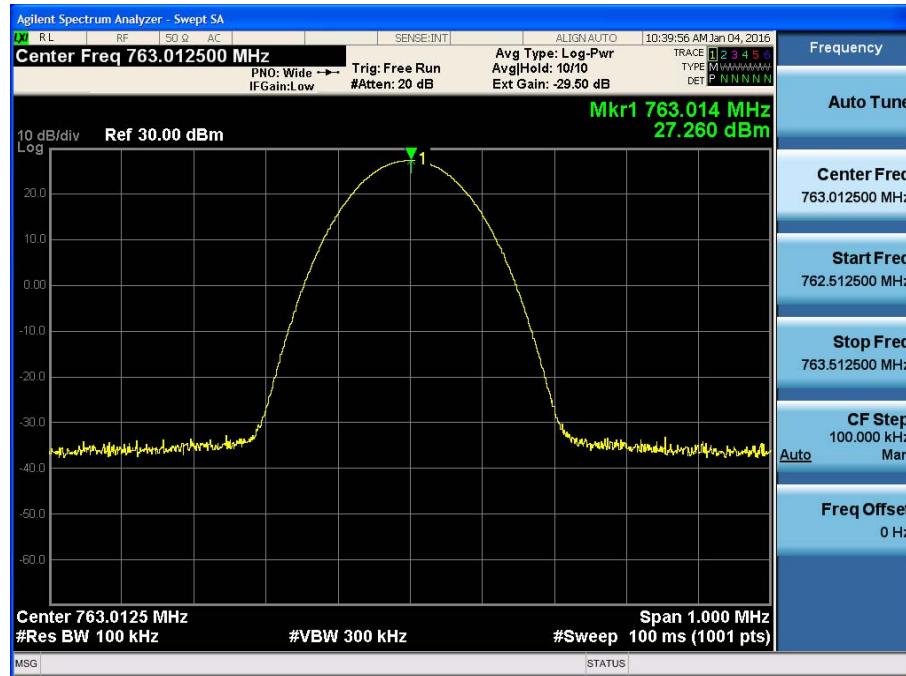
[700 Band AGC threshold Downlink FM Middle]



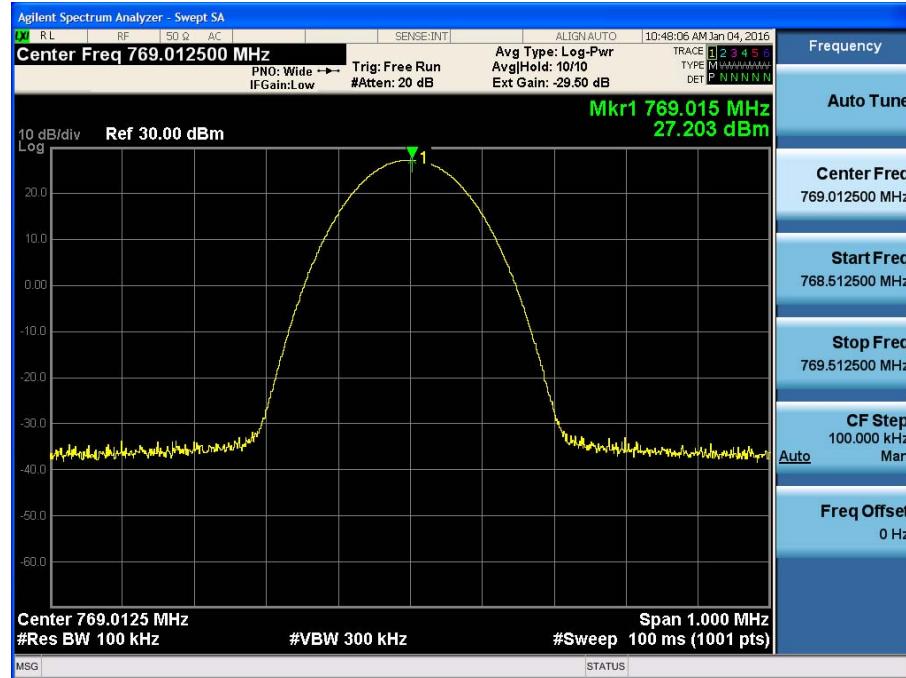
[700 Band AGC threshold Downlink FM High]



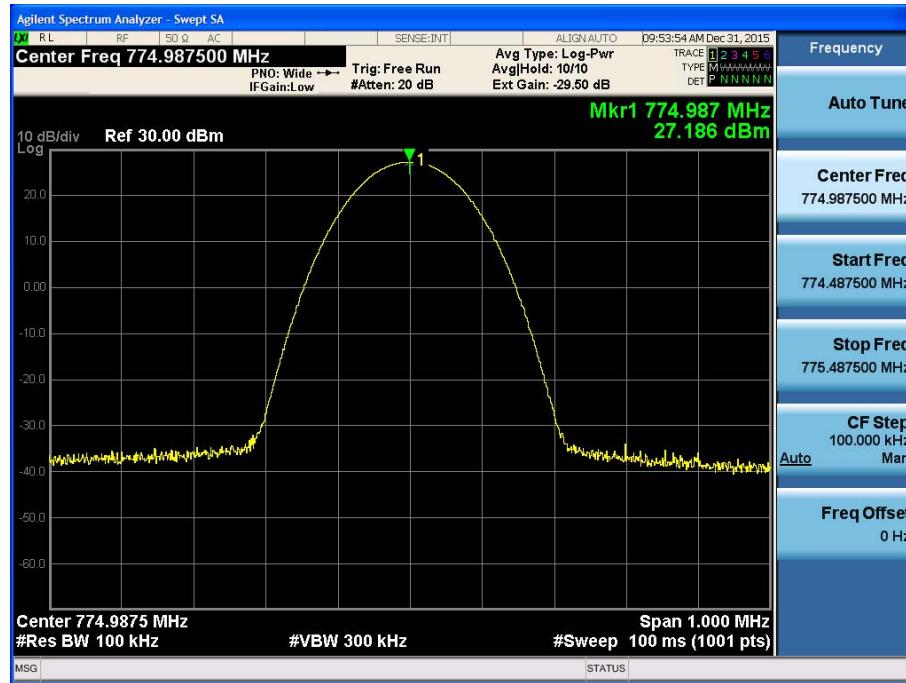
[700 Band +3dB above the AGC threshold Downlink P25 Low]



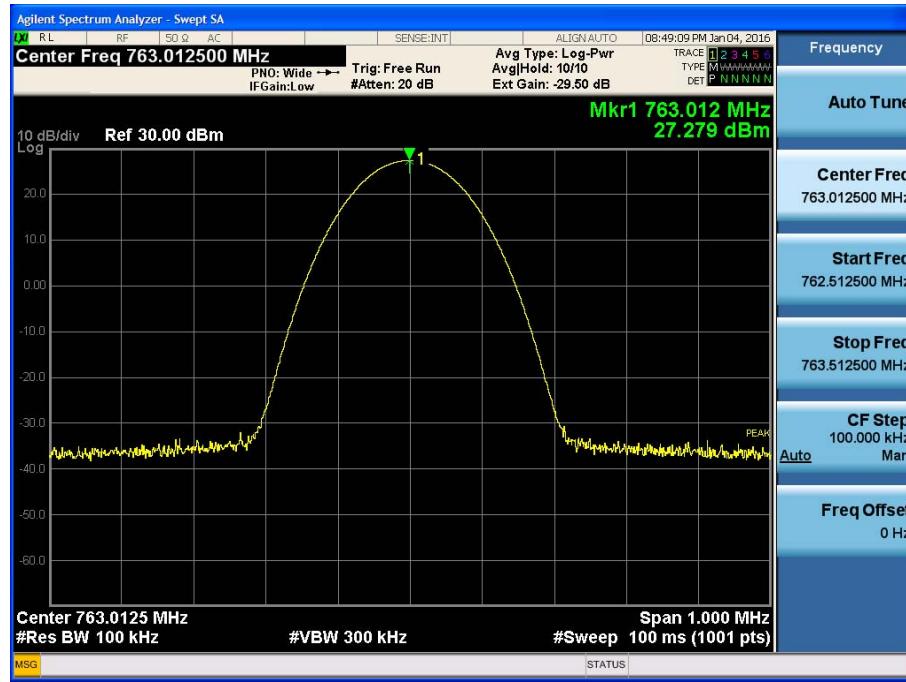
[700 Band +3dB above the AGC threshold Downlink P25 Middle]



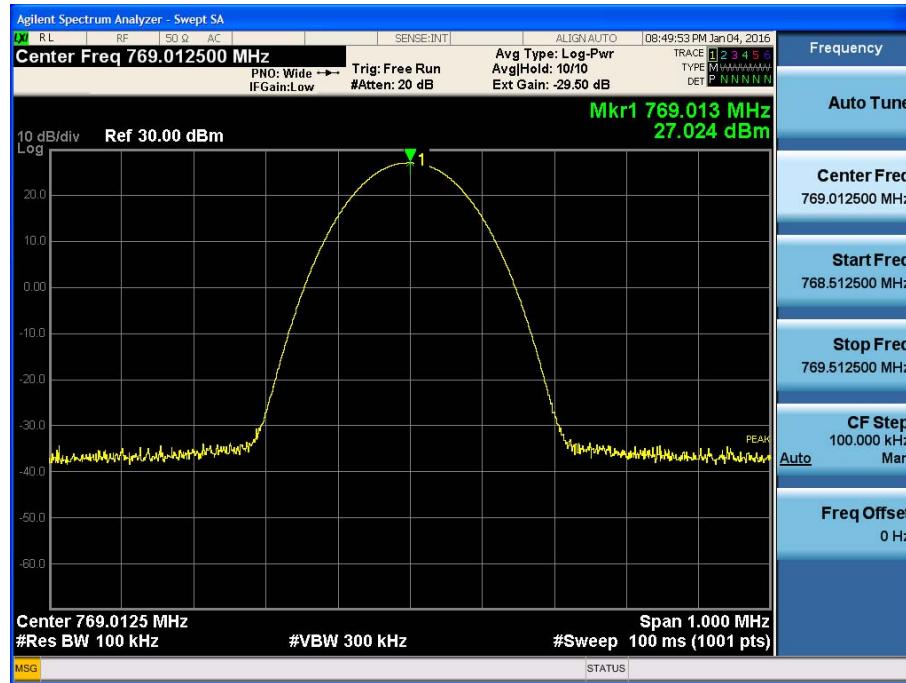
[700 Band +3dB above the AGC threshold Downlink P25 High]



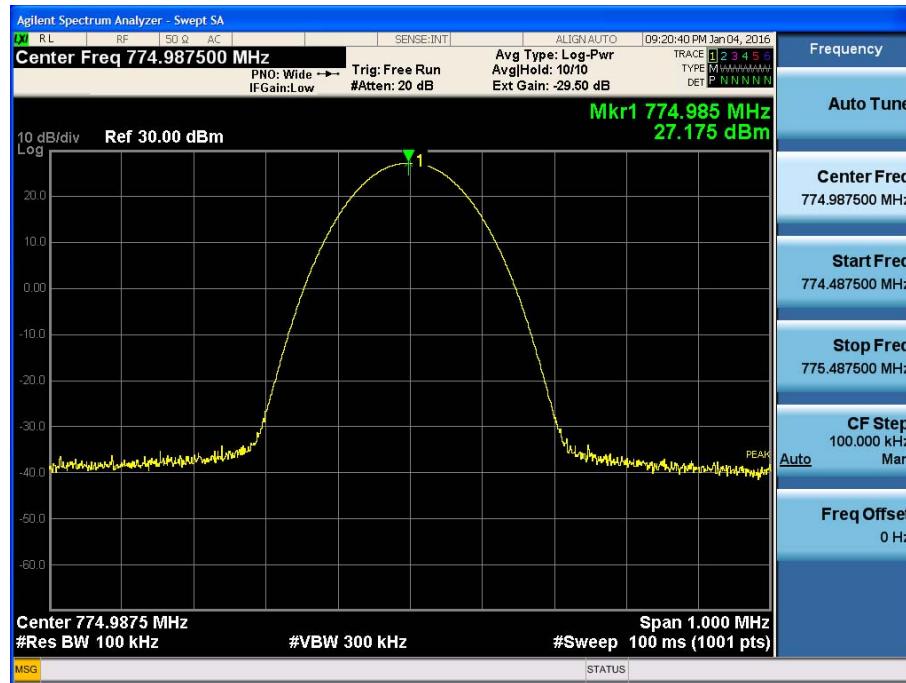
[700 Band +3dB above the AGC threshold Downlink FM Low]



[700 Band +3dB above the AGC threshold Downlink FM Middle]

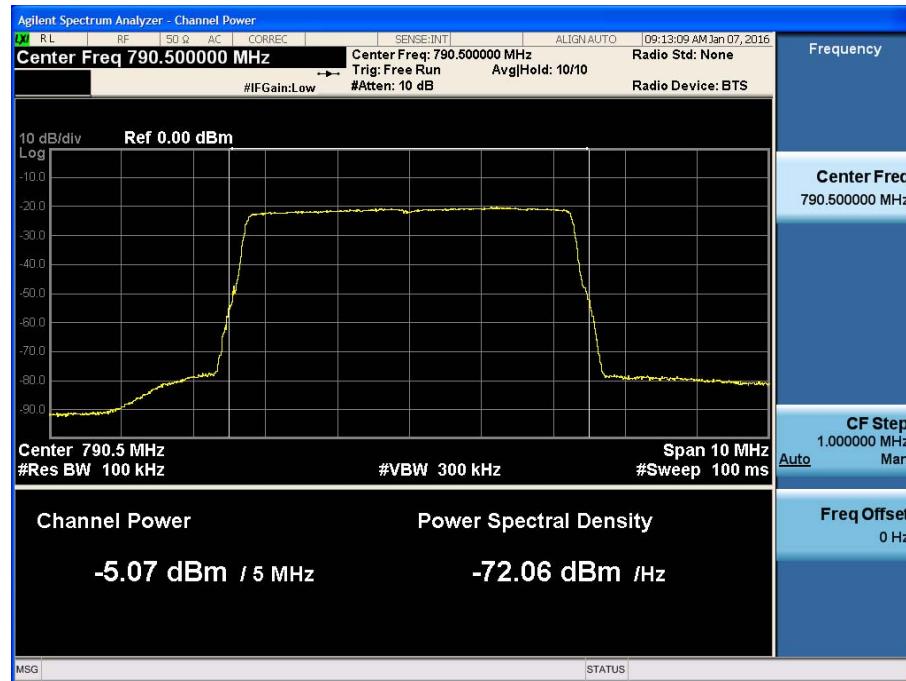


[700 Band +3dB above the AGC threshold Downlink FM High]

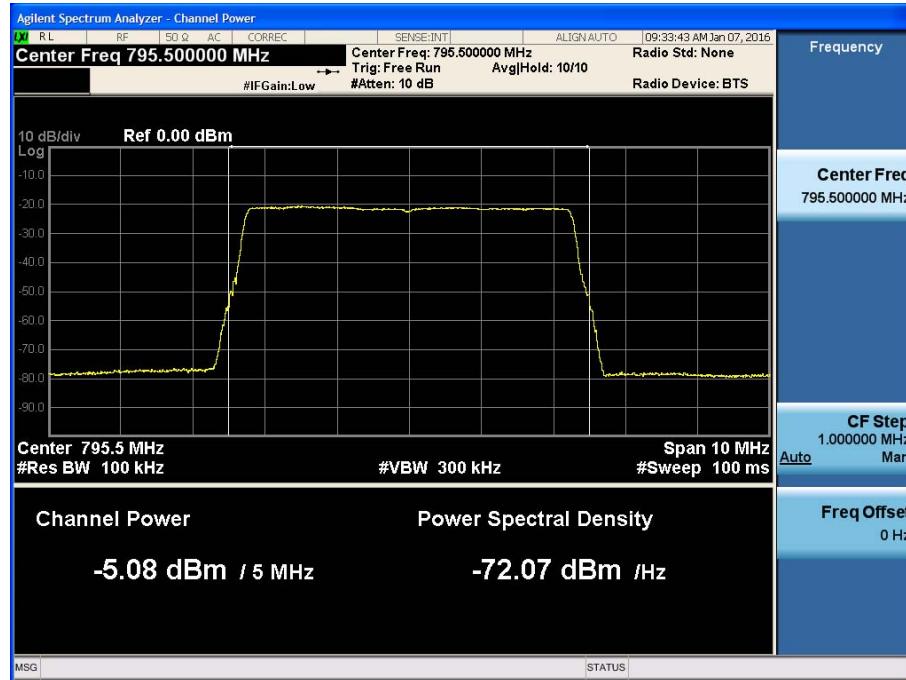


700 MHz Band LTE UL

[700 Band AGC threshold Uplink LTE 5 MHz Low]



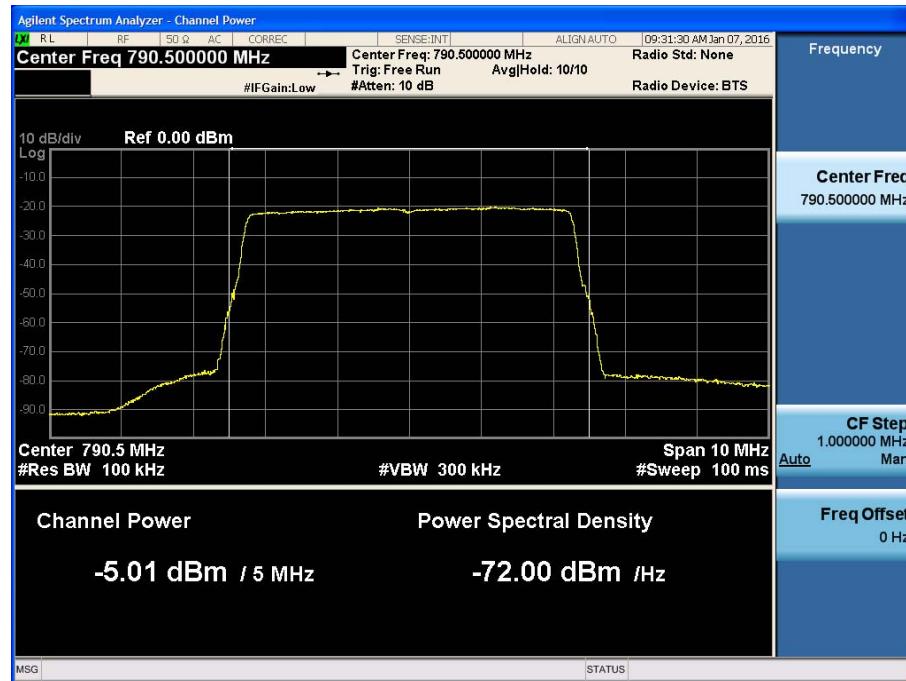
[700 Band AGC threshold Uplink LTE 5 MHz High]



[700 Band AGC threshold Uplink LTE 10 MHz Middle]



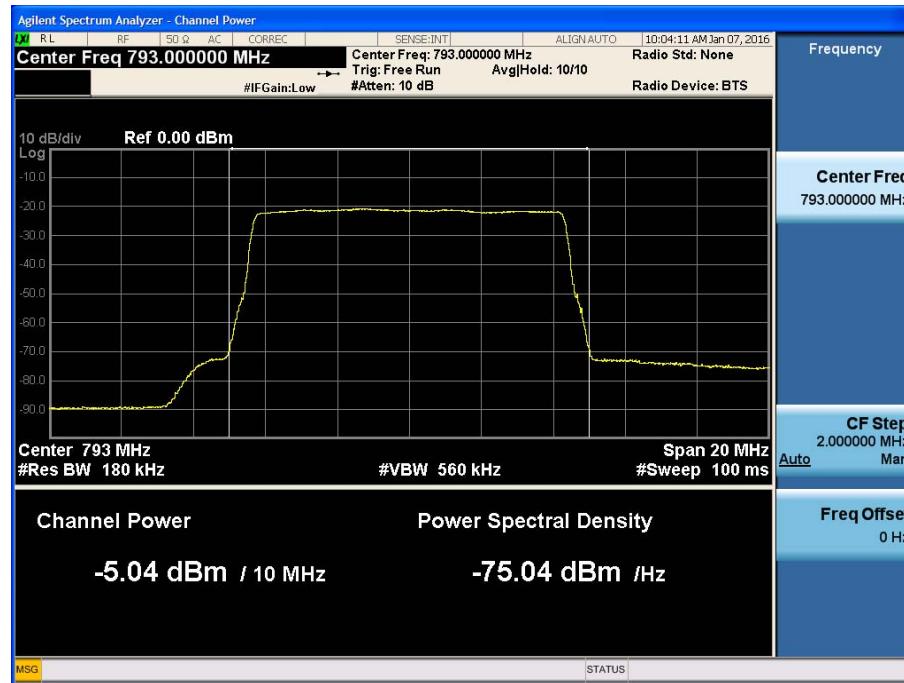
[700 Band +3dB above the AGC threshold Uplink LTE 5 MHz Low]

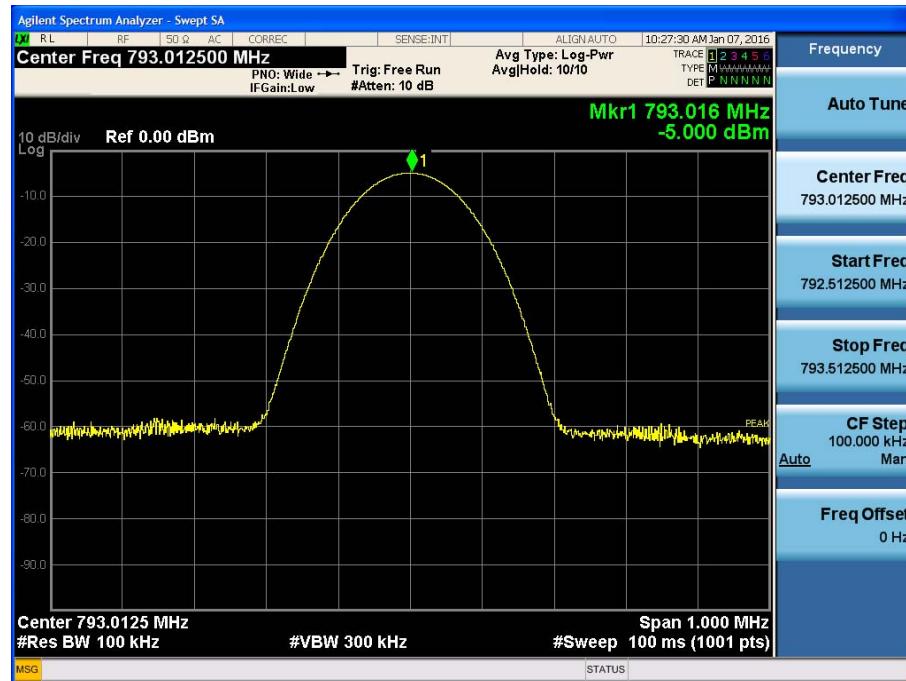
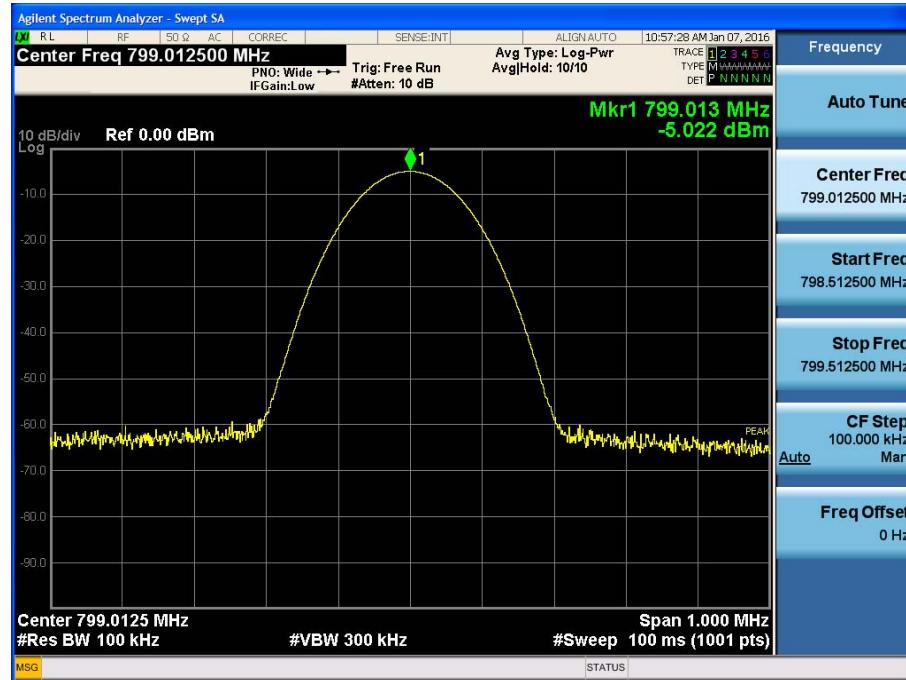


[700 Band +3dB above the AGC threshold Uplink LTE 5 MHz High]

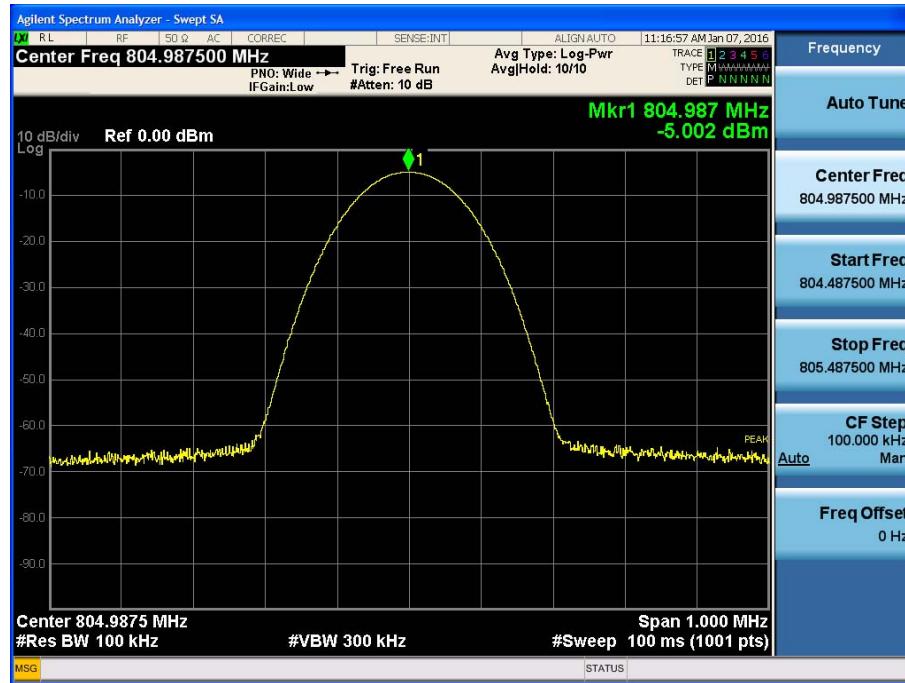


[700 Band +3dB above the AGC threshold Uplink LTE 10 MHz Middle]

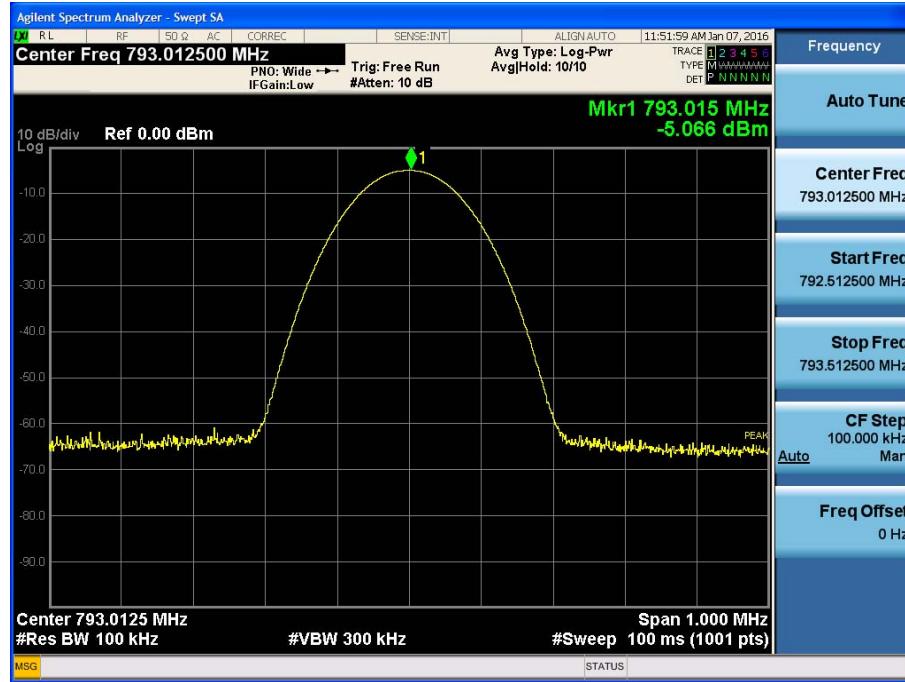


700 MHz Band_P25, FM UL
[700 Band AGC threshold Uplink P25 Low]

[700 Band AGC threshold Uplink P25 Middle]


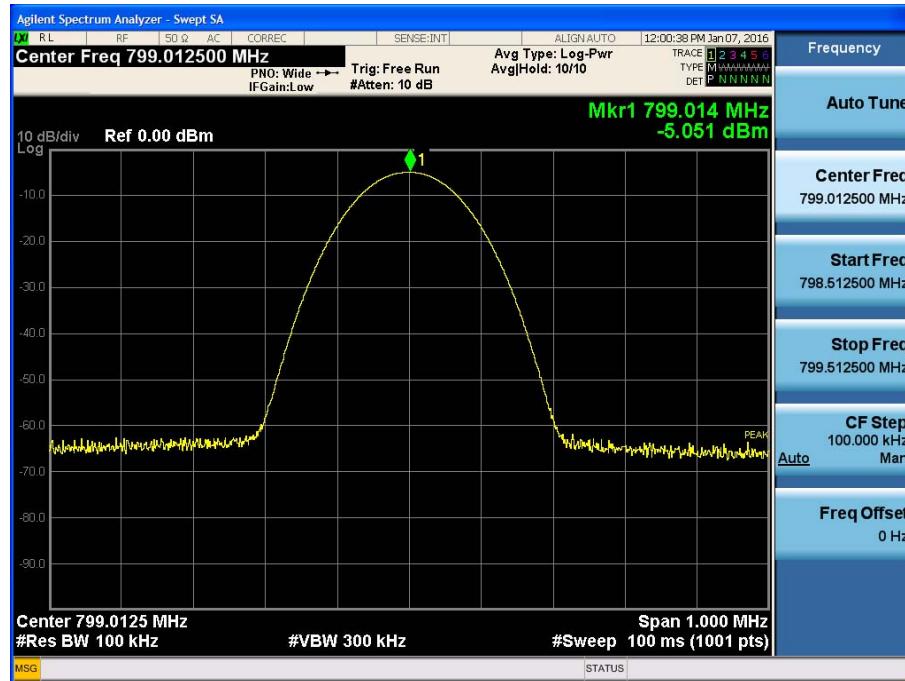
[700 Band AGC threshold Uplink P25 High]



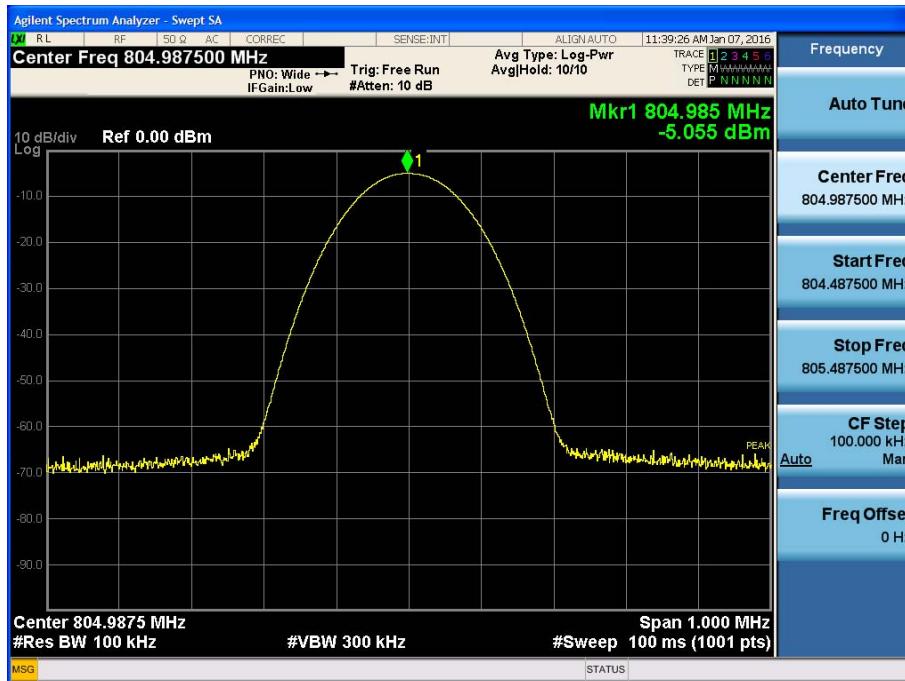
[700 Band AGC threshold Uplink FM Low]



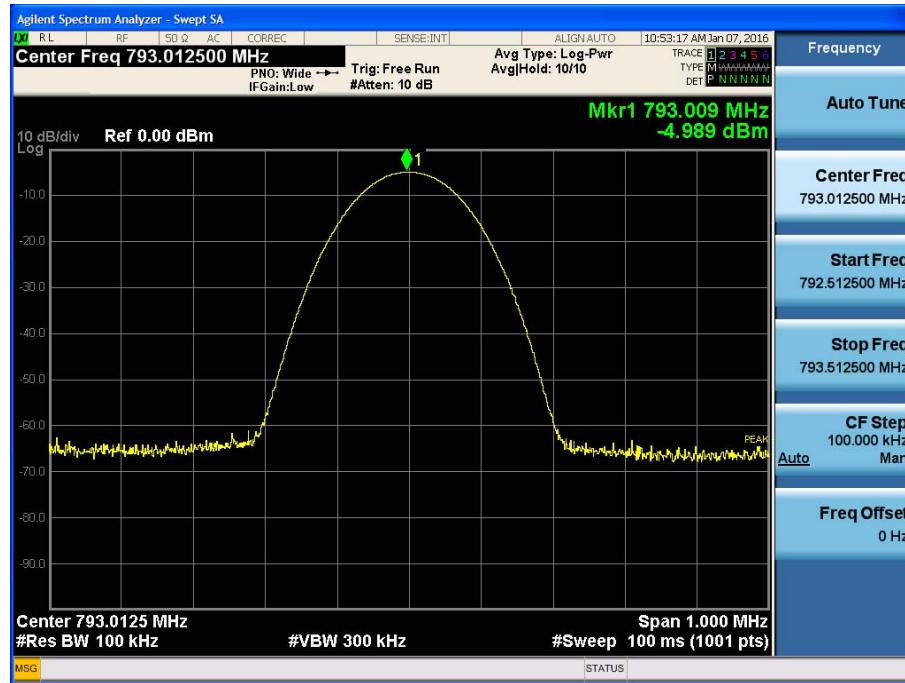
[700 Band AGC threshold Uplink FM Middle]



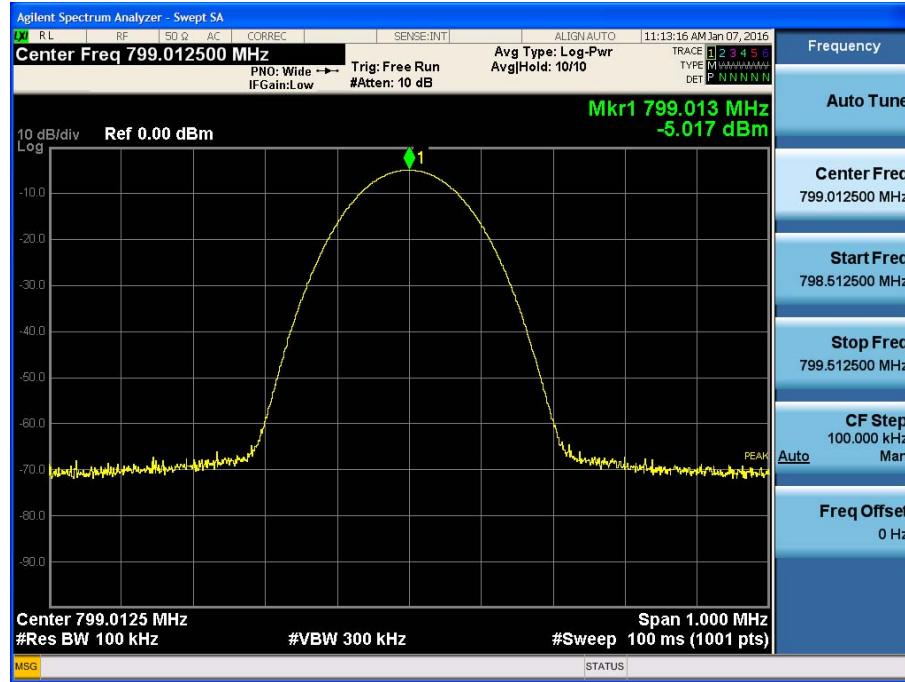
[700 Band AGC threshold Uplink FM High]



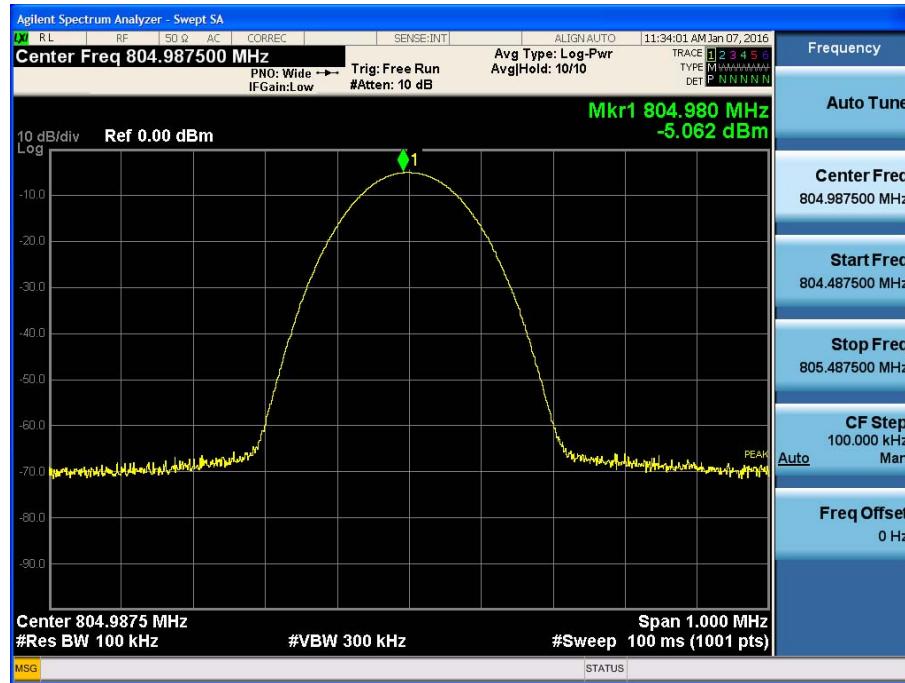
[700 Band +3dB above the AGC threshold Uplink P25 Low]



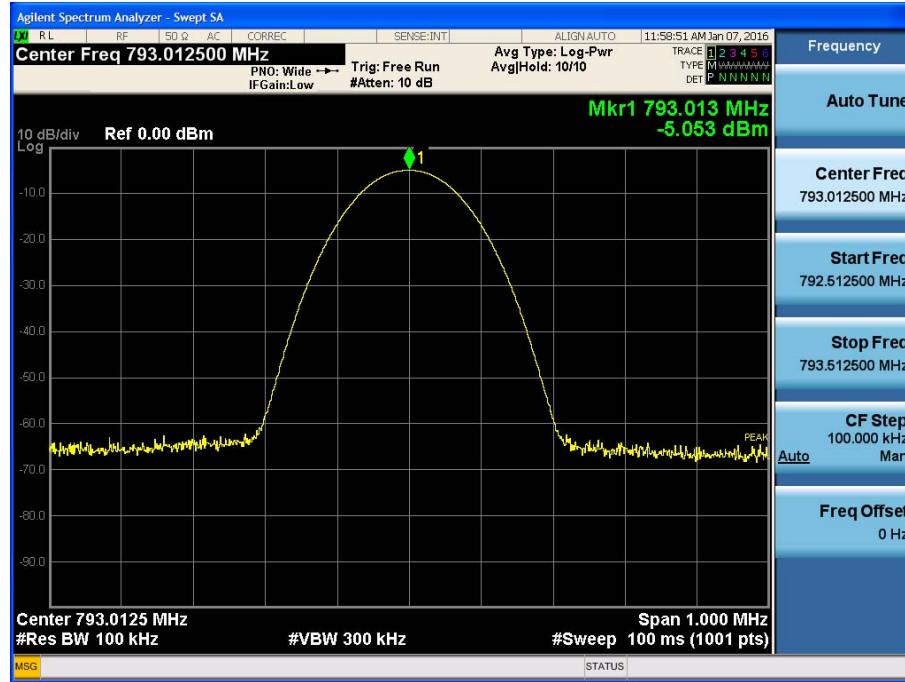
[700 Band +3dB above the AGC threshold Uplink P25 Middle]



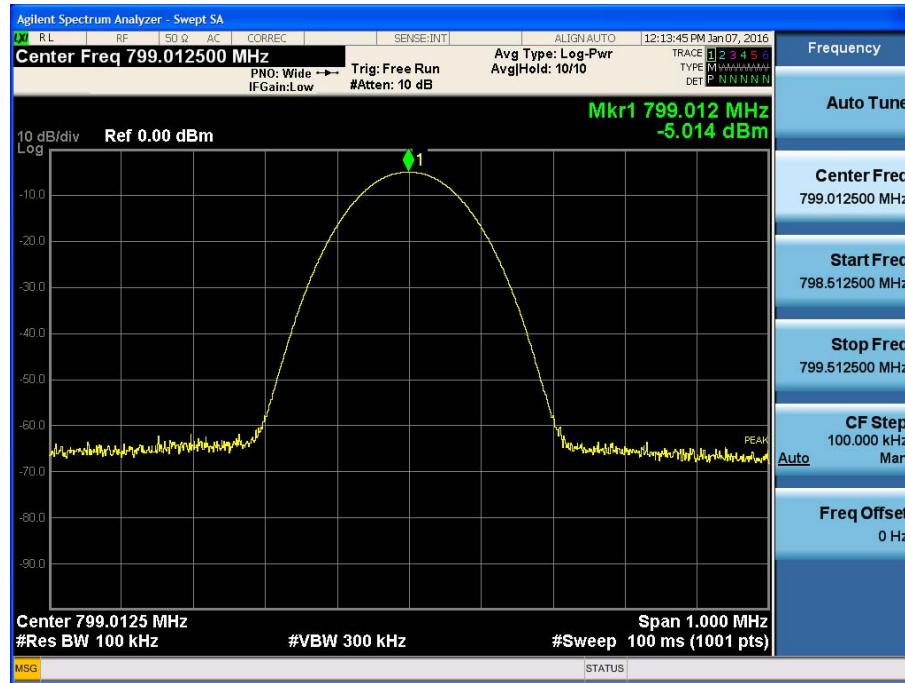
[700 Band +3dB above the AGC threshold Uplink P25 High]



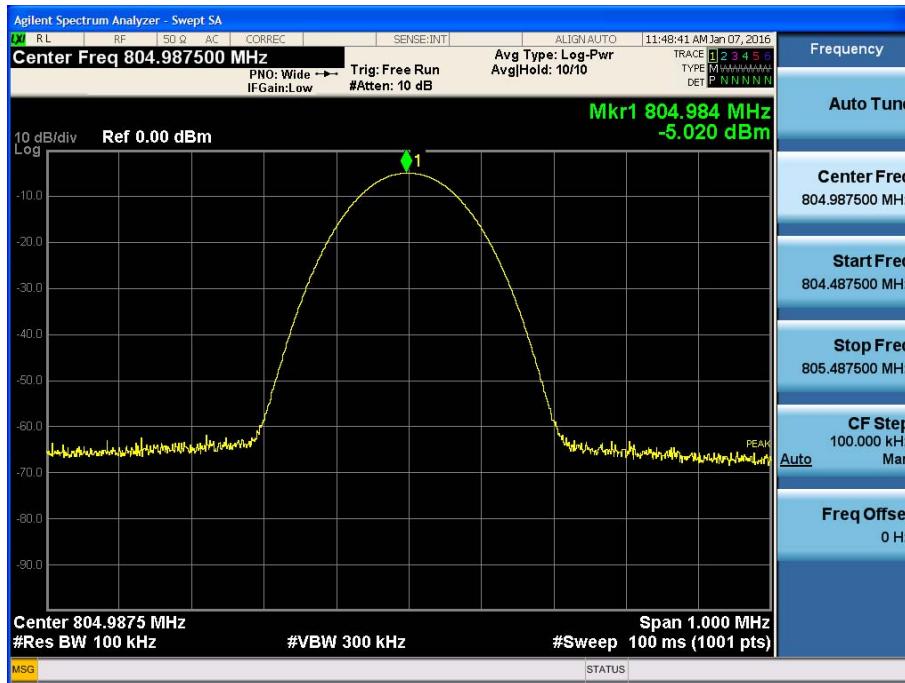
[700 Band +3dB above the AGC threshold Uplink FM Low]



[700 Band +3dB above the AGC threshold Uplink FM Middle]



[700 Band +3dB above the AGC threshold Uplink FM High]



800MHz Band_LTE, CDMA DL

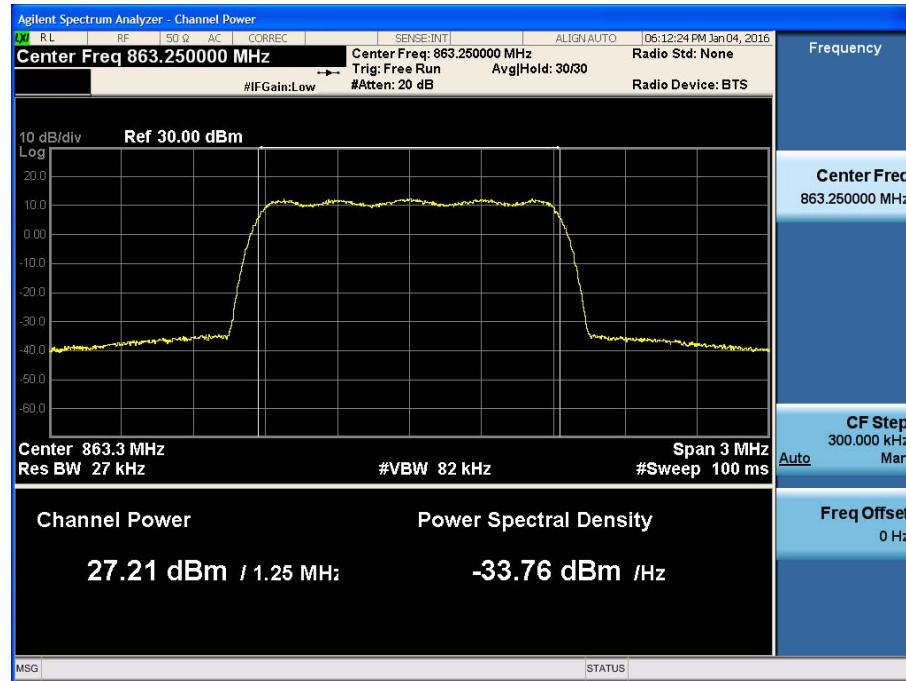
[800 Band AGC threshold Downlink LTE 5 MHz Low]



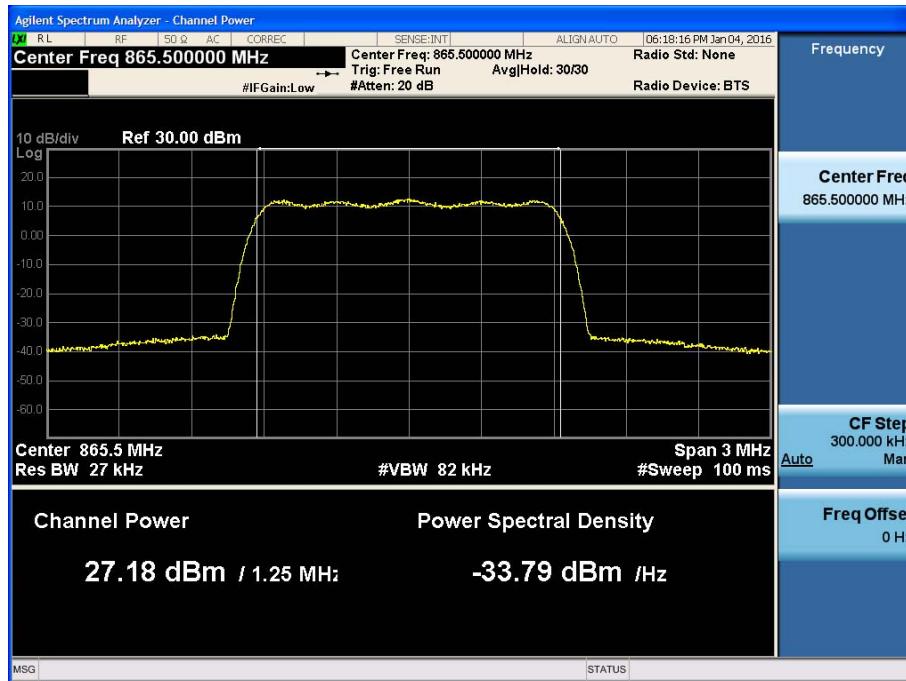
[800 Band AGC threshold Downlink LTE 5 MHz High]



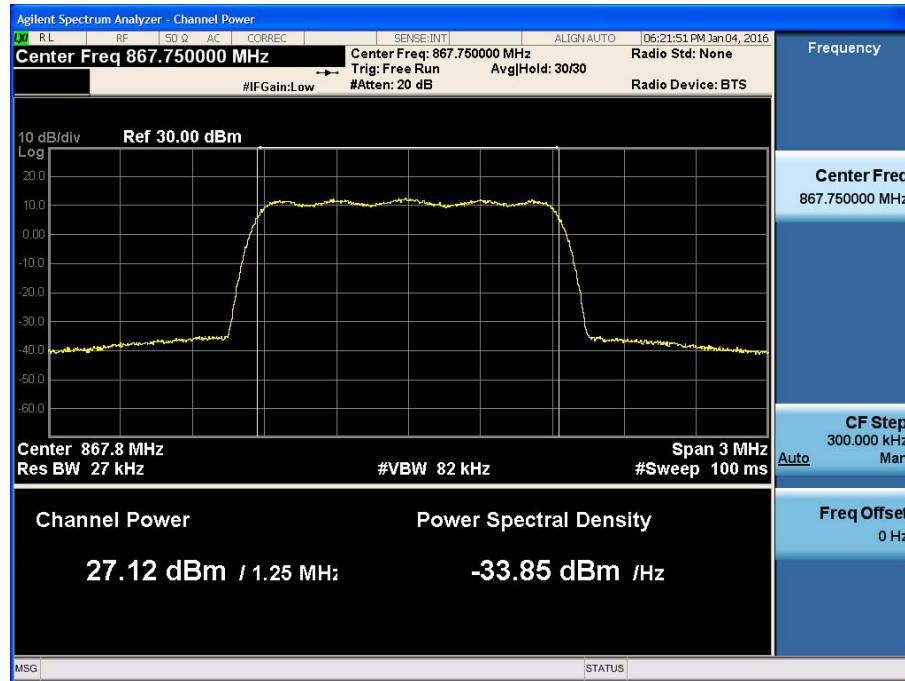
[800 Band AGC threshold Downlink CDMA 1.25 MHz Low]



[800 Band AGC threshold Downlink CDMA 1.25 MHz Middle]



[800 Band AGC threshold Downlink CDMA 1.25 MHz High]



[800 Band +3dB above the AGC threshold Downlink LTE 5 MHz Low]



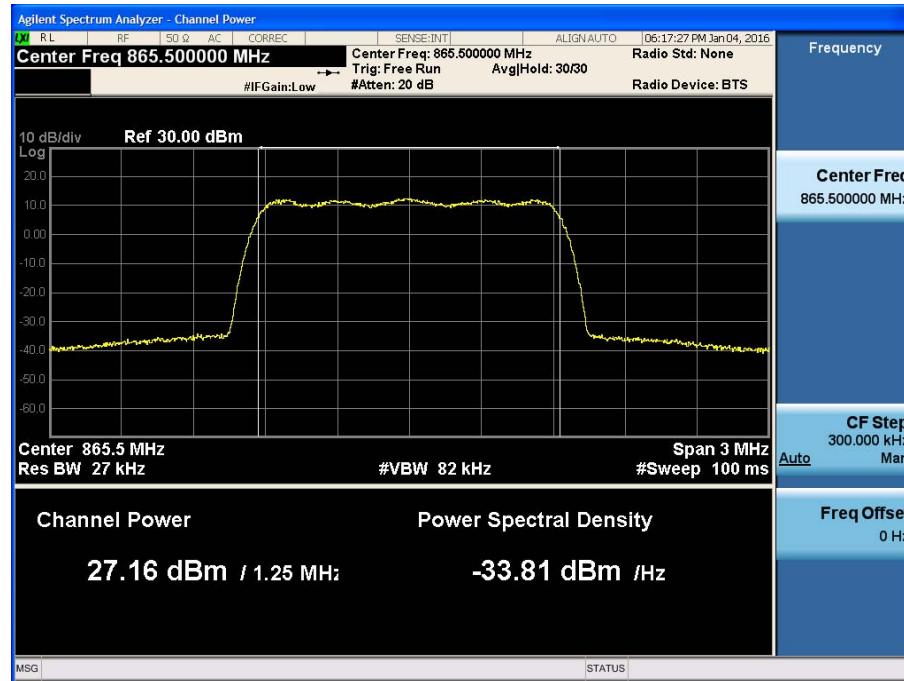
[800 Band +3dB above the AGC threshold Downlink LTE 5 MHz High]



[800 Band +3dB above the AGC threshold Downlink CDMA 1.25 MHz Low]



[800 Band +3dB above the AGC threshold Downlink CDMA 1.25 MHz Middle]



[800 Band +3dB above the AGC threshold Downlink CDMA 1.25 MHz High]

