

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stability Measurement

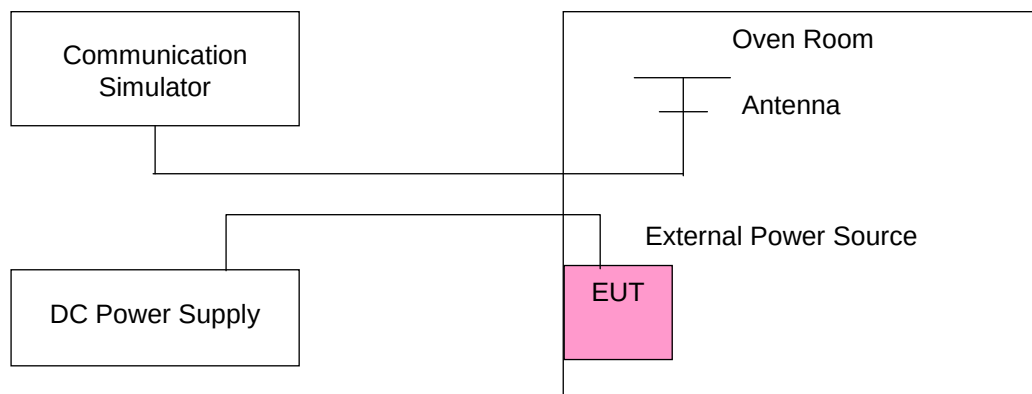
According to the FCC part 2.1055 shall be tested the frequency stability. The rule is defined that "The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with specification of EUT $-30^{\circ}\text{C} \sim 50^{\circ}\text{C}$.

4.2.2 Test Procedure

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the $\pm 0.5^{\circ}\text{C}$ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

4.2.3 Test Setup



4.2.4 Test Results (Subcontract Item)

WCDMA

Frequency Error vs. Voltage

Voltage (Volts)	Frequency Error (ppm)	Limit (ppm)
	WCDMA	
3.3	0.001	2.5
2.805	0.001	2.5
3.795	0.002	2.5

Frequency Error vs. Temperature.

TEMP. (°C)	Frequency Error (ppm)	Limit (ppm)
	WCDMA	
-30	0.001	2.5
-20	0.002	2.5
-10	0.002	2.5
0	0.001	2.5
10	0.001	2.5
20	-0.001	2.5
30	-0.001	2.5
40	-0.001	2.5
50	-0.002	2.5

LTE Band 4

Voltage (Volts)	Frequency Error (ppm)						Limit (ppm)
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz	
3.3	0.001	0.002	0.002	0.002	0.001	0.002	2.5
2.805	0.002	0.001	0.002	0.001	0.001	0.001	2.5
3.795	0.002	0.001	0.002	0.002	0.001	0.001	2.5

TEMP. (°C)	Frequency Error (ppm)						Limit (ppm)
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz	
-30	0.002	0.001	0.002	0.001	0.002	0.002	2.5
-20	0.002	0.002	0.001	0.002	0.002	0.002	2.5
-10	0.002	0.001	0.002	0.001	0.002	0.001	2.5
0	0.002	0.001	0.001	0.001	0.002	0.002	2.5
10	0.001	0.002	0.001	0.002	0.001	0.001	2.5
20	-0.002	-0.002	-0.001	-0.002	-0.001	-0.001	2.5
30	-0.002	-0.001	-0.001	-0.002	-0.002	-0.001	2.5
40	-0.002	-0.001	-0.002	-0.002	-0.002	-0.001	2.5
50	-0.002	-0.002	-0.002	-0.002	-0.002	-0.001	2.5

LTE Band 7

Voltage (Volts)	Frequency Error (ppm)				Limit (ppm)
	5MHz	10MHz	15MHz	20MHz	
3.3	0.001	0.001	0.000	0.001	2.5
2.805	0.001	0.001	0.001	0.001	2.5
3.795	0.002	0.001	0.001	0.001	2.5

TEMP. (°C)	Frequency Error (ppm)				Limit (ppm)
	5MHz	10MHz	15MHz	20MHz	
-30	0.001	0.001	0.001	0.000	2.5
-20	0.001	0.001	0.001	0.001	2.5
-10	0.001	0.001	0.001	0.001	2.5
0	0.000	0.001	0.002	0.001	2.5
10	0.001	0.001	0.002	0.000	2.5
20	-0.001	-0.001	-0.001	-0.001	2.5
30	-0.001	-0.001	-0.001	-0.001	2.5
40	0.000	-0.001	-0.001	-0.001	2.5
50	-0.001	-0.001	-0.002	-0.001	2.5

LTE Band 12

Voltage (Volts)	Frequency Error (ppm)				Limit (ppm)
	1.4MHz	3MHz	5MHz	10MHz	
3.3	0.003	0.004	0.005	0.002	2.5
2.805	0.002	0.005	0.002	0.005	2.5
3.795	0.002	0.004	0.005	0.003	2.5

TEMP. (°C)	Frequency Error (ppm)				Limit (ppm)
	1.4MHz	3MHz	5MHz	10MHz	
-30	0.002	0.005	0.004	0.006	2.5
-20	0.005	0.004	0.003	0.005	2.5
-10	0.003	0.003	0.003	0.004	2.5
0	0.004	0.003	0.003	0.004	2.5
10	0.004	0.005	0.004	0.004	2.5
20	-0.004	-0.003	-0.003	-0.006	2.5
30	-0.003	-0.005	-0.003	-0.002	2.5
40	-0.002	-0.004	-0.002	-0.004	2.5
50	-0.006	-0.005	-0.005	-0.005	2.5

LTE Band 13

Voltage (Volts)	Frequency Error (ppm)		Limit (ppm)
	5MHz	10MHz	
3.3	0.002	0.003	2.5
2.805	0.001	0.002	2.5
3.795	0.004	0.004	2.5

TEMP. (°C)	Frequency Error (ppm)		Limit (ppm)
	5MHz	10MHz	
-30	0.003	0.004	2.5
-20	0.003	0.003	2.5
-10	0.001	0.001	2.5
0	0.003	0.004	2.5
10	0.004	0.002	2.5
20	-0.004	-0.004	2.5
30	-0.005	-0.002	2.5
40	-0.002	-0.003	2.5
50	-0.003	-0.002	2.5

LTE Band 17

Voltage (Volts)	Frequency Error (ppm)		Limit (ppm)
	5MHz	10MHz	
3.3	0.003	0.002	2.5
2.805	0.002	0.004	2.5
3.795	0.004	0.005	2.5

TEMP. (°C)	Frequency Error (ppm)		Limit (ppm)
	5MHz	10MHz	
-30	0.001	0.006	2.5
-20	0.003	0.005	2.5
-10	0.004	0.003	2.5
0	0.003	0.004	2.5
10	0.003	0.003	2.5
20	-0.002	-0.004	2.5
30	-0.005	-0.005	2.5
40	-0.002	-0.001	2.5
50	-0.003	-0.004	2.5

LTE Band 30

Voltage (Volts)	Frequency Error (ppm)		Limit (ppm)
	5MHz	10MHz	
3.3	0.001	0.002	2.5
2.805	0.002	0.001	2.5
3.795	0.001	0.001	2.5

TEMP. (°C)	Frequency Error (ppm)		Limit (ppm)
	5MHz	10MHz	
-30	0.002	0.001	2.5
-20	0.002	0.001	2.5
-10	0.001	0.001	2.5
0	0.001	0.001	2.5
10	0.001	0.001	2.5
20	-0.002	-0.001	2.5
30	-0.001	-0.001	2.5
40	-0.001	-0.002	2.5
50	-0.002	-0.002	2.5

LTE Band 38

Voltage (Volts)	Frequency Error (ppm)				Limit (ppm)
	5MHz	10MHz	15MHz	20MHz	
3.3	0.001	0.000	0.001	0.002	2.5
2.805	0.001	0.001	0.001	0.001	2.5
3.795	0.001	0.000	0.000	0.001	2.5

TEMP. (°C)	Frequency Error (ppm)				Limit (ppm)
	5MHz	10MHz	15MHz	20MHz	
-30	0.001	0.001	0.000	0.001	2.5
-20	0.001	0.001	0.001	0.001	2.5
-10	0.000	0.000	0.001	0.001	2.5
0	0.001	0.001	0.001	0.001	2.5
10	0.001	-0.001	-0.001	-0.001	2.5
20	-0.001	-0.001	-0.001	-0.001	2.5
30	-0.001	-0.001	-0.001	-0.001	2.5
40	-0.001	-0.001	-0.001	-0.001	2.5
50	0.001	0.001	0.000	0.001	2.5

LTE Band 41

Voltage (Volts)	Frequency Error (ppm)				Limit (ppm)
	5MHz	10MHz	15MHz	20MHz	
3.3	0.001	0.002	0.001	0.001	2.5
2.805	0.001	0.001	0.002	0.001	2.5
3.795	0.000	0.002	0.001	0.001	2.5

TEMP. (°C)	Frequency Error (ppm)				Limit (ppm)
	5MHz	10MHz	15MHz	20MHz	
-30	0.001	0.001	0.001	0.001	2.5
-20	0.001	0.001	0.000	0.001	2.5
-10	0.002	0.001	0.001	0.001	2.5
0	0.001	0.001	0.001	0.001	2.5
10	0.001	0.001	0.001	0.001	2.5
20	-0.001	-0.001	-0.001	-0.001	2.5
30	-0.001	-0.001	-0.001	0.000	2.5
40	-0.001	-0.001	-0.001	-0.001	2.5
50	-0.001	-0.001	-0.001	-0.001	2.5

LTE Band 66

Voltage (Volts)	Frequency Error (ppm)						Limit (ppm)
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz	
3.3	0.001	0.002	0.001	0.001	0.002	0.001	2.5
2.805	0.001	0.002	0.002	0.002	0.002	0.001	2.5
3.795	0.002	0.002	0.002	0.001	0.001	0.002	2.5

TEMP. (°C)	Frequency Error (ppm)						Limit (ppm)
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz	
-30	0.001	0.002	0.002	0.002	0.001	0.001	2.5
-20	0.001	0.002	0.002	0.002	0.001	0.002	2.5
-10	0.002	0.001	0.002	0.001	0.001	0.002	2.5
0	0.002	0.002	0.001	0.001	0.002	0.002	2.5
10	-0.002	-0.001	0.001	0.002	0.001	0.001	2.5
20	-0.002	-0.002	-0.001	-0.002	-0.001	-0.001	2.5
30	-0.001	-0.002	-0.001	-0.001	-0.001	-0.001	2.5
40	-0.002	-0.001	-0.001	-0.002	-0.001	-0.001	2.5
50	-0.001	-0.001	-0.001	-0.002	-0.001	-0.001	2.5

4.3 Emission Bandwidth Measurement

4.3.1 Limits of Emission Bandwidth Measurement

-26dBc Bandwidth

According to FCC 27.53 specified that emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

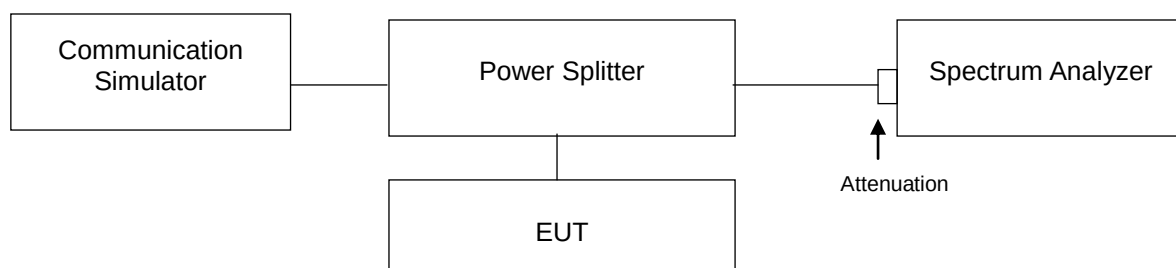
Occupied Bandwidth

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.3.2 Test Procedure

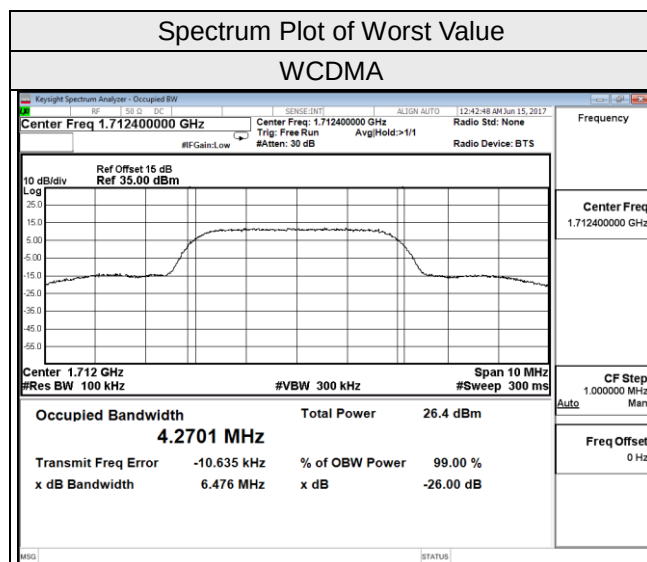
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with $RBW \geq 1\% \times OBW$ and $VBW \geq 3 \times VBW$.

4.3.3 Test Setup



4.3.4 Test Results (-26dBc Bandwidth, Subcontract Item)

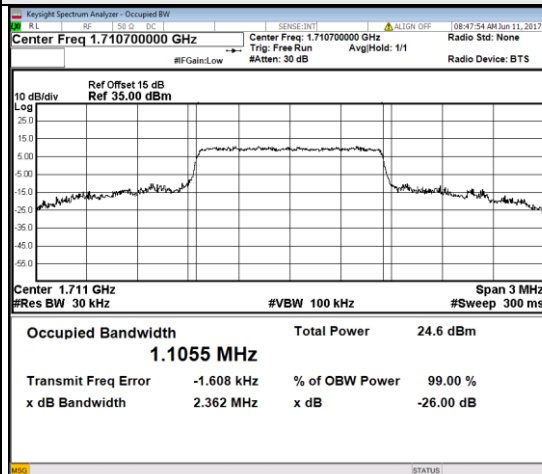
Channel	FREQ. (MHz)	-26dB Bandwidth (MHz)
		WCDMA
1312	1712.4	6.48
1413	1732.6	4.99
1513	1752.6	4.87



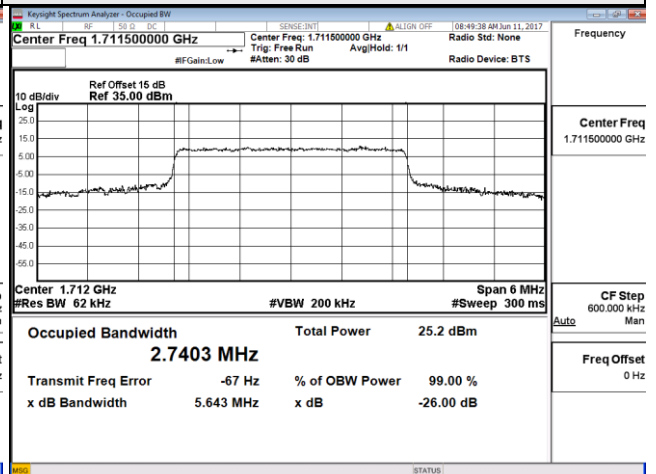
LTE Band 4							
Channel Bandwidth 1.4MHz				Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
19957	1710.7	2.10	2.36	19965	1711.5	5.64	5.56
20175	1732.5	1.80	1.86	20175	1732.5	5.34	5.01
20393	1754.3	1.47	1.44	20385	1753.5	3.28	2.97
Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
19975	1712.5	9.26	9.02	20000	1715	20.00	16.38
20175	1732.5	6.48	8.14	20175	1732.5	14.93	14.11
20375	1752.5	6.45	4.87	20350	1750	10.01	9.58
Channel Bandwidth 15MHz				Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
20025	1717.5	21.11	16.22	20050	1720	25.33	22.65
20175	1732.5	18.25	14.51	20175	1732.5	24.52	19.38
20325	1747.5	24.91	20.56	20300	1745	35.49	33.14

Spectrum Plot of Worst Value

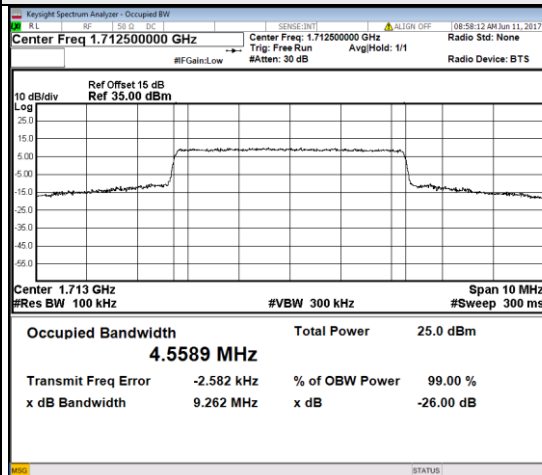
1.4MHz / 16QAM



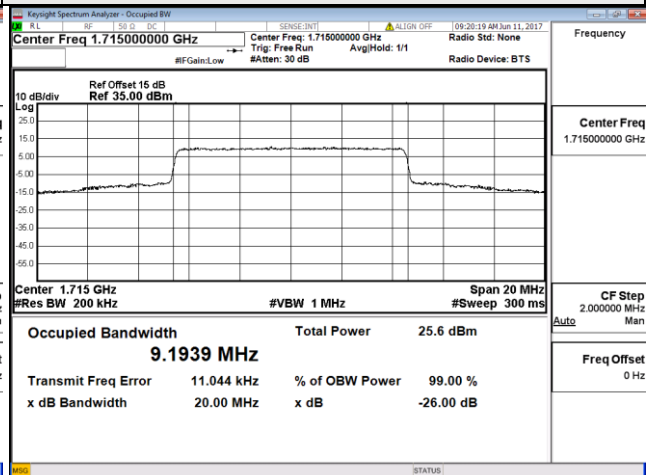
3MHz / QPSK



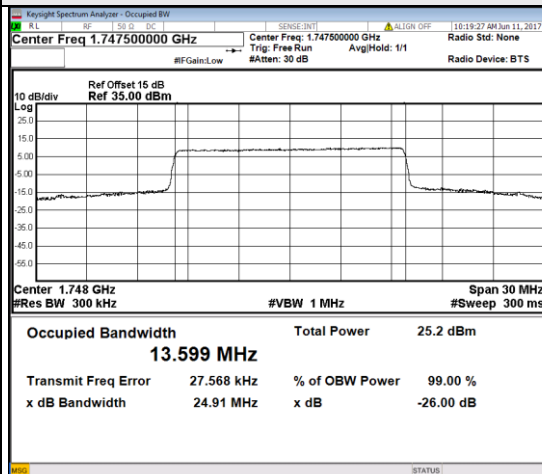
5MHz / QPSK



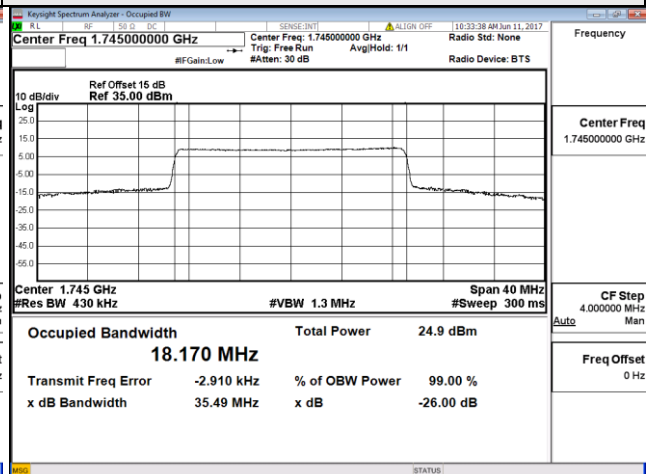
10MHz / QPSK



15MHz / QPSK



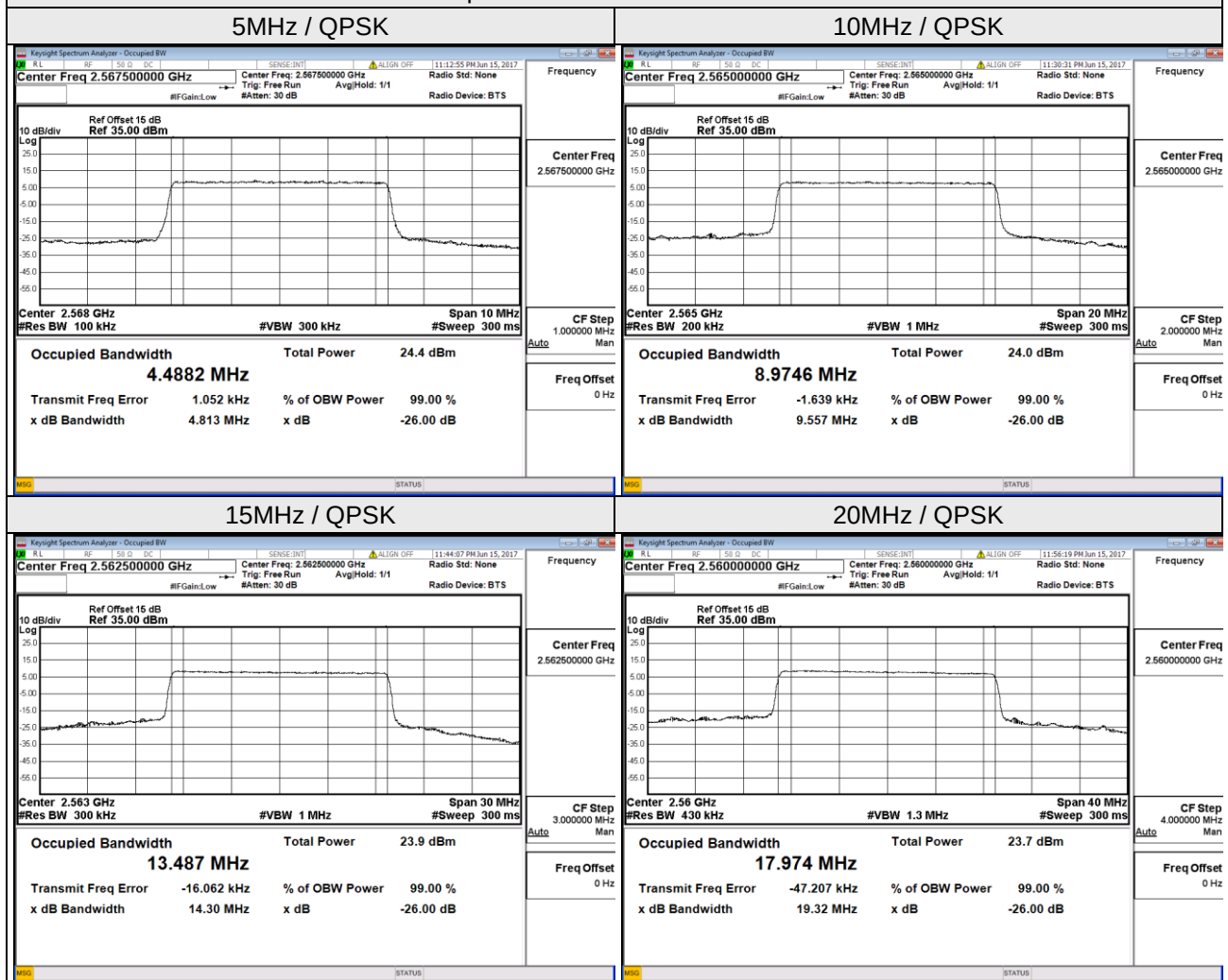
20MHz / QPSK



LTE Band 7

Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
20775	2502.5	4.80	4.81	20800	2505	9.52	9.52
21100	2535	4.81	4.81	21100	2535	9.52	9.55
21425	2567.5	4.81	4.81	21400	2565	9.56	9.53
Channel Bandwidth 15MHz				Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
20825	2507.5	14.25	14.26	20850	2510	19.06	19.03
21100	2535	14.29	14.29	21100	2535	19.13	19.10
21375	2562.5	14.30	14.30	21350	2560	19.32	19.07

Spectrum Plot of Worst Value

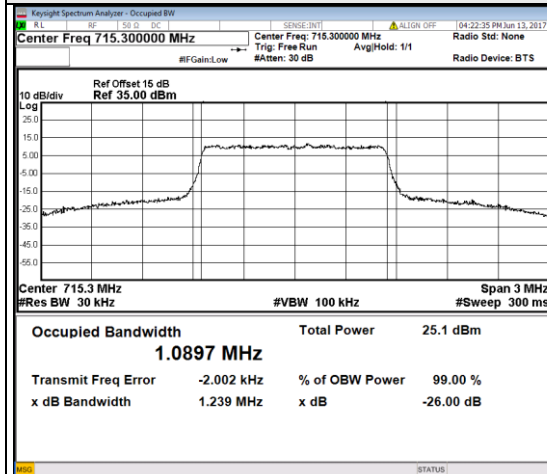


LTE Band 12

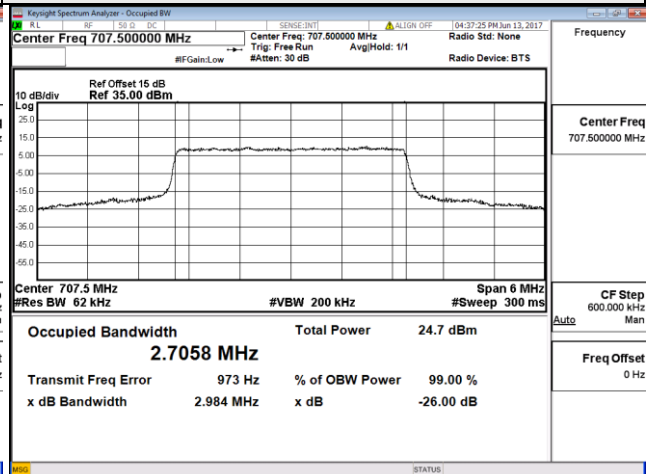
Channel Bandwidth 1.4MHz				Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
23017	699.7	1.23	1.22	23025	700.5	2.94	2.94
23095	707.5	1.23	1.23	23095	707.5	2.98	2.97
23173	715.3	1.24	1.23	23165	714.5	2.95	2.96
Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
23035	701.5	4.87	4.83	23060	704	9.59	9.57
23095	707.5	4.86	4.84	23095	707.5	9.60	9.54
23155	713.5	4.89	4.87	23130	711	9.75	9.55

Spectrum Plot of Worst Value

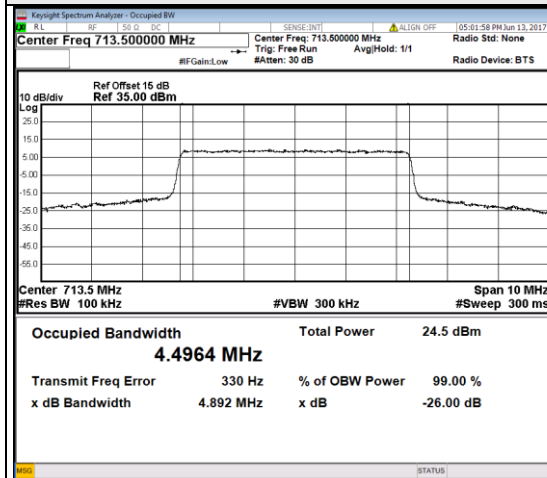
1.4MHz / QPSK



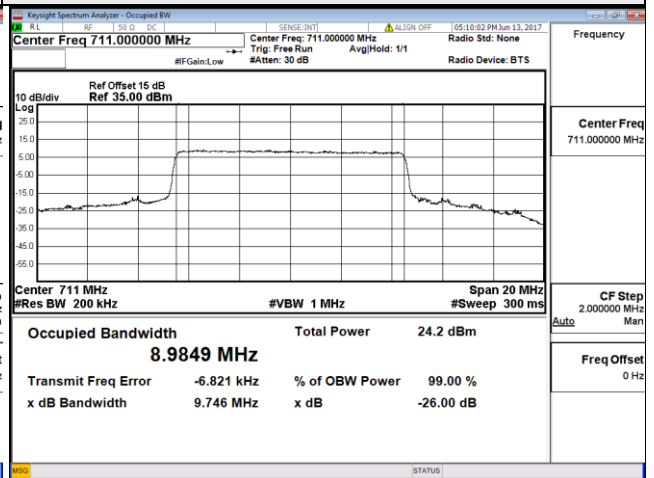
3MHz / QPSK



5MHz / QPSK



10MHz / QPSK

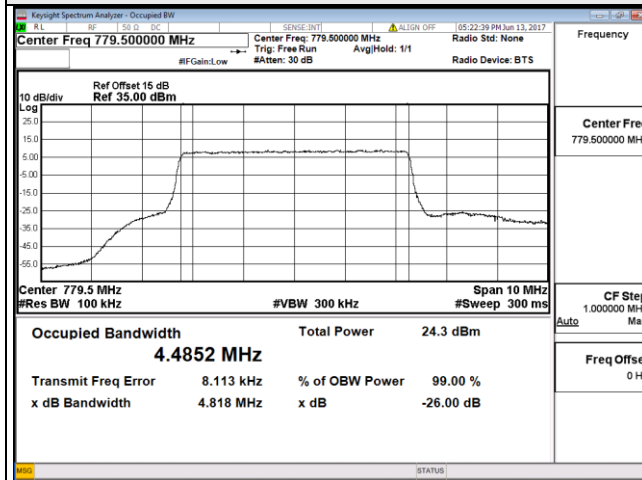


LTE Band 13

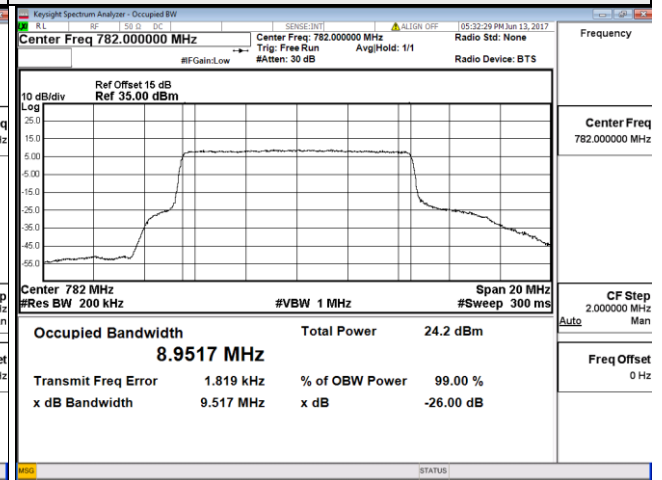
Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
23205	779.5	4.82	4.80	23230	782	9.52	9.51
23230	782	4.79	4.80				
23255	784.5	4.81	4.81				

Spectrum Plot of Worst Value

5MHz / 16QAM



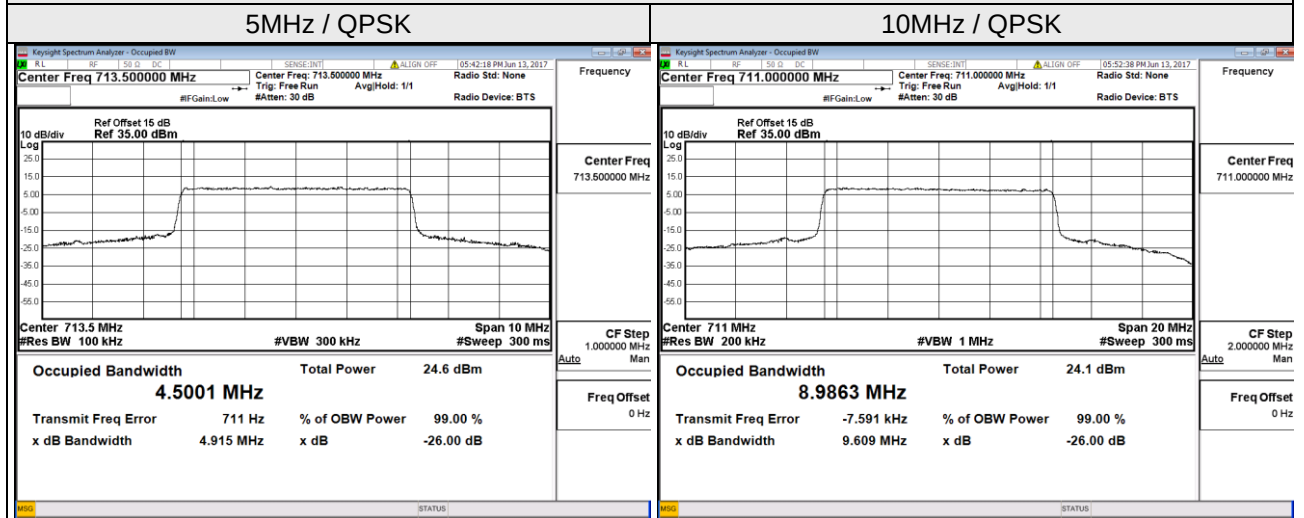
10MHz / QPSK



LTE Band 17

Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
23775	706.5	4.84	4.83	23780	709	9.55	9.55
23790	710	4.86	4.85	23790	710	9.58	9.55
23825	713.5	4.92	4.86	23800	711	9.61	9.57

Spectrum Plot of Worst Value

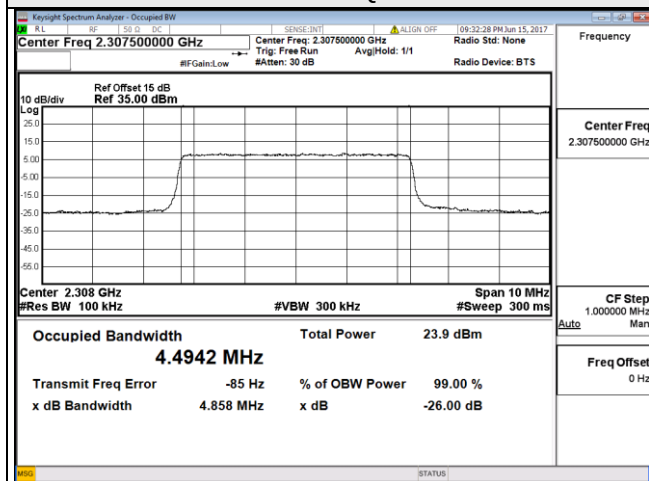


LTE Band 30

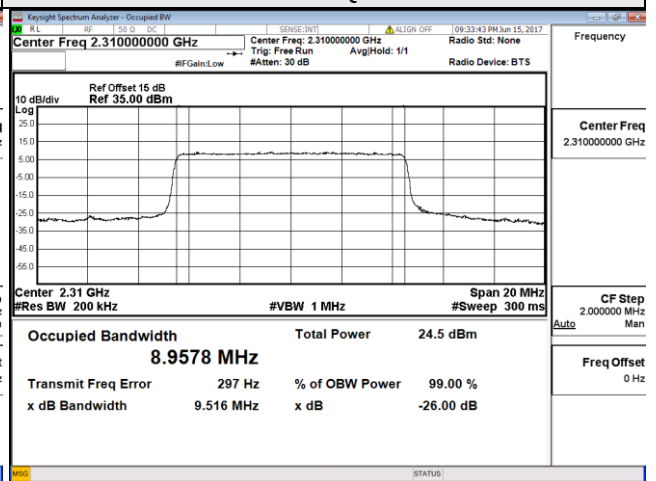
Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
27685	2307.5	4.83	4.86	27710	2310	9.52	9.51
27710	2310	4.81	4.80				
27735	2312.5	4.81	4.80				

Spectrum Plot of Worst Value

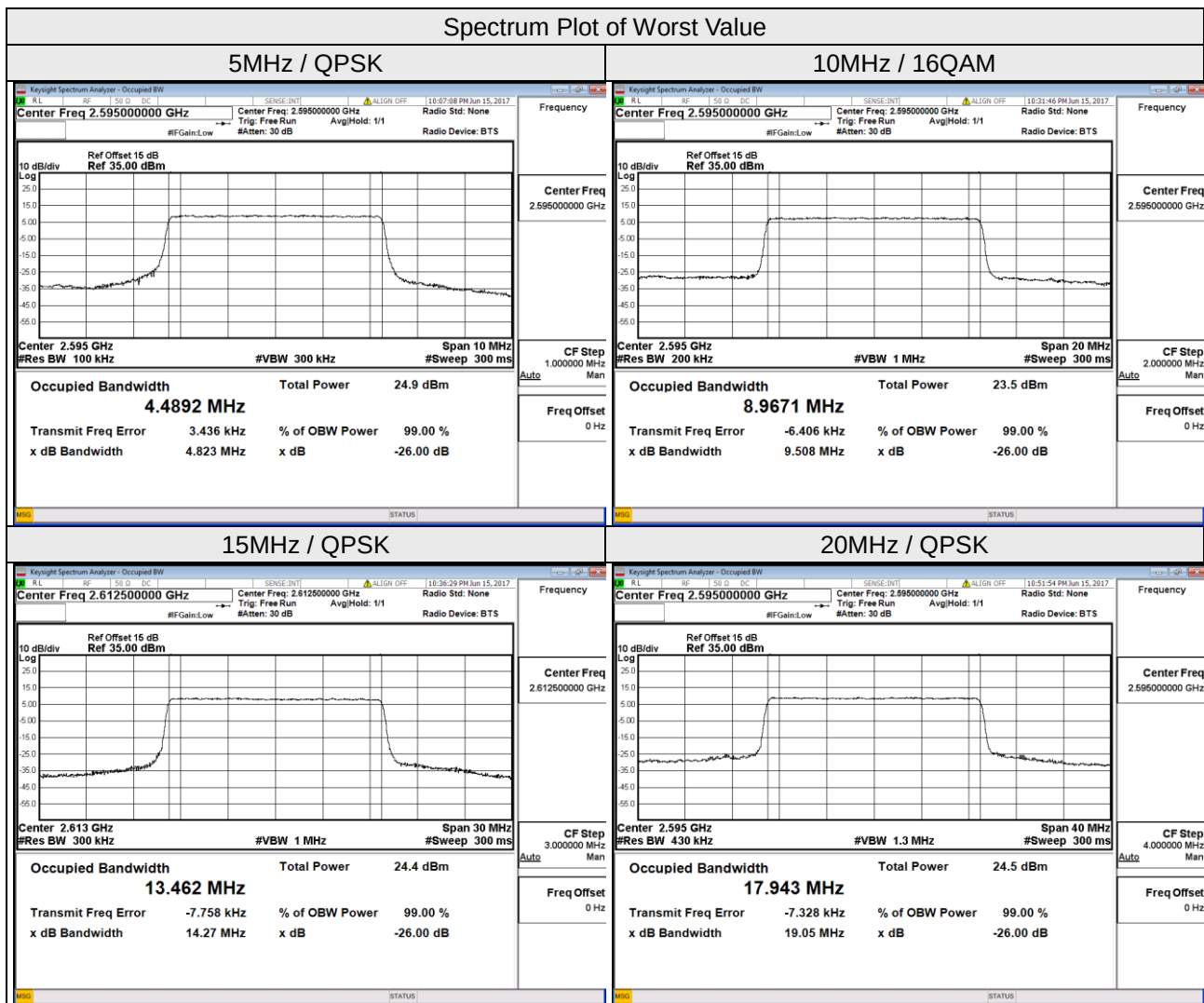
5MHz / 16QAM



10MHz / QPSK



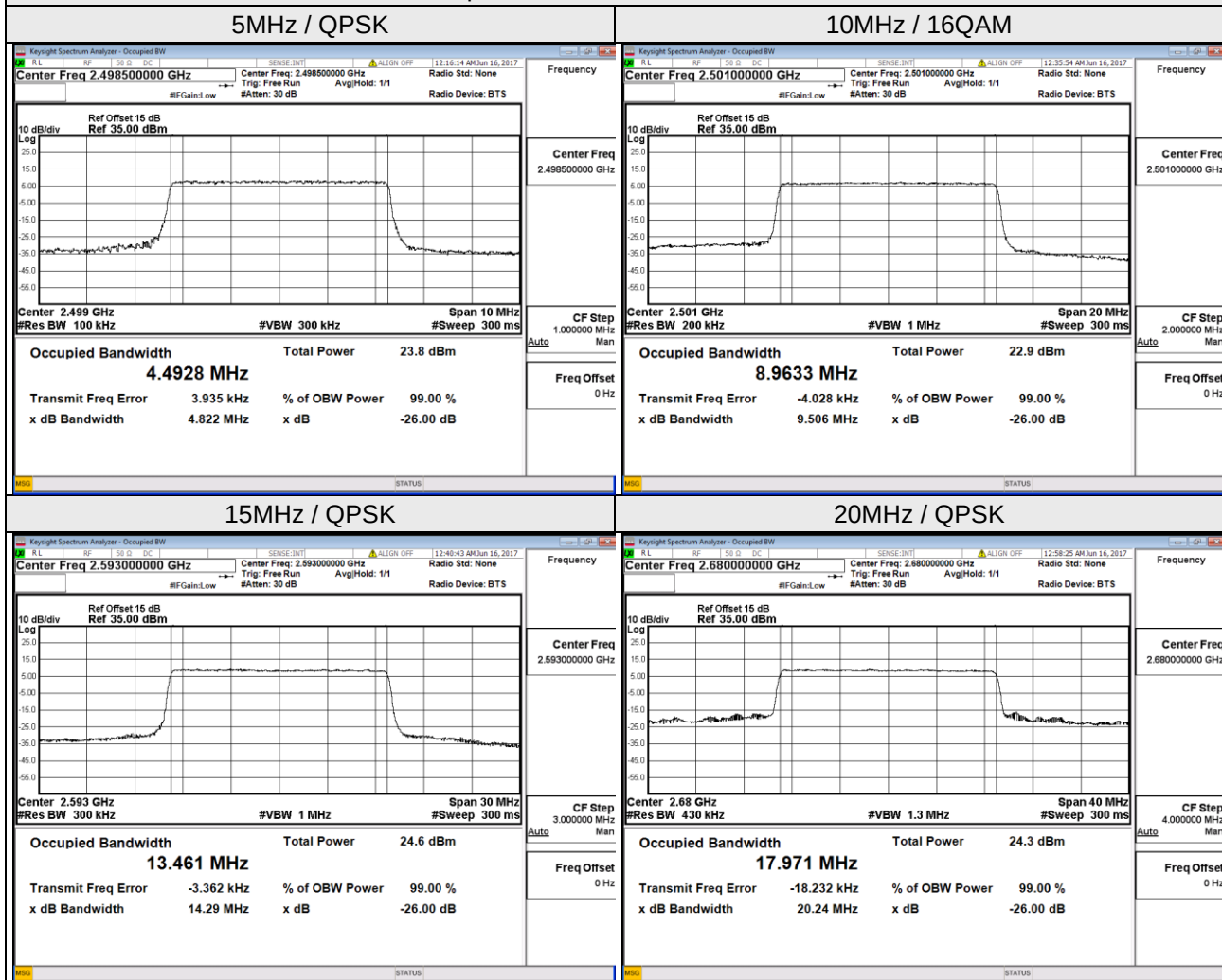
LTE Band 38							
Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
37775	2572.5	4.80	4.78	37800	2575	9.50	9.87
38000	2595	4.82	4.79	38000	2595	9.48	9.51
38225	2617.5	4.80	4.79	38200	2615	9.49	9.48
Channel Bandwidth 15MHz				Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
37825	2577.5	14.25	14.25	37850	2580	19.04	19.02
38000	2595	14.26	14.24	38000	2595	19.05	19.05
38175	2612.5	14.27	14.26	38150	2610	19.03	19.01



LTE Band 41

Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
39675	2498.5	4.82	4.79	39700	2501	9.49	9.51
40620	2593	4.81	4.78	50620	2593	9.49	9.51
41565	2687.5	4.79	4.81	41540	2685	9.48	9.50
Channel Bandwidth 15MHz				Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
39725	2503.5	14.25	14.25	39750	2506	19.05	19.03
40620	2593	14.29	14.25	40620	2593	19.08	19.03
41515	2682.5	14.26	14.23	41490	2680	20.24	19.07

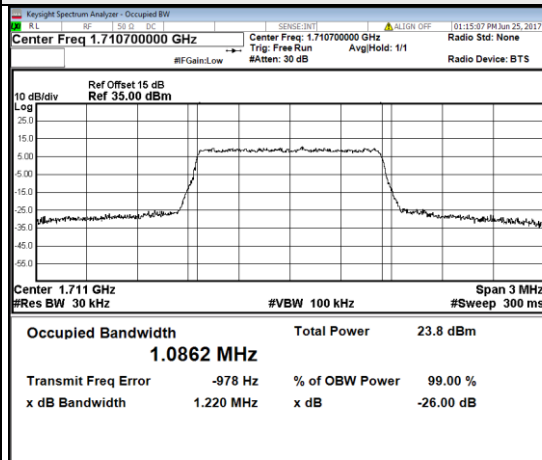
Spectrum Plot of Worst Value



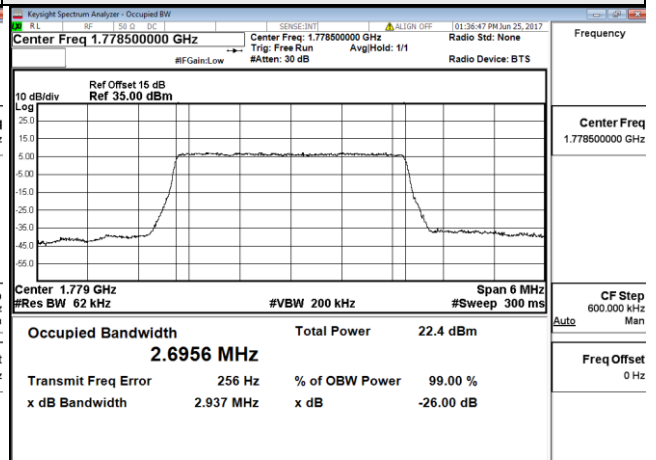
LTE Band 66							
Channel Bandwidth 1.4MHz				Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
131979	1710.7	1.22	1.22	131987	1711.5	2.93	2.93
132322	1745	1.21	1.22	132322	1745	2.92	2.92
132665	1779.3	1.21	1.22	132657	1778.5	2.92	2.94
Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
131997	1712.5	5.54	4.90	132022	1715	9.86	9.59
132322	1745	4.80	4.82	132322	1745	9.54	9.52
132647	1777.5	5.58	5.10	132622	1775	10.46	9.67
Channel Bandwidth 15MHz				Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
132047	1717.5	14.51	14.31	132072	1720	20.84	19.10
132322	1745	14.39	14.30	132322	1745	19.33	19.12
132597	1722.5	19.42	14.60	132572	1770	28.44	22.13

Spectrum Plot of Worst Value

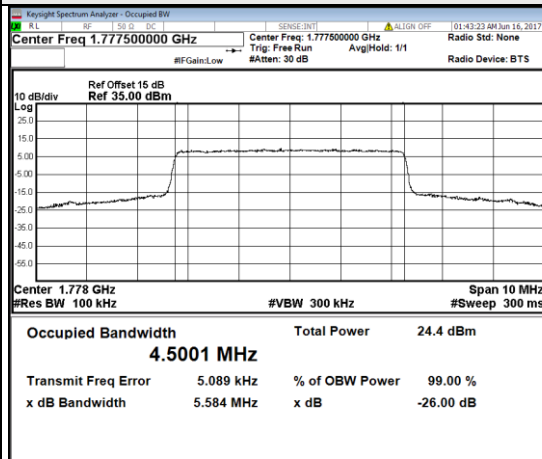
1.4MHz / QPSK



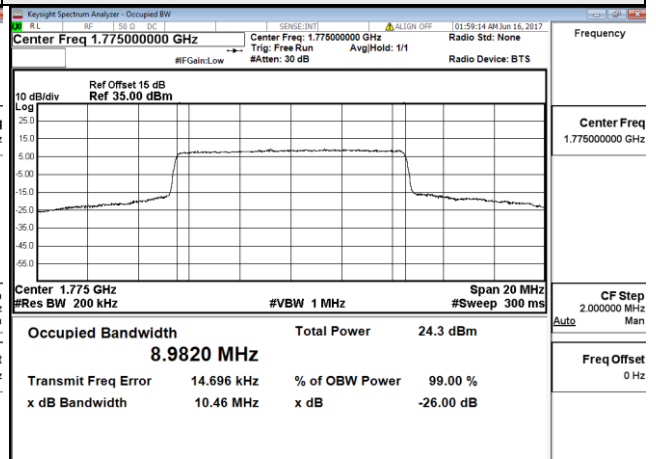
3MHz / 16QAM



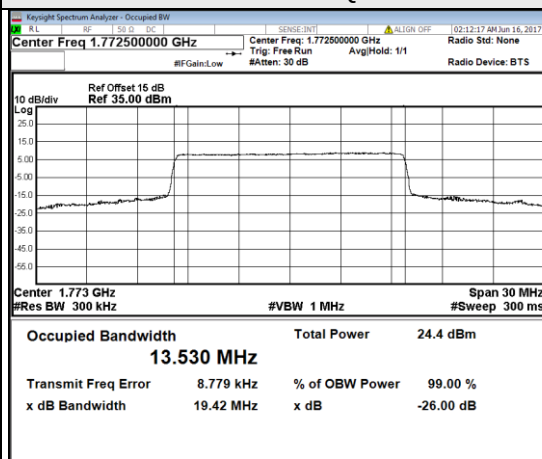
5MHz / QPSK



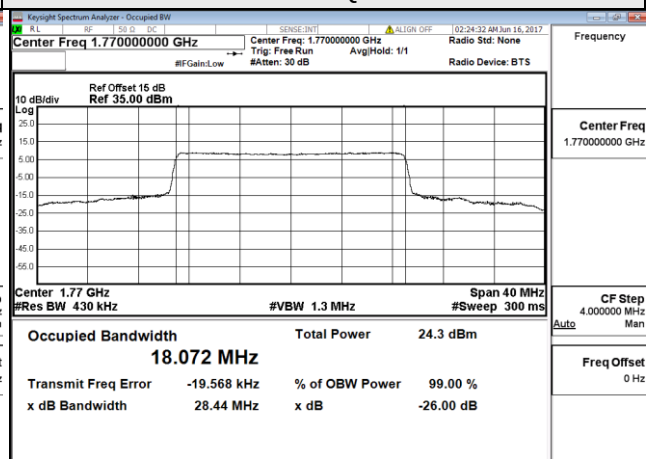
10MHz / QPSK



15MHz / QPSK

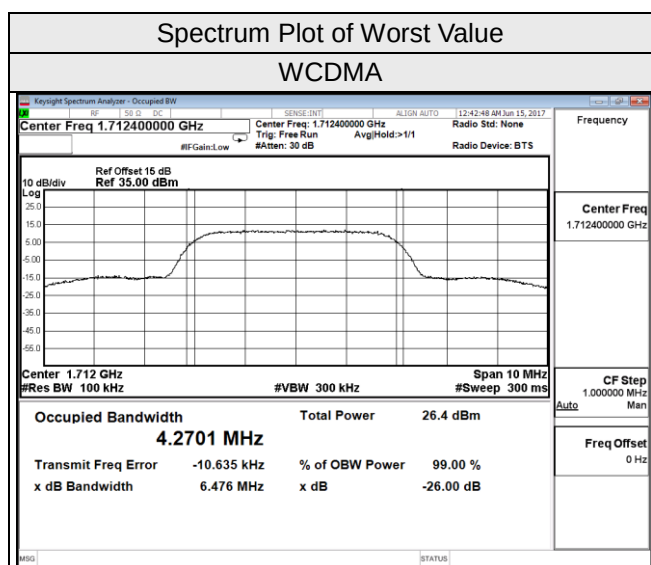


20MHz / QPSK



4.3.5 Test Results (Occupied Bandwidth, Subcontract Item)

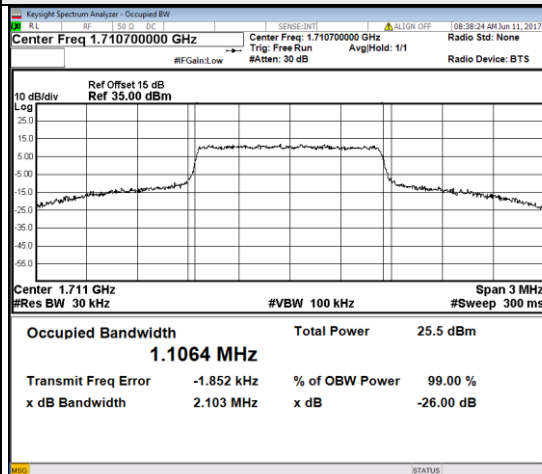
Channel	FREQ. (MHz)	Occupied Bandwidth (MHz)
		WCDMA
1312	1712.4	4.27
1413	1732.6	4.26
1513	1752.6	4.20



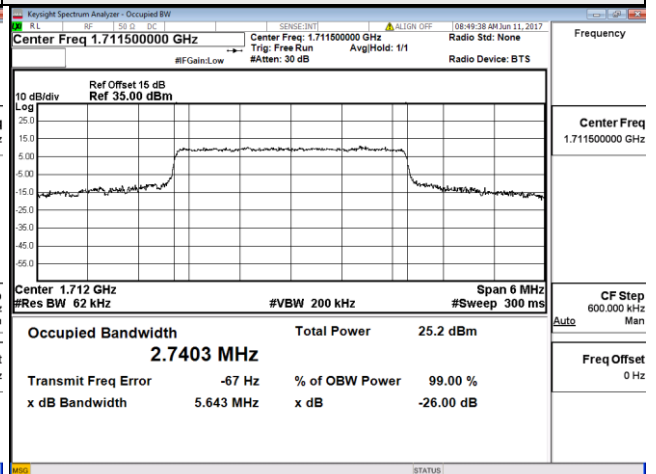
LTE Band 4							
Channel Bandwidth 1.4MHz				Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
19957	1710.7	1.11	1.11	19965	1711.5	2.74	2.74
20175	1732.5	1.10	1.10	20175	1732.5	2.73	2.72
20393	1754.3	1.10	1.10	20385	1753.5	2.71	2.70
Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
19975	1712.5	4.56	4.54	20000	1715	9.19	9.05
20175	1732.5	4.51	4.52	20175	1732.5	9.03	9.01
20375	1752.5	4.50	4.50	20350	1750	8.99	8.99
Channel Bandwidth 15MHz				Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
20025	1717.5	13.56	13.53	20050	1720	18.06	18.05
20175	1732.5	13.49	13.46	20175	1732.5	17.97	17.96
20325	1747.5	13.60	13.55	20300	1745	18.17	18.15

Spectrum Plot of Worst Value

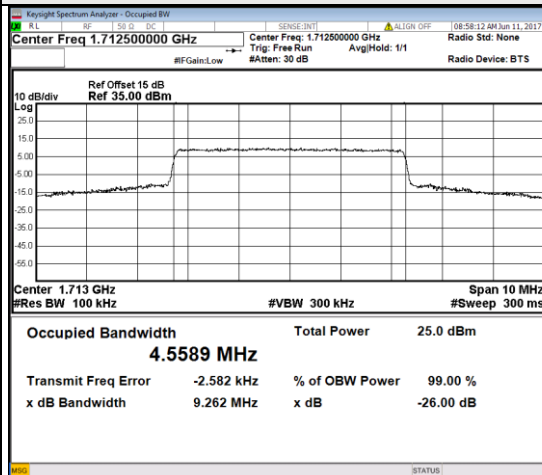
1.4MHz / 16QAM



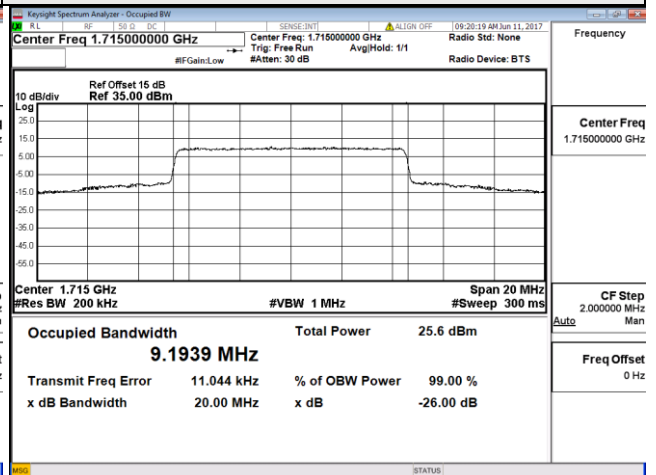
3MHz / QPSK



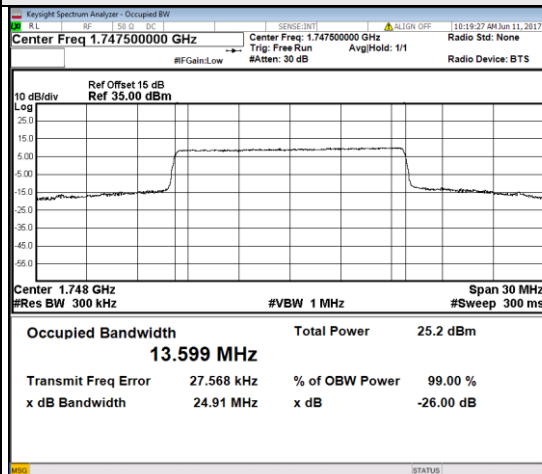
5MHz / QPSK



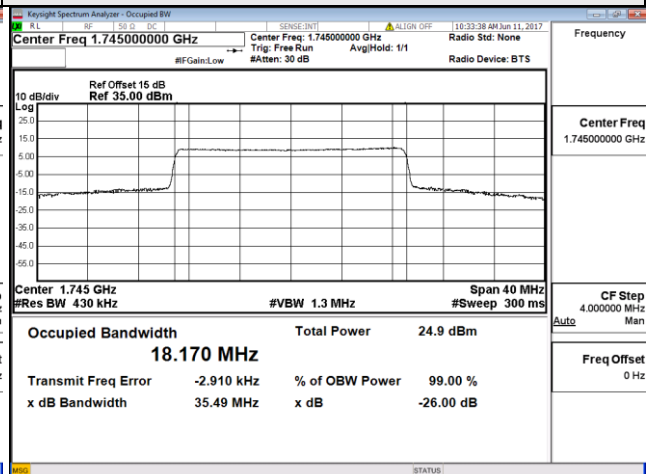
10MHz / QPSK



15MHz / QPSK



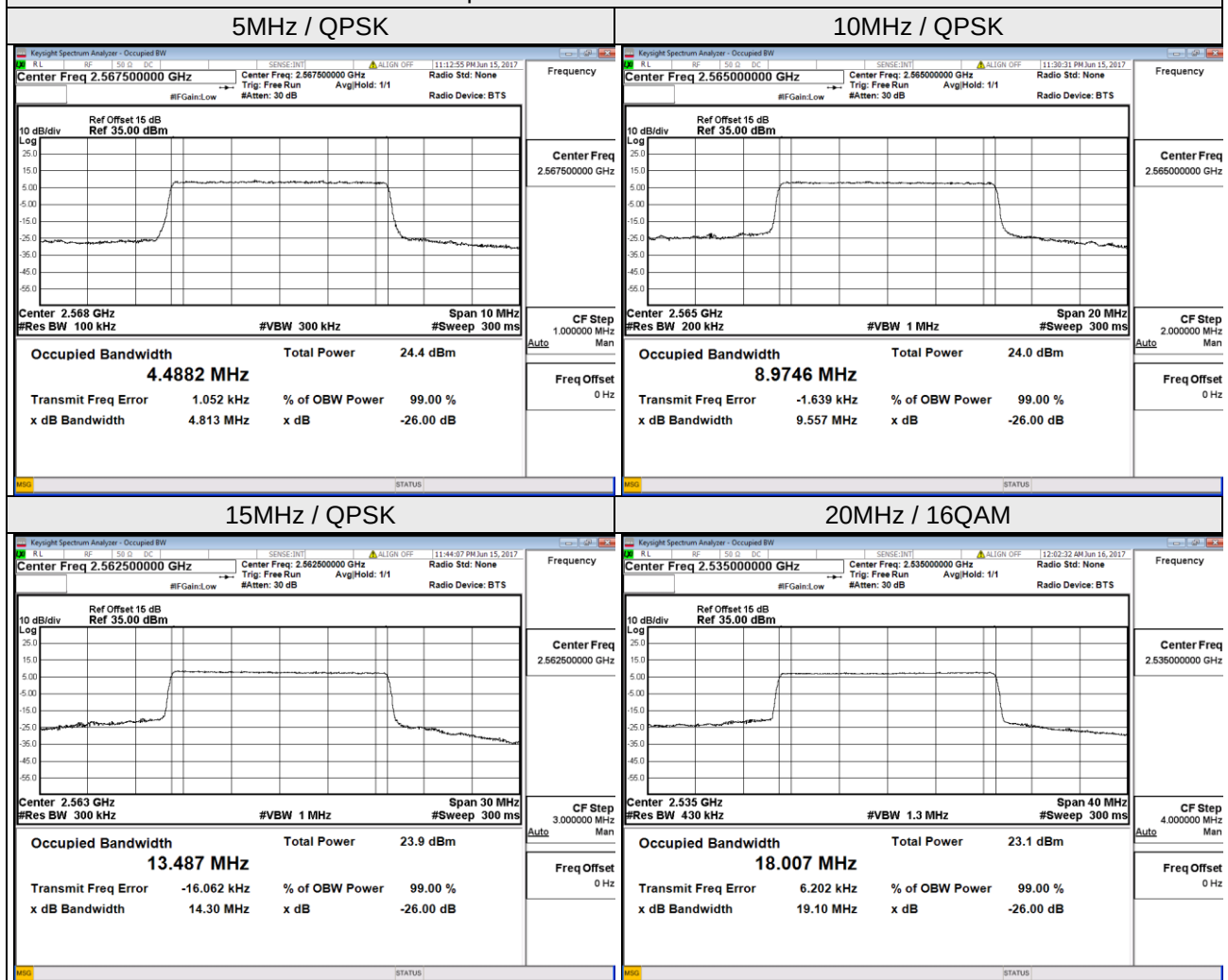
20MHz / QPSK



LTE Band 7

Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
20775	2502.5	4.49	4.49	20800	2505	8.96	8.97
21100	2535	4.49	4.49	21100	2535	8.97	8.97
21425	2567.5	4.49	4.49	21400	2565	8.97	8.97
Channel Bandwidth 15MHz				Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
20825	2507.5	13.46	13.45	20850	2510	17.94	17.95
21100	2535	13.48	13.47	21100	2535	17.99	18.01
21375	2562.5	13.49	13.47	21350	2560	17.97	17.98

Spectrum Plot of Worst Value



LTE Band 12							
Channel Bandwidth 1.4MHz				Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
23017	699.7	1.09	1.09	23025	700.5	2.70	2.70
23095	707.5	1.09	1.09	23095	707.5	2.71	2.70
23173	715.3	1.09	1.09	23165	714.5	2.70	2.70
Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
23035	701.5	4.50	4.50	23060	704	8.98	8.99
23095	707.5	4.49	4.49	23095	707.5	8.97	8.96
23155	713.5	4.50	4.50	23130	711	8.98	8.98

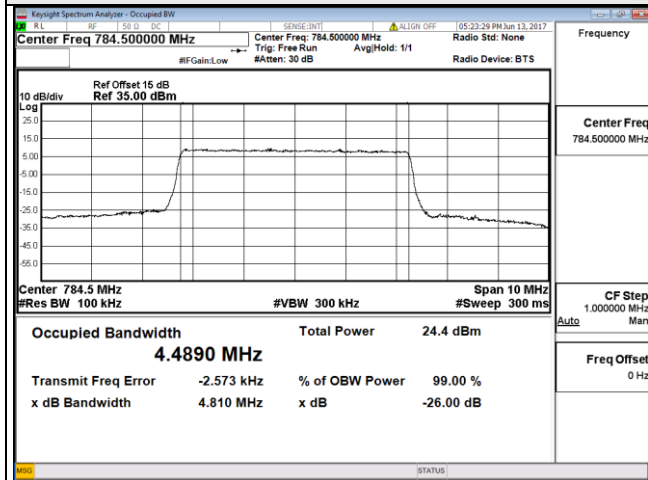


LTE Band 13

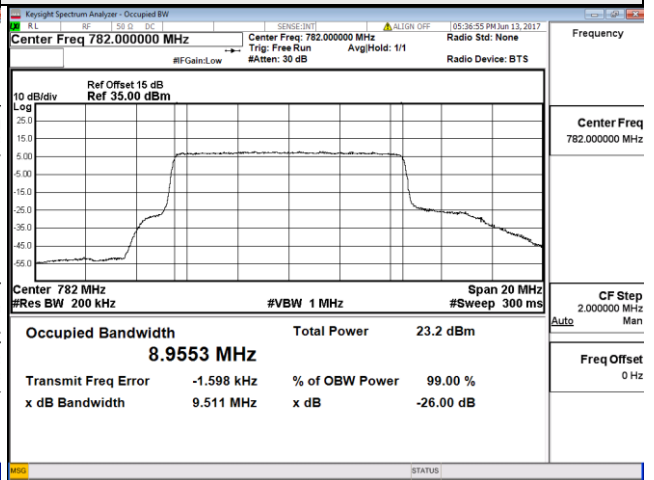
Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
23205	779.5	4.49	4.49	23230	782	8.95	8.96
23230	782	4.49	4.49				
23255	784.5	4.49	4.49				

Spectrum Plot of Worst Value

5MHz / 16QAM



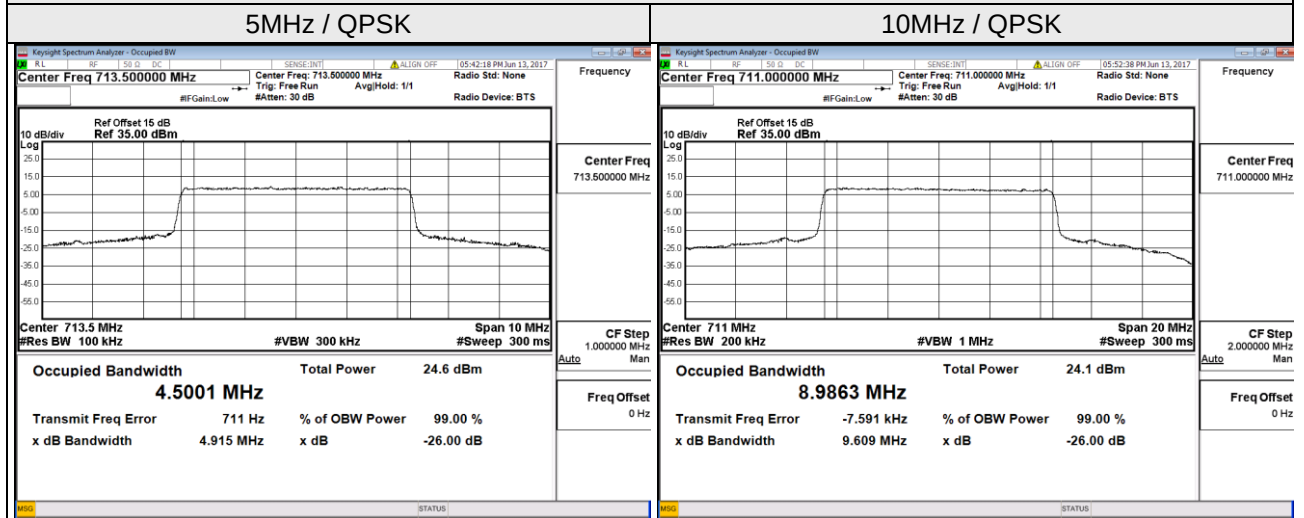
10MHz / QPSK



LTE Band 17

Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
23775	706.5	4.49	4.49	23780	709	8.97	8.96
23790	710	4.50	4.49	23790	710	8.98	8.97
23825	713.5	4.50	4.50	23800	711	8.99	8.98

Spectrum Plot of Worst Value

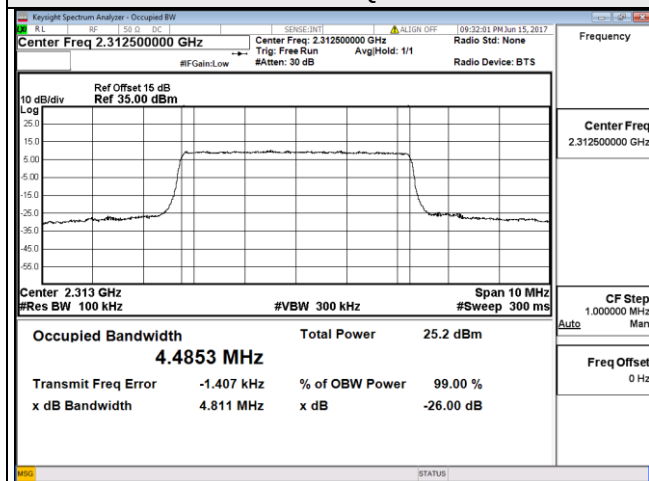


LTE Band 30

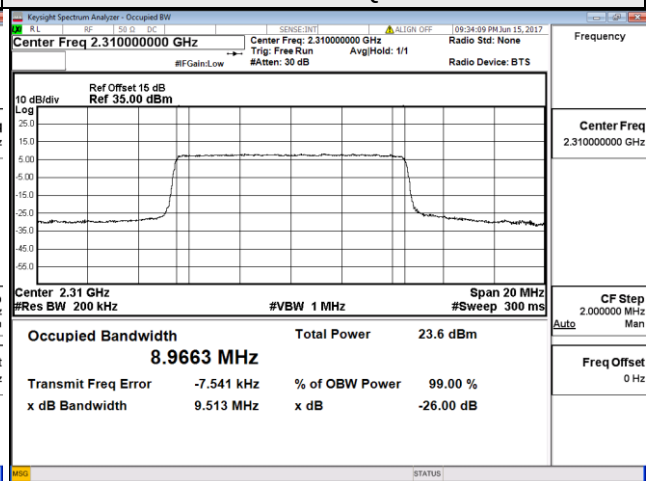
Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
27685	2307.5	4.49	4.49	27710	2310	8.96	8.97
27710	2310	4.49	4.49				
27735	2312.5	4.49	4.49				

Spectrum Plot of Worst Value

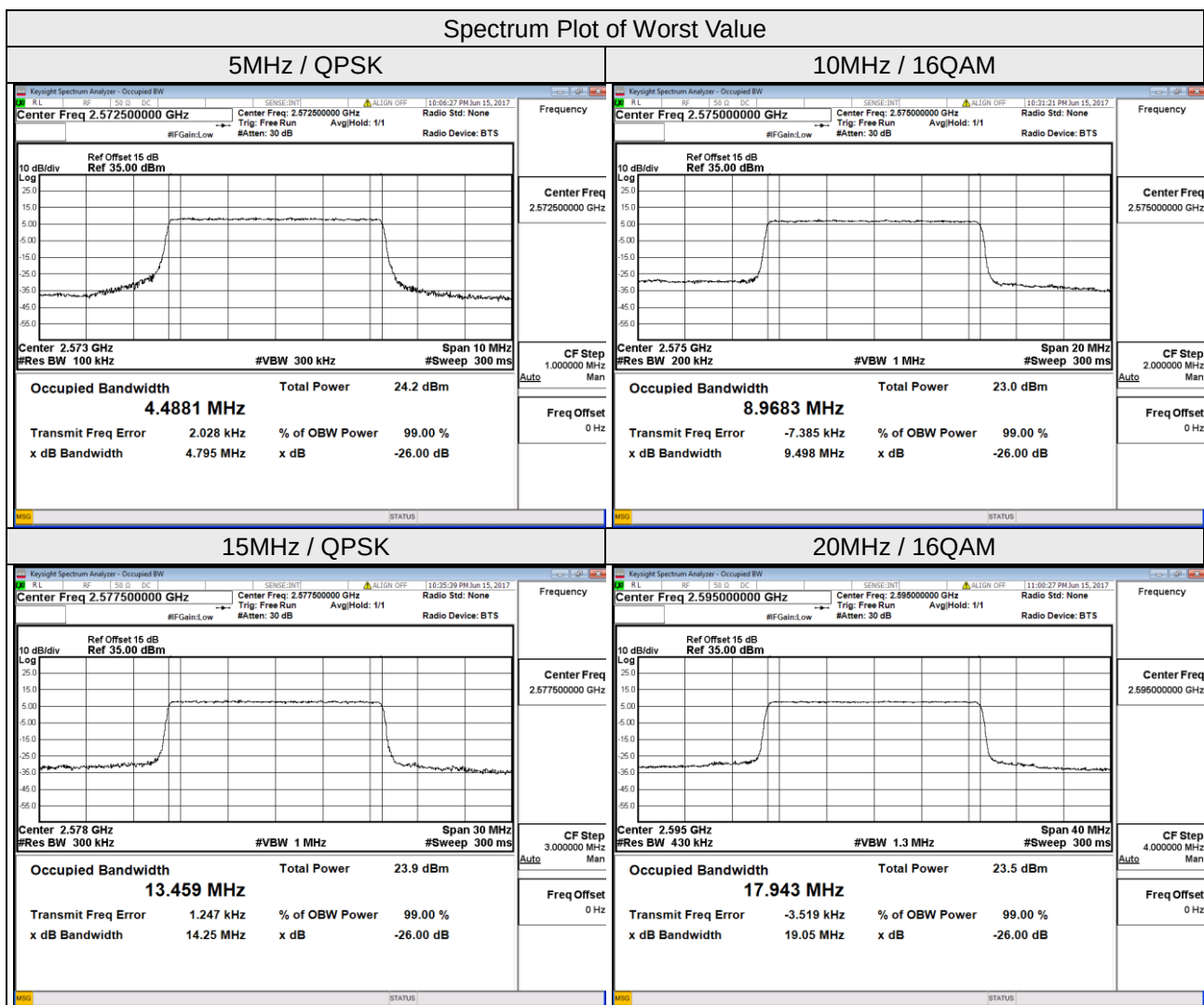
5MHz / 16QAM



10MHz / 16QAM



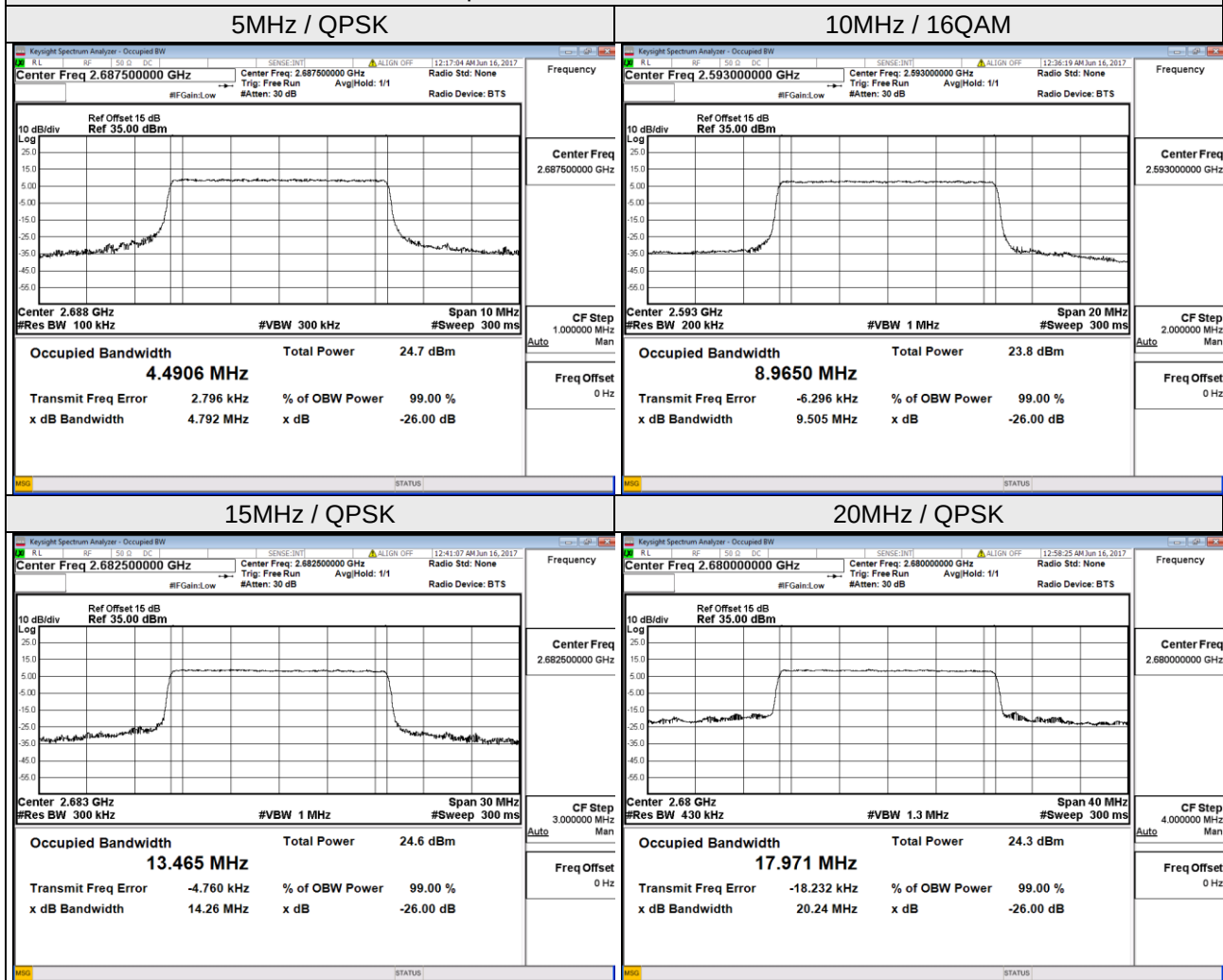
LTE Band 38							
Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
37775	2572.5	4.49	4.49	37800	2575	8.96	8.97
38000	2595	4.49	4.49	38000	2595	8.96	8.97
38225	2617.5	4.49	4.49	38200	2615	8.95	8.97
Channel Bandwidth 15MHz				Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
37825	2577.5	13.46	13.45	37850	2580	17.94	17.93
38000	2595	13.46	13.45	38000	2595	17.94	17.94
38175	2612.5	13.46	13.45	38150	2610	17.93	17.92



LTE Band 41

Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
39675	2498.5	4.49	4.49	39700	2501	8.95	8.96
40620	2593	4.49	4.49	50620	2593	8.95	8.97
41565	2687.5	4.49	4.49	41540	2685	8.96	8.96
Channel Bandwidth 15MHz				Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
39725	2503.5	13.46	13.45	39750	2506	17.94	17.93
40620	2593	13.46	13.45	40620	2593	17.95	17.94
41515	2682.5	13.47	13.45	41490	2680	17.97	17.95

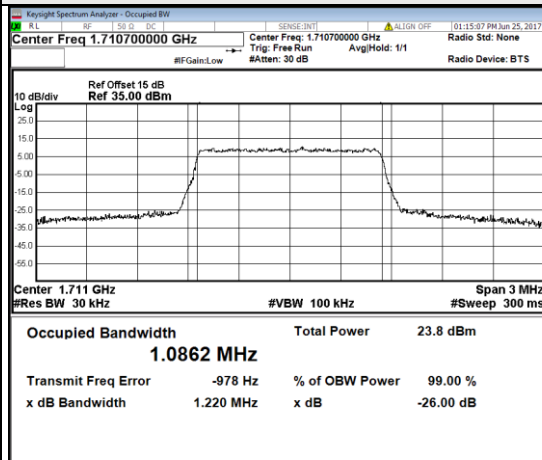
Spectrum Plot of Worst Value



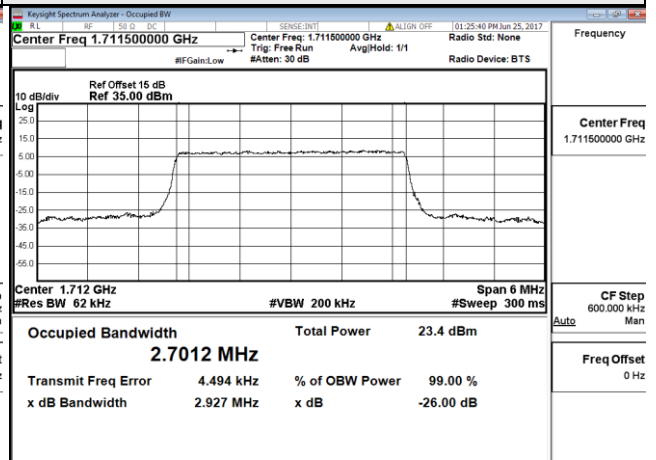
LTE Band 66							
Channel Bandwidth 1.4MHz				Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
131979	1710.7	1.09	1.09	131987	1711.5	2.70	2.70
132322	1745	1.09	1.09	132322	1745	2.70	2.70
132665	1779.3	1.09	1.09	132657	1778.5	2.70	2.70
Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
131997	1712.5	4.50	4.50	132022	1715	9.00	8.99
132322	1745	4.49	4.49	132322	1745	8.98	8.98
132647	1777.5	4.50	4.50	132622	1775	8.98	8.98
Channel Bandwidth 15MHz				Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
132047	1717.5	13.52	13.49	132072	1720	18.01	18.01
132322	1745	13.51	13.49	132322	1745	18.03	18.04
132597	1722.5	13.53	13.50	132572	1770	18.07	18.05

Spectrum Plot of Worst Value

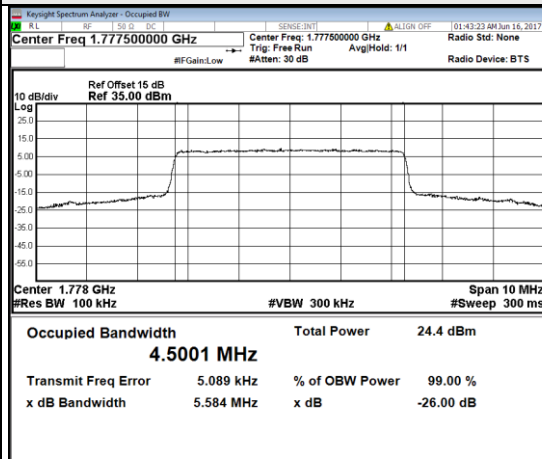
1.4MHz / QPSK



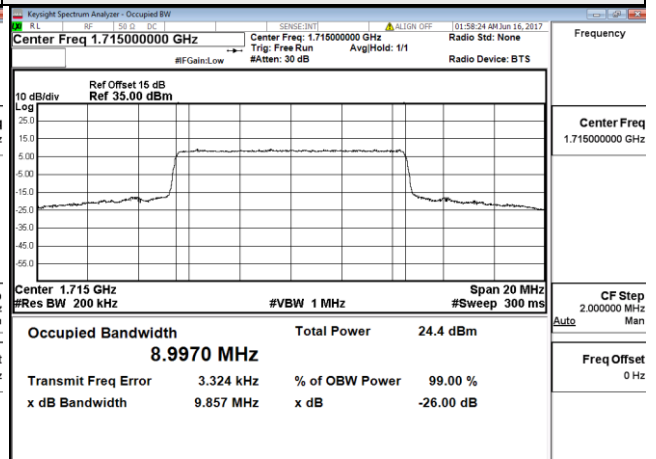
3MHz / QPSK



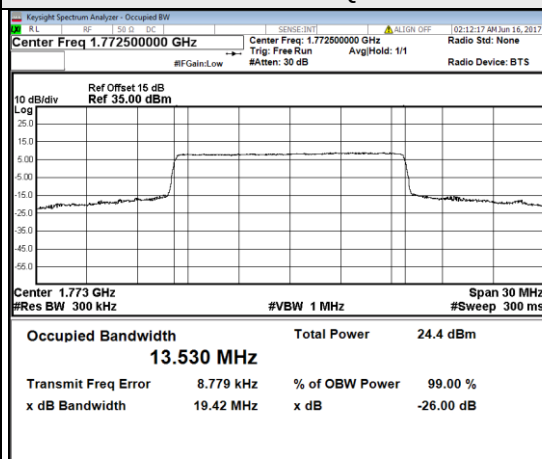
5MHz / QPSK



10MHz / QPSK



15MHz / QPSK



20MHz / QPSK

