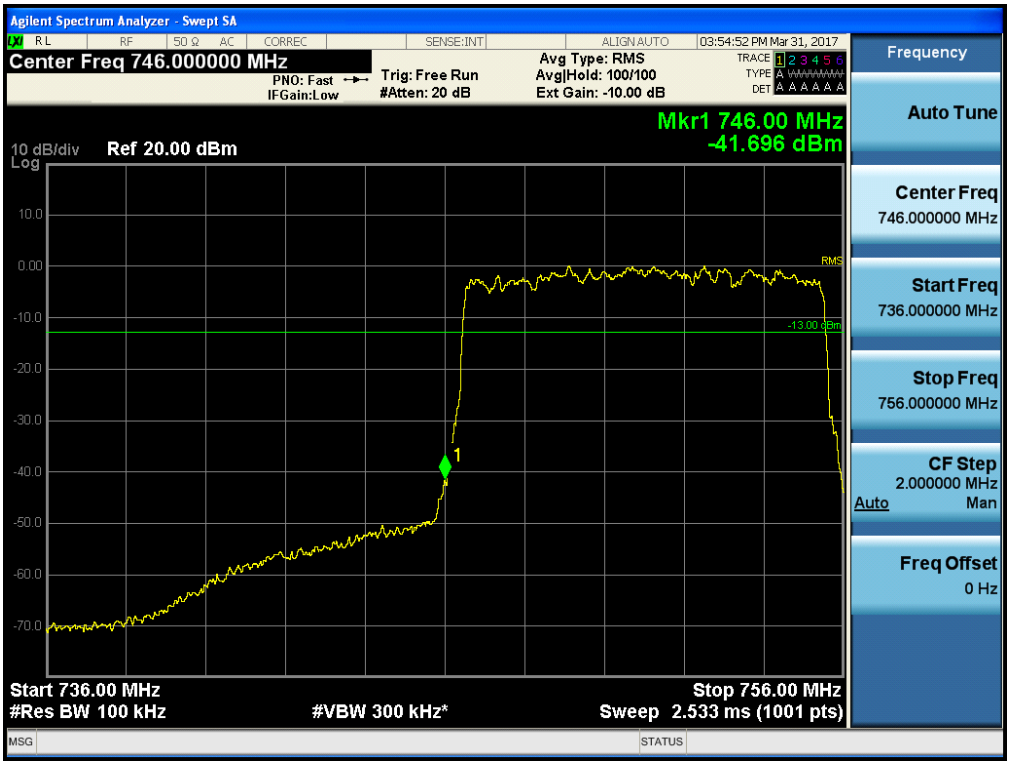
Band Edge

700 MHz_LTE 10M_QPSK

Test Data at Output Port 0

[Downlink Low]



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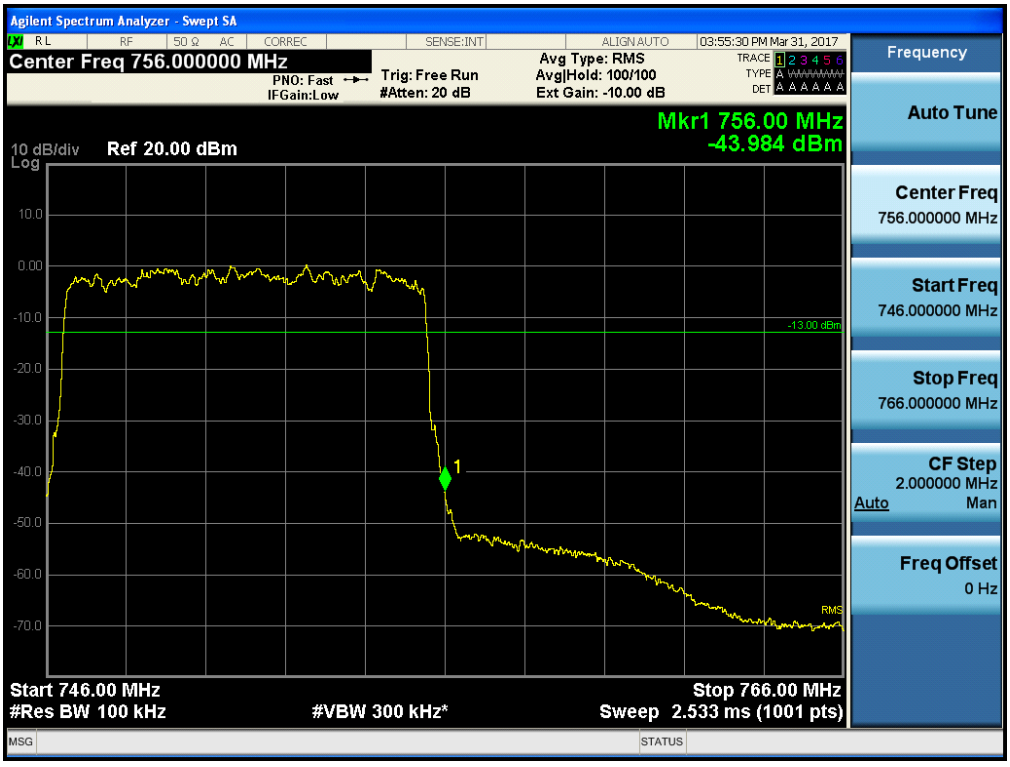
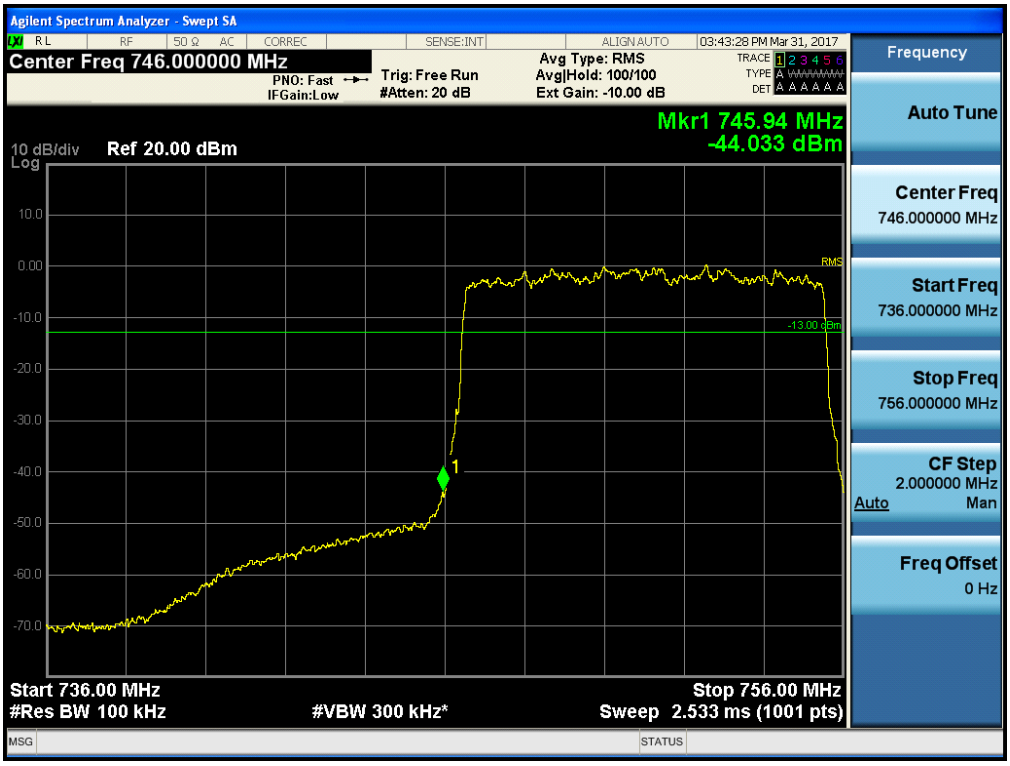


700 MHz _LTE 10M_16QAM

Test Data at Output Port 0

[Downlink Low]

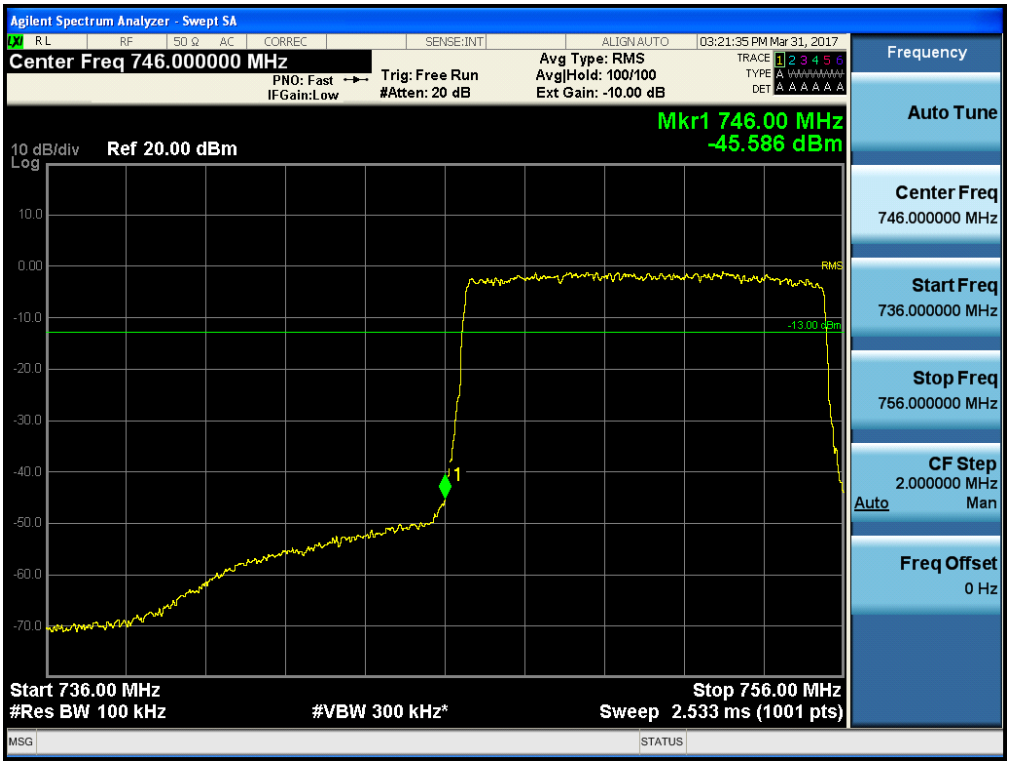


[Downlink High]

700 MHz _LTE 10M_64QAM

Test Data at Output Port 0

[Downlink Low]



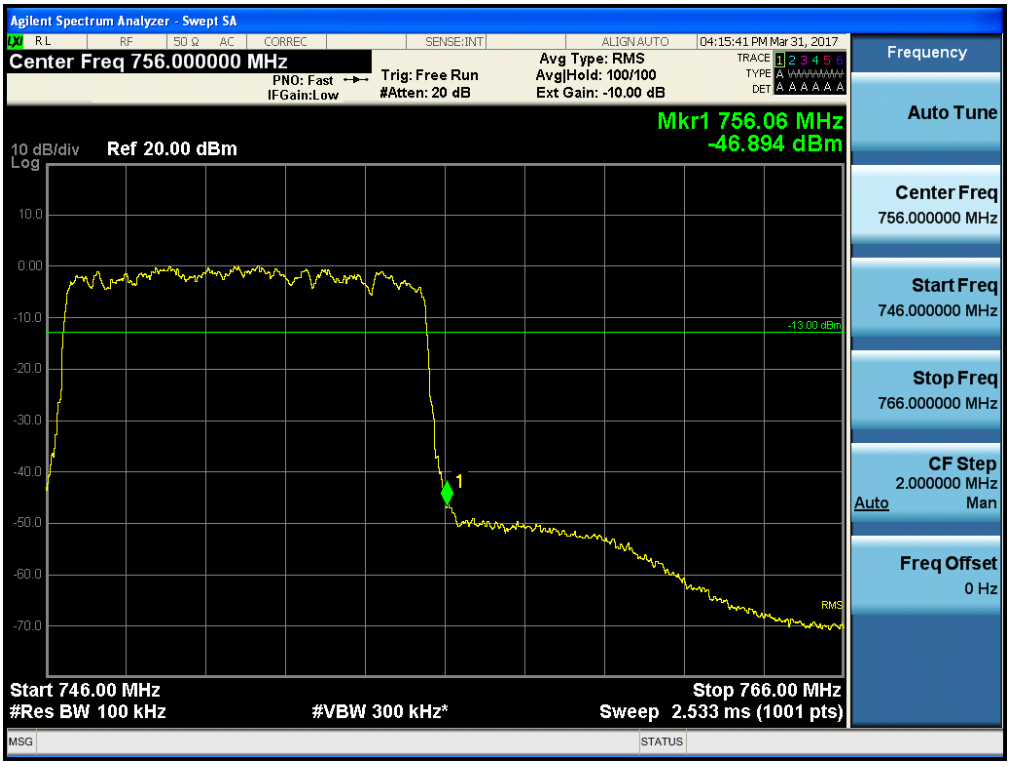
[Downlink High]

700 MHz _LTE 10M_QPSK

Test Data at Output Port 1

[Downlink Low]

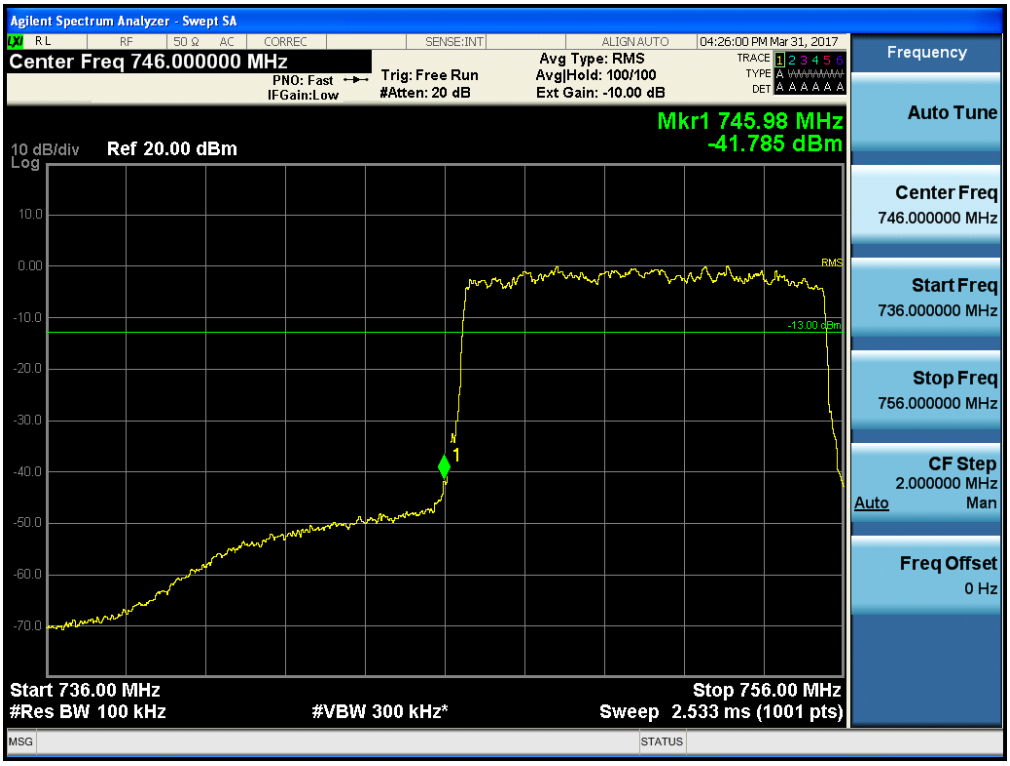
[Downlink High]



700 MHz _LTE 10M_16QAM

Test Data at Output Port 1

[Downlink Low]

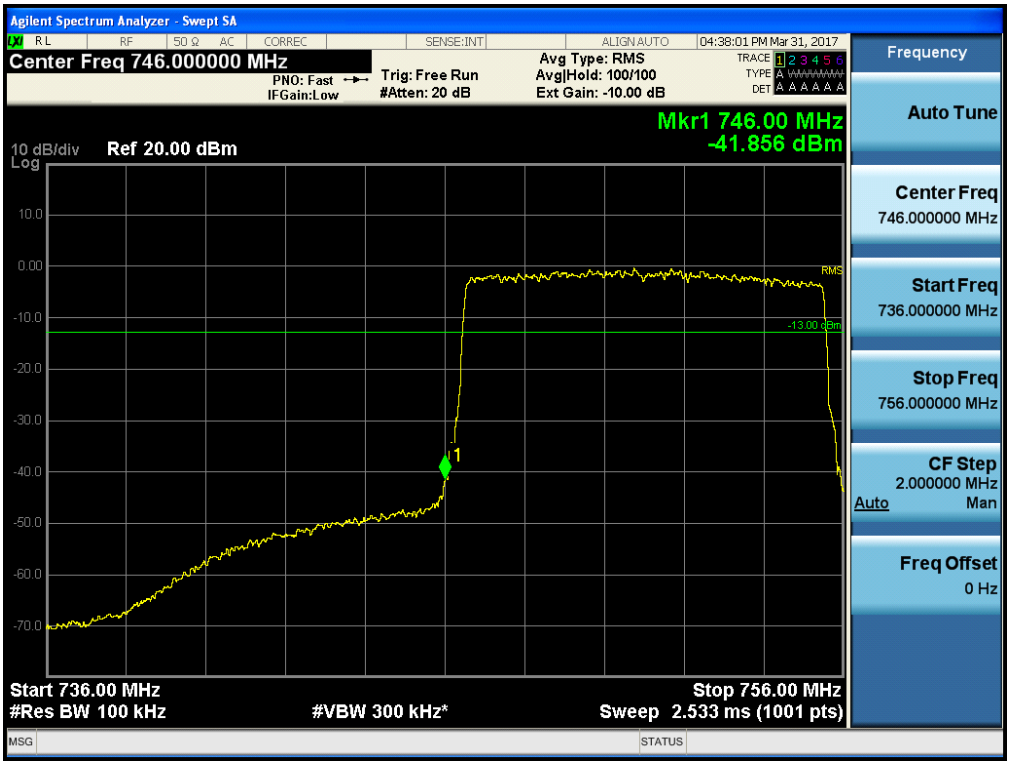


[Downlink High]

700 MHz _LTE 10M_64QAM

Test Data at Output Port 1

[Downlink Low]



[Downlink High]

AWS2100_LTE 10M_QPSK

Test Data at Output Port 0

[Downlink Low]

[Downlink High]

AWS2100_LTE 10M_16QAM

Test Data at Output Port 0

[Downlink Low]

[Downlink High]

AWS2100_LTE 10M_64QAM

Test Data at Output Port 0

[Downlink Low]

[Downlink High]

AWS2100_LTE 15M_QPSK

Test Data at Output Port 0

[Downlink Low]

[Downlink High]

AWS2100_LTE 15M_16QAM

Test Data at Output Port 0

[Downlink Low]

[Downlink High]

AWS2100_LTE 15M_64QAM

Test Data at Output Port 0

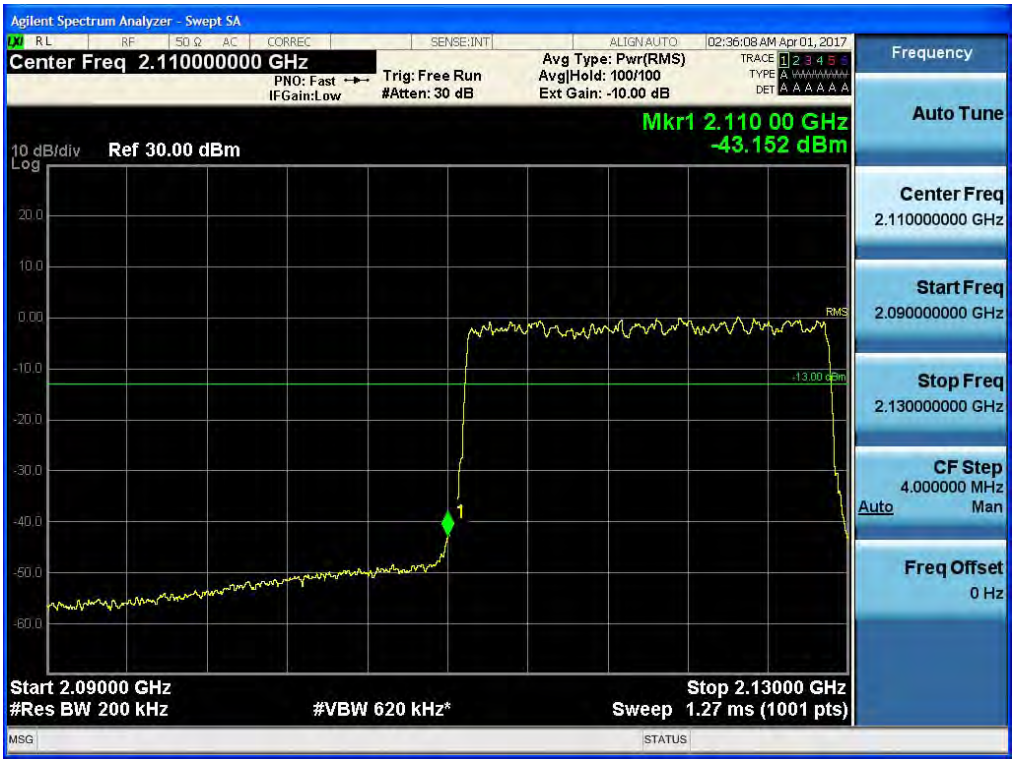
[Downlink Low]

[Downlink High]

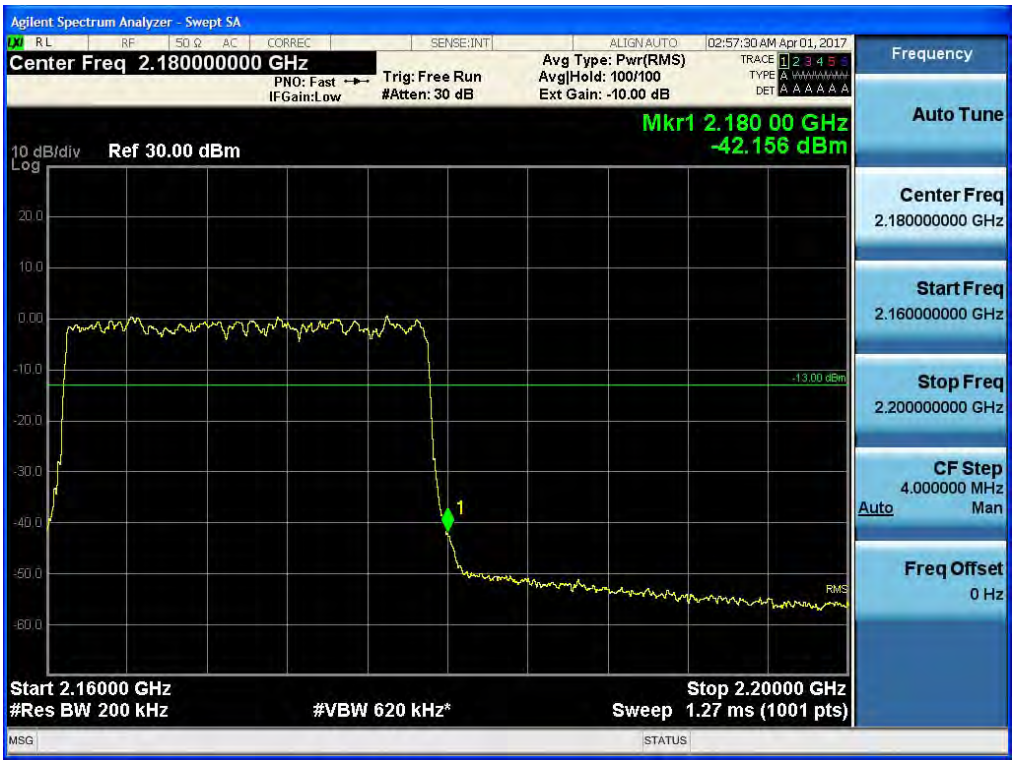
AWS2100_LTE 20M_QPSK

Test Data at Output Port 0

[Downlink Low]



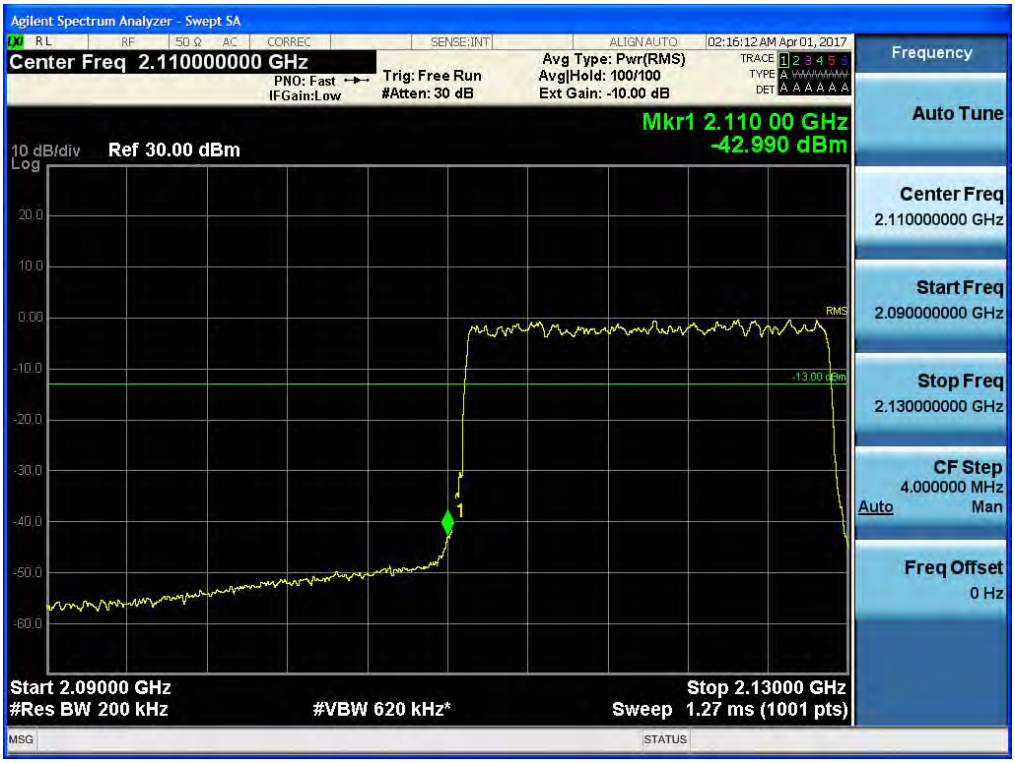
[Downlink High]



AWS2100_LTE 20M_16QAM

Test Data at Output Port 0

[Downlink Low]



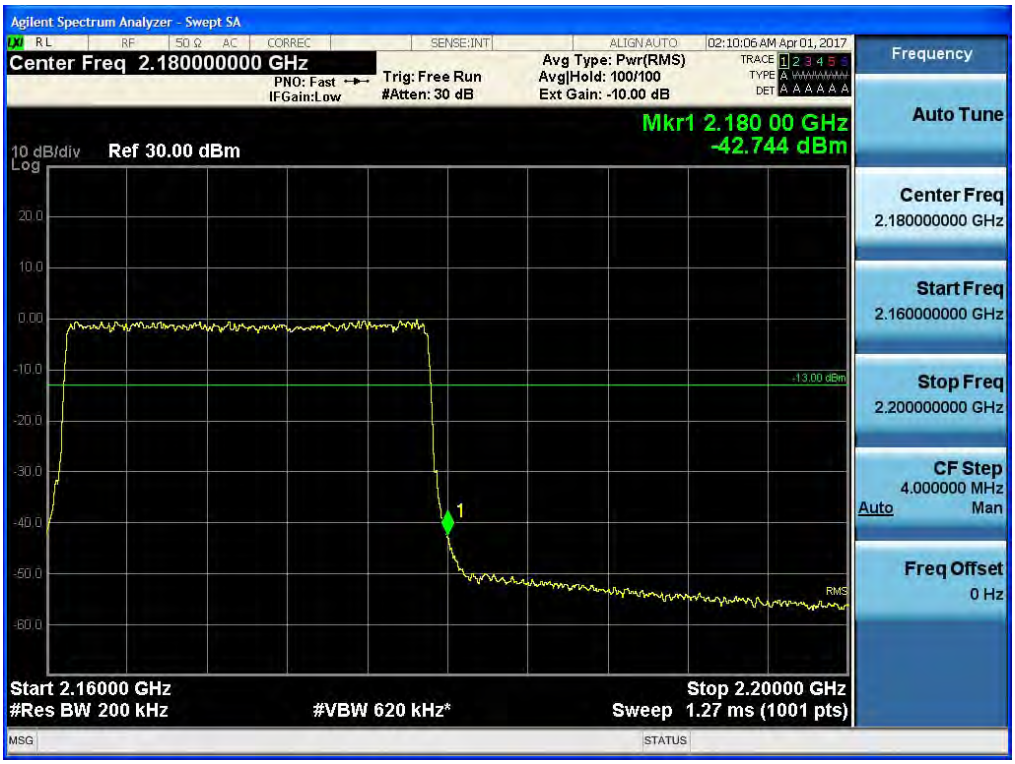
[Downlink High]

AWS2100_LTE 20M_64QAM

Test Data at Output Port 0

[Downlink Low]

[Downlink High]



AWS2100_LTE 10M_QPSK

Test Data at Output Port 1

[Downlink Low]

[Downlink High]

AWS2100_LTE 10M_16QAM

Test Data at Output Port 1

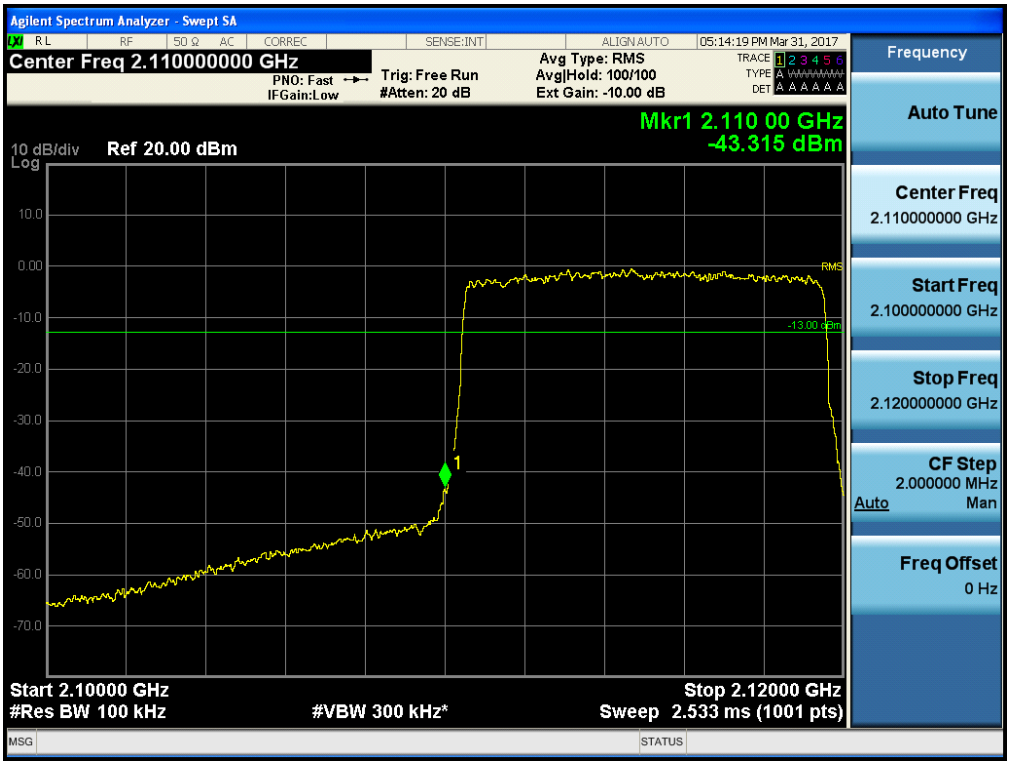
[Downlink Low]

[Downlink High]

AWS2100_LTE 10M_64QAM

Test Data at Output Port 1

[Downlink Low]



[Downlink High]

AWS2100_LTE 15M_QPSK

Test Data at Output Port 1

[Downlink Low]

[Downlink High]

AWS2100_LTE 15M_16QAM

Test Data at Output Port 1

[Downlink Low]

[Downlink High]

AWS2100_LTE 15M_64QAM

Test Data at Output Port 1

[Downlink Low]

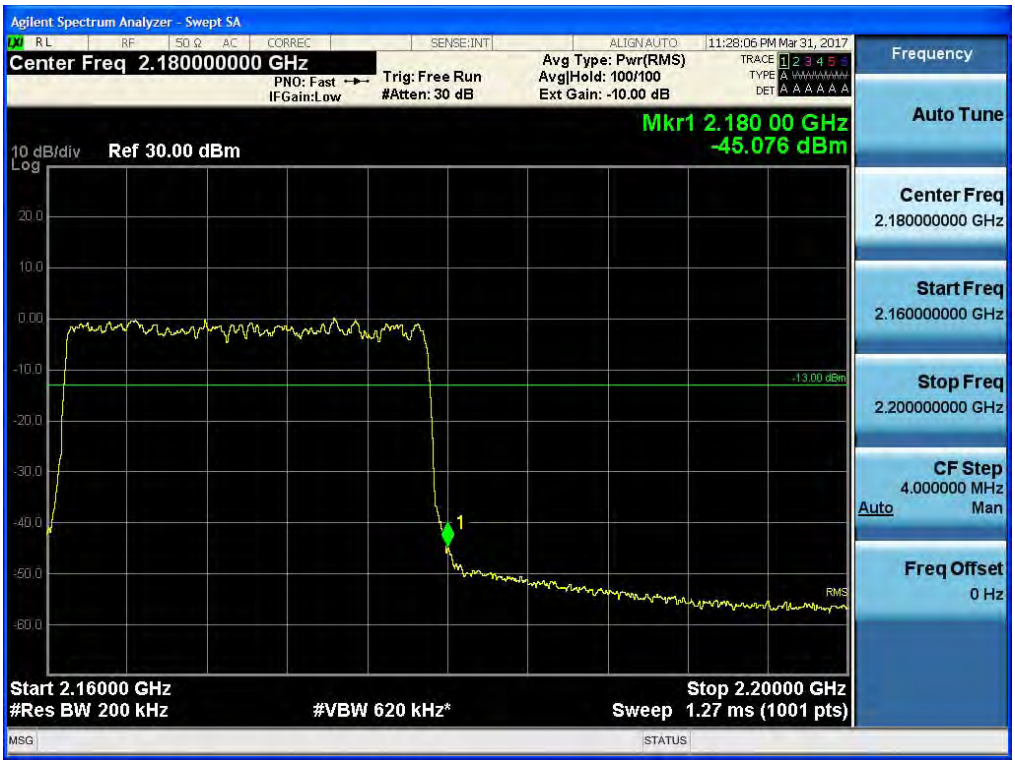
[Downlink High]

AWS2100_LTE 20M_QPSK

Test Data at Output Port 1

[Downlink Low]

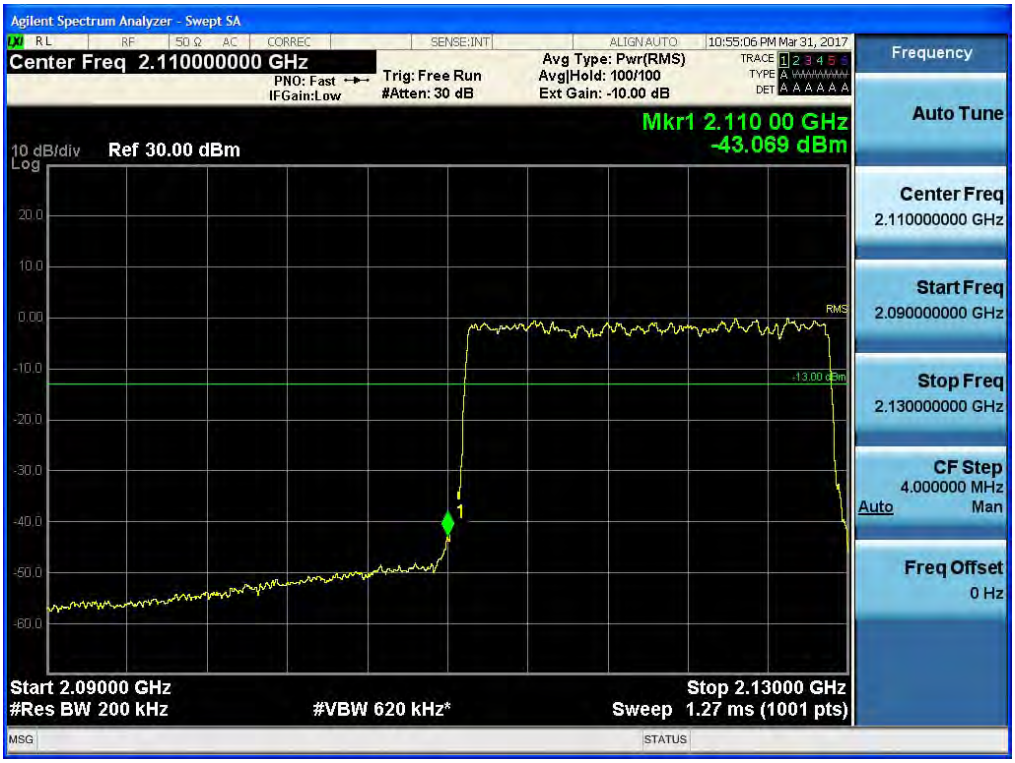
[Downlink High]



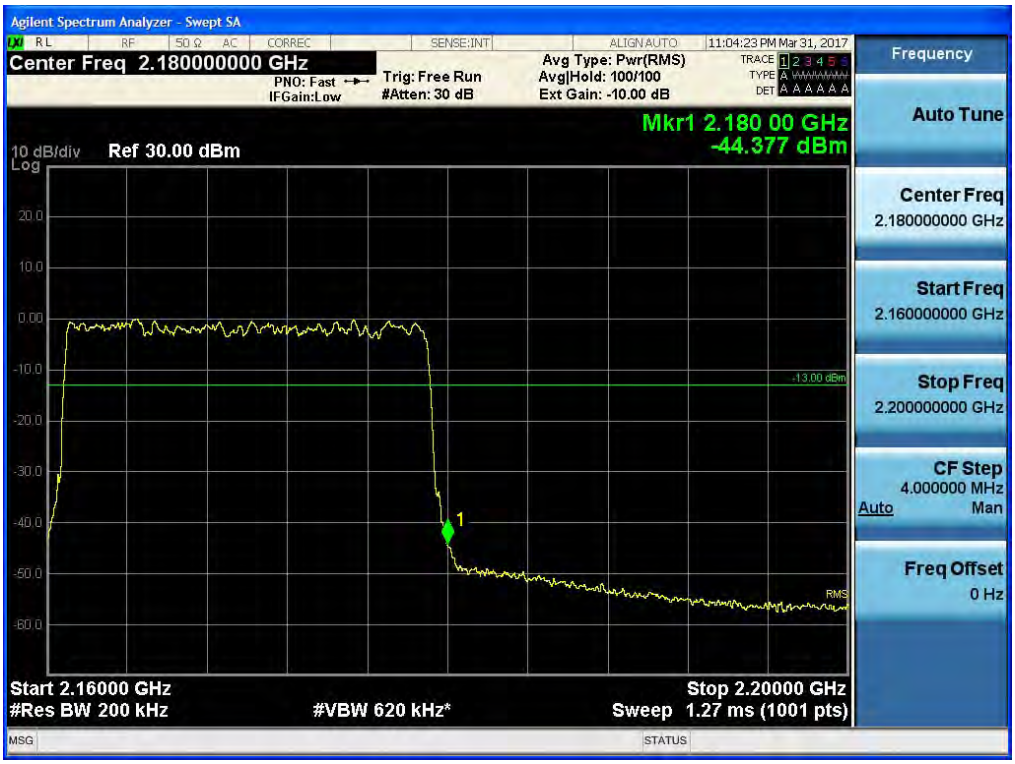
AWS2100_LTE 20M_16QAM

Test Data at Output Port 1

[Downlink Low]



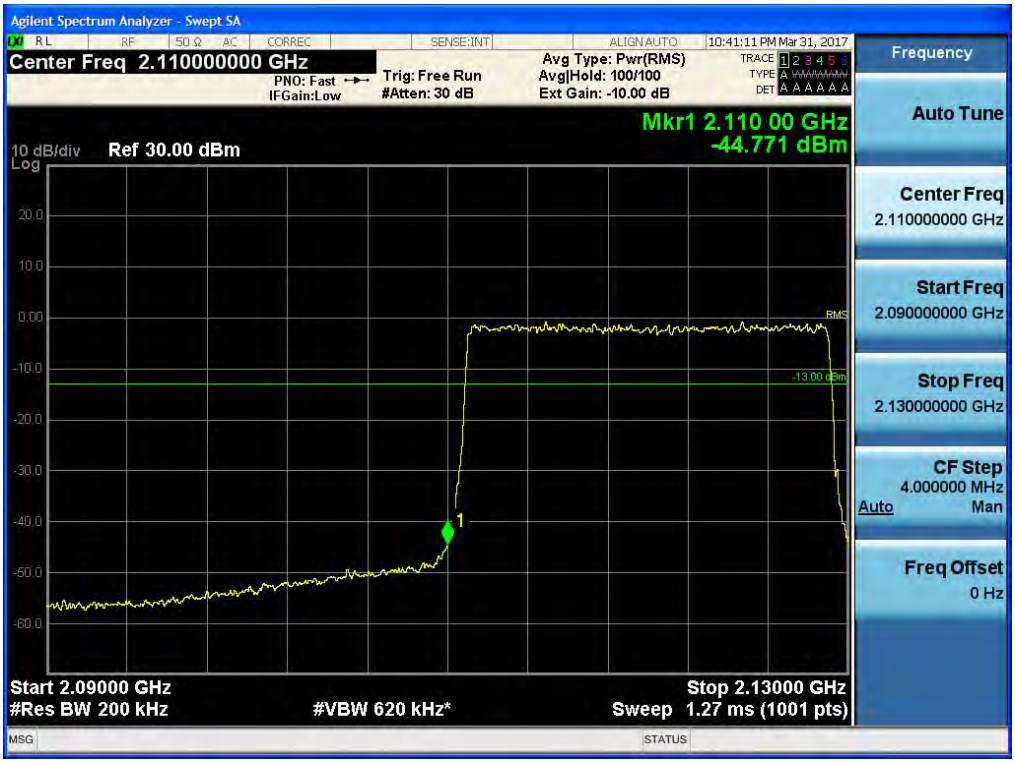
[Downlink High]



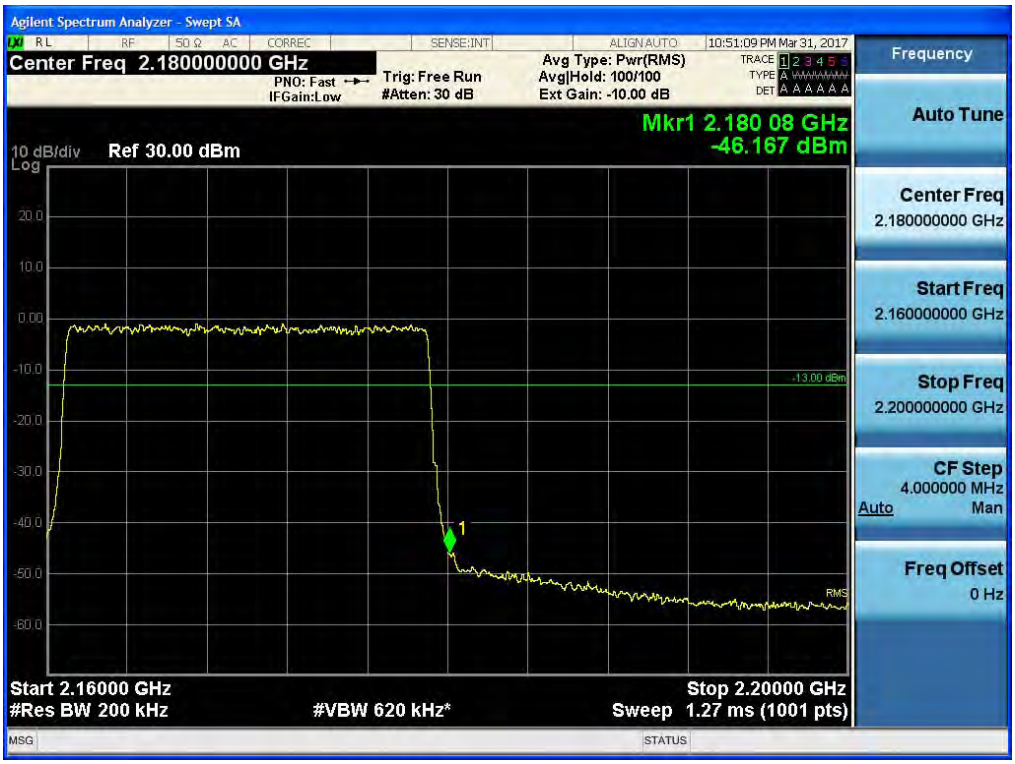
AWS2100_LTE 20M_64QAM

Test Data at Output Port 1

[Downlink Low]



[Downlink High]



8. RADIATED SPURIOUS EMISSION

Test Requirements:

§ 2.1053 Measurements required: Field strength of spurious radiation.

(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 halfwave dipole antennas.

(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 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;

(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than

65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;
(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;
(6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

Test Procedures:

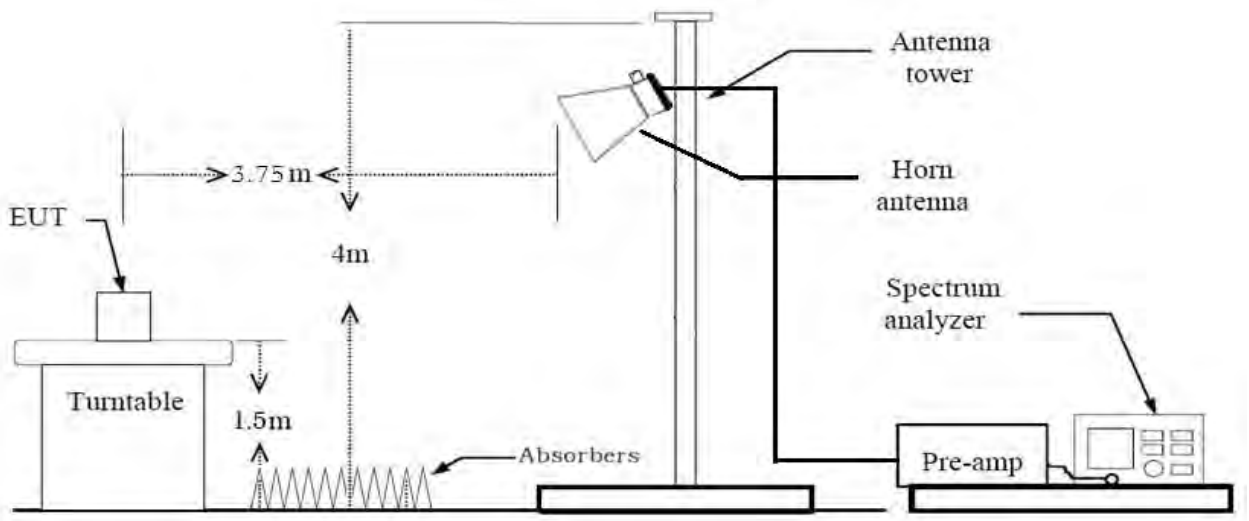
Radiated emission measurements were performed at an semi-anechoic chamber.

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 360^0 and the receiving antenna scanned from 1-4m 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 40GHz, whichever was the lesser, were investigated.

Radiated Spurious Emissions Test Setup



Note :

1. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor(reference distance : 3 m).
2. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Test Results:

Band 13

[LTE 10 MHz]

Ch.	Freq.(MHz)	Measured Level [dBuV]	Measured Power [dBm]	Ant. Factor [dB/m]	C.L [dB]	A.G. [dB]	D.F. [dB]	Pol.	Result [dBm/m]
Mid	1,502.00	77.54	-17.66	25.440	2.10	46.15	1.96	H	-34.310
	2,253.00	71.78	-23.42	28.320	2.77	45.95	1.96	H	-36.320

* C.L.: Cable Loss / A.G.: Amp Gain / H.P.F.: High Pass Filter / D.F.: Distance Factor (3.75 m)

Notes:

1. We have done all test case. Test datas were only the worst case.

2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Band 66

[LTE 10 MHz]

Ch.	Freq.(MHz)	Measured Level [dBuV]	Measured Power [dBm]	Ant. Factor [dB/m]	C.L [dB]	A.G. [dB]	H.P.F.. [dB]	D.F. [dB]	Pol.	Result [dBm/m]
Low	4,230.00	74.88	-20.32	30.100	4.10	44.93	-0.79	1.96	H	-29.880
	8,460.00	72.26	-22.94	36.68	6.31	44.39	0.42	1.96	H	-21.962
Mid.	4,290.00	77.83	-17.37	30.280	3.53	44.56	-0.17	1.96	H	-26.330
	8,580.00	70.65	-24.55	37.178	7.07	44.22	0.44	1.96	H	-22.122
High	4,350.00	-24.53	-24.53	30.340	4.61	44.56	-0.36	1.96	H	-32.540
	8,700.00	-26.44	-26.44	37.62	6.19	44.13	0.41	1.96	H	-24.390

* C.L.: Cable Loss / A.G.: Amp Gain / H.P.F.: High Pass Filter / D.F.: Distance Factor (3.75 m)

Notes:

1. We have done all test case. Test datas were only the worst case.

2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

[LTE 15 MHz]

Ch.	Freq.(MHz)	Measured Level [dBuV]	Measured Power [dBm]	Ant. Factor [dB/m]	C.L [dB]	A.G. [dB]	H.P.F.. [dB]	D.F. [dB]	Pol.	Result [dBm/m]
Low	4,235.00	67.88	-27.32	30.110	4.06	44.95	-0.75	1.96	V	-36.890
	8,470.00	73.02	-22.18	36.696	6.27	44.60	0.35	1.96	H	-21.504
Mid.	4,290.00	71.98	-23.22	30.280	3.53	44.56	-0.17	1.96	H	-32.180
	8,580.00	69.92	-25.28	37.178	7.07	44.22	0.44	1.96	H	-22.852
High	4,345.00	68.63	-26.57	30.338	4.55	44.635	-0.48	1.96	H	-34.837
	8,690.00	68.68	-26.52	37.594	6.41	43.95	0.44	1.96	H	-24.066

* C.L.: Cable Loss / A.G.: Amp Gain / H.P.F.: High Pass Filter / D.F.: Distance Factor (3.75 m)

Notes:

1. We have done all test case. Test datas were only the worst case.

2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

[LTE 20 MHz]

Ch.	Freq.(MHz)	Measured Level [dBuV]	Measured Power [dBm]	Ant. Factor [dB/m]	C.L [dB]	A.G. [dB]	H.P.F.. [dB]	D.F. [dB]	Pol.	Result [dBm/m]
Low	4,240.00	64.67	-30.53	30.120	4.01	44.96	-0.71	1.96	H	-40.110
	8,480.00	71.98	-23.22	36.714	6.56	44.22	0.44	1.96	H	-21.766
Mid.	4,290.00	75.70	-19.50	30.280	3.53	44.56	-0.17	1.96	H	-28.460
	8,580.00	71.18	-24.02	37.178	7.07	44.22	0.44	1.96	H	-21.592
High	4,340.00	65.43	-29.77	30.336	4.49	44.71	-0.60	1.96	H	-38.294
	8,680.00	70.99	-24.21	37.568	6.49	44.07	0.33	1.96	H	-21.932

* C.L.: Cable Loss / A.G.: Amp Gain / H.P.F.: High Pass Filter / D.F.: Distance Factor (3.75 m)

Notes:

1. We have done all test case. Test datas were only the worst case.

2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

9. FREQUECNY STABILITY

Test Requirements:

§2.1055 Measurements required: Frequency stability.

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From −30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

§27.54 Frequency stability.

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

Test Procedures:

Frequency Stability over Temperature variation:

The equipment under test was connected to an external DC power supply and the RF output was connected to a Spectrum Analyzer via feed-through attenuators. The EUT was placed inside the temperature chamber. RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 30 minutes, the frequency output was recorded from the VSA8960 S/W via MXA Signal Analyzer.

Frequency stability over Voltage variation:

An external variable DC power supply Source. The voltage was set to 85% and 115% of the nominal value. The output frequency was recorded for each voltage.

Test Results:

Band 13

Reference: 110 Vac at 20°c **Freq.** = 751,000,000 Hz

Voltage (%)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	750 999 996	-3.617	0.000	0.00000
	-30	751 000 001	0.506	4.123	0.00159
	-20	751 000 001	1.001	4.618	0.00178
	-10	751 000 001	1.034	4.651	0.00179
	0	751 000 000	-0.301	3.316	0.00128
	+10	750 999 999	-0.604	3.013	0.00116
	+30	751 000 002	1.901	5.518	0.00213
	+40	750 999 998	-1.583	2.034	0.00078
	+50	751 000 002	1.604	5.221	0.00201
115%	+20	750 999 998	-2.011	1.606	0.00062
85%	+20	750 999 997	-2.937	0.680	0.00026

Band 66

Reference: 110 Vac at 20°C **Freq.** = 2145,000,000 Hz

Voltage (%)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	2145 000 001	1.232	0.000	0.00000
	-30	2145 000 001	0.765	-0.467	-0.00018
	-20	2145 000 001	1.118	-0.114	-0.00004
	-10	2145 000 000	-0.304	-1.536	-0.00059
	0	2144 999 999	-1.301	-2.533	-0.00098
	+10	2145 000 003	2.644	1.412	0.00054
	+30	2145 000 003	2.931	1.699	0.00066
	+40	2144 999 997	-3.171	-4.403	-0.00170
	+50	2144 999 998	-1.996	-3.228	-0.00124
115%	+20	2145 000 002	2.101	0.869	0.00034
85%	+20	2145 000 002	1.937	0.705	0.00027

Note:

The results of the frequency stability test shown above the frequency deviation measured values are very small and similer trend for each port, so attached datas were only the port 0.