HCT CO., LTD.
CERTIFICATION DIVISION
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea
TEL : +82 31 645 6300 FAX : +82 31 645 6401

CERTIFICATE OF COMPLIANCE (ERM EVALUATION)

Manufacture;

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

SOLiD, Inc

Date of Issue : September 15, 2014
Test Site/Location:
HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

Report No.: HCT-R-1408-F026-2
IC Recognition No.: 5944A-3

FCC ID:	**W6UNH700L**
IC:	**9354A-NH700L**
APPLICANT:	**SOLiD, Inc**

FCC/ IC Model Name:	**TR-HRDU-L700**
FCC/ IC Additional Model Name:	**N20-HRDU-L700**
EUT Type:	**HPRD (High Power Remote Drive Unit)**
Frequency Ranges:	**728 MHz ~ 757 MHz**
Conducted Output Power:	**25 W (44 dBm)**
Date of Test :	**August 11, 2014 ~ August 21, 2014**
FCC Rules Part(s):	**CFR 47, Part 27**
IC Rules :	**RSS-Gen (Issue 3, December 2010) , RSS-131 (Issue 2, July 2003)**

Engineering Statement:

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 27 of the FCC Rules under normal use and maintenance.

Report prepared by : Jae Chul Shin
Engineer of RF Team

Report approved by : Yong Hyun Lee
Manager of RF Team

Report Revision

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1408-F026	August 28, 2014	- First Approval Report
HCT-R-1408-F026-1	September 3, 2014	- Revised the Multi-channel power -Revised the Model name (THOR/N20-HRDU-L700 -> TR-HRDU-L700)
HCT-R-1408-F026-2	September 15, 2014	- Added the antenna height limitations.

Table of Contents

1. CLIENT INFORMATION

The EUT has been tested by request of

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

■ FCC ID: **W6UNH700L**

■ IC: **9354A-NH700L**

■ APPLICANT: **SOLiD, Inc**

■ EUT Type: **HPRD (High Power Remote Drive Unit)**

■ Model: **TR-HRDU-L700**

■ Additional Model: **N20-HRDU-L700**

■ Frequency Ranges: **728 MHz ~ 757 MHz**

■Conducted Output Power: **25 W (44 dBm)**

■ Antenna Gain(s) : **Manufacturer does not provide an antenna.**

■ FCC Rules Part(s): **CFR Title 47 Part 27 Sub Part C**

■ IC Rules Part(s): **RSS-Gen (Issue3, December 2010), RSS-131(Issue 2, July 2003)**

■ Measurement standard(s): **ANSI/TIA-603-C-2004, KDB 971168 D01 v02, KDB 935210 D03 v02r01, RSS-131(Issue 2, July 2003)**

■ Place of Tests: **74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. (IC Recognition No. : 5944A-3)**

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, 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 February 28, 2014 (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 SUMMARY

3.1. STANDARDS

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 27, RSS-GEN, RSS-131.

Description	Reference (FCC)	Reference (IC)	Results
Conducted RF Output Power	§2.1046; §27.50	RSS-131, Section 4.3 RSS-131, Section 6.2	Compliant
Occupied Bandwidth	§2.1049	RSS-GEN, Section 4.6.1	Compliant
Passband Gain and Bandwidth & Out of Band Rejection	KDB 935210 D03 v02r01	RSS-131, Section 4.2 RSS-131, Section 6.1	Compliant
Spurious Emissions at Antenna Terminals	§2.1051, §27.53	RSS-131, Section 4.4 RSS-131, Section 6.3 RSS-131, Section 6.4	Compliant
Radiated Spurious Emissions	§2.1053, §27.53	-	Compliant
Frequency Stability	§2.1055, §27.54	RSS-131, Section 4.5 RSS-131, Section 6.5	Compliant

3.2. MODE OF OPERATION DURING THE TEST

The EUT was operated in a manner representative of the typical usage of the equipment.

During all testing, system components were manipulated within the confines of typical usage to maximize each emission.

The device does not supply antenna(s) with the system, so the dummy loads were connected to the RF output ports for radiated spurious emission testing.

QPSK was only selected and tested since it's the worst case configuration among all here modulations (QPSK, 16QAM, 64QAM).

4. STANDARDS ENVIRONMENTAL TEST CONDITIONS

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

5. TEST EQUIPMENT

Manufacturer	Model / Equipment	Cal Interval	Calibration Date	Serial No.
Agilent	E4438C /Signal Generator	Annual	09/05/2013	MY42082646
Agilent	N5182A /Signal Generator	Annual	09/30/2013	MY50141649
Agilent	E4416A /Power Meter	Annual	10/16/2013	GB41291412
Agilent	E9327A/ Power Sensor	Annual	03/31/2014	MY4442009
NANGYEUL CO., LTD.	NY-THR18750/ Temperature and Humidity Chamber	Annual	10/30/2013	NY-2009012201A
Agilent	N9020A /Signal Analyzer	Annual	04/16/2014	US46220219
WEINSCHEL	67-30-33 / Fixed Attenuator	Annual	11/05/2013	BU5347
MCE / Weinschel	2-10 / Fixed Attenuator	Annual	10/28/2013	BR0554
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
MITEQ	AMF-6D-001180-35-20P/AMP	Annual	09/12/2013	1081666
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	07/05/2013	1151
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	07/05/2013	1151
Schwarzbeck	VULB 9160/TRILOG Antenna	Biennial	12/17/2012	3150

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.

§ 27.50 Power and antenna height limits.

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

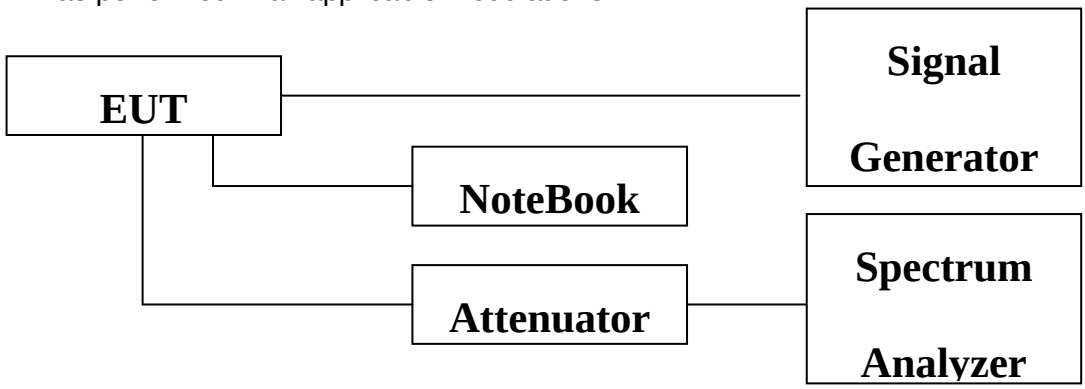
Table 3 to §27.50—Permissible Power and Antenna Heights for Base and Fixed Stations in the 698-757 MHz and 776-787 MHz Bands Transmitting a Signal With an Emission Bandwidth Greater than 1 MHz

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

Test Procedures:

As required by 47 CFR 2.1046, RF power output measurements were made at the RF output terminals using an attenuator and spectrum analyzer or power meter. This test was performed in all applicable modulations.



Block Diagram 1. RF Power Output Test Setup

Test Results:

700 MHz LTE Band

Input Signal	Input Level (dBm)	Maximum Amp Gain
LTE 5 MHz	DL : -15 dBm	DL : 59 dB
LTE 10 MHz		

IC Rules

Test Requirements:

SRSP-518

5.1 Radiated Power and Antenna Height Limits

5.1.1.2 For fixed and base stations transmitting in accordance with sections 4.1.1 to 4.1.3 within the frequency range 716-756 MHz with a channel bandwidth greater than 1 MHz, the maximum permissible e.i.r.p. is 1640 watts/MHz (i.e. no more than 1640 watts e.i.r.p. in any 1 MHz band segment) with a HAAT up to 305 metres. The same e.i.r.p. limit also applies to fixed and base stations operating at any frequency in the 700 MHz band in accordance with Section 4.1.4.

5.1.1.4 For all installations with an antenna HAAT in excess of 305 metres, a corresponding reduction in e.i.r.p. according to the following formula shall be applied:

EIRPreduction =20 log10(HAAT/305) dB

RSS-131 6.2

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

Additional Power Back-off Condition for Multiple Carrier Operations:

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

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

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

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

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

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

Test Procedures: RSS-131 4.3

4.3.1 Multi-channel Enhancer

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

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

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

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

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

For enhancers rated 500 watts or less: Raise the input level to the DUT until the greater level of the intermodulation products at the enhancer output terminals, Po3 or Po4, equals -43 dBW.

For enhancers rated over 500 watts: Raise the input level to the DUT until the greater level of the intermodulation products at the enhancer output terminals, Po3 or Po4, is 67 dB below the level of either output tone level, Po1 or Po2.

Record all signal levels and their frequencies. Calculate the mean output power (Pmean) under this testing condition using Pmean = Po1 + 3 dB.

4.3.2 Single Channel Enhancer

A suitably modulated signal, representative of the technology for which certification is sought, is applied to the input of the amplifier. The input power level is increased until the manufacturer’s rated input power level is achieved or until a 2 dB increase in input level results in a 1 dB increase

in output level (i.e. compression begins). Record the output power in the 99% emission bandwidth using any suitable means.

Single channel Enhancer

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

The same output power is transmit.

700 MHz LTE Band

[Downlink]

	Channel	Frequency (MHz)	Output Power	
			(dBm)	(W)
LTE 5 MHz	Low	731.50	43.91	24.581
	Middle	737.50	44.06	25.445
	High	743.50	44.01	25.183
LTE 10 MHz	Low	734.00	44.03	25.299
	Middle	741.00	44.01	25.177
	High	751.00	43.99	25.084

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)
LTE	Low	728.40	41.00	44.00
	Middle	742.50	41.05	44.05
	High	756.60	41.07	44.07

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

[Downlink]

	1 Carrier (dBm)	3 Carrier (dBm)	Power Back-off (dB)
LTE 5 MHz	44.01	38.93	5.08

Antenna height limitation

ERP/MHz Calculation

Max Peak output Power	25.445	W
Max Peak output Power	44.056	dBm
Antenna Gain	17.00	dBi
ERP for FCC	777.3	W
EIRP for IC	1275.3	W
Minimum Occupied Bandwidth	4.5	MHz
ERP/MHz for FCC	172.7	W/MHz
EIRP/MHz for IC	283.4	W/MHz

It applies the normal antenna gain with 17dBi for ERP Calculation because this system is the manufacturer does not provide an antenna.

HAAT Calculation for IC Rules

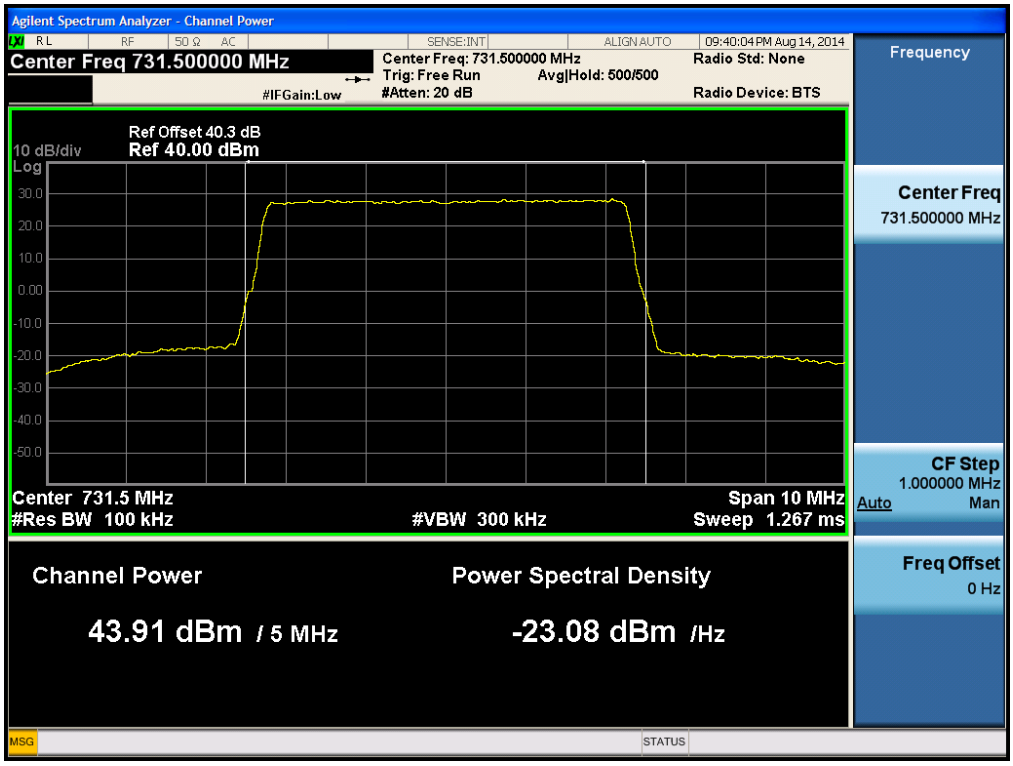
EIRPreduction =20 log10(HAAT/305) dB

HAAT=10^(EIRPreduction/20)*305

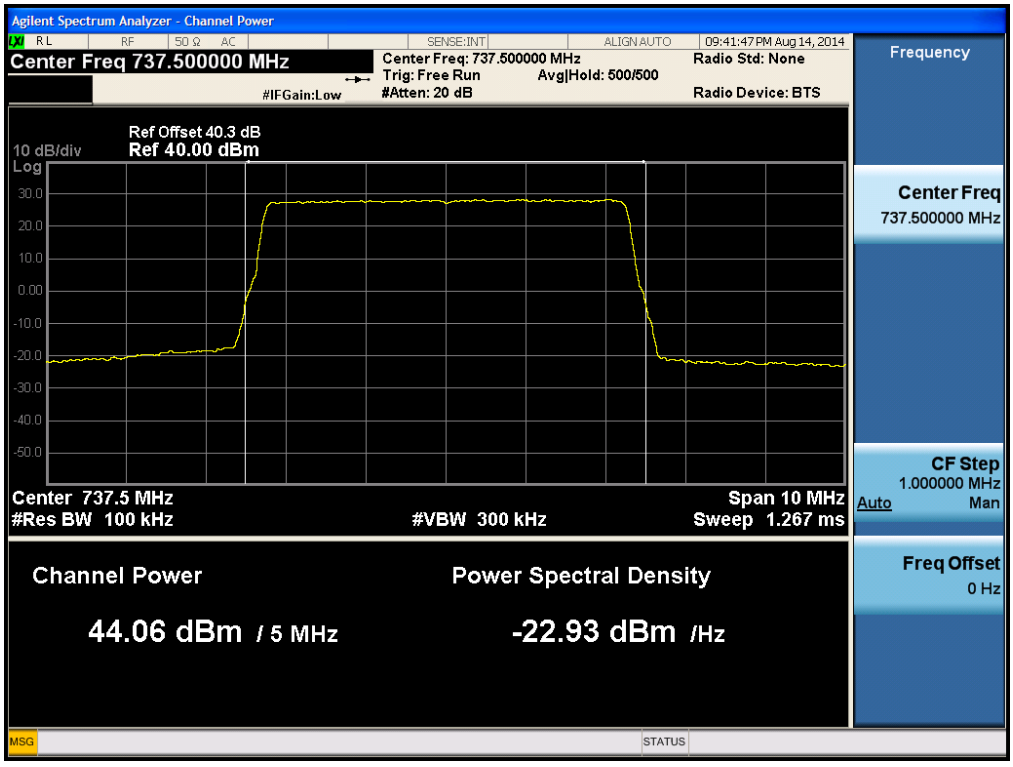
The maximum permissible EIRP	1640	W/MHz
Max Peak output EIRP	283.4	W/MHz
EIRPreduction	7.62	dB
Antenna height limited	733	m

Single channel Enhancer Plots of RF Output Power

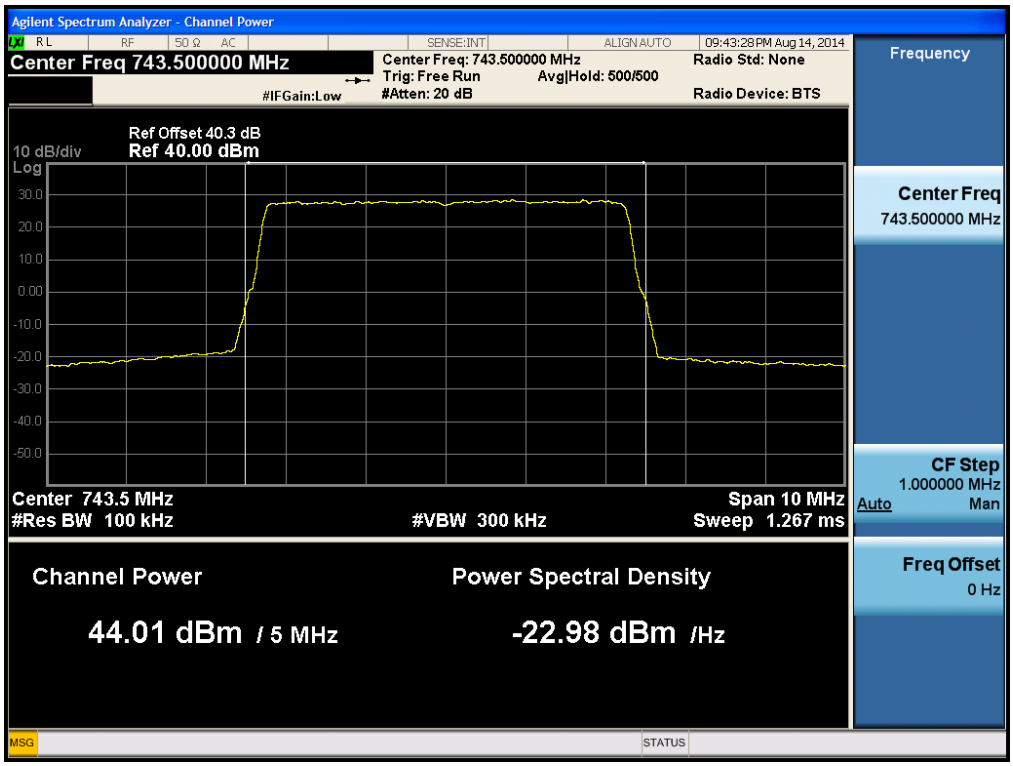
[LTE Downlink 5 MHz Low]



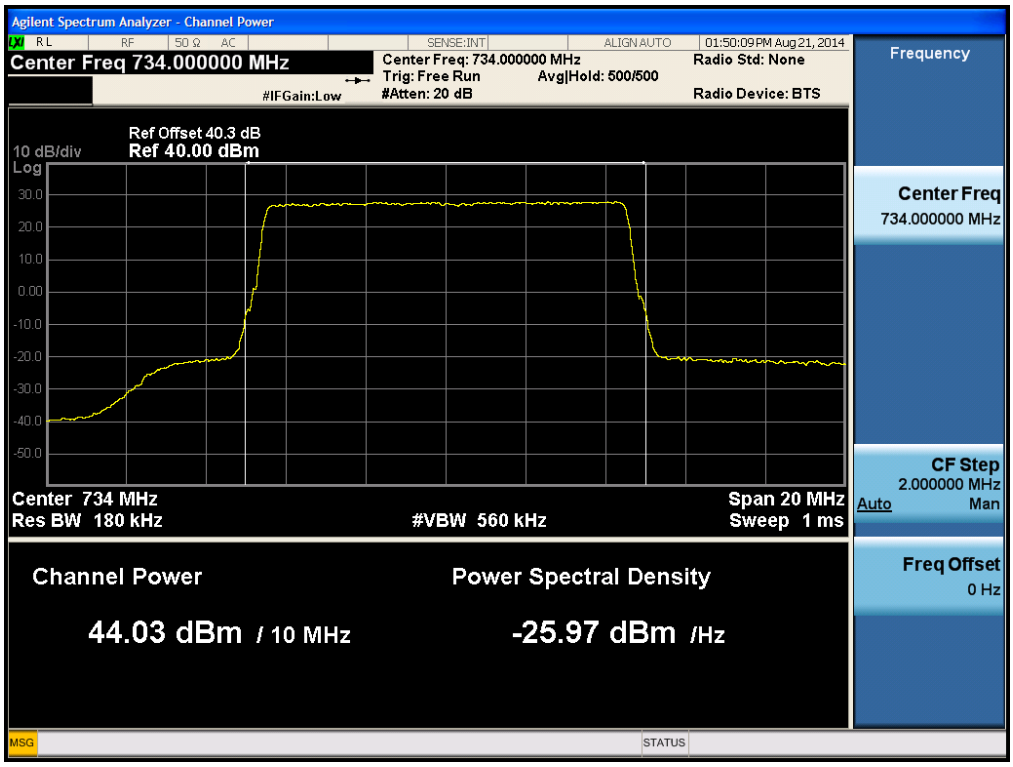
[LTE Downlink 5 MHz Middle]



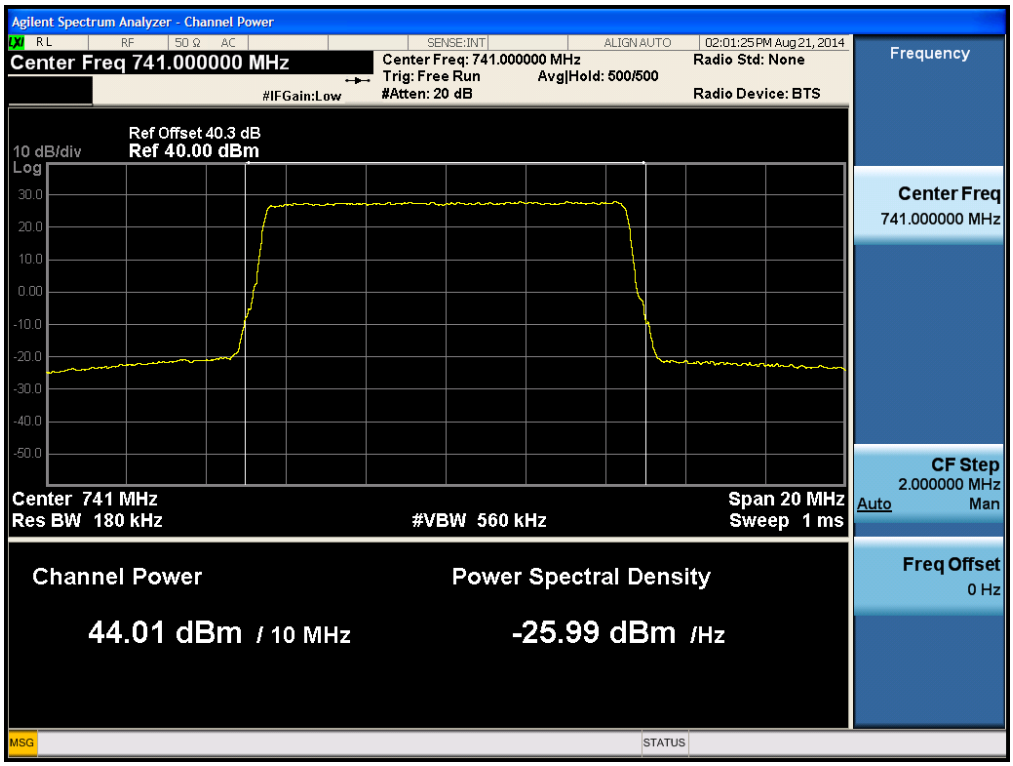
[LTE Downlink 5 MHz High]



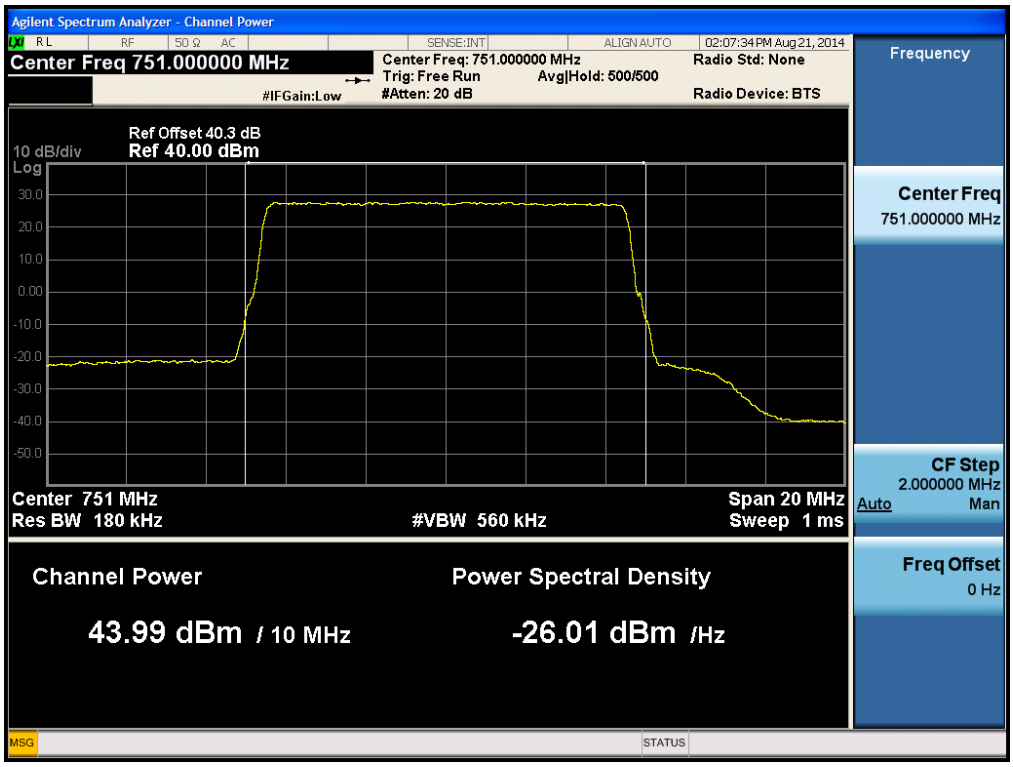
[LTE Downlink 10 MHz Low]



[LTE Downlink 10 MHz Middle]

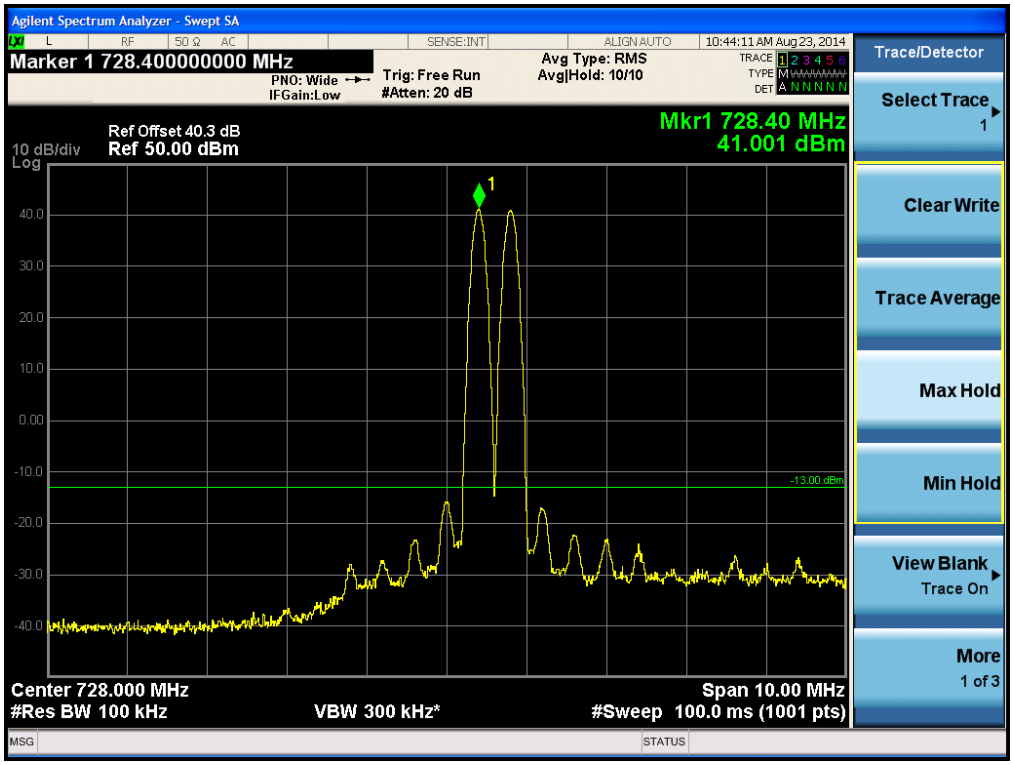


[LTE Downlink 10 MHz High]

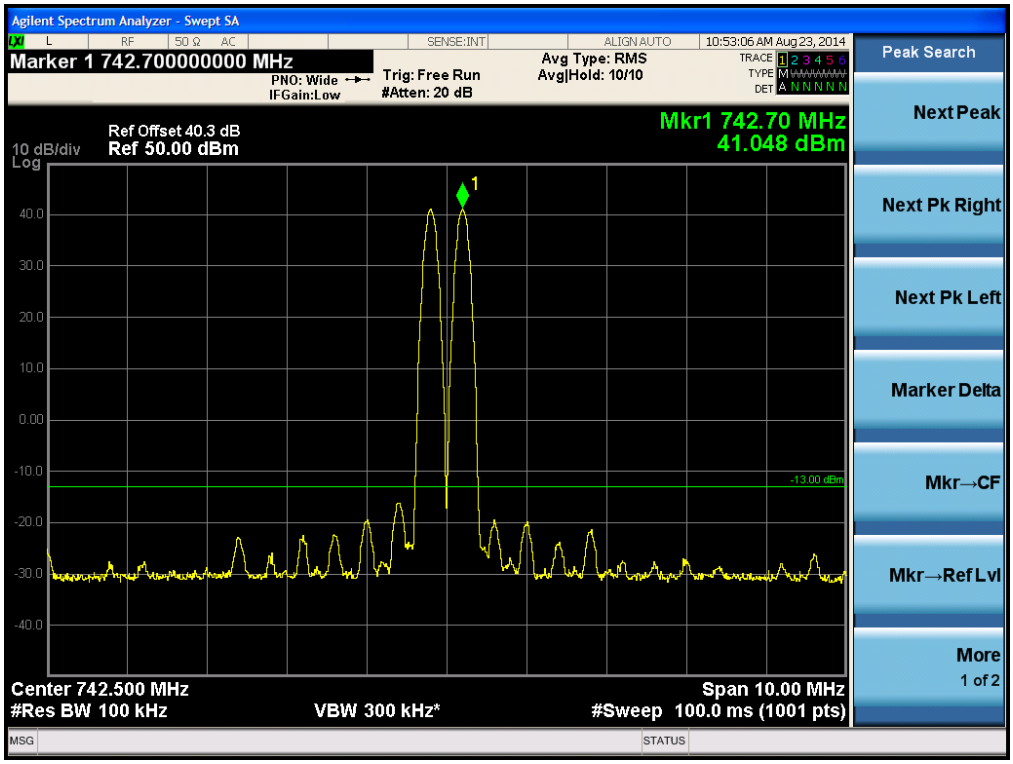


Multi-channel Enhancer for IC

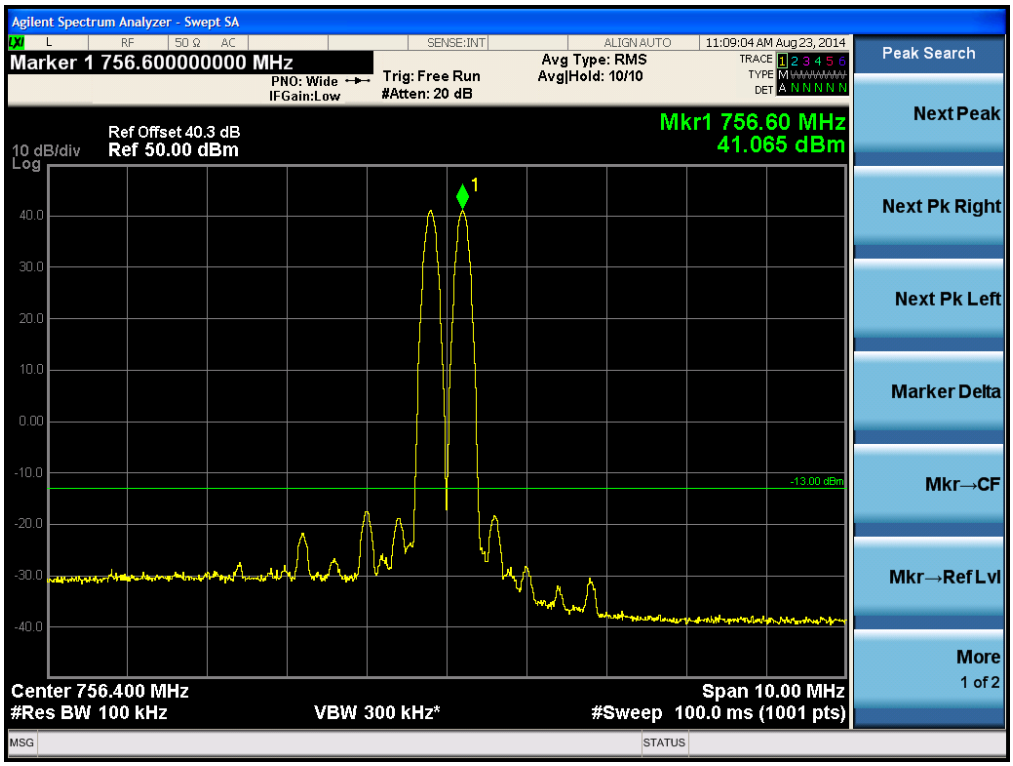
[LTE Downlink Low]



[LTE Downlink Middle]

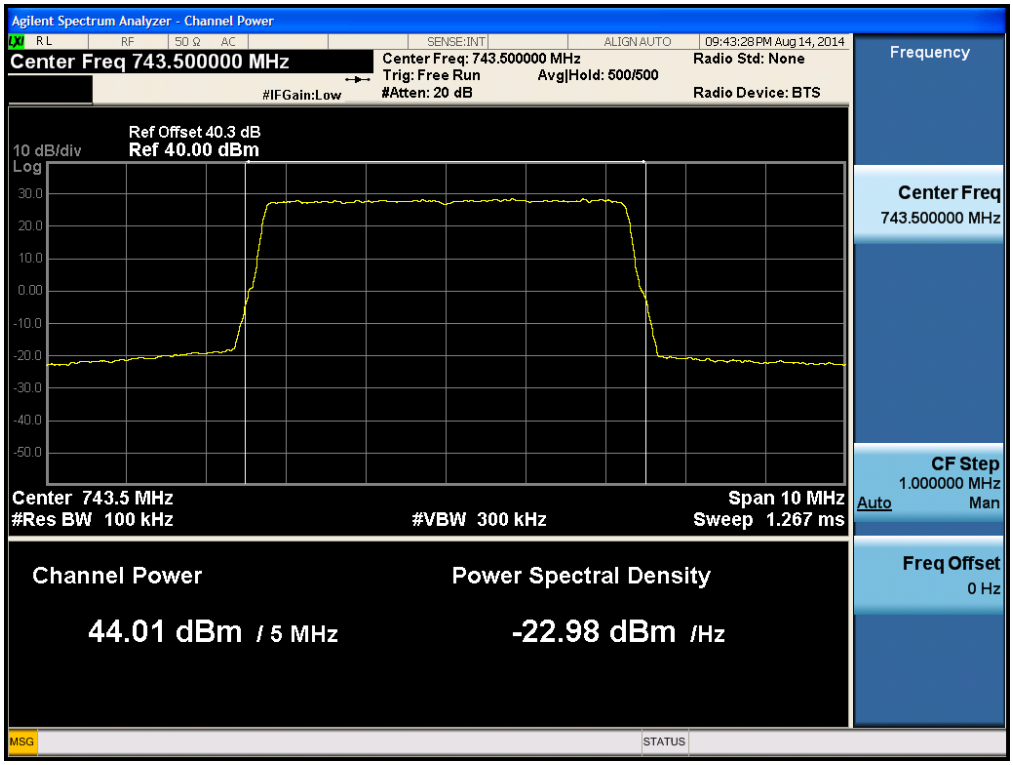


[LTE Downlink High]

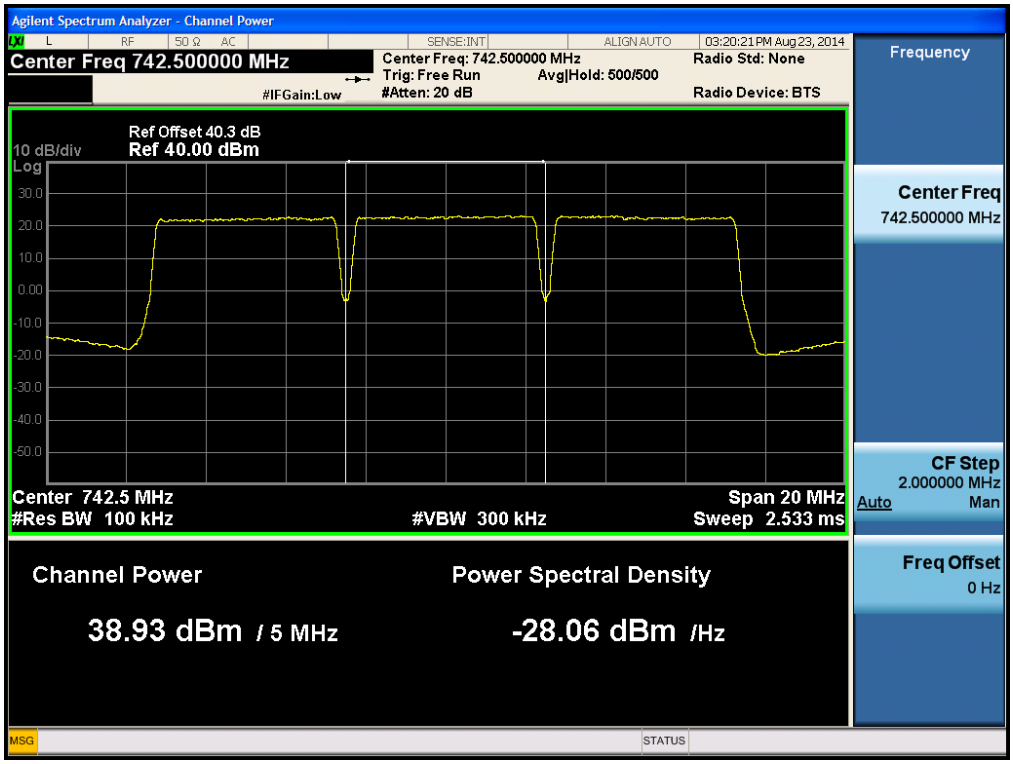


Power Back-off for IC

[1 Carrier]



[3 Carrier]



7. OCCUPIED BANDWIDTH

FCC Rules

Test Requirement(s): § 2.1049 Measurements required: Occupied bandwidth:

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

Test Procedures: As required by 47 CFR 2.1049, *occupied bandwidth measurements* were made with a Spectrum Analyzer connected to the RF ports for both Uplink and Downlink The modulation characteristics of signal generator's carrier was measured first at a maximum RF level prescribed by the OEM. The signal generator was then connected to either the Uplink or Downlink input at the appropriate RF level. The resulting modulated signal through the EUT was measured and compared against the original signal.

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

Input Signal	Input Level (dBm)	Maximum Amp Gain
LTE 5 MHz	DL : -15 dBm	DL : 59 dB
LTE 10 MHz		

IC Rules

Test Requirements: RSS-GEN 4.6.1

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

Test Procedures: RSS-GEN 4.6.1

The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth.

Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a

running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

700 MHz LTE Band

[Downlink Output]

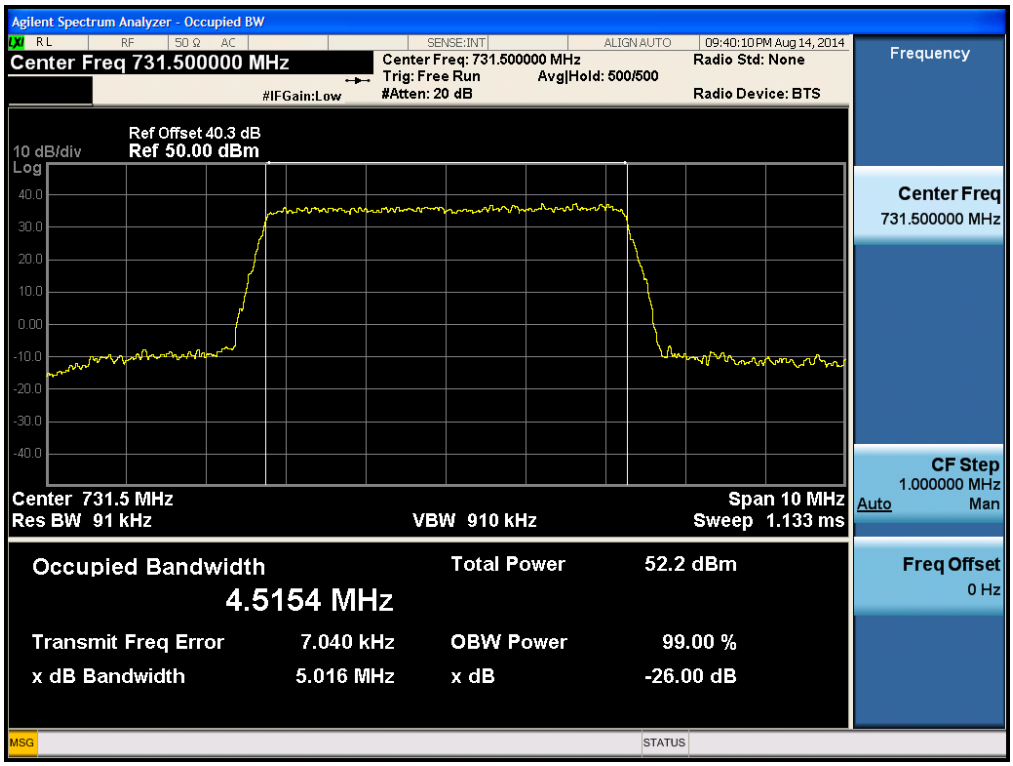
	Channel	Frequency (MHz)	OBW (MHz)
LTE 5 MHz	Low	731.50	4.515
	Middle	737.50	4.507
	High	743.50	4.518
LTE 10 MHz	Low	734.00	9.003
	Middle	741.00	8.995
	High	751.00	8.991

[Downlink Input]

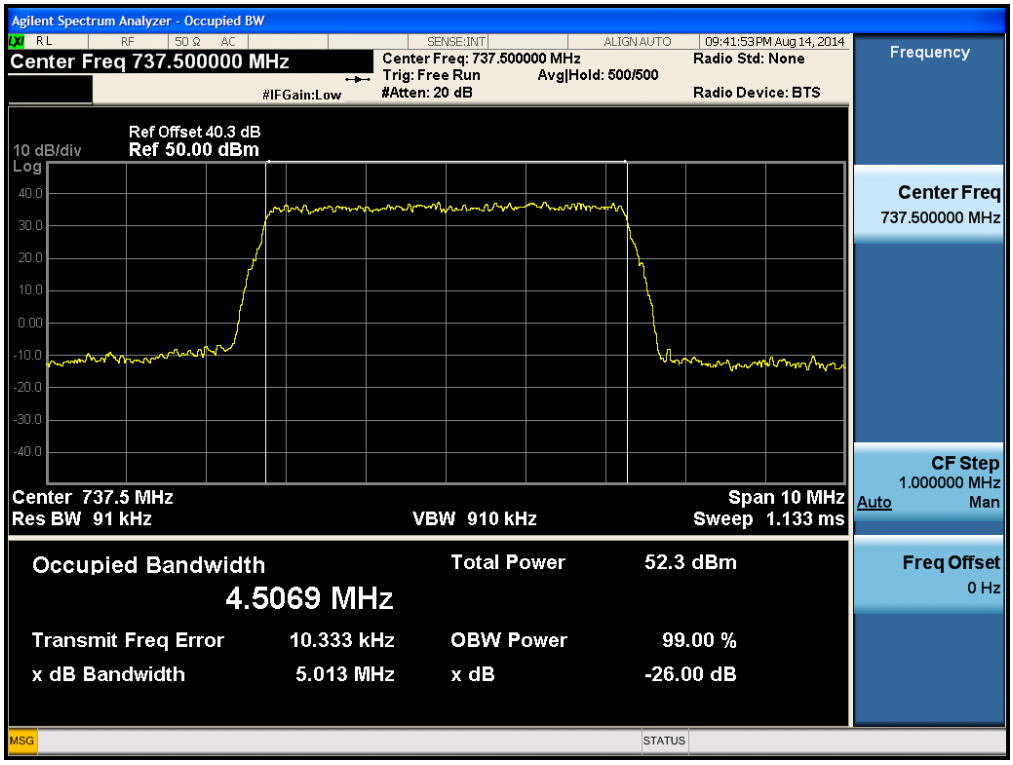
	Channel	Frequency (MHz)	OBW (MHz)
LTE 5 MHz	Low	731.50	4.509
	Middle	737.50	4.506
	High	743.50	4.521
LTE 10 MHz	Low	734.00	8.997
	Middle	741.00	9.004
	High	751.00	9.011

Plots of Occupied Bandwidth

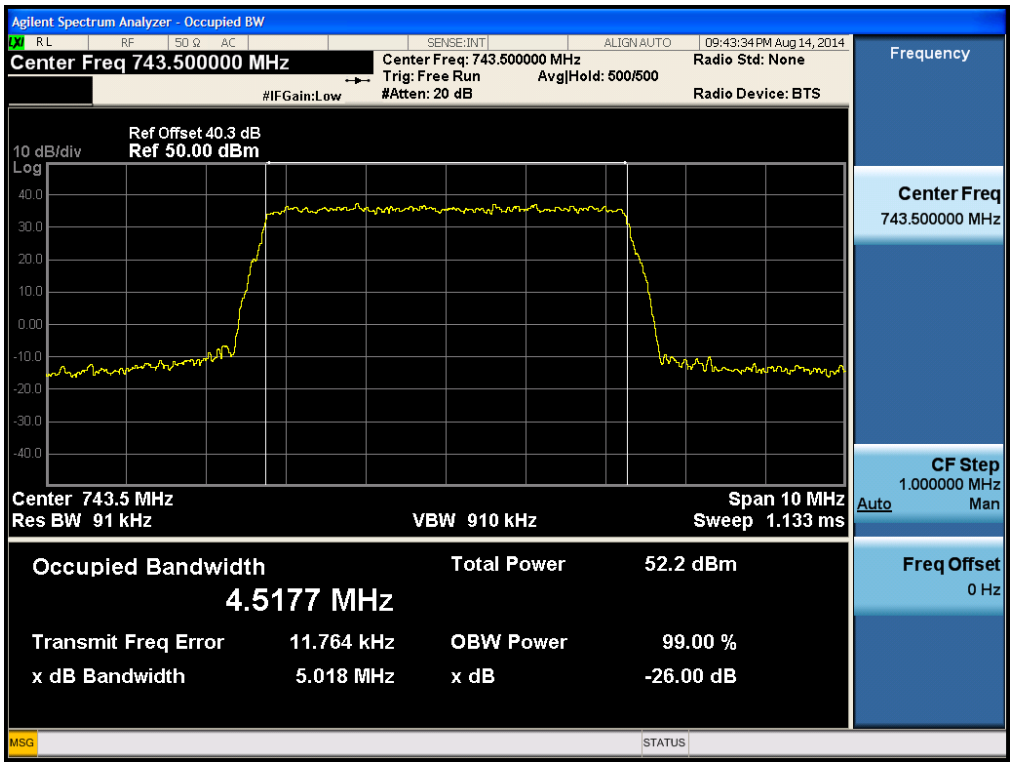
[Output LTE Downlink 5 MHz Low]



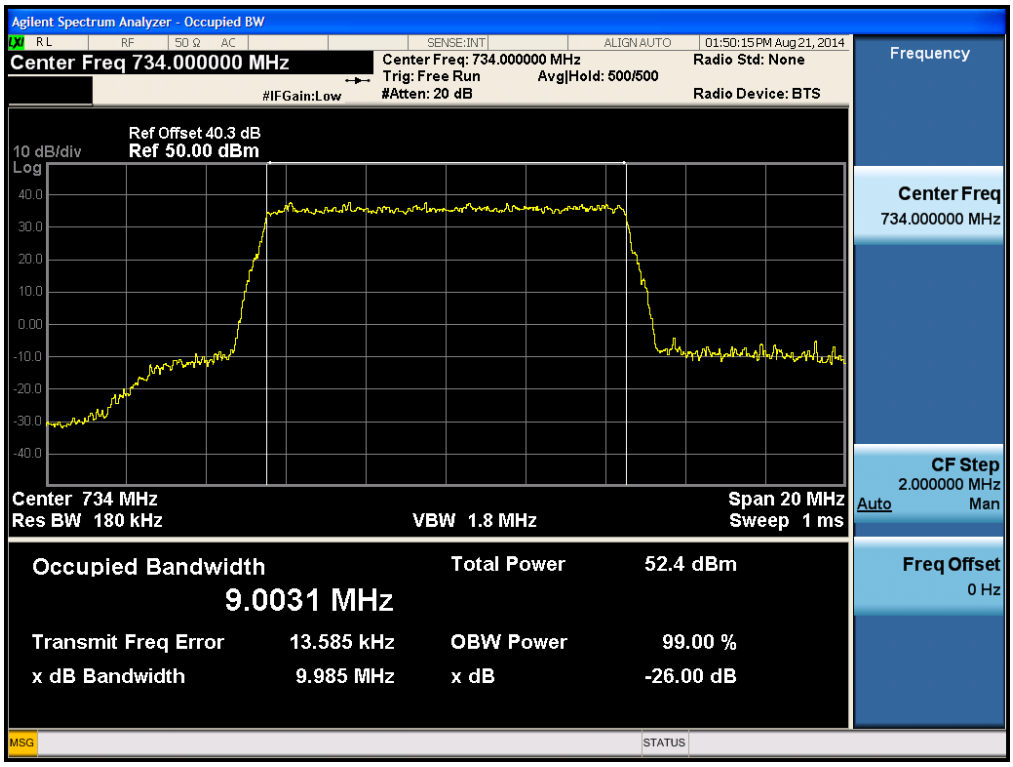
[Output LTE Downlink 5 MHz Middle]



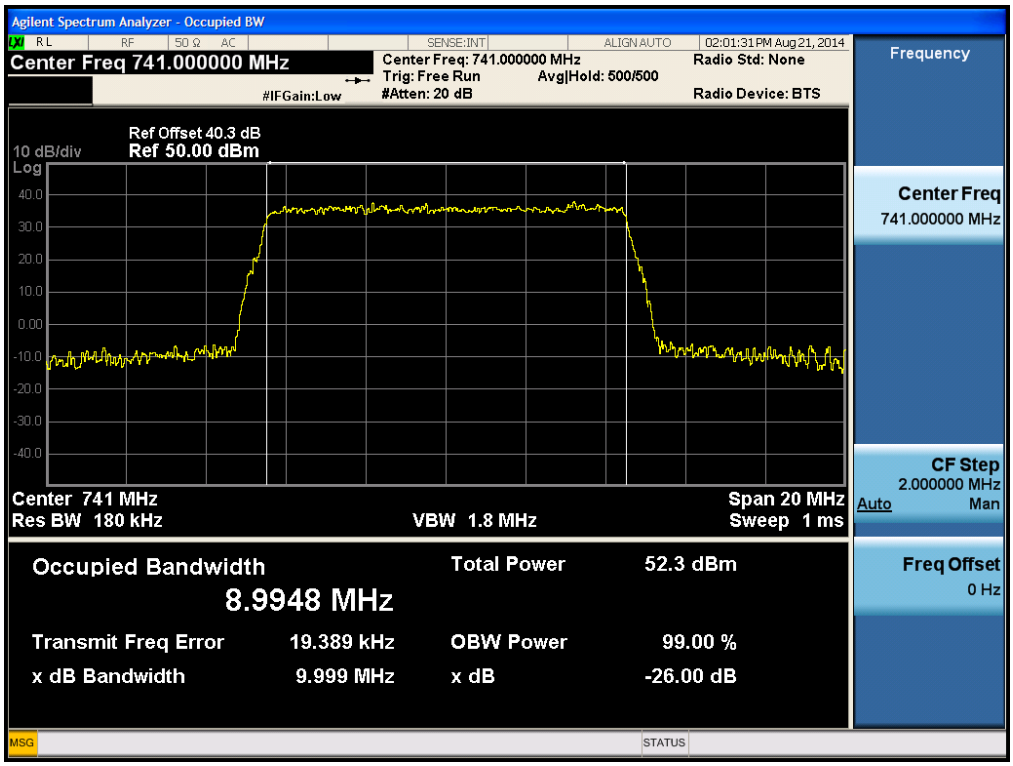
[Output LTE Downlink 5 MHz High]



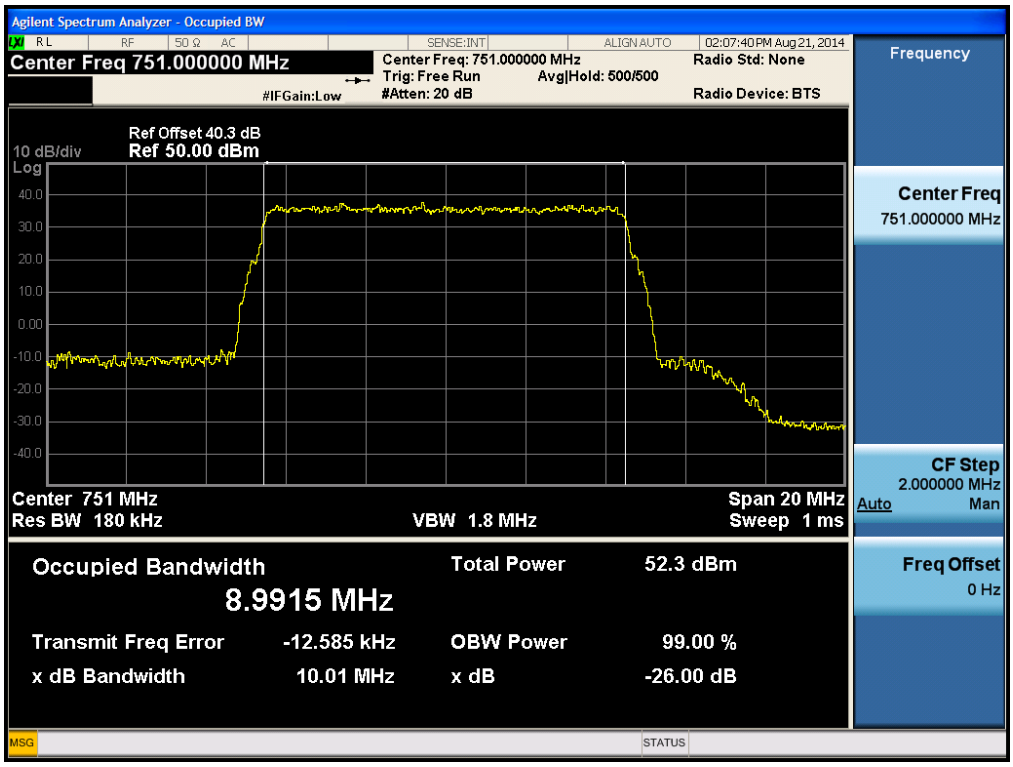
[Output LTE Downlink 10 MHz Low]



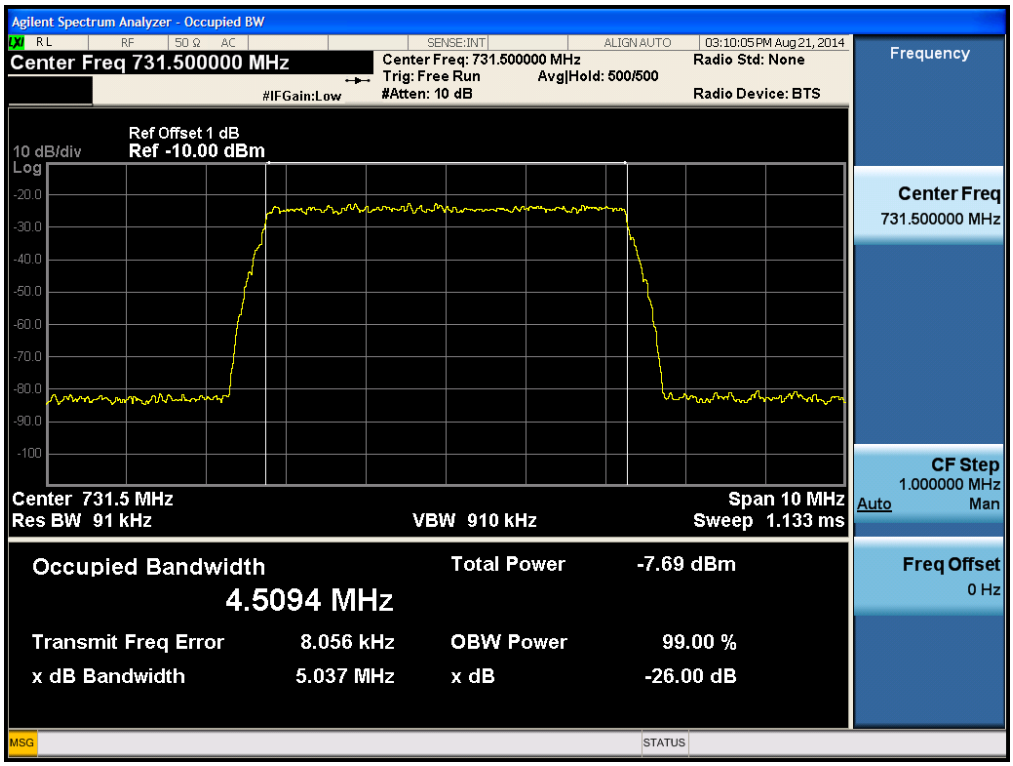
[Output LTE Downlink 10 MHz Middle]



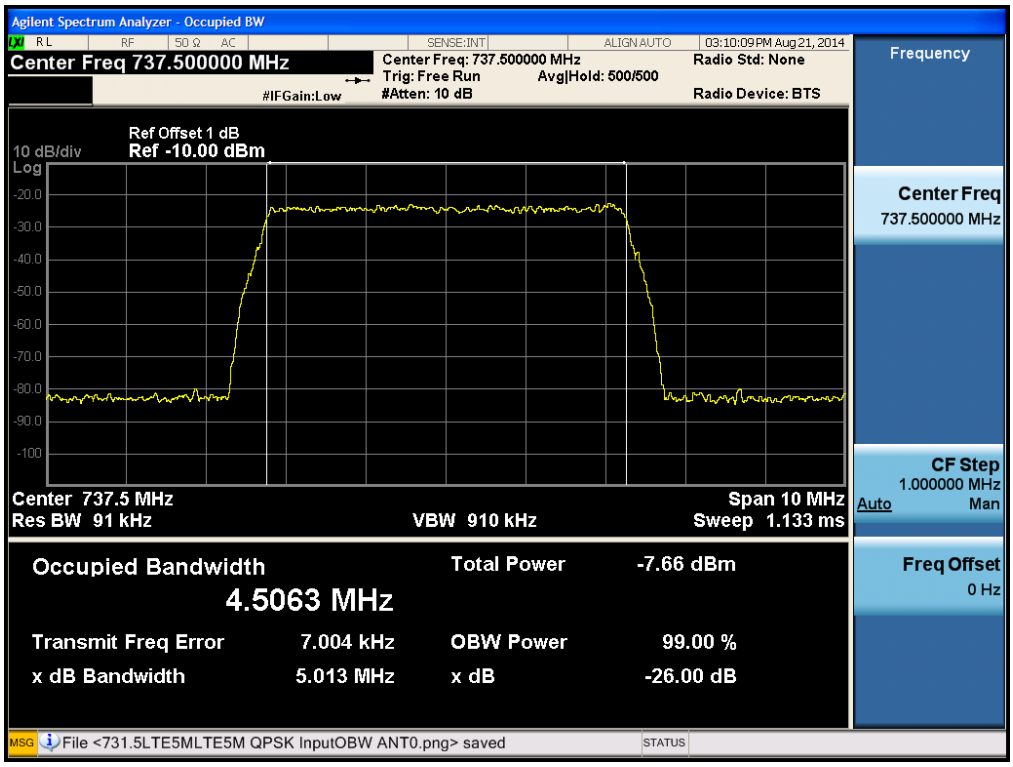
[Output LTE Downlink 10 MHz High]



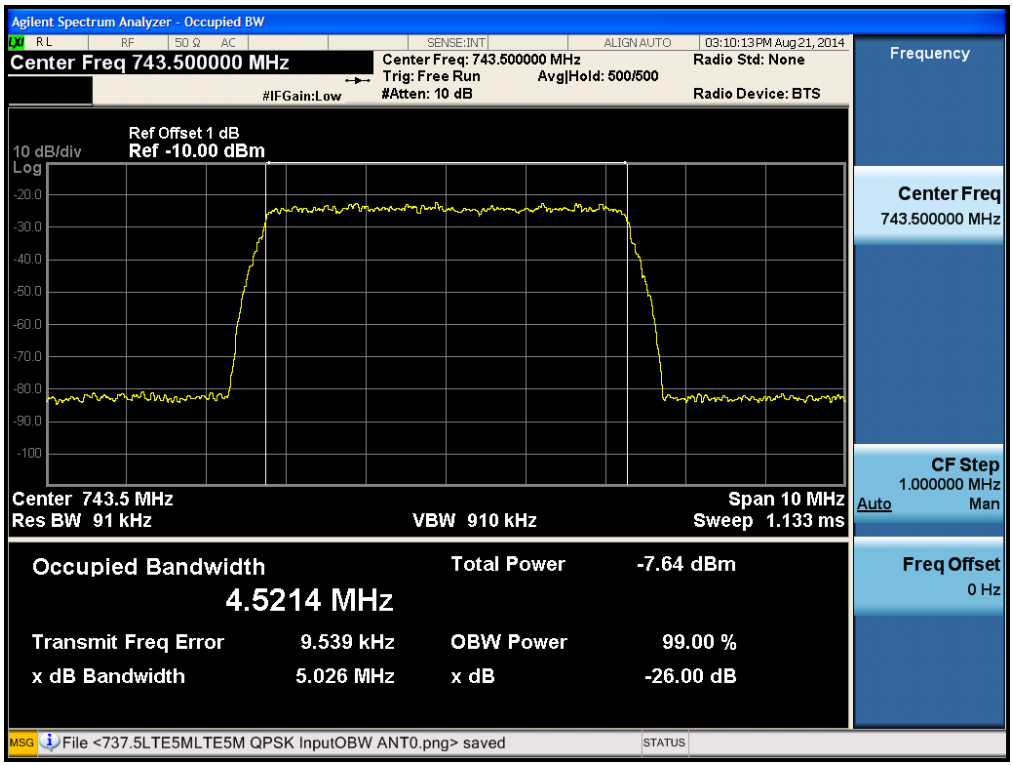
[Input LTE Downlink 5 MHz Low]



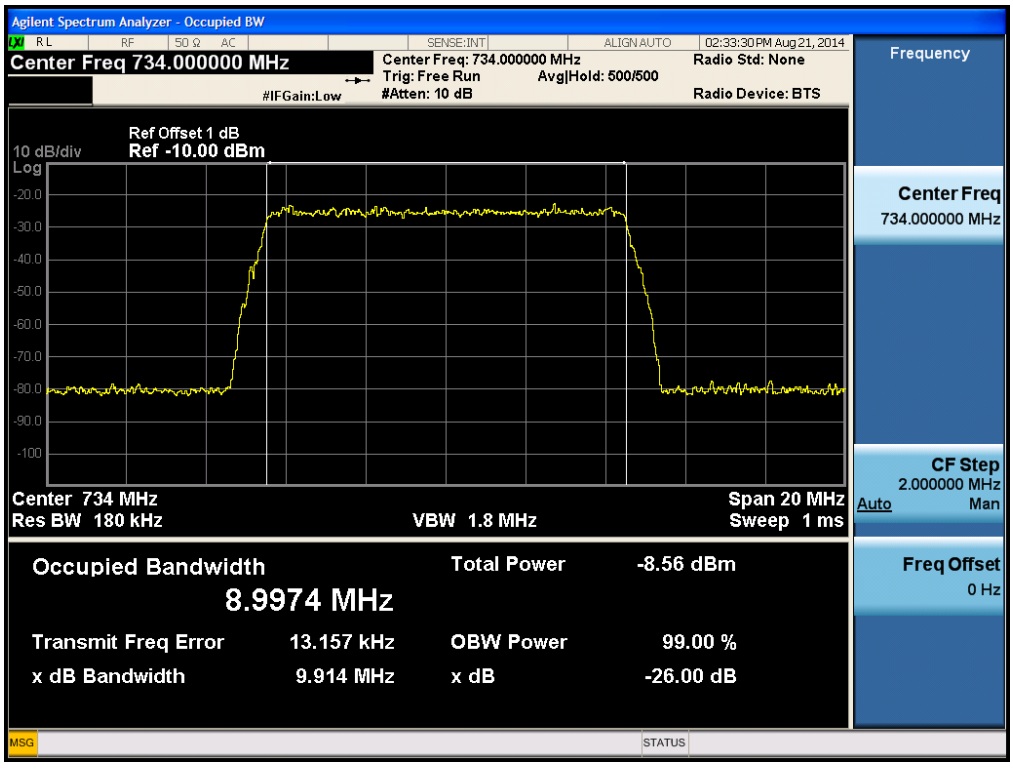
[Input LTE Downlink 5 MHz Middle]



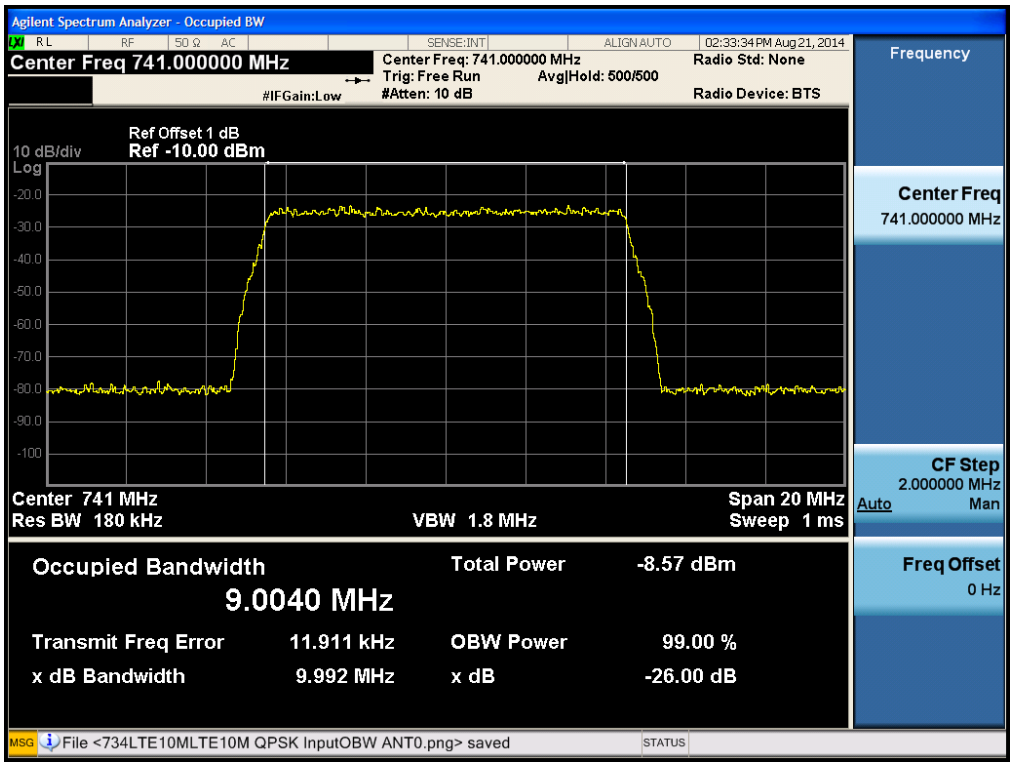
[Input LTE Downlink 5 MHz High]



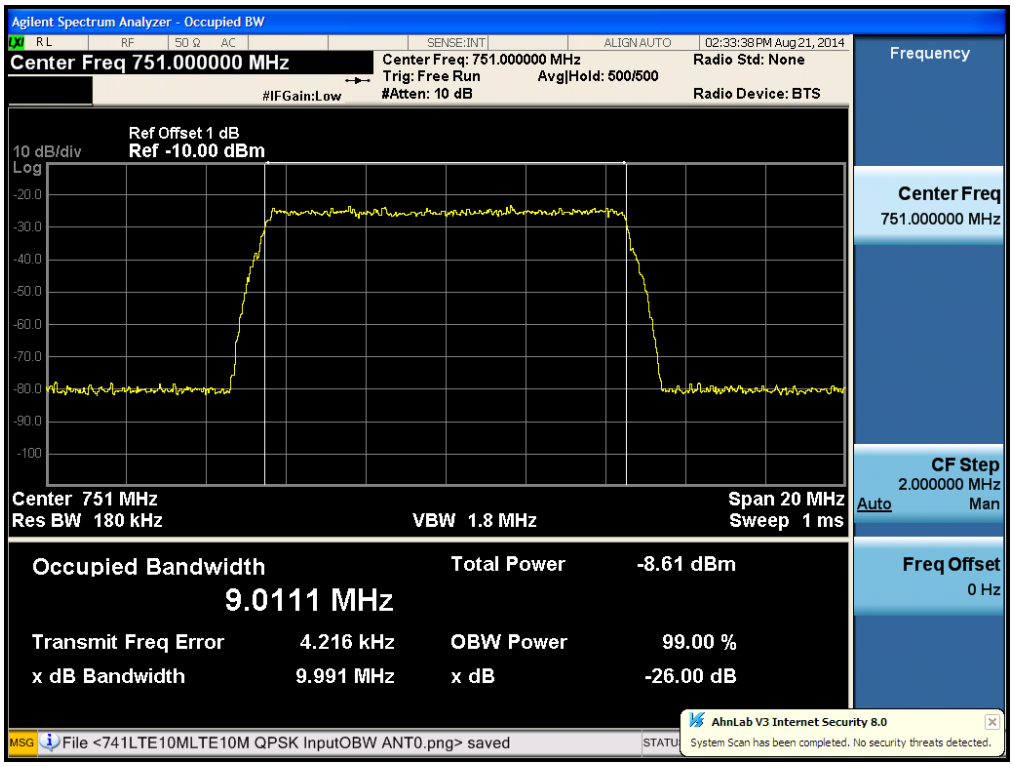
[Input LTE Downlink 10 MHz Low]



[Input LTE Downlink 10 MHz Middle]



[Input LTE Downlink 10 MHz High]



8. PASSBAND GAIN AND BANDWIDTH & OUT OF BAND REJECTION

FCC Rules

Test Requirement(s): KDB 935210 D03 v02r01

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

Test Procedures: A modulated carrier generated by the signal generator carrier was connected to either the Uplink or Downlink RF port at a maximum level as determined by the spectrum analyzer was connected to either the Uplink or Downlink port depending on the circuitry being measured. Signal generator sweep from the frequency more lower than the operating frequency to the frequency more higher than it, find the product band filter characteristic

IC Rules

Test Requirements: RSS-131 6.1

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

Test Procedures: RSS-131 4.2

Adjust the internal gain control of the equipment under test to the nominal gain for which equipment certification is sought.

With the aid of a signal generator and spectrum analyzer, measure the 20 dB bandwidth of the amplifier (i.e. at the point where the gain has fallen by 20 dB).

Measure the gain-versus-frequency response of the amplifier from the midband frequency f0 of the passband up to at least f0 + 250% of the 20 dB bandwidth.

Signal generator sweep from the frequency more lower than the low frequency -250% to the frequency more higher than high frequency +250%.

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

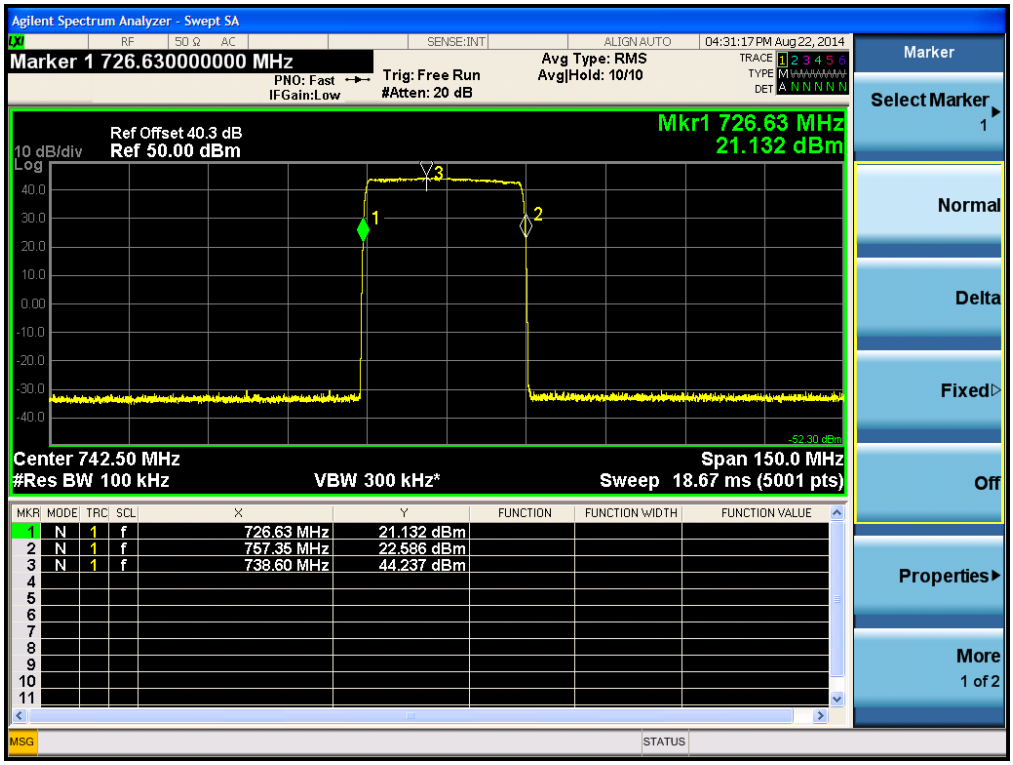
Input Level (dBm) Input Signal : Sinusoidal	Maximum Amp Gain
DL : -15 dBm	DL : 59 dB

[Downlink]

20 dB point frequency (MHz)	Output power (dBm)	Gain (dB)
726.63 ~ 757.36	44.24	58.24

Plots of Passband Gain and Bandwidth & Out of Band Rejection

[LTE Downlink]



9. SPURIOUS AND HARMONIC EMISSION AT ANTENNA TERMINAL

FCC Rules

Test Requirement(s): § 2.1051 Measurements required: Spurious emissions at antenna terminals:

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 27.53 Emission limits

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

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

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

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

Test Procedures: A modulated carrier generated by the signal generator carrier was connected to either the Uplink or Downlink RF port at a maximum level as determined by the spectrum analyzer was connected to either the Uplink or Downlink port depending on the circuitry being measured.

The spectrum was investigated from 9 kHz to the 12.75 of the carrier.

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

IC Rules

Test Requirement(s): RSS-131 6.4

Spurious emissions of zone enhancers and translators shall be suppressed as much as possible.

Spurious emissions shall be attenuated below the rated power of the enhancer by at least:
43 + 10 Log10(Prated in watts), or 70 dB, whichever is less stringent.
Note: If the minimum standard is not met, check to see if the input signal generators have a high harmonic content.

Test Procedures: RSS-131 4.4

4.4.1 Multi-channel Enhancer

The spurious emissions of the equipment under test shall be measured using the two-tone method in section 4.3.1, with the two tones Po1 and Po2 set to the required levels. Using a spectrum analyser with a resolution bandwidth set at 100 kHz, search for spurious emissions from 30 MHz to at least 5 times the highest RF passband frequency. The search may omit the band that contains the test tones and intermodulation products.

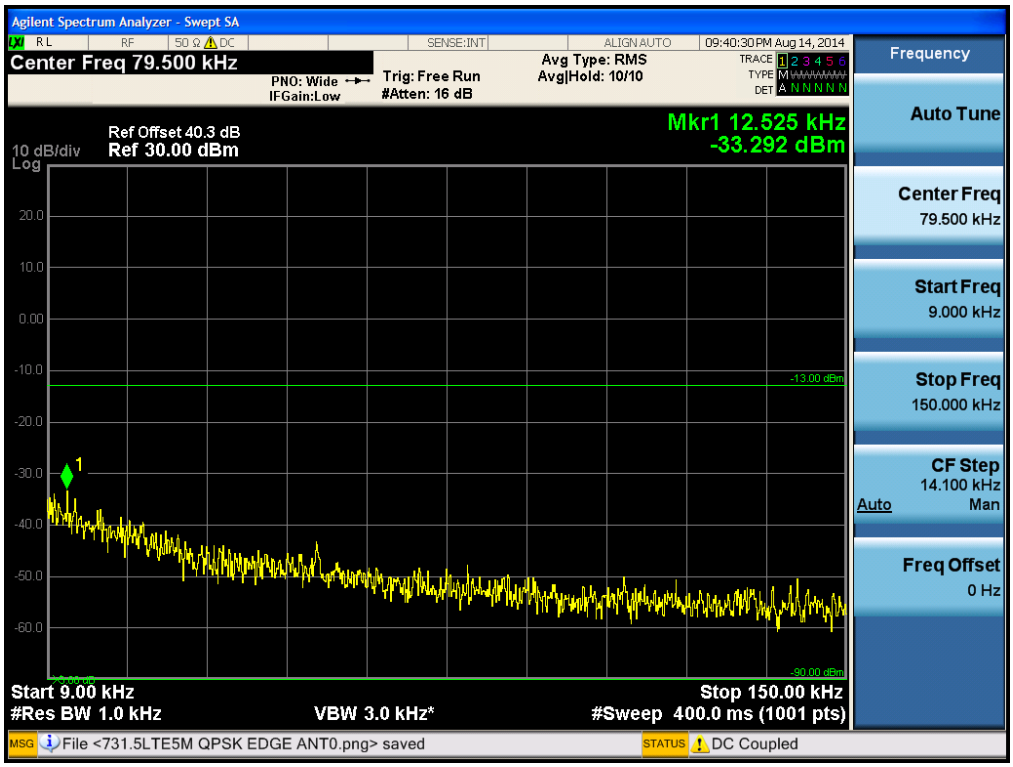
4.4.2 Single channel Enhancer

The enhancer shall be operated as described in section 4.3.2 during the search for spurious emissions.
Using a spectrum analyser with a resolution bandwidth set at 100 kHz, search for spurious emissions from 30 MHz to at least 5 times the highest RF passband frequency. The search may omit the band that contains the input signal.

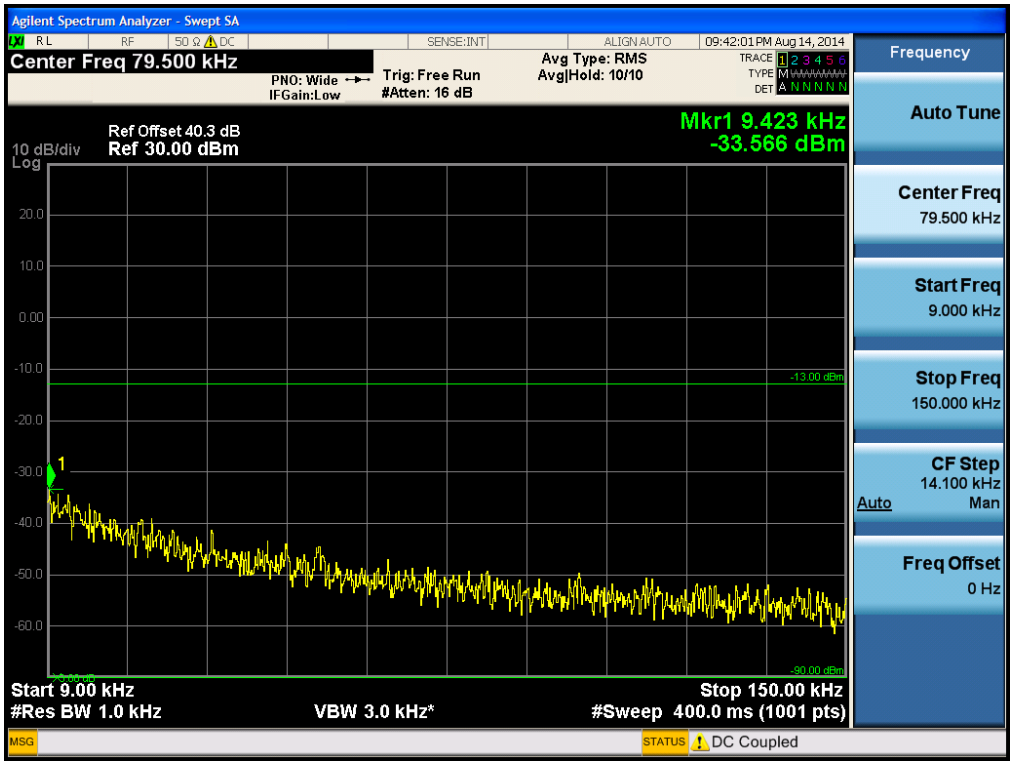
Single channel Enhancer Plots of Spurious Emission

Conducted Spurious Emissions (9 kHz – 150 kHz)

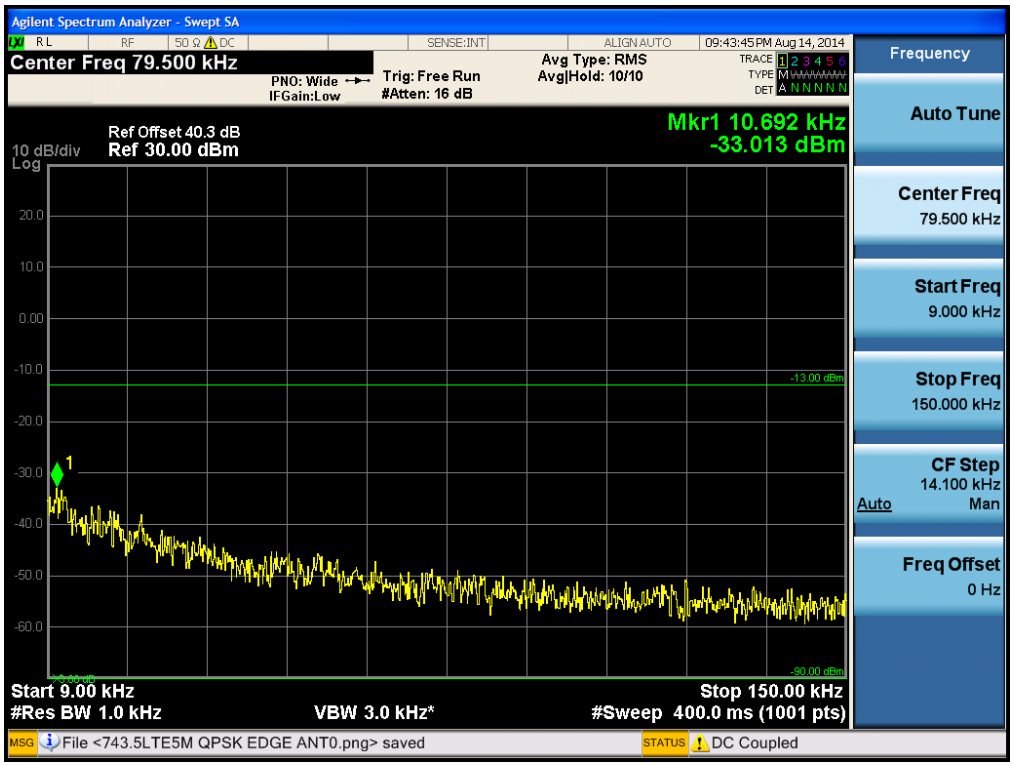
[LTE Downlink 5 MHz Low]



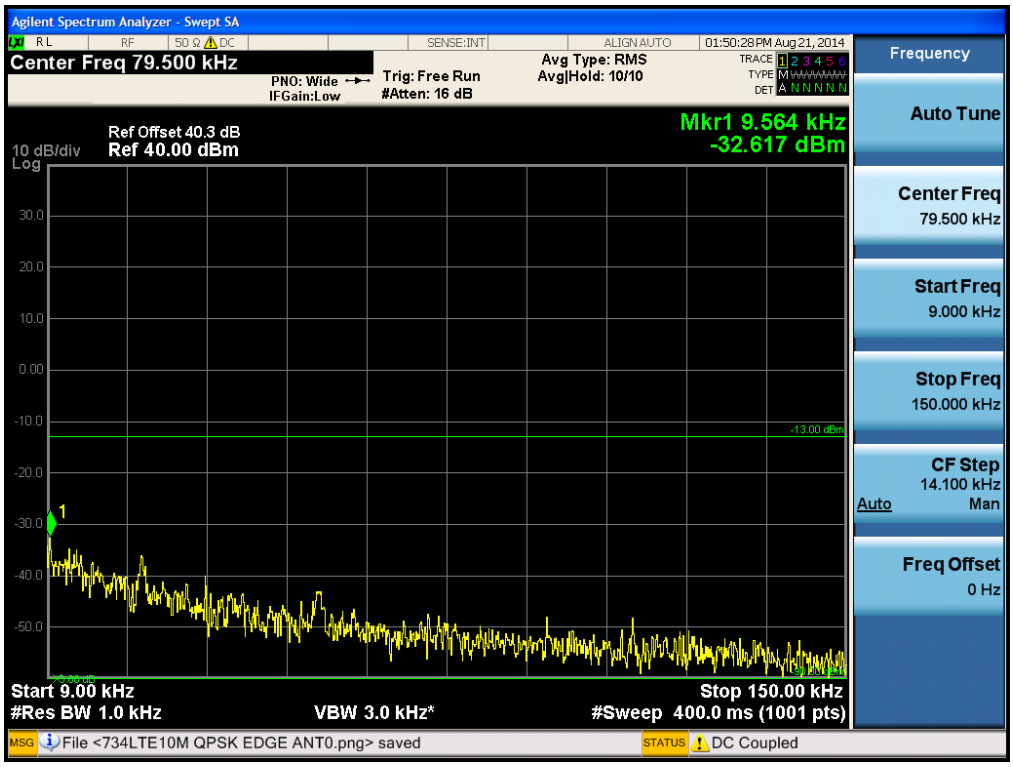
[LTE Downlink 5 MHz Middle]



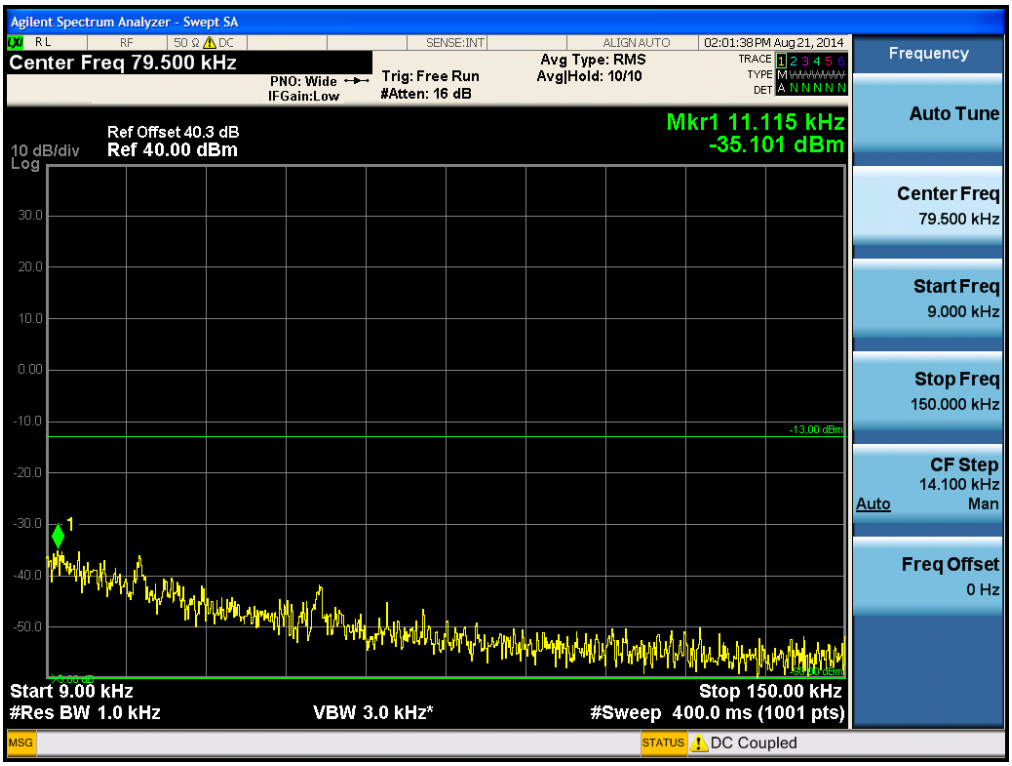
[LTE Downlink 5 MHz High]



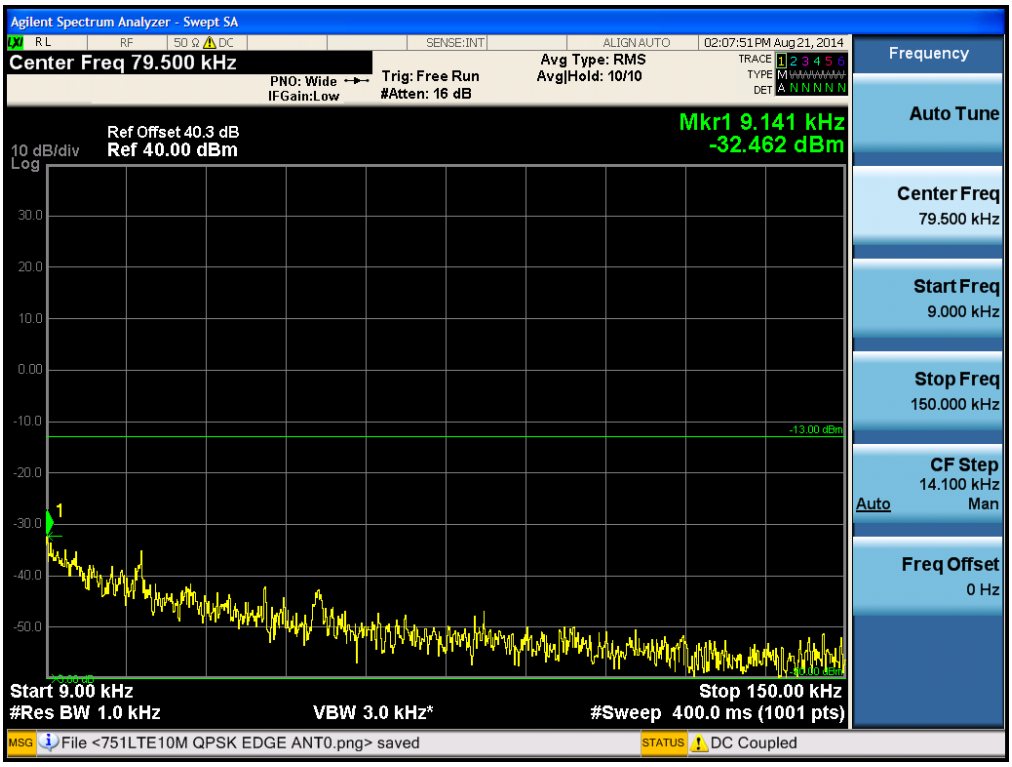
[LTE Downlink 10 MHz Low]



[LTE Downlink 10 MHz Middle]

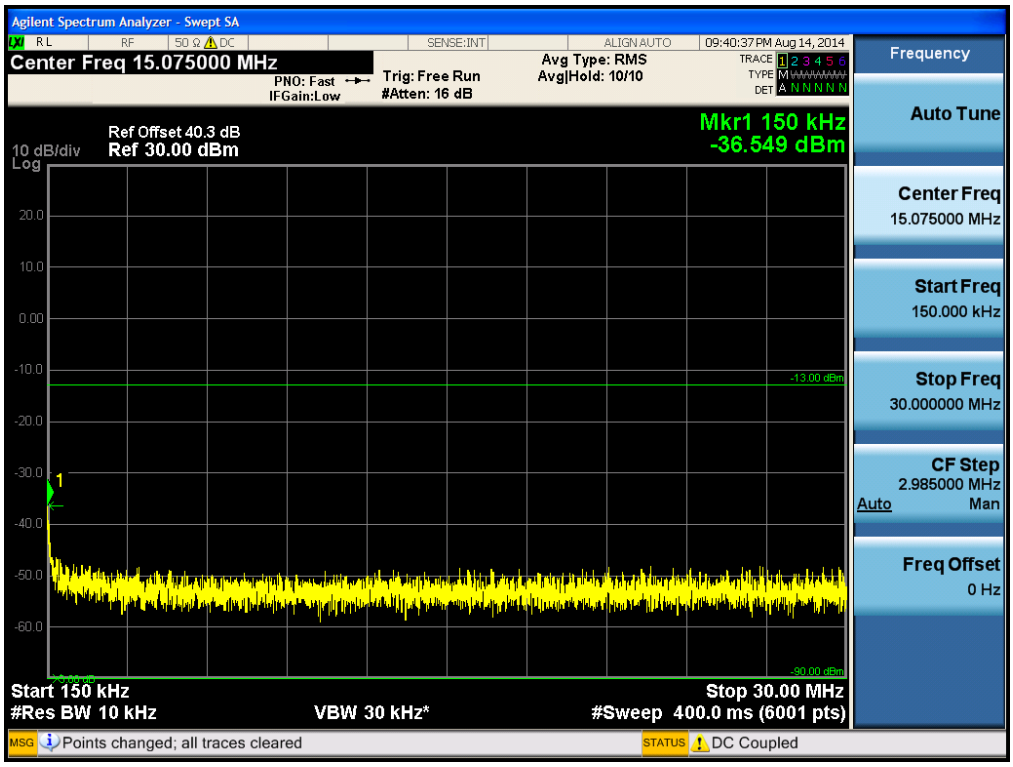


[LTE Downlink 10 MHz High]

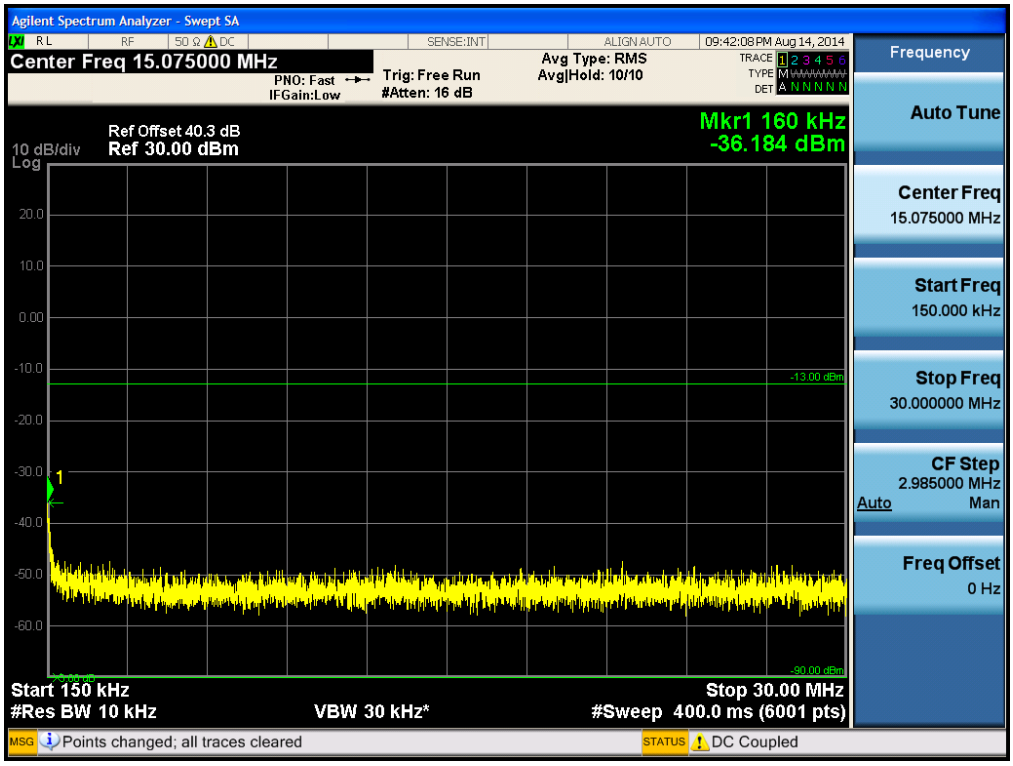


Conducted Spurious Emissions (150 kHz – 30 MHz)

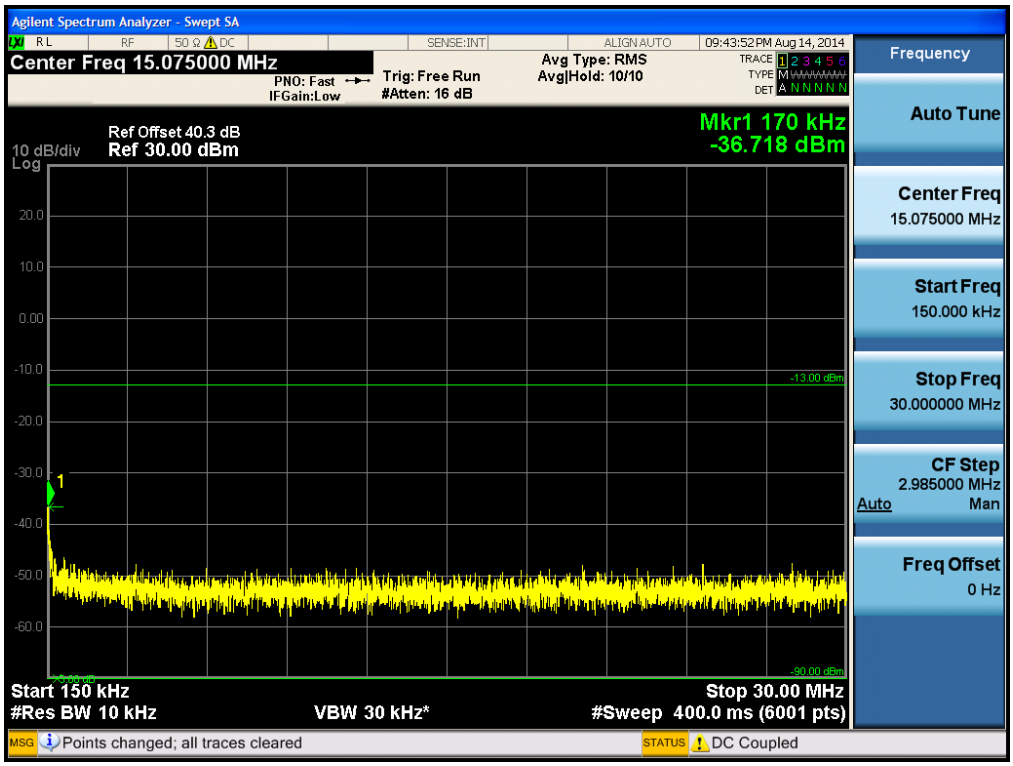
[LTE Downlink 5 MHz Low]



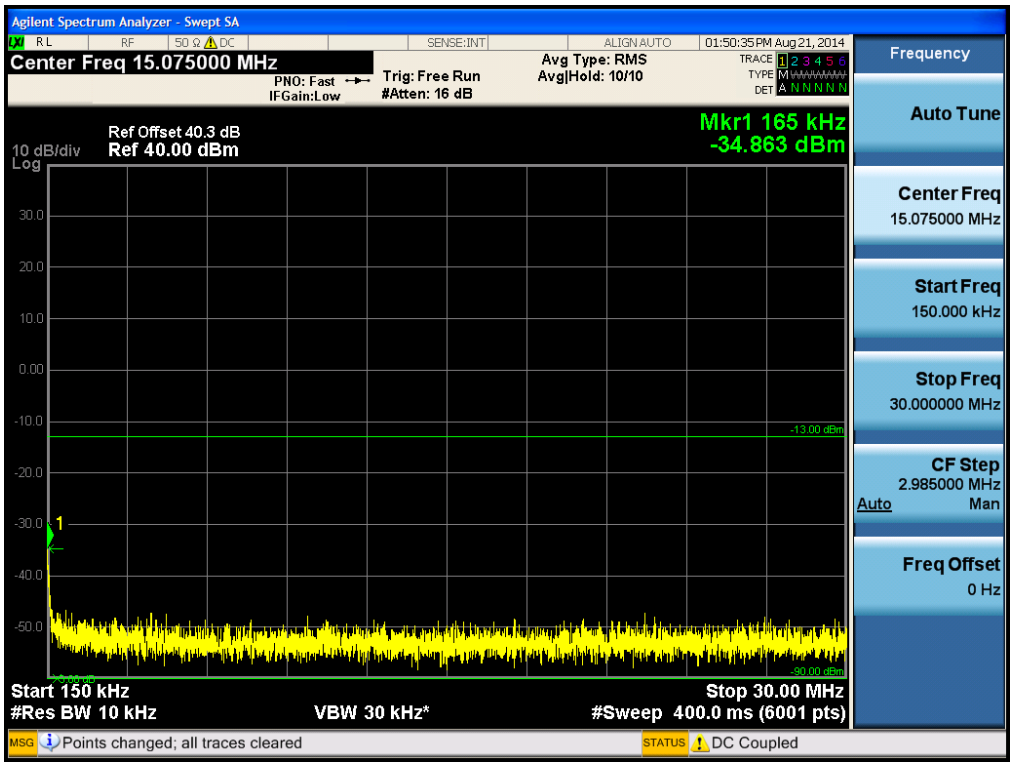
[LTE Downlink 5 MHz Middle]



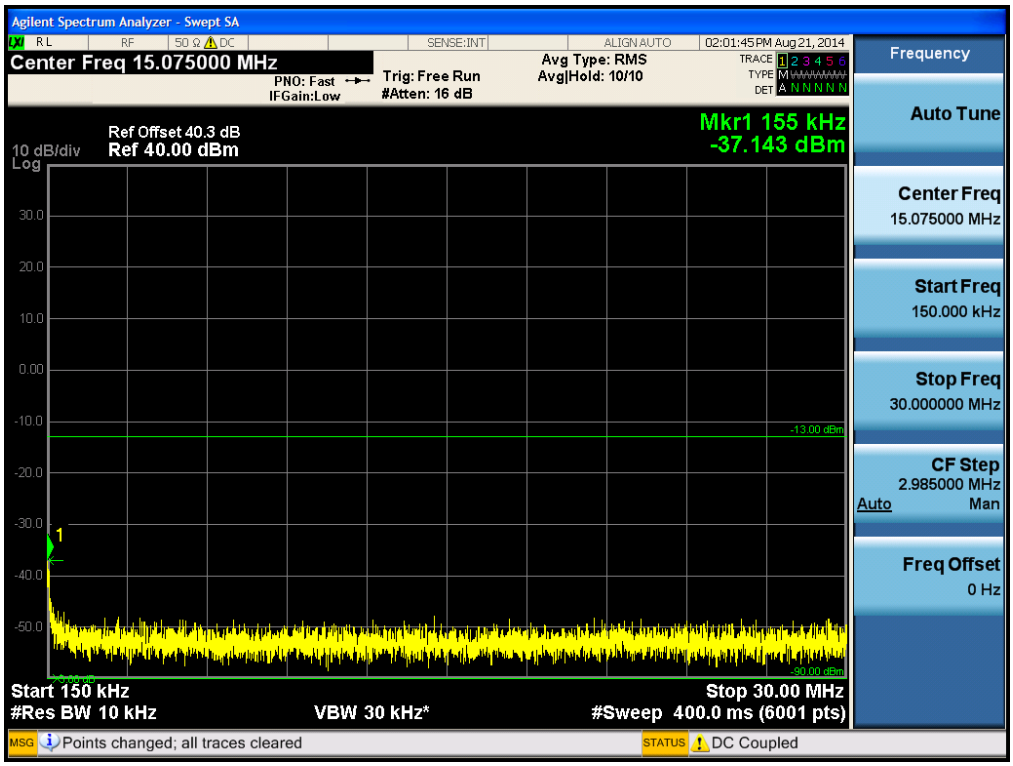
[LTE Downlink 5 MHz High]



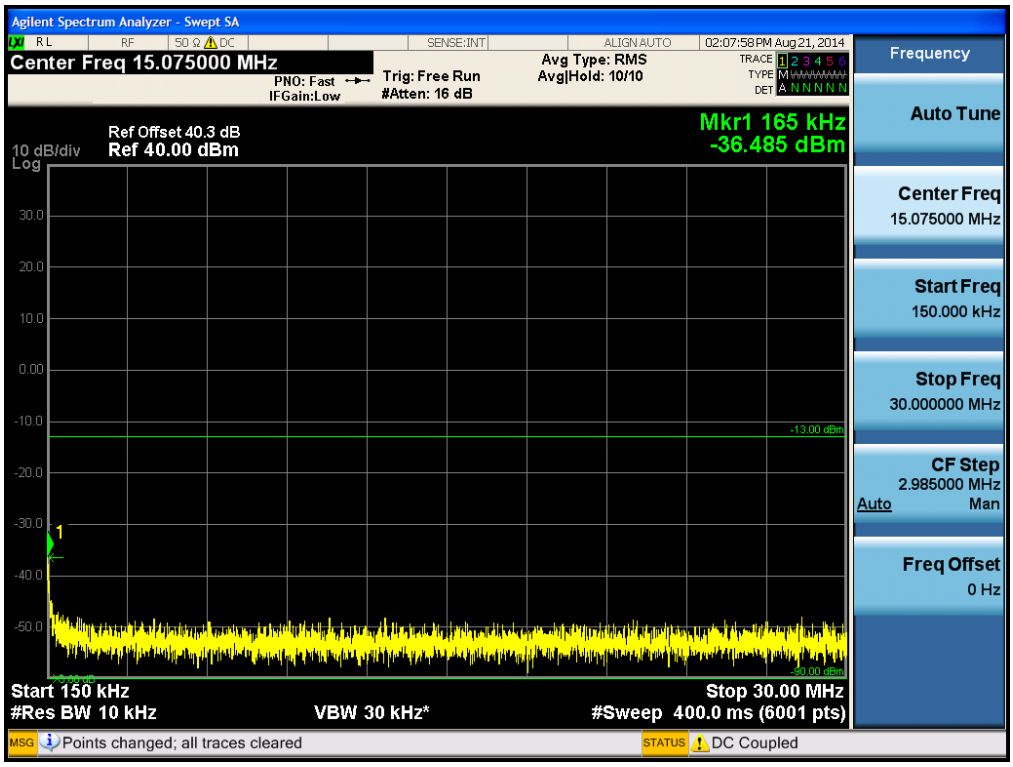
[LTE Downlink 10 MHz Low]



[LTE Downlink 10 MHz Middle]

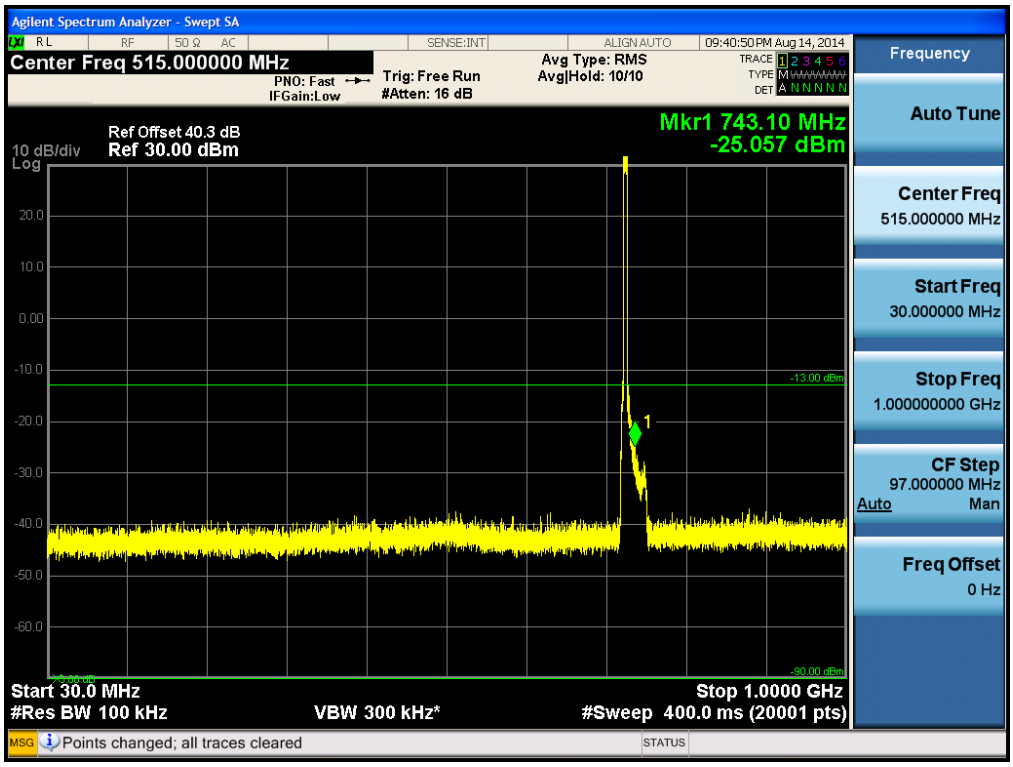


[LTE Downlink 10 MHz High]

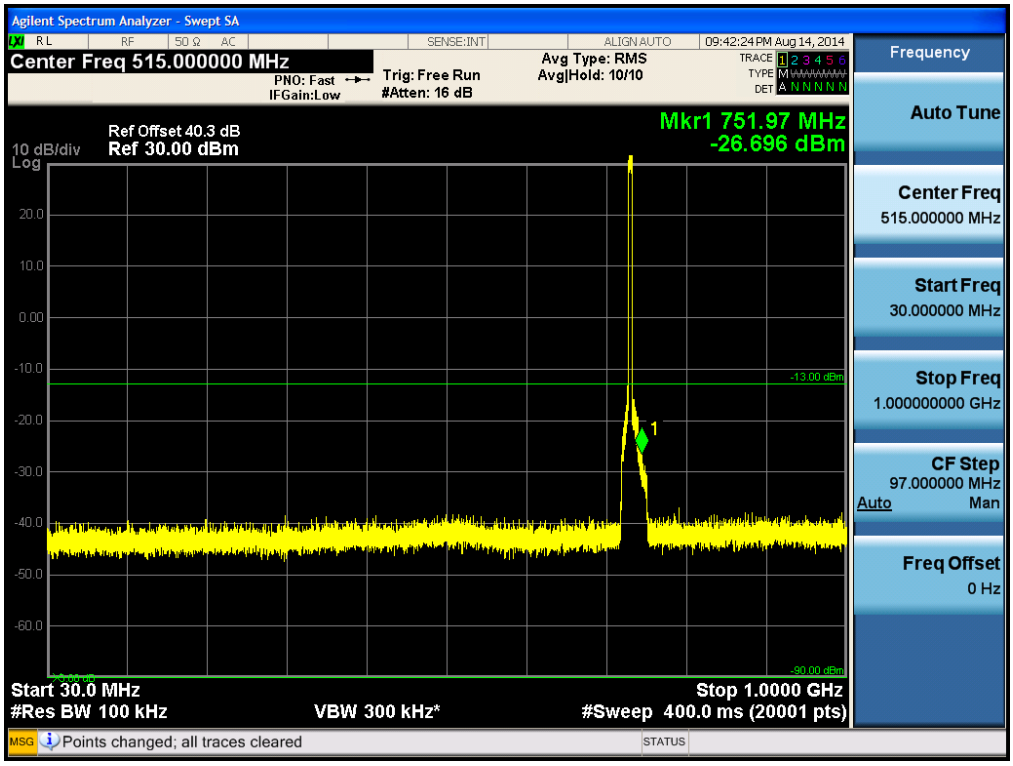


Conducted Spurious Emissions (30 MHz – 1 GHz)

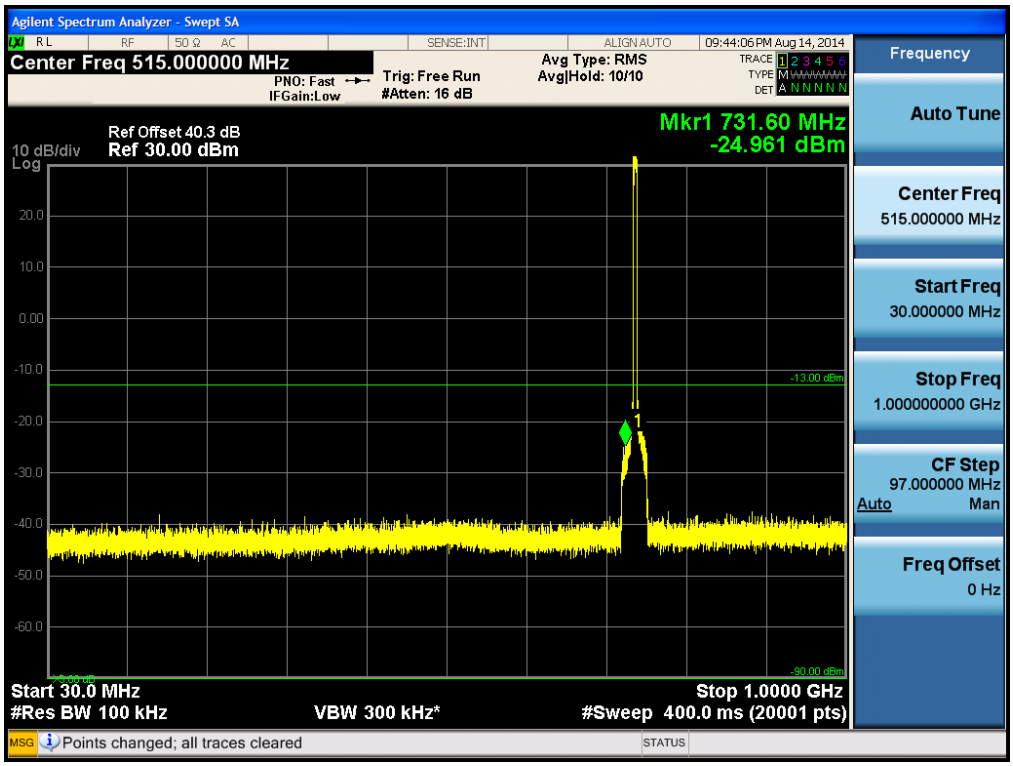
[LTE Downlink 5 MHz Low]



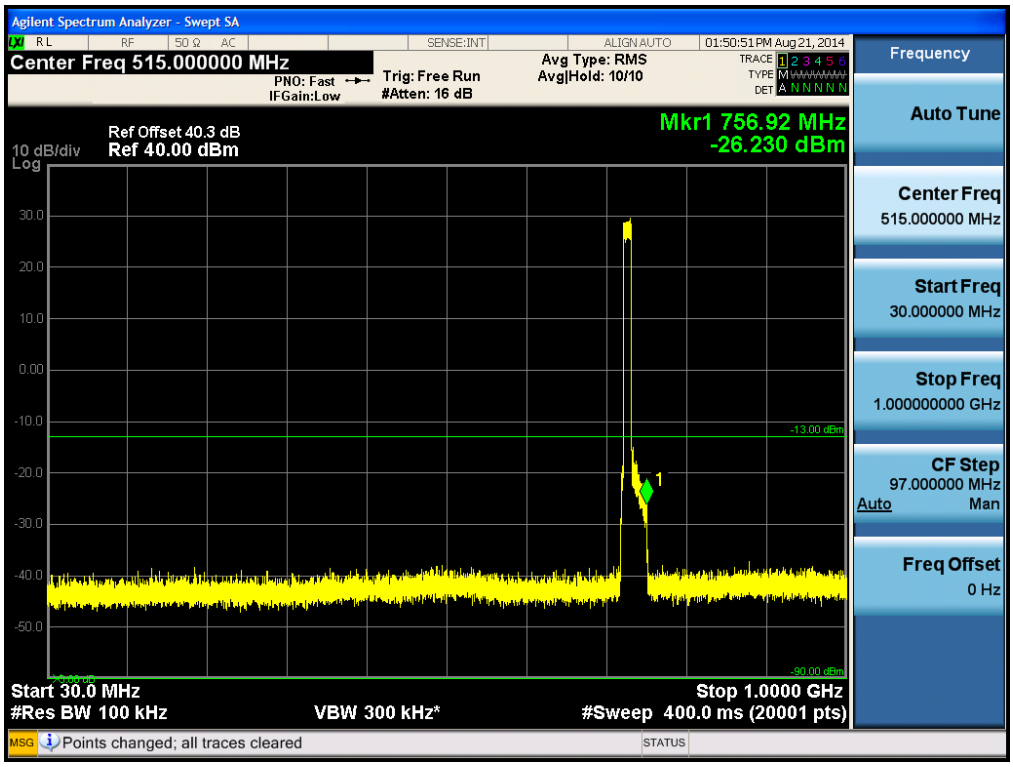
[LTE Downlink 5 MHz Middle]



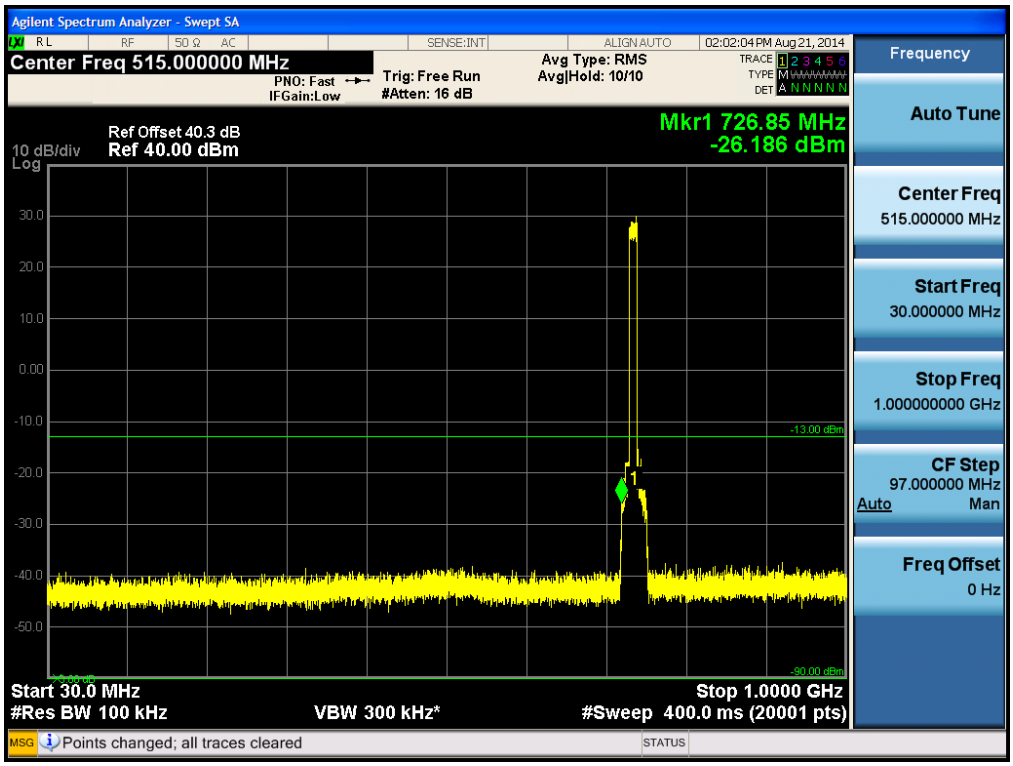
[LTE Downlink 5 MHz High]



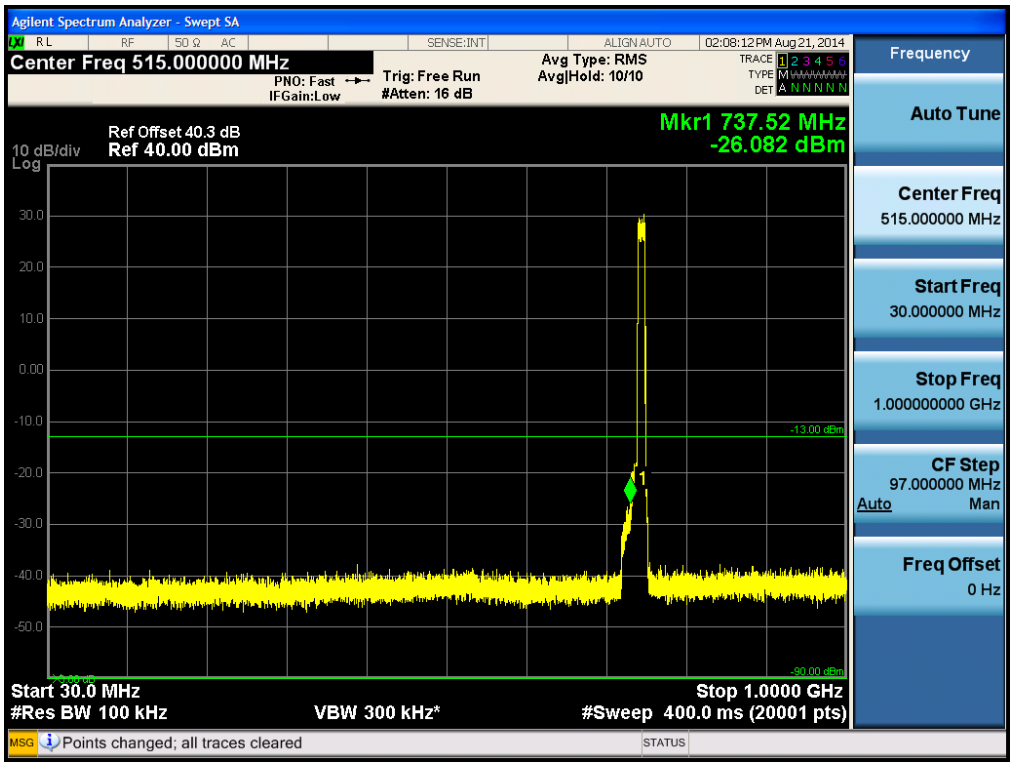
[LTE Downlink 10 MHz Low]



[LTE Downlink 10 MHz Middle]

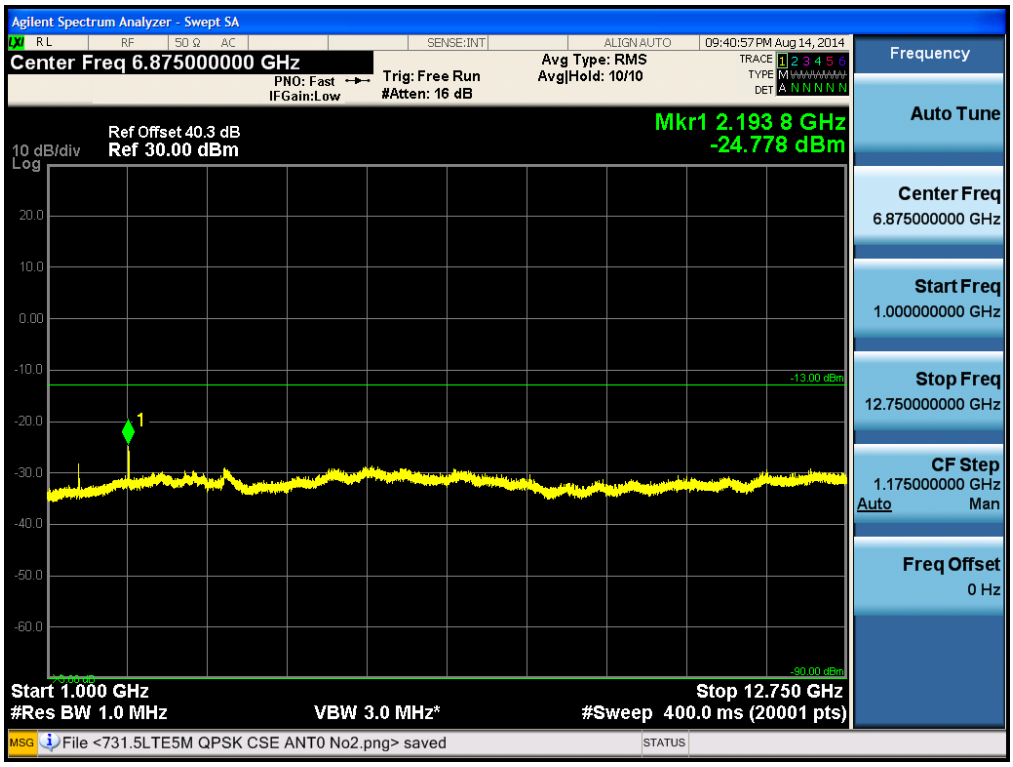


[LTE Downlink 10 MHz High]

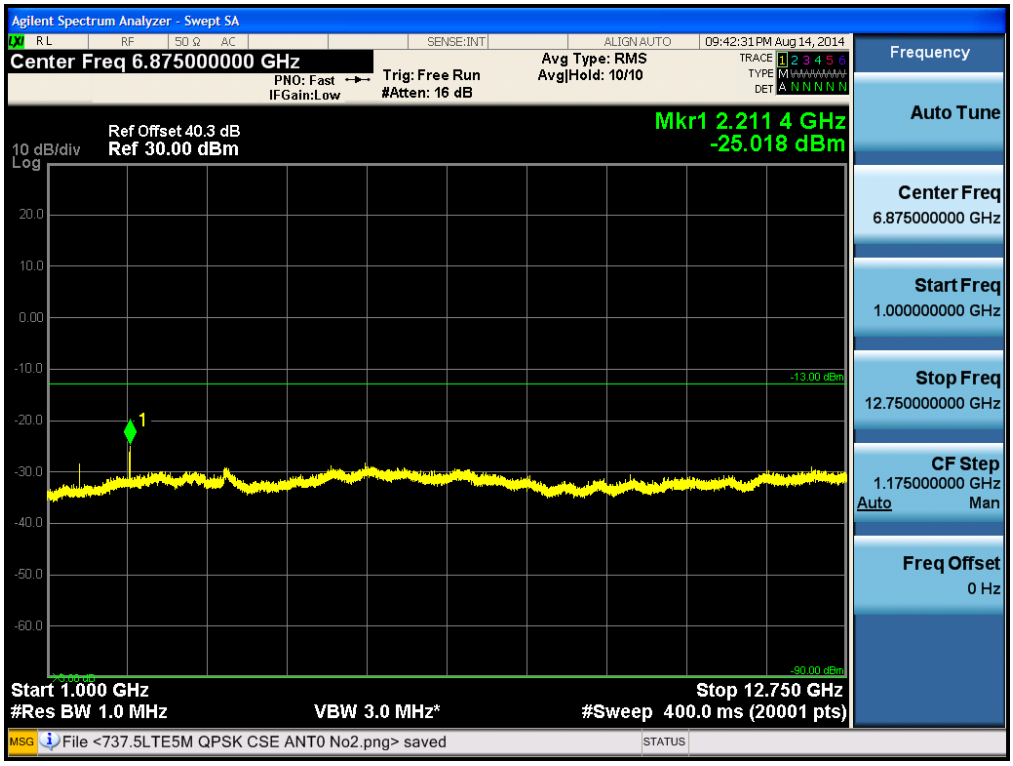


Conducted Spurious Emissions (1 GHz –12.75 GHz)

[LTE Downlink 5 MHz Low]



[LTE Downlink 5 MHz Middle]



[LTE Downlink 5 MHz High]

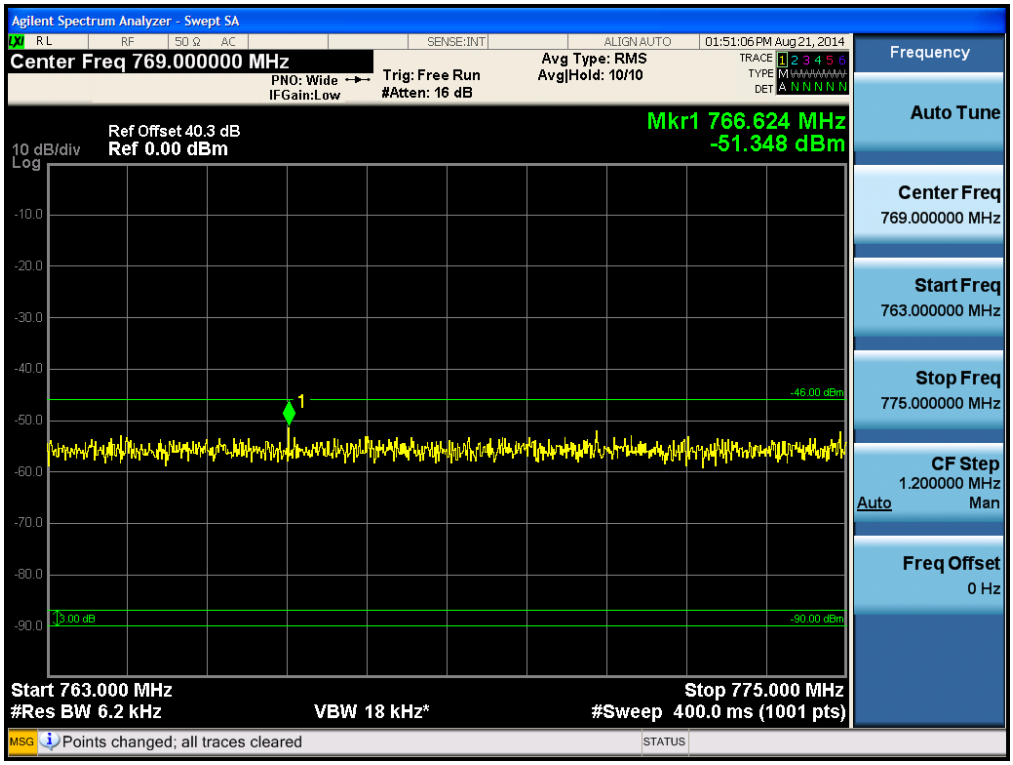
[LTE Downlink 10 MHz Low]

[LTE Downlink 10 MHz Middle]

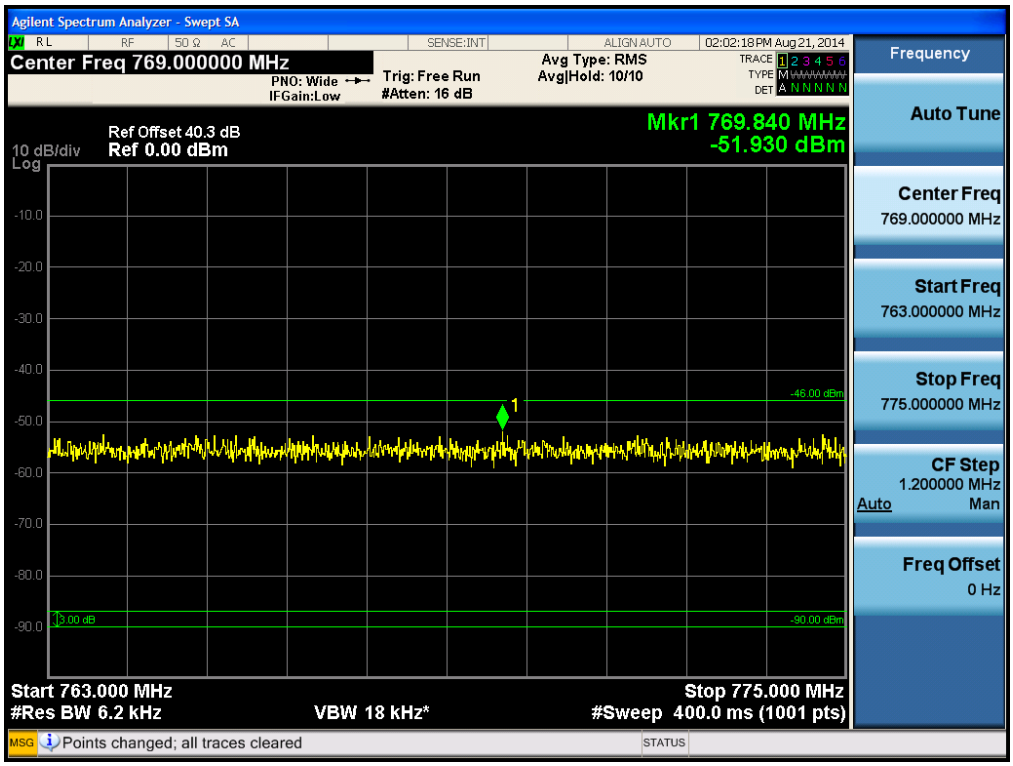
[LTE Downlink 10 MHz High]

Conducted Spurious Emissions (763 MHz – 775 MHz)

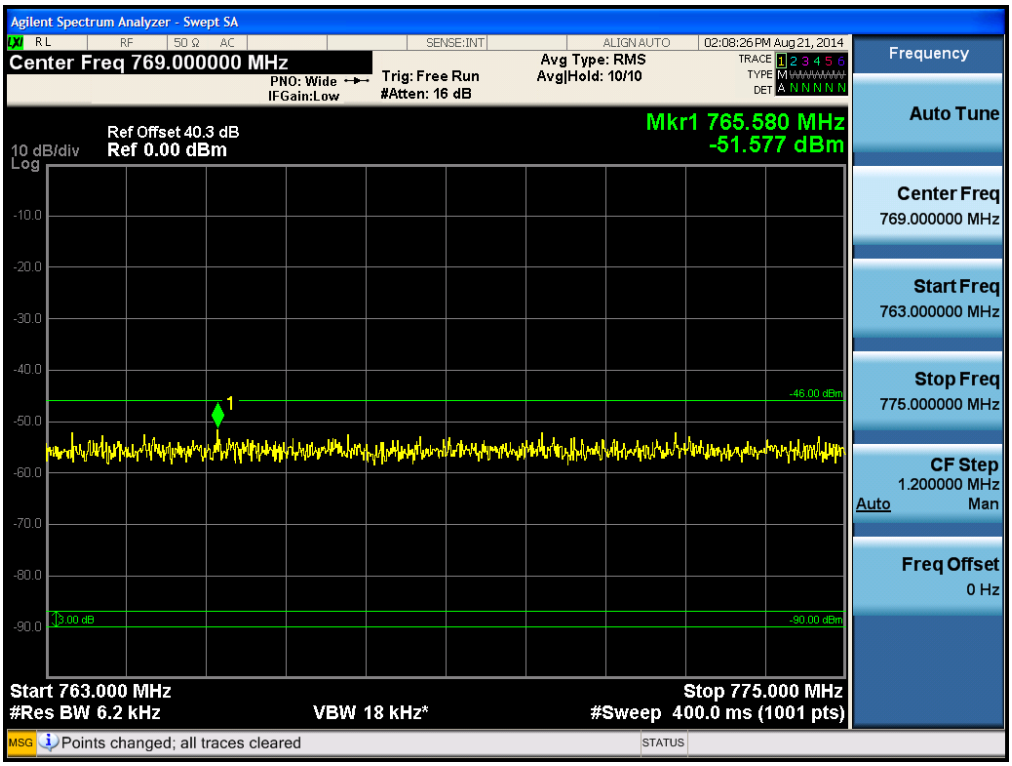
[LTE Downlink 10 MHz Low]



[LTE Downlink 10 MHz Middle]

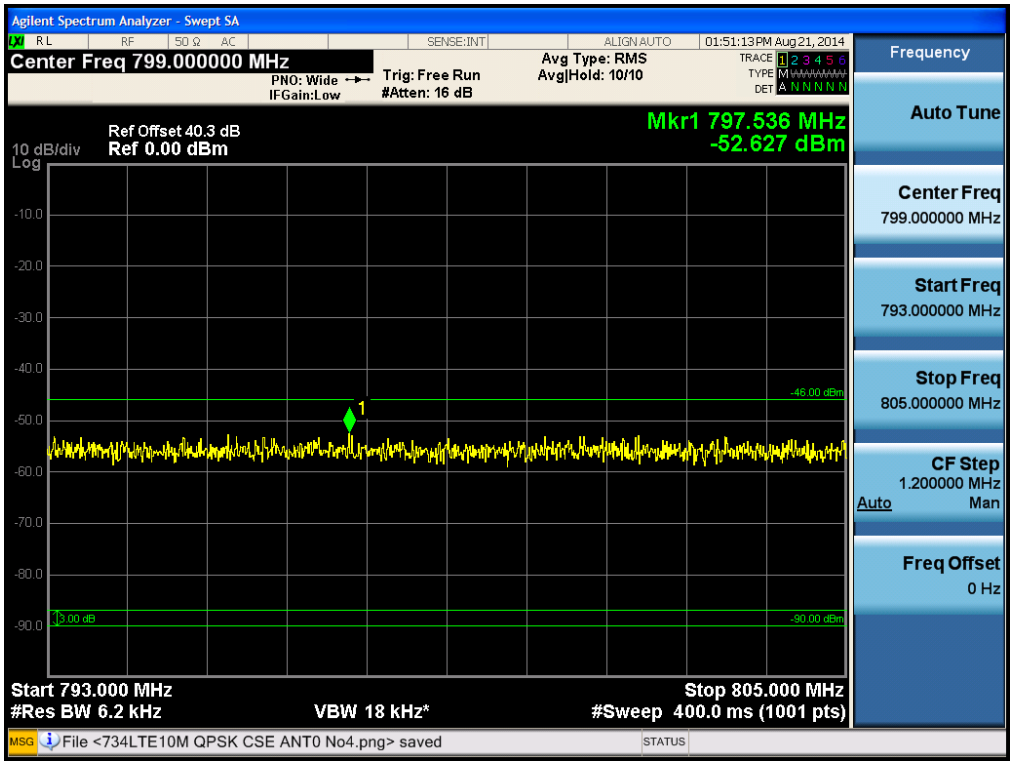


[LTE Downlink 10 MHz High]

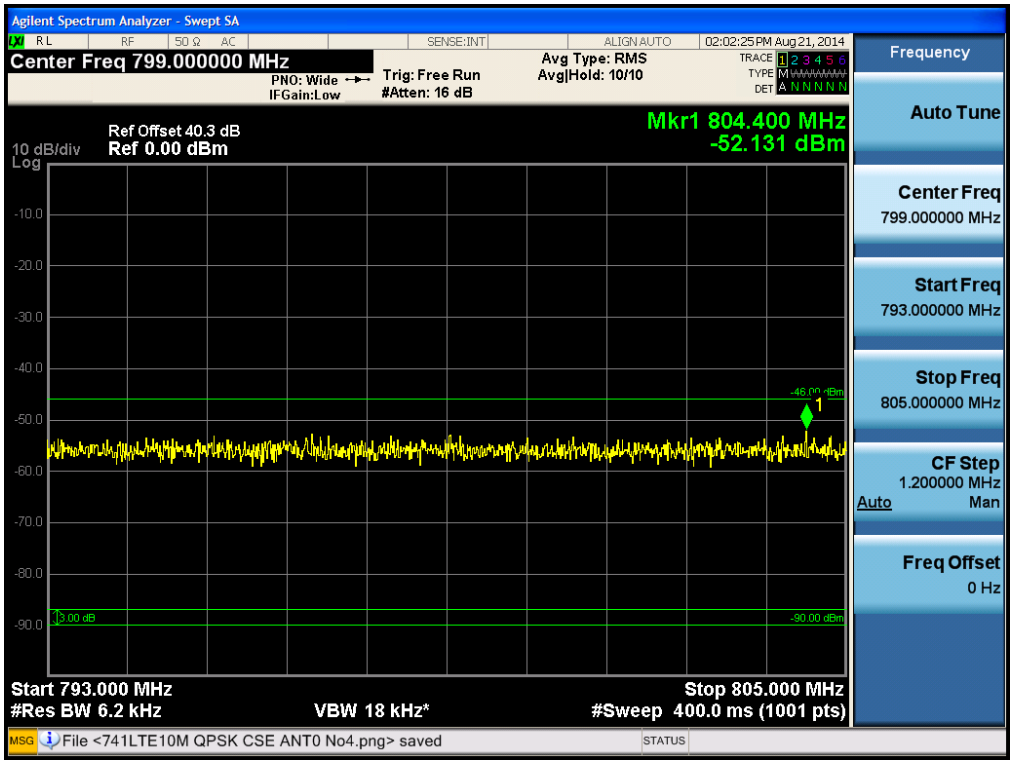


Conducted Spurious Emissions (793 MHz – 805 MHz)

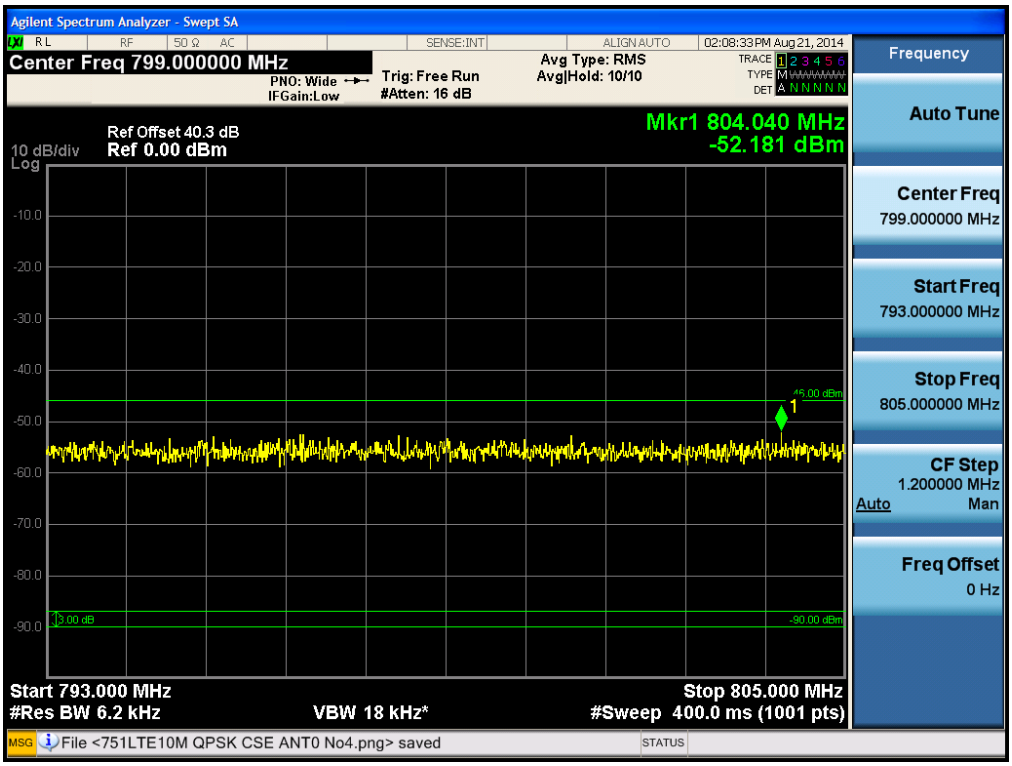
[LTE Downlink 10 MHz Low]



[LTE Downlink 10 MHz Middle]



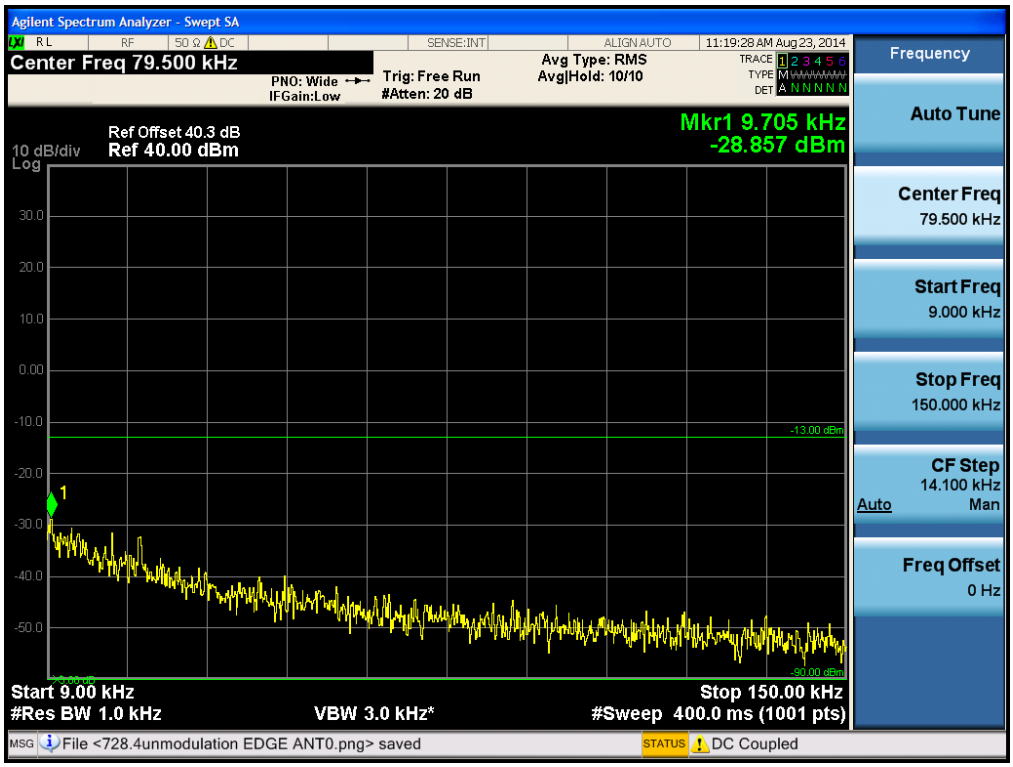
[LTE Downlink 10 MHz High]



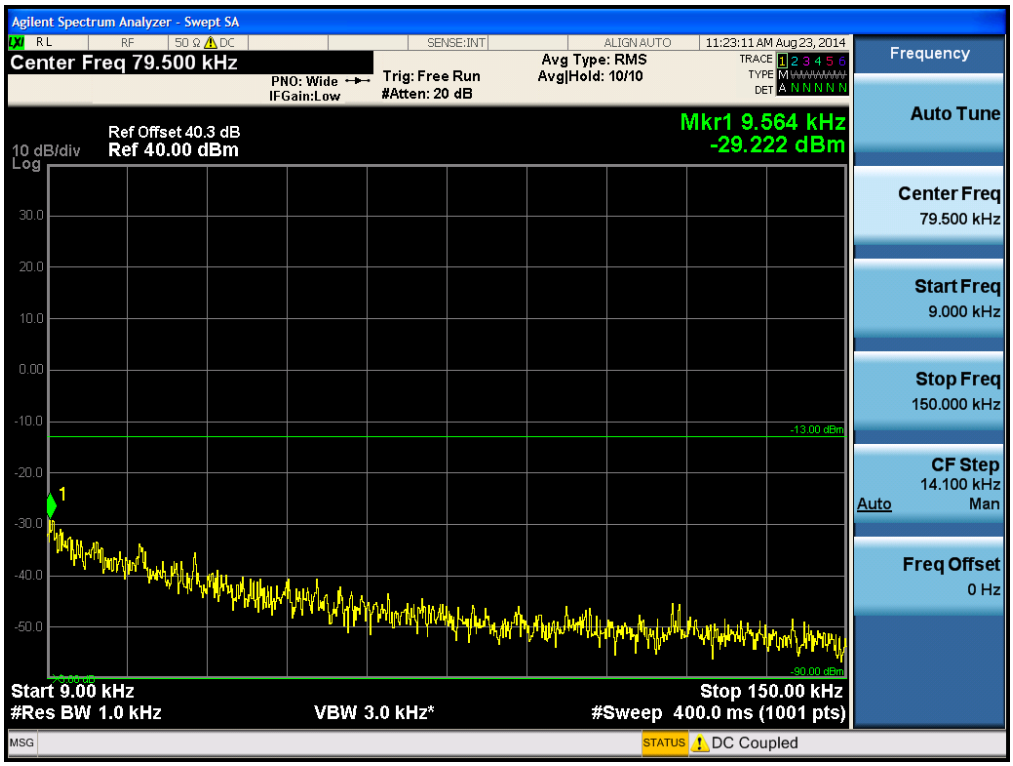
Multi channel Enhancer Plots of Spurious Emission for IC

Conducted Spurious Emissions (9 kHz – 150 kHz)

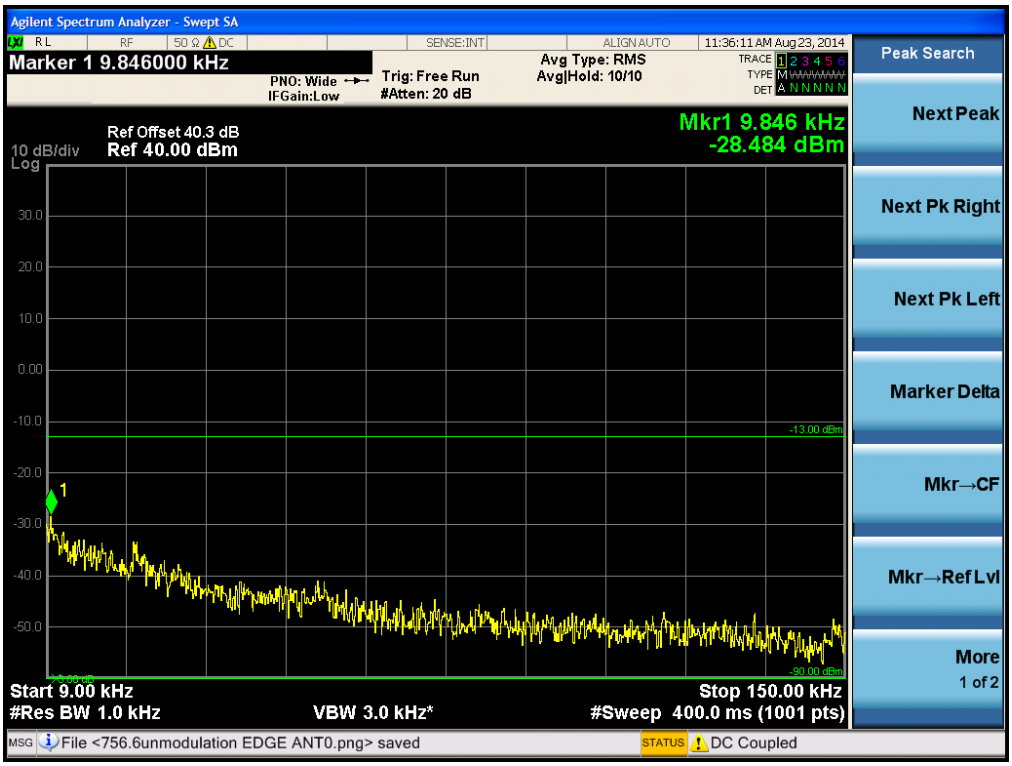
[LTE Downlink Low]



[LTE Downlink Middle]

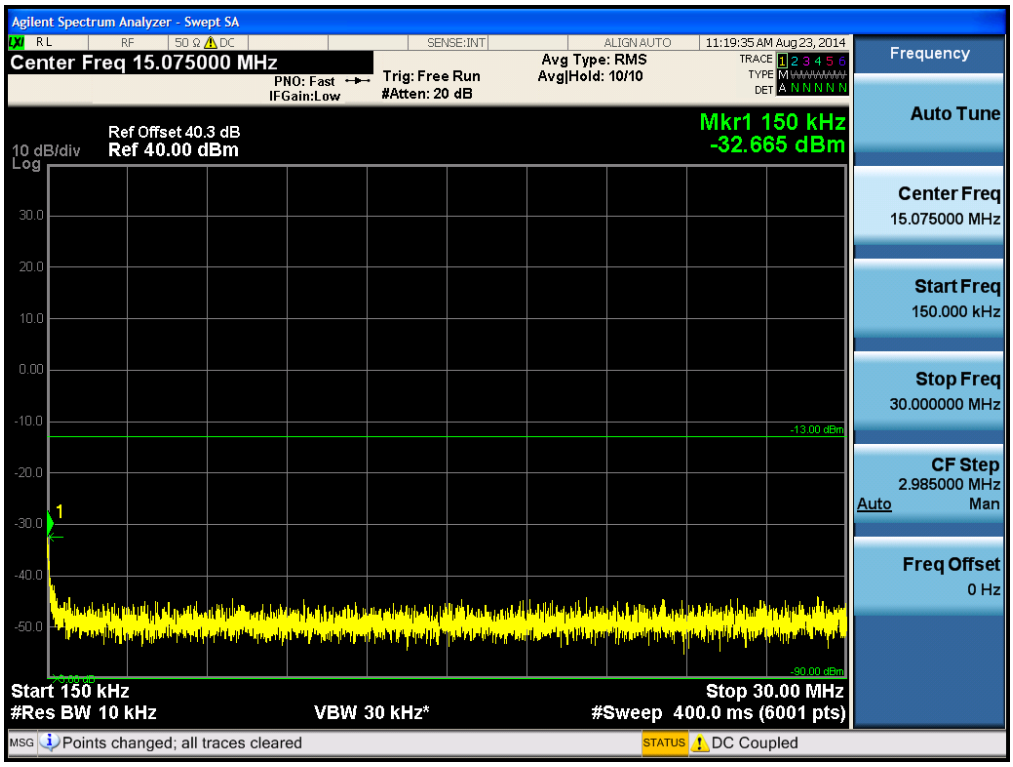


[LTE Downlink High]

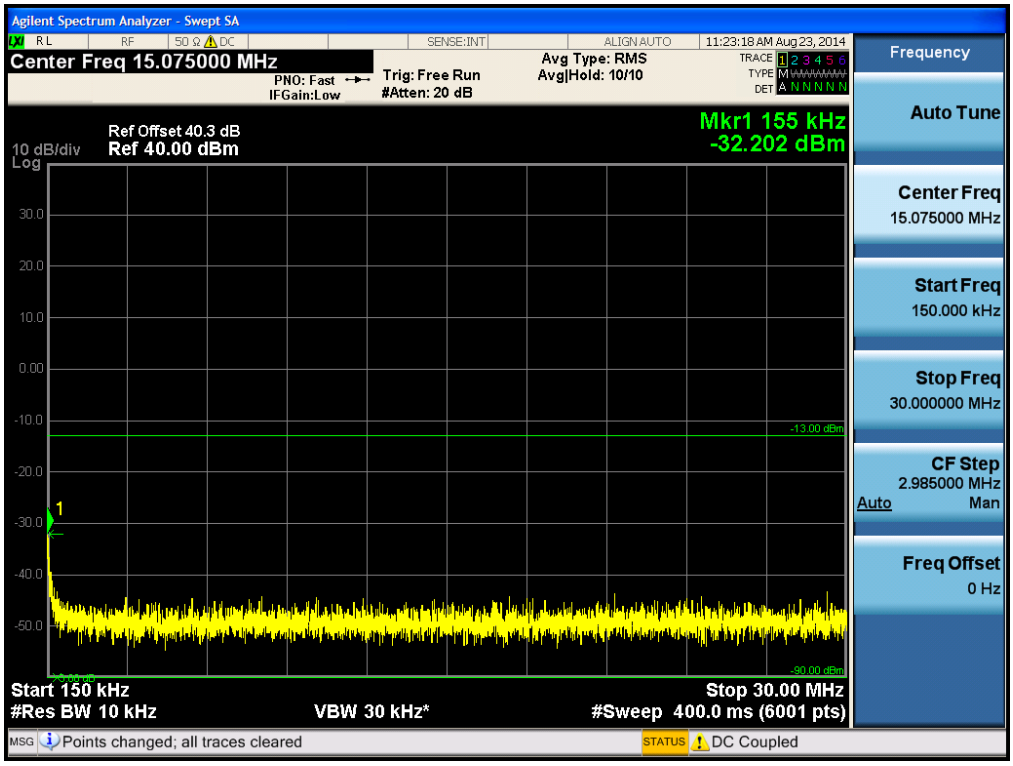


Conducted Spurious Emissions (150 kHz – 30 MHz)

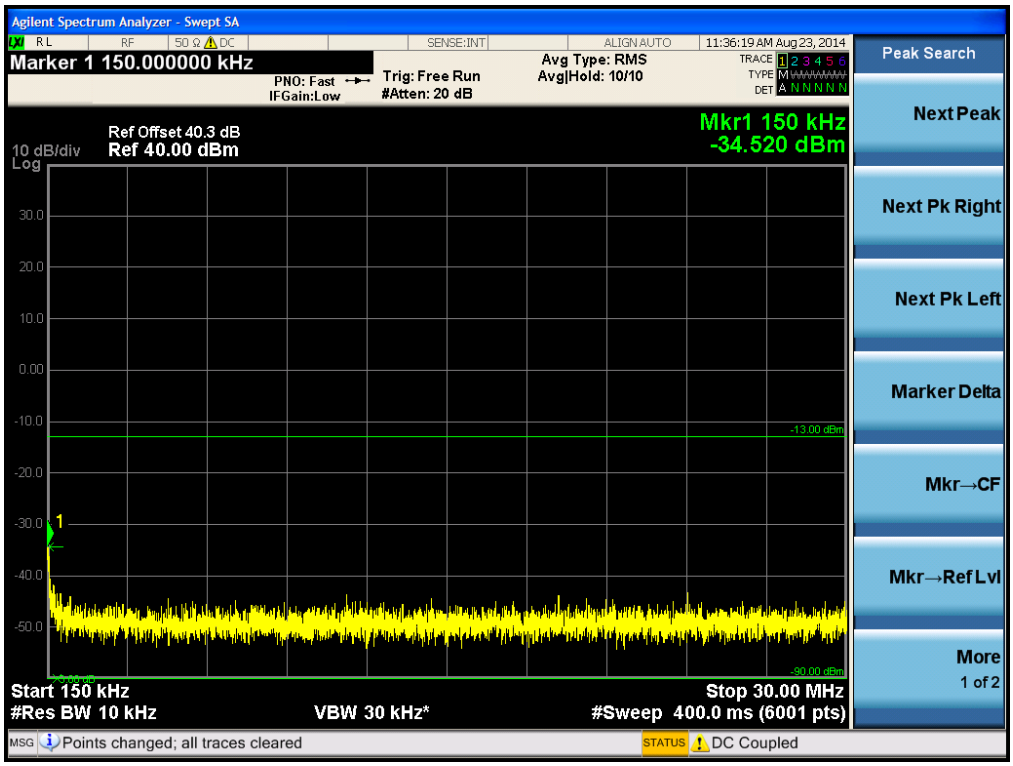
[LTE Downlink Low]



[LTE Downlink Middle]

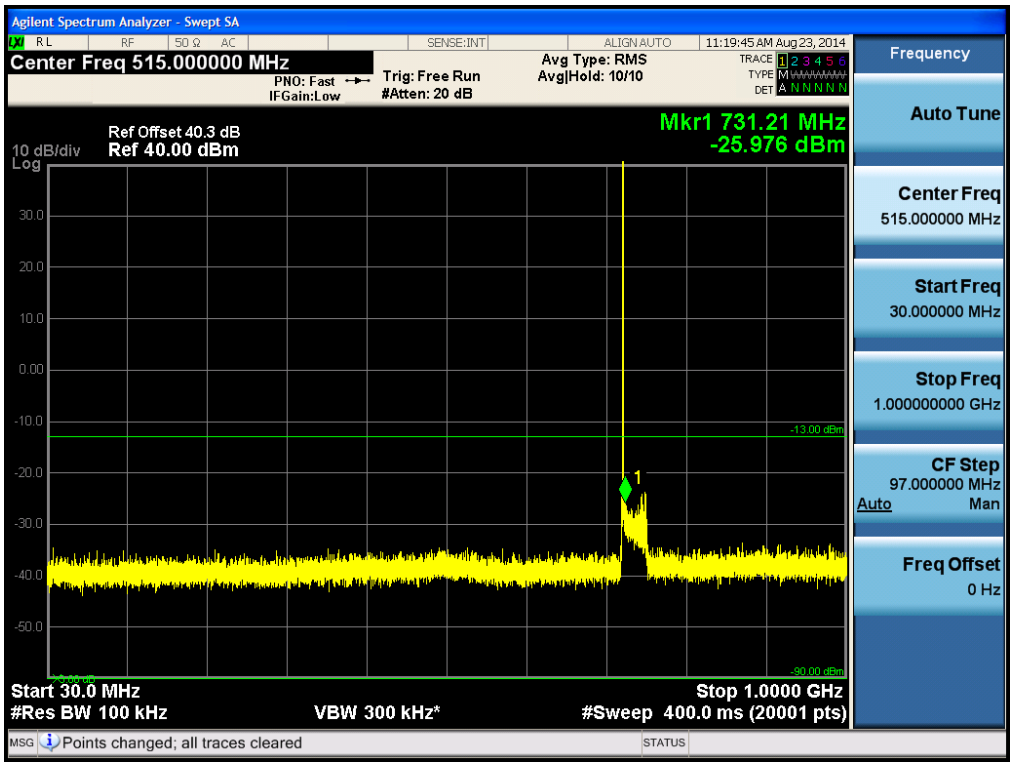


[LTE Downlink High]

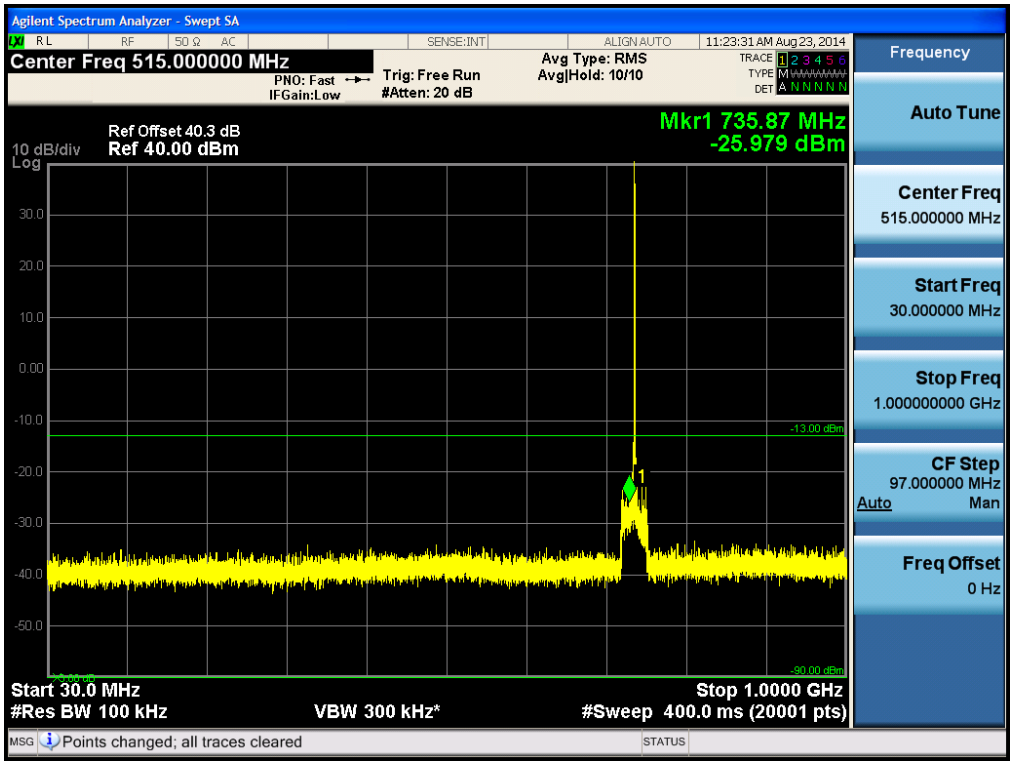


Conducted Spurious Emissions (30 MHz – 1 GHz)

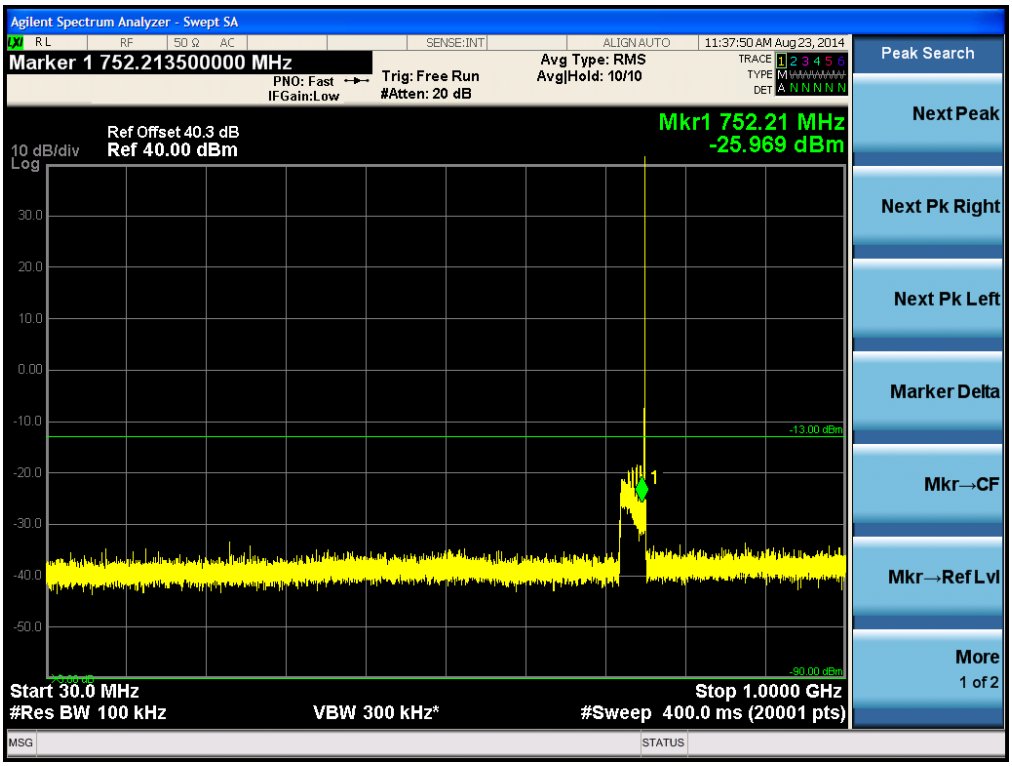
[LTE Downlink Low]



[LTE Downlink Middle]

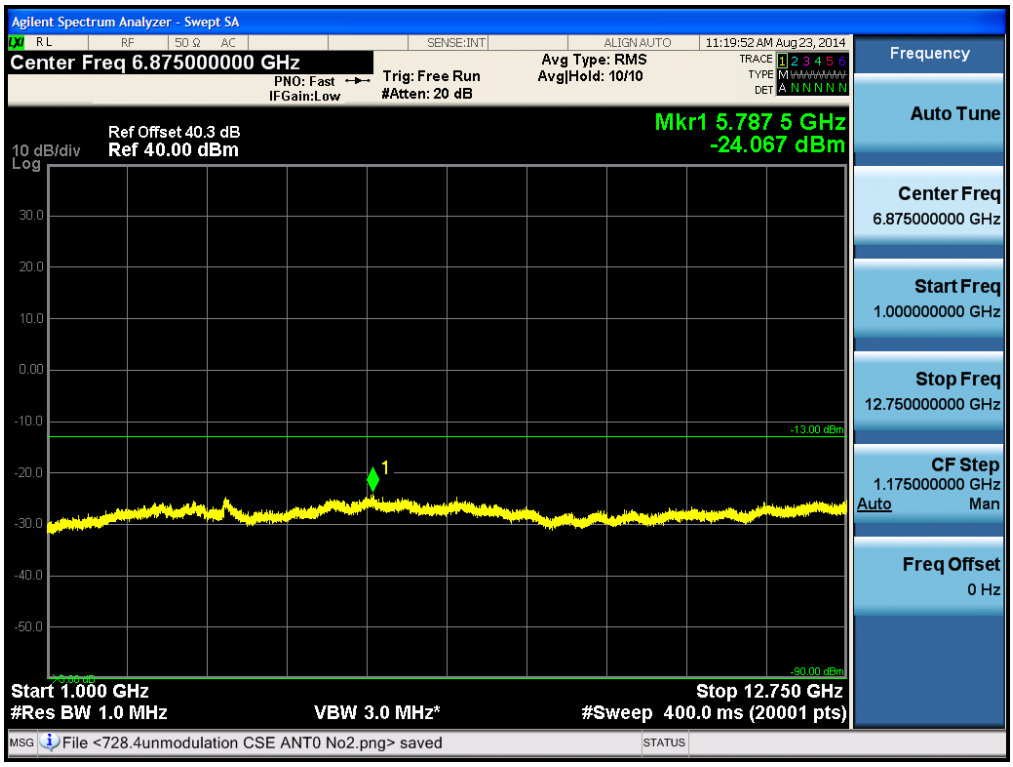


[LTE Downlink High]

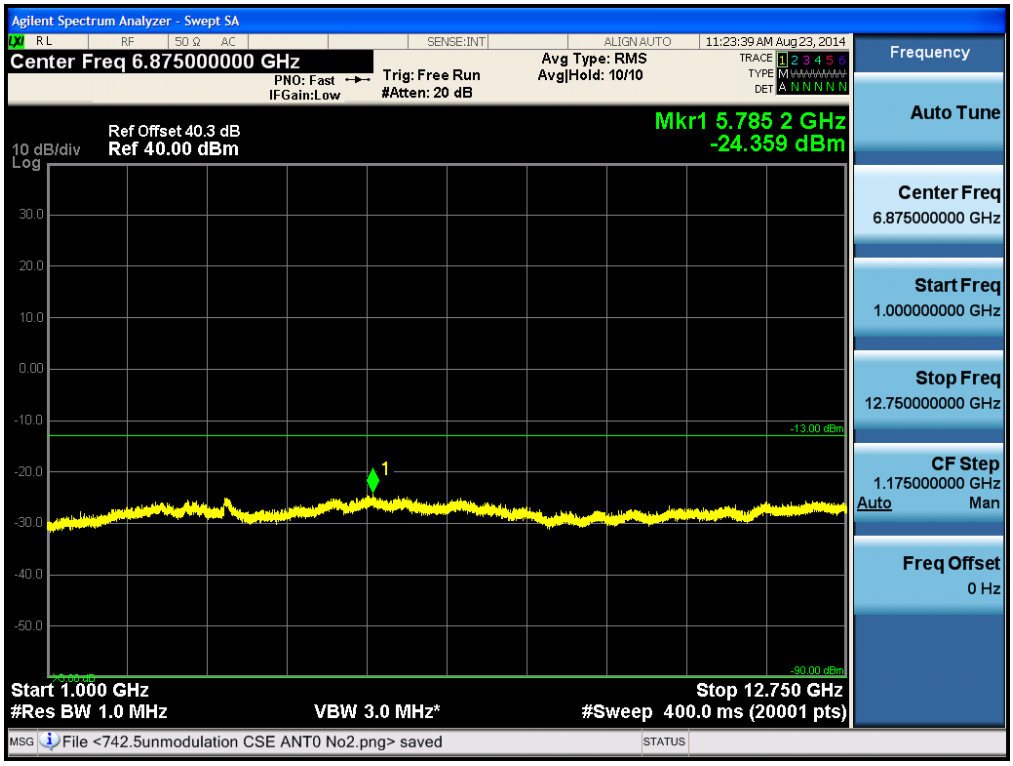


Conducted Spurious Emissions (1 GHz –12.75 GHz)

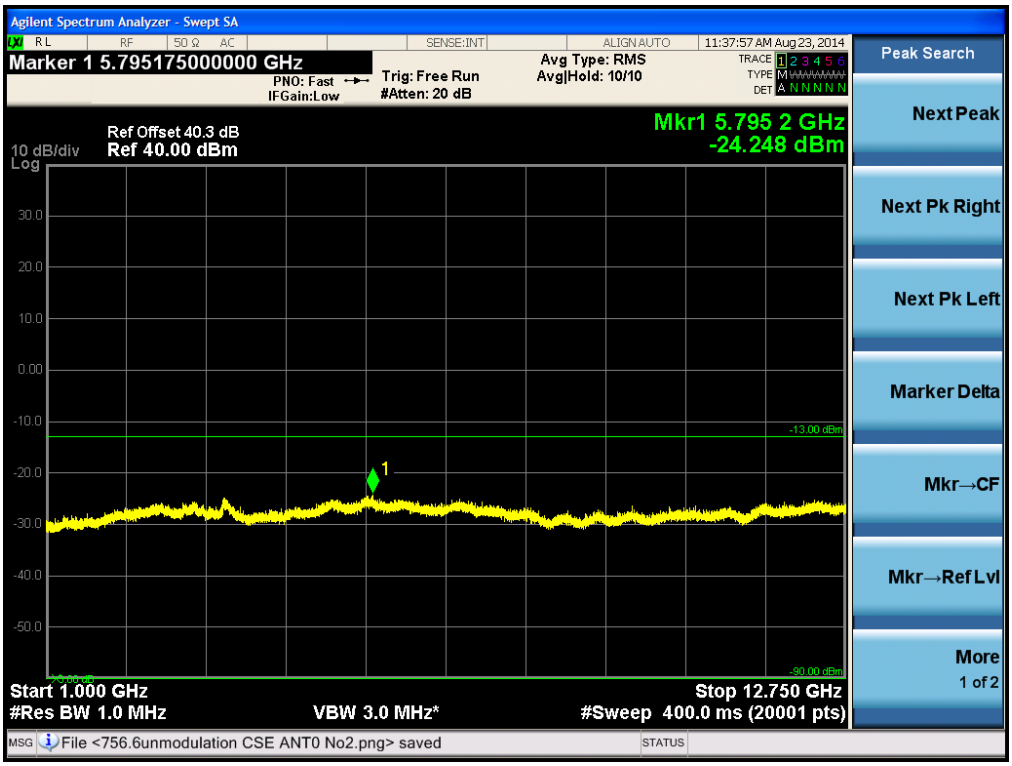
[LTE Downlink Low]



[LTE Downlink Middle]

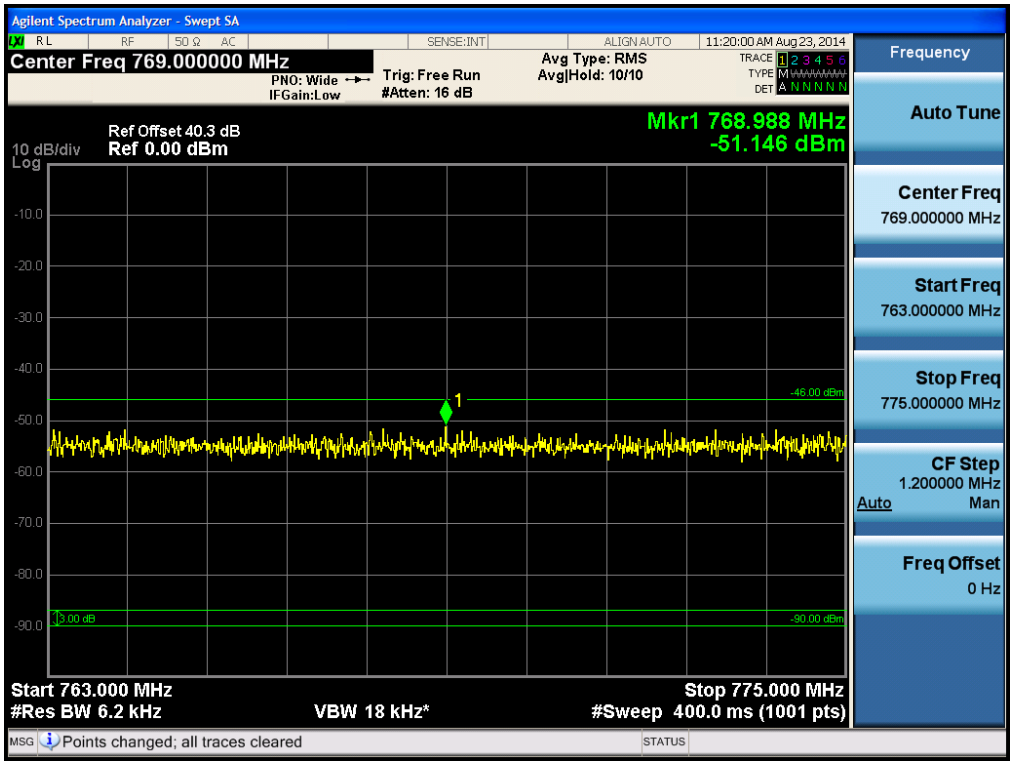


[LTE Downlink High]

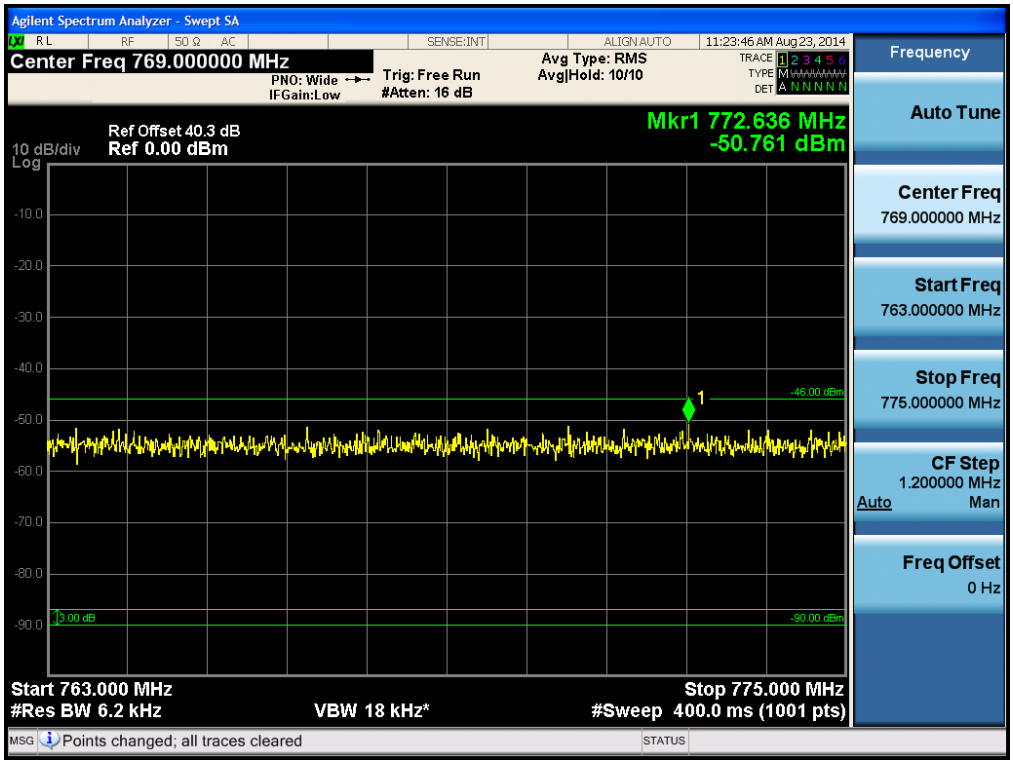


Conducted Spurious Emissions (763 MHz – 775 MHz)

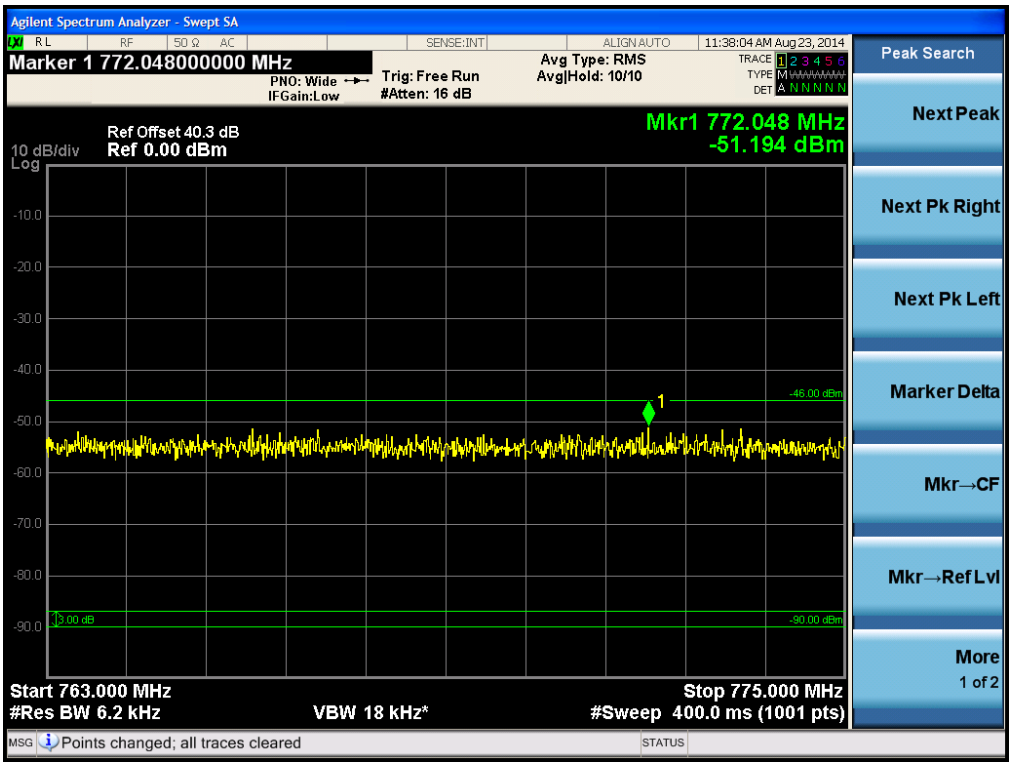
[LTE Downlink Low]



[LTE Downlink Middle]

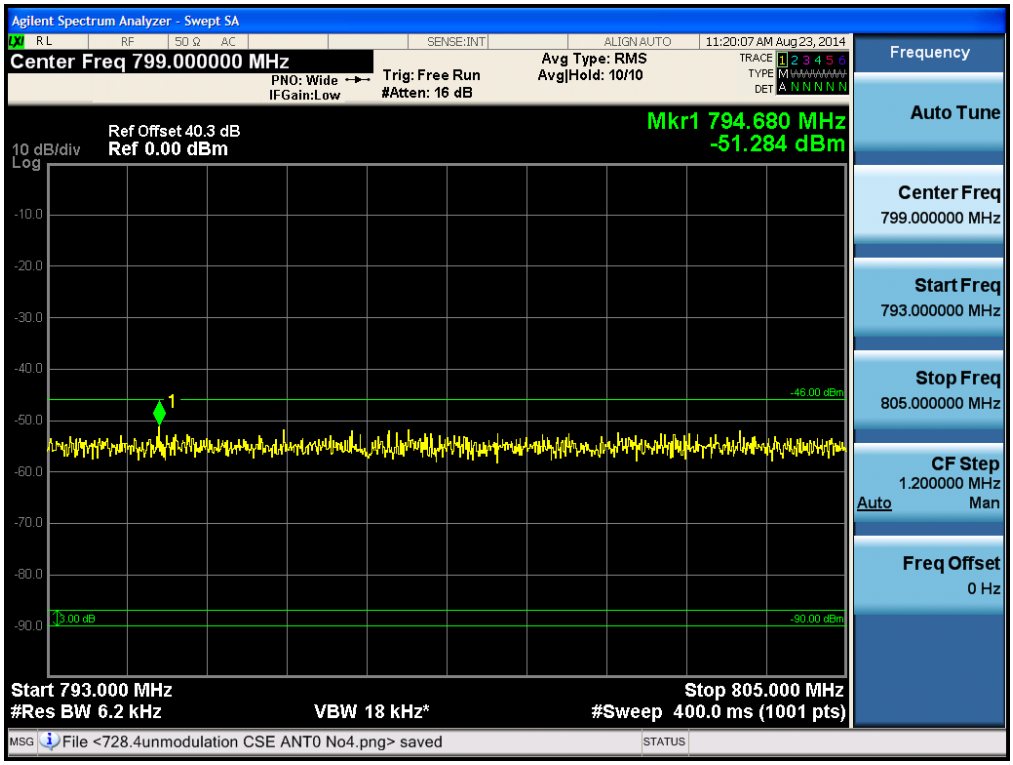


[LTE Downlink High]

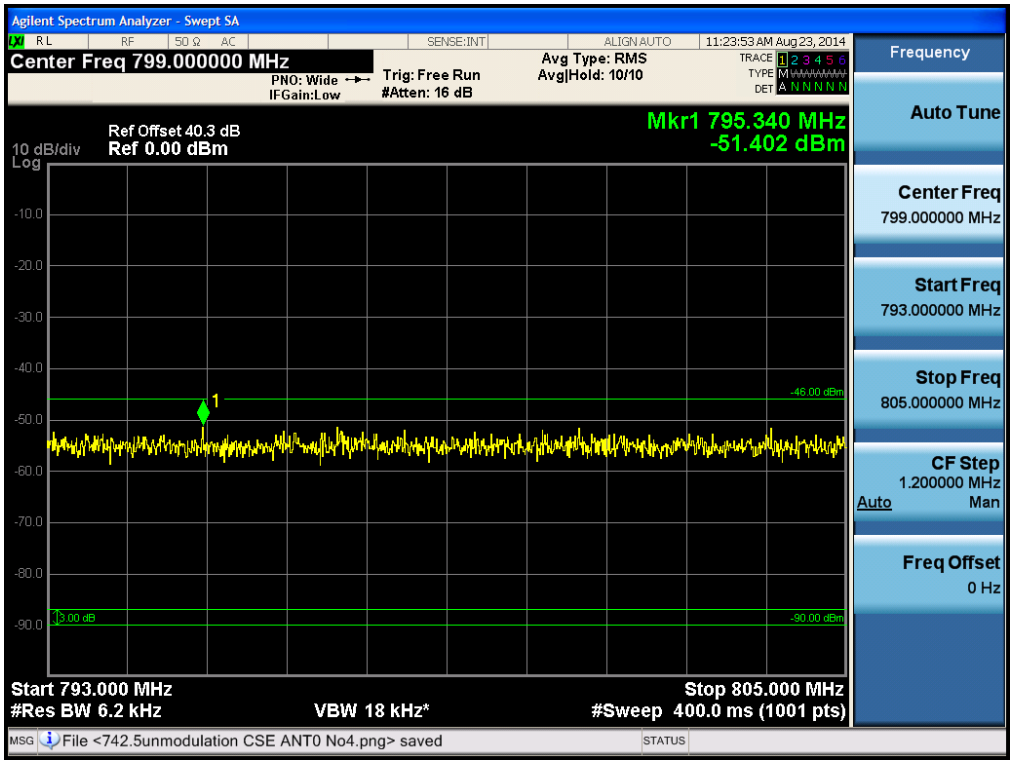


Conducted Spurious Emissions (793 MHz – 805 MHz)

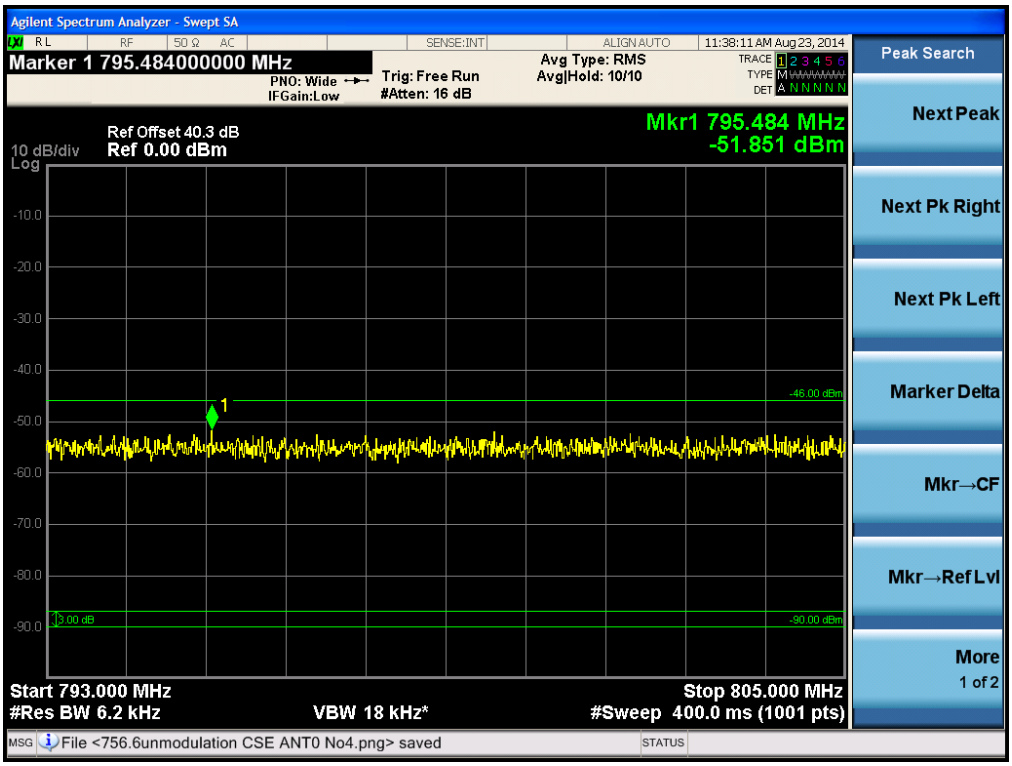
[LTE Downlink Low]



[LTE Downlink Middle]

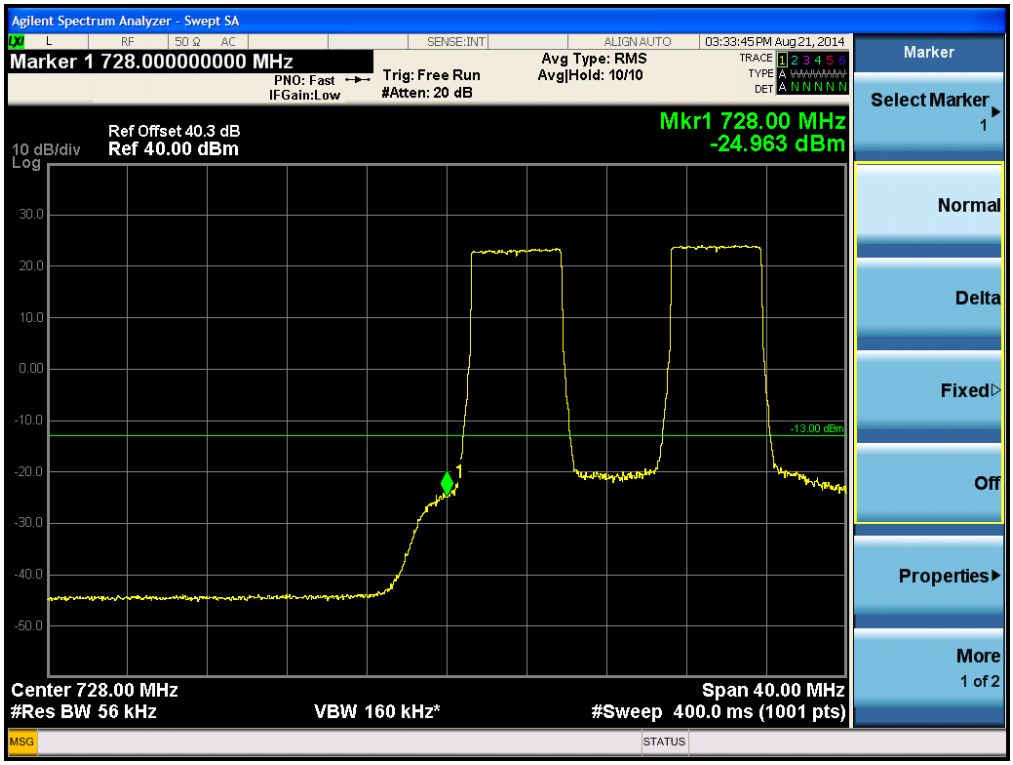


[LTE Downlink High]

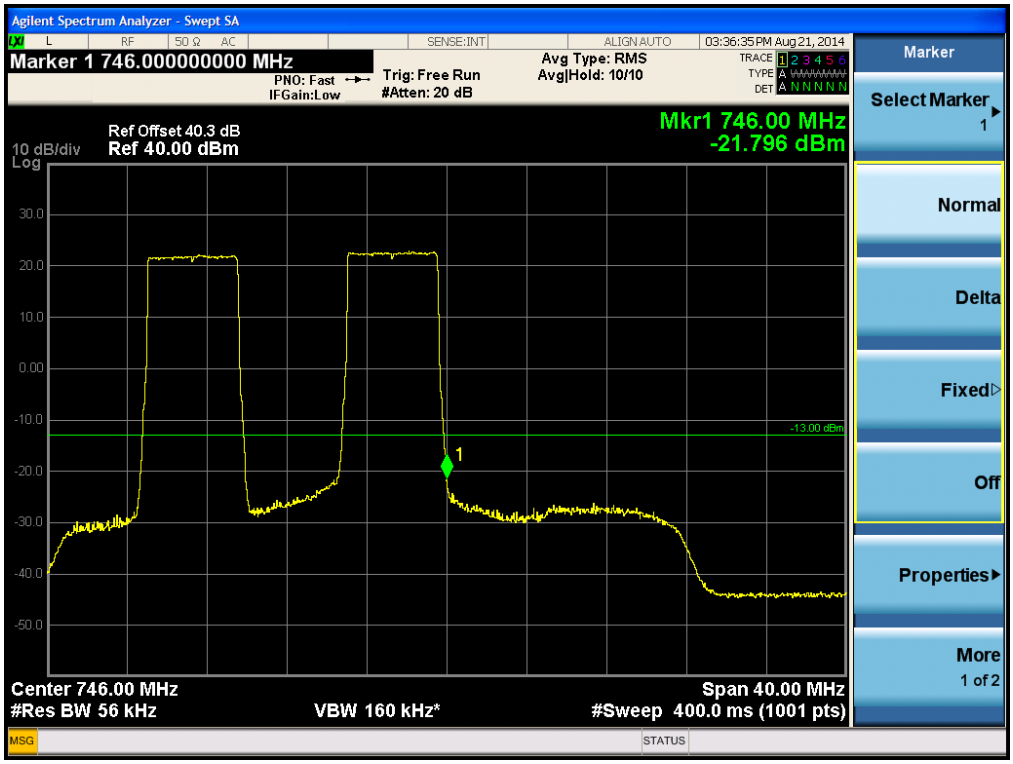


Intermodulation Spurious Emissions for FCC

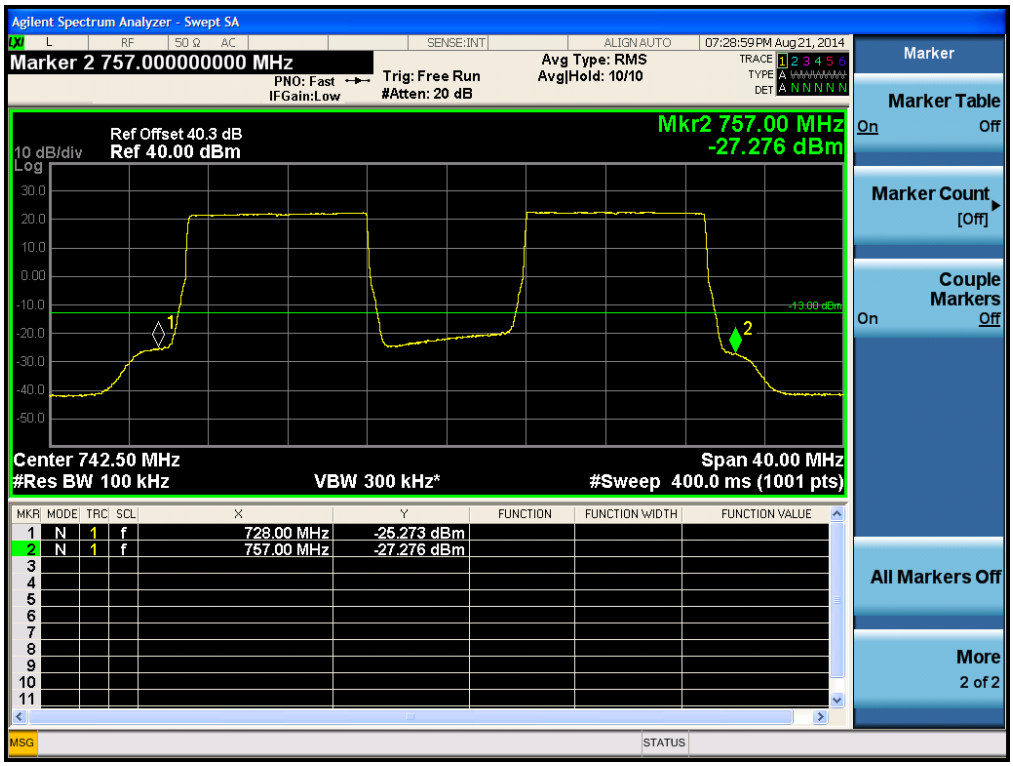
[LTE Downlink 5 MHz Low]



[LTE Downlink 5 MHz High]

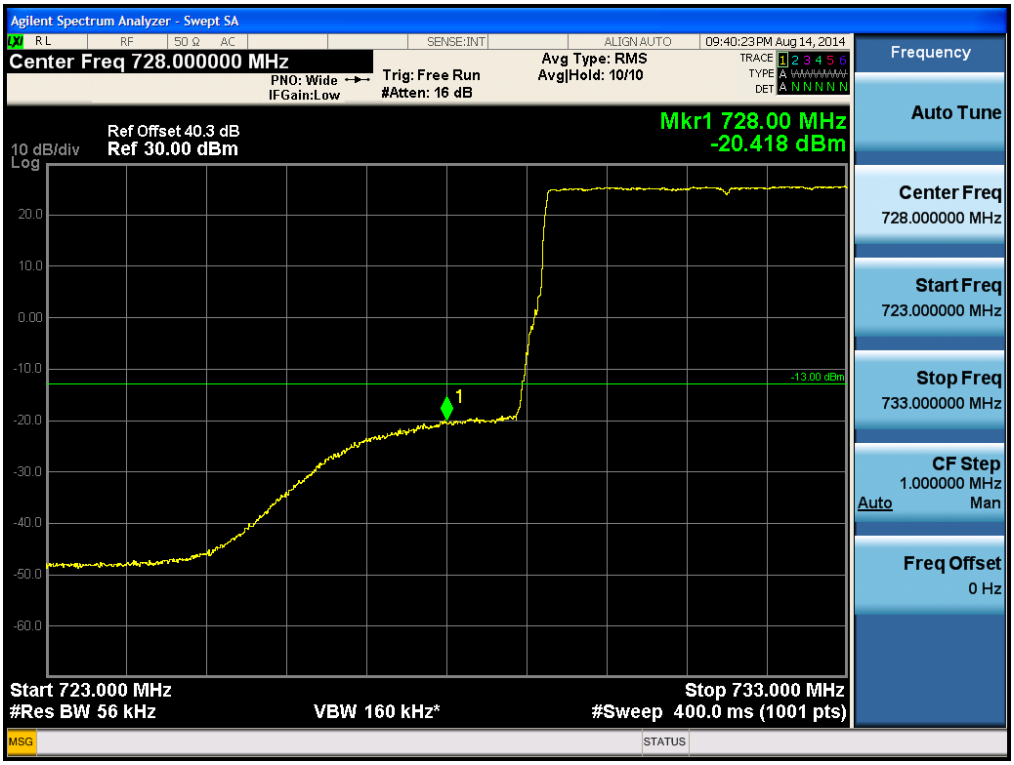


[LTE Downlink 10 MHz]

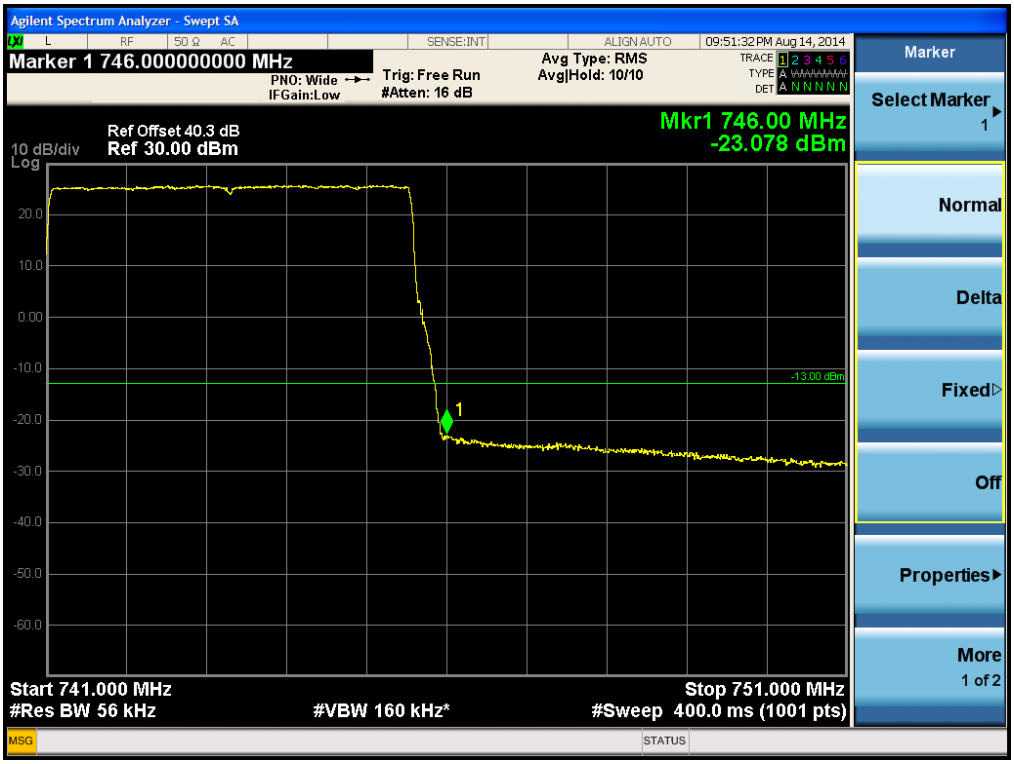


Single channel Enhancer Band Edge

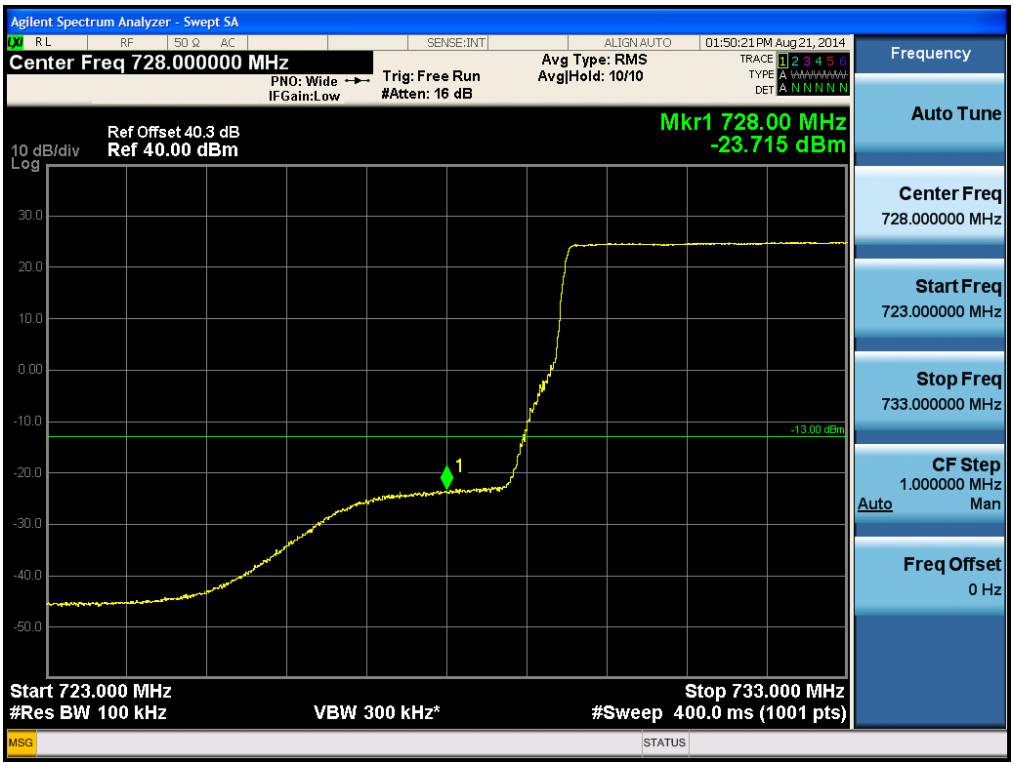
[LTE Downlink 5 MHz Low]



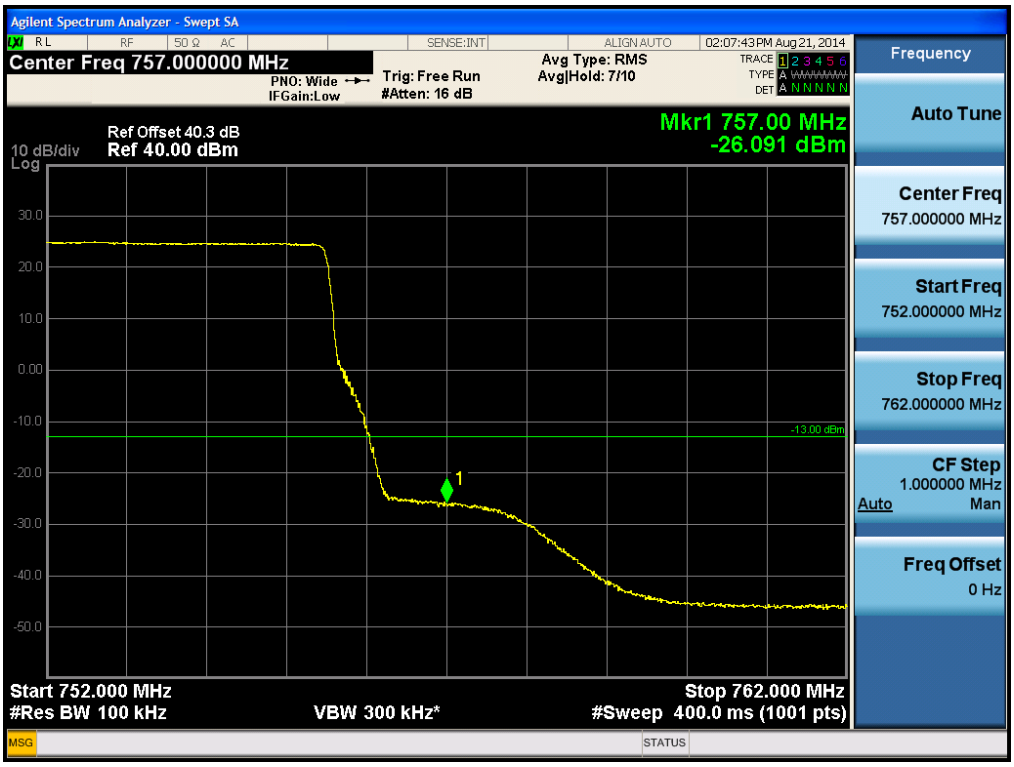
[LTE Downlink 5 MHz High]



[LTE Downlink 10 MHz Low]

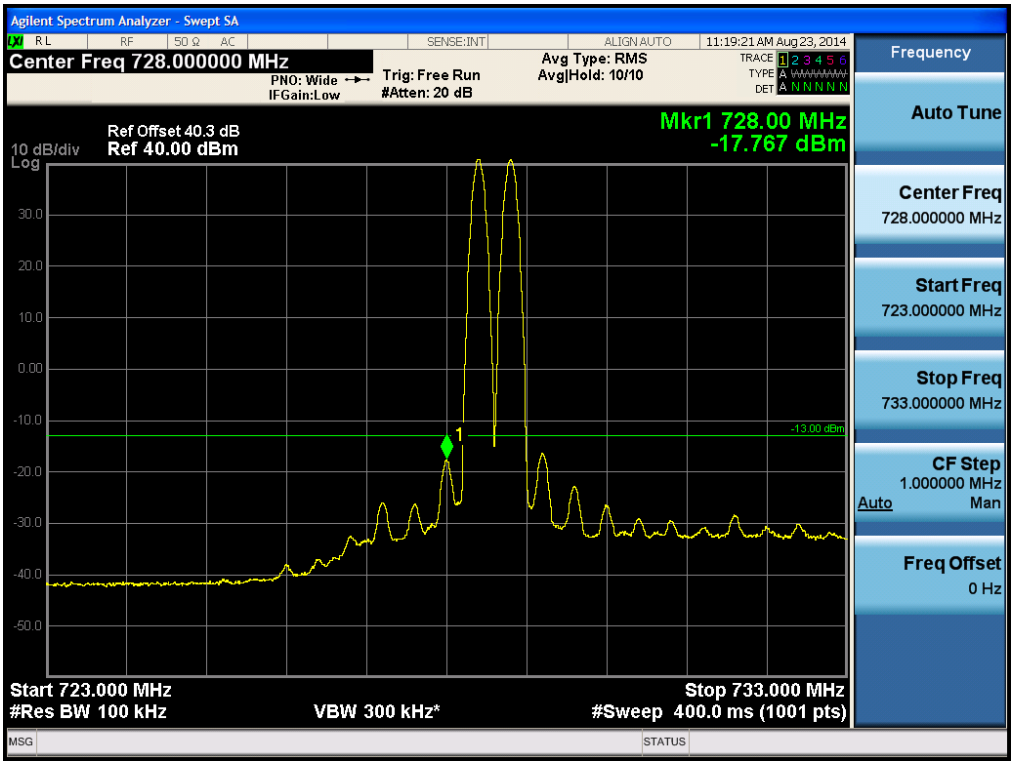


[LTE Downlink 10 MHz High]

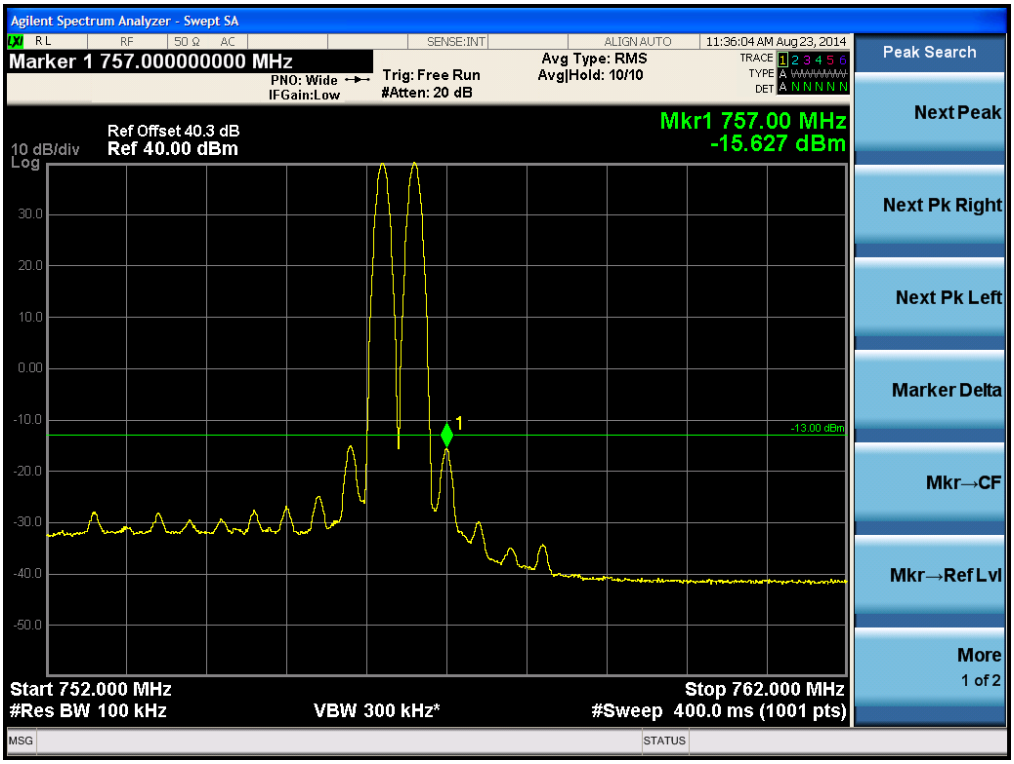


Multi channel Enhancer Band Edge for IC

[LTE Downlink Low]



[LTE Downlink High]



10. RADIATED SPURIOUS EMISSIONS

Test Requirement(s): § 2.1053 Measurements required: Field strength of spurious radiation.

§ 2.1053 (a) Measurements shall be made to detect spurious emissions that may be Radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

§ 2.1053 (b): The measurements specified in paragraph (a) of this section shall be made for the following equipment:

(1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.

(2) All equipment operating on frequencies higher than 25 MHz.

(3) All equipment where the antenna is an integral part of, and attached directly to The transmitter.

(4) Other types of equipment as required, when deemed necessary by the Commission.

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

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

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

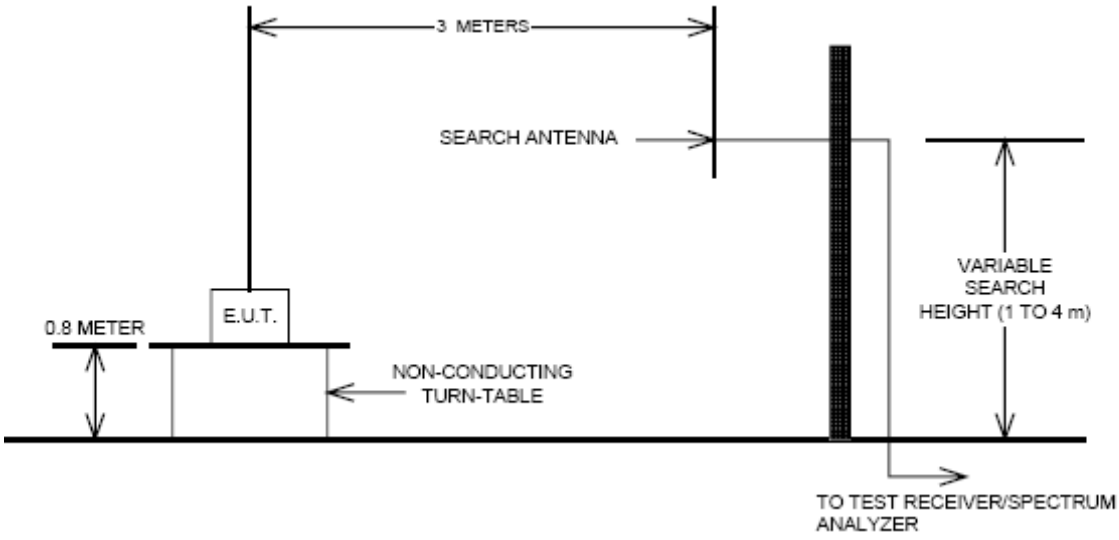
(f) For operations in the 746–763 MHz, 775–793 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to **-**70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and **-**80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Test Procedures: As required by 47 CFR 2.1053, *field strength of radiated spurious measurements* were made in accordance with the procedures of ANSI/TIA-603-C-2004 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards".

Radiated emission measurements were performed inside a 3 meter semi-anechoic chamber.

The EUT was set at a distance of 3m from the receiving antenna. The EUT's RF ports were terminated to 50ohm load. The EUT was set to transmit at the low, mid and high channels of the transmitter frequency range at its maximum power level. The EUT was rotated about 360 and the receiving antenna scanned from 1-3m in order to capture the maximum emission. A calibrated antenna source was positioned in place of the EUT and the previously recorded signal was duplicated. The maximum EIRP of the emission was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried. out with the receiving antenna in both vertical and horizontal polarization. Harmonic emissions up to the 10th or 40 GHz, whichever was the lesser, were investigated.

Radiated Spurious Emissions Test Setup



Test Result:

Note.

Input signal is the CW signal.

Harmonics were not found.

700 MHz LTE band

[Downlink]

Voltage supplied to EUT	Tx Freq.(MHz)	Freq.(MHz)	Substitute Level [dBm]	Ant. Gain (dBi)	C.L	Pol.	EIRP (dBm)	Margin (dB)
120 Vac	728.4	1776	-31.63	7.94	5.24	H	-28.93	15.93
		2000	-32.72	8.45	5.64	H	-29.91	16.91
	742.5	1776	-32.07	7.94	5.24	H	-29.37	15.82
		2000	-33.30	8.45	5.64	H	-30.49	16.97
	756.6	1776	-31.47	7.94	5.24	H	-28.77	15.77
		1776	-32.92	7.94	5.24	H	-30.11	17.11

Voltage supplied to EUT	Tx Freq.(MHz)	Freq.(MHz)	Substitute Level [dBm]	Ant. Gain (dBi)	C.L	Pol.	EIRP (dBm)	Margin (dB)
-48 Vdc	728.4	1776	-31.38	7.94	5.24	H	-28.68	15.68
		2000	-32.59	8.45	5.64	H	-29.78	16.78
	742.5	1776	-31.67	7.94	5.24	H	-28.82	15.97
		2000	-33.04	8.45	5.64	H	-30.23	17.23
	756.6	1776	-31.89	7.94	5.24	H	-29.19	16.19
		2000	-32.36	8.45	5.64	H	-29.55	16.55

11. FREQUENCY STABILITY OVER TEMPERATURE AND VOLTAGE VARIATIONS

FCC Rules

Test Requirement(s): §2.1055(a)(1), § 27.54

Test Procedures:

As required by 47 CFR 2.1055, *Frequency Stability measurements* were made at the RF output terminals using a Spectrum Analyzer.

The EUT was placed in the Environmental Chamber.

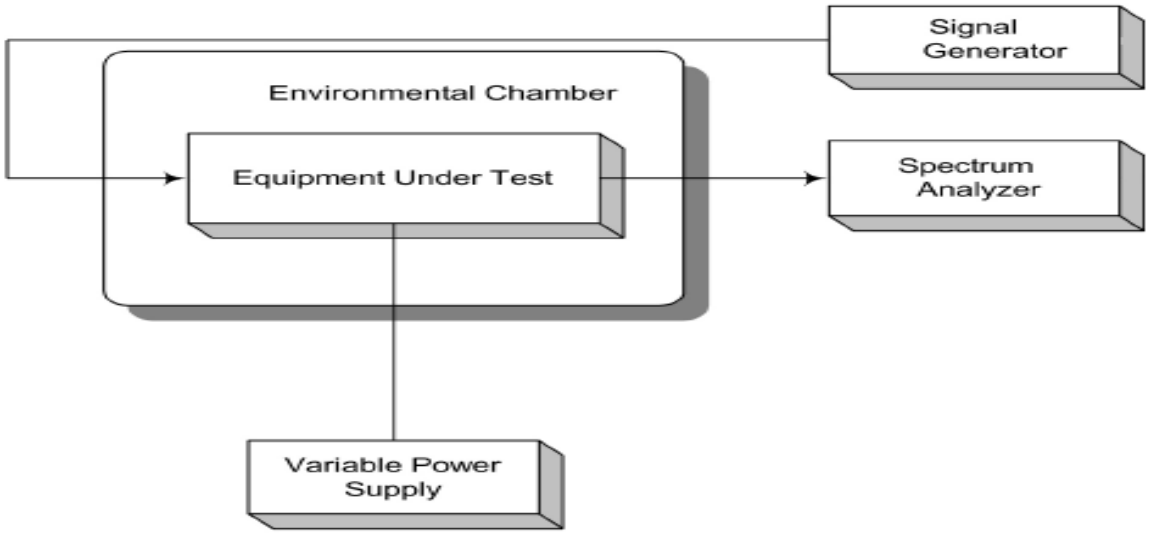
A CW signal was injected into the EUT at the appropriate RF level. The frequency counter option on the Spectrum Analyzer was used to measure frequency deviations.

The frequency drift was investigated for every 10 °C increment until the unit is stabilized then recorded the reading in tabular format with the temperature range of -30 to 50 °C.

Voltage supplied to EUT is 110 Vac reference temperature was done at 20°C.

The voltage was varied by ± 15 % of nominal

Test Setup:



Test Results:

The E.U.T was found in compliance for Frequency Stability and Voltage Test

IC Rules

Test Requirement(s): RSS-131 6.5

A band translator is essentially a repeater station and should introduce as little frequency error as possible. The frequency stability should therefore meet the objectives of the overall land mobile or cellular service for which it serves. Better frequency stability than the minimum standard cited below will therefore be required in some cases.

The frequency stability shall be within 1.5 parts per million (0.00015%).

Test Procedures: RSS-131 4.5

In addition, the local oscillator frequency stability of the band translator shall be reported. Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage.

The following temperature and supply voltage ranges apply:

(a) at 10 degree intervals of temperatures between -30 °C and +50 °C, and at the manufacturer's rated-supply voltage; and

(b) at +20 °C temperature and 15% supply voltage variations.

AC power. Frequency Stability and Voltage Test Results

Reference: 120 Vac at 20°C **Freq.** = 742.5 MHz

Voltage (%)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	742500000. 0	0.0	0.0	0.0000
	-30	742499999. 9	-0.1	-0.1	-0.0001
	-20	742499999. 9	-0.1	-0.1	-0.0001
	-10	742500000. 0	0.0	0.0	0.0000
	0	742500000. 0	0.0	0.0	0.0000
	+10	742500000. 0	0.0	0.0	0.0000
	+30	742500000. 0	0.0	0.0	0.0000
	+40	742500000. 0	0.0	0.0	0.0000
	+50	742500000. 0	0.0	0.0	0.0000
115%	+20	742500000. 0	0.0	0.0	0.0000
85%	+20	742500000. 0	0.0	0.0	0.0000

[Downlink]

DC power. Frequency Stability and Voltage Test Results

Reference: -48 Vdc at 20°C **Freq.** = 742.5 MHz

Voltage (%)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	742500000. 0	0.0	0.0	0.0000
	-30	742499999. 9	-0.1	-0.1	-0.0001
	-20	742500000. 0	0.0	0.0	0.0000
	-10	742500000. 0	0.0	0.0	0.0000
	0	742500000. 0	0.0	0.0	0.0000
	+10	742500000. 0	0.0	0.0	0.0000
	+30	742500001. 0	1.0	1.0	0.0005
	+40	742500000. 0	0.0	0.0	0.0000
	+50	742500000. 0	0.0	0.0	0.0000
115%	+20	742500000. 0	0.0	0.0	0.0000
85%	+20	742500000. 0	0.0	0.0	0.0000

[Downlink]