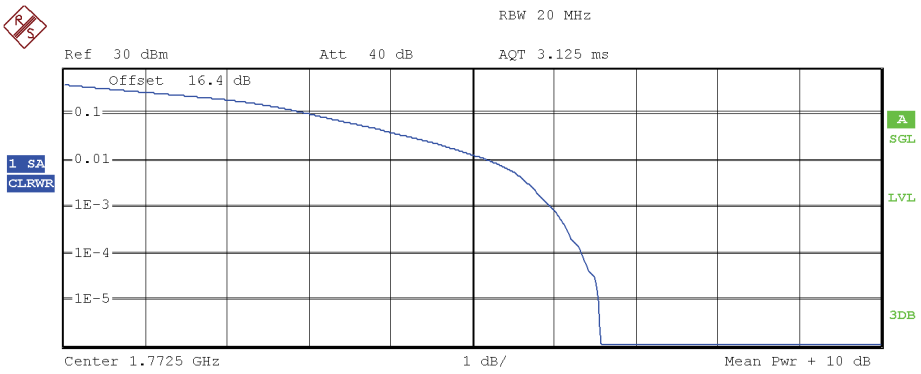
Highest Channel:

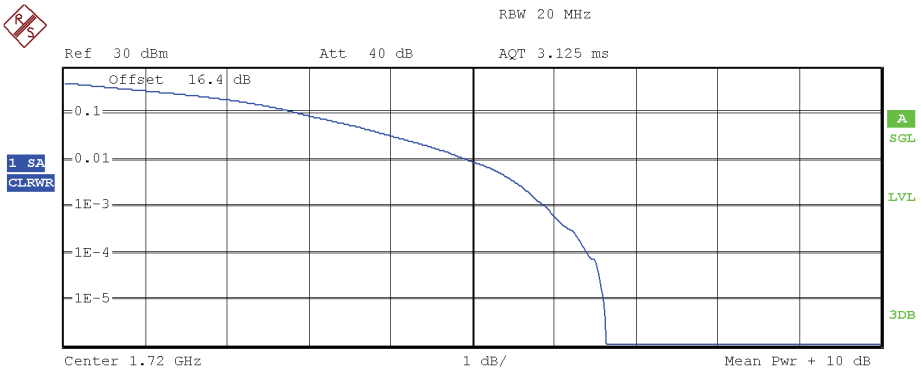


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	22.62 dBm
Peak	29.19 dBm
Crest	6.57 dB
10 %	3.03 dB
1 %	5.21 dB
.1 %	5.96 dB
.01 %	6.35 dB

LTE Band 66. Bandwidth = 20 MHz. Modulation 16 QAM. RB Size: 100. RB Offset: 0.

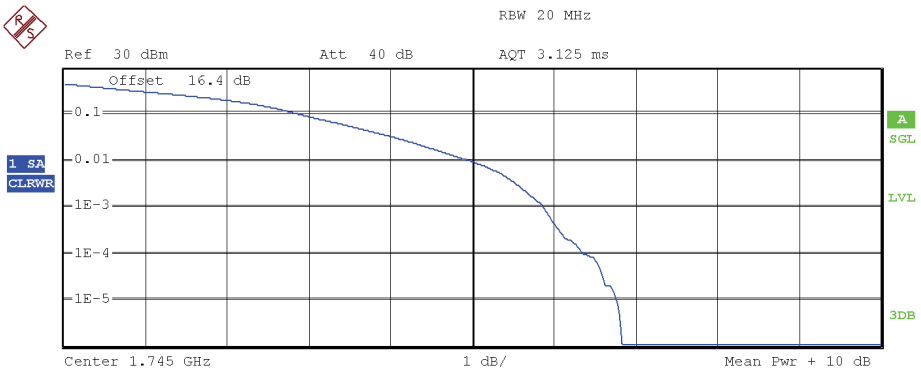
Lowest Channel:



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	21.15 dBm
Peak	27.79 dBm
Crest	6.64 dB
10 %	2.90 dB
1 %	4.95 dB
.1 %	5.90 dB
.01 %	6.41 dB

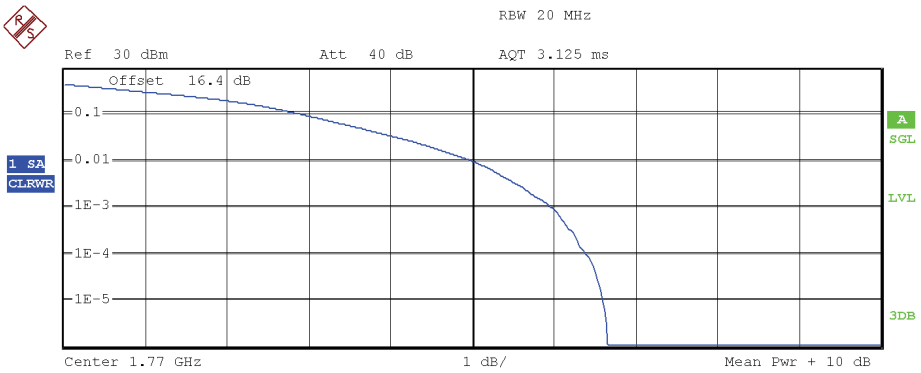
Middle Channel:



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	21.17 dBm
Peak	28.01 dBm
Crest	6.83 dB
10 %	2.90 dB
1 %	4.98 dB
.1 %	5.88 dB
.01 %	6.36 dB

Highest Channel:



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	21.17 dBm
Peak	27.84 dBm
Crest	6.66 dB
10 %	2.92 dB
1 %	5.00 dB
.1 %	5.98 dB
.01 %	6.39 dB

Verdict: PASS

Frequency Stability

SPECIFICATION:

FCC §27.54 & §2.1055:

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

RSS-139 Clause 6.4:

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

RSS-199 Clause 4.3:

The transmitter frequency stability limit shall be determined as follows:

a. the frequency offset shall be measured according to the procedure described in RSS-Gen and recorded.

b. using a resolution bandwidth equal to that permitted within the 1 MHz band immediately outside the channel edge, as found in section 4.5, reference points will be selected at the unwanted emission limits, which comply with the attenuation specified in section 4.5 for the type of device under test, on the emission mask of the lowest and highest channels. The frequency at these points shall be recorded as fL and fH respectively.

The applicant shall ensure compliance with frequency stability requirements by showing that fL minus the frequency offset and fH plus the frequency offset is within the frequency range in which the equipment is designed to operate.

RSS-130 Clause 4.5:

For equipment that is capable of transmitting numerous channels simultaneously for different applications (e.g. LTE and narrowband – Internet of Things (IoT)), the occupied bandwidth shall be the bandwidth representing the sum of the occupied bandwidths of these channels.

The frequency stability shall be sufficient to ensure that the occupied bandwidth remains within each frequency block range when tested at the temperature and supply voltage variations specified in RSS-Gen.

METHOD:

The frequency tolerance measurements over temperature variations were made over the temperature range of –30ºC to +50ºC. The EUT was placed inside a climatic chamber and the temperature was raised hourly in 10ºC steps from –30ºC up to +50ºC.
The supply voltage was varied between 85% and 115% of nominal voltage.

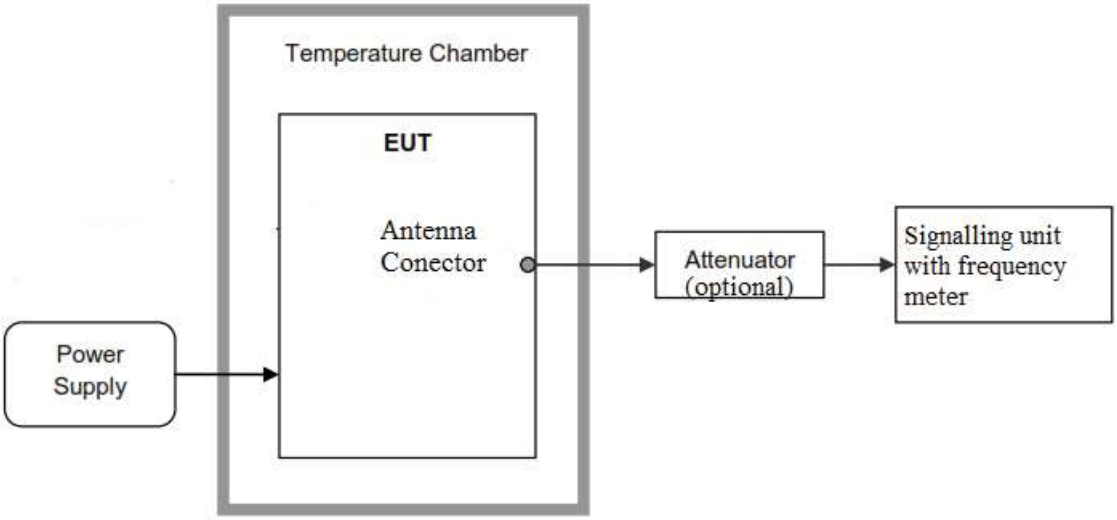
The EUT was set in “Radio Resource Control (RRC) mode” in the middle channel using the Universal Radio Communication tester R&S CMW500 and the maximum frequency error was measured using the built-in calibrated frequency meter.
The worst case LTE mode for conducted power was used for the test.

In order to check that the frequency stability is sufficient such that the fundamental emissions stay within the authorized bands of operation, a reference point is established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation are identified as fL and fH respectively. The worst-case frequency offset determined in the above methods is added or subtracted from the values of fL and fH to check that the resulting frequencies remain within the band.

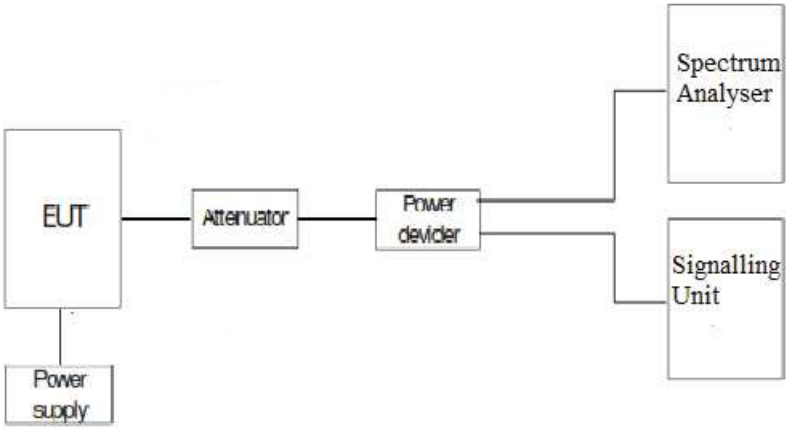
The reference point measurements were made at the RF output terminals of the EUT using an attenuator. power splitter and spectrum analyser. The EUT was controlled via the Universal Radio Communication tester R&S CMW500 selecting maximum transmission power of the EUT and different modes of modulation.

TEST SETUP:

1. Frequency Tolerance:



2. Reference Frequency Points fL and fH:



RESULTS:

1. Frequency Tolerance:

- **Frequency Stability over Temperature Variations:**

3G Band IV. WCDMA AND HSUPA MODULATIONS.

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
+50	4.17	0.002
+40	4.01	0.002
+30	4.12	0.002
+20	4.31	0.002
+10	4.74	0.003
0	5.91	0.003
-10	3.91	0.002
-20	3.59	0.002
-30	3.91	0.002

LTE Band 7. QPSK MODULATION. BW = 10 MHz.

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
+50	-4.21	-0.002
+40	-3.93	-0.002
+30	0.49	0.0002
+20	2	0.001
+10	0.43	0.0002
0	0.94	0.0004
-10	2.49	0.001
-20	6.54	0.003
-30	-1.79	-0.001

LTE Band 12. QPSK MODULATION. BW = 10 MHz.

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
+50	-6.51	-0.009
+40	-2.85	-0.004
+30	-4.15	-0.006
+20	-6.17	-0.009
+10	-1.33	-0.002
0	-2.09	-0.003
-10	-2.72	-0.004
-20	-0.46	-0.001
-30	-3.2	-0.005

LTE Band 13. QPSK MODULATION. BW = 10 MHz.

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
+50	-3.73	-0.005
+40	-3.65	-0.005
+30	-0.41	-0.001
+20	-5.39	-0.007
+10	-3.5	-0.004
0	-1.37	-0.002
-10	-6.15	-0.008
-20	-1.26	-0.002
-30	-2.09	-0.003

LTE Band 30. QPSK MODULATION. BW = 10 MHz.

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
+50	5.34	0.0023
+40	8.18	0.0035
+30	-3.46	-0.0015
+20	-0.4	-0.0002
+10	-0.09	-0.00004
0	-0.19	-0.0001
-10	3.53	0.0015
-20	0.64	0.0003
-30	-4.32	-0.0019

LTE Band 38. QPSK MODULATION. BW = 20 MHz.

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
+50	-257.1	-0.0991
+40	-397.4	-0.1531
+30	-591.2	-0.2278
+20	-376.3	-0.1450
+10	-174.7	-0.0673
0	-420	-0.1618
-10	-385.1	-0.1484
-20	-195.6	-0.0754
-30	-94.6	-0.0364

LTE Band 66. QPSK MODULATION. BW = 10 MHz.

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
+50	-1.57	-0.0009
+40	1.17	0.00067
+30	5.16	0.00296
+20	1.86	0.00107
+10	2.96	0.0017
0	2.16	0.00124
-10	2.27	0.0013
-20	-0.11	-0.00006
-30	1.04	0.0006

- **Frequency Stability over Voltage Variations.**

3G Band IV. WCDMA AND HSUPA MODULATION.

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Vmax	4.2	4.21	0.00243
Vmin (*)	3.6	4.19	0.00242

(*): Operating end point specified by the manufacturer.

LTE Band 7. QPSK MODULATION. BW = 10 MHz.

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Vmax	4.2	0.63	0.00025
Vmin(*)	3.6	-1.13	-0.00044

(*): Operating end point specified by the manufacturer.

LTE Band 12. QPSK MODULATION. BW = 10 MHz.

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Vmax	4.2	-2.27	-0.003208
Vmin(*)	3.6	-5.14	-0.007265

(*): Operating end point specified by the manufacturer.

LTE Band 13. QPSK MODULATION. BW = 10 MHz.

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Vmax	4.2	-1.89	-0.002417
Vmin(*)	3.6	-4.91	-0.006279

(*): Operating end point specified by the manufacturer.

LTE Band 30. QPSK MODULATION. BW = 10 MHz.

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Vmax	4.2	0.8	0.00035
Vmin(*)	3.6	-0.51	-0.00022

(*): Operating end point specified by the manufacturer.

LTE Band 38. QPSK MODULATION. BW = 10 MHz.

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Vmax	4.2	-597.4	-0.23021
Vmin(*)	3.6	-576.5	-0.22216

(*): Operating end point specified by the manufacturer.

LTE Band 66. QPSK MODULATION. BW = 10 MHz.

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Vmax	4.2	1.53	0.00087
Vmin(*)	3.6	1.77	0.00101

(*): Operating end point specified by the manufacturer.

2. Reference Frequency Points fL and fH:

The worst-case frequency offsets added or subtracted per band and bandwidth:

3G Band IV:

	WCDMA MODULATION
fL (MHz)	1710.037003
fH (MHz)	1754.997006

LTE Band 7:

	LTE QPSK MODULATION. BW = 10 MHz
fL (MHz)	2528.499996
fH (MHz)	2541.500006

LTE Band 12:

	LTE QPSK MODULATION. BW = 10 MHz
fL (MHz)	699.281593
fH (MHz)	715.760900

LTE Band 13:

	LTE QPSK MODULATION. BW = 10 MHz
fL (MHz)	777.201194
fH (MHz)	786.816800

LTE Band 30:

	LTE QPSK MODULATION. BW = 10 MHz
fL (MHz)	2305.2932957
fH (MHz)	2314. 7027082

LTE Band 38:

	LTE QPSK MODULATION. BW = 10 MHz
fL (MHz)	2588.499403
fH (MHz)	2601.500094

LTE Band 66:

	LTE QPSK MODULATION. BW = 10 MHz
fL (MHz)	1710.219198
fH (MHz)	1779.784805

The reference frequency points fL and fH stay within the authorized blocks for all the bands above.

Verdict: PASS

Modulation Characteristics

SPECIFICATION:

FCC §2.1047: Measurements required: Modulation characteristics.

RSS-139 Clause 6.2:

The devices may employ any type of modulation techniques. The type of modulation used must be reported.

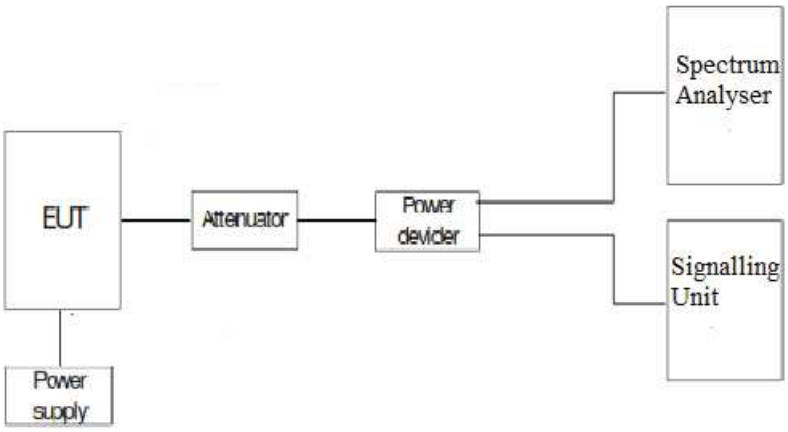
RSS-199 Clause 4.1 & RSS-130 Clause 4.2:

Equipment certified under this standard shall employ digital modulation.

METHOD:

For 3G, the EUT operates with WCDMA (QPSK) and HSUPA (QPSK) modes, in which the information is digitized and coded into a bit stream.
For LTE the EUT operates with QPSK and 16QAM modulation modes in which the information is digitised and coded into a bit stream. The RF transmission is multiplexed using *Orthogonal Frequency Division Multiplexing (OFDM)* using different possible arrangement of subcarriers (Resource Blocks RB).

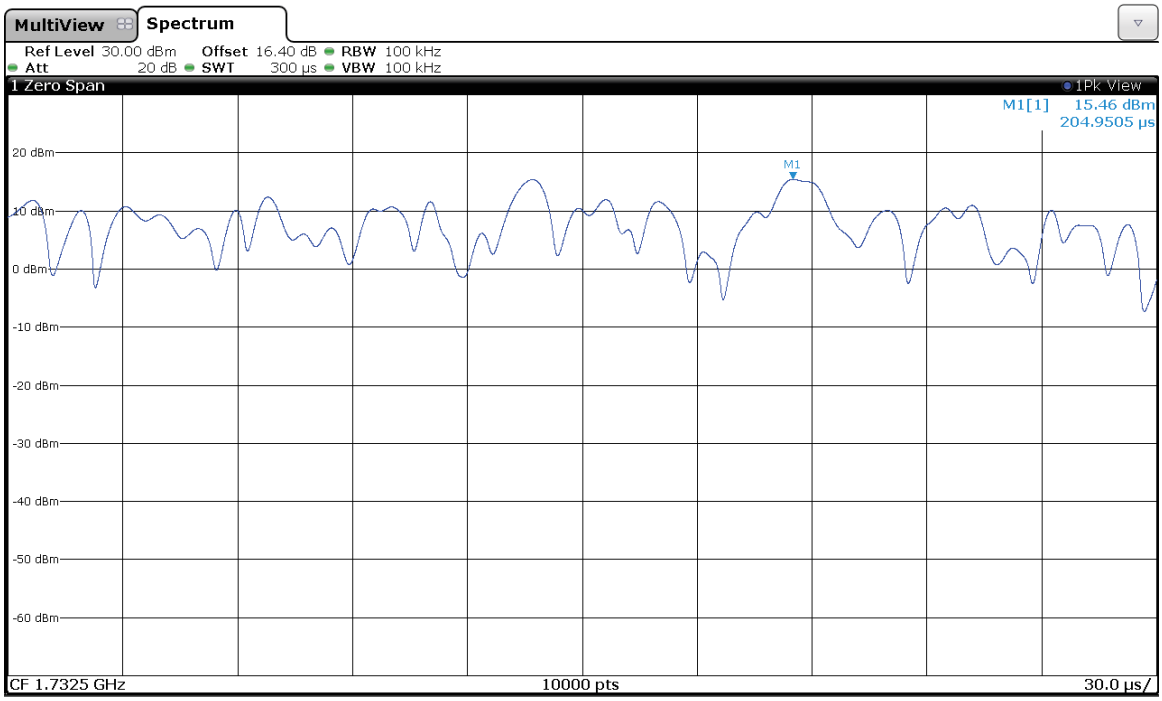
TEST SETUP:



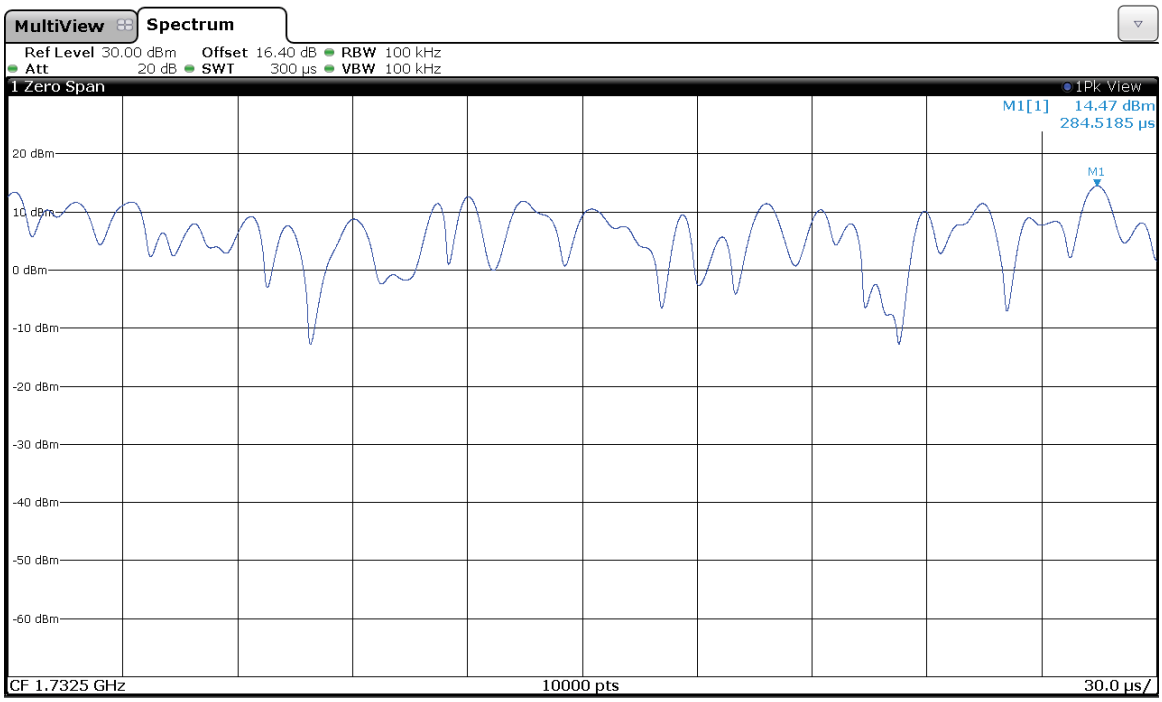
RESULTS:

The following plots show the modulation schemes in the EUT.

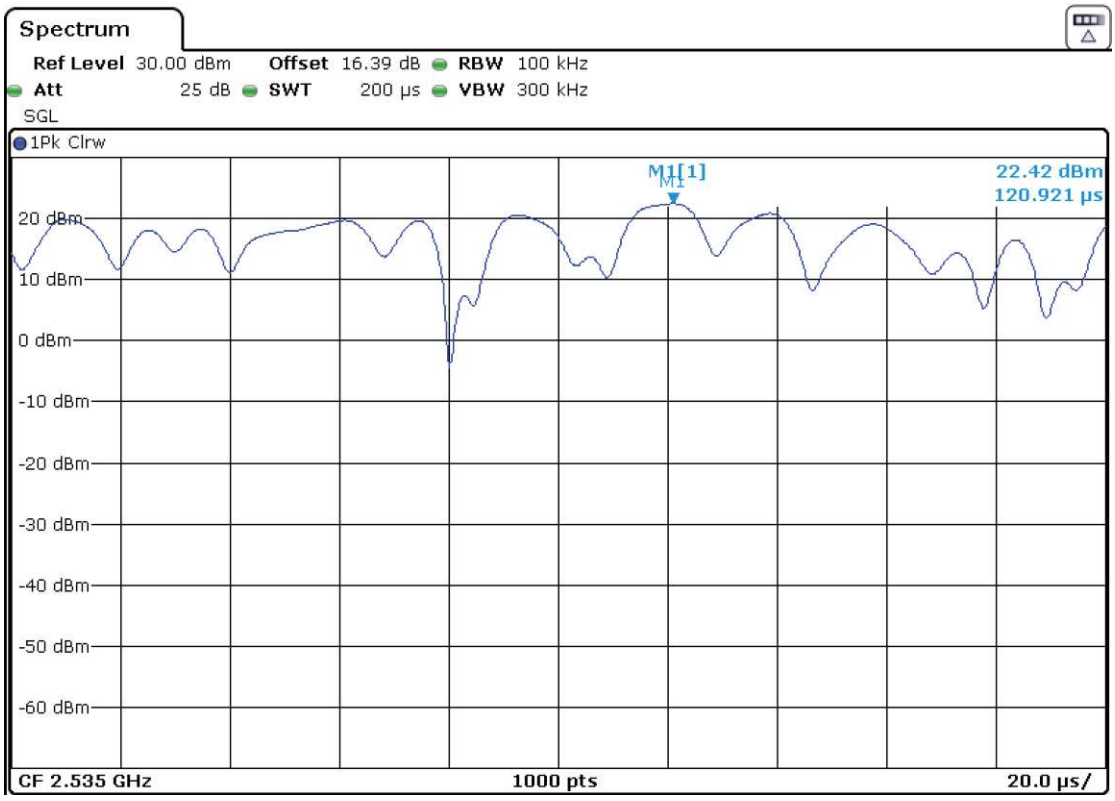
3G Band IV. WCDMA MODULATION.



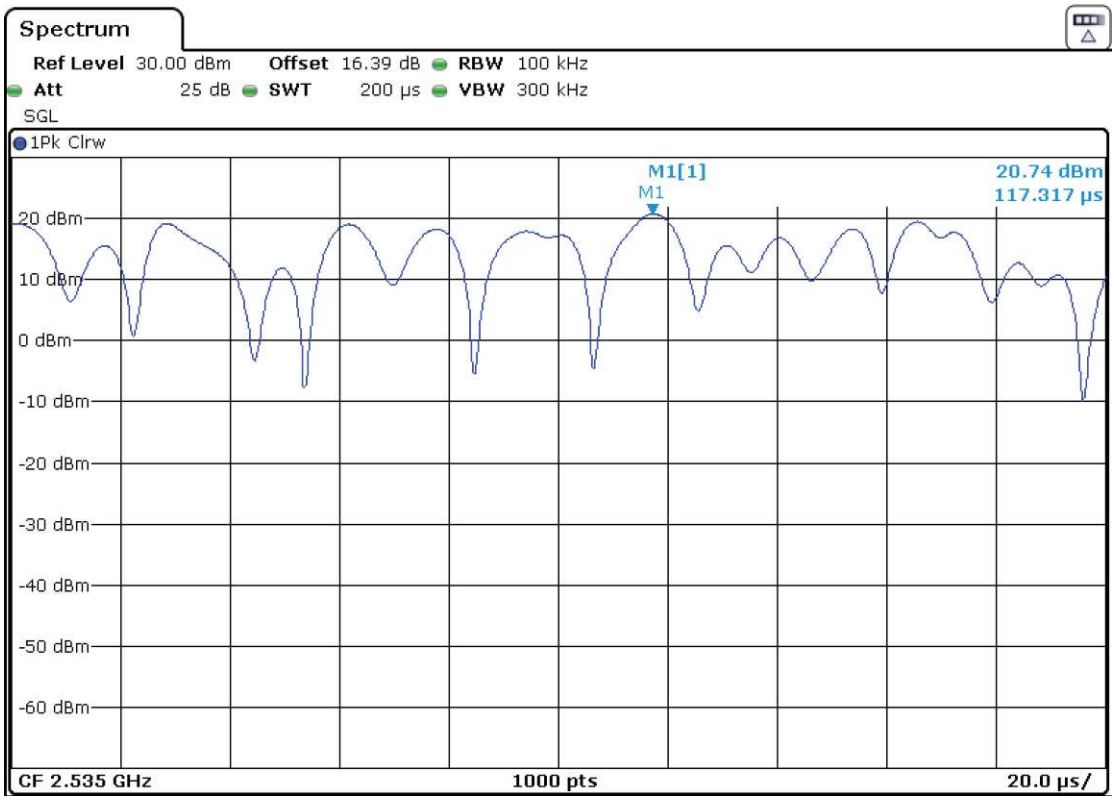
3G Band IV. HSUPA MODULATION.



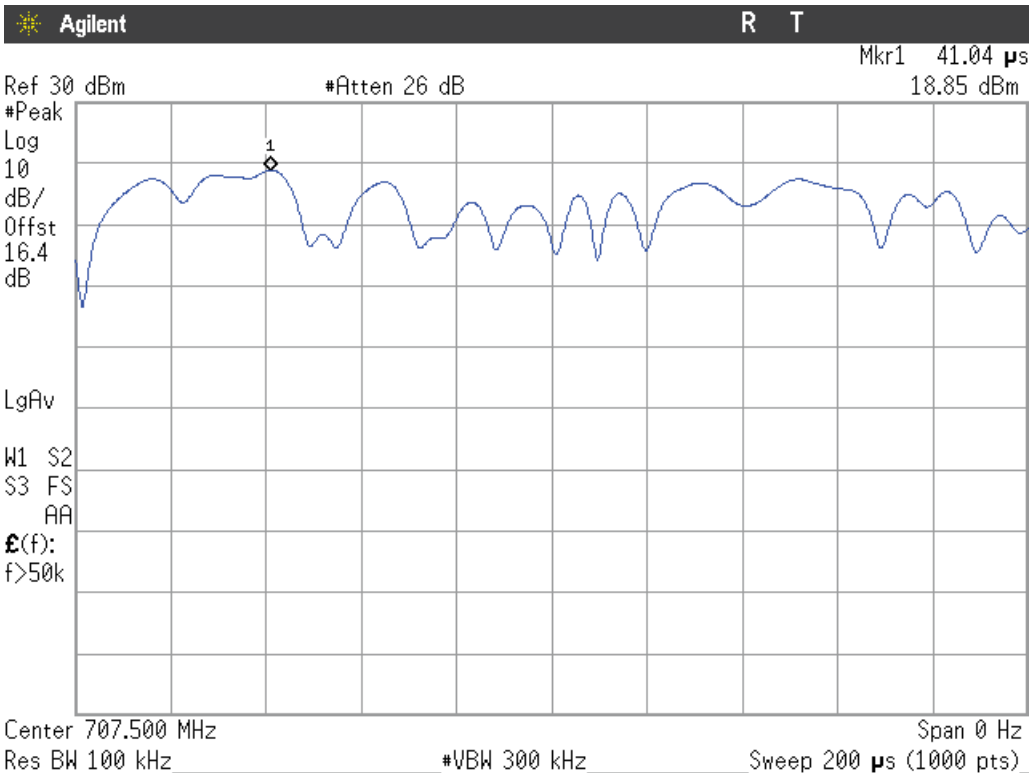
LTE Band 7. QPSK MODULATION. BW = 10 MHz.



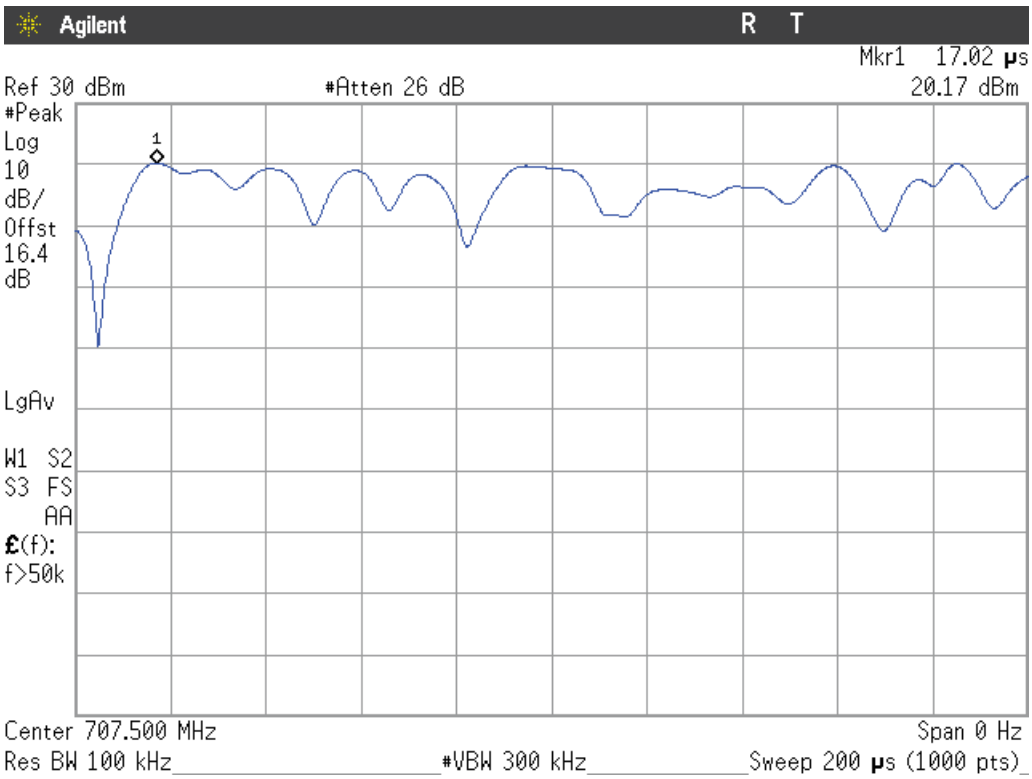
LTE Band 7. 16QAM MODULATION. BW = 10 MHz.



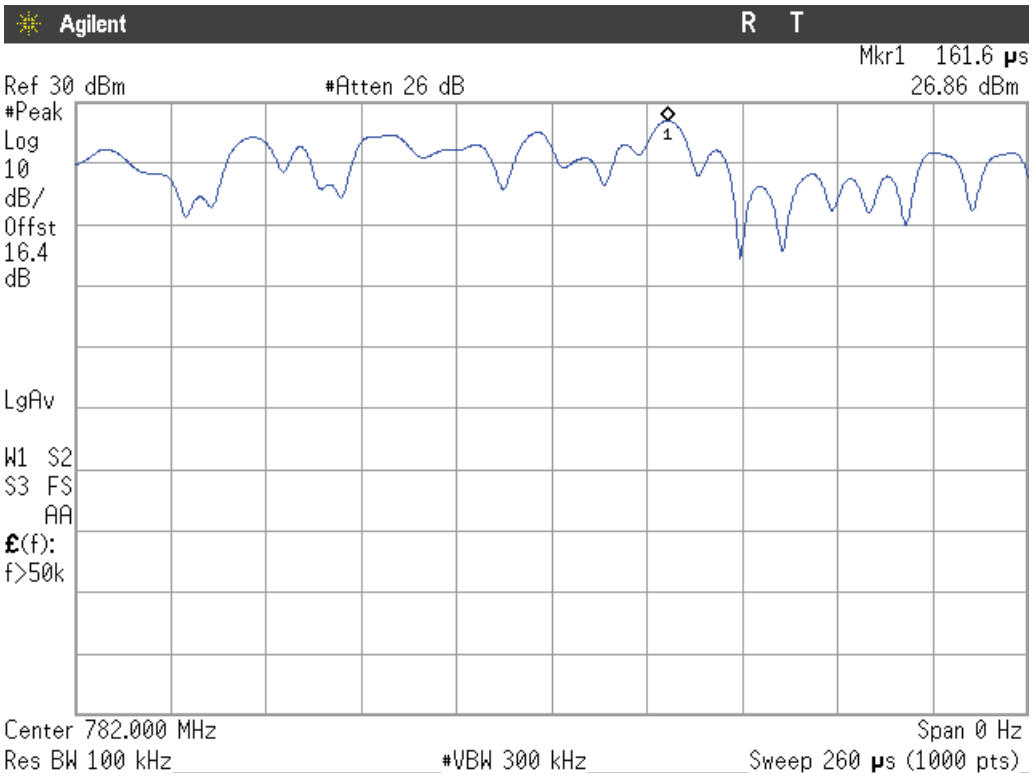
LTE Band 12. QPSK MODULATION. BW = 10 MHz.



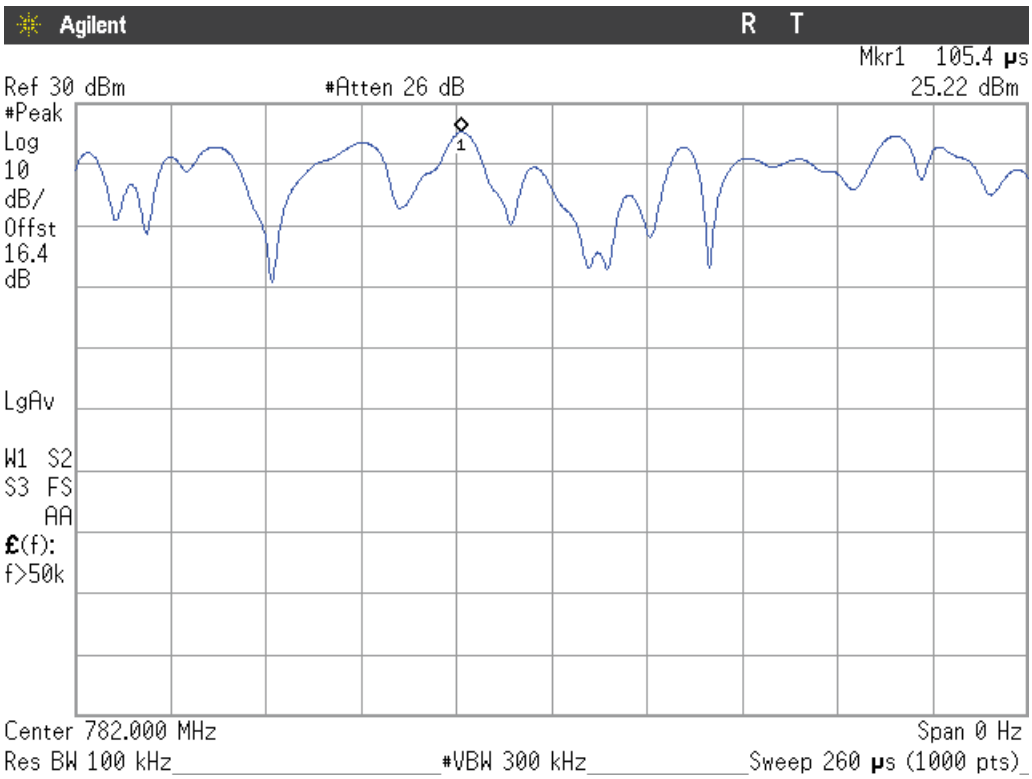
LTE Band 12. 16QAM MODULATION. BW = 10 MHz.



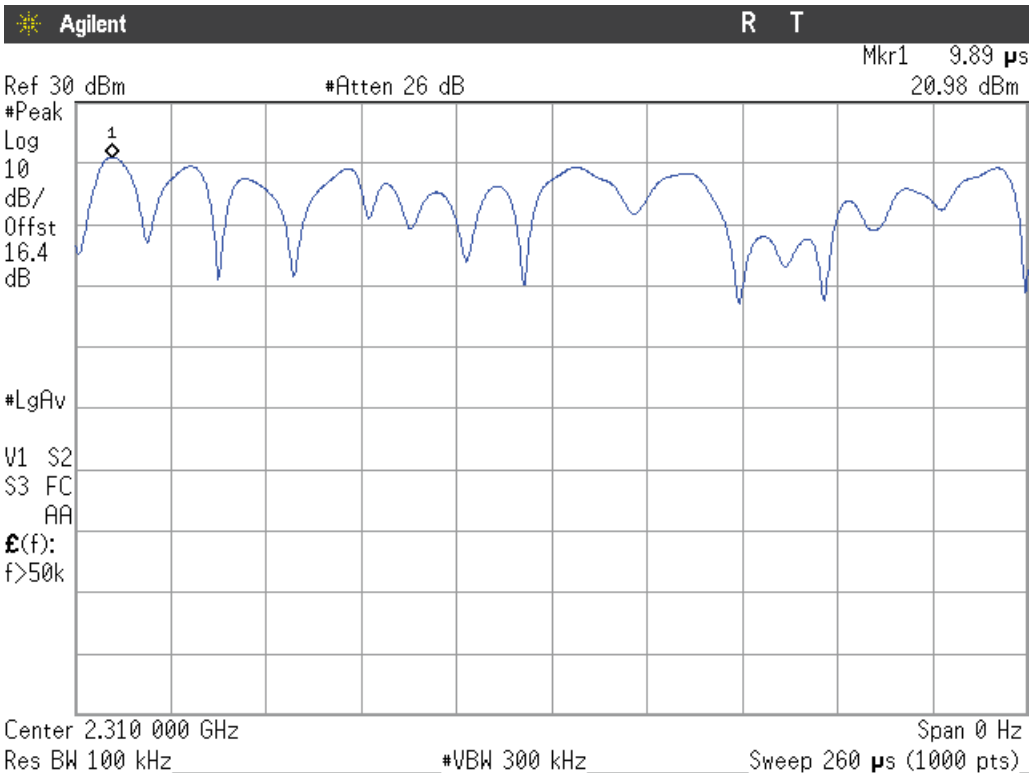
LTE Band 13. QPSK MODULATION. BW = 10 MHz.



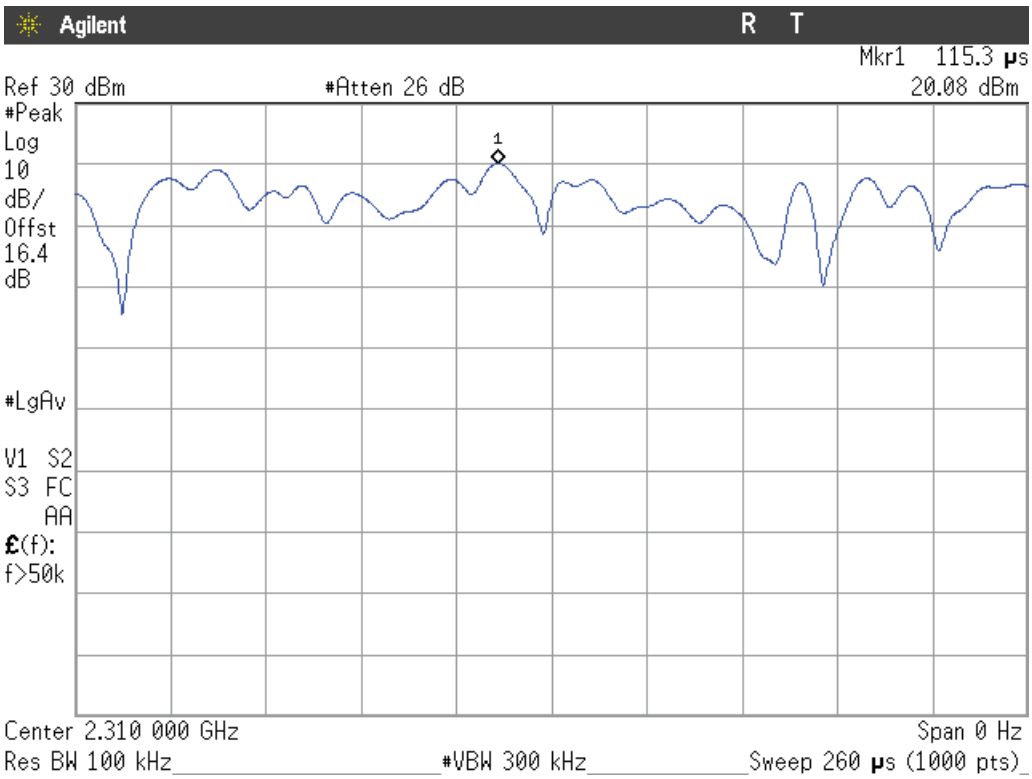
LTE Band 13. 16QAM MODULATION. BW = 10 MHz.



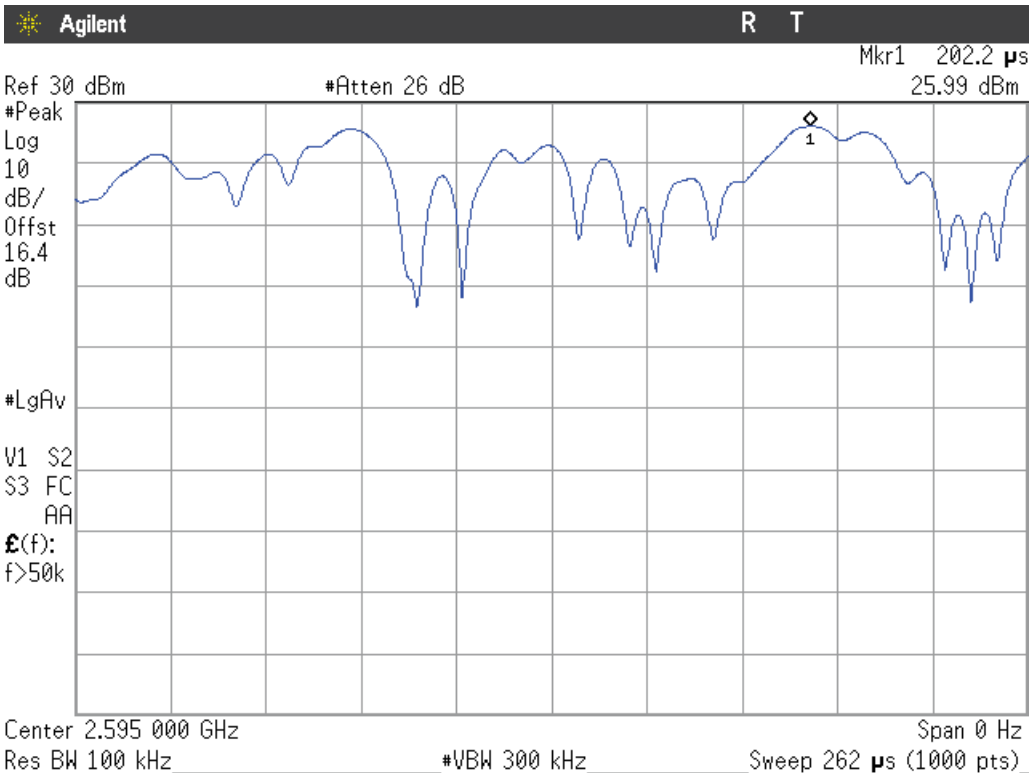
LTE Band 30. QPSK MODULATION. BW = 10 MHz.



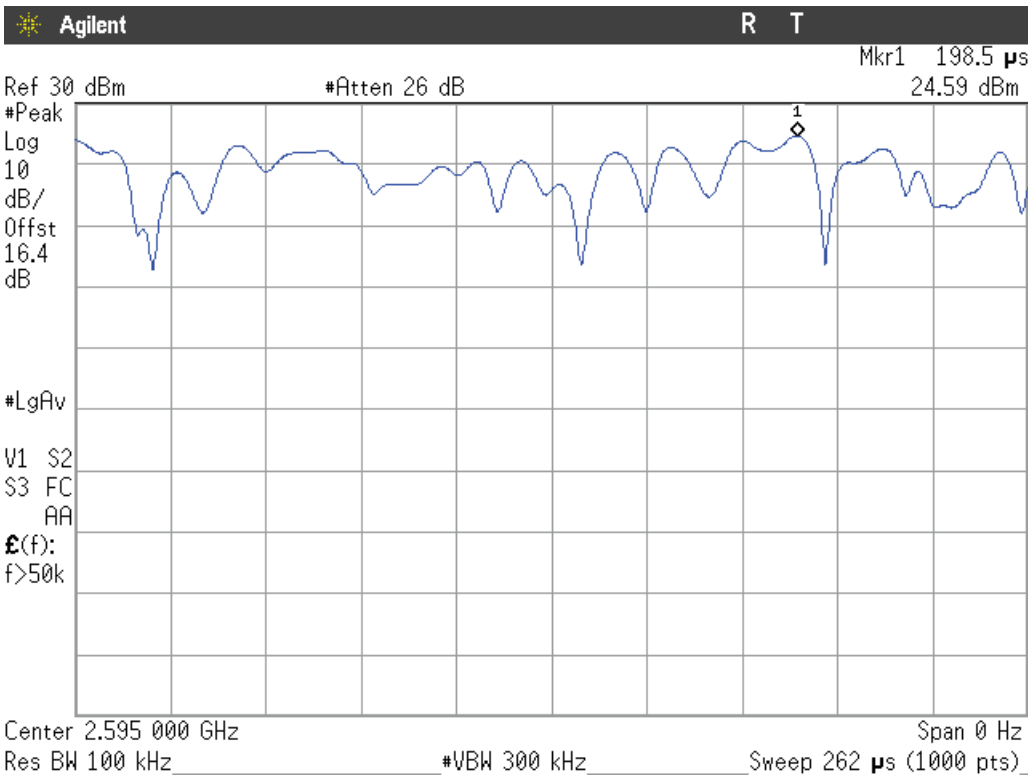
LTE Band 30. 16QAM MODULATION. BW = 10 MHz.



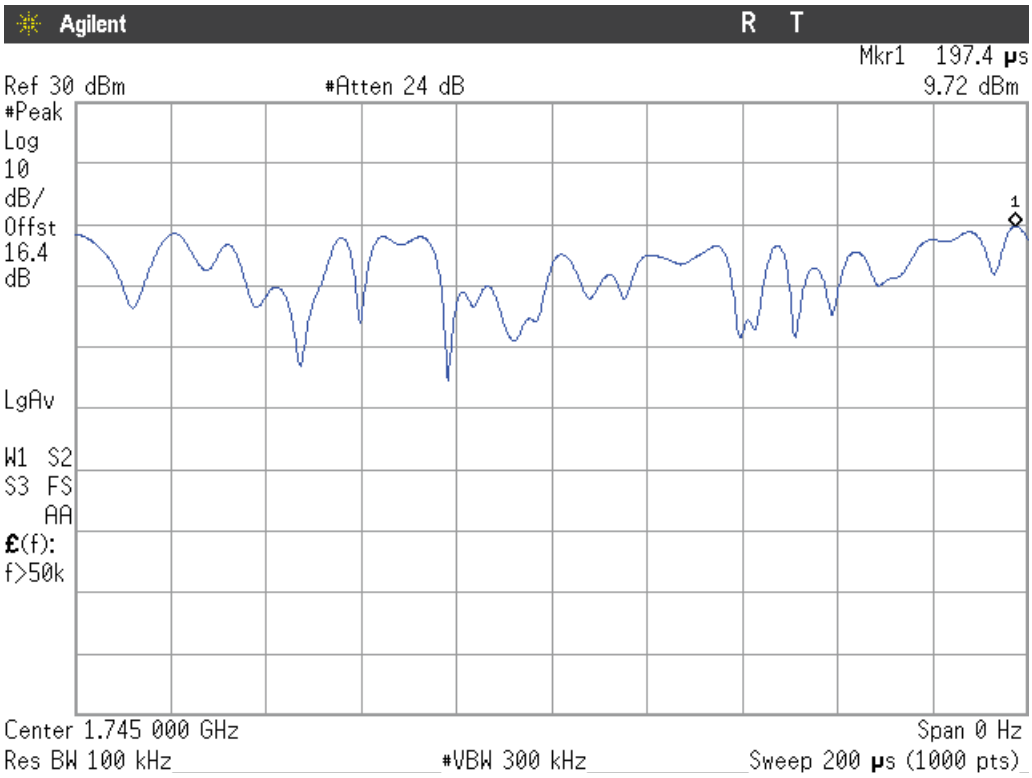
LTE Band 38. QPSK MODULATION. BW = 10 MHz.



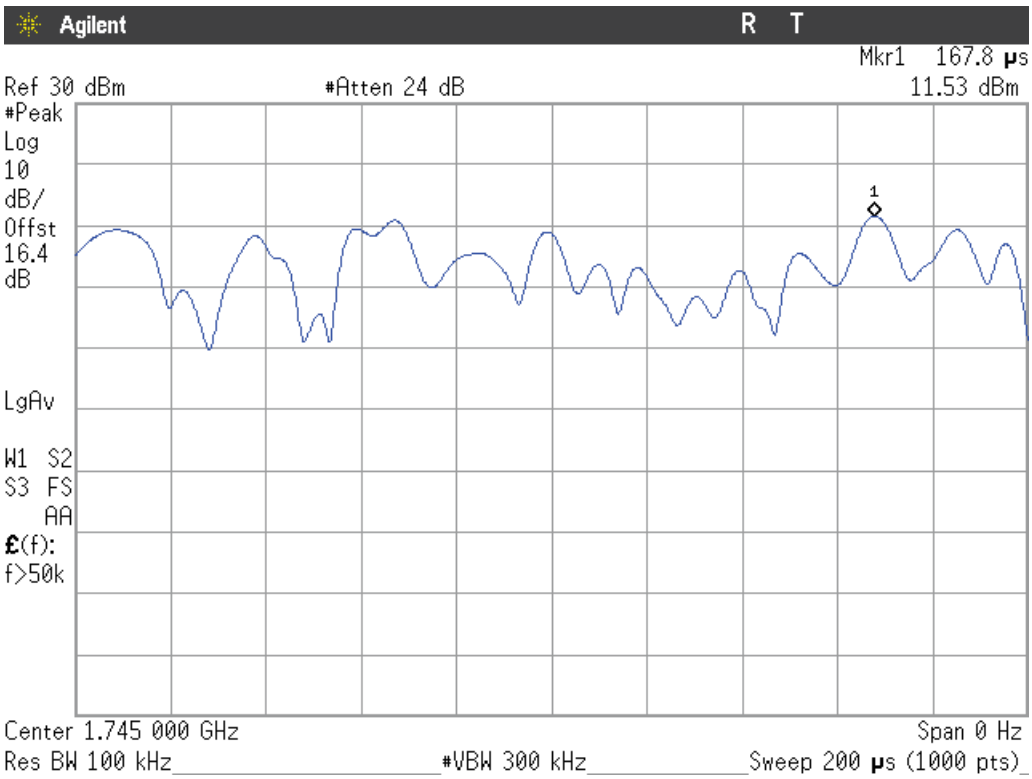
LTE Band 38. 16QAM MODULATION. BW = 10 MHz.



LTE Band 66. QPSK MODULATION. BW = 10 MHz.



LTE Band 66. 16QAM MODULATION. BW = 10 MHz.



Occupied Bandwidth

SPECIFICATION:

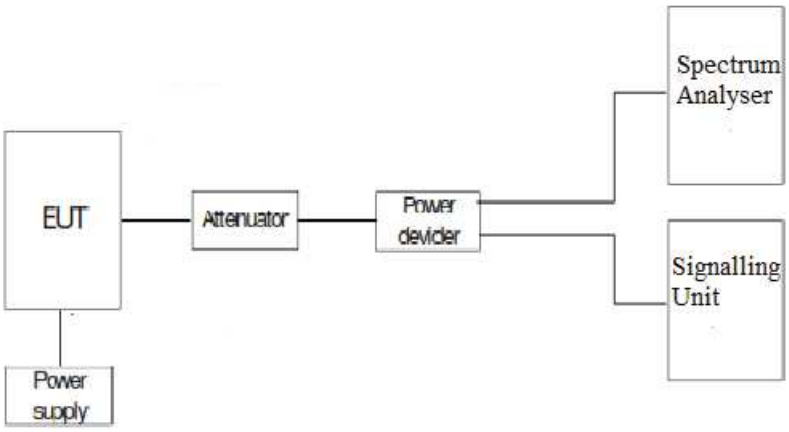
FCC §2.1049: Measurements required: Occupied bandwidth.

RSS-Gen Clause 6.7: Occupied bandwidth (or 99% emission bandwidth) and x dB bandwidth.

METHOD:

The occupied bandwidth measurement was performed at the output terminals of the EUT using an attenuator. power splitter and spectrum analyser. The EUT was controlled via the Universal Radio Communication tester R&S CMW500 selecting maximum transmission power of the EUT and different modes of modulation. The 99% occupied bandwidth and the -26 dBc bandwidth were measured directly using the built-in bandwidth measuring option of spectrum analyser.

TEST SETUP:



RESULTS:

3G Band IV:

3G Band IV. WCDMA MODULATION.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	4.119	4.1406	4.1415
-26 dBc bandwidth (MHz)	4.697	4.698	4.696
Measurement uncertainty (kHz)	<±16.67		

3G Band IV. HSUPA MODULATION.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	4.137	4.151	4.141
-26 dBc bandwidth (MHz)	4.703	4.719	4.714
Measurement uncertainty (kHz)	<±16.67		

LTE Bands: The worst case of Occupied Bandwidth corresponds to all Resource Blocks (RB) with Offset 0, regardless the nominal bandwidth selected.

LTE Band 7:

LTE Band 7. QPSK MODULATION. BW = 5 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	4.524	4.547	4.524
-26 dBc bandwidth (MHz)	4.968	5.019	4.981
Measurement uncertainty (kHz)	<±10		

LTE Band 7. 16QAM MODULATION. BW = 5 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	4.507	4.523	4.511
-26 dBc bandwidth (MHz)	4.967	5.026	4.957
Measurement uncertainty (kHz)	<±10		

LTE Band 7. QPSK MODULATION. BW = 10 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	8.936	8.935	8.932
-26 dBc bandwidth (MHz)	9.652	9.658	9.573
Measurement uncertainty (kHz)	<±33.33		

LTE Band 7. 16QAM MODULATION. BW = 10 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	8.939	8.938	8.931
-26 dBc bandwidth (MHz)	9.634	9.633	9.621
Measurement uncertainty (kHz)	<±33.33		

LTE Band 7. QPSK MODULATION. BW = 15 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	13.490	13.409	13.449
-26 dBc bandwidth (MHz)	14.781	14.732	14.627
Measurement uncertainty (kHz)	<±50		

LTE Band 7. 16QAM MODULATION. BW = 15 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	13.470	13.415	13.448
-26 dBc bandwidth (MHz)	14.796	14.649	14.631
Measurement uncertainty (kHz)	<±50		

LTE Band 7. QPSK MODULATION. BW = 20 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	17.878	17.856	17.886
-26 dBc bandwidth (MHz)	19.410	19.259	19.301
Measurement uncertainty (kHz)	<±66.67		

LTE Band 7. 16QAM MODULATION. BW = 20 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	17.896	17.844	17.860
-26 dBc bandwidth (MHz)	19.511	19.183	19.265
Measurement uncertainty (kHz)	<±66.67		

LTE Band 12:

LTE Band 12. QPSK MODULATION. BW = 1.4 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	1.091	1.084	1.094
-26 dBc bandwidth (MHz)	1.246	1.241	1.248
Measurement uncertainty (kHz)	<±4.67		

LTE Band 12. 16QAM MODULATION. BW = 1.4 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	1.098	1.095	1.092
-26 dBc bandwidth (MHz)	1.252	1.247	1.247
Measurement uncertainty (kHz)	<±4.67		

LTE Band 12. QPSK MODULATION. BW = 3 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	2.753	2.744	2.756
-26 dBc bandwidth (MHz)	3.087	3.102	3.098
Measurement uncertainty (kHz)	<±10		

LTE Band 12. 16QAM MODULATION. BW = 3 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	2.753	2.746	2.734
-26 dBc bandwidth (MHz)	3.084	3.091	3.101
Measurement uncertainty (kHz)	<±10		

LTE Band 12. QPSK MODULATION. BW = 5 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	4.509	4.536	4.511
-26 dBc bandwidth (MHz)	4.986	4.988	5.007
Measurement uncertainty (kHz)	<±16.67		

LTE Band 12. 16QAM MODULATION. BW = 5 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	4.512	4.508	4.504
-26 dBc bandwidth (MHz)	4.999	4.993	4.967
Measurement uncertainty (kHz)	<±16.67		

LTE Band 12. QPSK MODULATION. BW = 10 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	9.030	9.020	9.032
-26 dBc bandwidth (MHz)	9.947	10.080	9.918
Measurement uncertainty (kHz)	<±33.33		

LTE Band 12. 16QAM MODULATION. BW = 10 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	9.046	9.037	9.067
-26 dBc bandwidth (MHz)	10.009	10.060	9.931
Measurement uncertainty (kHz)	<±33.33		

LTE Band 13:

LTE Band 13. QPSK MODULATION. BW = 5 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	4.513	4.536	4.509
-26 dBc bandwidth (MHz)	4.989	5.000	4.974
Measurement uncertainty (kHz)	<±16.67		

LTE Band 13. 16QAM MODULATION. BW = 5 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	4.519	4.508	4.495
-26 dBc bandwidth (MHz)	4.991	4.997	4.941
Measurement uncertainty (kHz)	<±16.67		

LTE Band 13. QPSK MODULATION. BW = 10 MHz.

	Middle Channel
99% Occupied bandwidth (MHz)	9.036
-26 dBc bandwidth (MHz)	10.068
Measurement uncertainty (kHz)	<±33.33

LTE Band 13. 16QAM MODULATION. BW = 10 MHz.

	Middle Channel
99% Occupied bandwidth (MHz)	9.036
-26 dBc bandwidth (MHz)	9.992
Measurement uncertainty (kHz)	<±33.33

LTE Band 30:

LTE Band 30. QPSK MODULATION. BW = 5 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	4.521	4.506	4.522
-26 dBc bandwidth (MHz)	4.978	4.922	4.963
Measurement uncertainty (kHz)	<±16.67		

LTE Band 30. 16QAM MODULATION. BW = 5 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	4.512	4.517	4.503
-26 dBc bandwidth (MHz)	4.976	4.953	4.974
Measurement uncertainty (kHz)	<±16.67		

LTE Band 30. QPSK MODULATION. BW = 10 MHz.

	Middle Channel
99% Occupied bandwidth (MHz)	8.947
-26 dBc bandwidth (MHz)	9.544
Measurement uncertainty (kHz)	<±33.33

LTE Band 30. 16QAM MODULATION. BW = 10 MHz.

	Middle Channel
99% Occupied bandwidth (MHz)	8.929
-26 dBc bandwidth (MHz)	9.634
Measurement uncertainty (kHz)	<±33.33

LTE Band 38:

LTE Band 38. QPSK MODULATION. BW = 5 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	4.498	4.517	4.517
-26 dBc bandwidth (MHz)	4.902	5.040	4.953
Measurement uncertainty (kHz)	<±16.67		

LTE Band 38. 16QAM MODULATION. BW = 5 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	4.493	4.498	4.514
-26 dBc bandwidth (MHz)	4.992	4.931	5.011
Measurement uncertainty (kHz)	<±16.67		

LTE Band 38. QPSK MODULATION. BW = 10 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	8.959	8.964	8.927
-26 dBc bandwidth (MHz)	9.752	9.752	9.689
Measurement uncertainty (kHz)	<±33.33		

LTE Band 38. 16QAM MODULATION. BW = 10 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	8.928	8.926	8.923
-26 dBc bandwidth (MHz)	8.649	9.578	9.537
Measurement uncertainty (kHz)	<±33.33		

LTE Band 38. QPSK MODULATION. BW = 15 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	13.476	13.457	13.446
-26 dBc bandwidth (MHz)	14.852	14.670	14.679
Measurement uncertainty (kHz)	<±50		

LTE Band 38. 16QAM MODULATION. BW = 15 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	13.450	13.480	13.442
-26 dBc bandwidth (MHz)	14.571	14.592	14.714
Measurement uncertainty (kHz)	<±50		

LTE Band 38. QPSK MODULATION. BW = 20 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	17.910	17.873	17.843
-26 dBc bandwidth (MHz)	19.158	19.329	19.252
Measurement uncertainty (kHz)	<±66.67		

LTE Band 38. 16QAM MODULATION. BW = 20 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	17.868	17.888	17.872
-26 dBc bandwidth (MHz)	19.296	19.244	19.230
Measurement uncertainty (kHz)	<±66.67		

LTE Band 66:

LTE Band 66. QPSK MODULATION. BW = 1.4 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	1.087	1.099	1.104
-26 dBc bandwidth (MHz)	1.241	1.262	1.247
Measurement uncertainty (kHz)	<±4.67		

LTE Band 66. 16QAM MODULATION. BW = 1.4 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	1.098	1.096	1.086
-26 dBc bandwidth (MHz)	1.244	1.247	1.238
Measurement uncertainty (kHz)	<±4.67		

LTE Band 66. QPSK MODULATION. BW = 3 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	2.747	2.752	2.747
-26 dBc bandwidth (MHz)	3.086	3.098	3.079
Measurement uncertainty (kHz)	<±10		

LTE Band 66. 16QAM MODULATION. BW = 3 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	2.752	2.740	2.753
-26 dBc bandwidth (MHz)	3.090	3.072	3.088
Measurement uncertainty (kHz)	<±10		

LTE Band 66. QPSK MODULATION. BW = 5 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	4.534	4.506	4.549
-26 dBc bandwidth (MHz)	4.992	4.948	5.004
Measurement uncertainty (kHz)	<±16.67		

LTE Band 66. 16QAM MODULATION. BW = 5 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	4.517	4.505	4.529
-26 dBc bandwidth (MHz)	5.007	4.959	4.998
Measurement uncertainty (kHz)	<±16.67		

LTE Band 66. QPSK MODULATION. BW = 10 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	9.032	9.090	9.054
-26 dBc bandwidth (MHz)	9.958	10.051	10.008
Measurement uncertainty (kHz)	<±33.33		

LTE Band 66. 16QAM MODULATION. BW = 10 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	9.029	9.057	9.049
-26 dBc bandwidth (MHz)	9.989	9.946	9.958
Measurement uncertainty (kHz)	<±33.33		

LTE Band 66. QPSK MODULATION. BW = 15 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	13.490	13.446	13.485
-26 dBc bandwidth (MHz)	14.797	14.877	14.824
Measurement uncertainty (kHz)	<±50		

LTE Band 66. 16QAM MODULATION. BW = 15 MHz.

	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	13.462	13.450	13.485
-26 dBc bandwidth (MHz)	14.745	14.671	14.715
Measurement uncertainty (kHz)	<±50		

LTE Band 66. QPSK MODULATION. BW = 20 MHz.

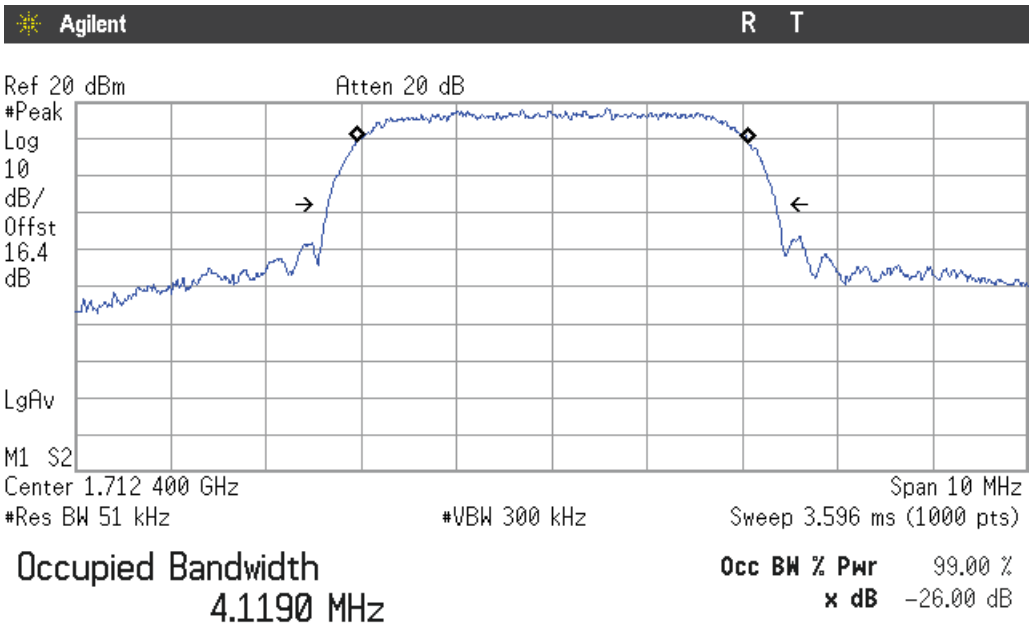
	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	17.896	17.890	17.900
-26 dBc bandwidth (MHz)	19.509	19.354	19.343
Measurement uncertainty (kHz)	<±66.67		

LTE Band 66. 16QAM MODULATION. BW = 20 MHz.

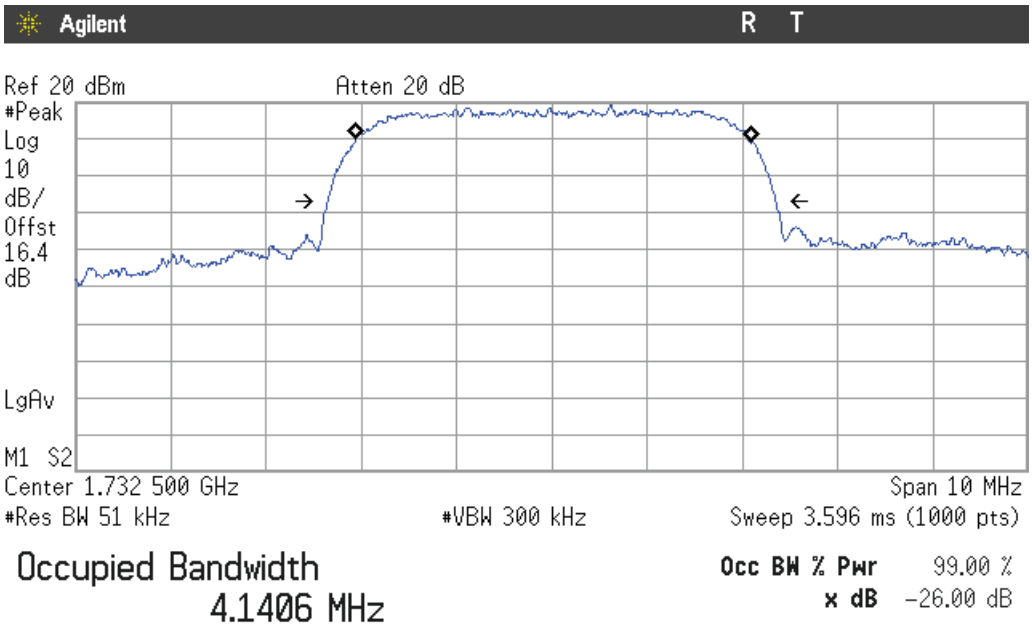
	Lowest Channel	Middle Channel	Highest Channel
99% Occupied bandwidth (MHz)	17.916	17.885	17.891
-26 dBc bandwidth (MHz)	19.329	19.294	19.338
Measurement uncertainty (kHz)	<±66.67		

3G Band IV. WCDMA MODULATION.

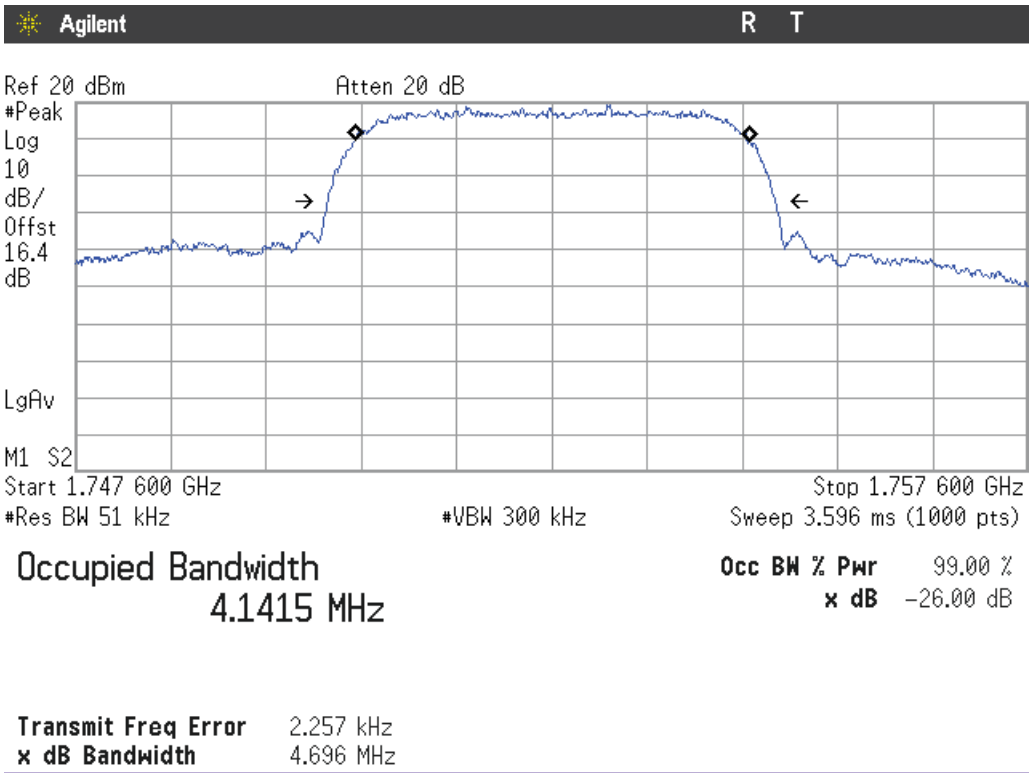
Lowest Channel:



Middle Channel:

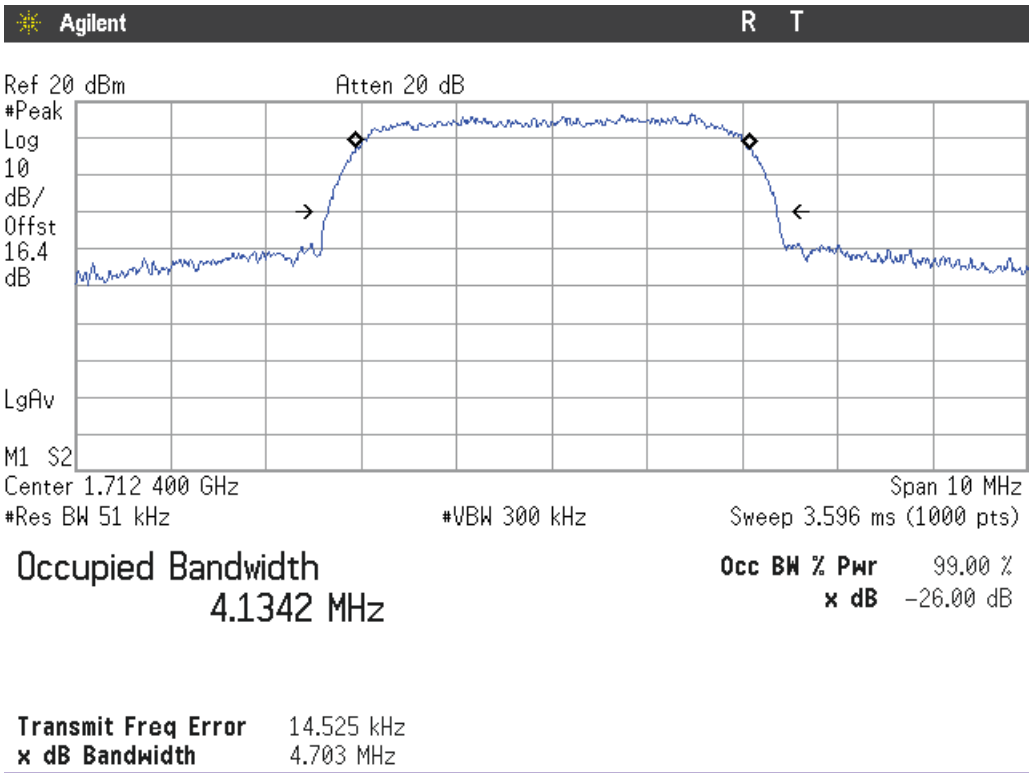


Highest Channel:

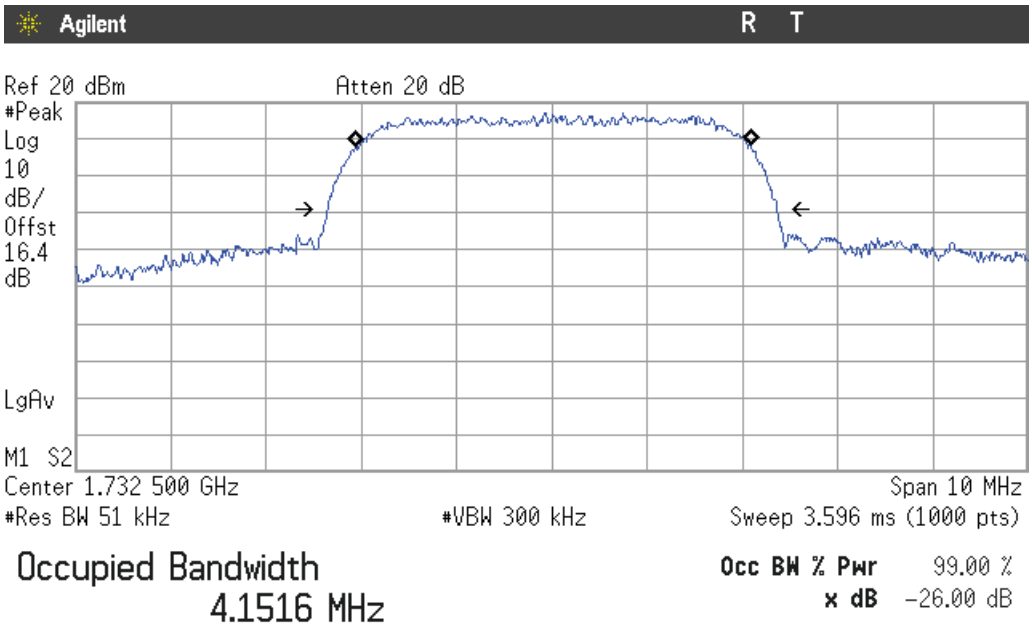


3G Band IV. HSUPA MODULATION.

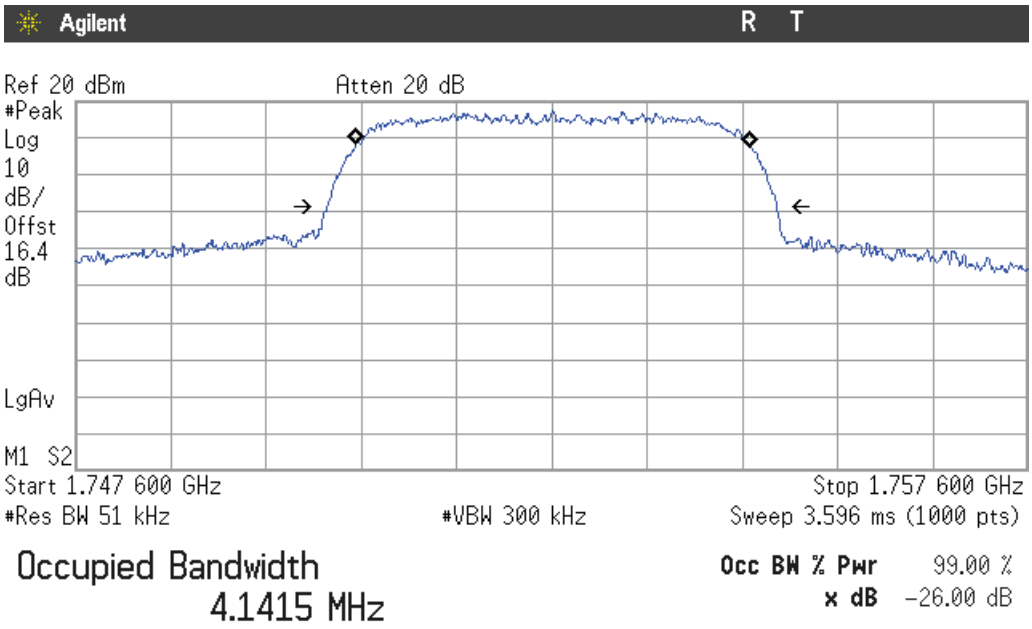
Lowest Channel:



Middle Channel:

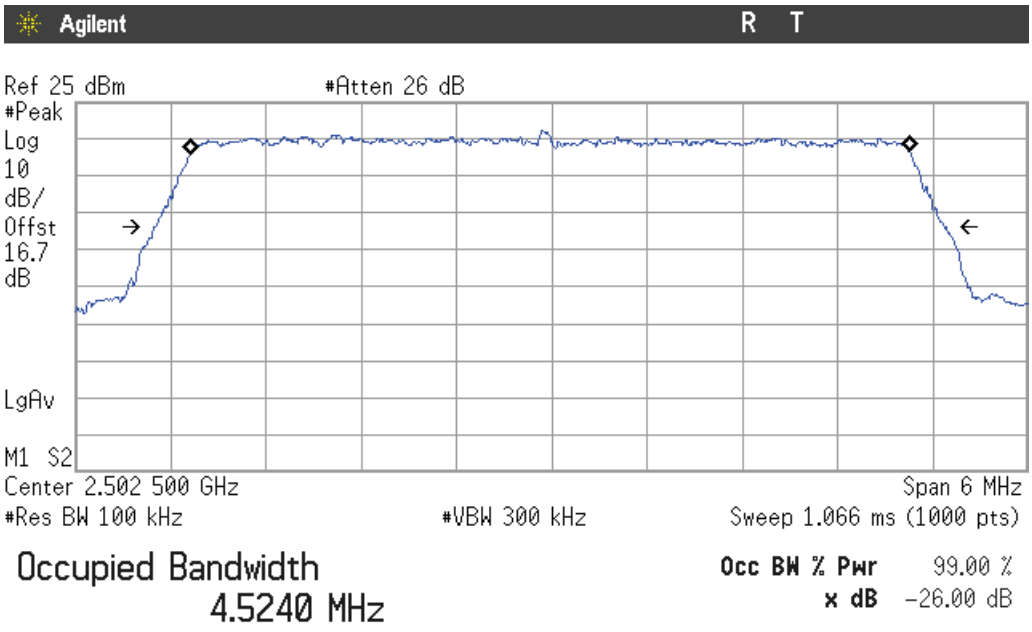


Highest Channel:

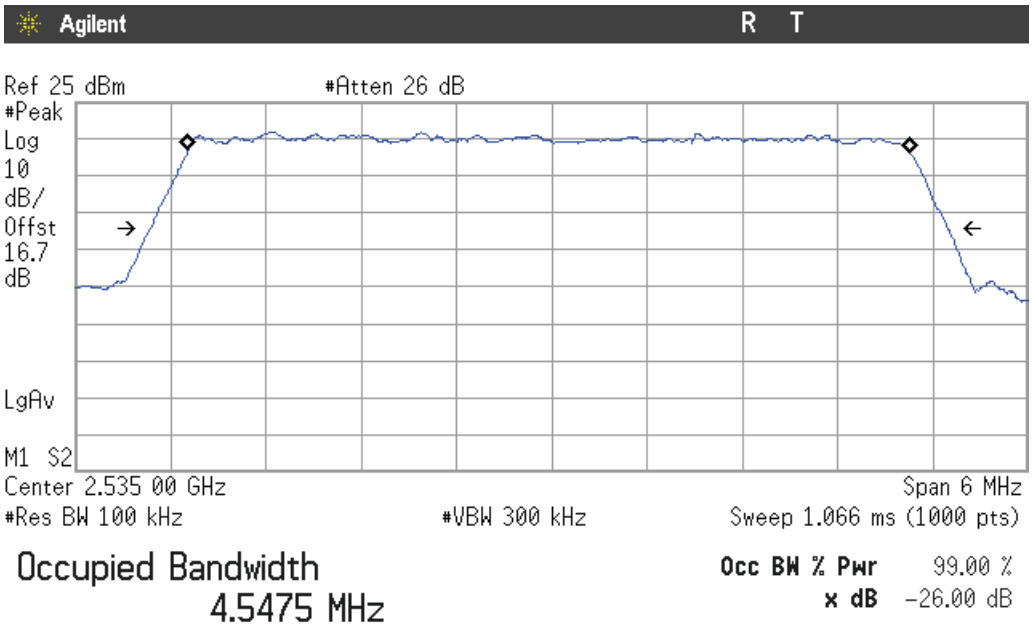


LTE Band 7. QPSK MODULATION. BW = 5 MHz.

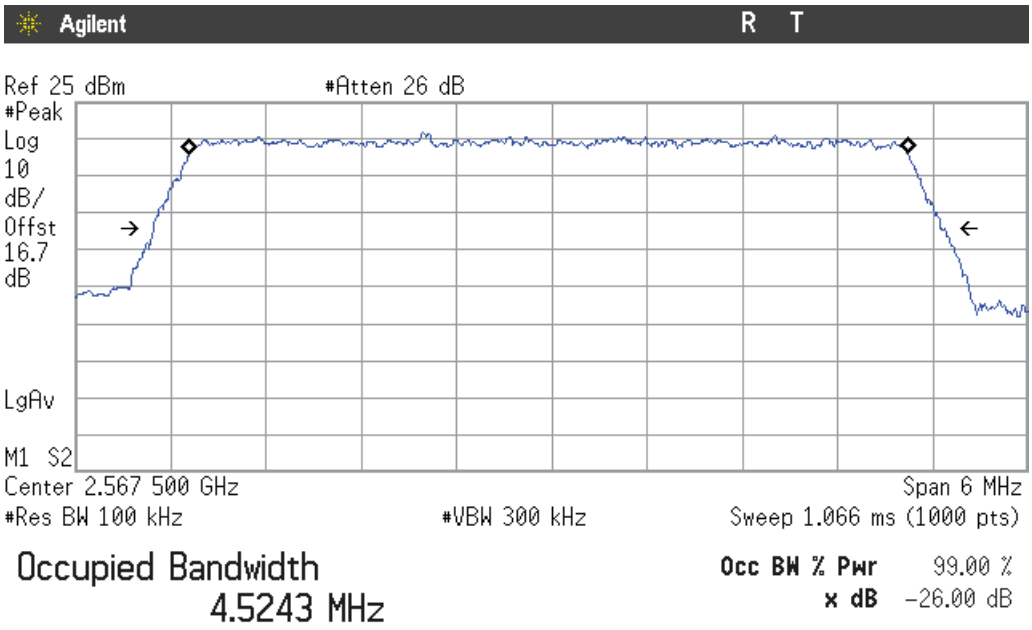
Lowest Channel:



Middle Channel:

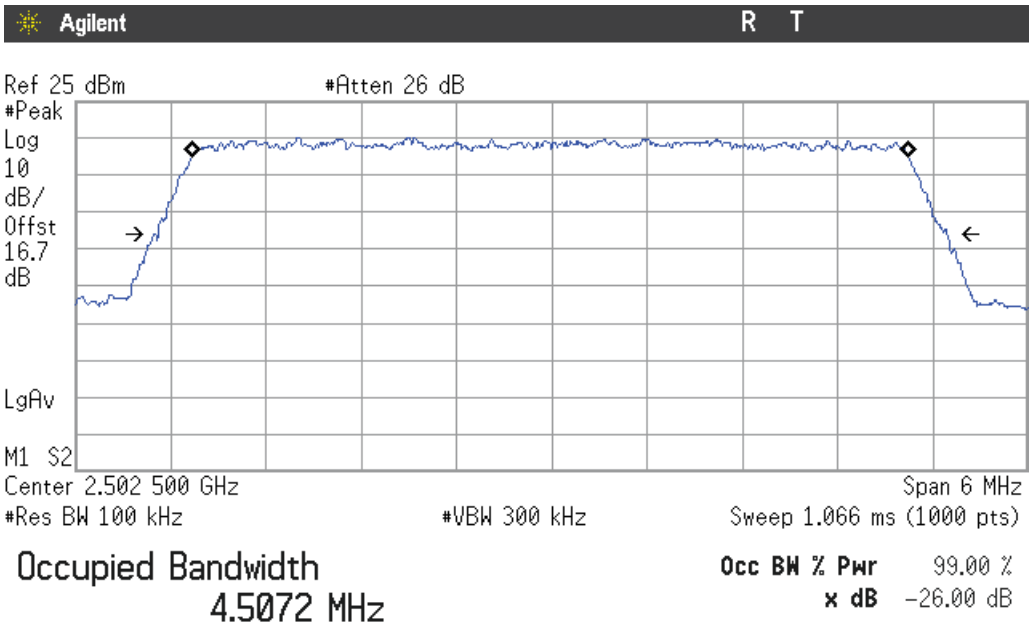


Highest Channel:

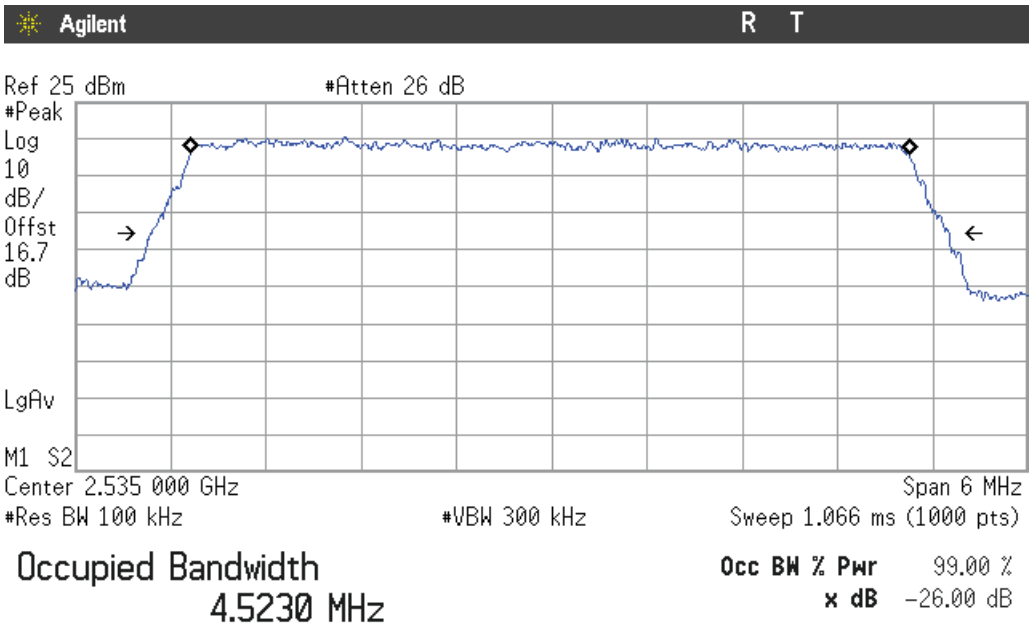


LTE Band 7. 16QAM MODULATION. BW = 5 MHz.

Lowest Channel:

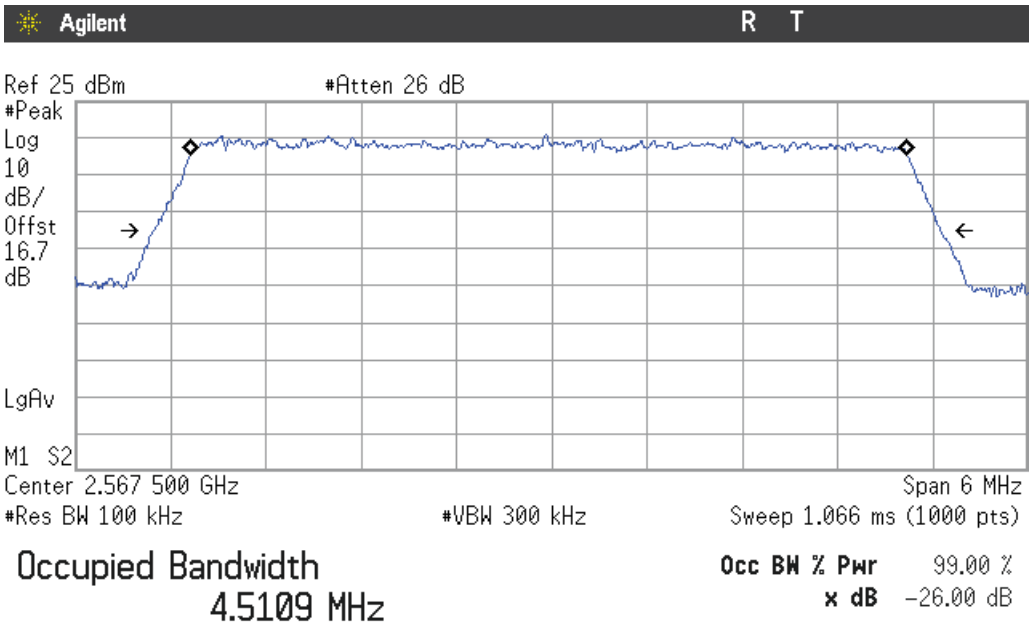


Middle Channel:



Transmit Freq Error	-12.371 kHz
x dB Bandwidth	5.026 MHz

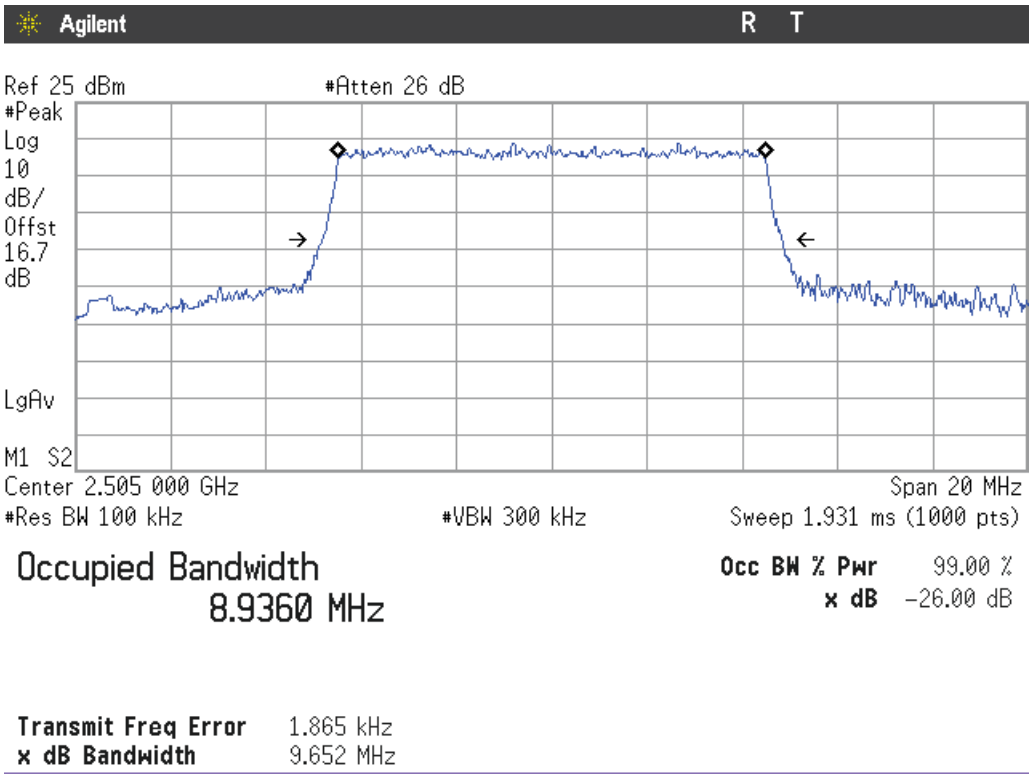
Highest Channel:



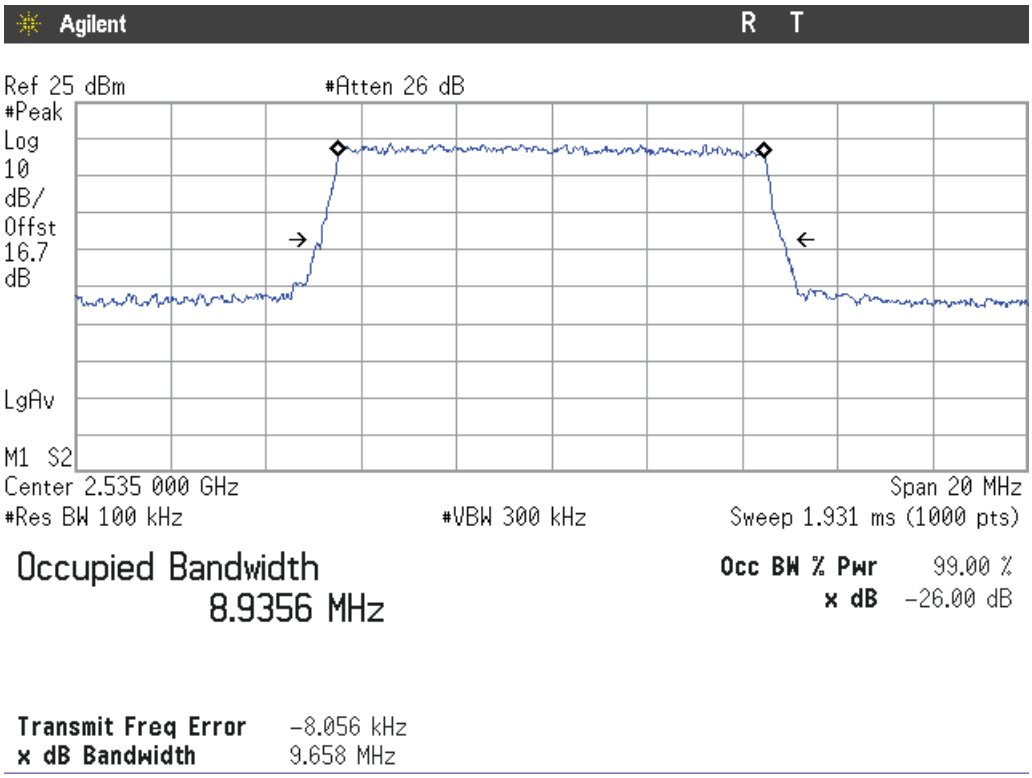
Transmit Freq Error	-17.757 kHz
x dB Bandwidth	4.957 MHz

LTE Band 7. QPSK MODULATION. BW = 10 MHz.

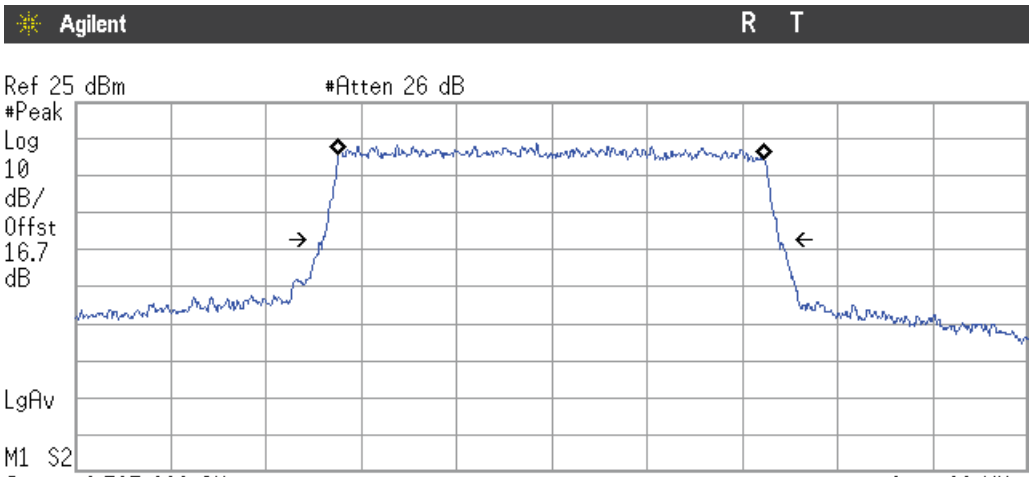
Lowest Channel:



Middle Channel:

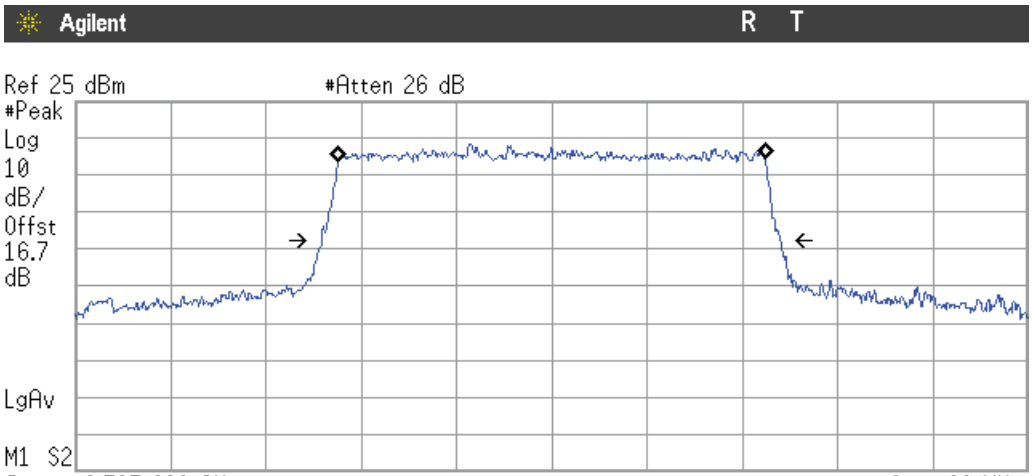


Highest Channel:

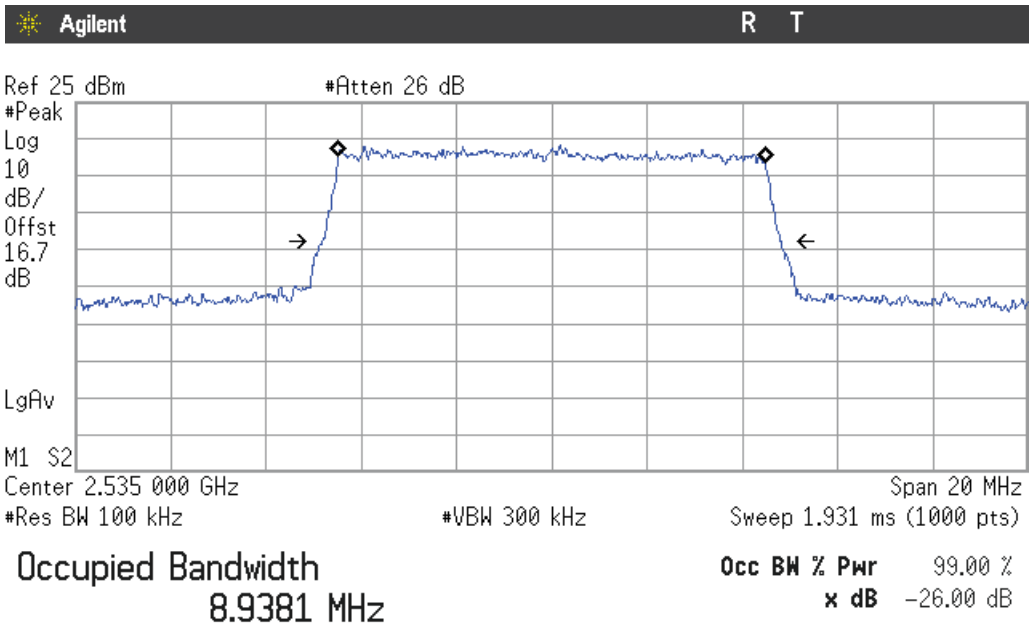


LTE Band 7. 16QAM MODULATION. BW = 10 MHz.

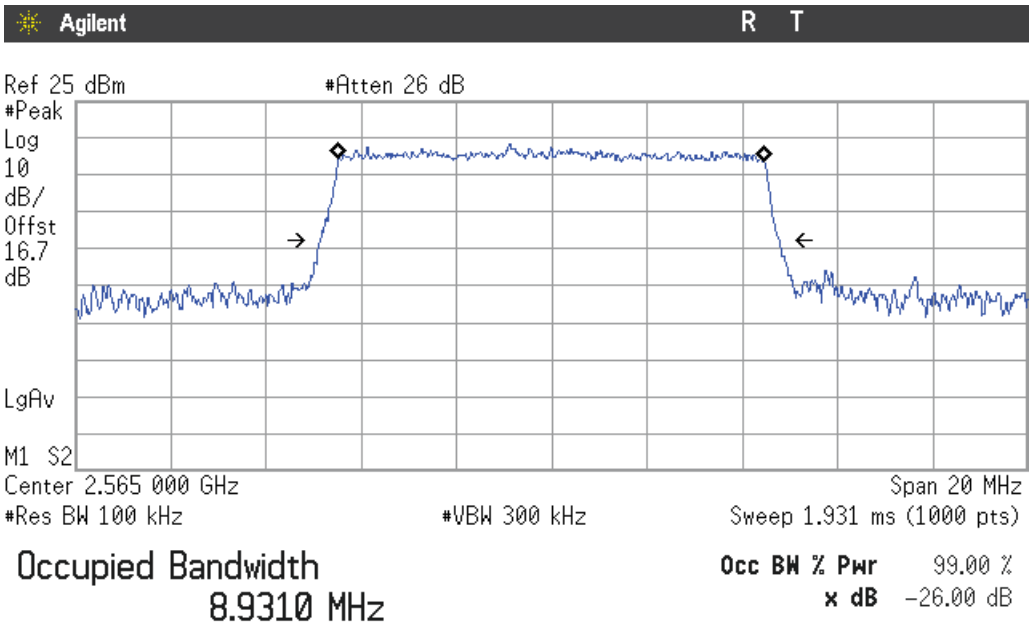
Lowest Channel:



Middle Channel:

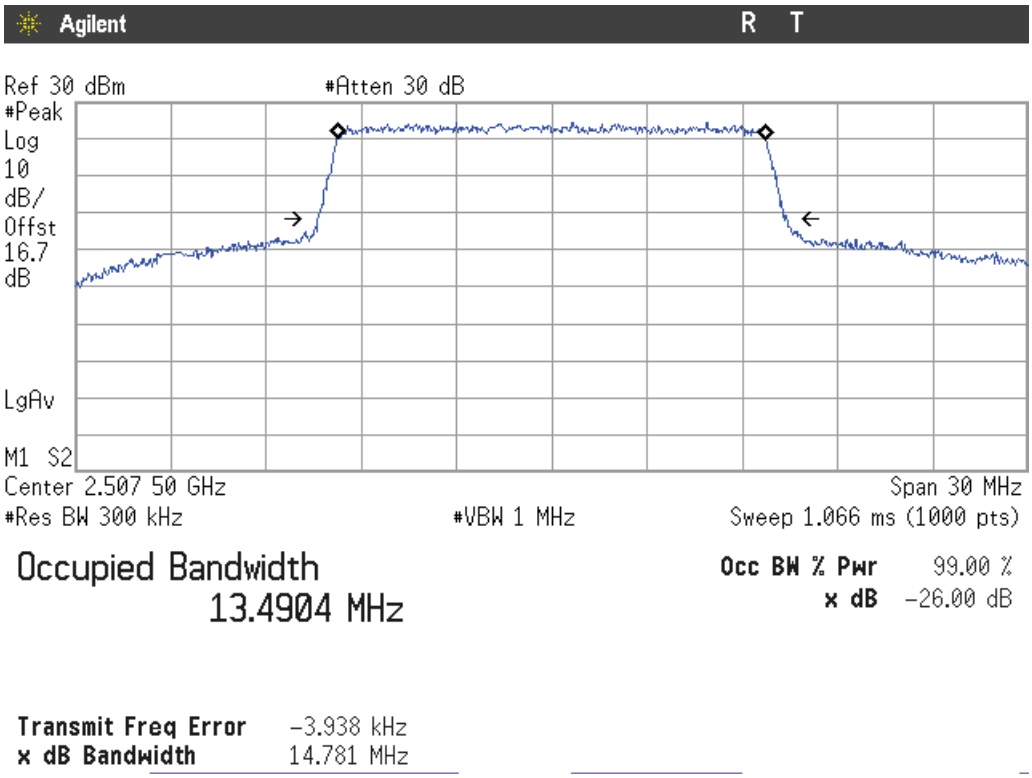


Highest Channel:

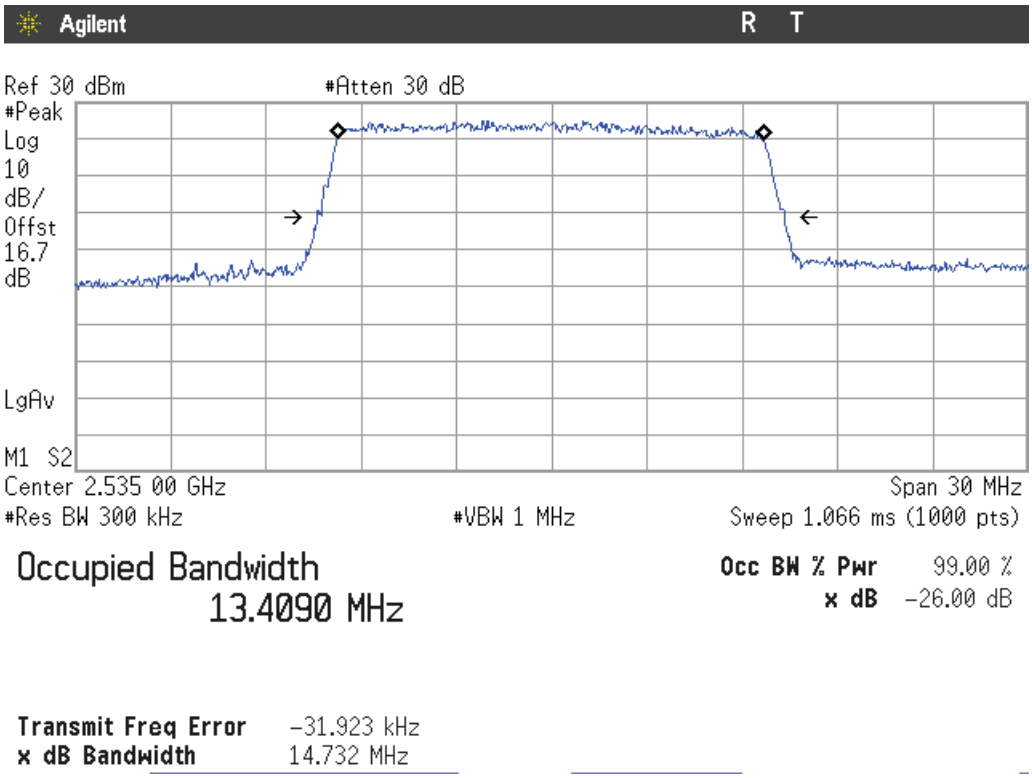


LTE Band 7. QPSK MODULATION. BW = 15 MHz.

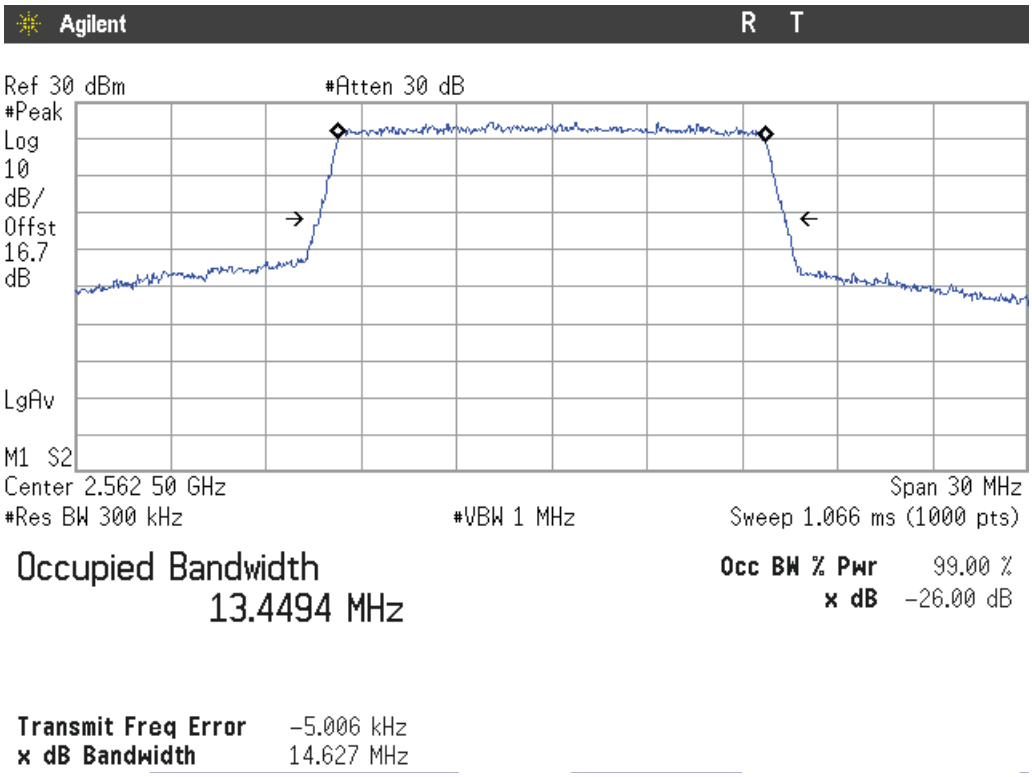
Lowest Channel:



Middle Channel:

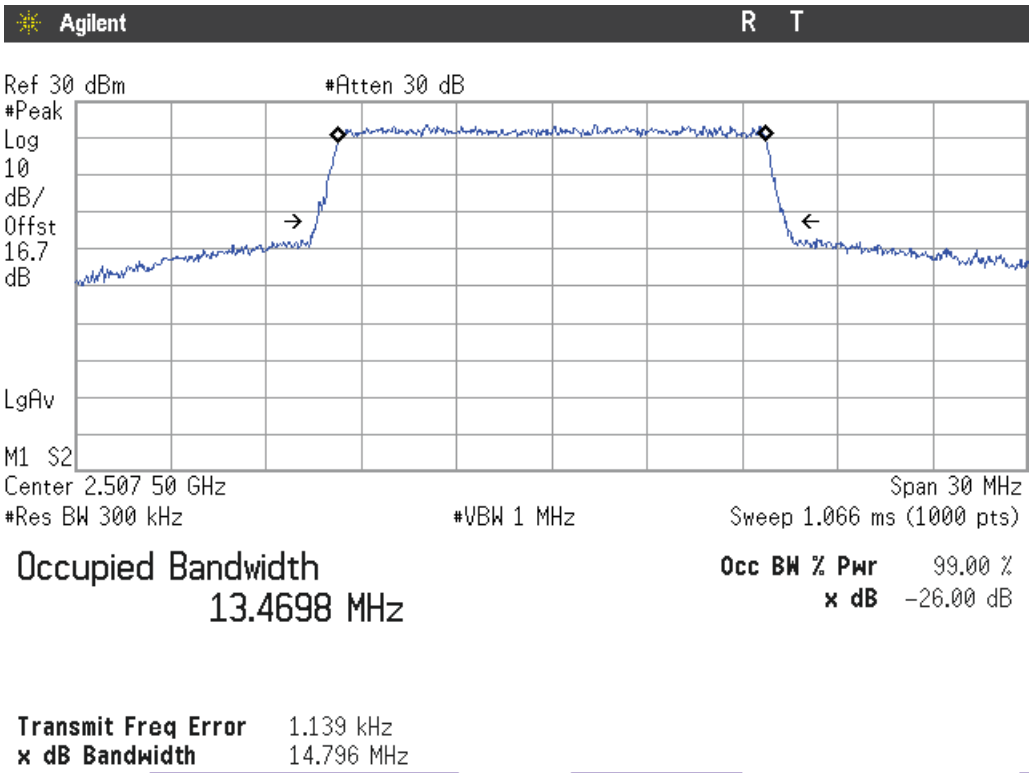


Highest Channel:

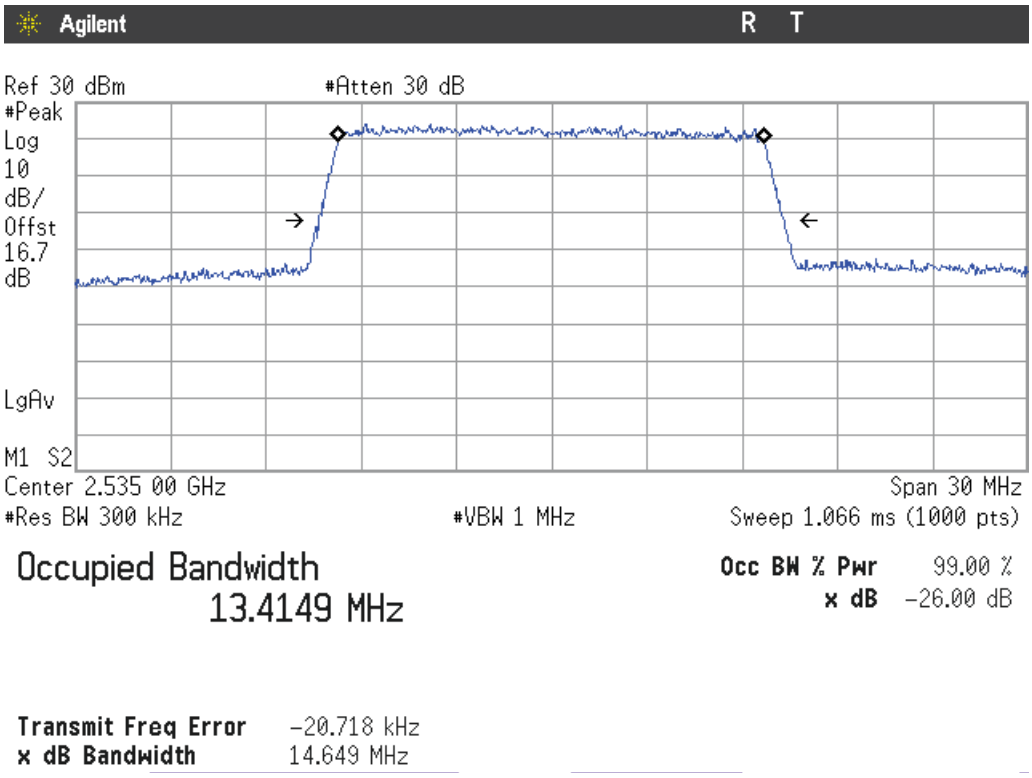


LTE Band 7. 16QAM MODULATION. BW = 15 MHz.

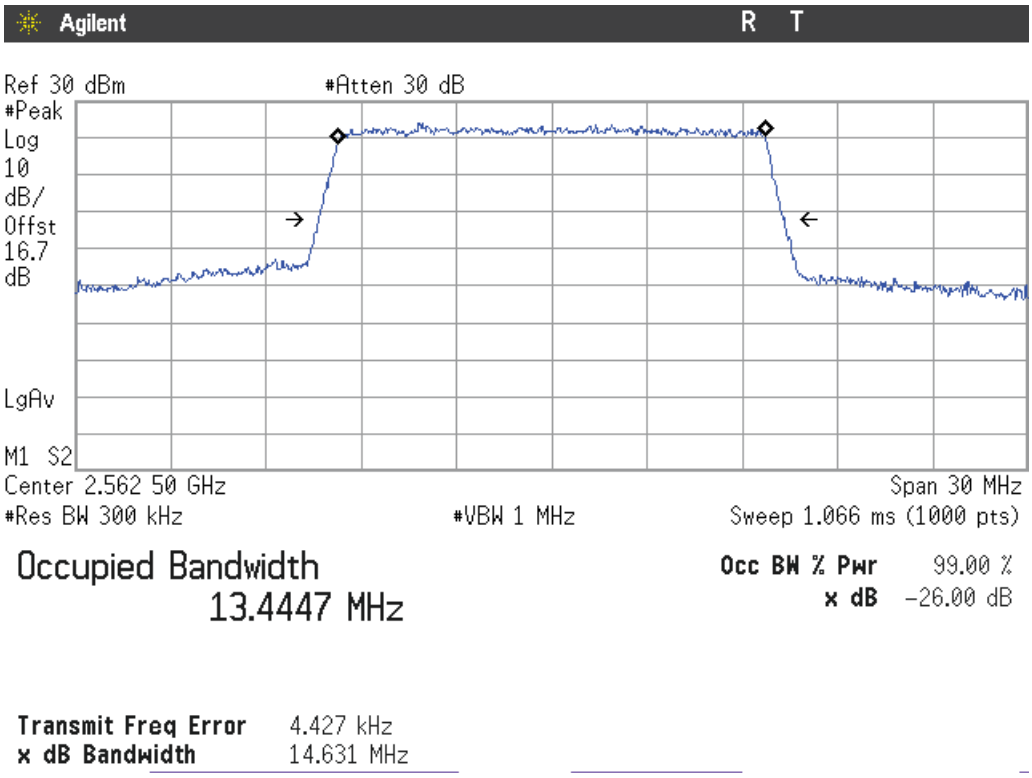
Lowest Channel:



Middle Channel:

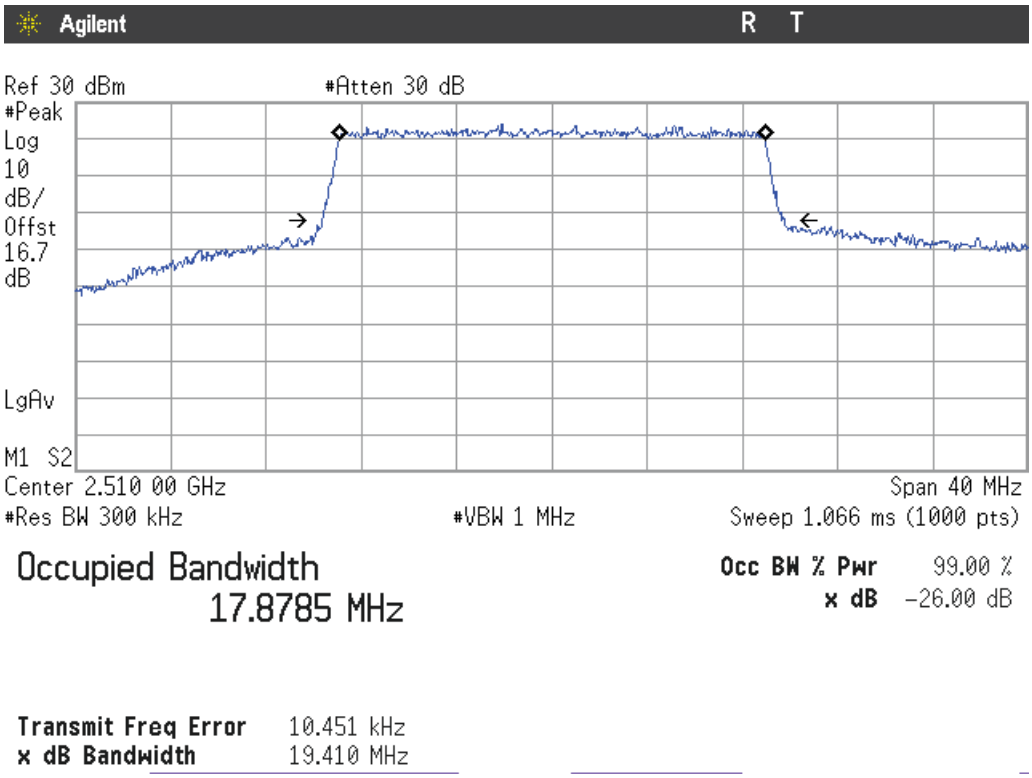


Highest Channel:

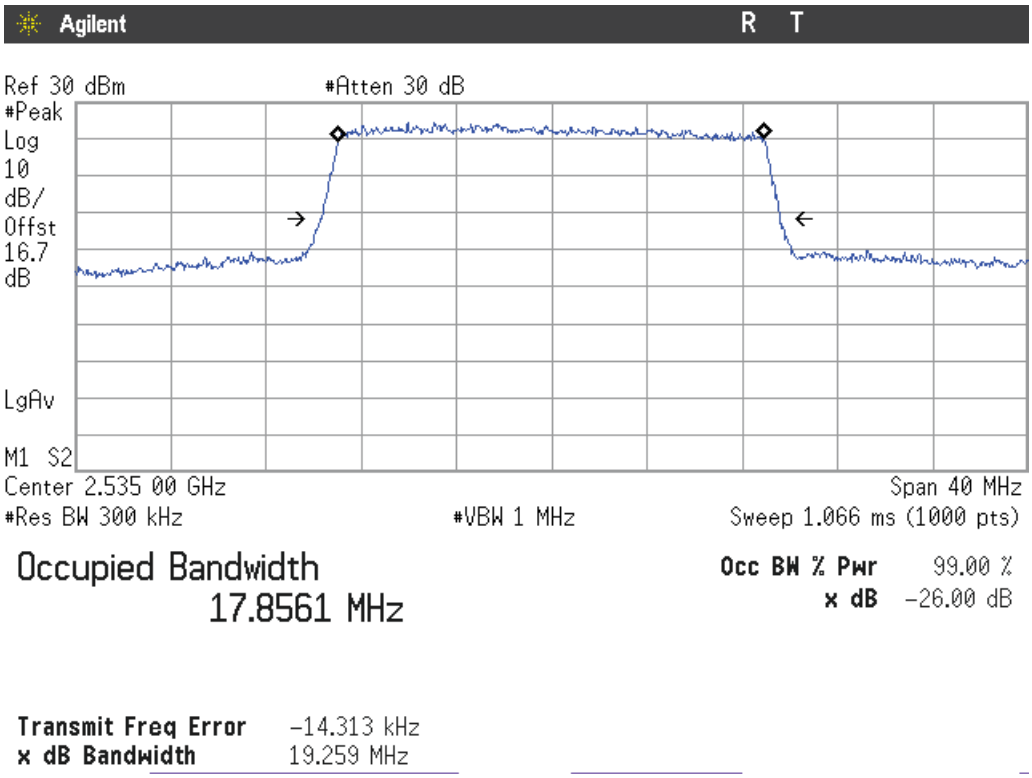


LTE Band 7. QPSK MODULATION. BW = 20 MHz.

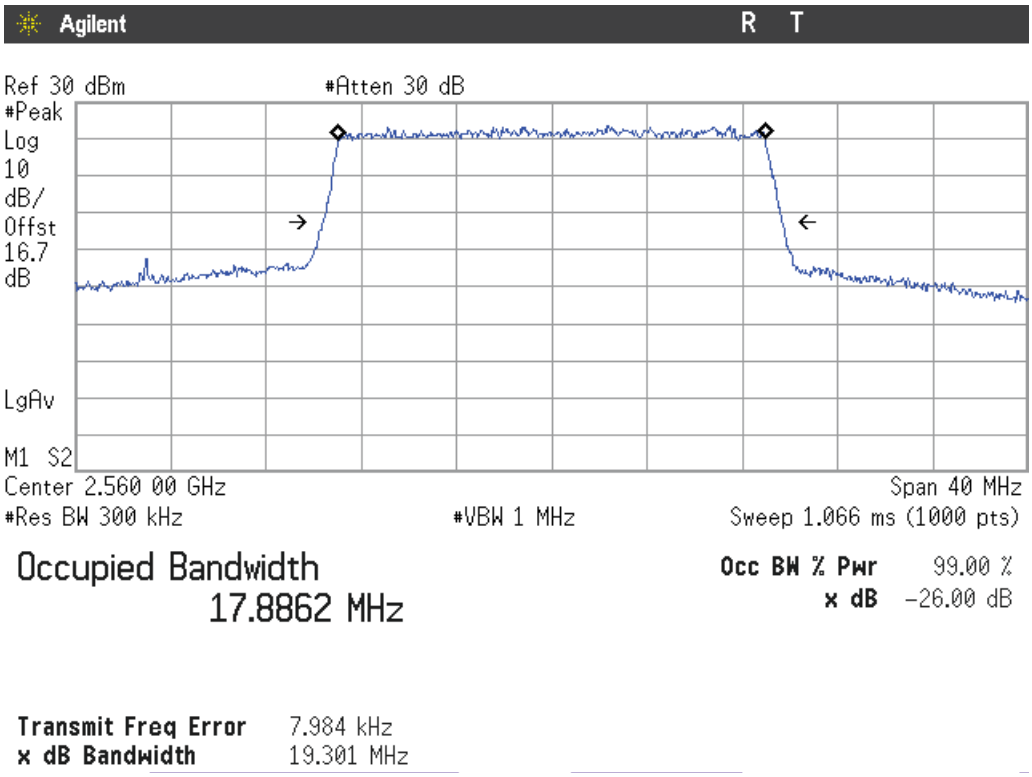
Lowest Channel:



Middle Channel:

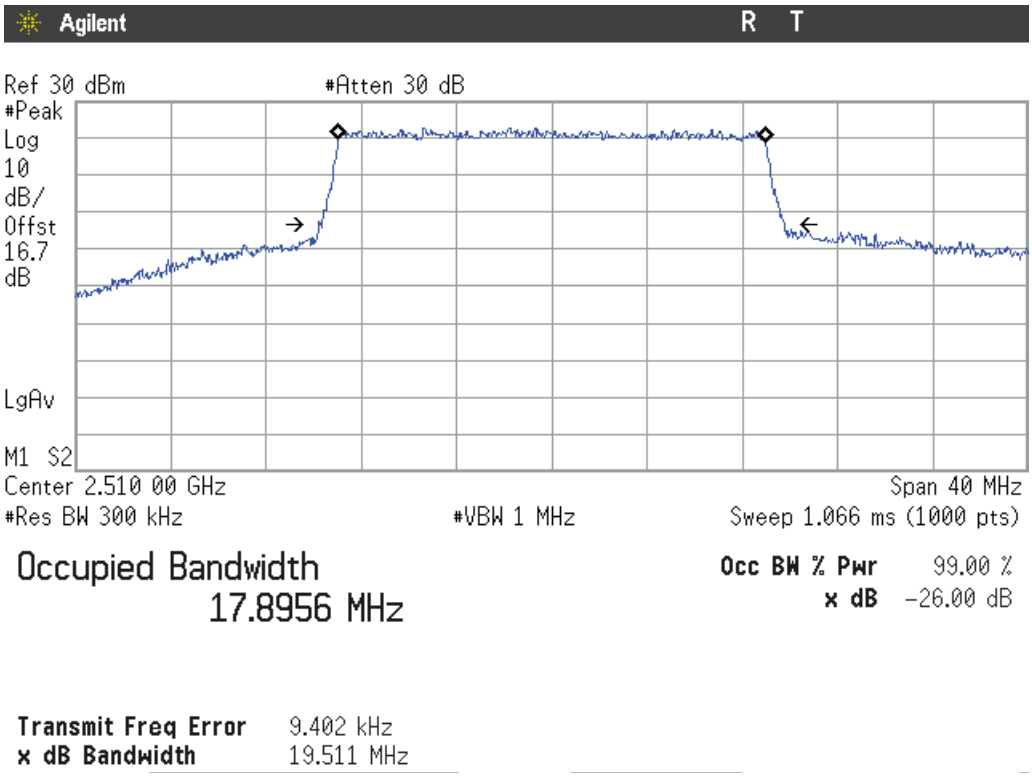


Highest Channel:

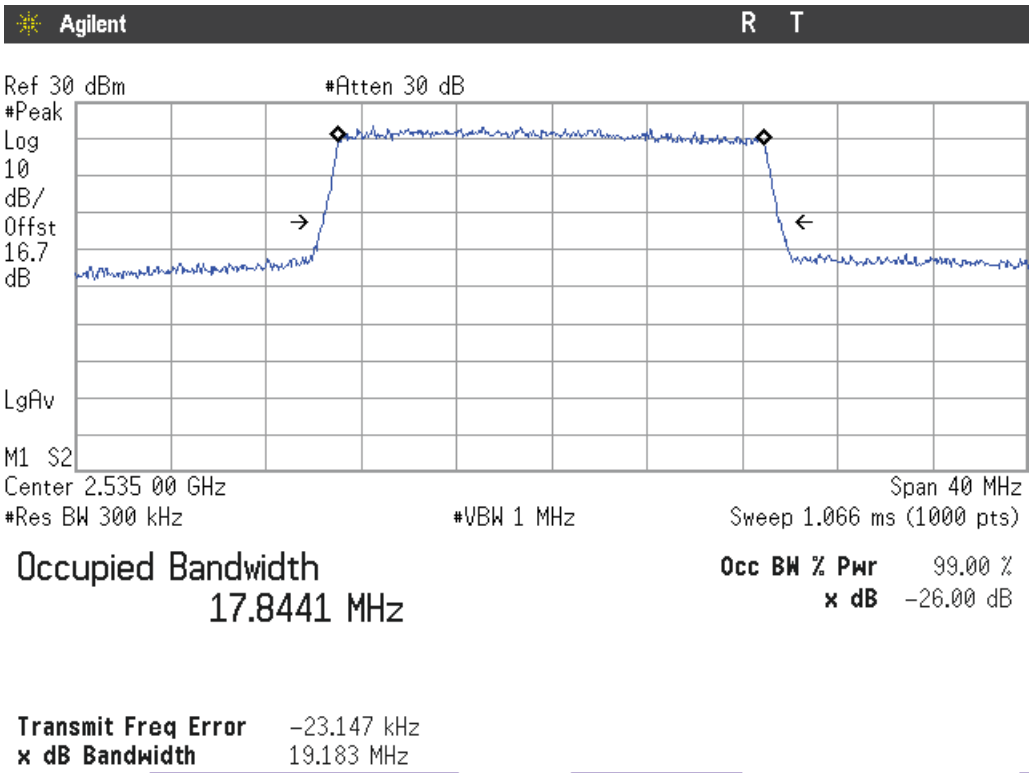


LTE Band 7. 16QAM MODULATION. BW = 20 MHz.

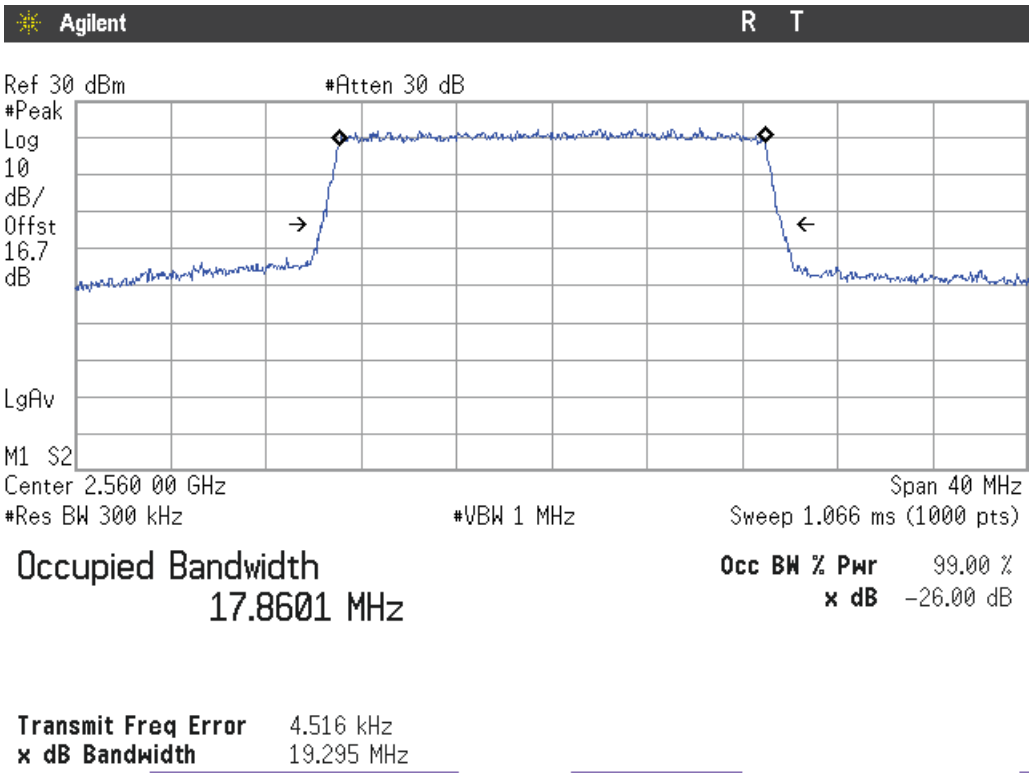
Lowest Channel:



Middle Channel:

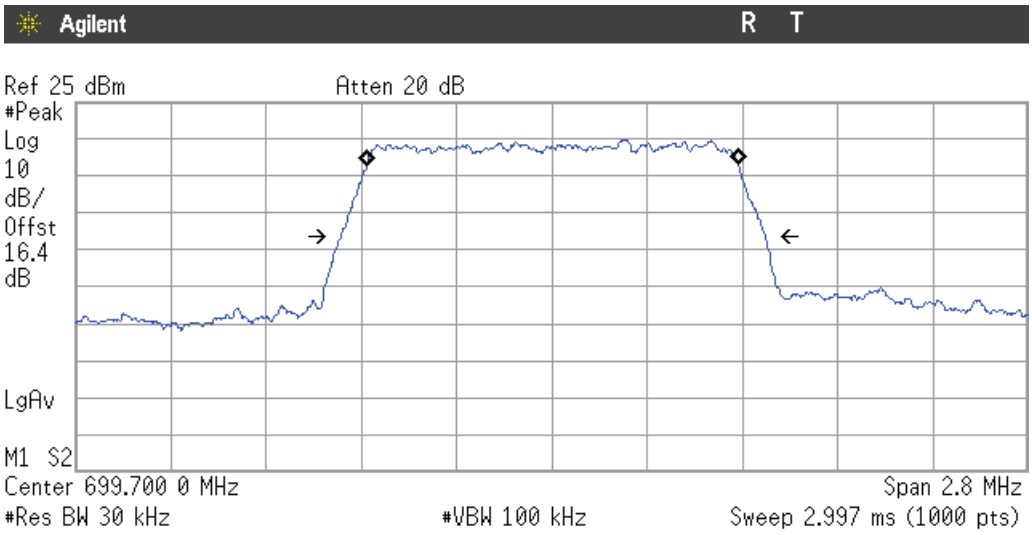


Highest Channel:

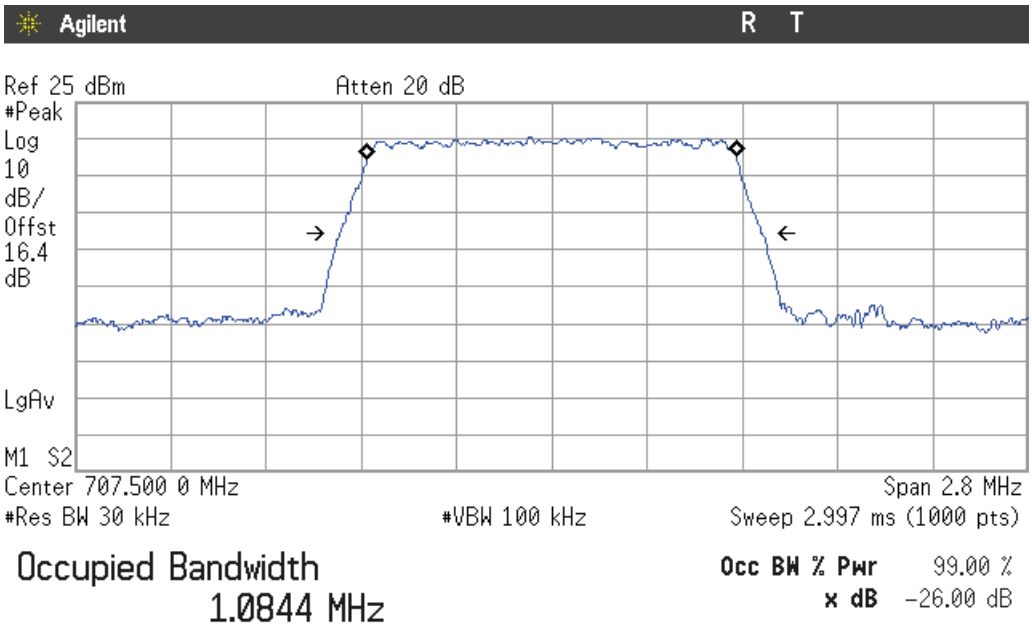


LTE Band 12. QPSK MODULATION. BW = 1.4 MHz.

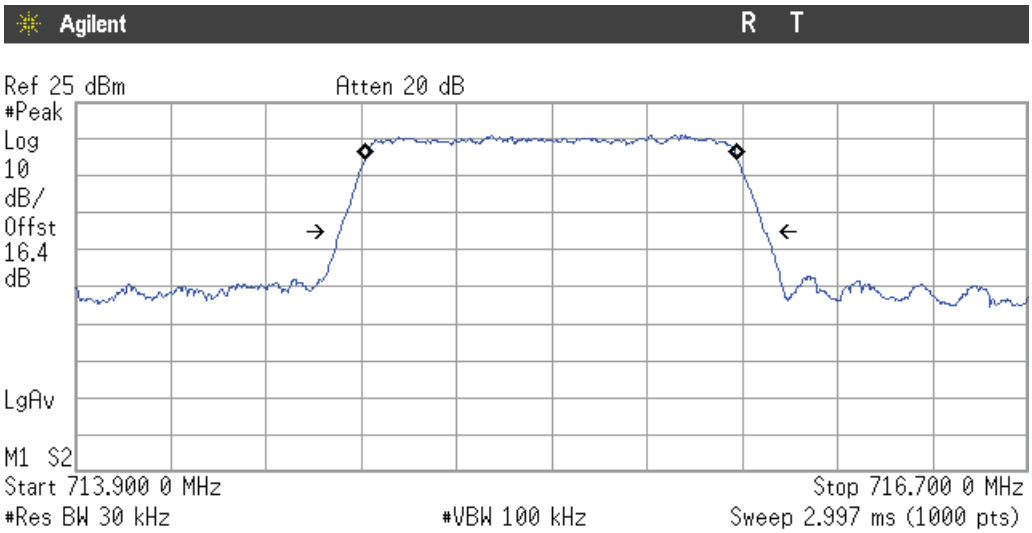
Lowest Channel:



Middle Channel:

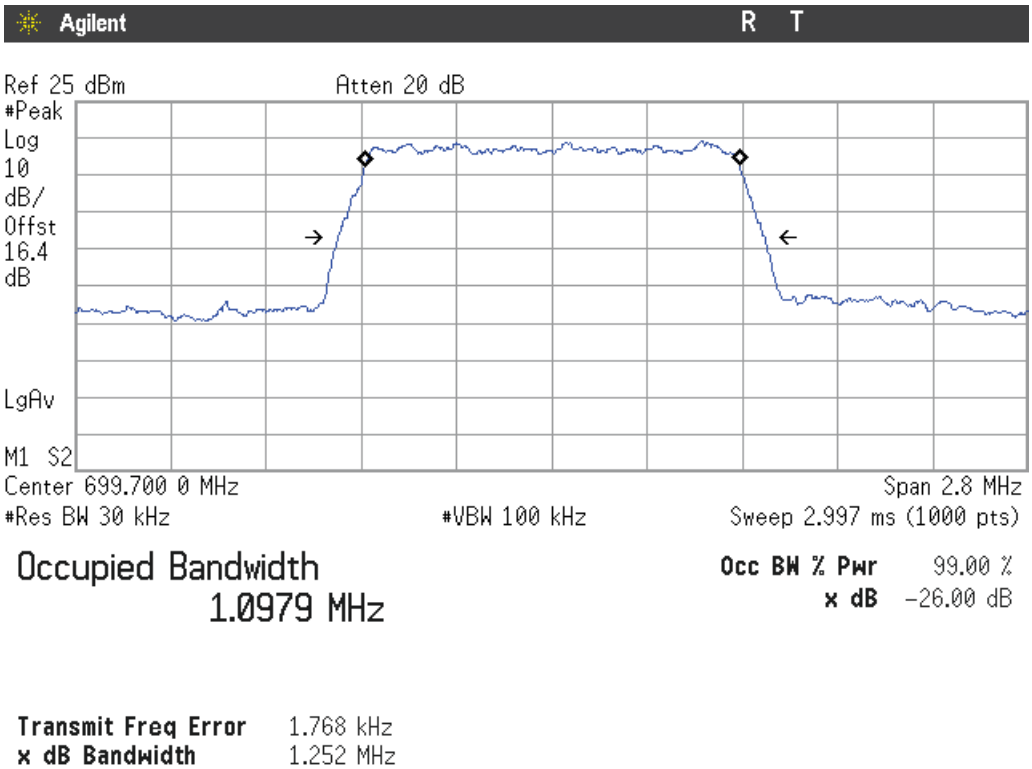


Highest Channel:

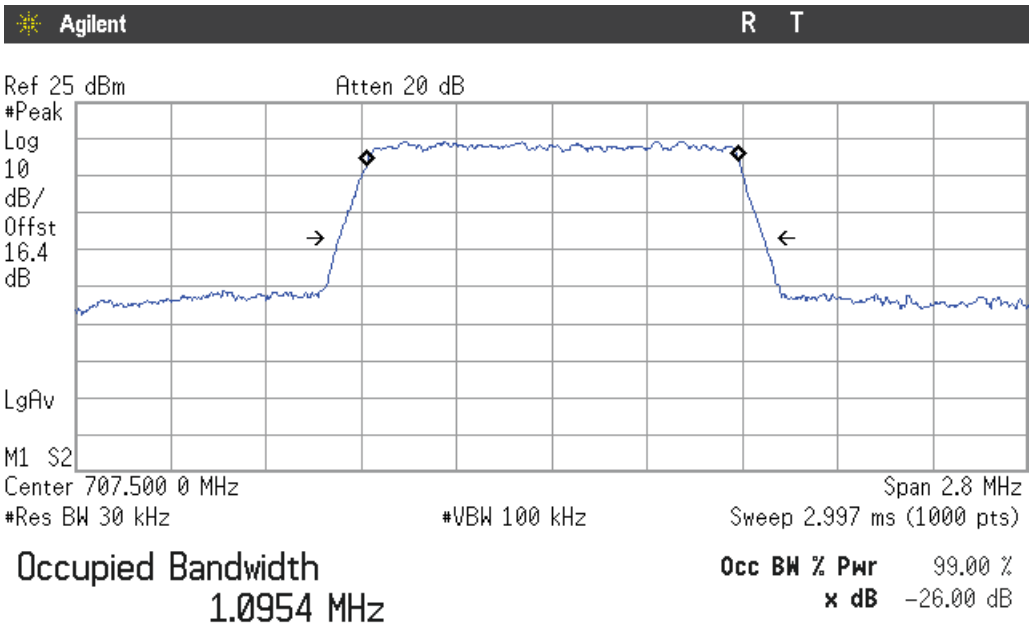


LTE Band 12. 16QAM MODULATION. BW = 1.4 MHz.

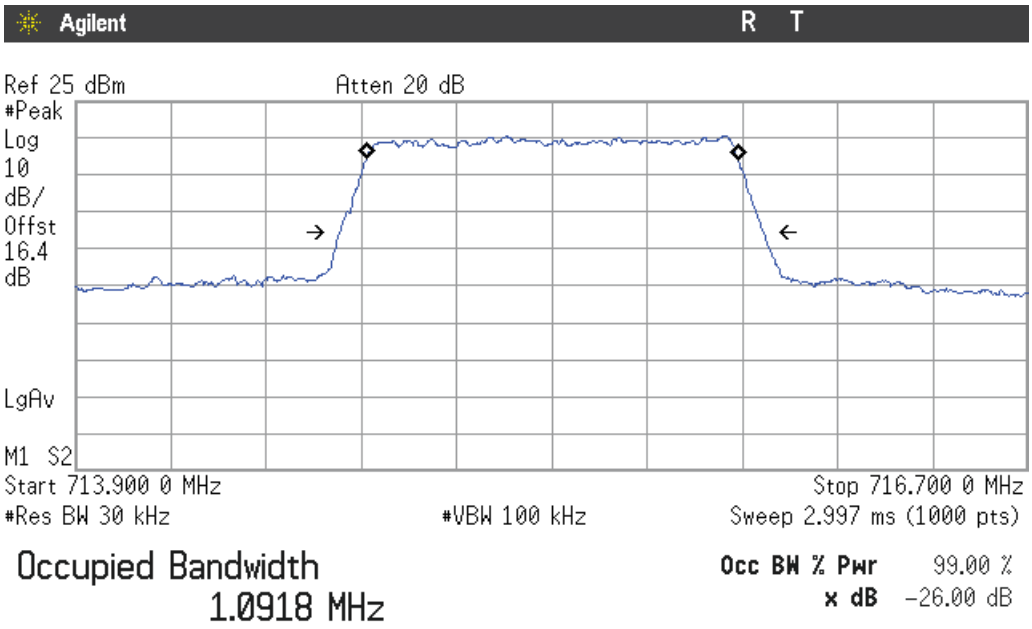
Lowest Channel:



Middle Channel:

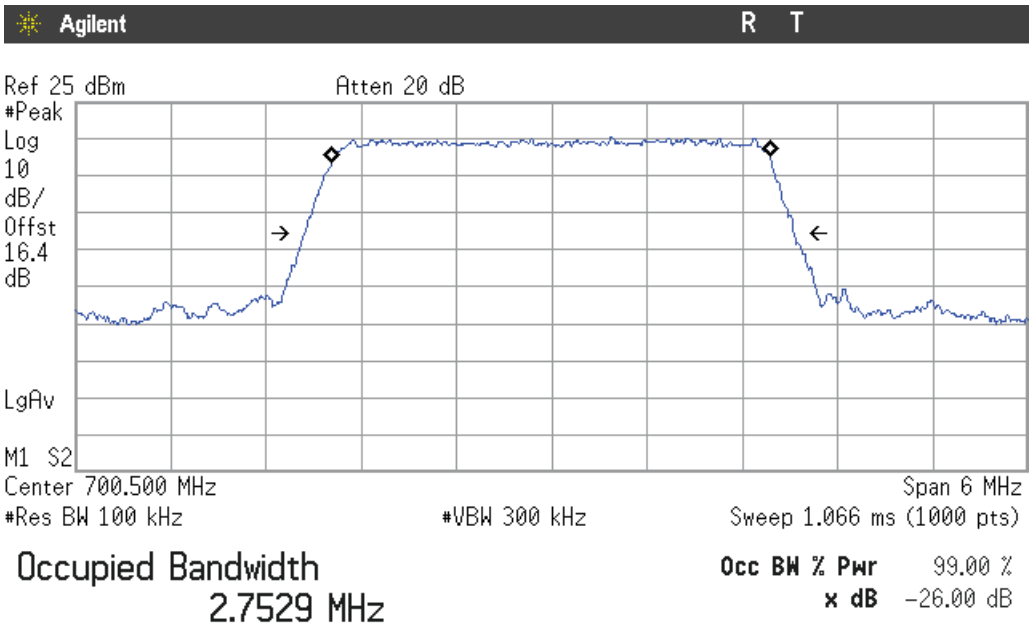


Highest Channel:

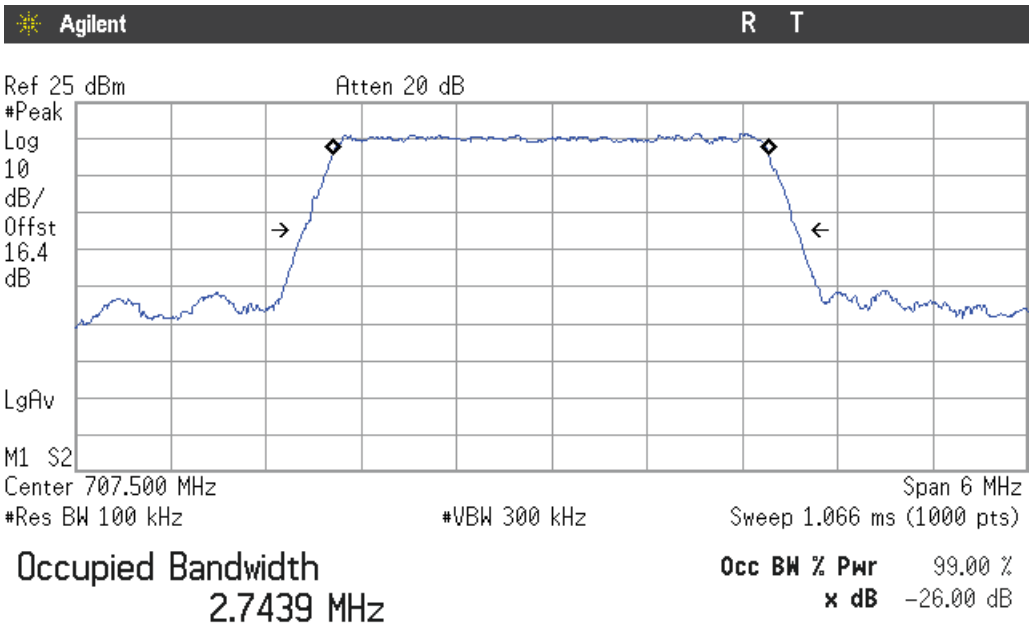


LTE Band 12. QPSK MODULATION. BW = 3 MHz.

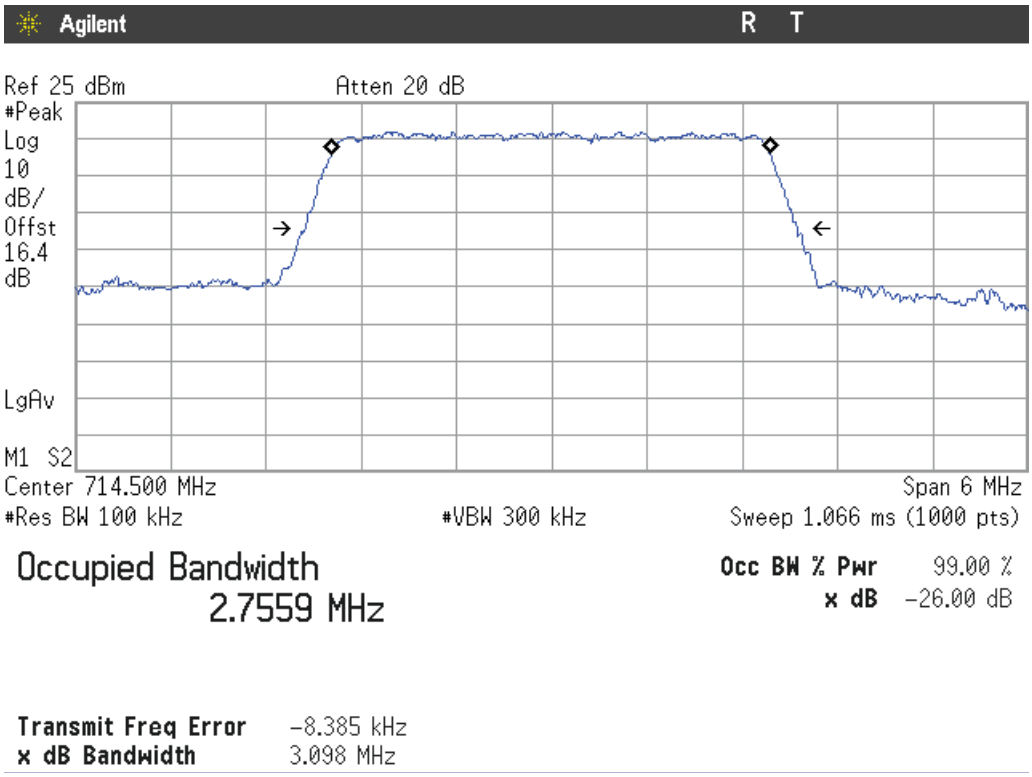
Lowest Channel:



Middle Channel:

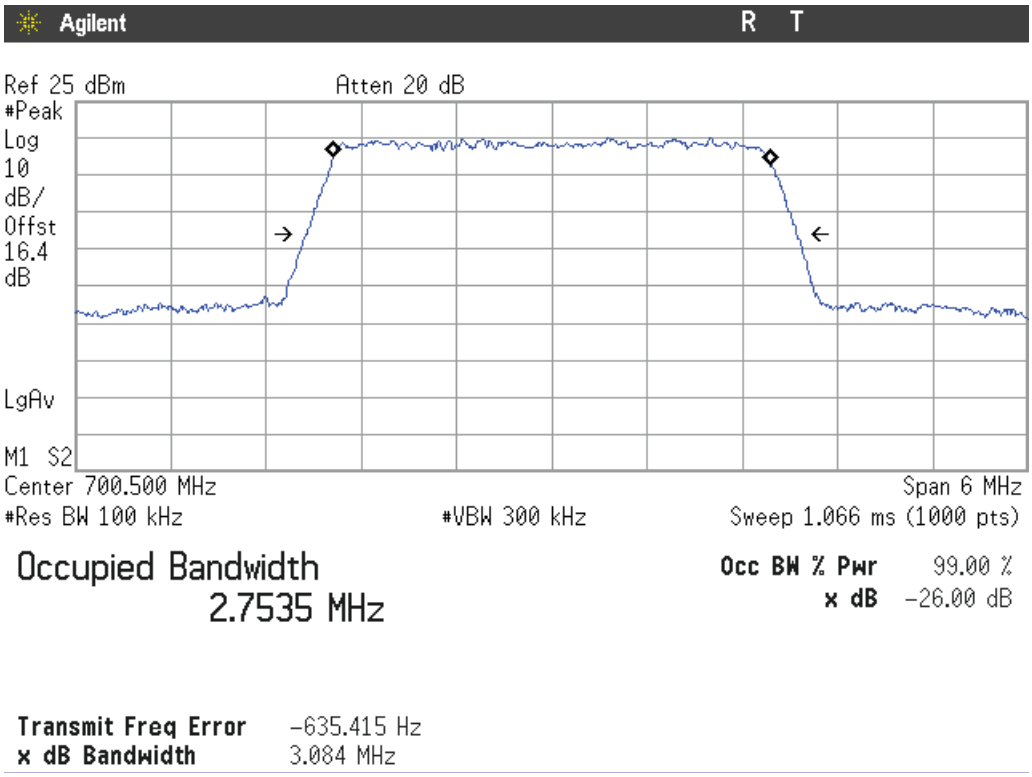


Highest Channel:

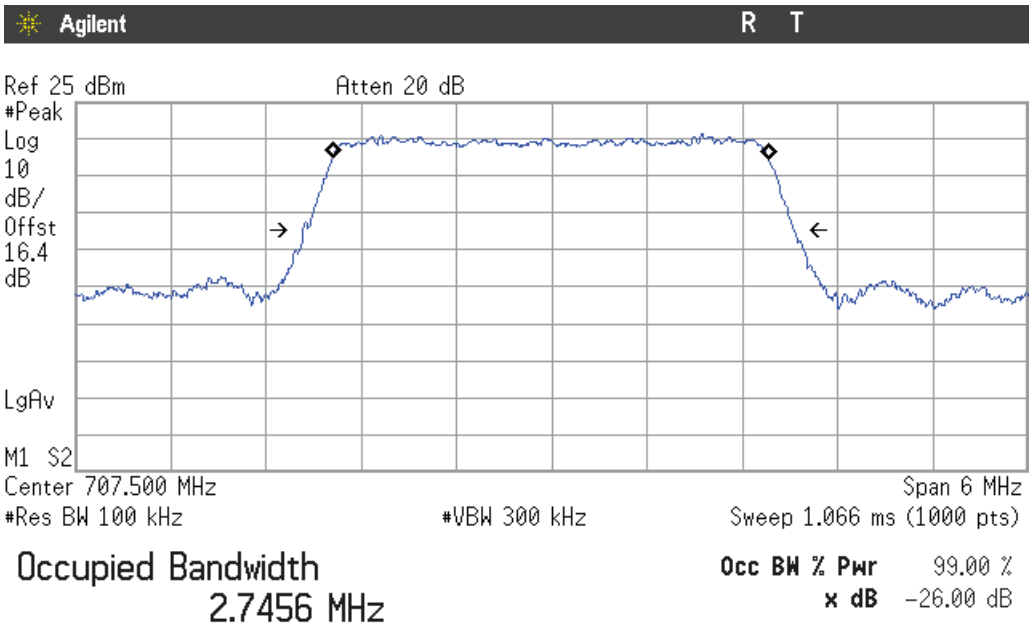


LTE Band 12. 16QAM MODULATION. BW = 3 MHz.

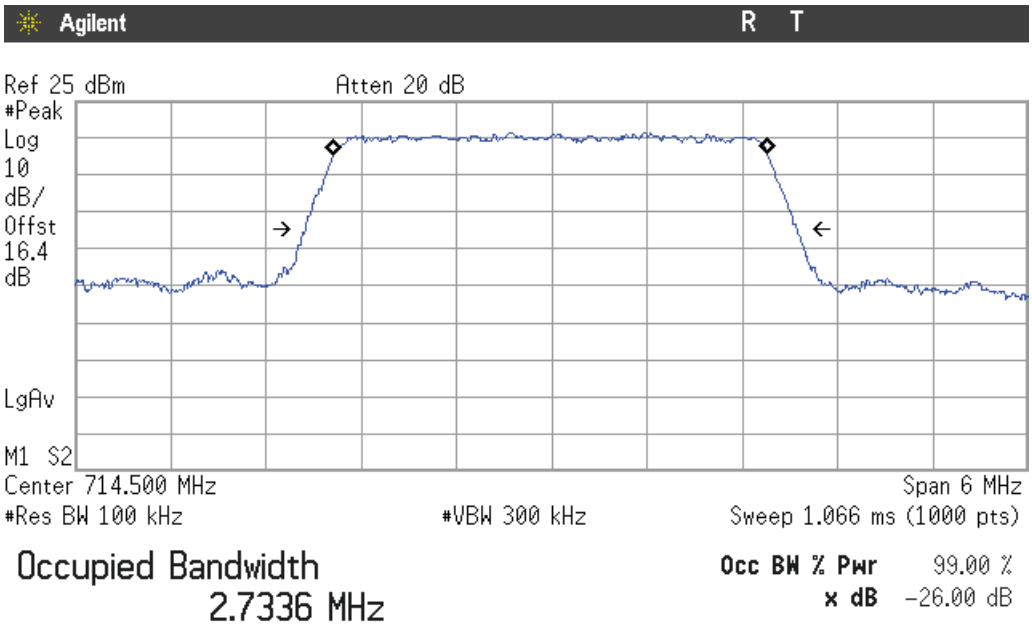
Lowest Channel:



Middle Channel:

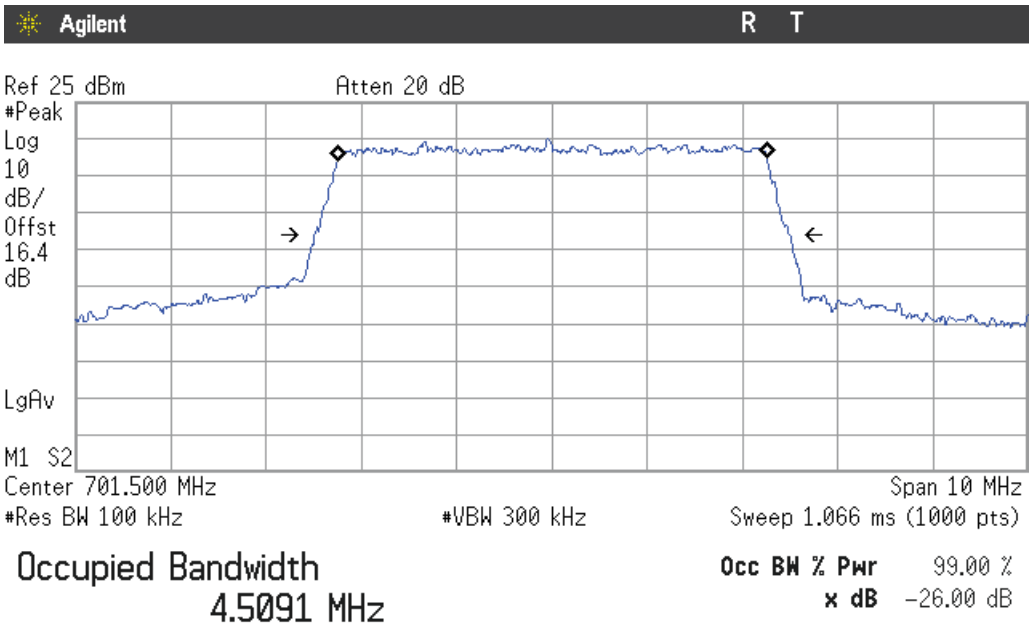


Highest Channel:

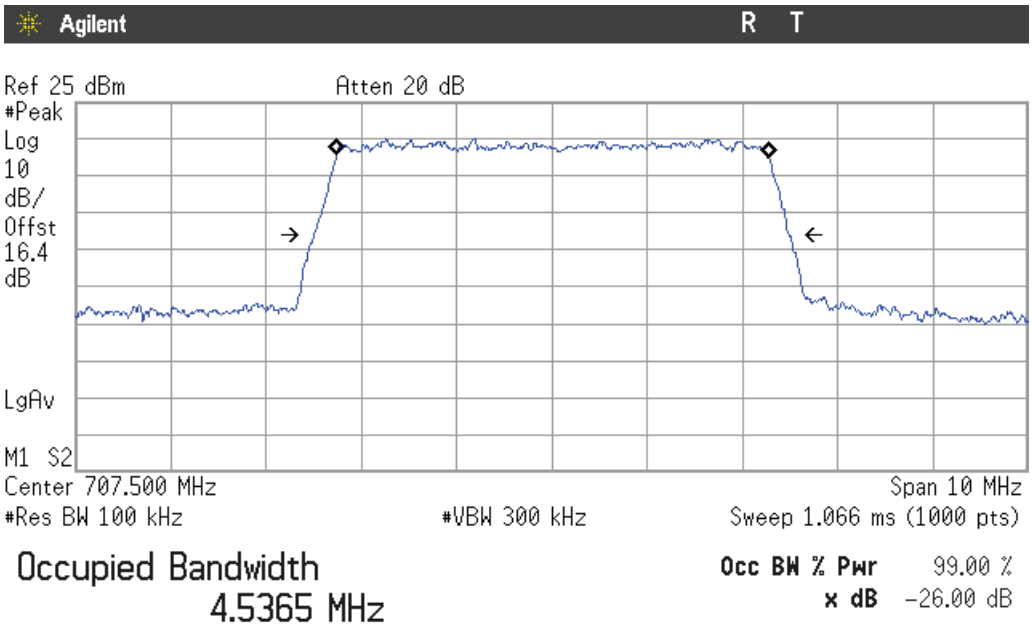


LTE Band 12. QPSK MODULATION. BW = 5 MHz.

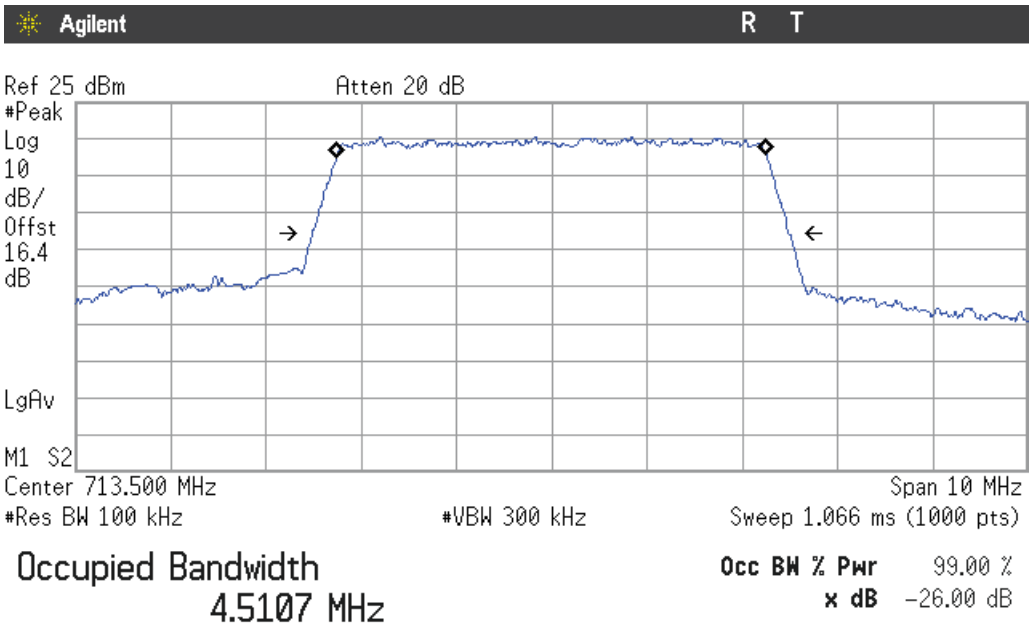
Lowest Channel:



Middle Channel:

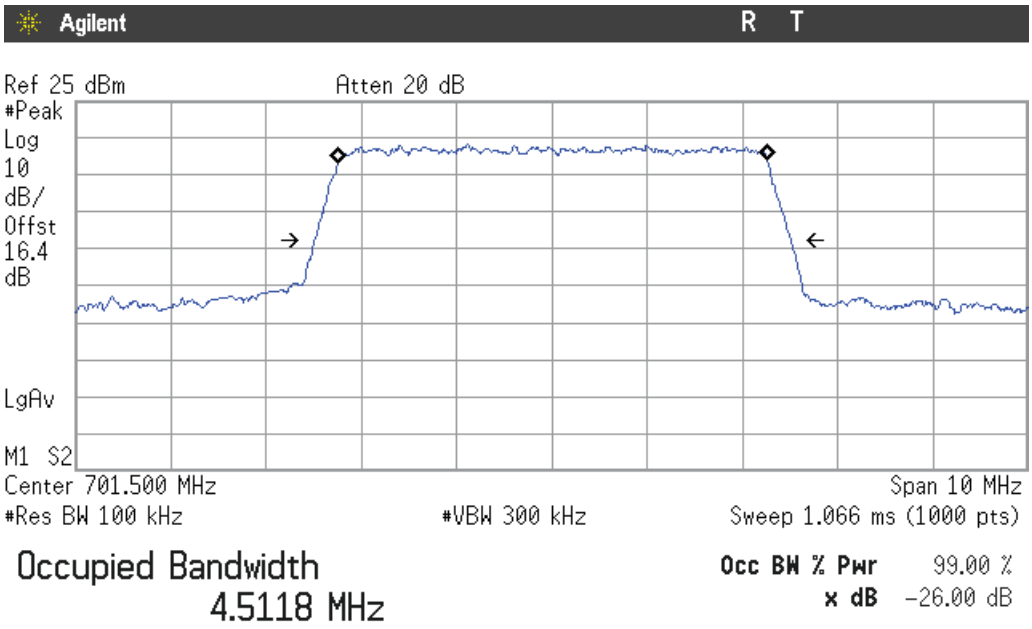


Highest Channel:

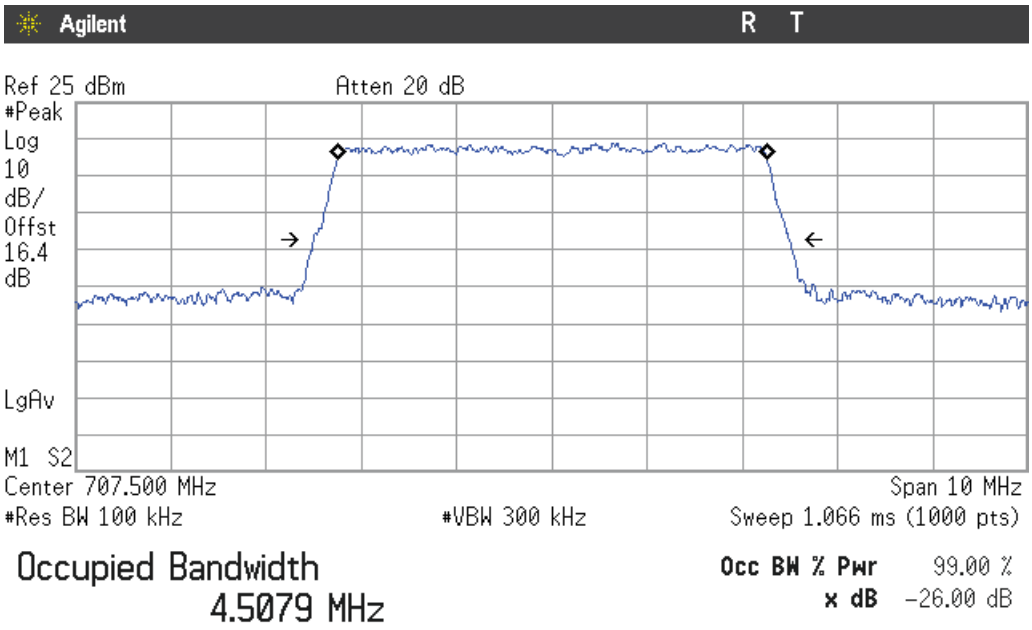


LTE Band 12. 16QAM MODULATION. BW = 5 MHz.

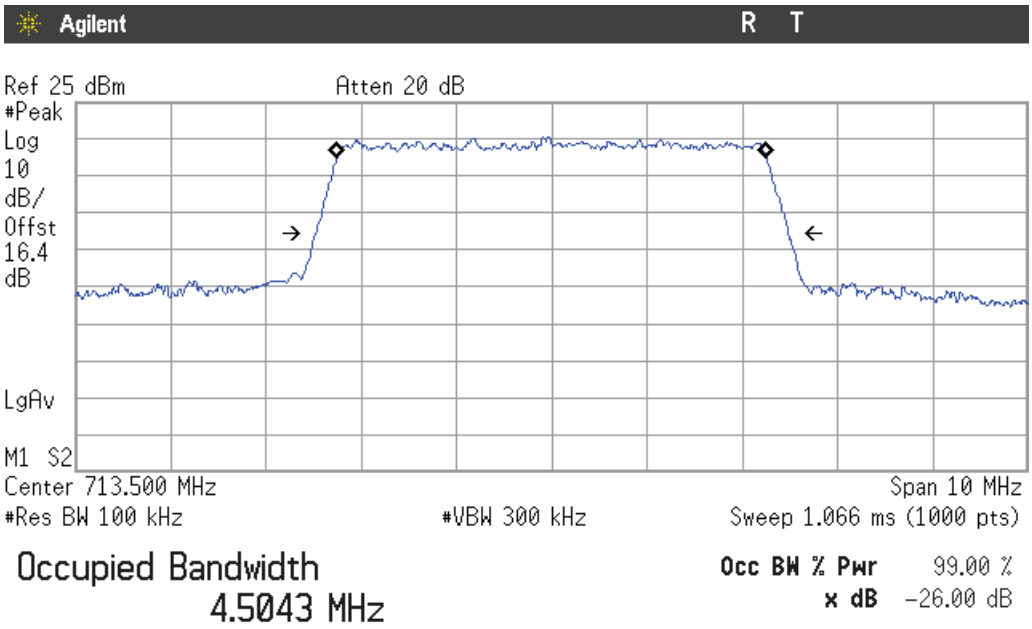
Lowest Channel:



Middle Channel:

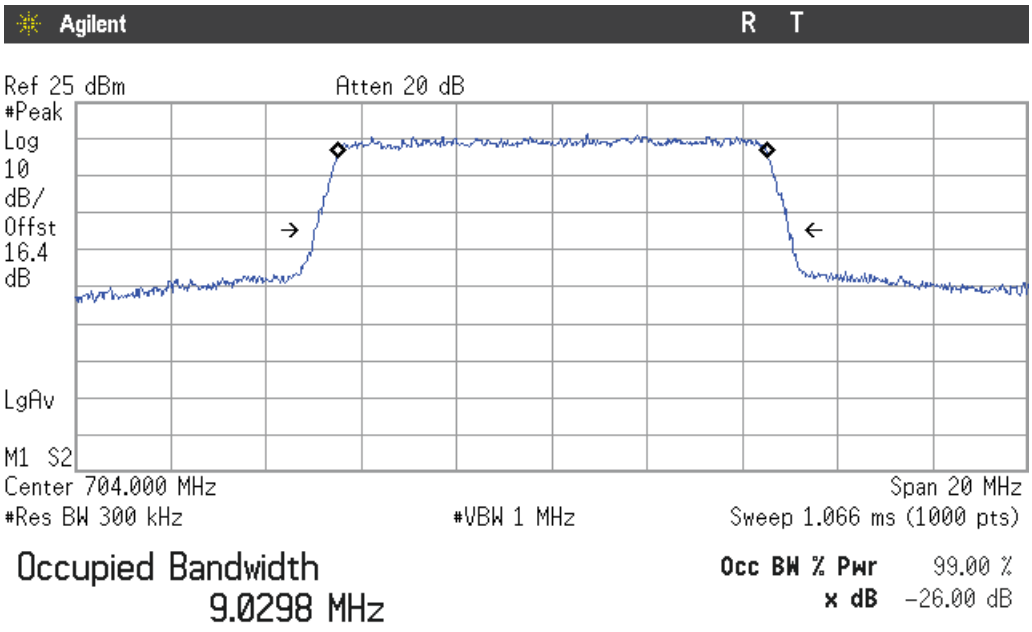


Highest Channel:

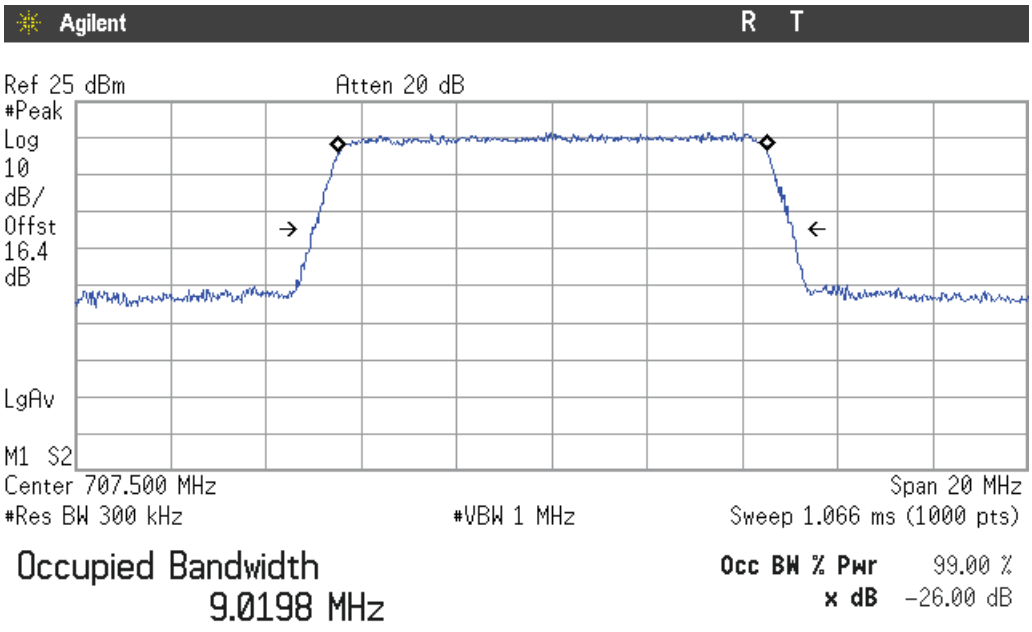


LTE Band 12. QPSK MODULATION. BW = 10 MHz.

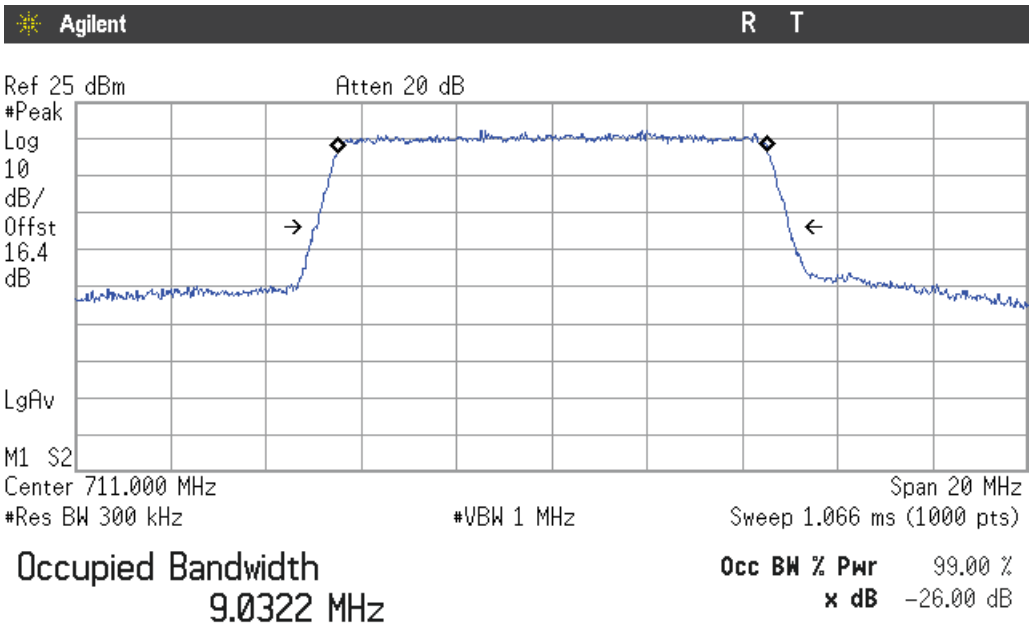
Lowest Channel:



Middle Channel:

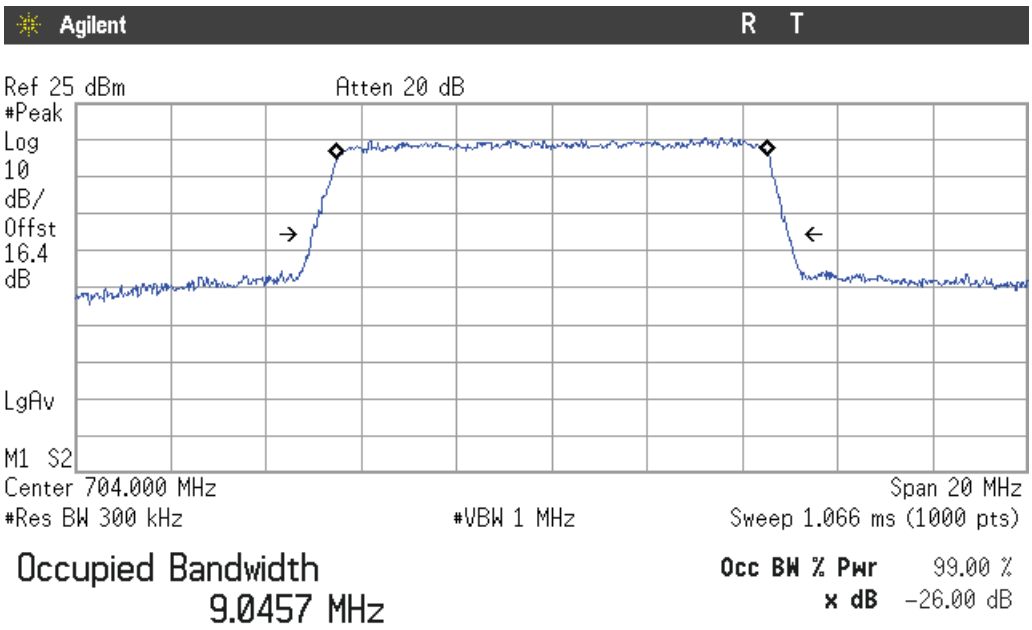


Highest Channel:

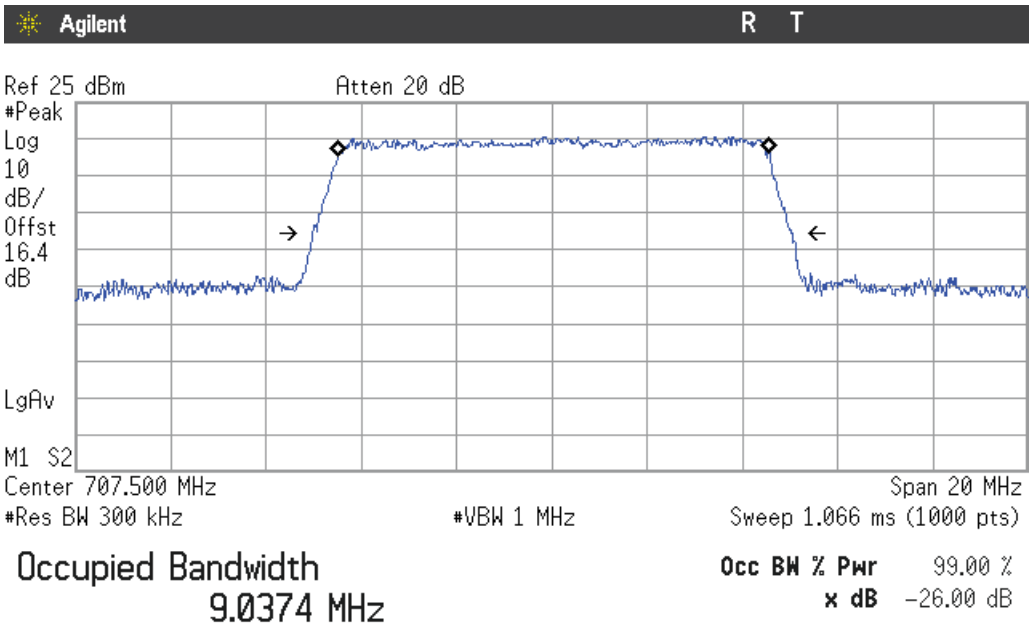


LTE Band 12. 16QAM MODULATION. BW = 10 MHz.

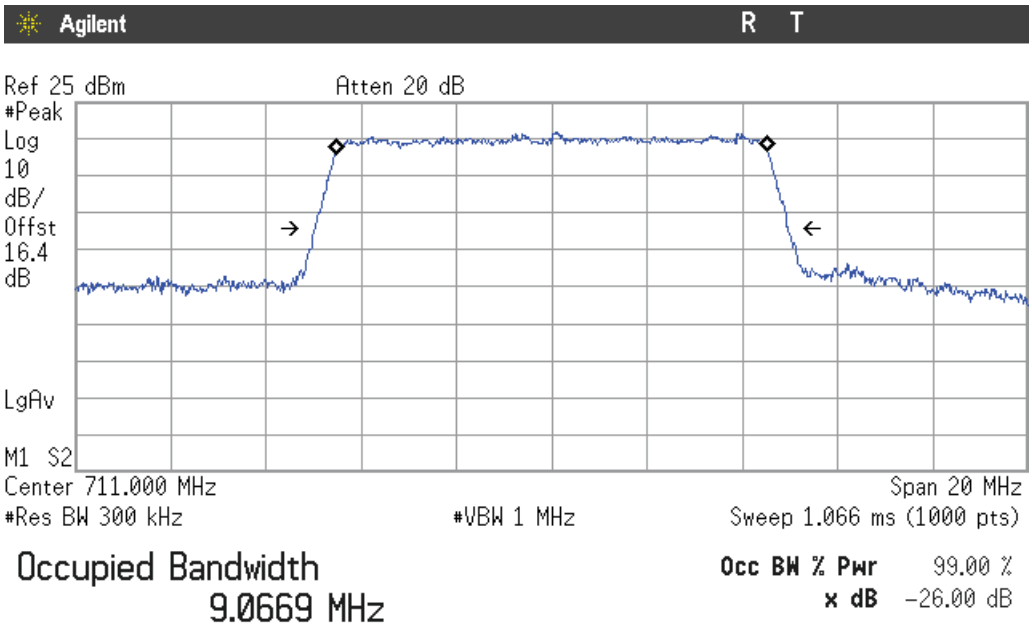
Lowest Channel:



Middle Channel:

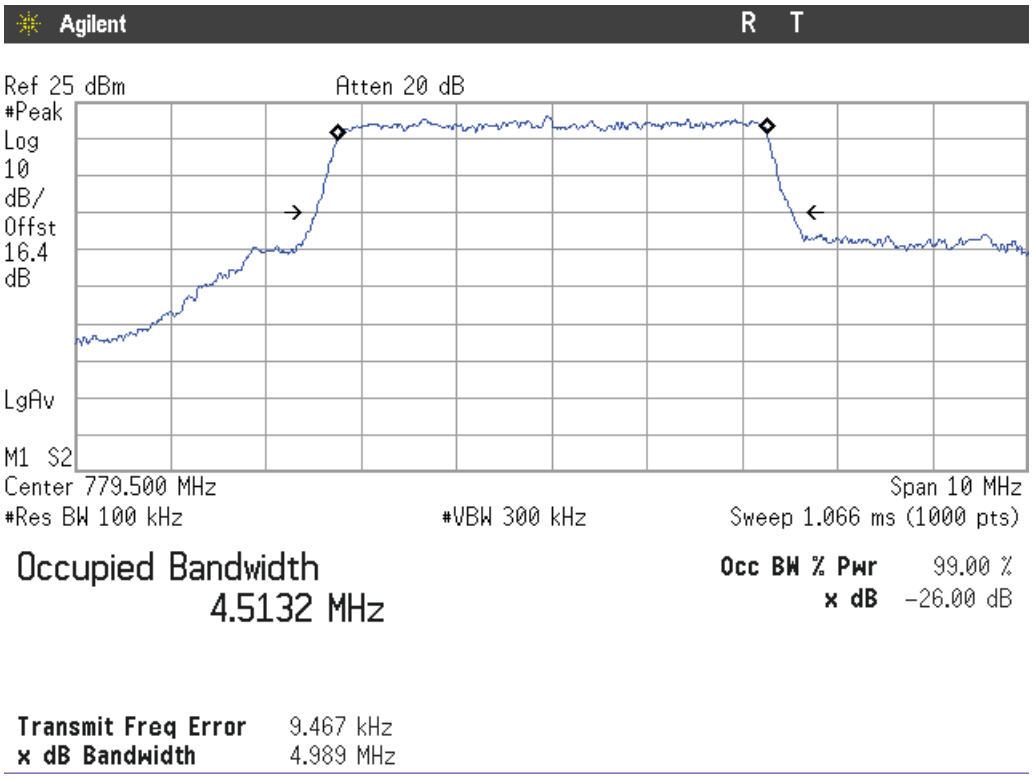


Highest Channel:

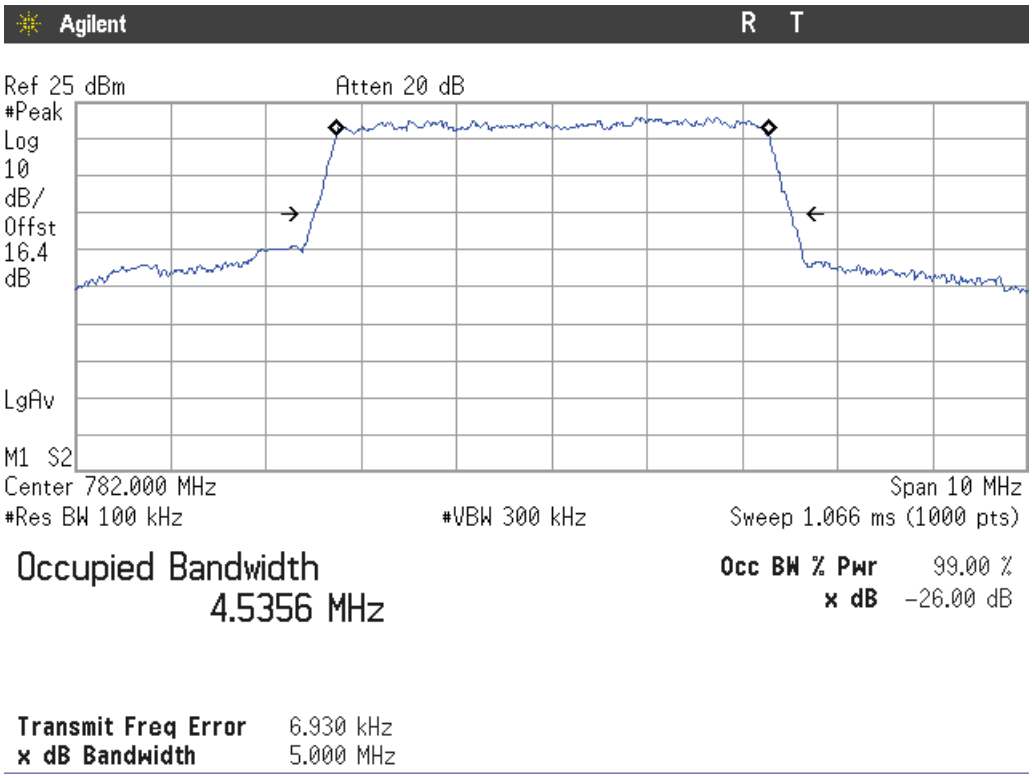


LTE Band 13. QPSK MODULATION. BW = 5 MHz.

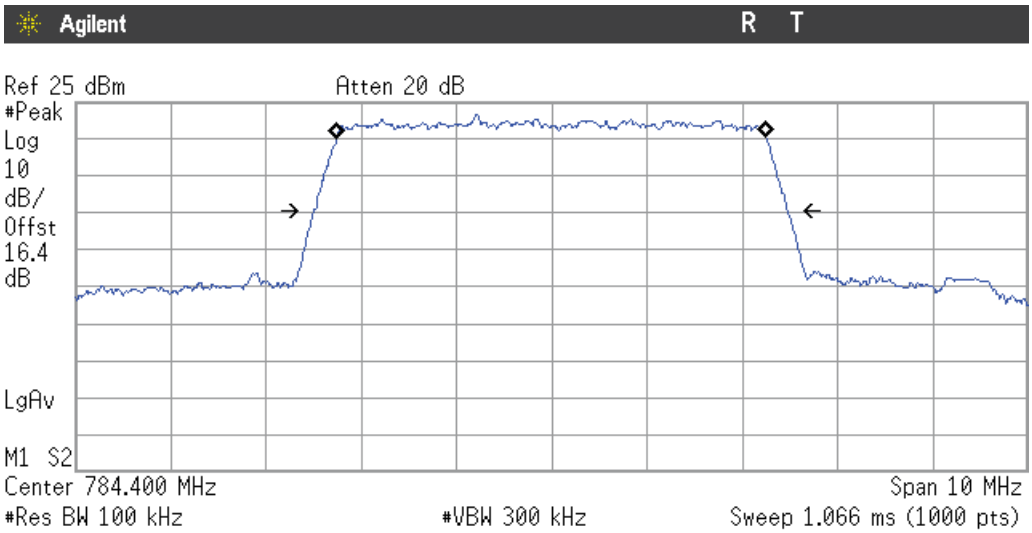
Lowest Channel:



Middle Channel:

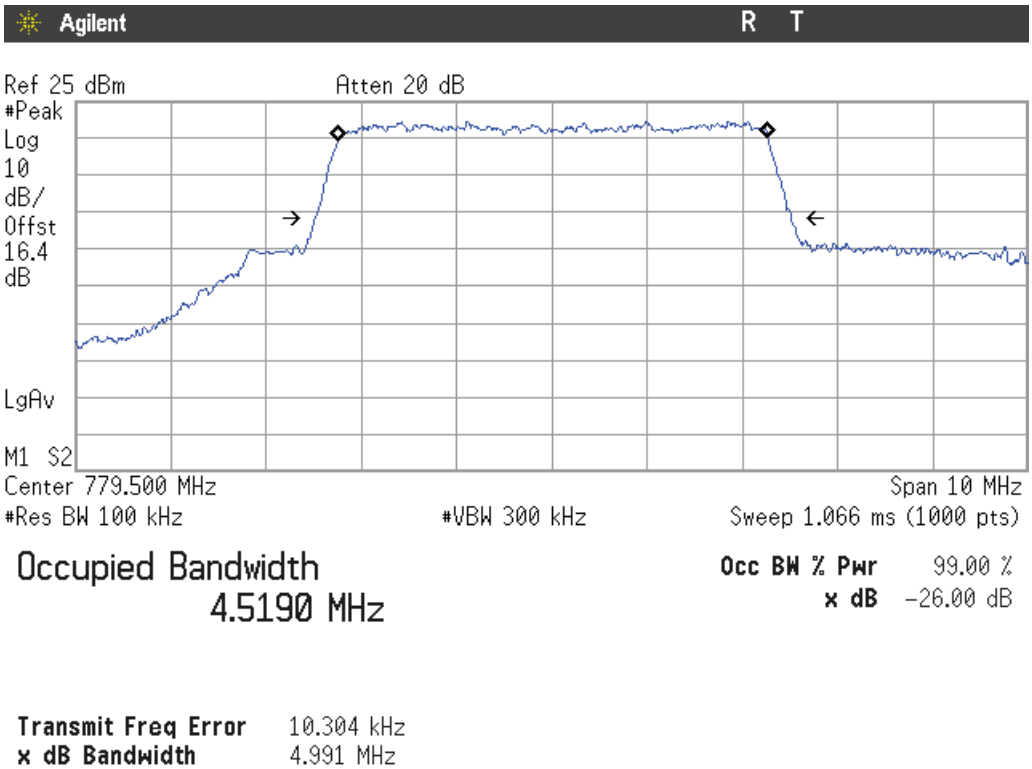


Highest Channel:

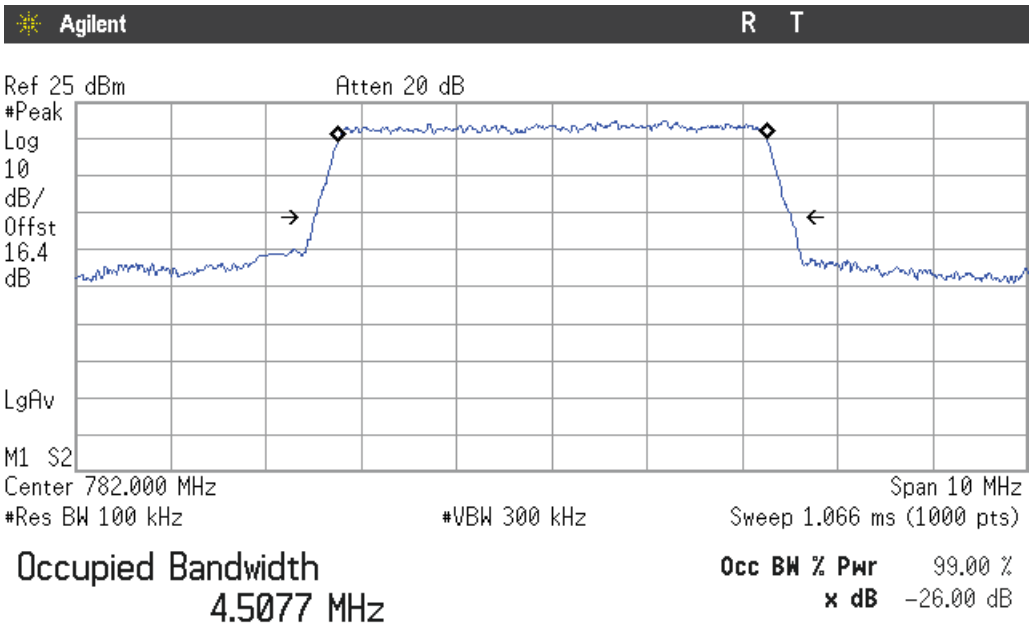


LTE Band 13. 16QAM MODULATION. BW = 5 MHz.

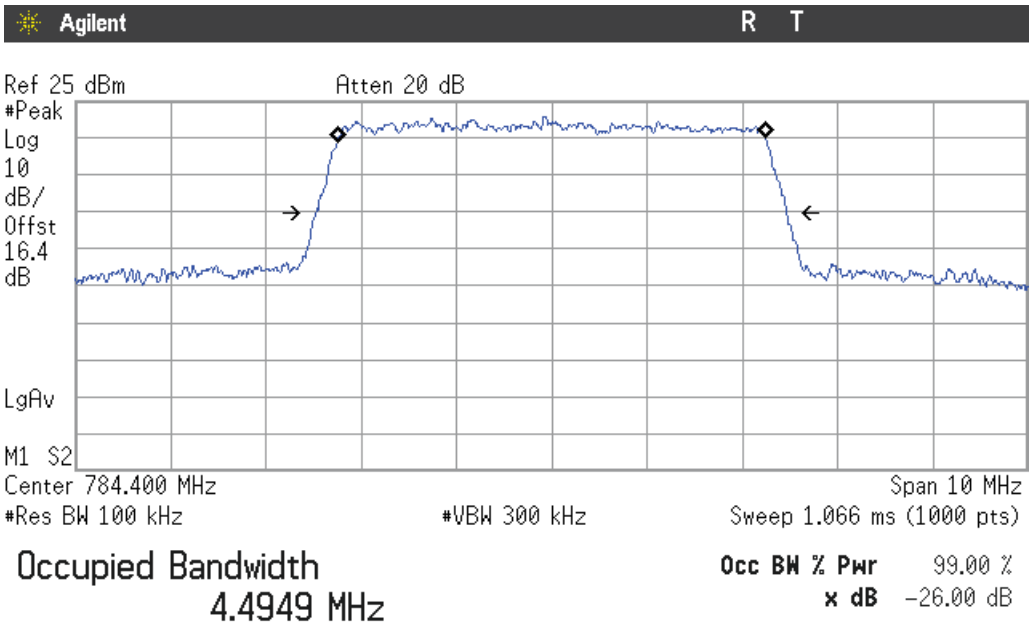
Lowest Channel:



Middle Channel:

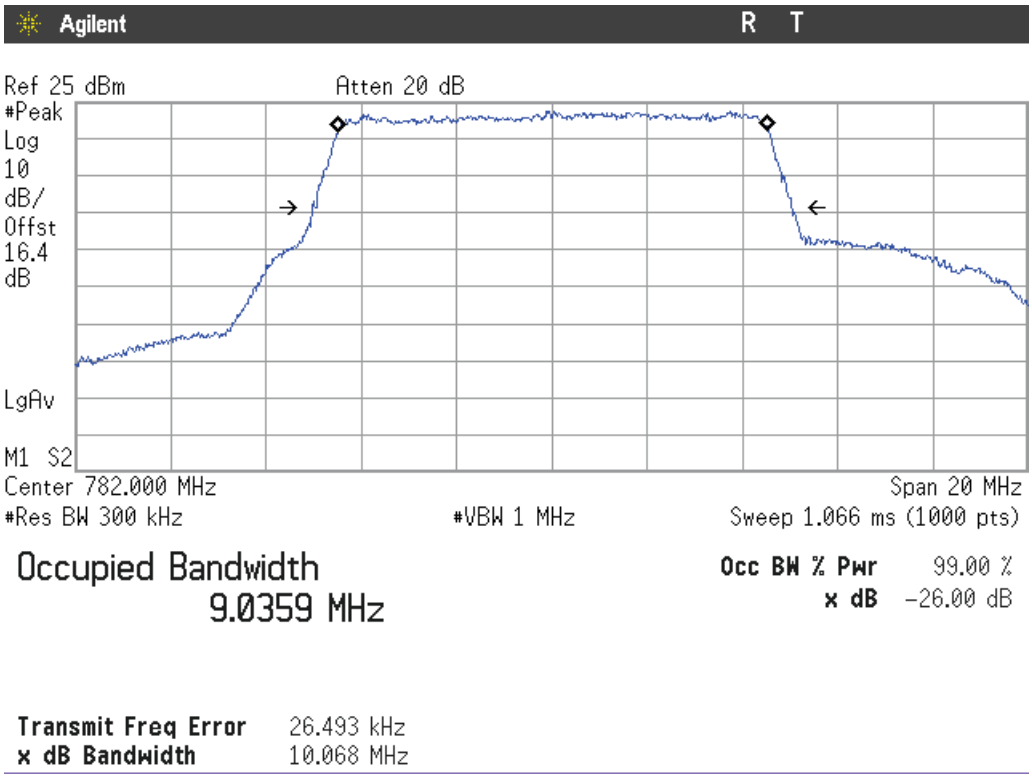


Highest Channel:



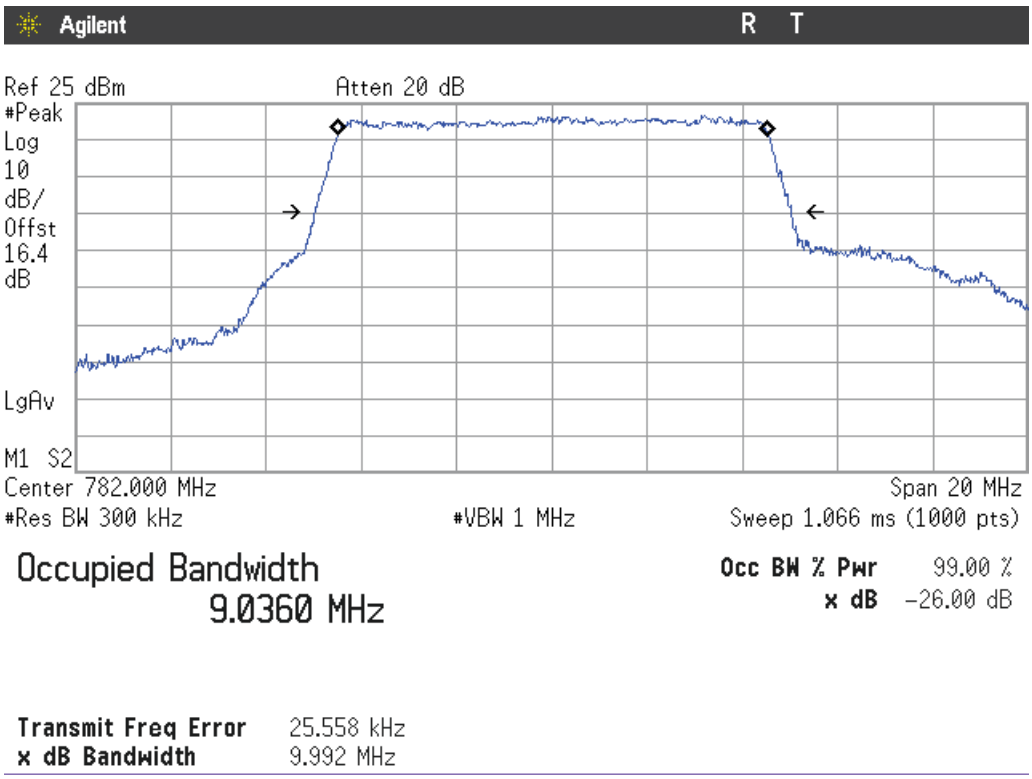
LTE Band 13. QPSK MODULATION. BW = 10 MHz.

Middle Channel:



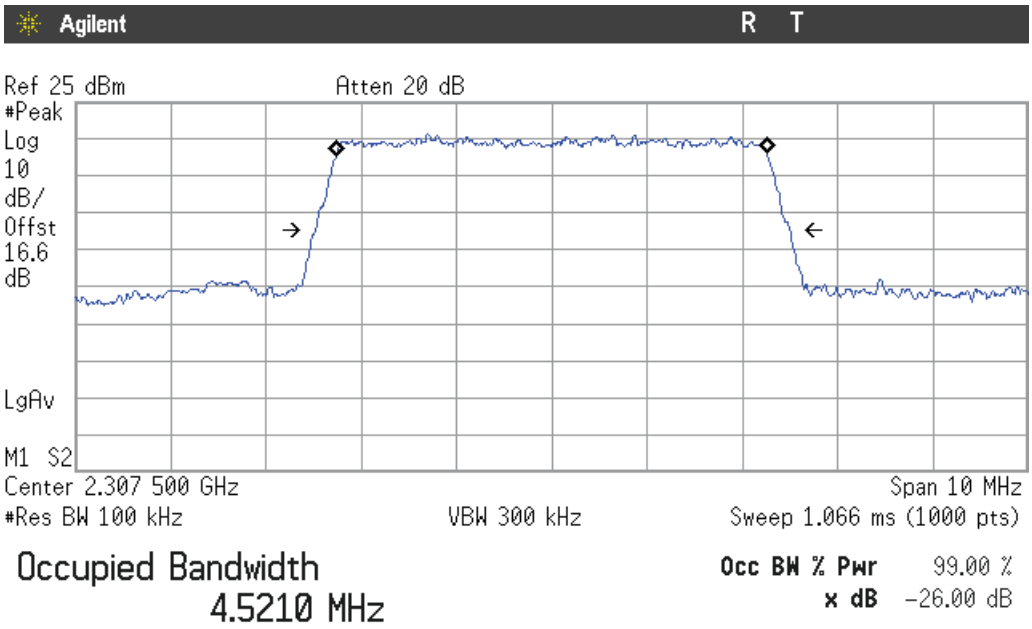
LTE Band 13. 16QAM MODULATION. BW = 10 MHz.

Middle Channel:

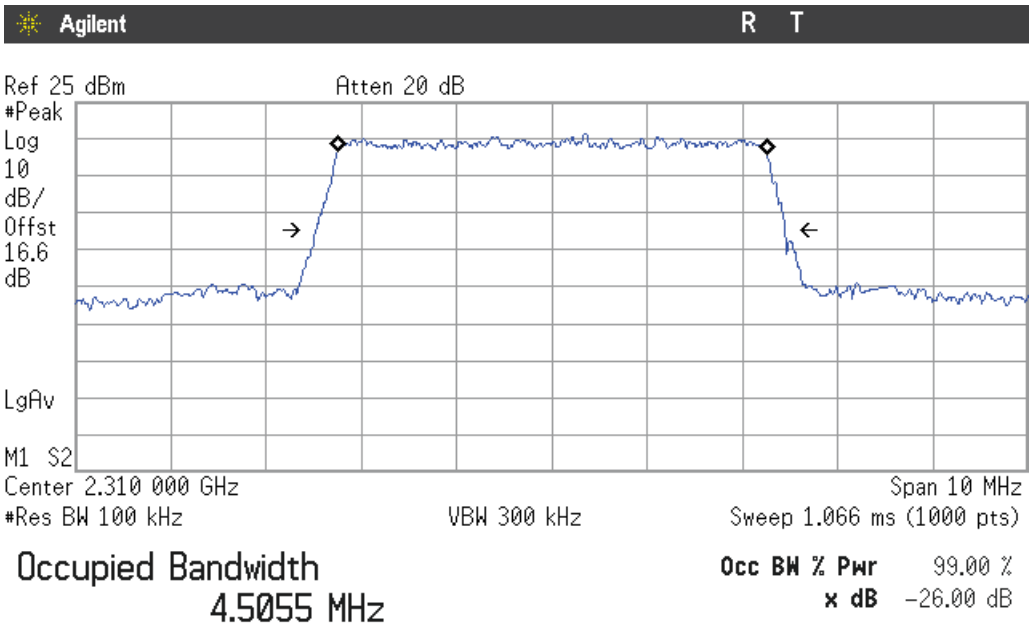


LTE Band 30. QPSK MODULATION. BW = 5 MHz.

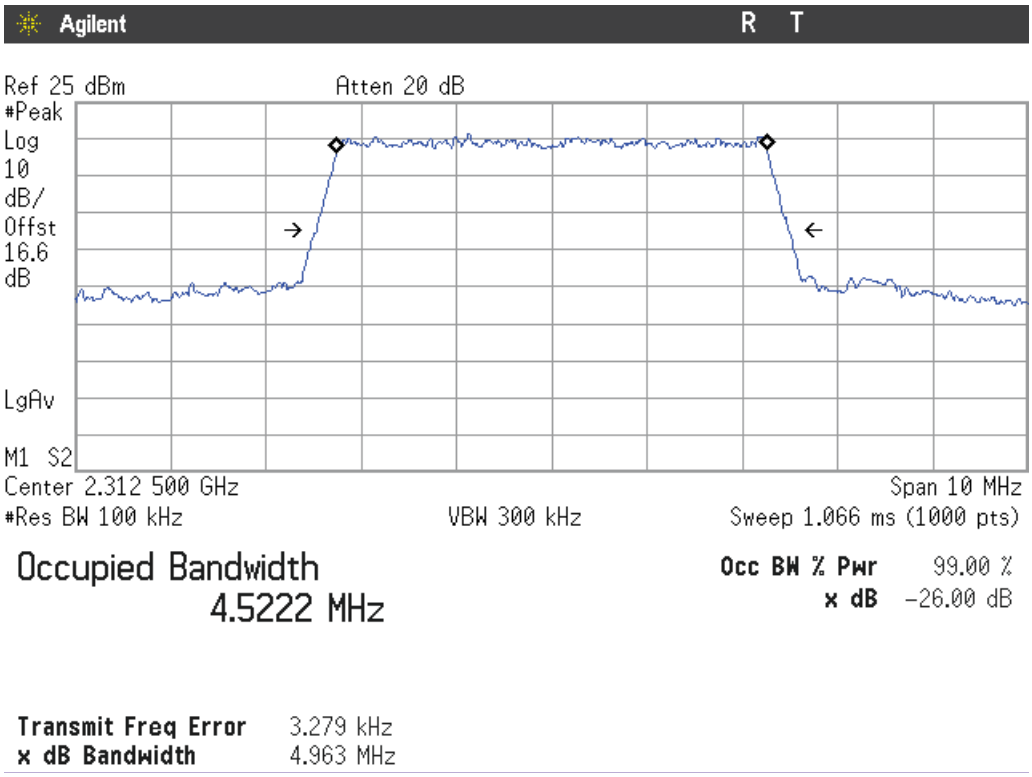
Lowest Channel:



Middle Channel:

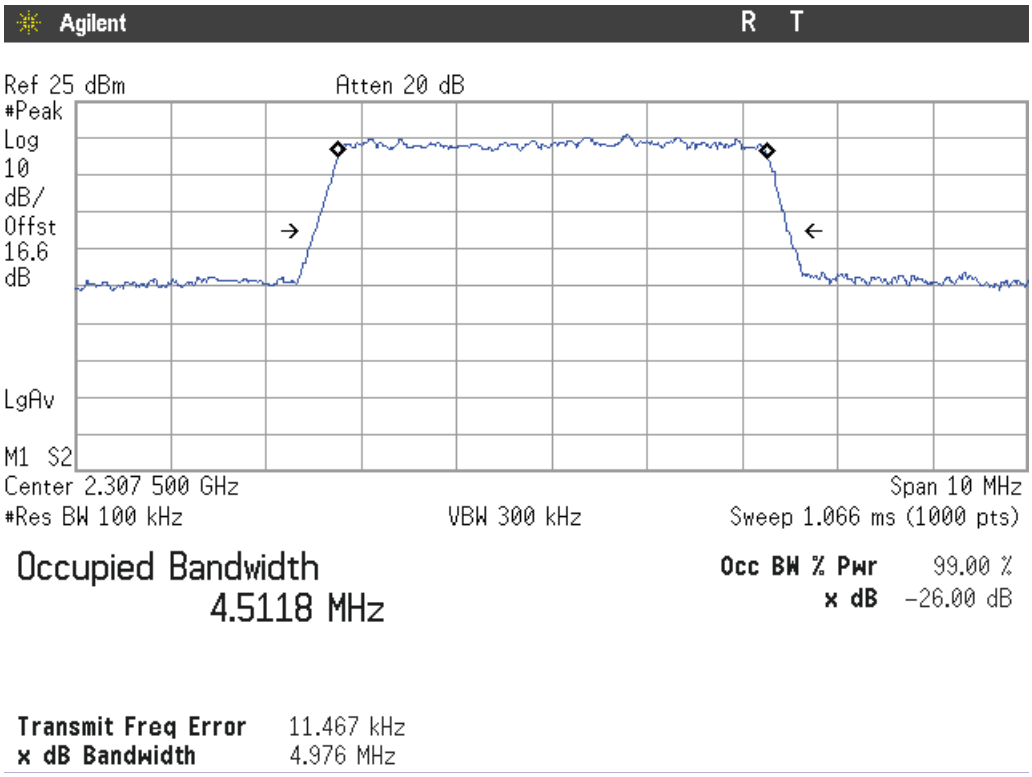


Highest Channel:

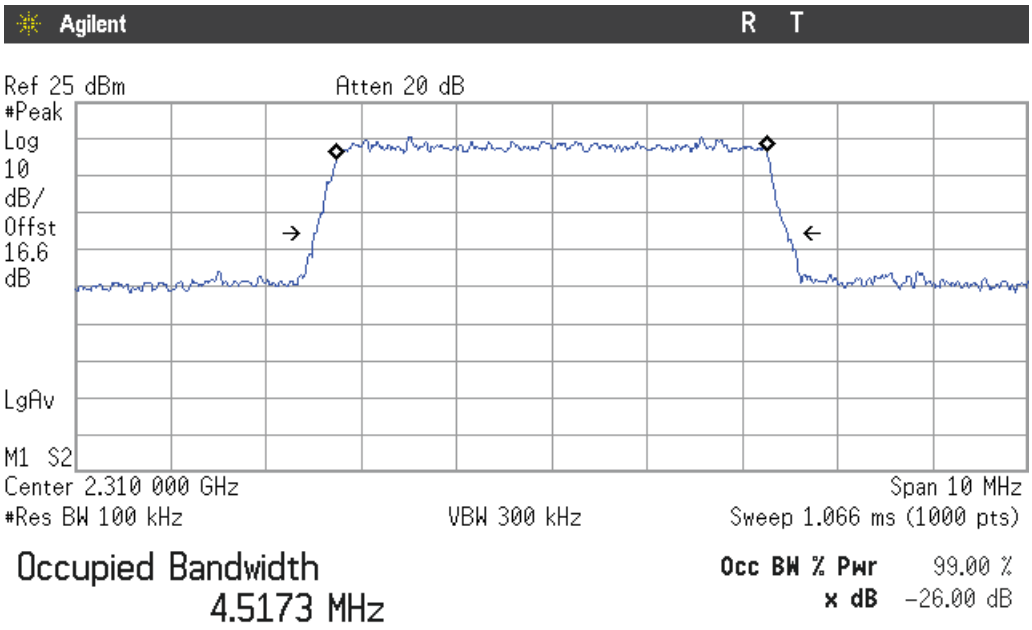


LTE Band 30. 16QAM MODULATION. BW = 5 MHz.

Lowest Channel:

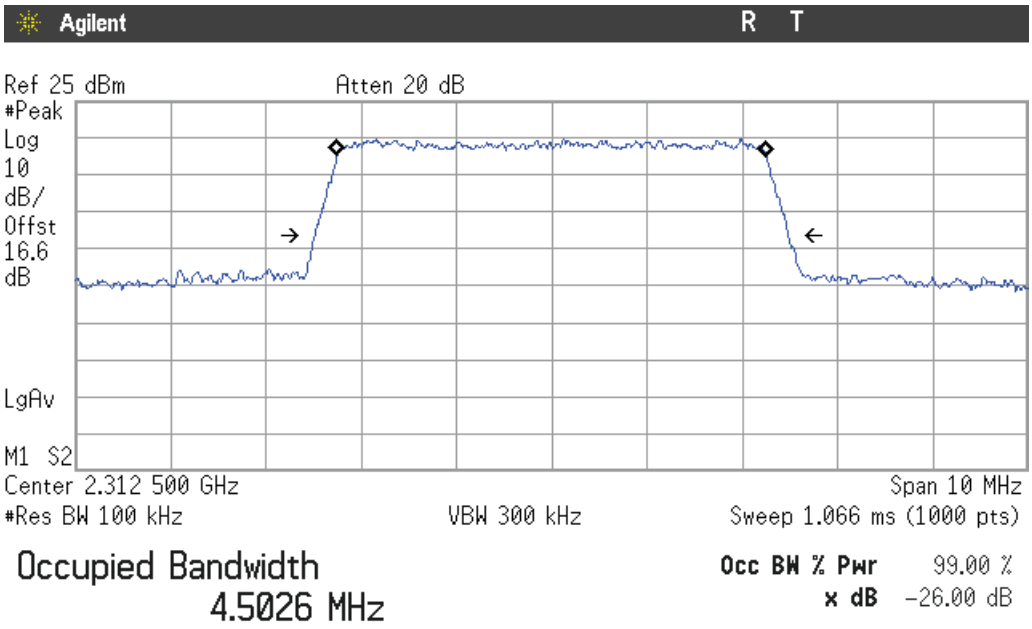


Middle Channel:



Transmit Freq Error	1.487 kHz
x dB Bandwidth	4.953 MHz

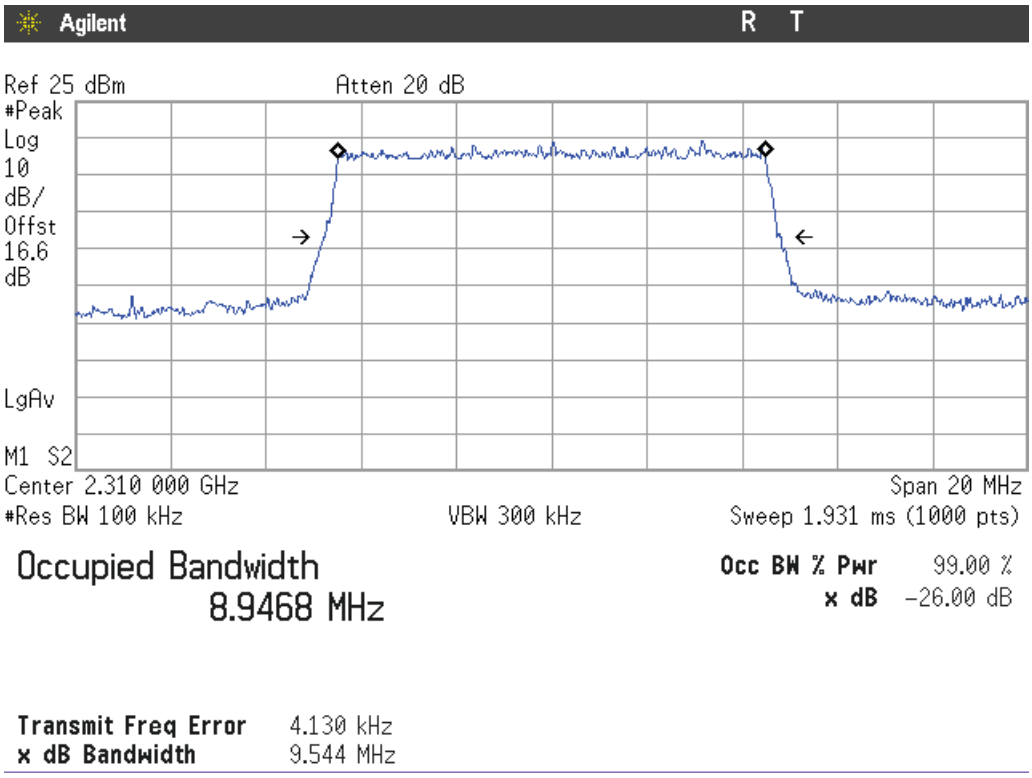
Highest Channel:



Transmit Freq Error	-1.127 kHz
x dB Bandwidth	4.974 MHz

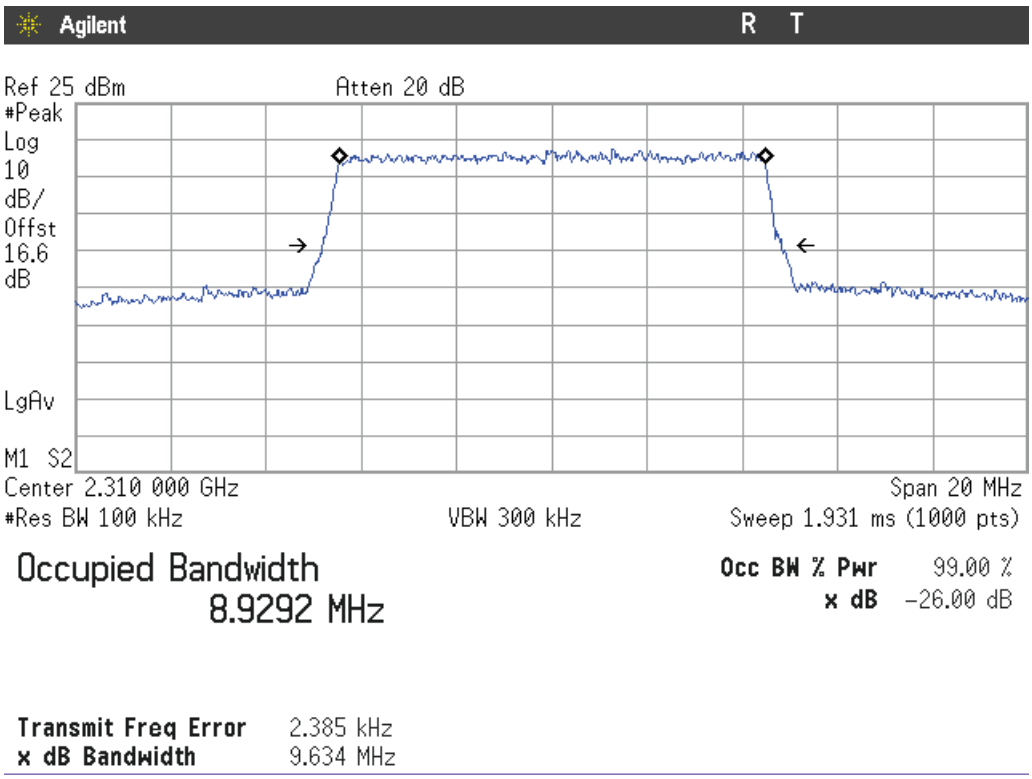
LTE Band 30. QPSK MODULATION. BW = 10 MHz.

Middle Channel:



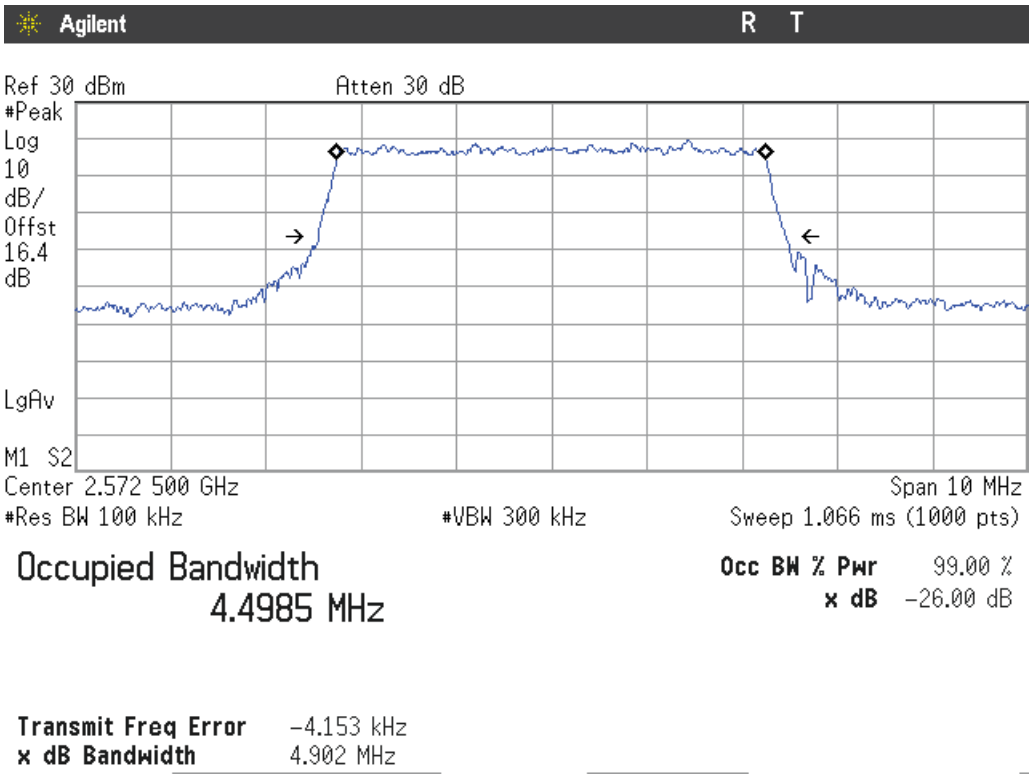
LTE Band 30. 16QAM MODULATION. BW = 10 MHz.

Middle Channel:

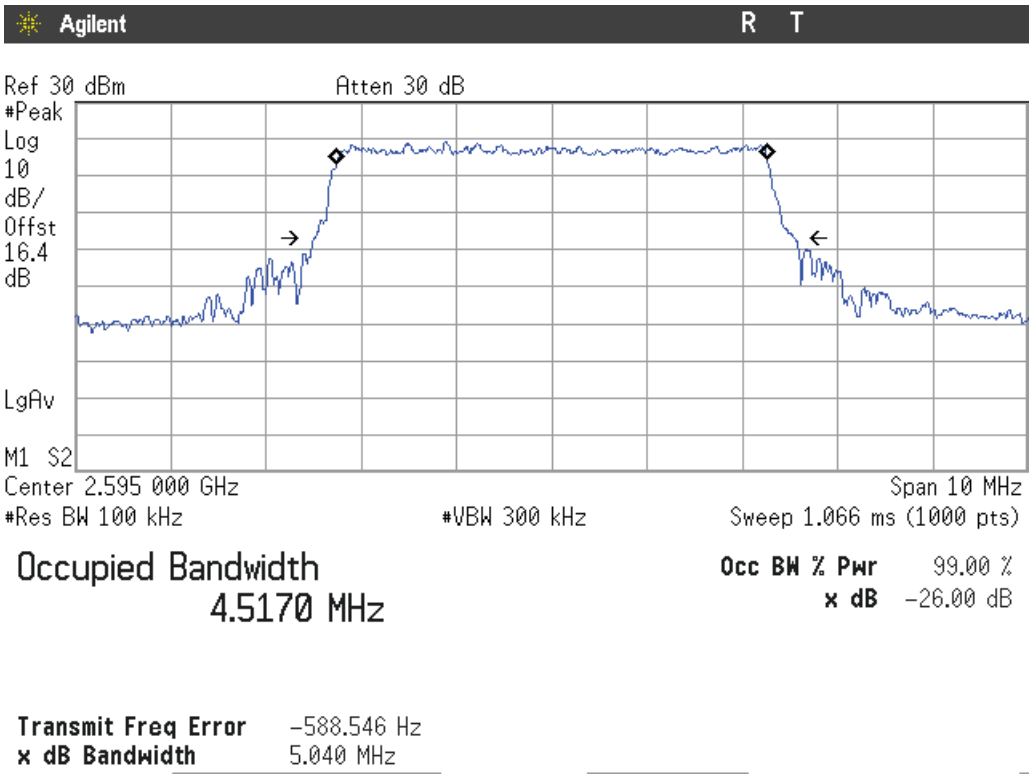


LTE Band 38. QPSK MODULATION. BW = 5 MHz.

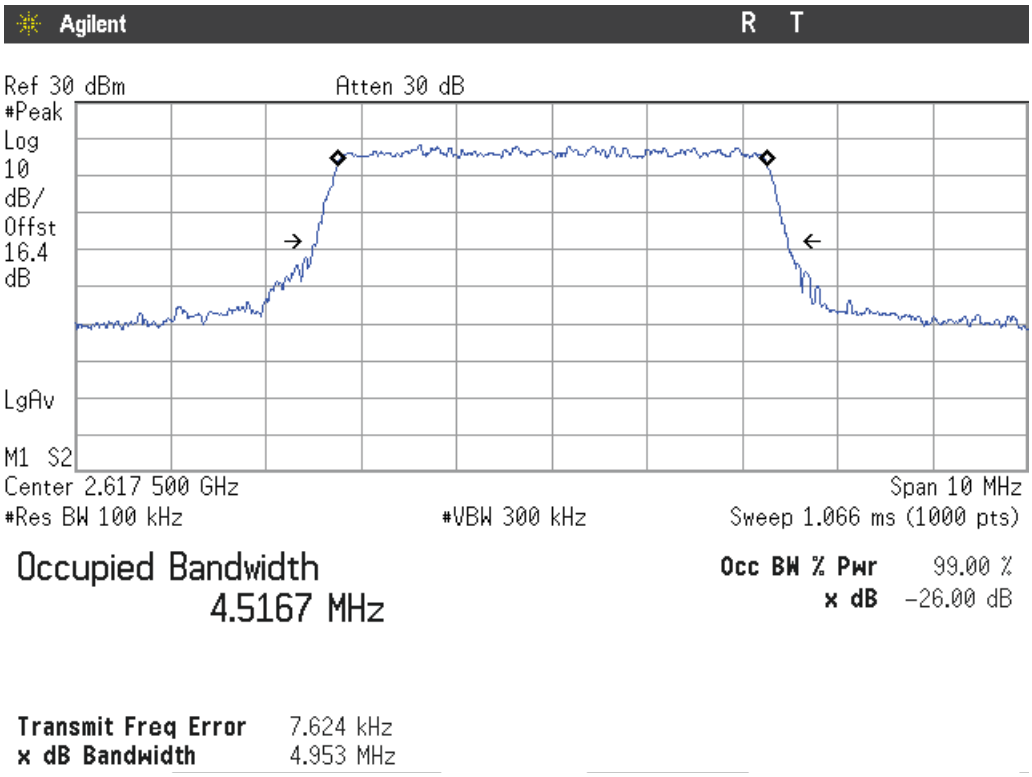
Lowest Channel:



Middle Channel:

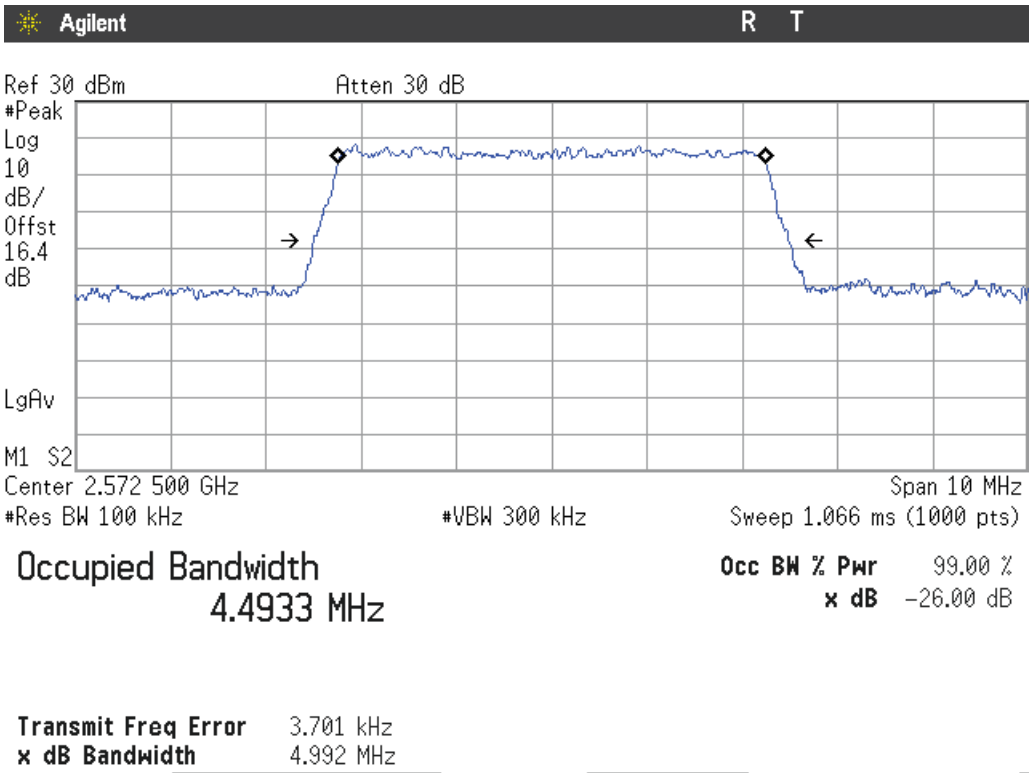


Highest Channel:

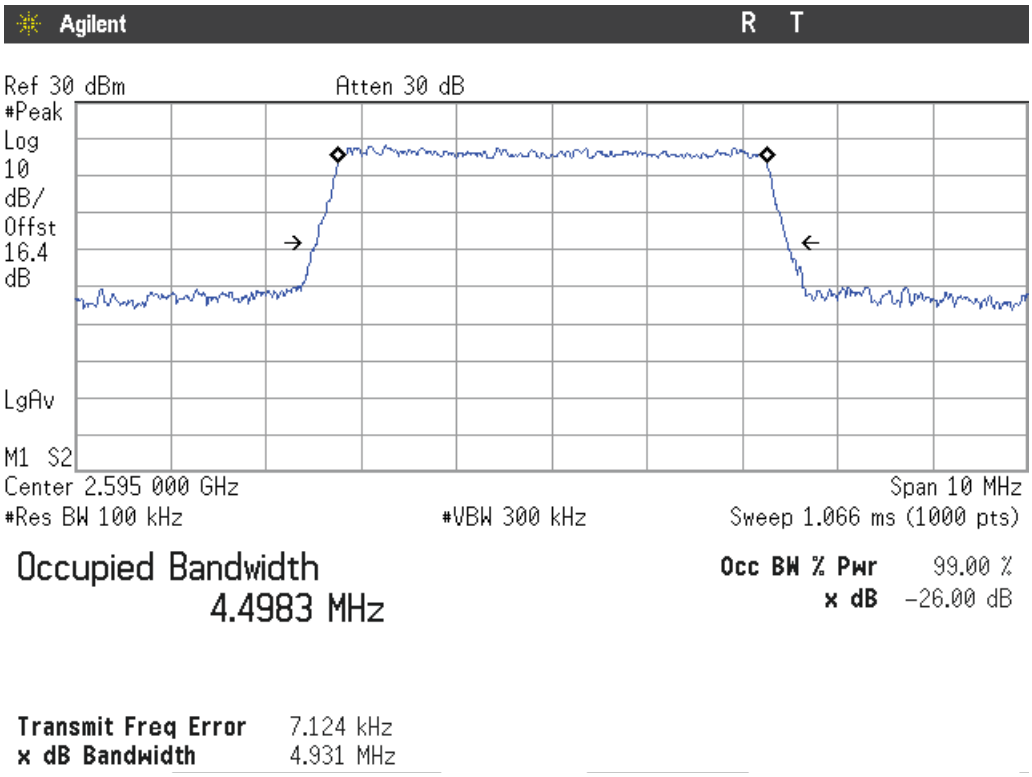


LTE Band 38. 16QAM MODULATION. BW = 5 MHz.

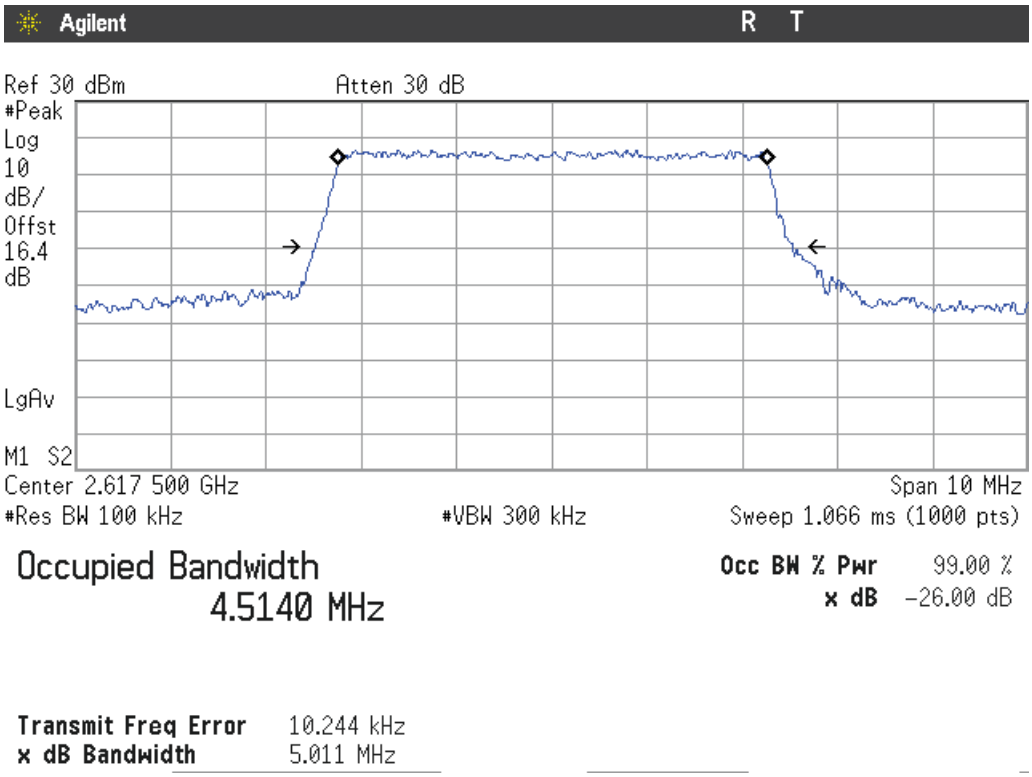
Lowest Channel:



Middle Channel:

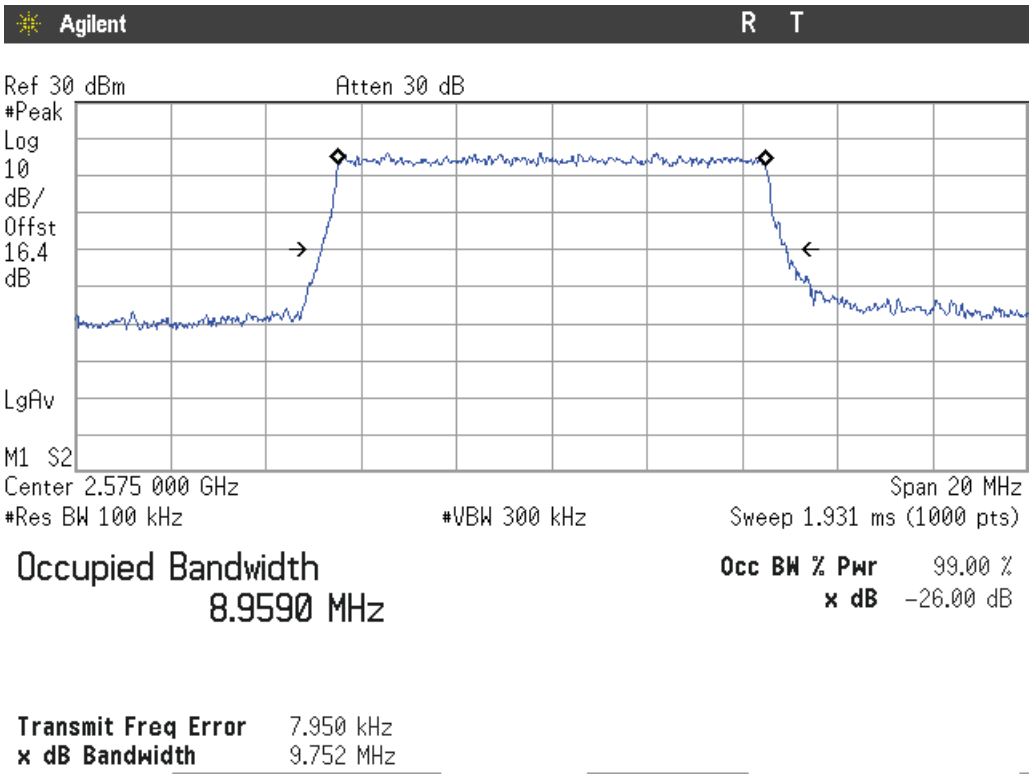


Highest Channel:

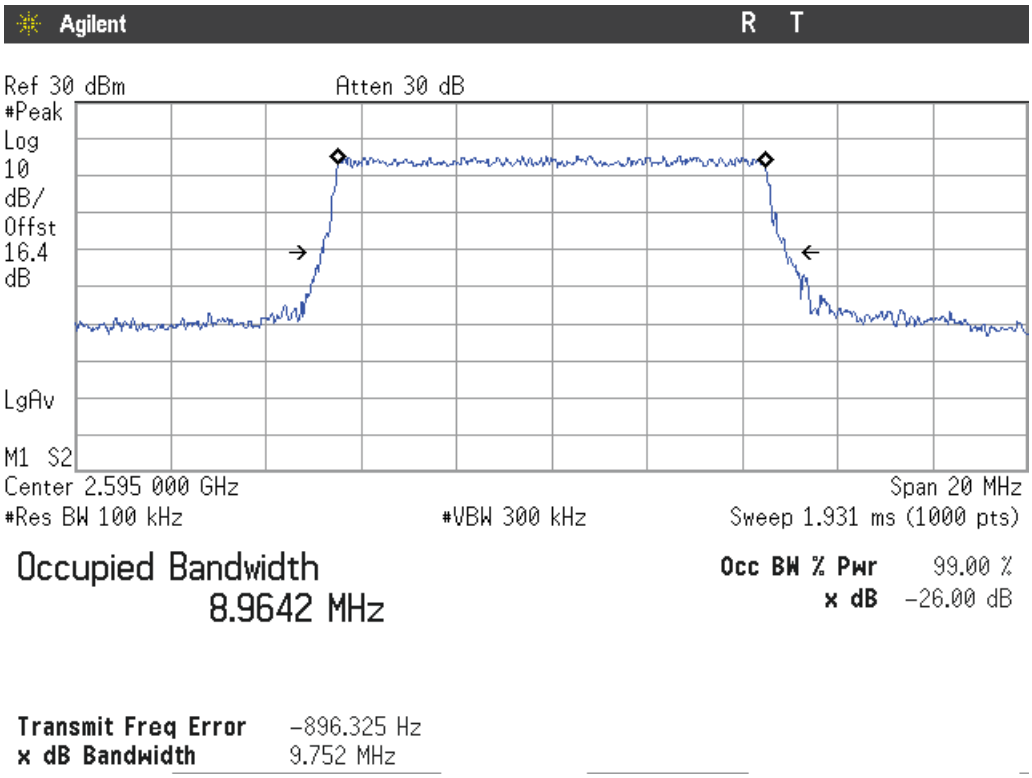


LTE Band 38. QPSK MODULATION. BW = 10 MHz.

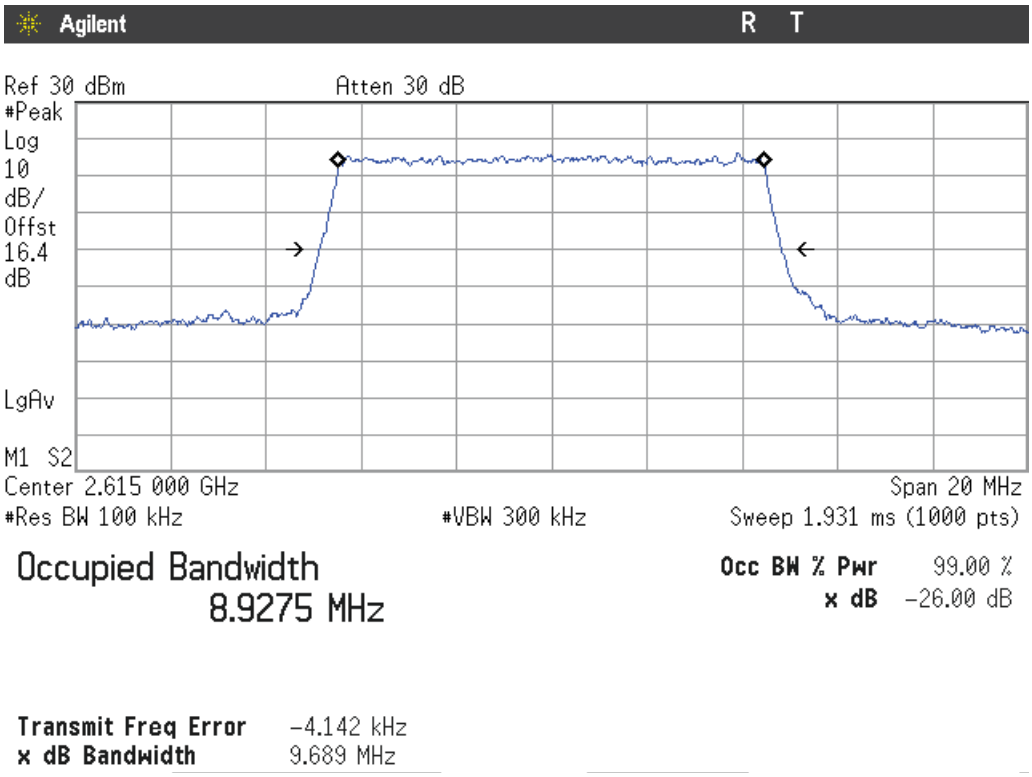
Lowest Channel:



Middle Channel:

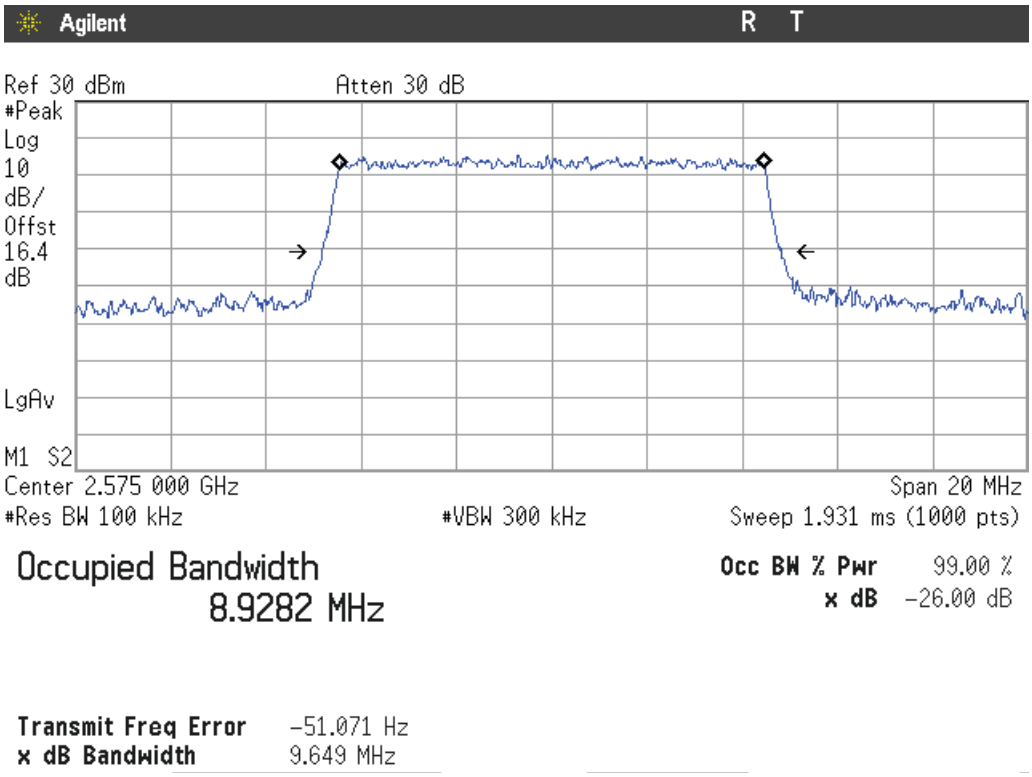


Highest Channel:

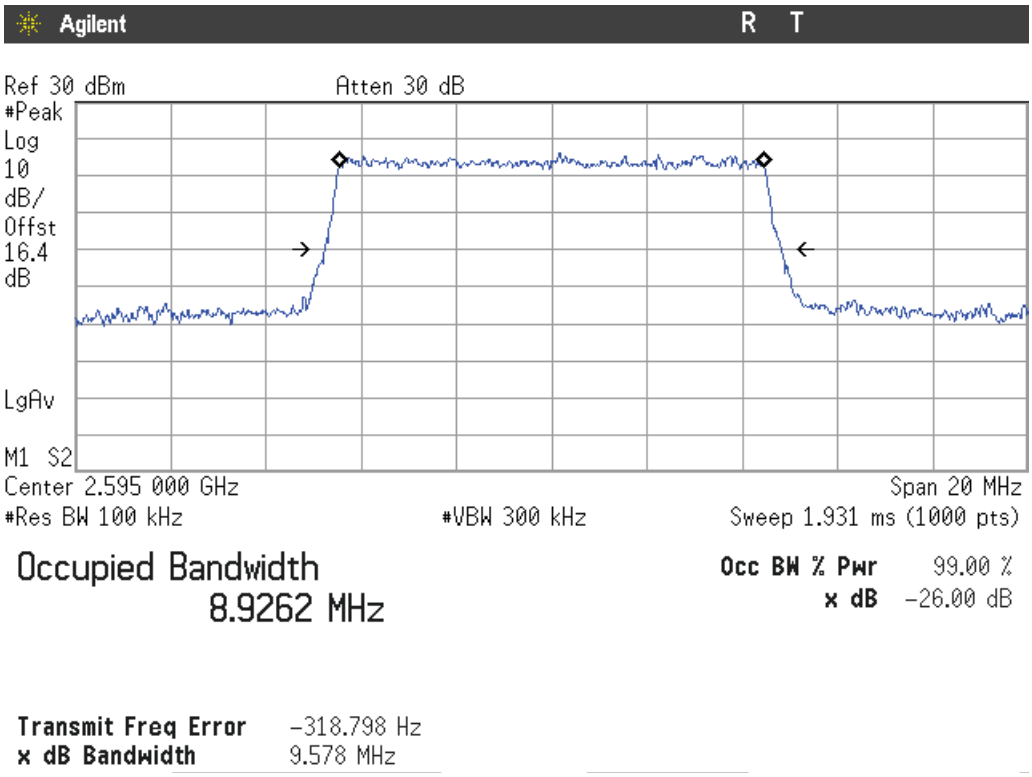


LTE Band 38. 16QAM MODULATION. BW = 10 MHz.

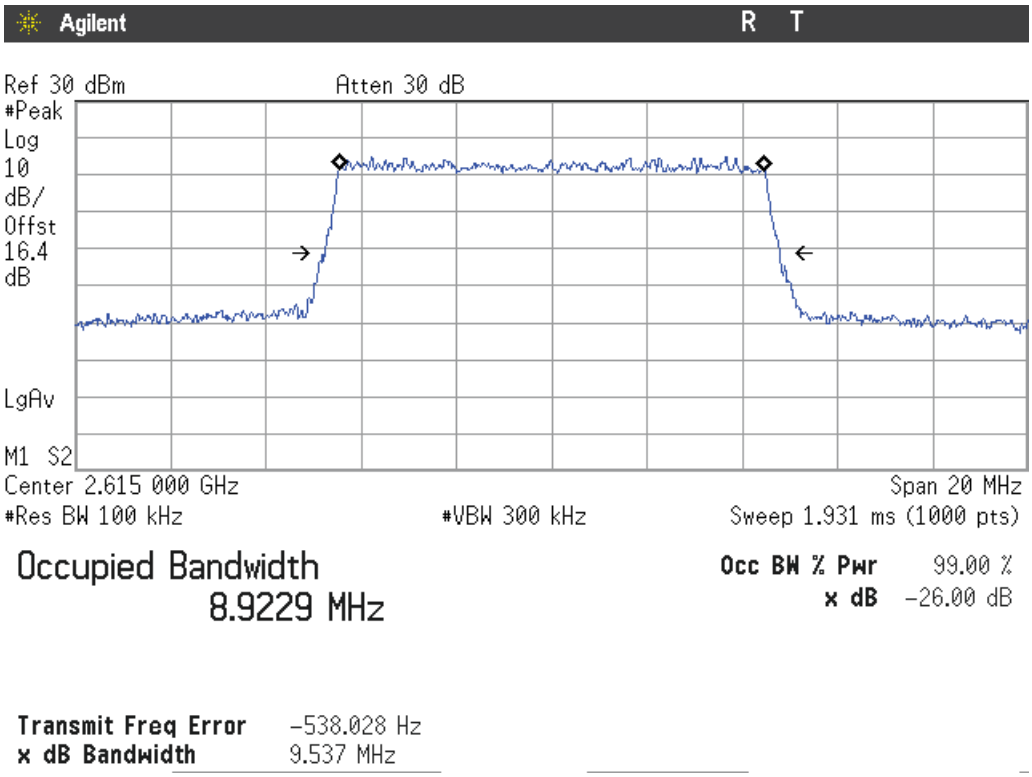
Lowest Channel:



Middle Channel:

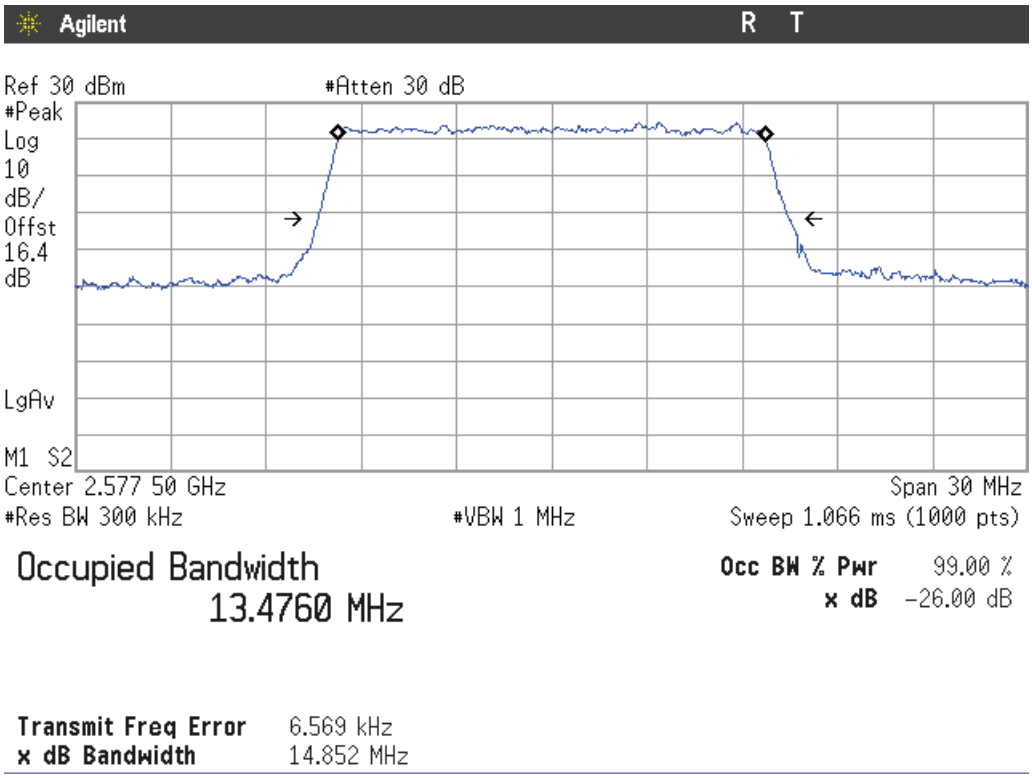


Highest Channel:

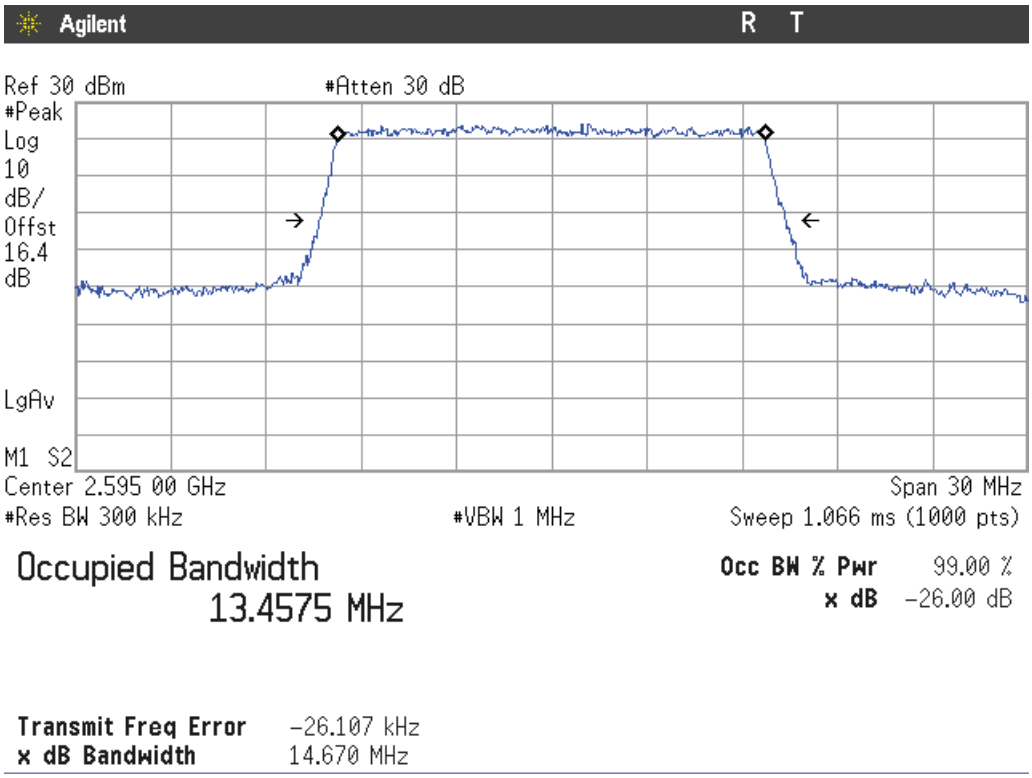


LTE Band 38. QPSK MODULATION. BW = 15 MHz.

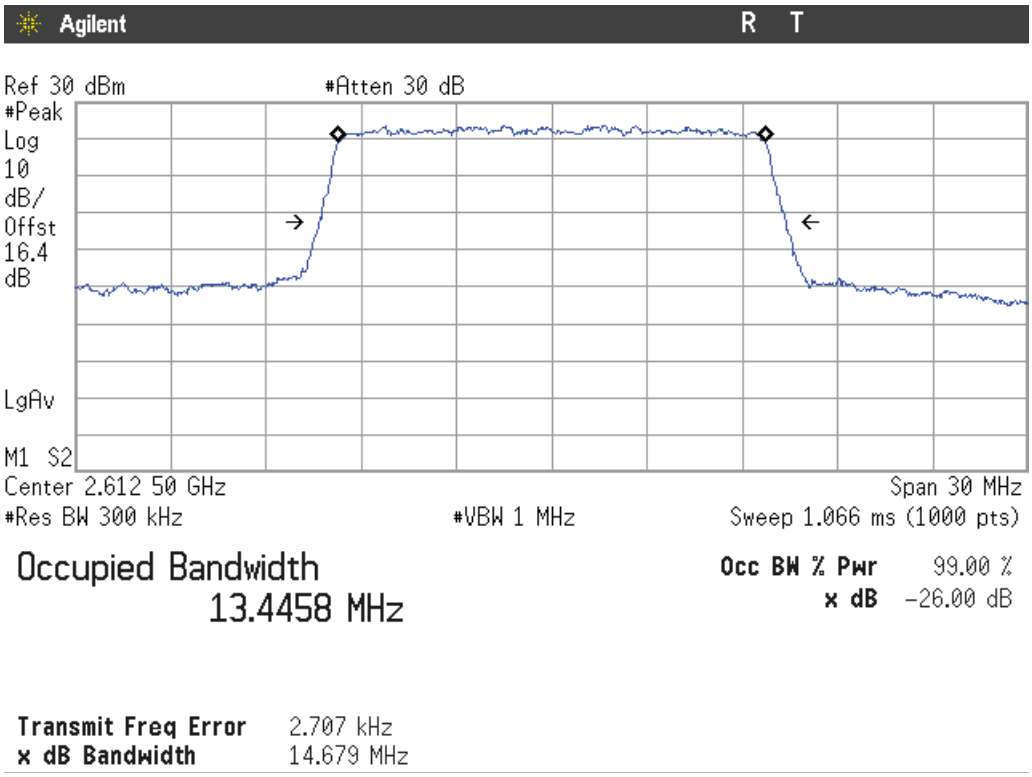
Lowest Channel:



Middle Channel:

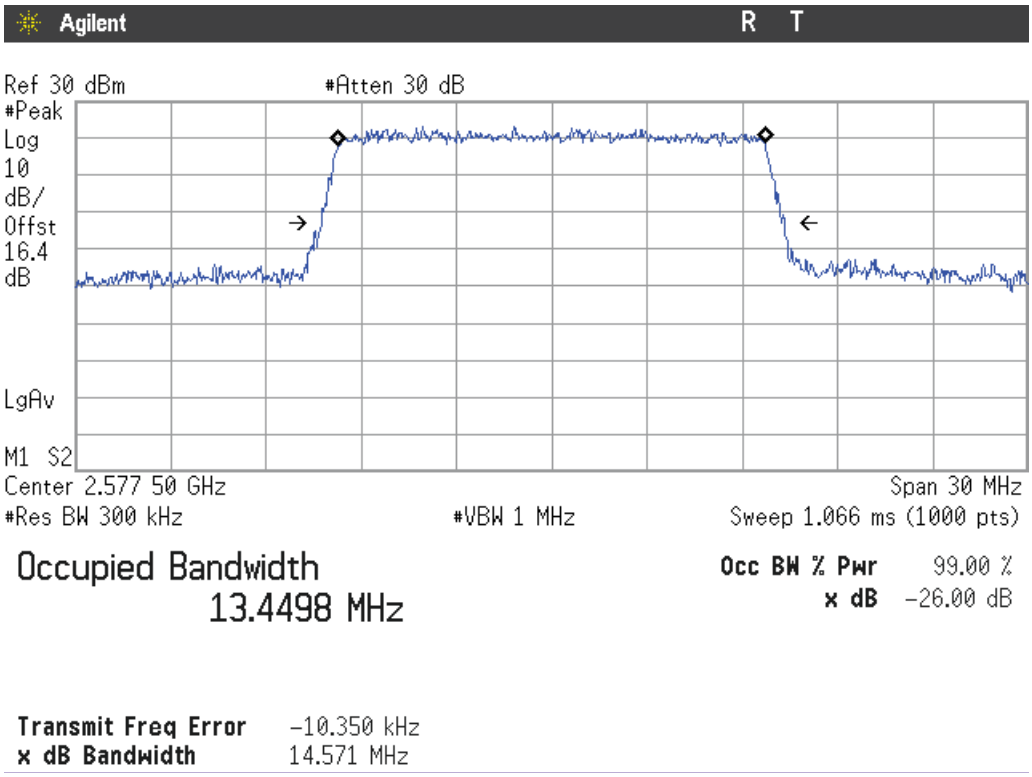


Highest Channel:

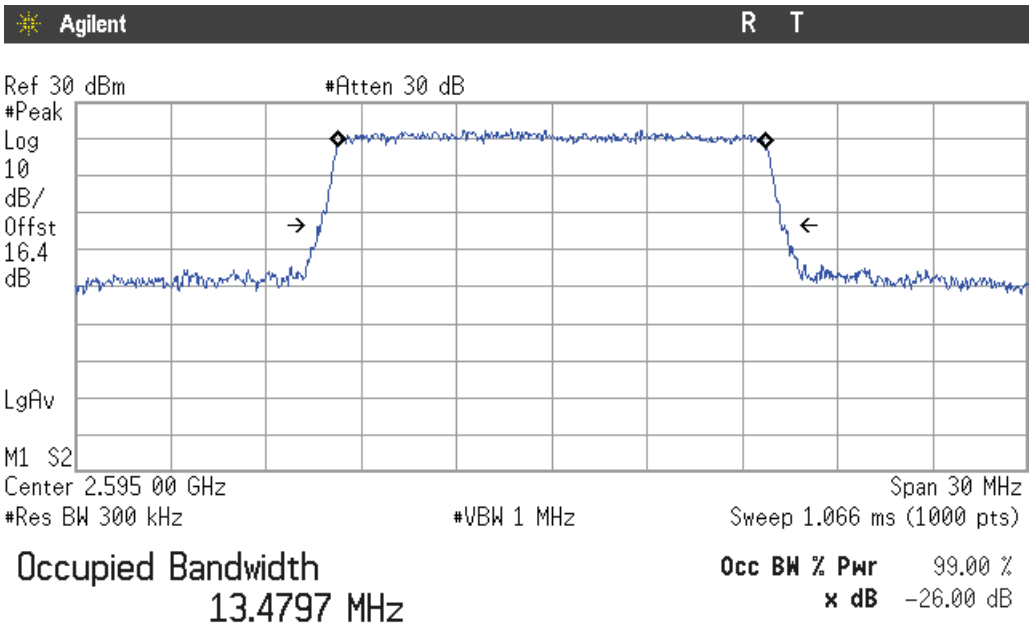


LTE Band 38. 16QAM MODULATION. BW = 15 MHz.

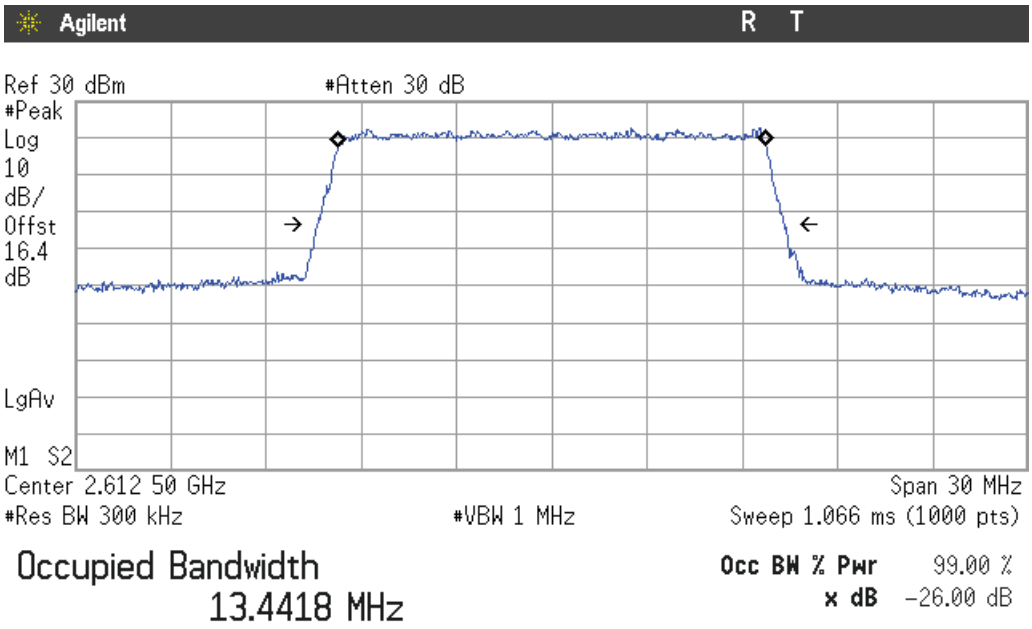
Lowest Channel:



Middle Channel:

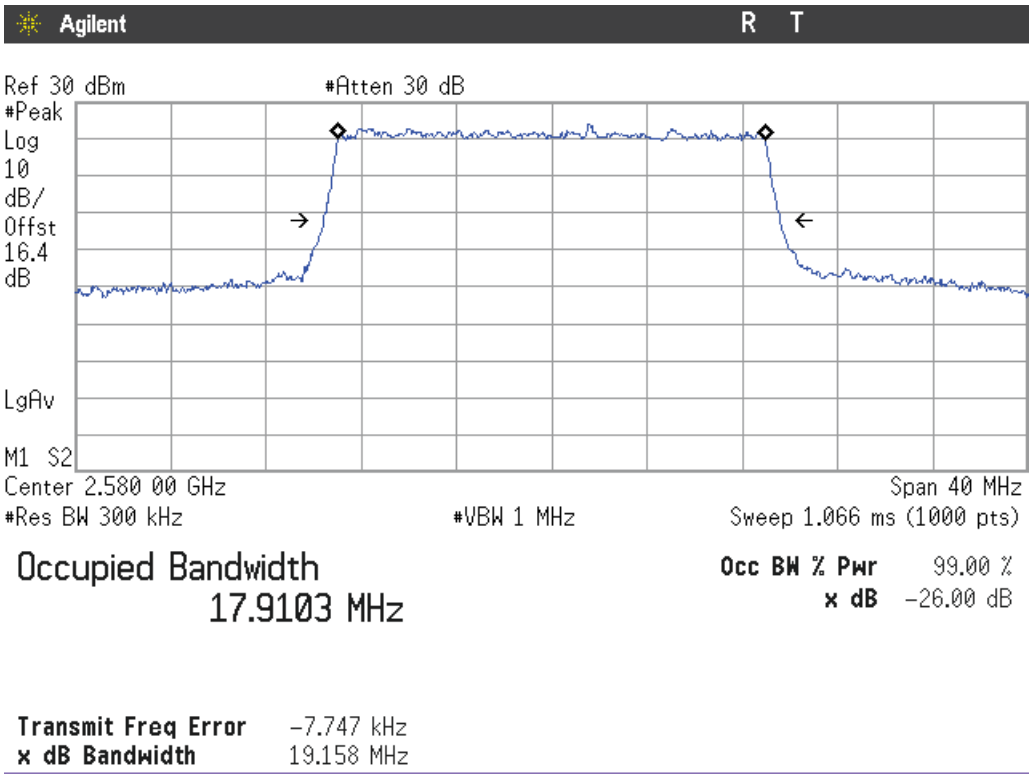


Highest Channel:

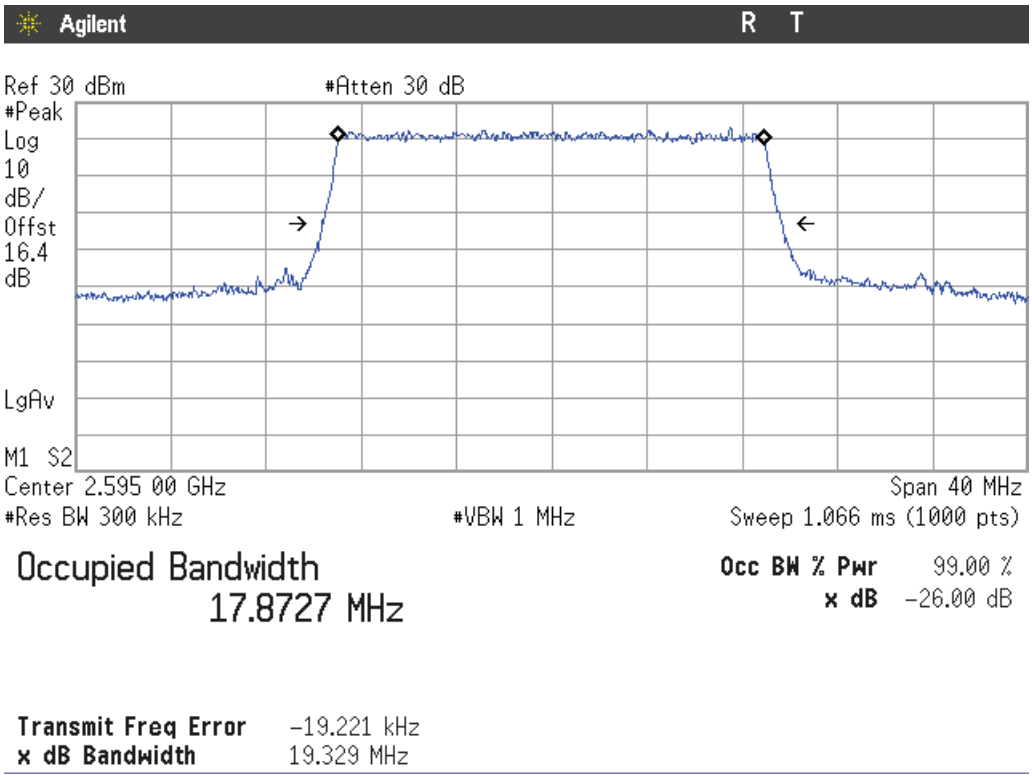


LTE Band 38. QPSK MODULATION. BW = 20 MHz.

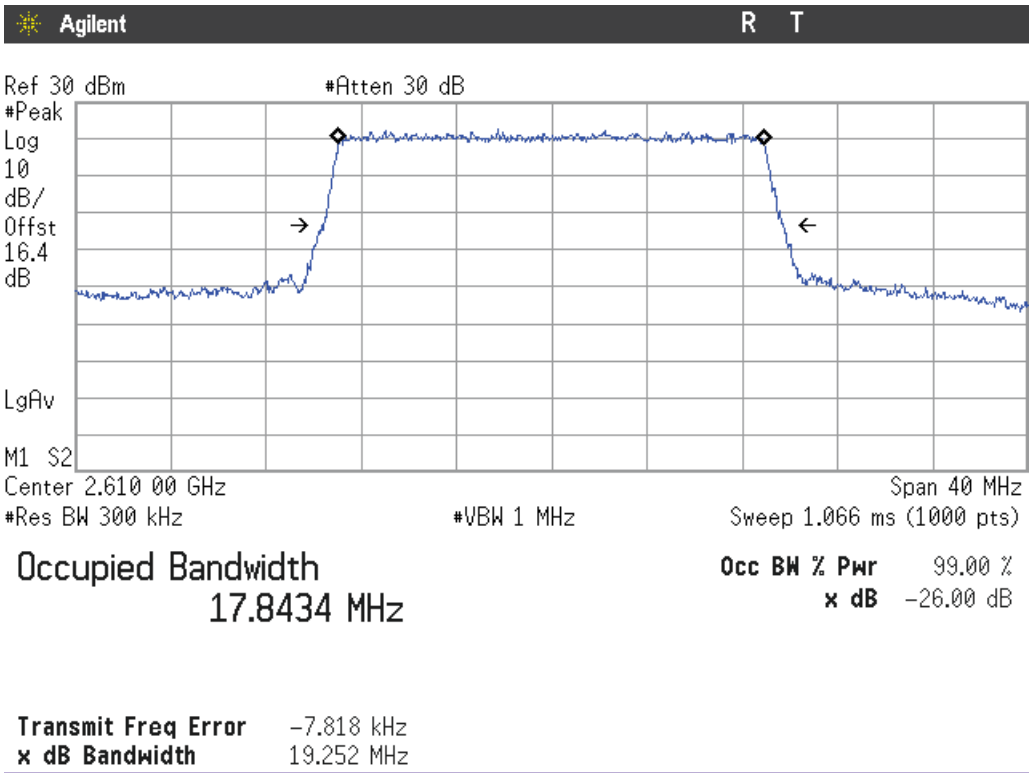
Lowest Channel:



Middle Channel:

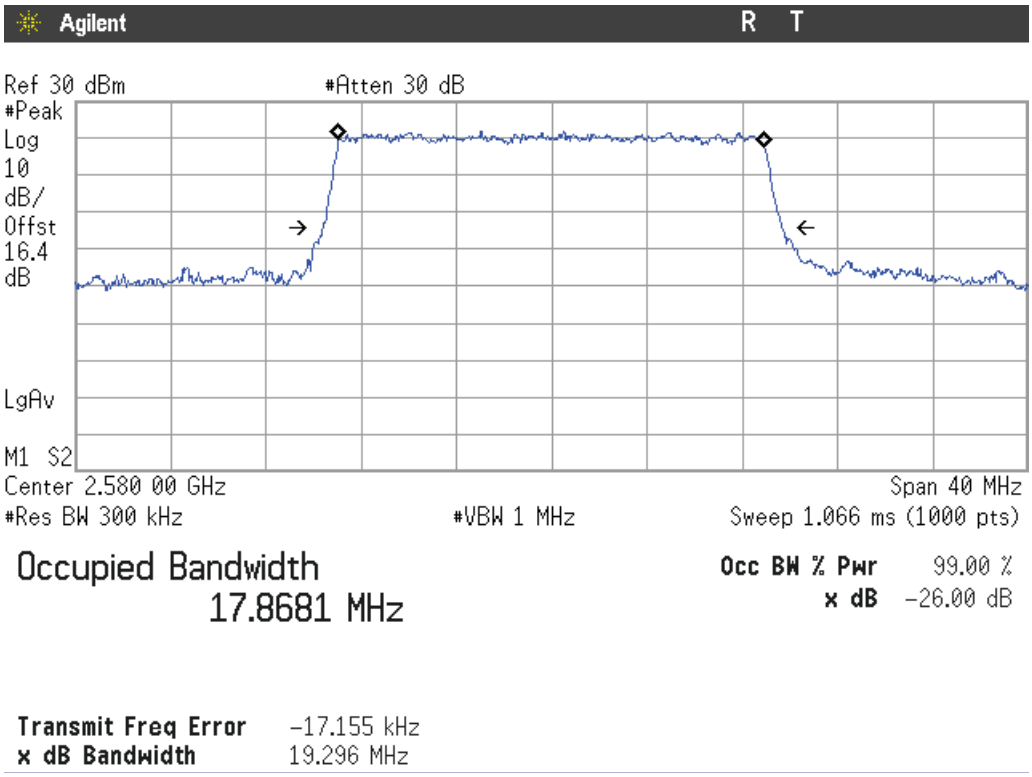


Highest Channel:

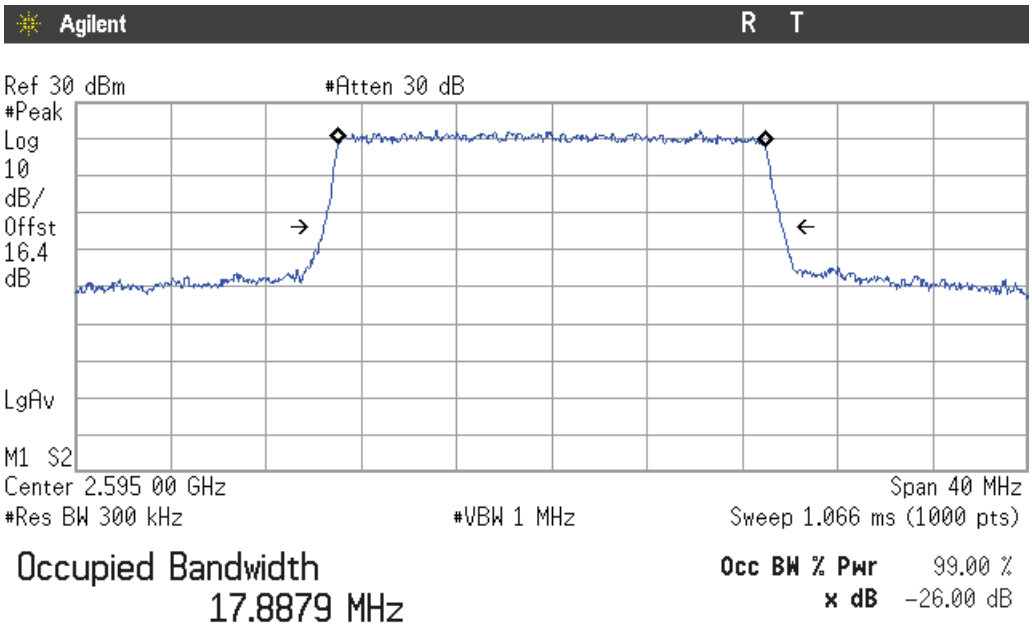


LTE Band 38. 16QAM MODULATION. BW = 20 MHz.

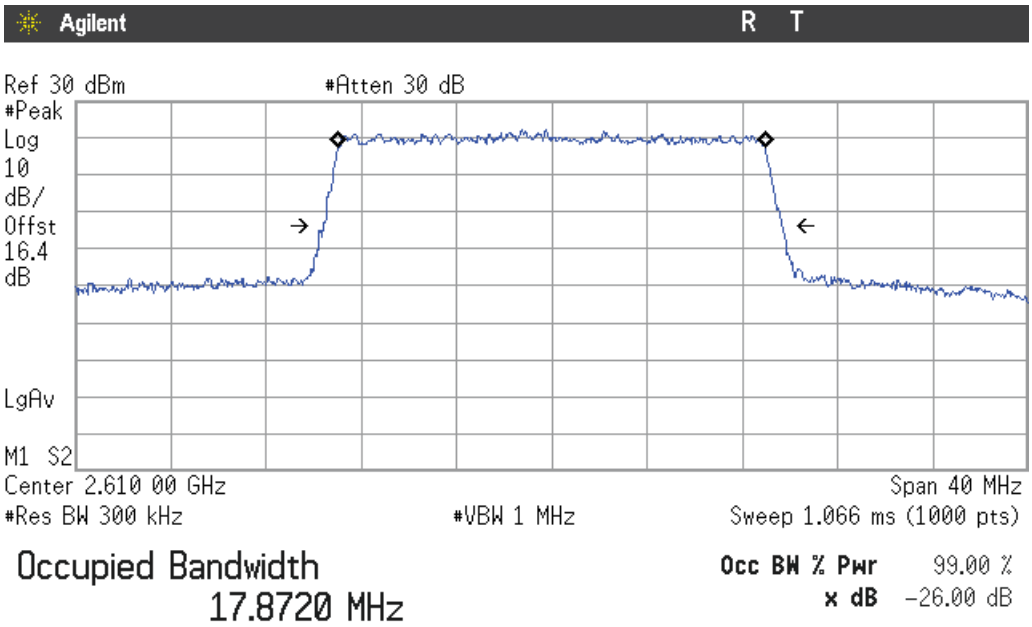
Lowest Channel:



Middle Channel:

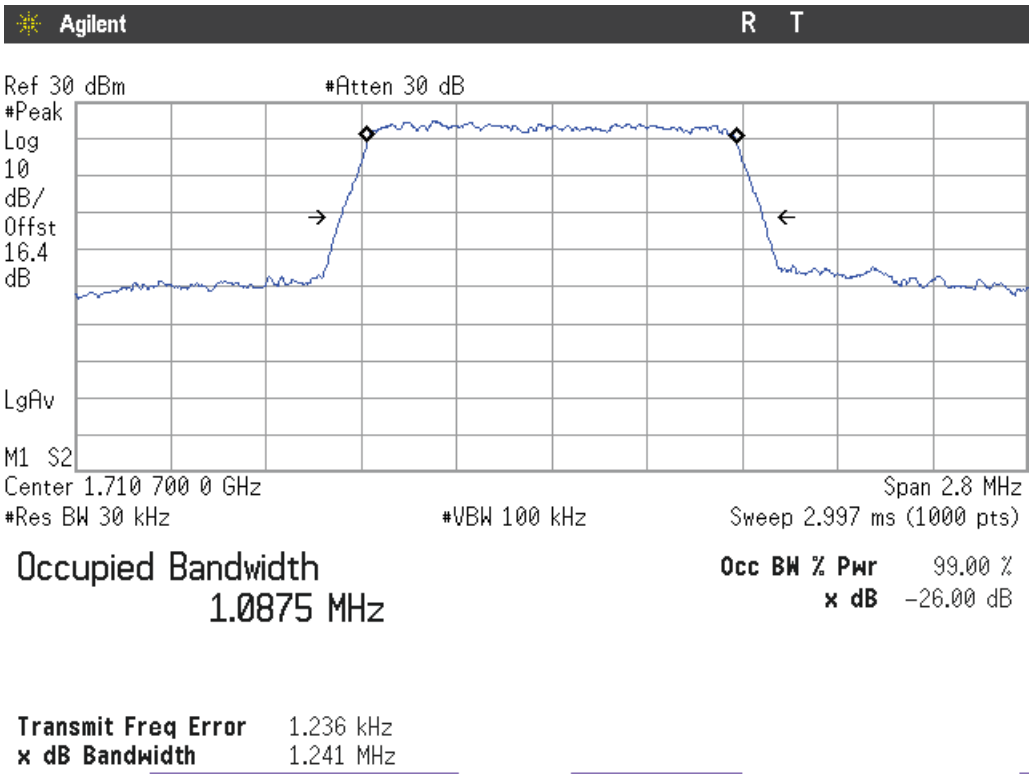


Highest Channel:

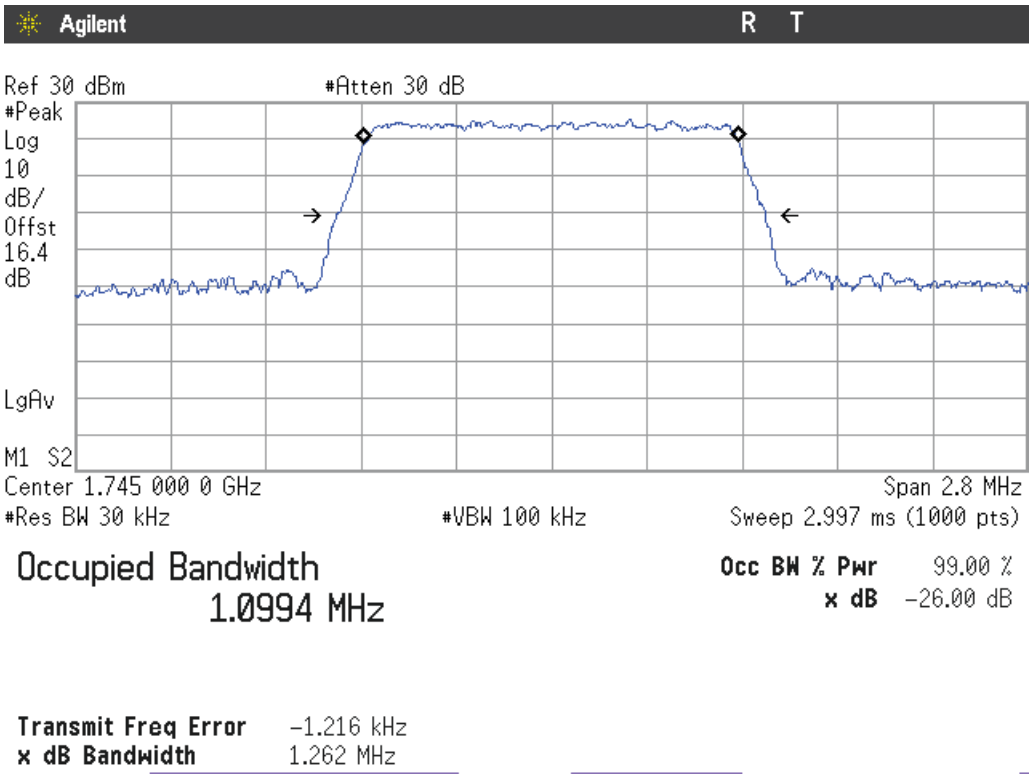


LTE Band 66. QPSK MODULATION. BW = 1.4 MHz.

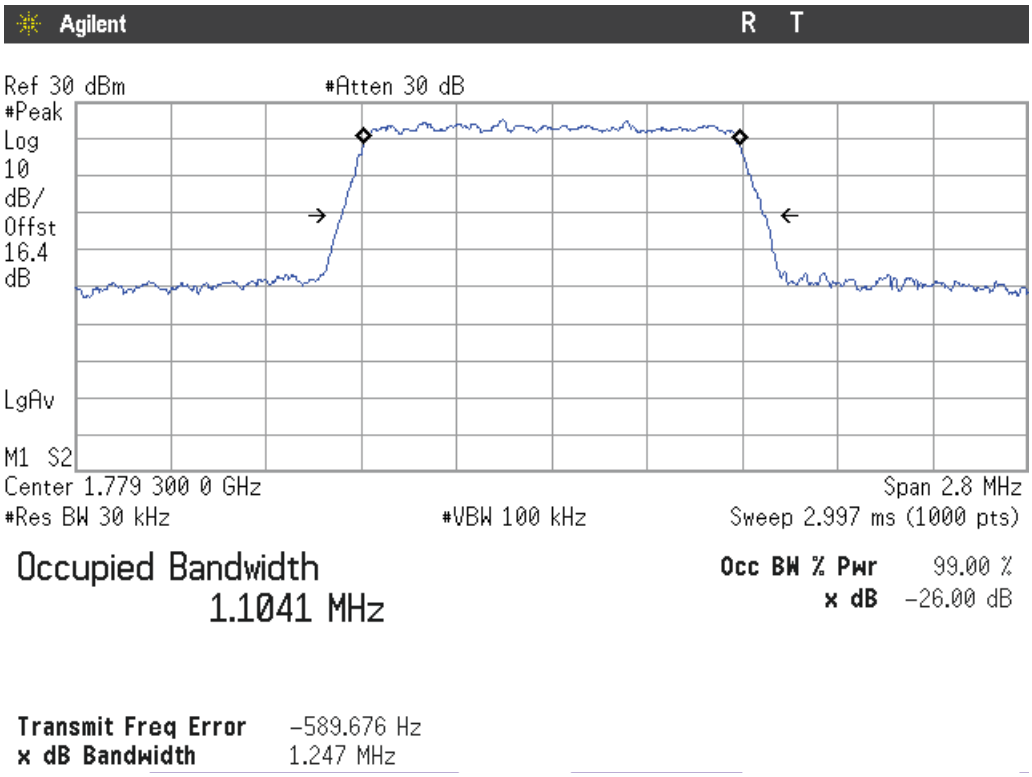
Lowest Channel:



Middle Channel:

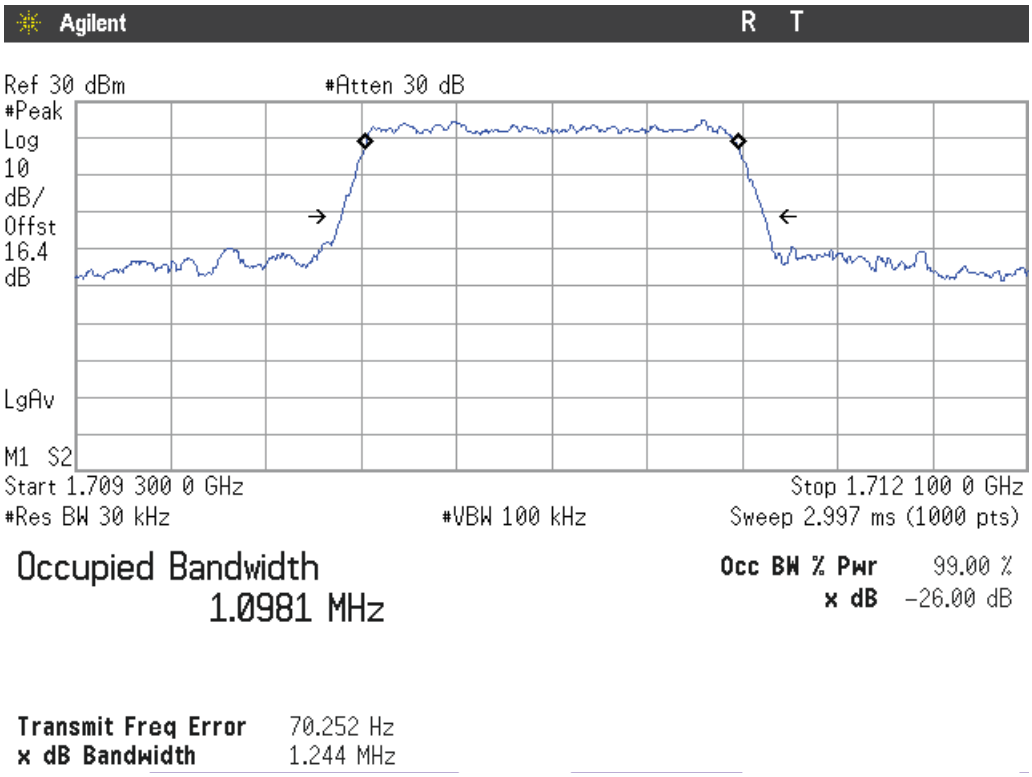


Highest Channel:

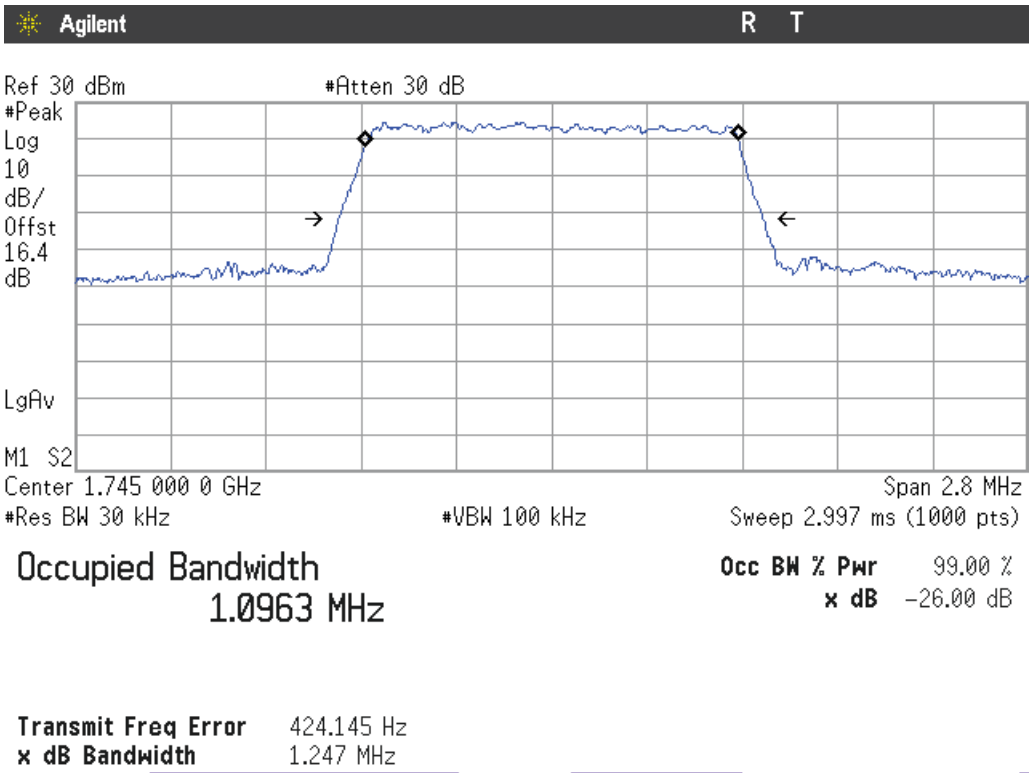


LTE Band 66. 16QAM MODULATION. BW = 1.4 MHz.

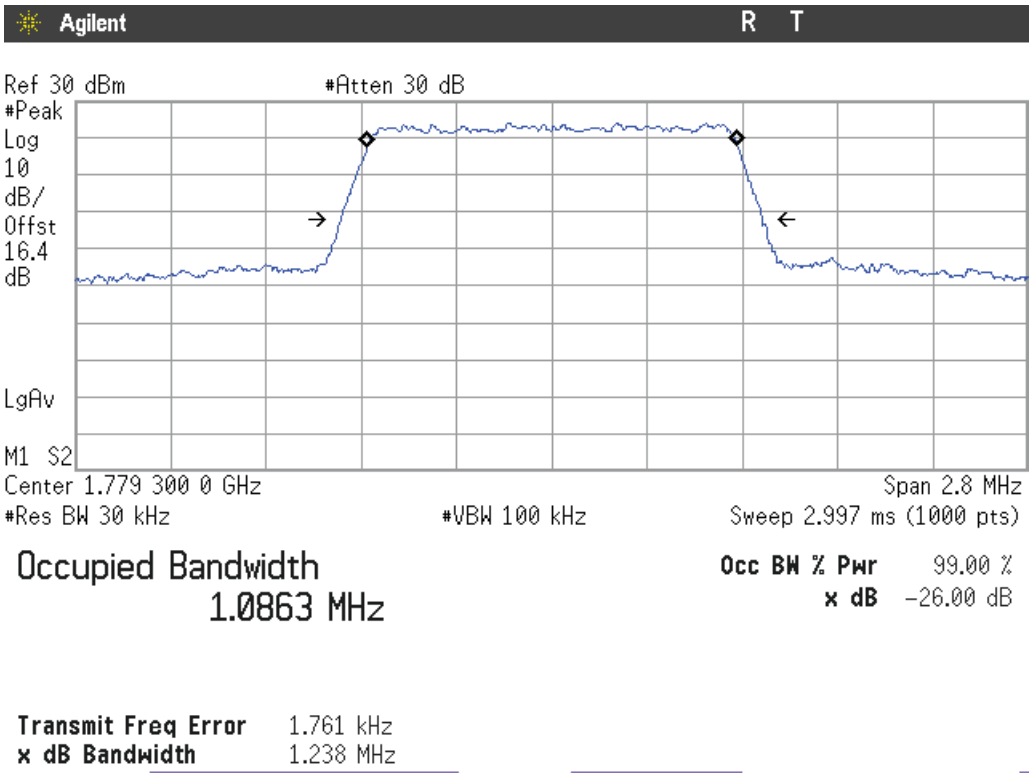
Lowest Channel:



Middle Channel:

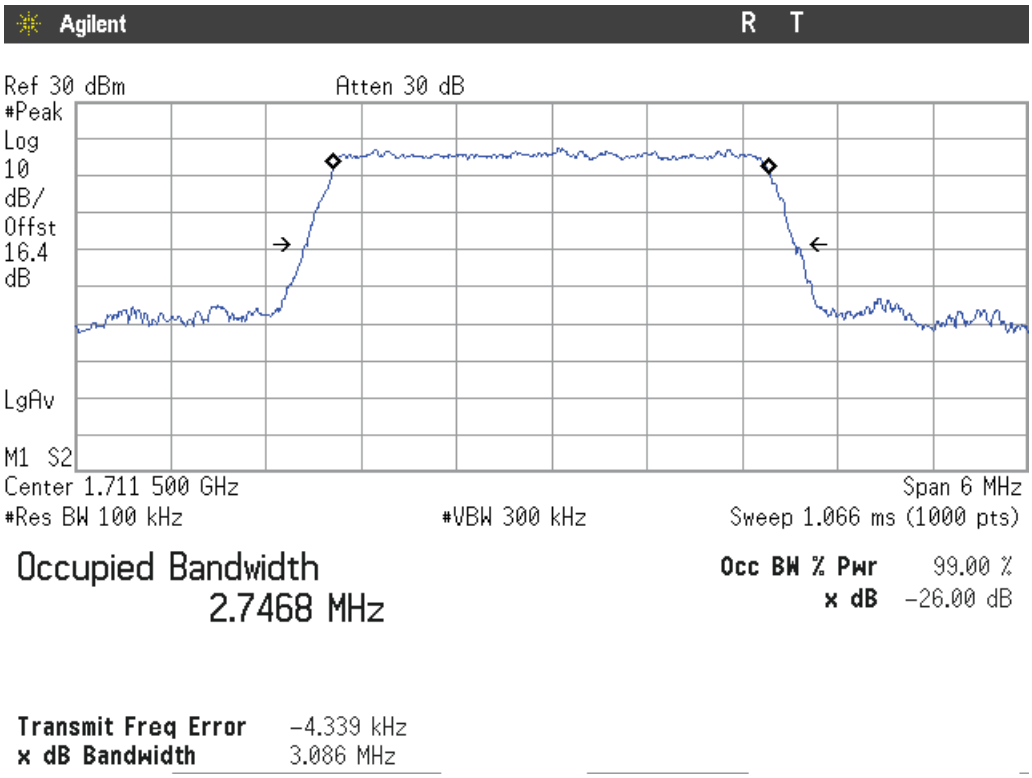


Highest Channel:

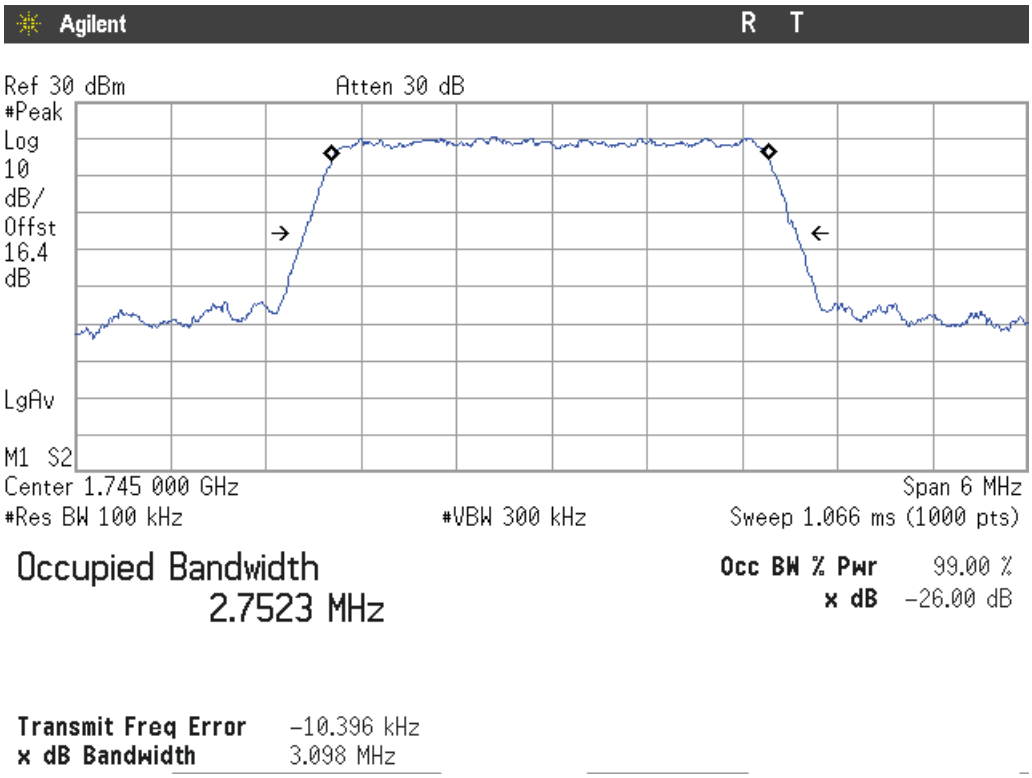


LTE Band 66. QPSK MODULATION. BW = 3 MHz.

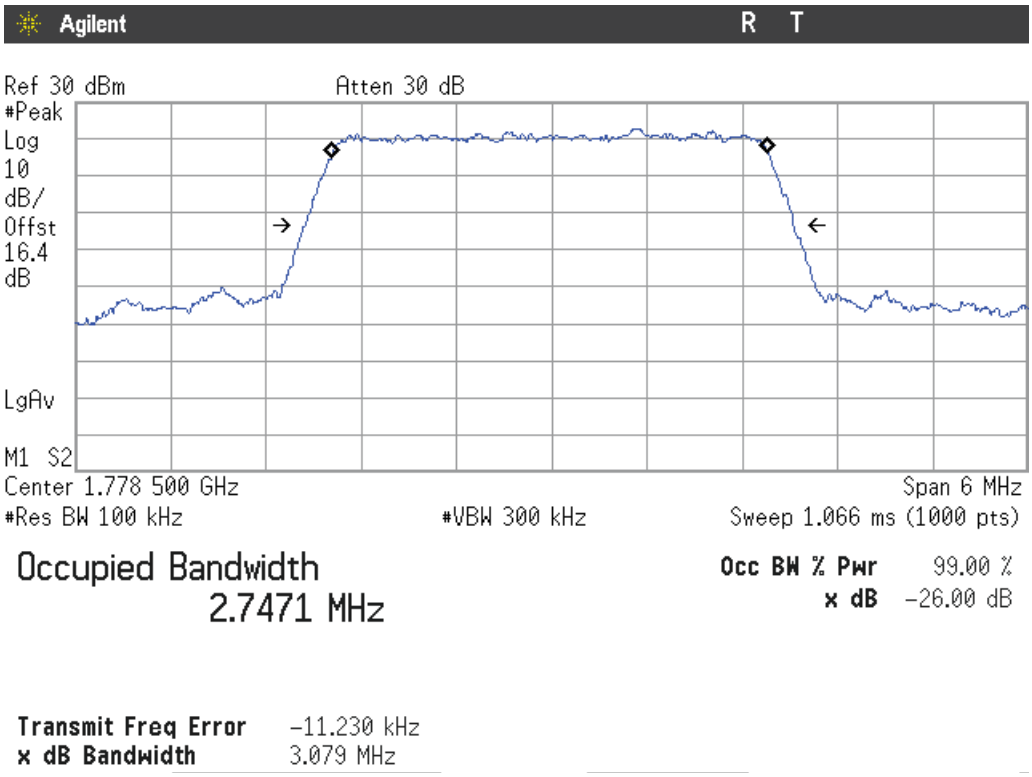
Lowest Channel:



Middle Channel:

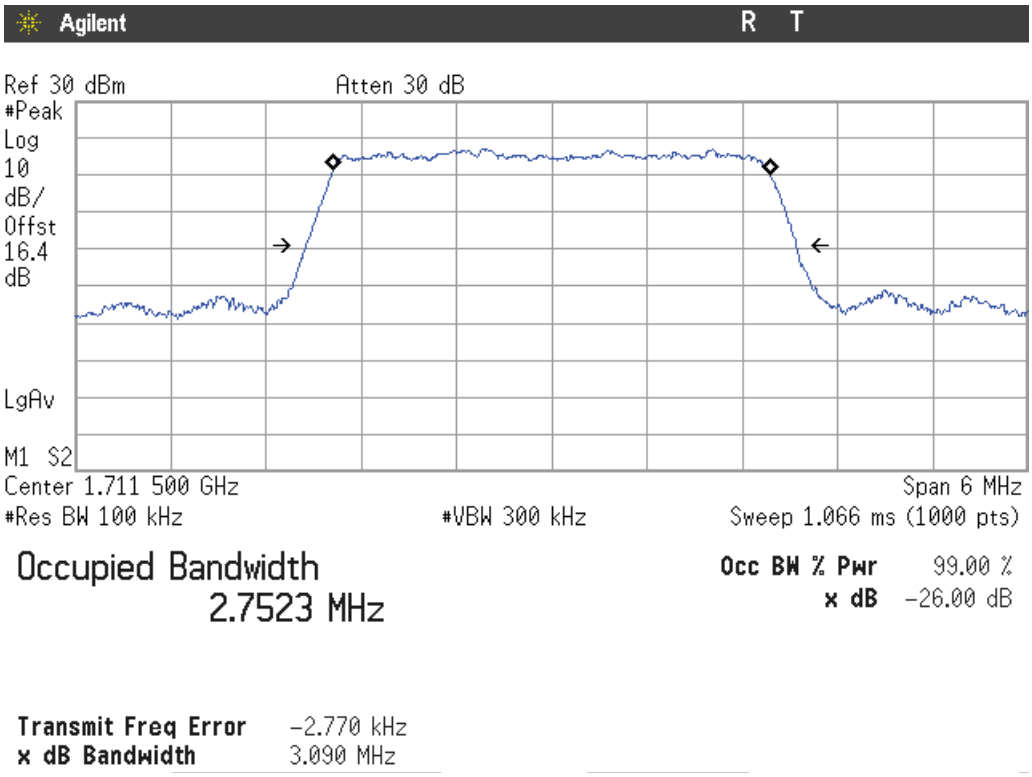


Highest Channel:

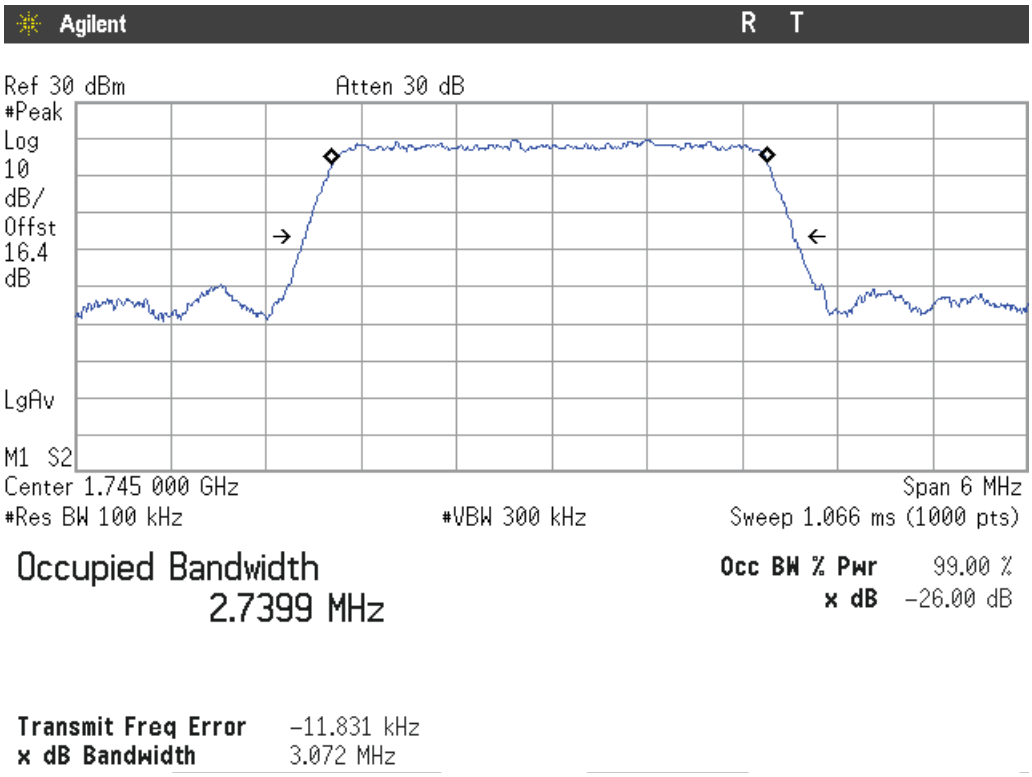


LTE Band 66. 16QAM MODULATION. BW = 3 MHz.

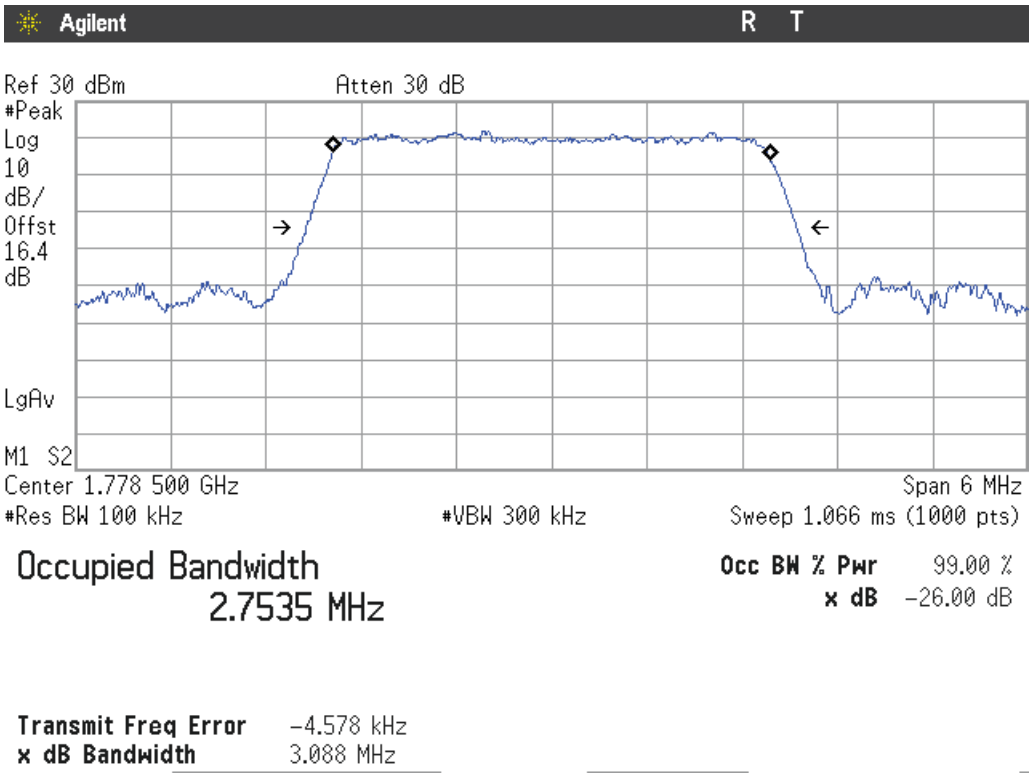
Lowest Channel:



Middle Channel:

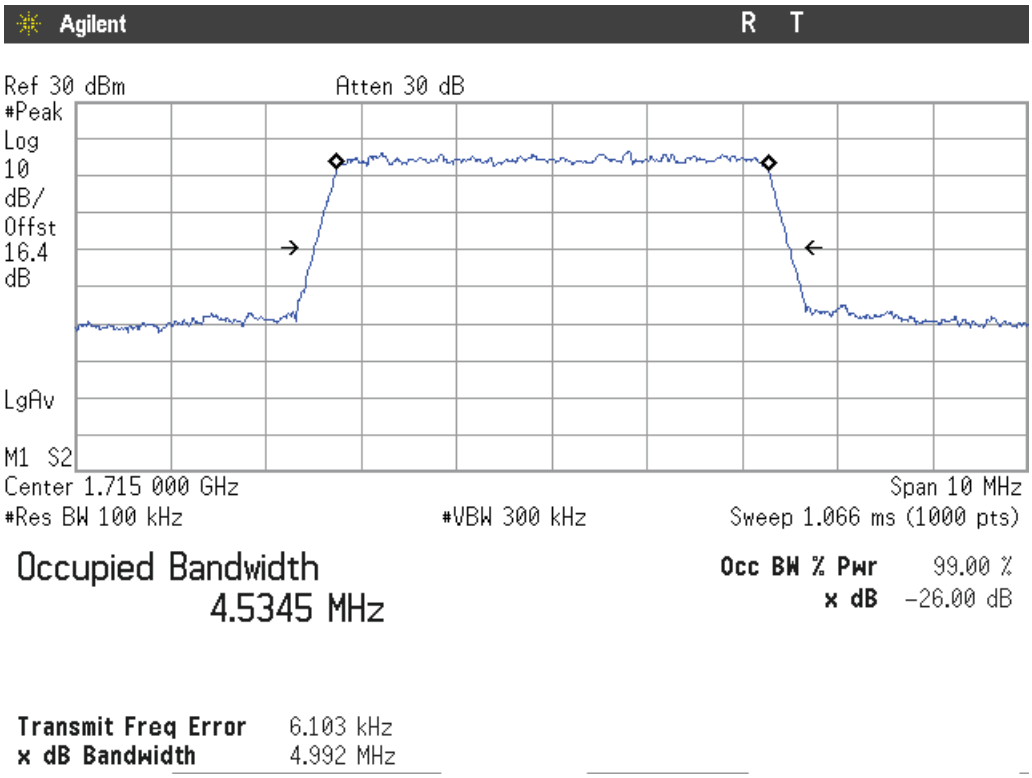


Highest Channel:

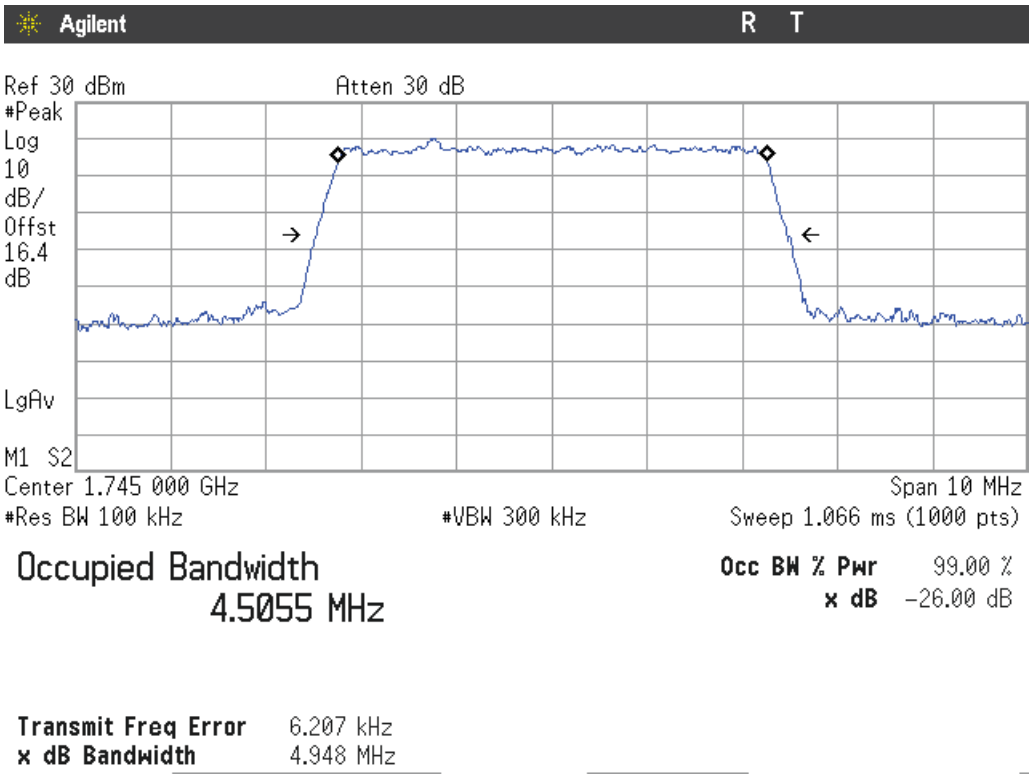


LTE Band 66. QPSK MODULATION. BW = 5 MHz.

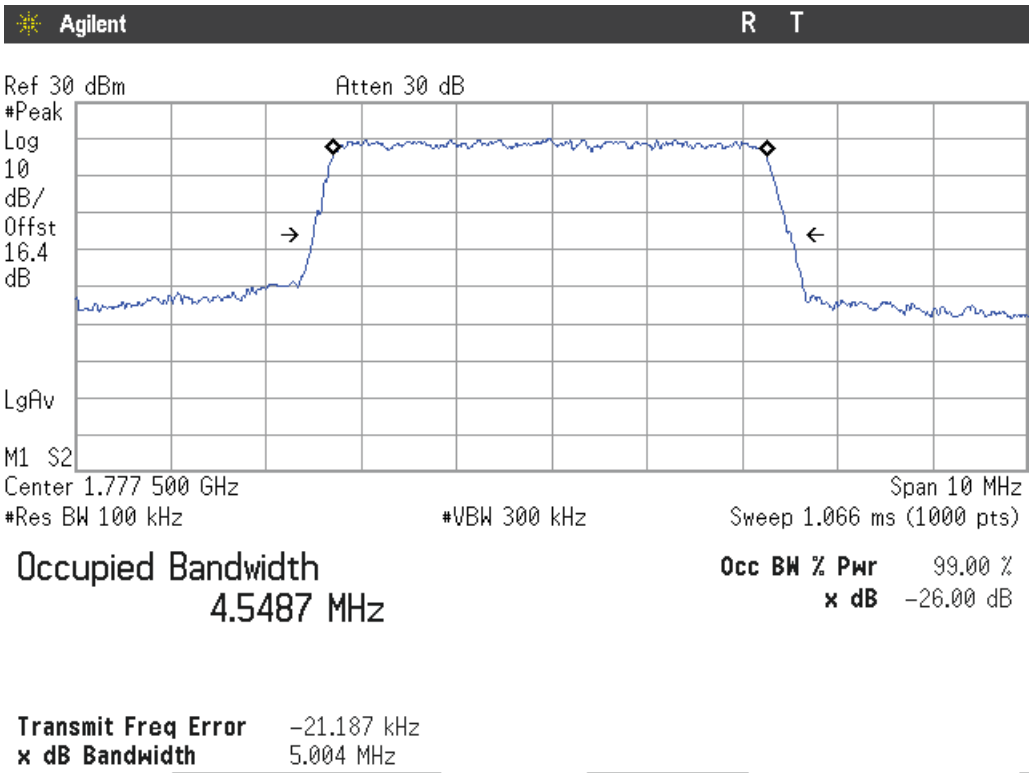
Lowest Channel:



Middle Channel:



Highest Channel:



LTE Band 66. 16QAM MODULATION. BW = 5 MHz.

Lowest Channel: