



**2.3.3 Test Verdict**

The nominal, highest and lowest extreme voltages are separately 3.8VDC, 4.2VDC and 3.45VDC, which are specified by the applicant; the normal temperature here used is 20°C. The frequency deviation limit is ±2.5ppm.

The testing was performed using one RB and Bandwidth setting for each band.

<b>LTE Band 2 – QPSK - Channel 18900 – Frequency 1880.0MHz – RB 6/0</b>				
<b>Limit: 1880.0MHz*1ppm=1880.0Hz</b>				
<b>Voltage (%)</b>	<b>Power (VDC)</b>	<b>Temp (°C)</b>	<b>Fre. Dev. (Hz)</b>	<b>Result</b>
100	3.8	-30	8.76	PASS
100		-20	14.11	
100		-10	-8.68	
100		0	7.57	
100		+10	9.42	
100		+20	8.33	
100		+30	-10.86	
100		+40	8.82	
100		+50	10.71	
115		4.2	+20	
85	3.45	+20	12.07	

<b>LTE Band 4 – QPSK - Channel 20175 – Frequency 1732.5MHz – RB 6/0</b>				
<b>Limit: 1732.5MHz*2.5ppm=4331.25Hz</b>				
<b>Voltage (%)</b>	<b>Power (VDC)</b>	<b>Temp (°C)</b>	<b>Fre. Dev. (Hz)</b>	<b>Result</b>
100	3.8	-30	11.51	PASS
100		-20	-10.71	
100		-10	8.78	
100		0	10.69	
100		+10	9.51	
100		+20	8.43	
100		+30	-11.94	
100		+40	9.78	
100		+50	8.73	
115		4.2	+20	
85	3.45	+20	11.86	



LTE Band 5 – QPSK - Channel 20525 – Frequency 836.5MHz – RB 6/0				
Limit: 836.5 MHz*2.5ppm=2091.25Hz				
Voltage (%)	Power (VDC)	Temp (°C)	Fre. Dev. (Hz)	Result
100	3.8	-30	11.72	PASS
100		-20	18.96	
100		-10	12.67	
100		0	11.62	
100		+10	12.36	
100		+20	8.33	
100		+30	-12.04	
100		+40	10.17	
100		+50	10.28	
115		4.2	+20	
85	3.45	+20	9.56	

TE Band 7 – QPSK - Channel 21100 – Frequency 2535MHz – RB 25/0				
Limit: 2535MHz*2.5ppm=6337.5Hz				
Voltage (%)	Power (VDC)	Temp (°C)	Fre. Dev. (Hz)	Result
100	3.8	-30	4.26	PASS
100		-20	-6.79	
100		-10	-6.83	
100		0	2.63	
100		+10	-3.46	
100		+20	4.50	
100		+30	1.36	
100		+40	3.55	
100		+50	-7.23	
115		4.2	+20	
85	3.45	+20	-6.64	



## **2.4 Peak to Average Ratio**

### **2.4.1 Requirement**

According to FCC section 27.50(d) (5), the peak to average ratio (PAR) of the transmission may not exceed 13dB.

### **2.4.2 Test Description**

See section 2.1.2 of this report.

### **2.4.3 Test Result**

Record the maximum PAPR level associated with a probability of 0.1%.

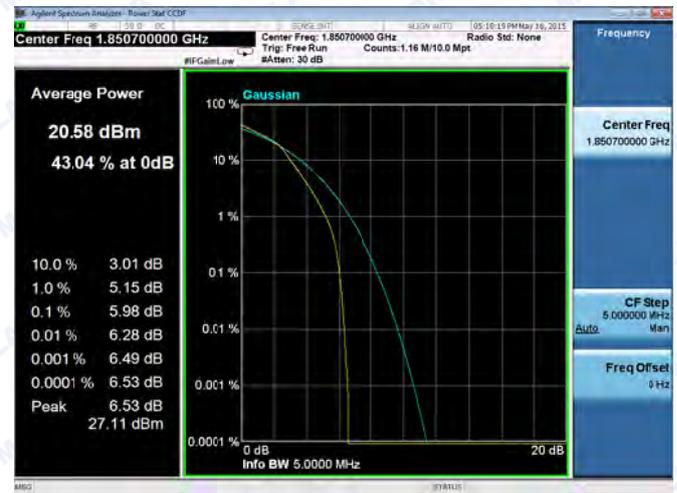
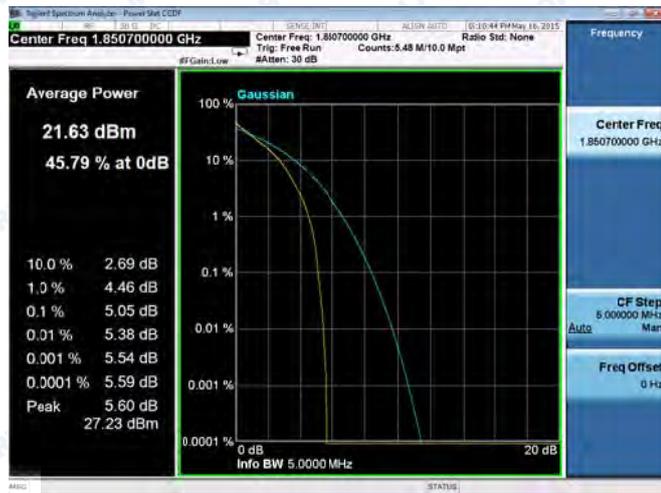


LTE Band 2 Low channel							
Channel Bandwidth: 1.4MHz				Channel Bandwidth: 3MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	5.05	5.98	18615	1851.5	5.14	6.07

Spectrum Plot of Worst Value (Low channel)

1.4MHz/QPSK

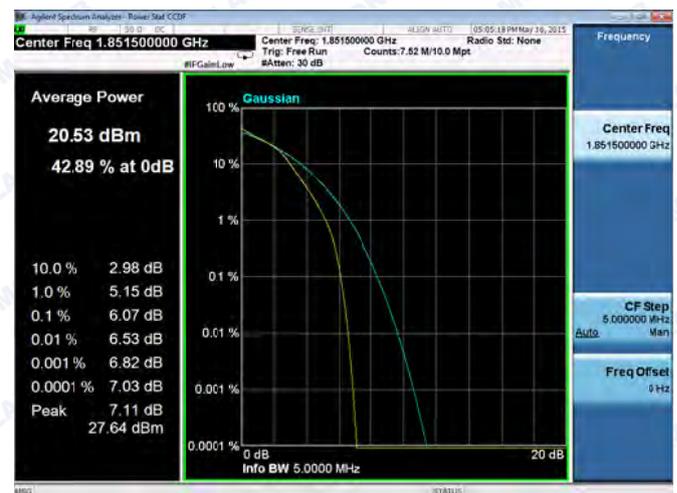
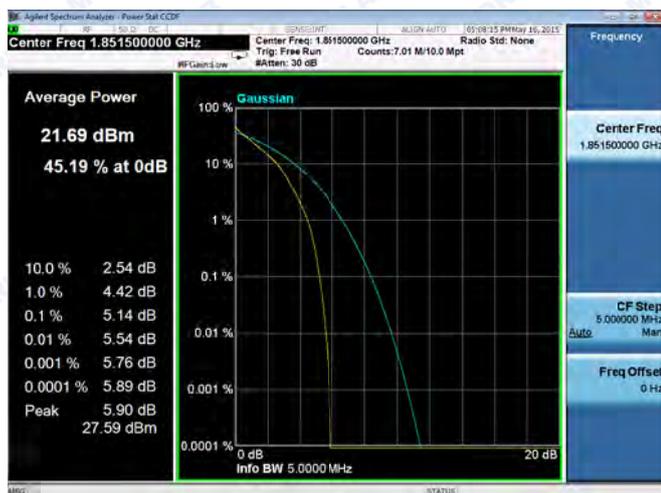
1.4MHz/16QAM



Spectrum Plot of Worst Value

3MHz/QPSK

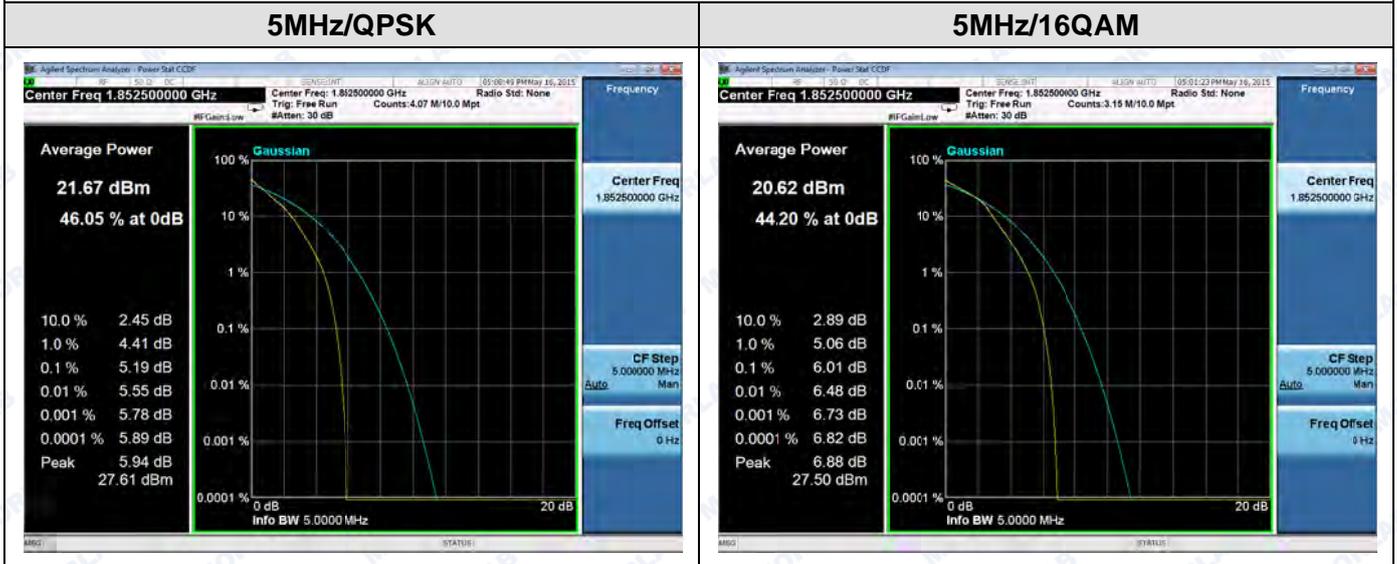
3MHz/16QAM



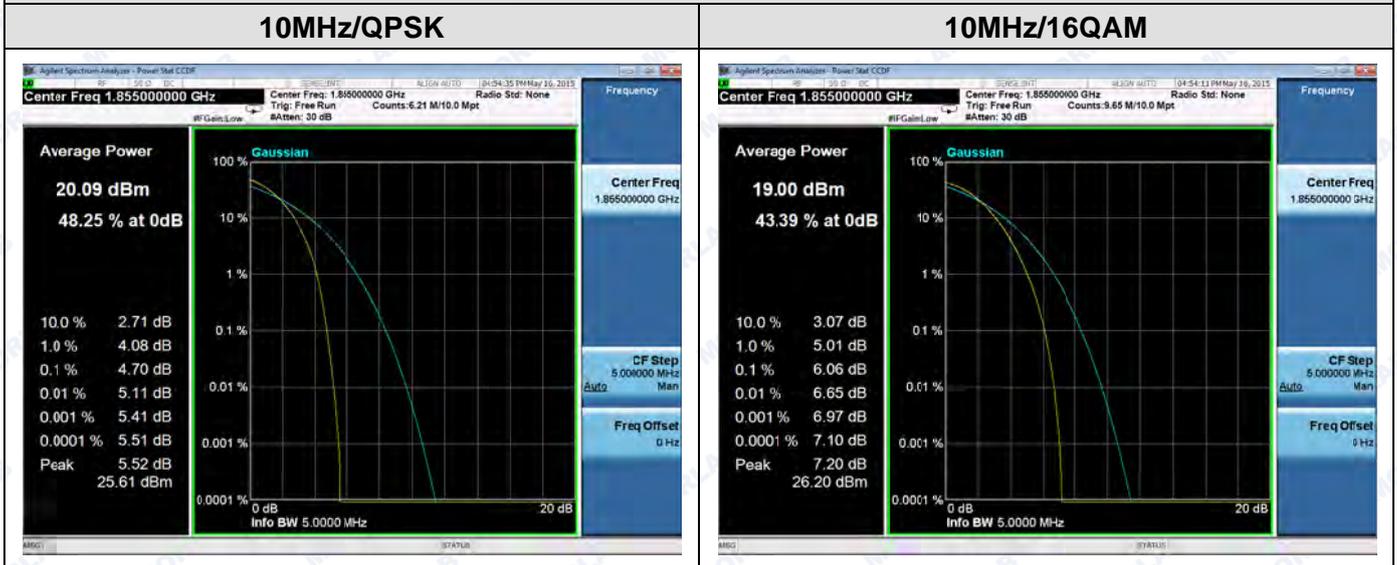


LTE Band 2 Low channel							
Channel Bandwidth: 5MHz				Channel Bandwidth: 10MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18625	1852.5	5.19	6.01	18650	1855.0	4.70	6.06

Spectrum Plot of Worst Value



Spectrum Plot of Worst Value



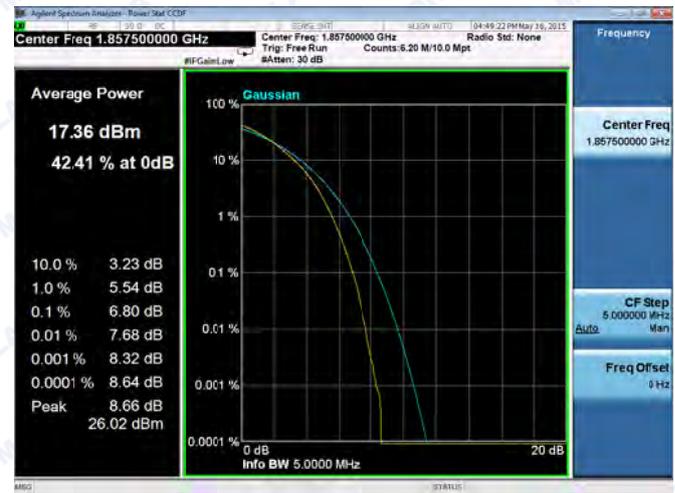


LTE Band 2 Low channel							
Channel Bandwidth: 15MHz				Channel Bandwidth: 20MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18675	1857.5	5.77	6.80	18700	1860.0	6.45	7.21

Spectrum Plot of Worst Value

15MHz/QPSK

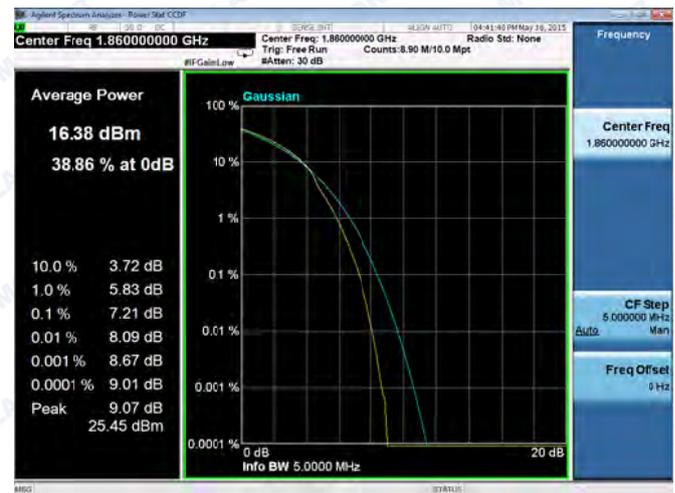
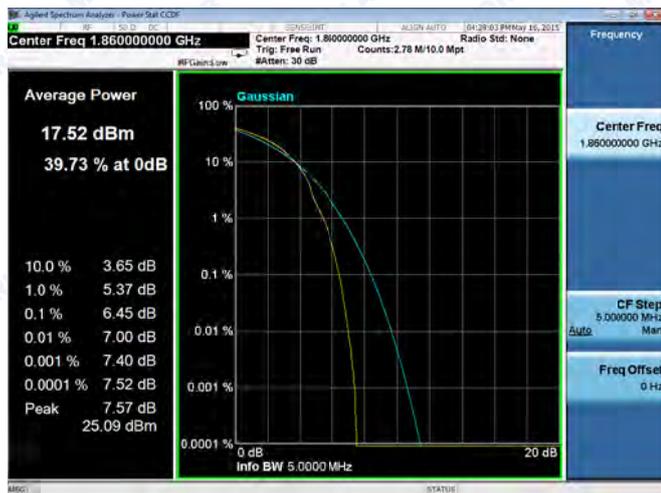
15MHz/16QAM



Spectrum Plot of Worst Value

20MHz/QPSK

20MHz/16QAM



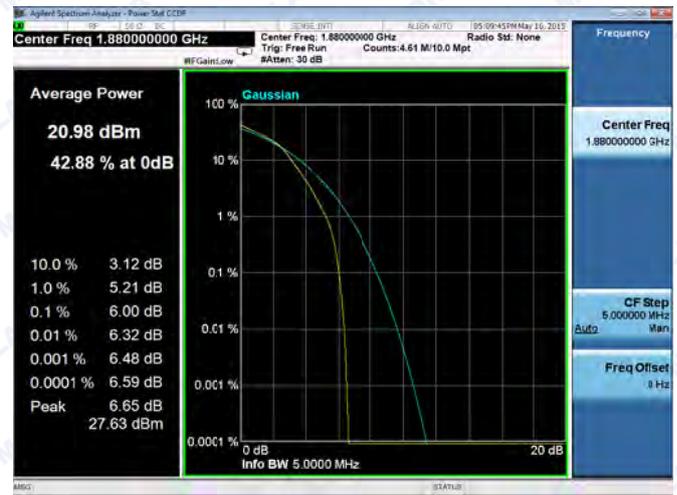
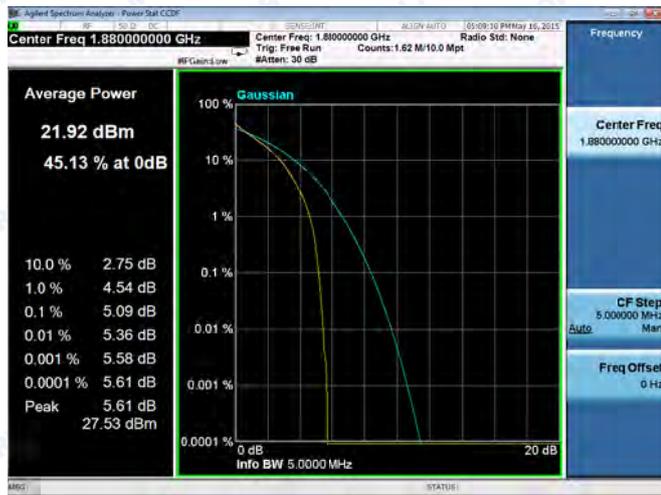


LTE Band 2 Middle channel							
Channel Bandwidth: 1.4MHz				Channel Bandwidth: 3MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18900	1880.0	5.09	6.00	18900	1880.0	5.18	6.12

Spectrum Plot of Worst Value

1.4MHz/QPSK

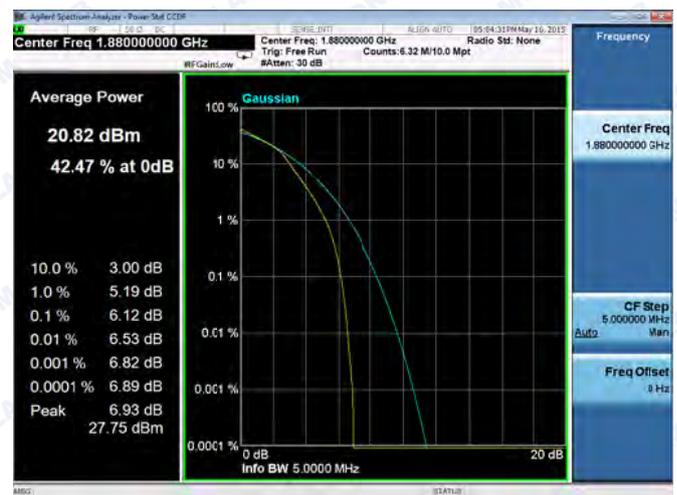
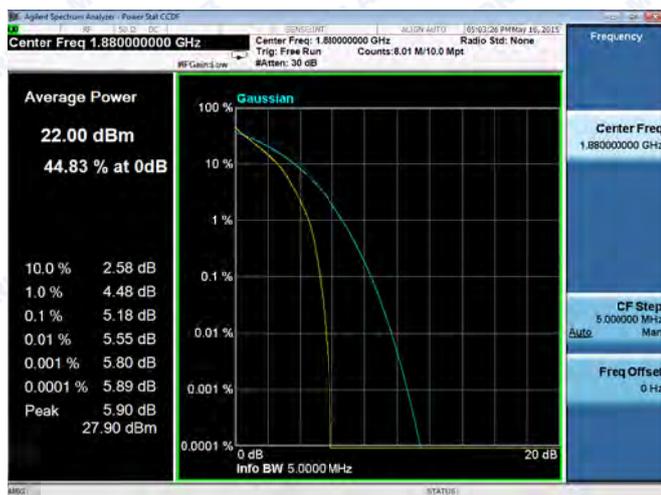
1.4MHz/16QAM



Spectrum Plot of Worst Value

3MHz/QPSK

3MHz/16QAM



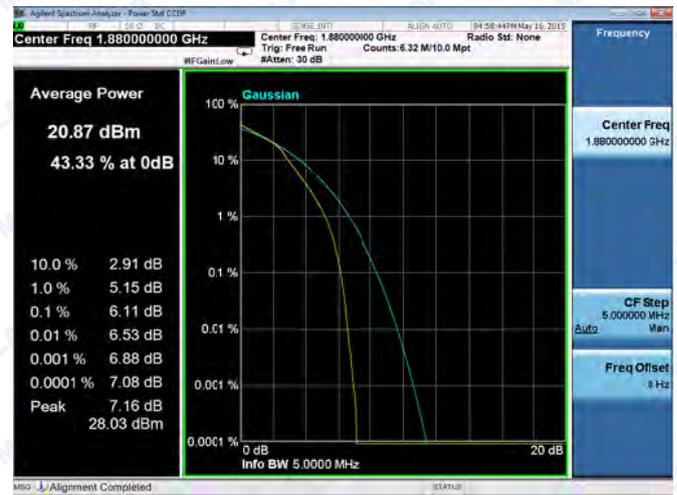
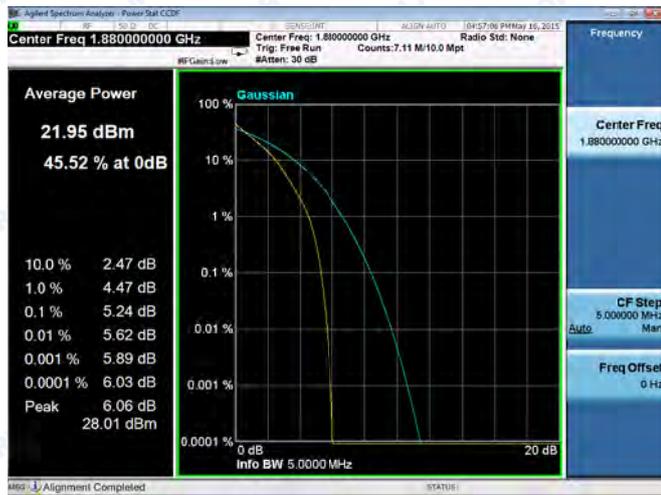


LTE Band 2 Middle channel							
Channel Bandwidth: 5MHz				Channel Bandwidth: 10MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18900	1880.0	5.24	6.11	18900	1880.0	4.68	6.15

Spectrum Plot of Worst Value

5MHz/QPSK

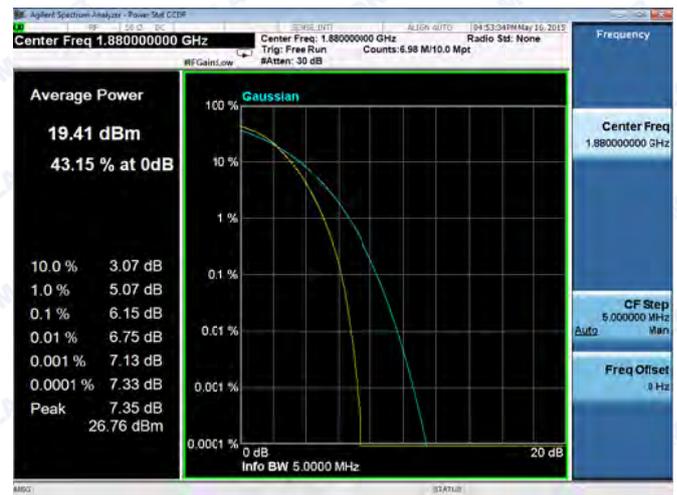
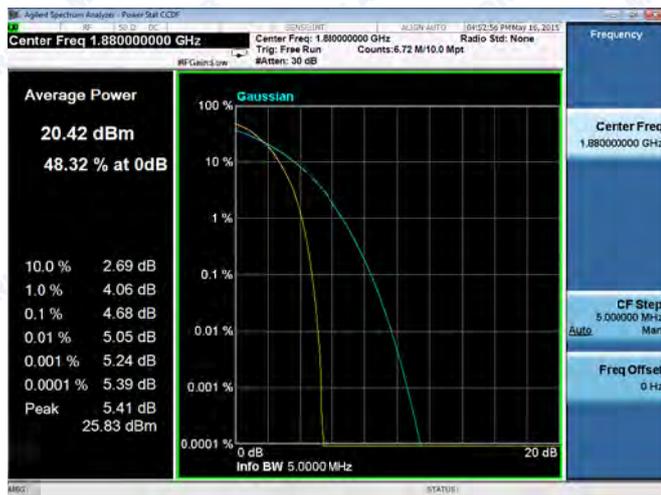
5MHz/16QAM



Spectrum Plot of Worst Value

10MHz/QPSK

10MHz/16QAM



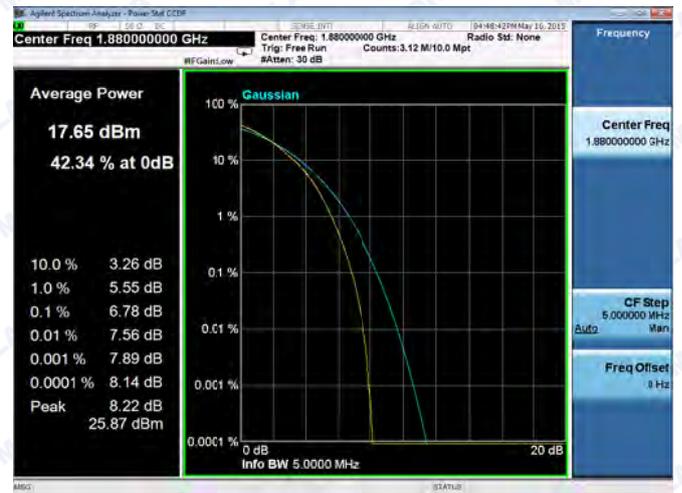
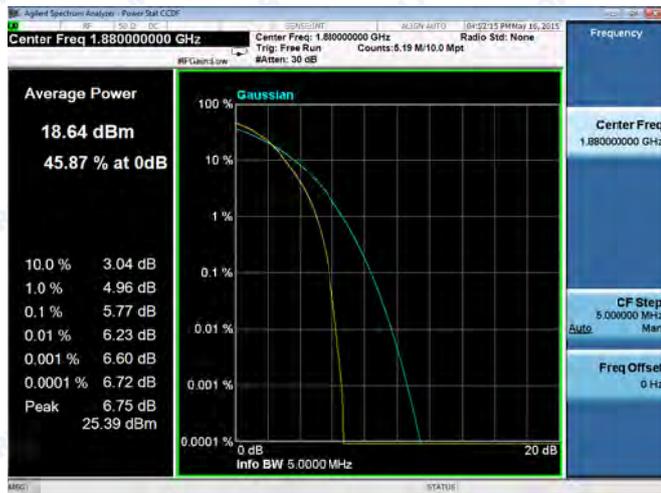


LTE Band 2 Middle channel							
Channel Bandwidth: 15MHz				Channel Bandwidth: 20MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18900	1880.0	5.77	6.78	18900	1880.0	6.45	7.16

Spectrum Plot of Worst Value

15MHz/QPSK

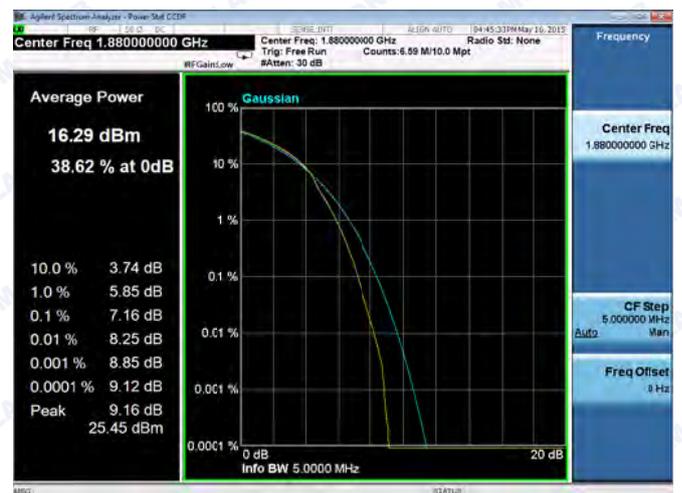
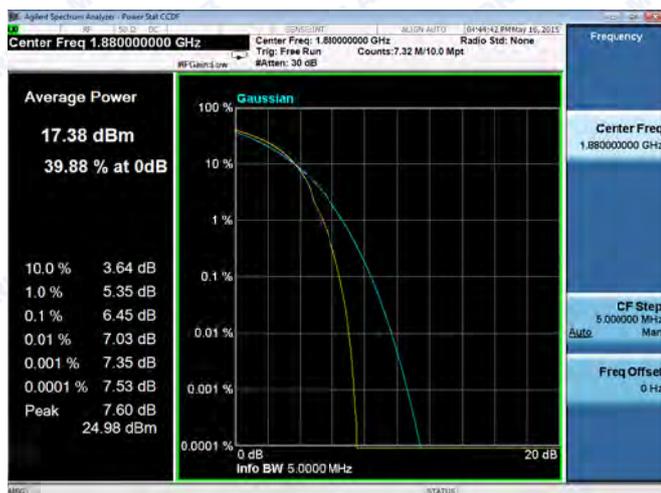
15MHz/16QAM



Spectrum Plot of Worst Value

20MHz/QPSK

20MHz/16QAM



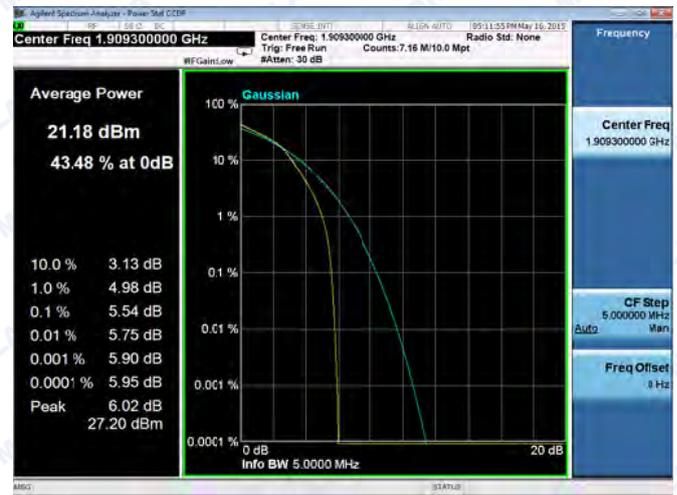
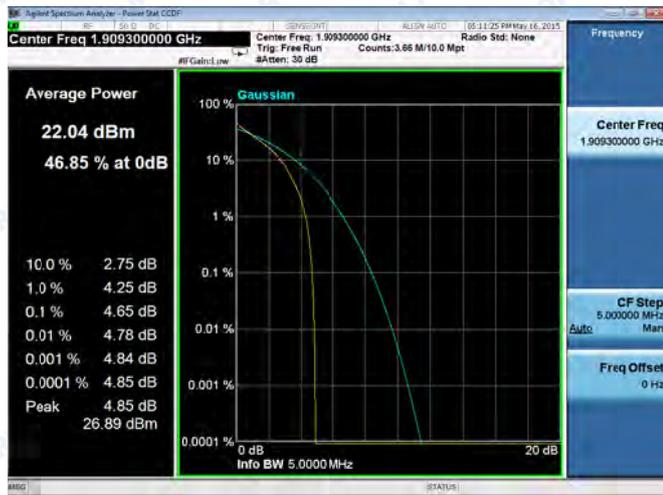


LTE Band 2 High channel							
Channel Bandwidth: 1.4MHz				Channel Bandwidth: 3MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
19193	1909.3	4.65	5.54	19185	1908.5	4.76	5.72

Spectrum Plot of Worst Value

1.4MHz/QPSK

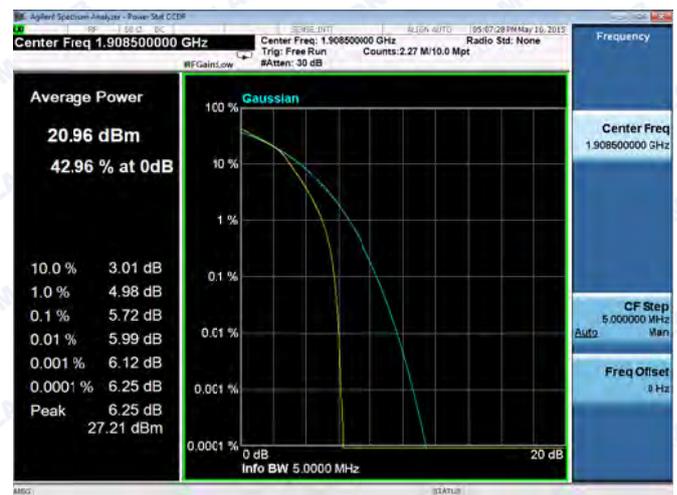
1.4MHz/16QAM



Spectrum Plot of Worst Value

3MHz/QPSK

3MHz/16QAM



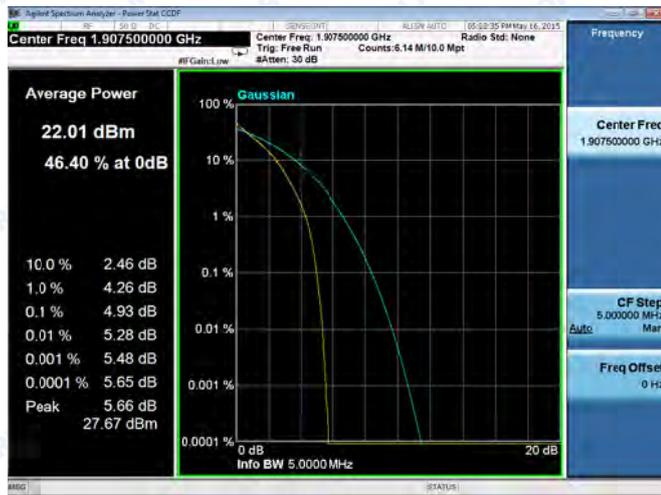


LTE Band 2 High channel							
Channel Bandwidth: 5MHz				Channel Bandwidth: 10MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
19175	1907.5	4.93	5.80	19150	1905.0	4.65	6.06

Spectrum Plot of Worst Value

5MHz/QPSK

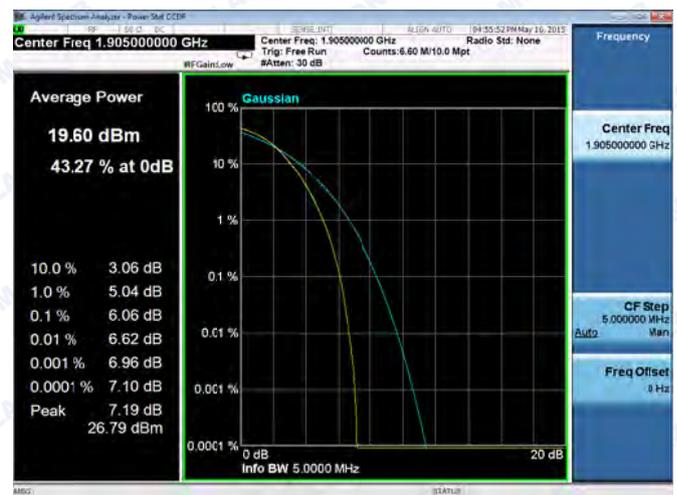
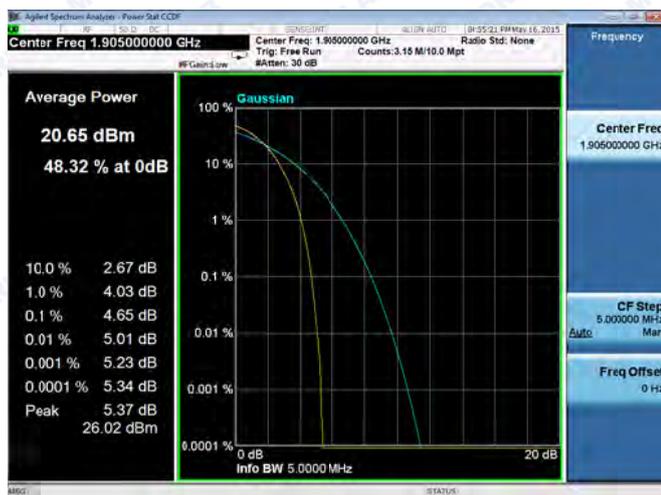
5MHz/16QAM



Spectrum Plot of Worst Value

10MHz/QPSK

10MHz/16QAM



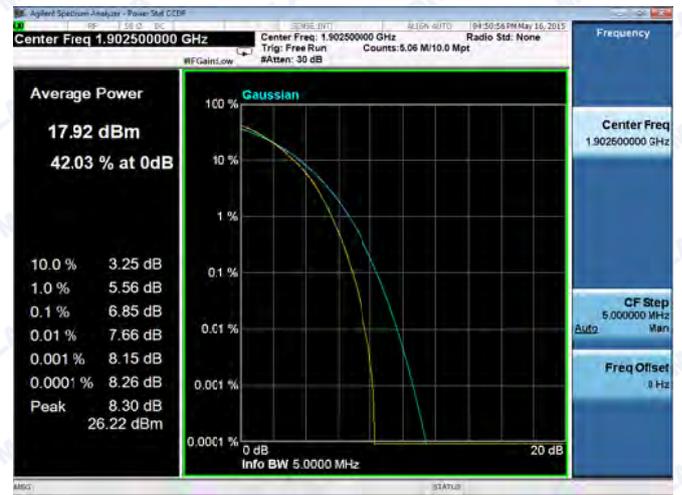
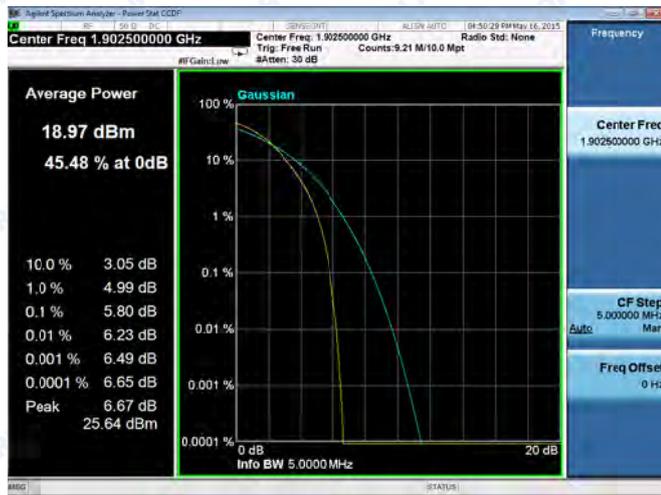


LTE Band 2 High channel							
Channel Bandwidth: 15MHz				Channel Bandwidth: 20MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
19125	1902.5	5.80	6.85	19100	1900.0	6.46	7.17

Spectrum Plot of Worst Value

15MHz/QPSK

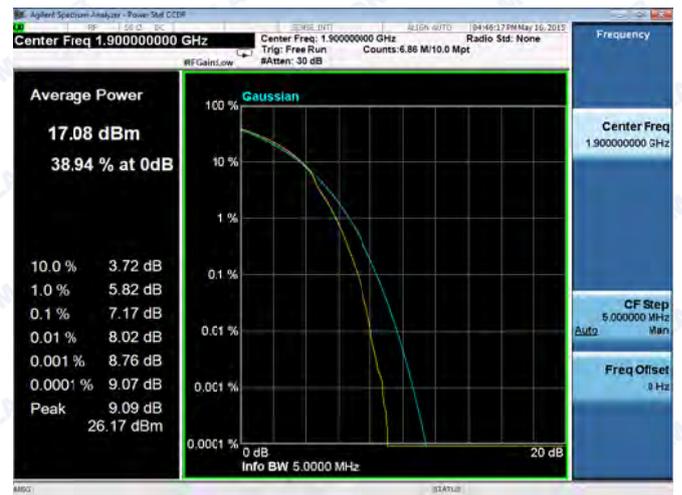
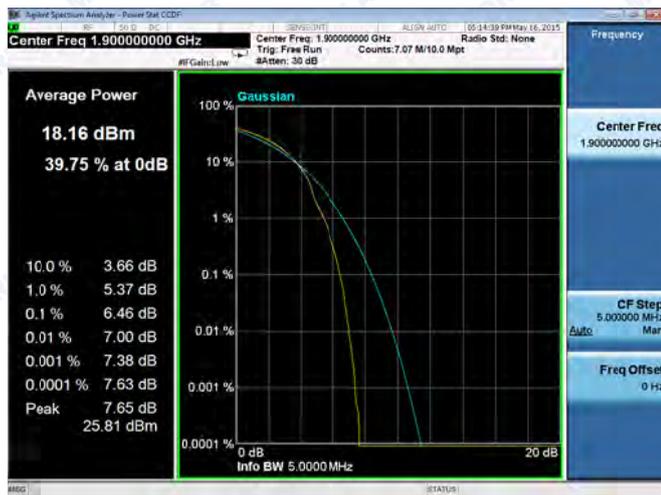
15MHz/16QAM



Spectrum Plot of Worst Value

20MHz/QPSK

20MHz/16QAM



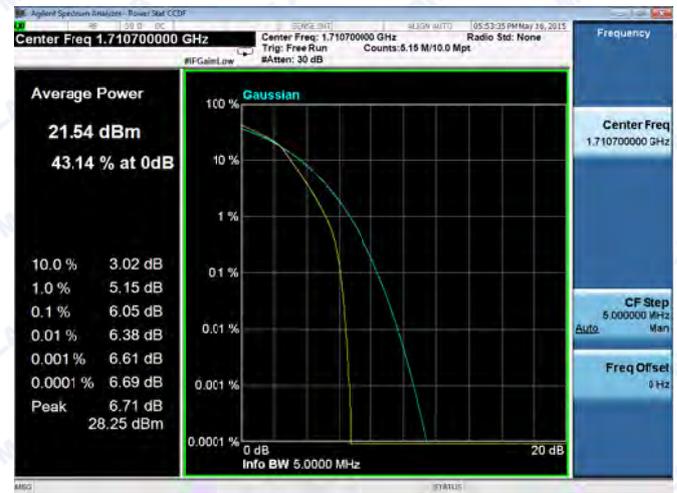
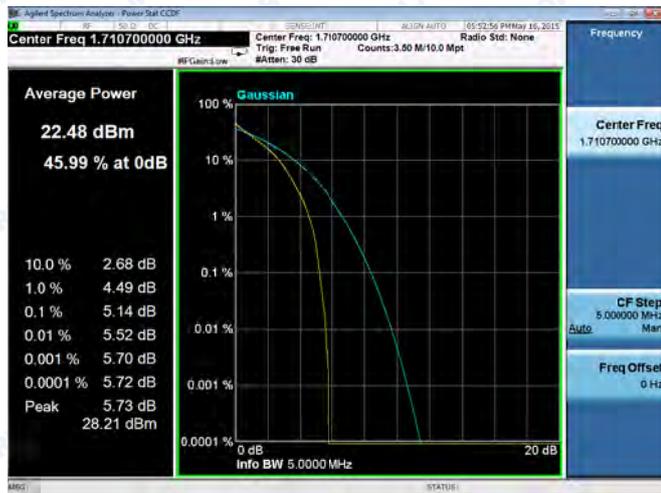


LTE Band 4 Low channel							
Channel Bandwidth: 1.4MHz				Channel Bandwidth: 3MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
19957	1710.7	5.14	6.05	19965	1711.5	5.26	6.17

Spectrum Plot of Worst Value (Low channel)

1.4MHz/QPSK

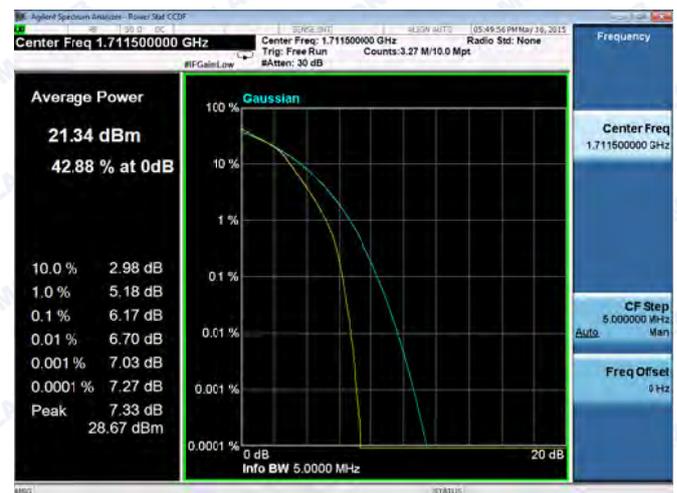
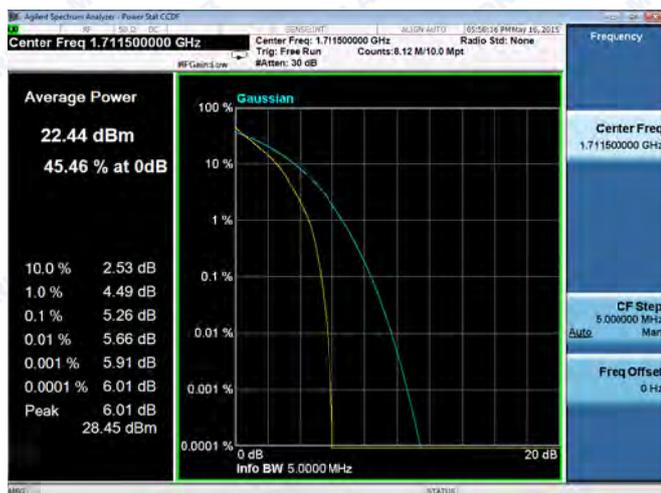
1.4MHz/16QAM



Spectrum Plot of Worst Value

3MHz/QPSK

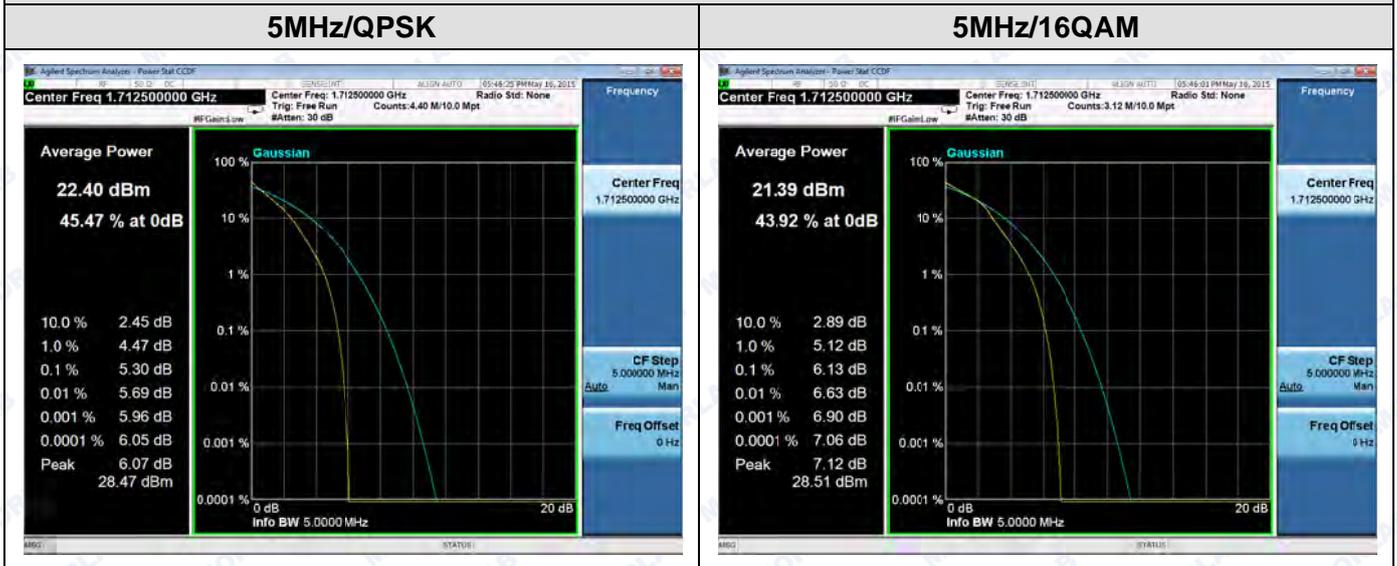
3MHz/16QAM



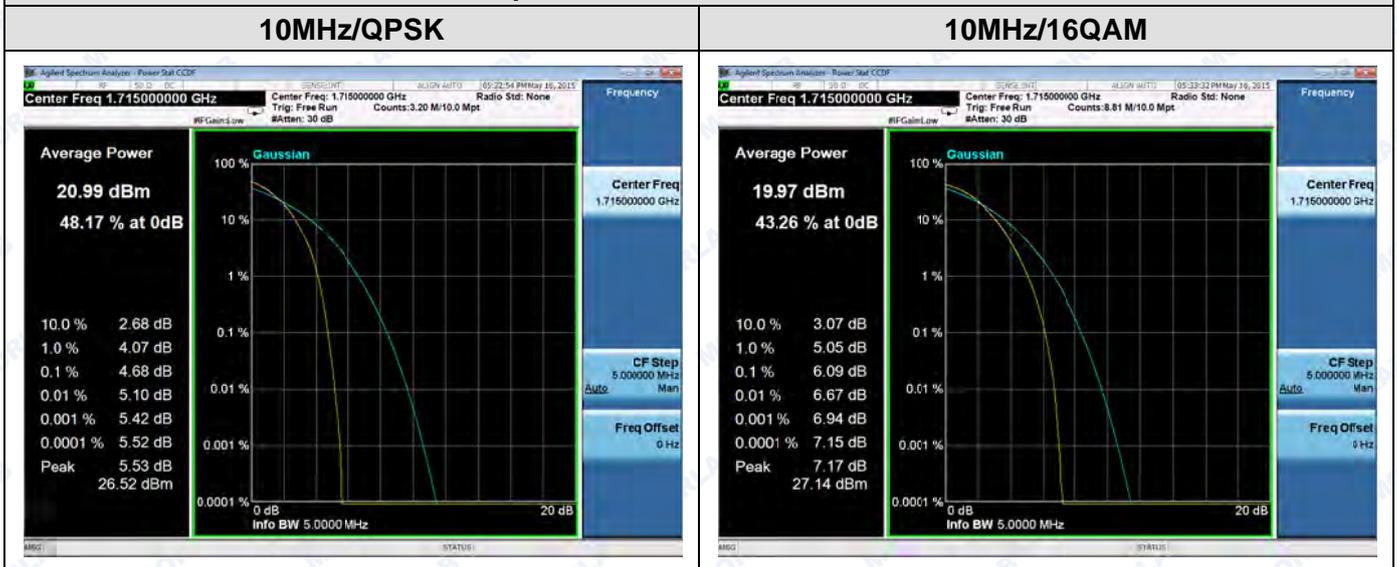


LTE Band 4 Low channel							
Channel Bandwidth: 5MHz				Channel Bandwidth: 10MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
19975	1712.5	5.30	6.13	20000	1715.0	4.68	6.09

Spectrum Plot of Worst Value



Spectrum Plot of Worst Value



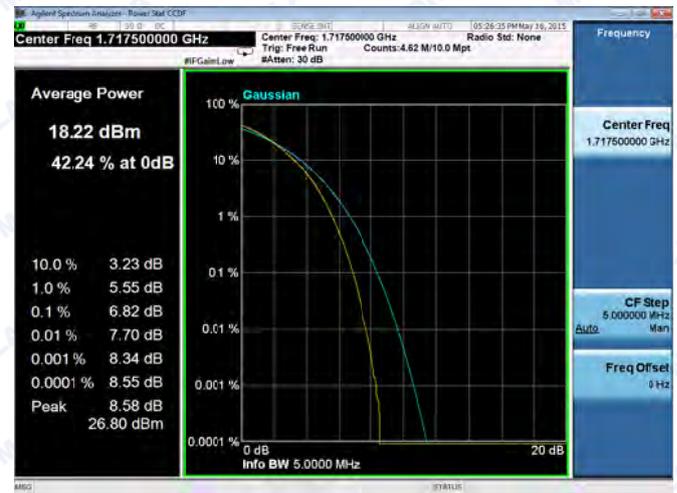
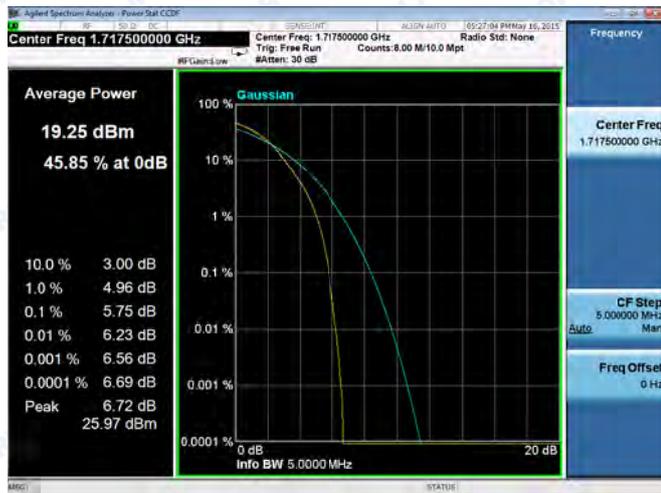


LTE Band 4 Low channel							
Channel Bandwidth: 15MHz				Channel Bandwidth: 20MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
20025	1717.5	5.75	6.82	20050	1720.0	6.45	7.16

Spectrum Plot of Worst Value

15MHz/QPSK

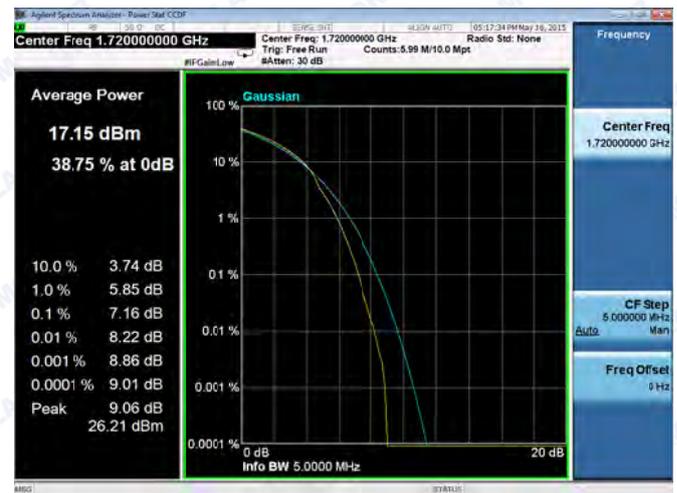
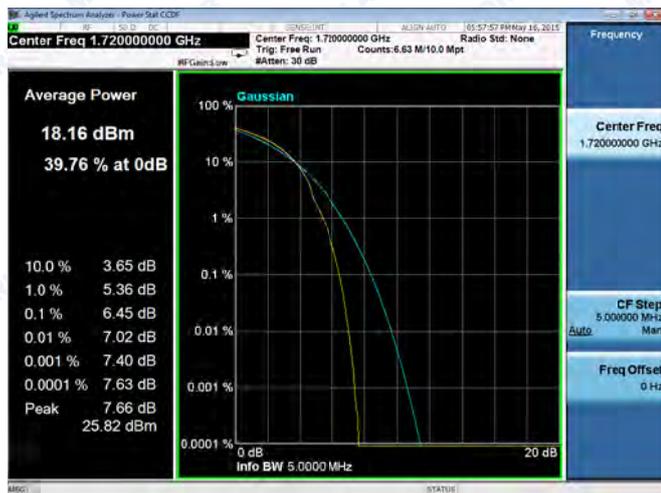
15MHz/16QAM



Spectrum Plot of Worst Value

20MHz/QPSK

20MHz/16QAM



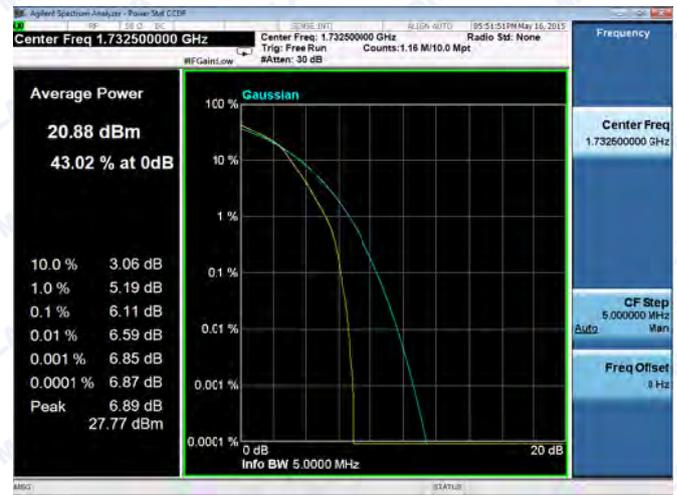
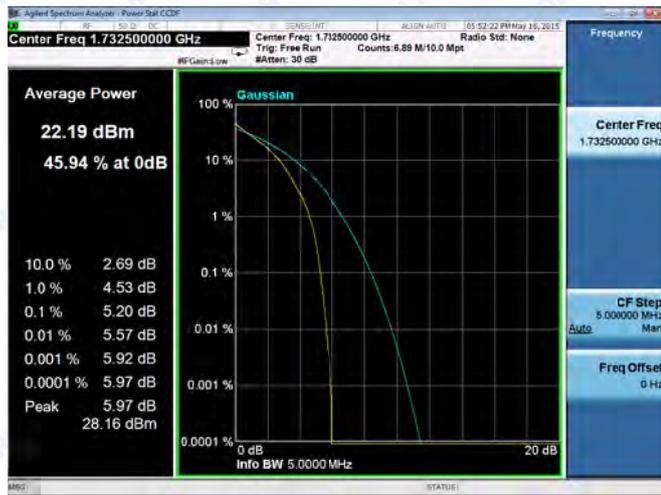


LTE Band 4 Middle channel							
Channel Bandwidth: 1.4MHz				Channel Bandwidth: 3MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
20175	1732.5	5.20	6.11	20175	1732.5	5.29	6.18

Spectrum Plot of Worst Value

1.4MHz/QPSK

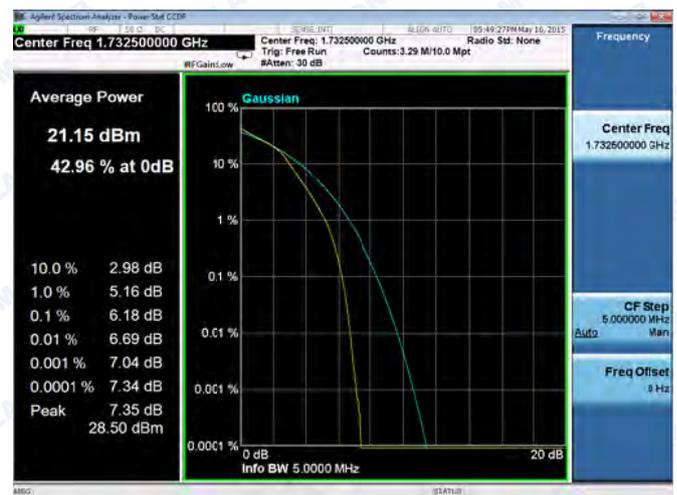
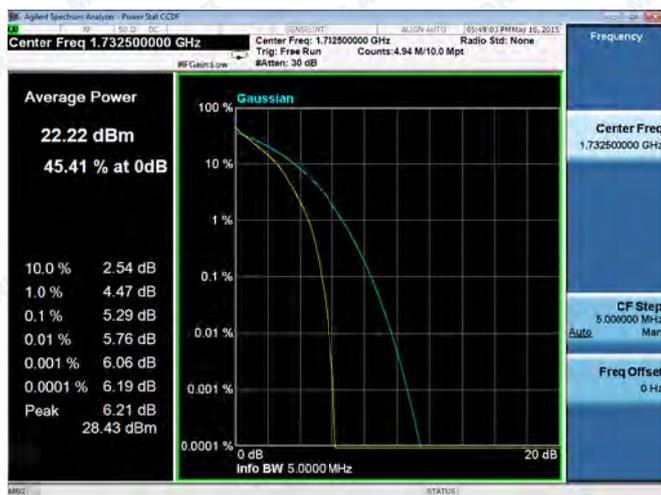
1.4MHz/16QAM



Spectrum Plot of Worst Value

3MHz/QPSK

3MHz/16QAM



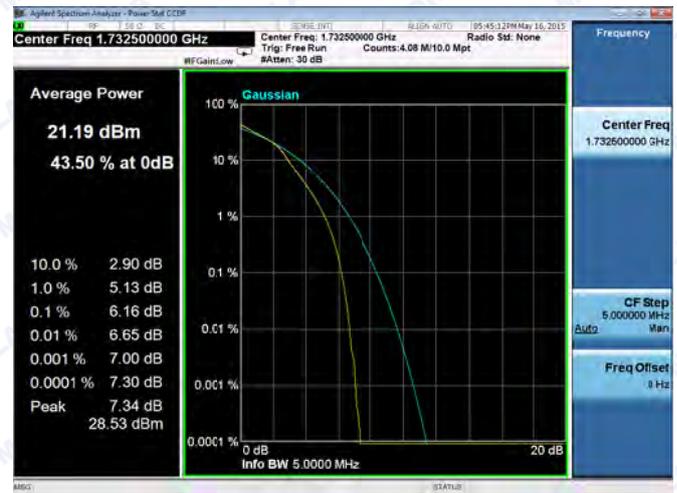


LTE Band 4 Middle channel							
Channel Bandwidth: 5MHz				Channel Bandwidth: 10MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
20175	1732.5	5.33	6.16	20175	1732.5	4.68	6.16

Spectrum Plot of Worst Value

5MHz/QPSK

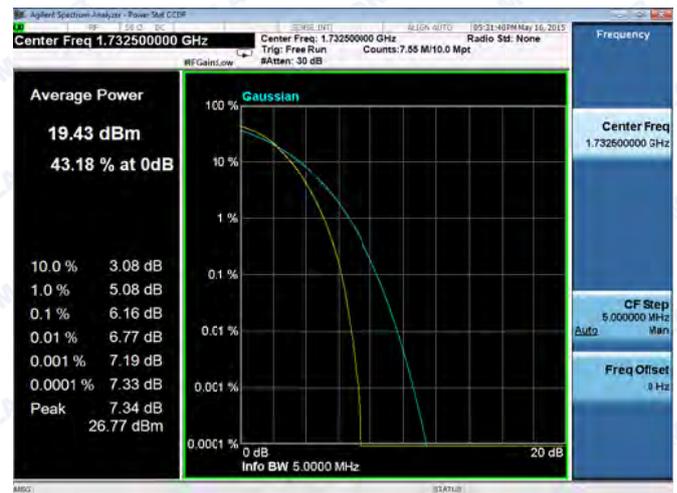
5MHz/16QAM



Spectrum Plot of Worst Value

10MHz/QPSK

10MHz/16QAM



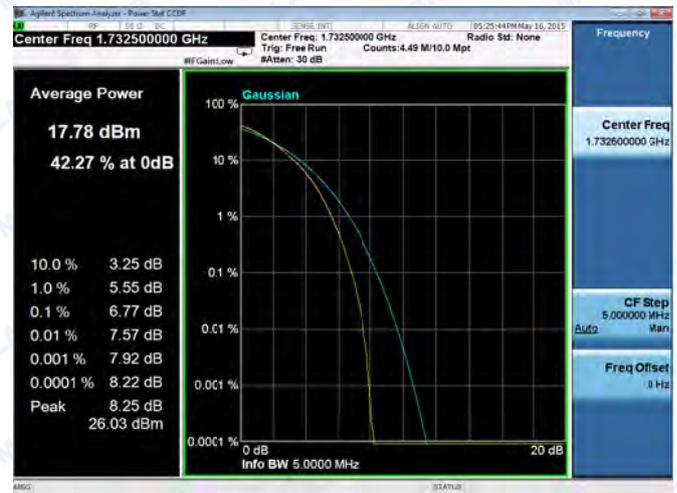
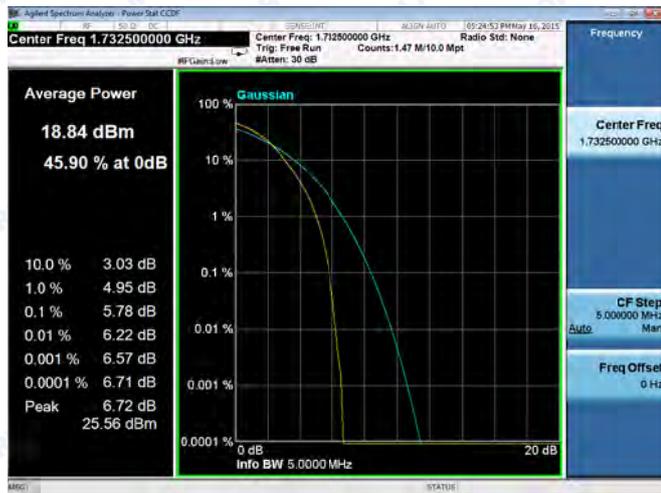


LTE Band 4 Middle channel							
Channel Bandwidth: 15MHz				Channel Bandwidth: 20MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
20175	1732.5	5.78	6.77	20175	1732.5	6.45	7.21

Spectrum Plot of Worst Value

15MHz/QPSK

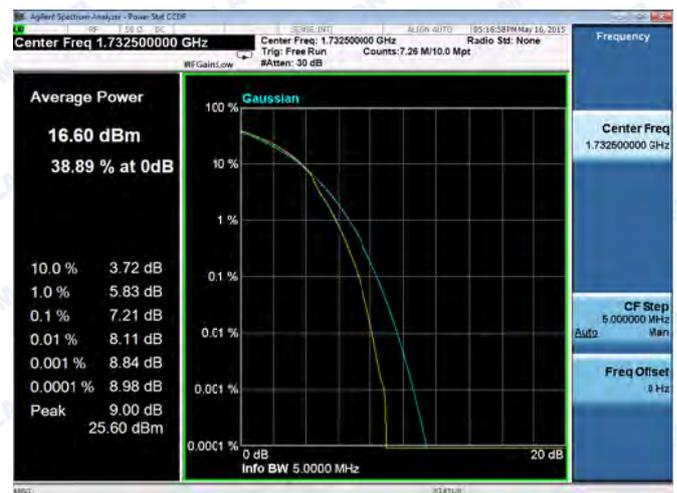
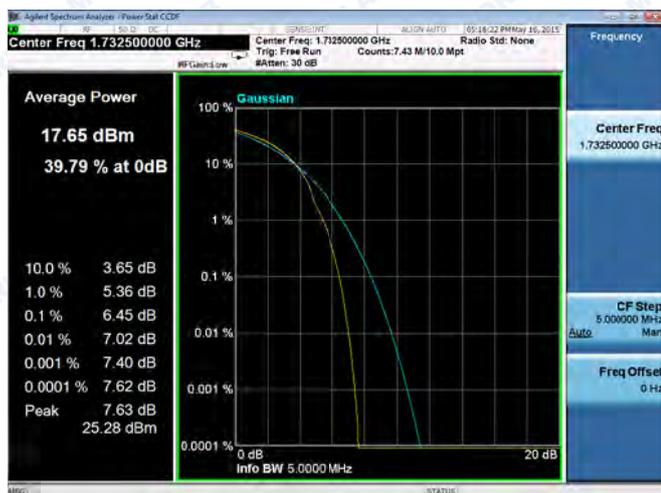
15MHz/16QAM



Spectrum Plot of Worst Value

20MHz/QPSK

20MHz/16QAM



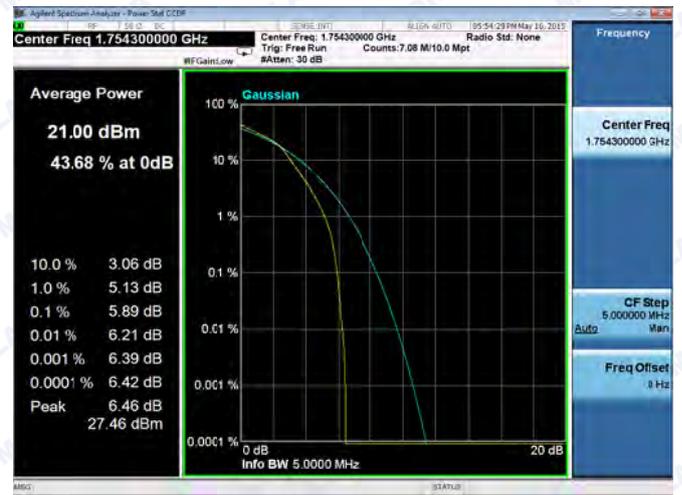
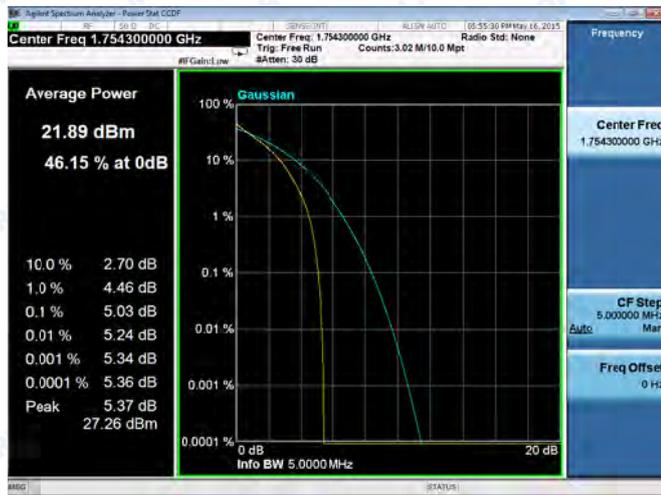


LTE Band 4 High channel							
Channel Bandwidth: 1.4MHz				Channel Bandwidth: 3MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
20393	1754.3	5.03	5.89	20385	1753.5	5.15	6.05

Spectrum Plot of Worst Value

1.4MHz/QPSK

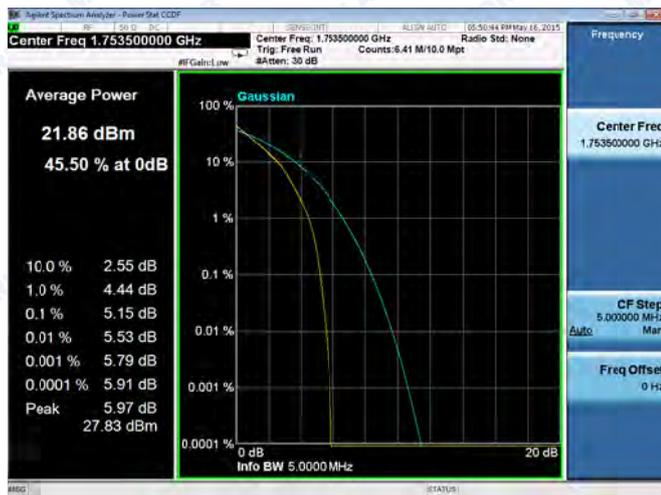
1.4MHz/16QAM



Spectrum Plot of Worst Value

3MHz/QPSK

3MHz/16QAM



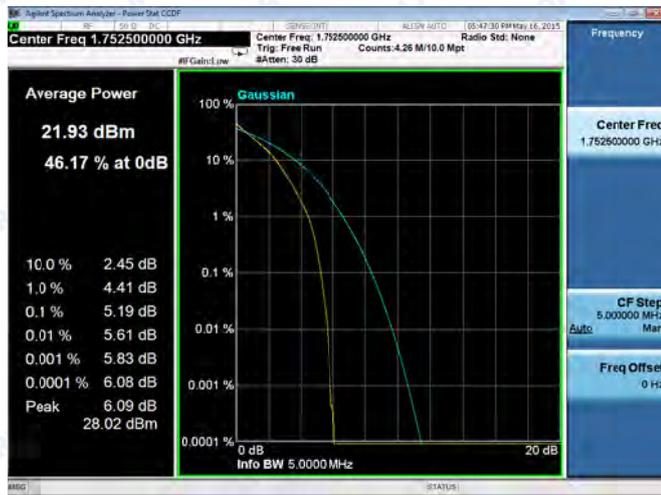


LTE Band 4 High channel							
Channel Bandwidth: 5MHz				Channel Bandwidth: 10MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
20375	1752.5	5.19	6.04	20350	1750.0	4.63	6.11

Spectrum Plot of Worst Value

5MHz/QPSK

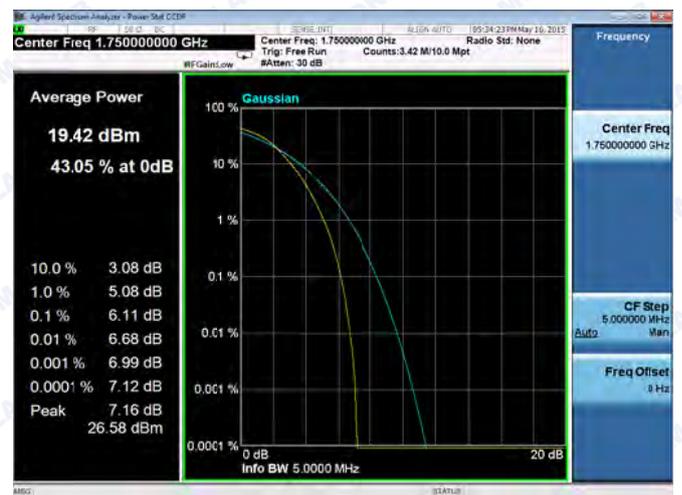
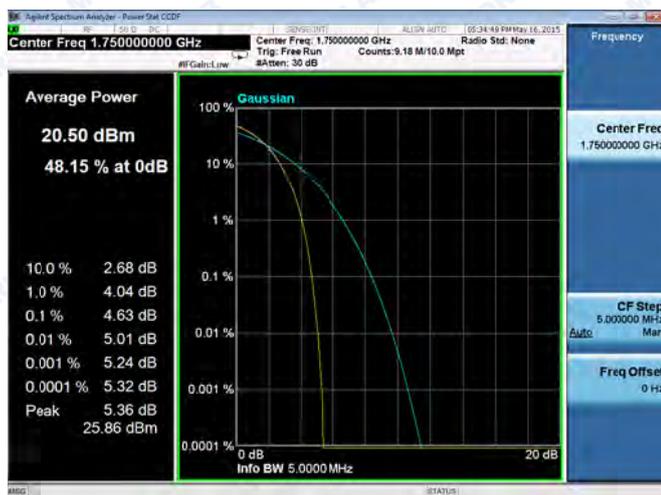
5MHz/16QAM



Spectrum Plot of Worst Value

10MHz/QPSK

10MHz/16QAM



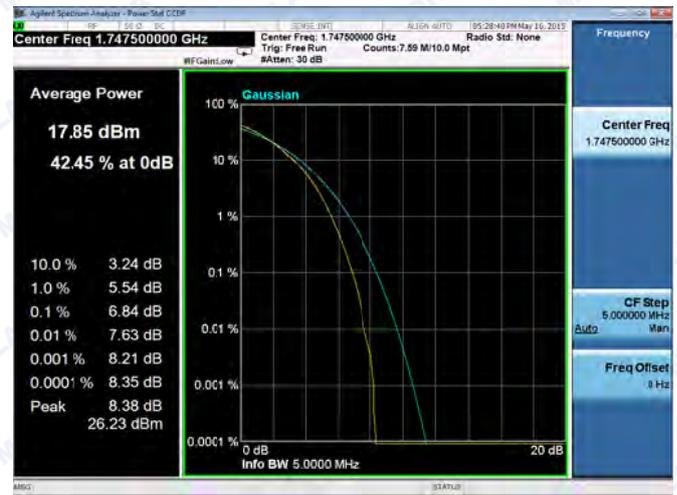
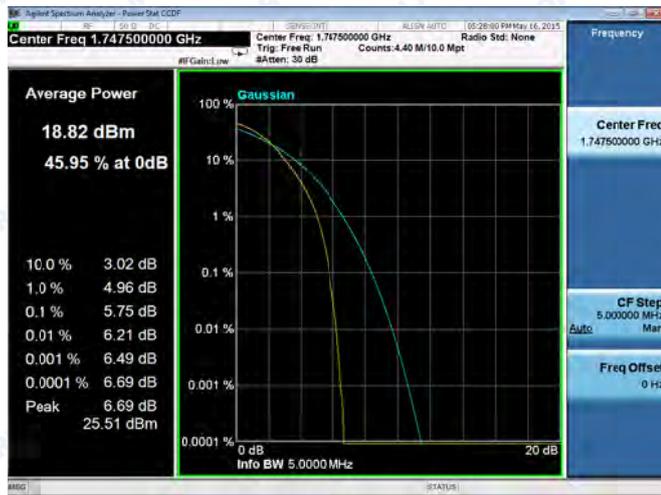


LTE Band 4 High channel							
Channel Bandwidth: 15MHz				Channel Bandwidth: 20MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
20325	1747.5	5.75	6.84	20300	1745.0	6.45	7.16

Spectrum Plot of Worst Value

15MHz/QPSK

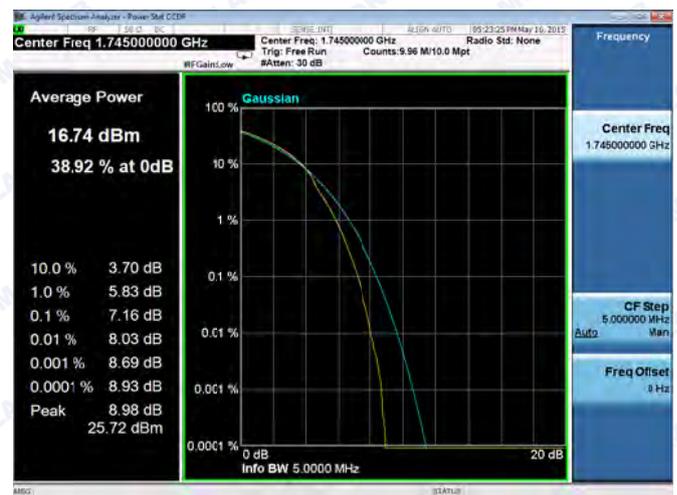
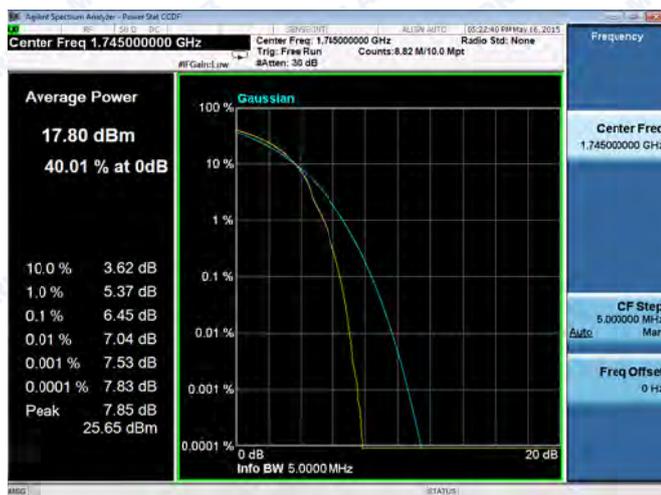
15MHz/16QAM



Spectrum Plot of Worst Value

20MHz/QPSK

20MHz/16QAM





## 2.5 Conducted Spurious Emissions

### 2.5.1 Test Requirement

According to FCC section 2.1051 and 27.53(g), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43+10*\log(P)$ dB. This calculated to be -13dBm.

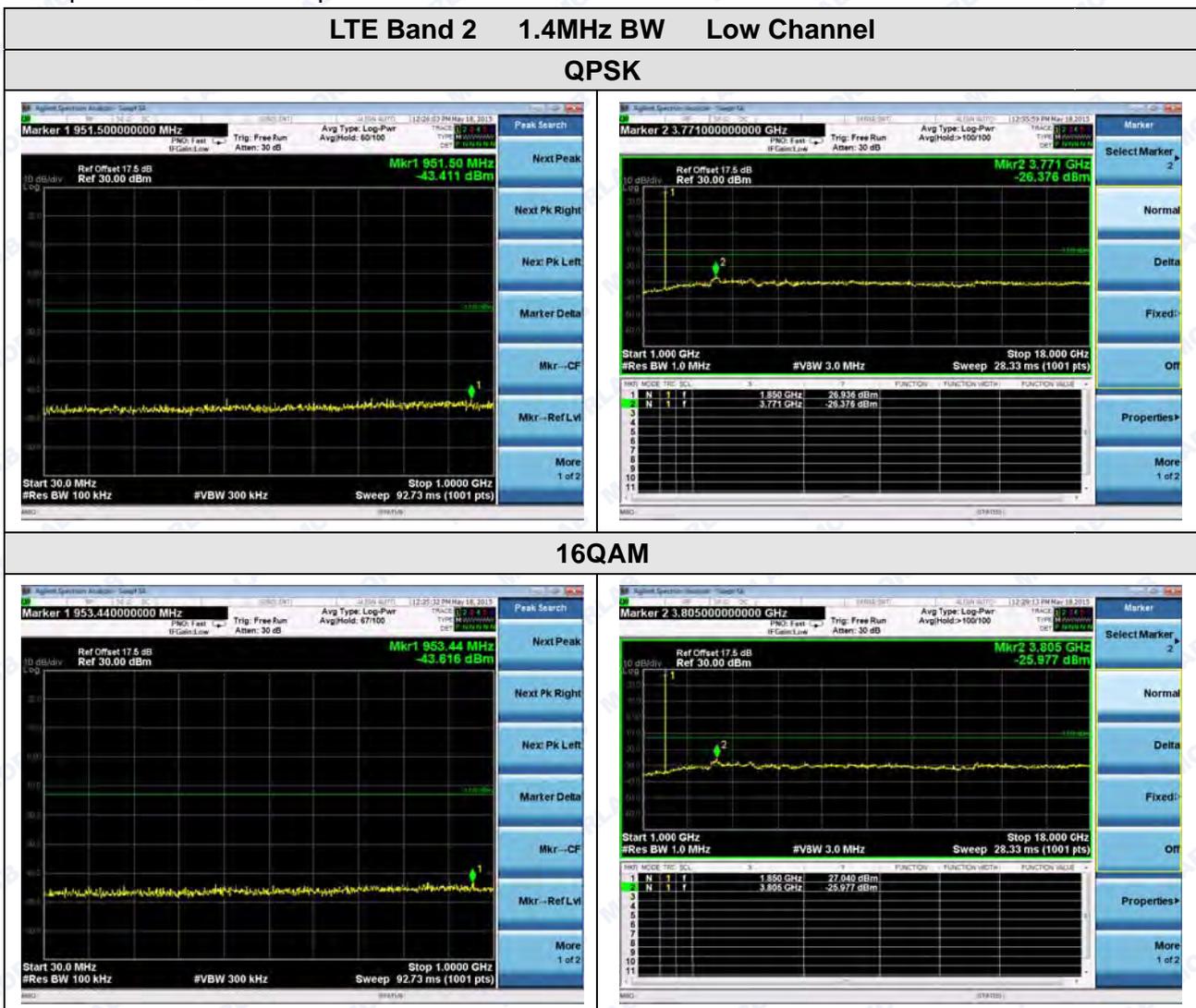
### 2.5.2 Test Procedure

See section 2.1.2 of this report.

Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

### 2.5.3 Test Result

Compliant. See attached pots.



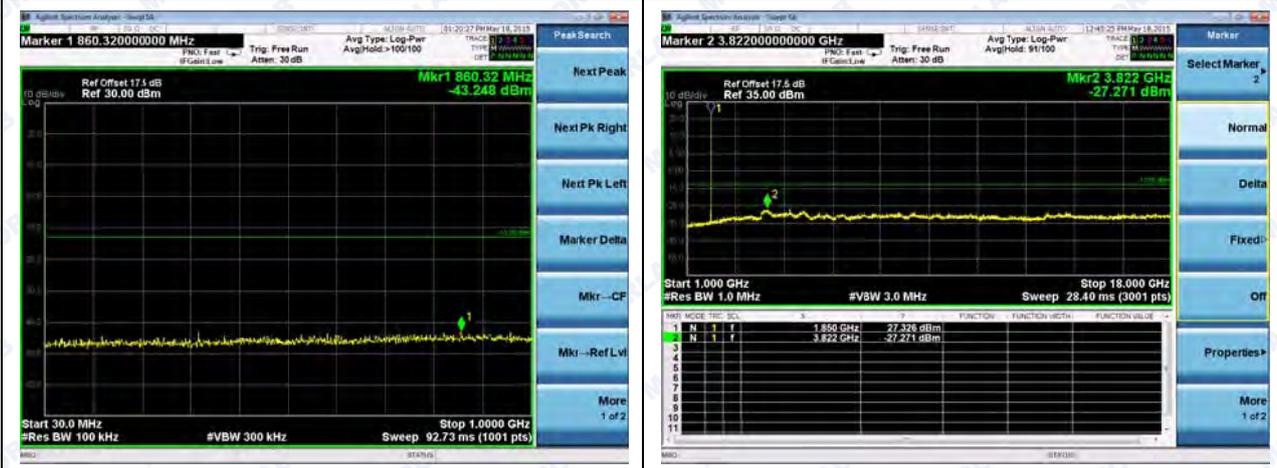


LTE Band 2 3MHz BW Low Channel

QPSK



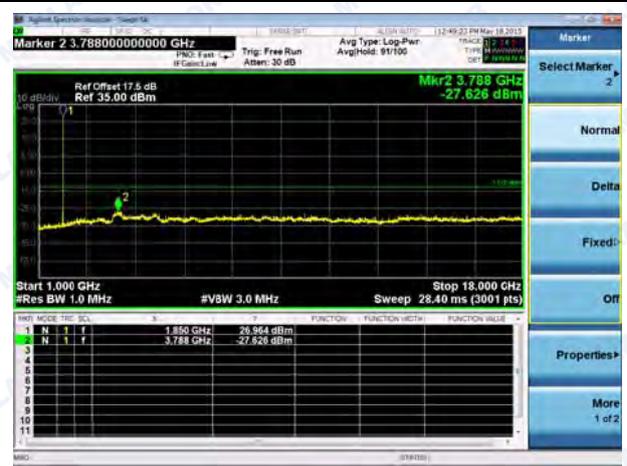
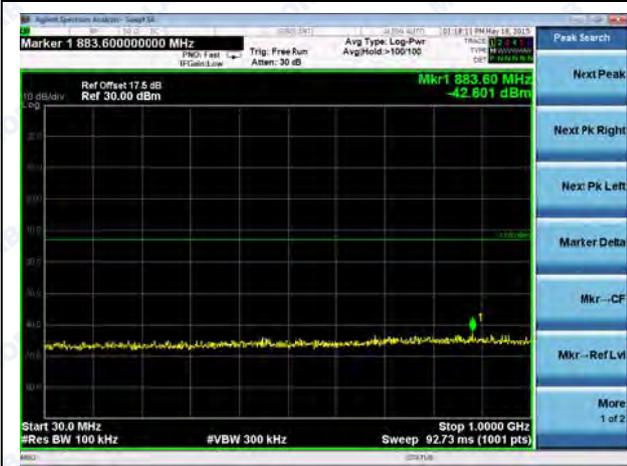
16QAM



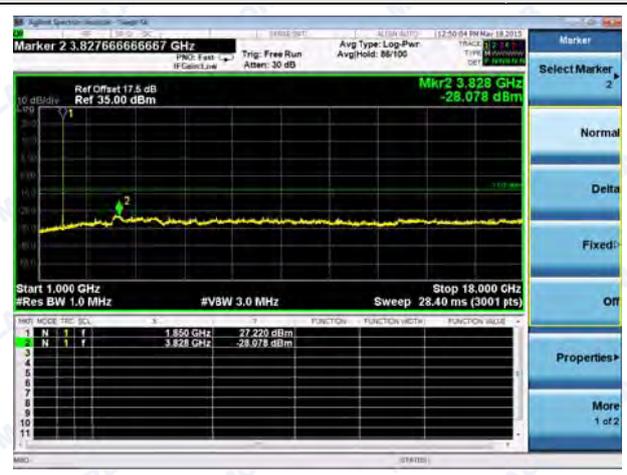


LTE Band 2 5MHz BW Low Channel

QPSK



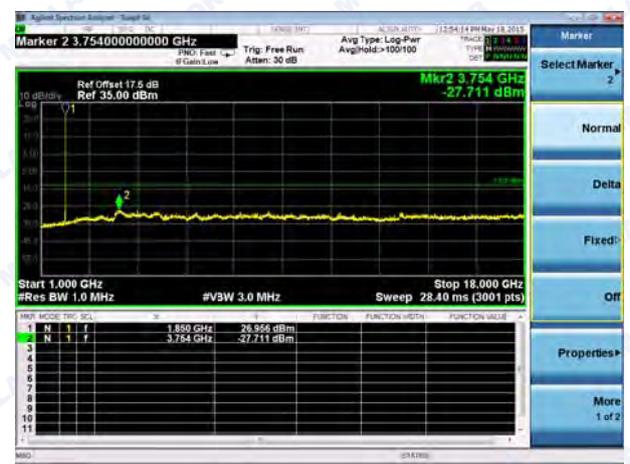
16QAM



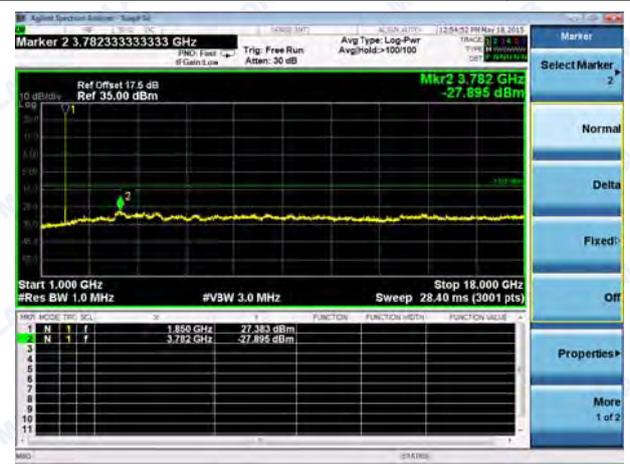


LTE Band 2 10MHz BW Low Channel

QPSK



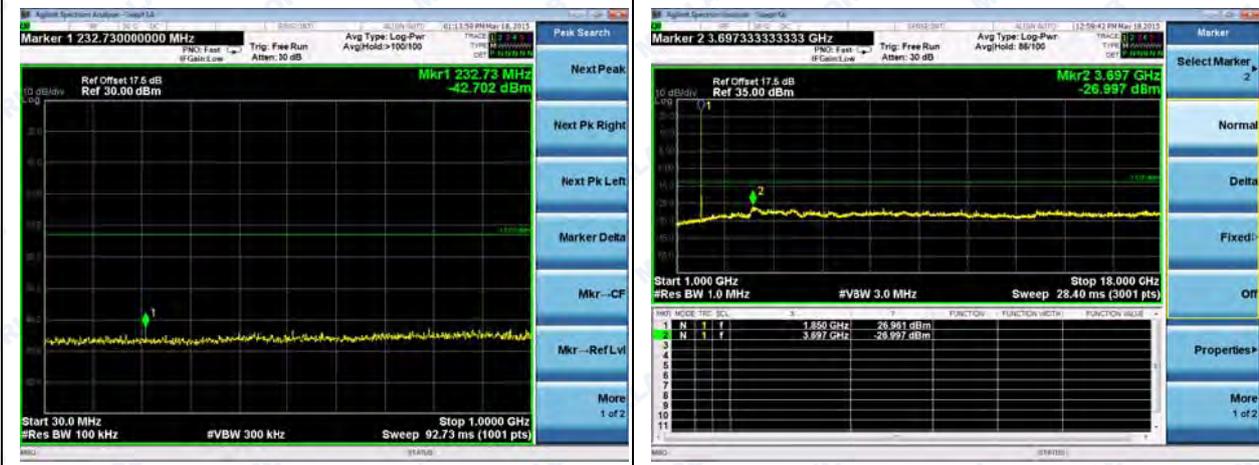
16QAM



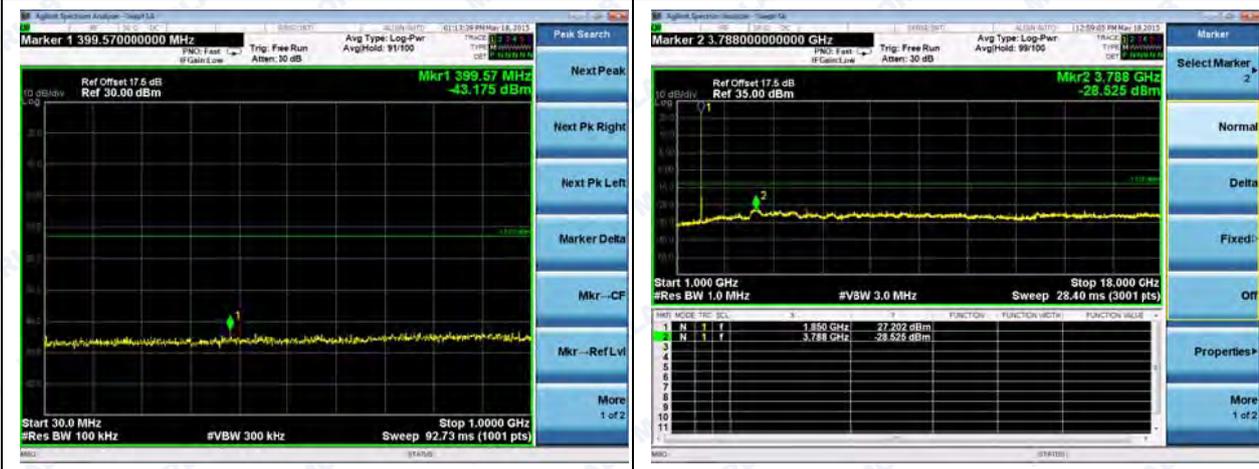


LTE Band 2 15MHz BW Low Channel

QPSK



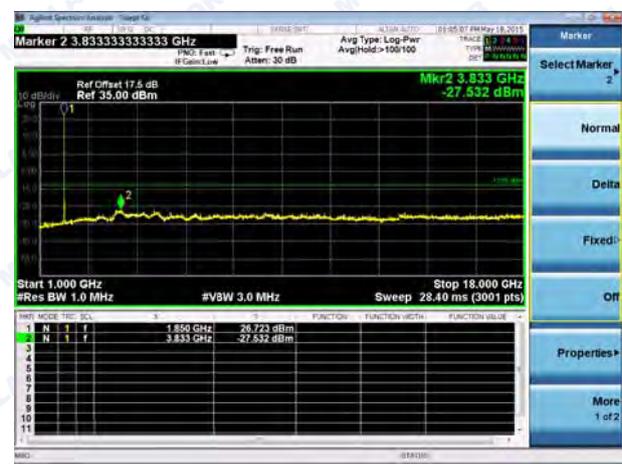
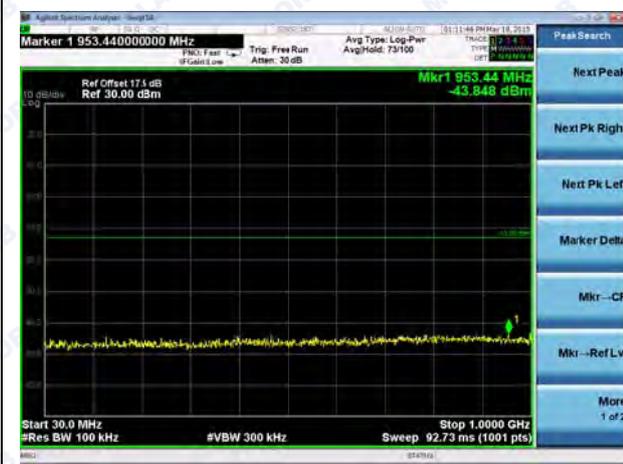
16QAM



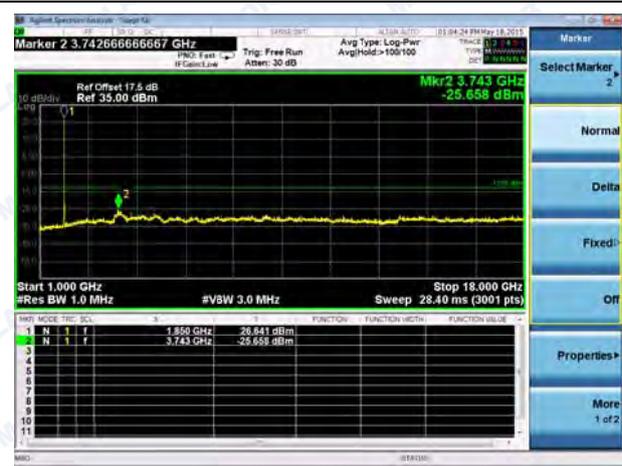
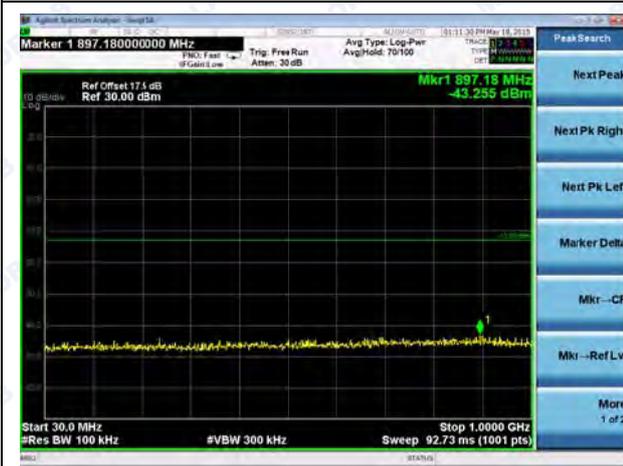


LTE Band 2 20MHz BW Low Channel

QPSK



16QAM

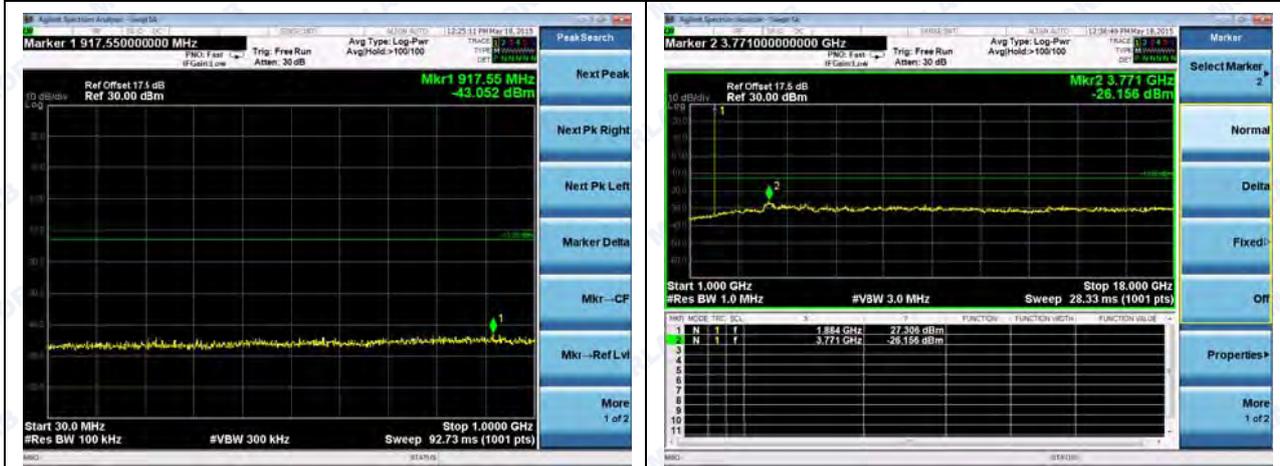




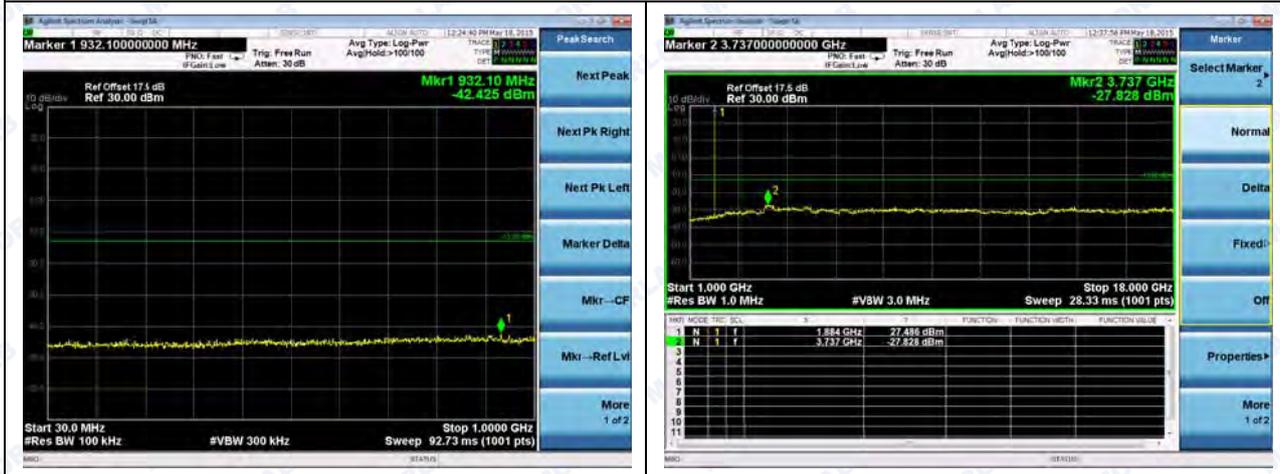
Middle channel:

LTE Band 2 1.4MHz BW Mid Channel

QPSK



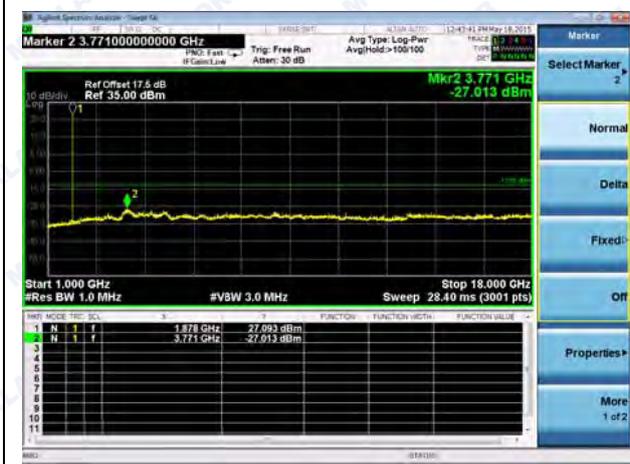
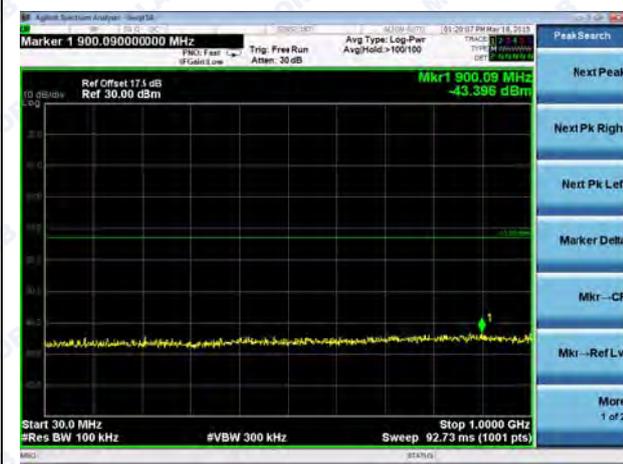
16QAM



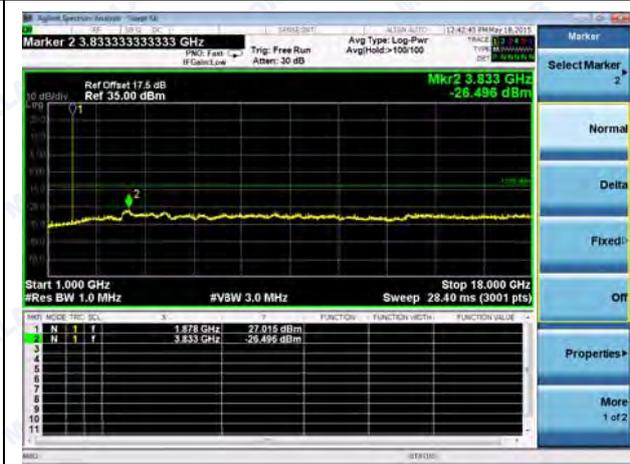
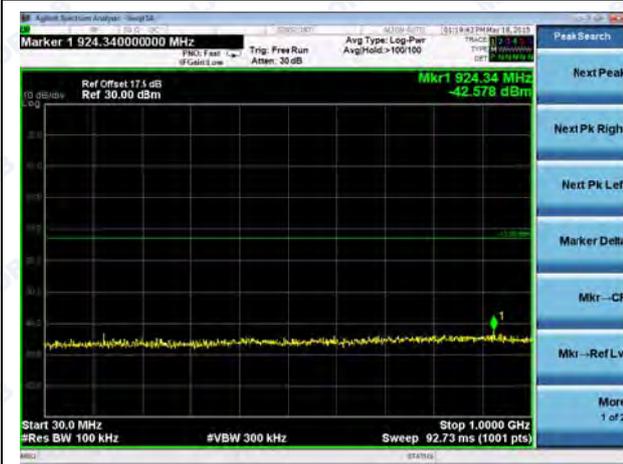


LTE Band 2 3MHz BW Mid Channel

QPSK



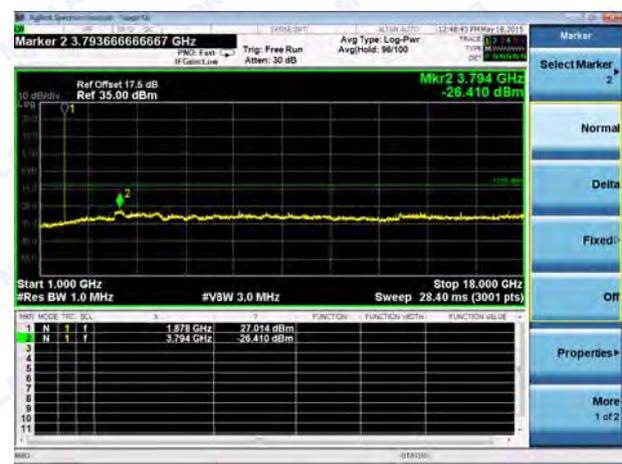
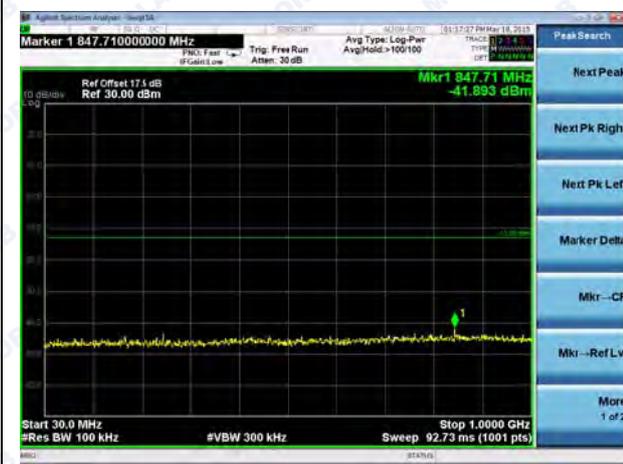
16QAM



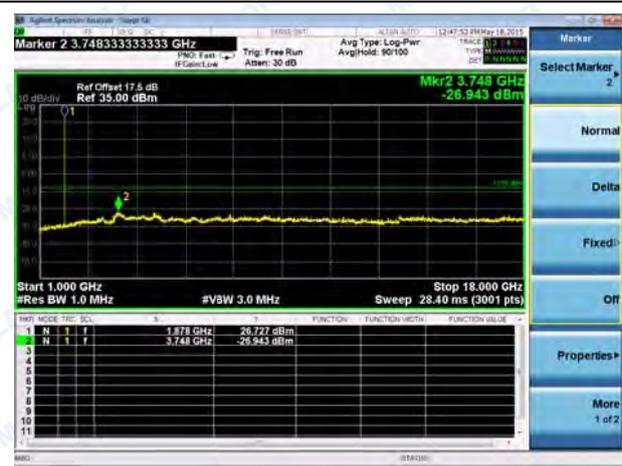
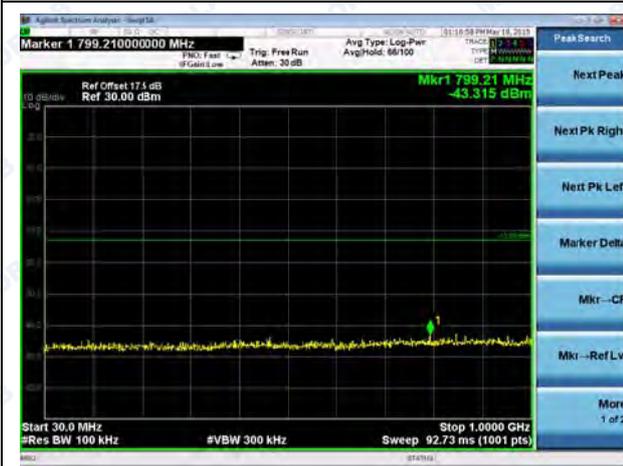


LTE Band 2 5MHz BW Mid Channel

QPSK



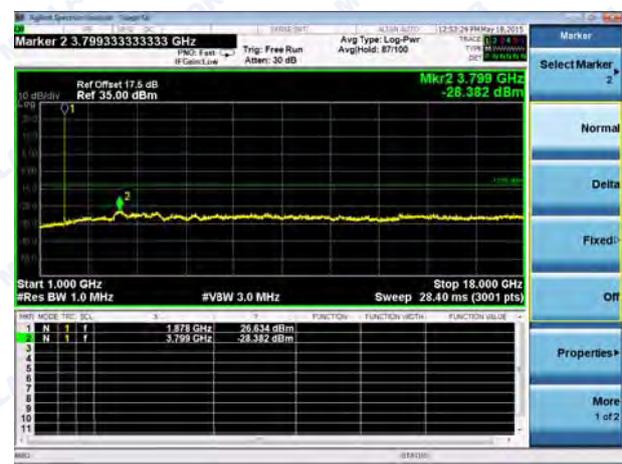
16QAM



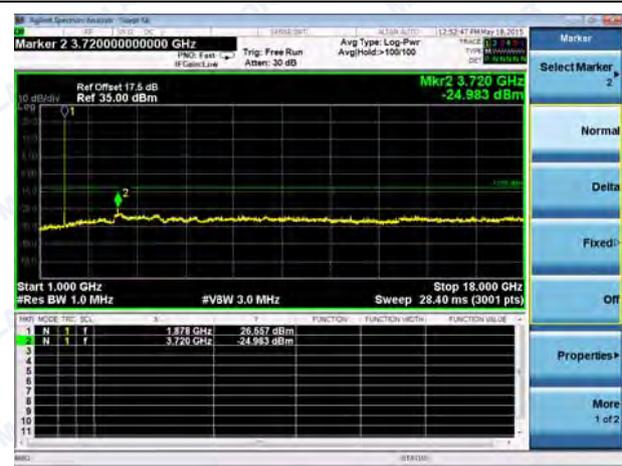
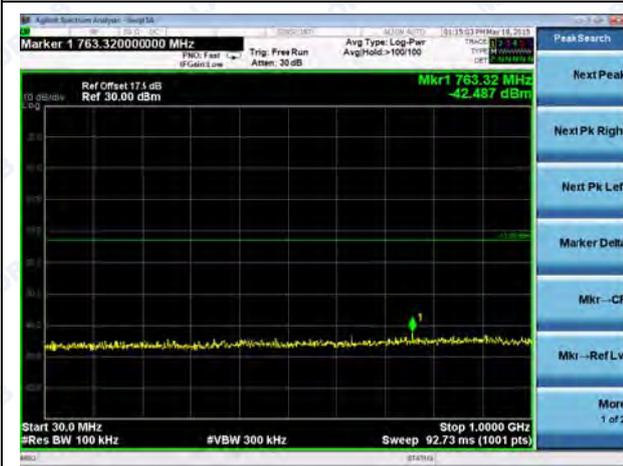


LTE Band 2 10MHz BW Mid Channel

QPSK



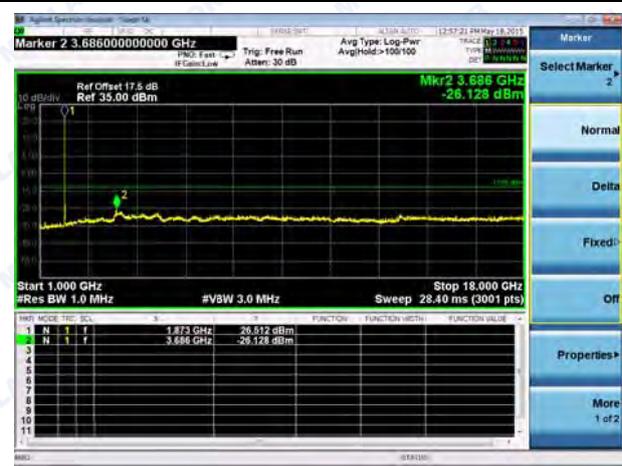
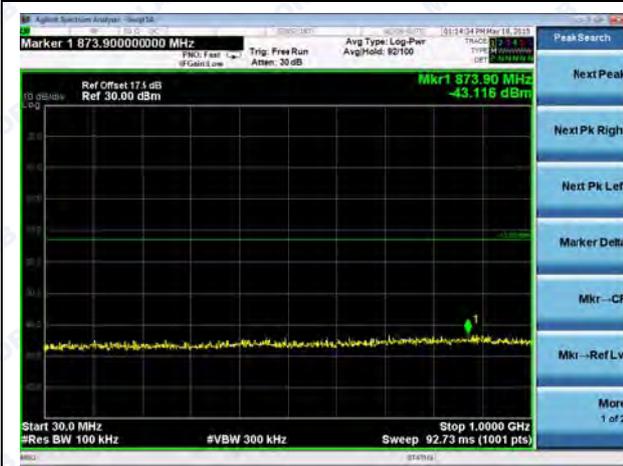
16QAM



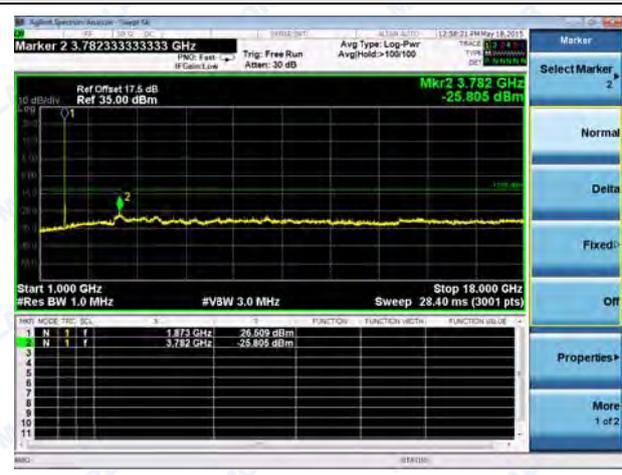


LTE Band 2 15MHz BW Mid Channel

QPSK



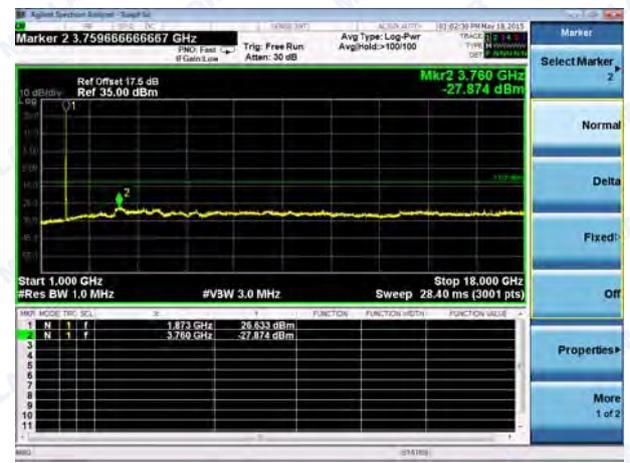
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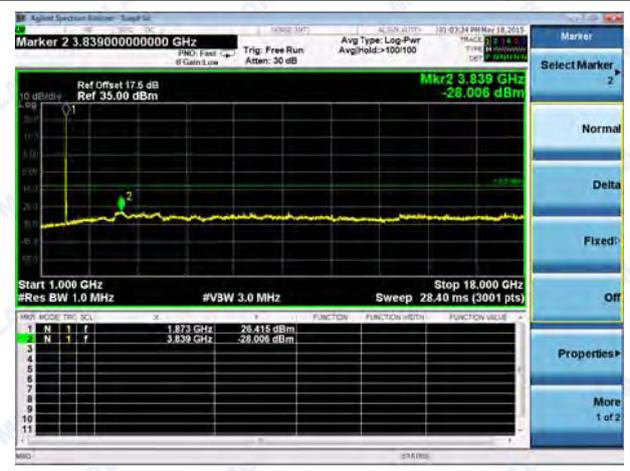


LTE Band 2 20MHz BW Mid Channel

QPSK



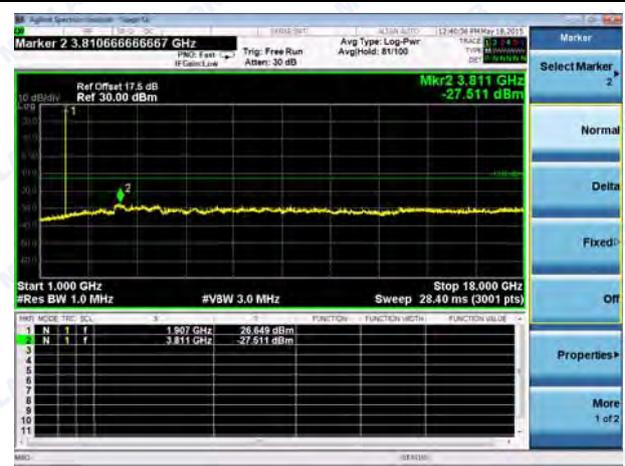
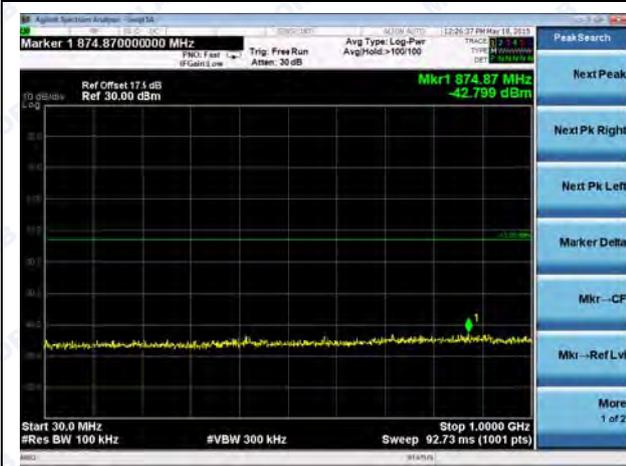
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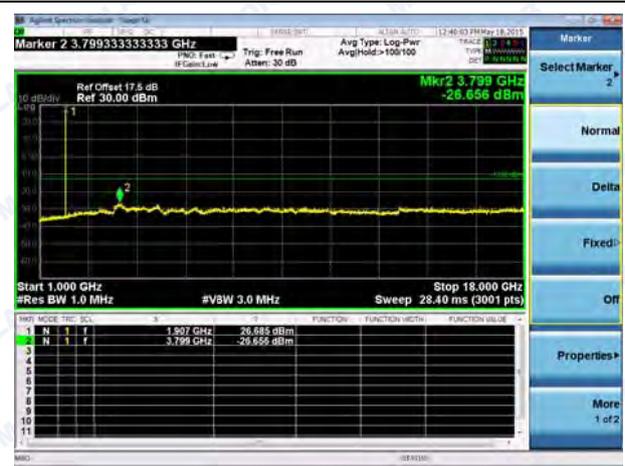
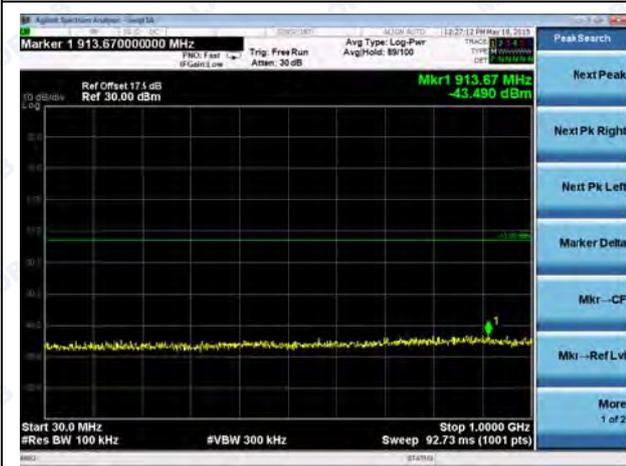


LTE Band 2 1.4MHz BW High Channel

QPSK



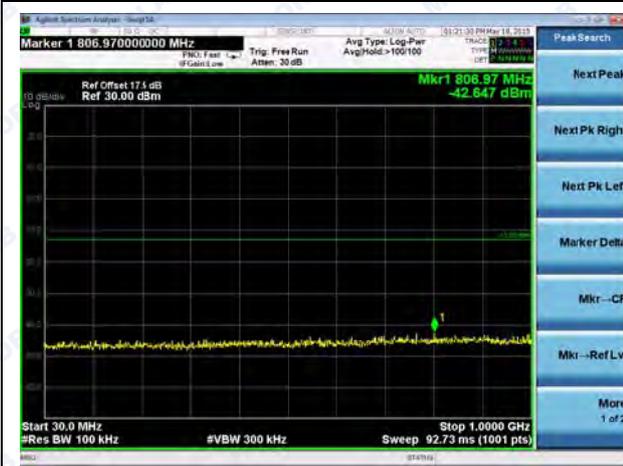
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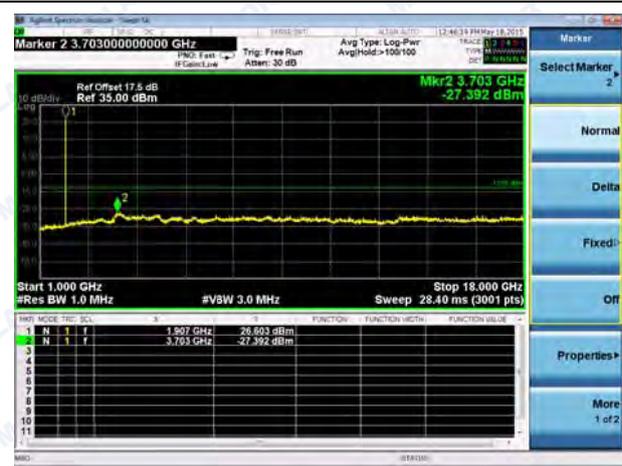
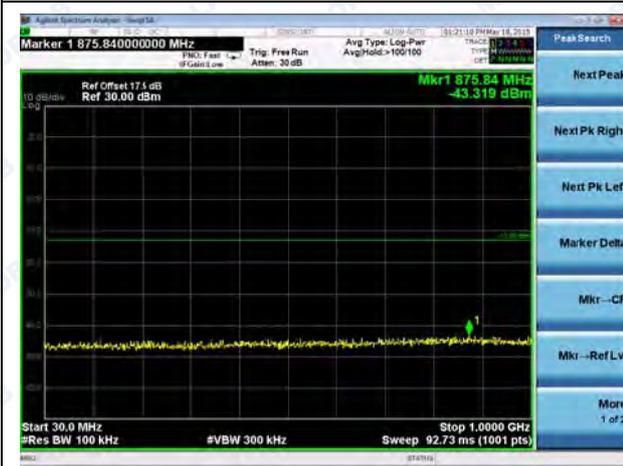


LTE Band 2 3MHz BW High Channel

QPSK



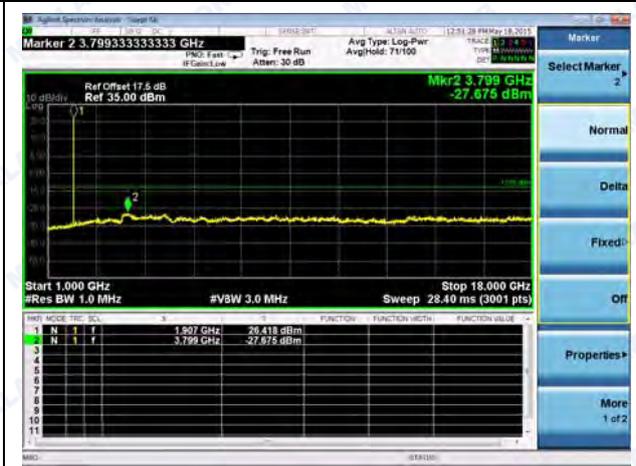
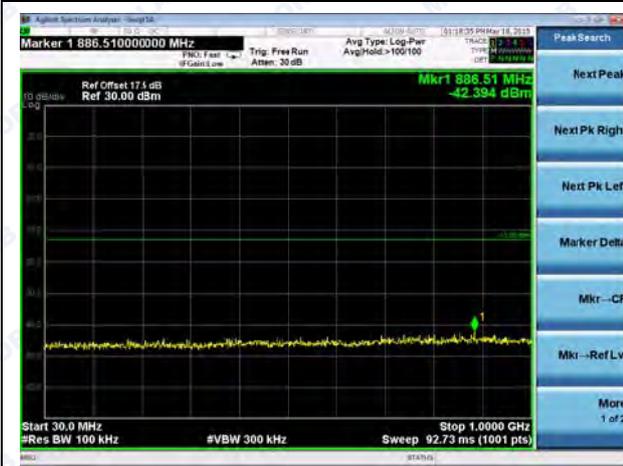
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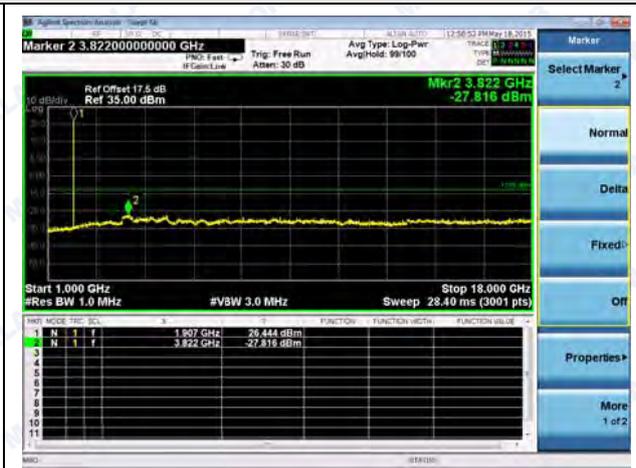


LTE Band 2 5MHz BW High Channel

QPSK



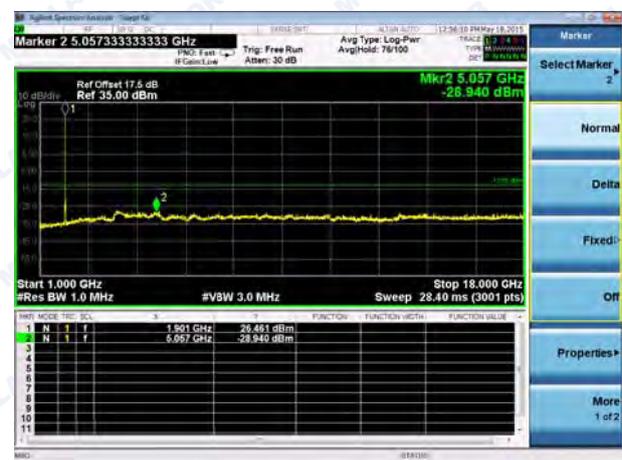
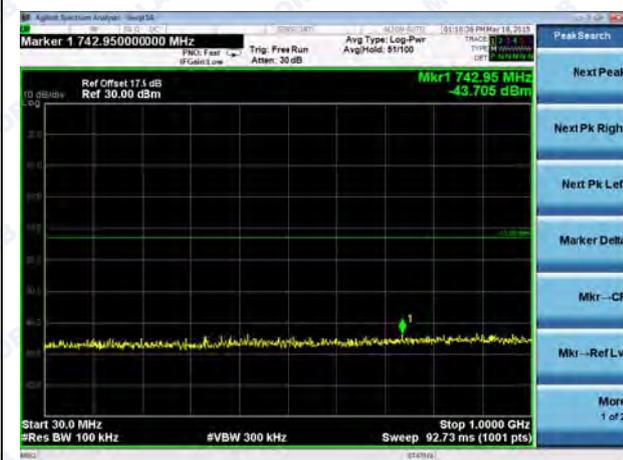
16QAM



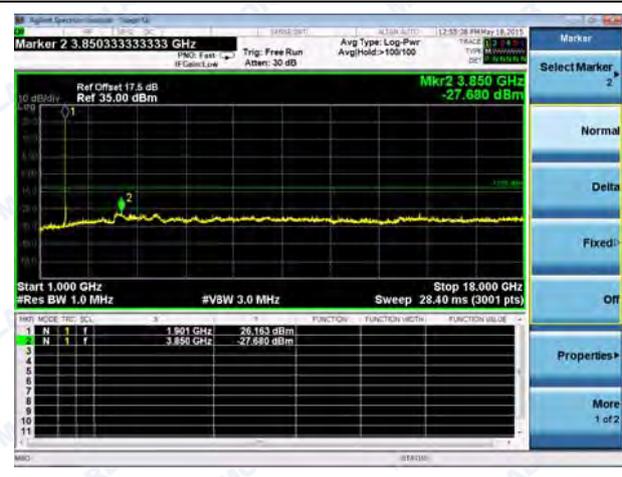


LTE Band 2 10MHz BW High Channel

QPSK



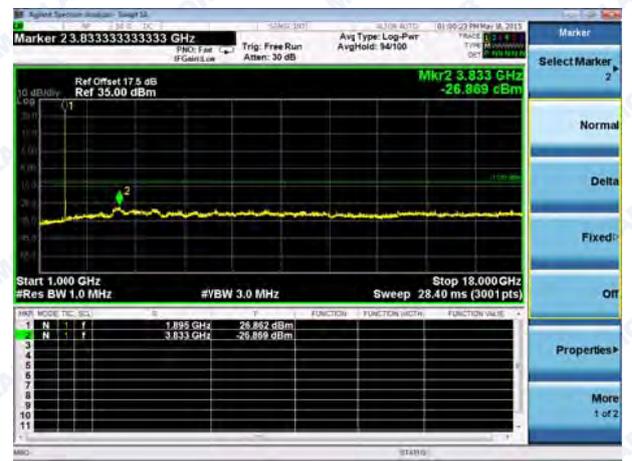
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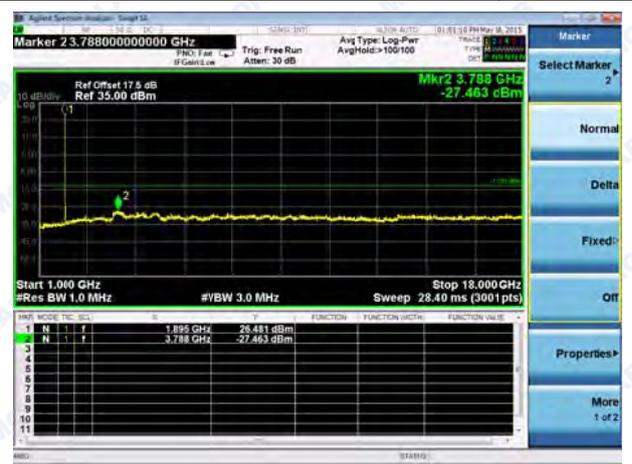
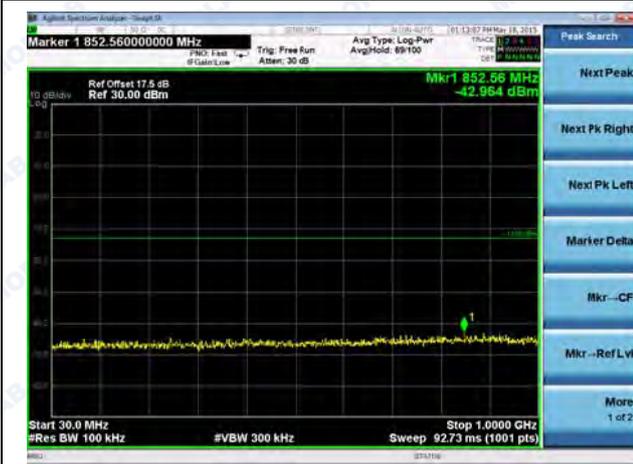


LTE Band 2 15MHz BW High Channel

QPSK



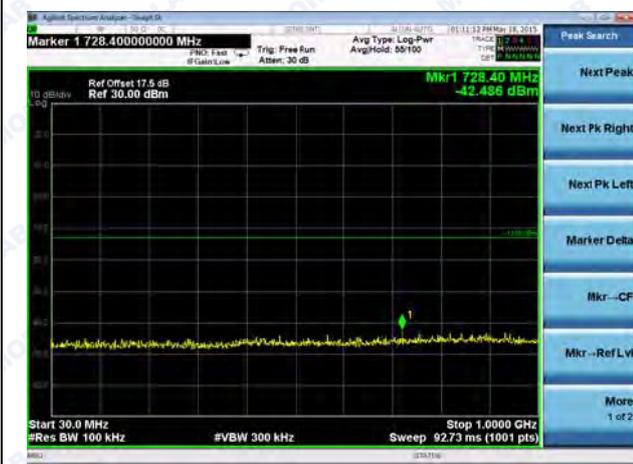
16QAM





LTE Band 2 20MHz BW High Channel

QPSK



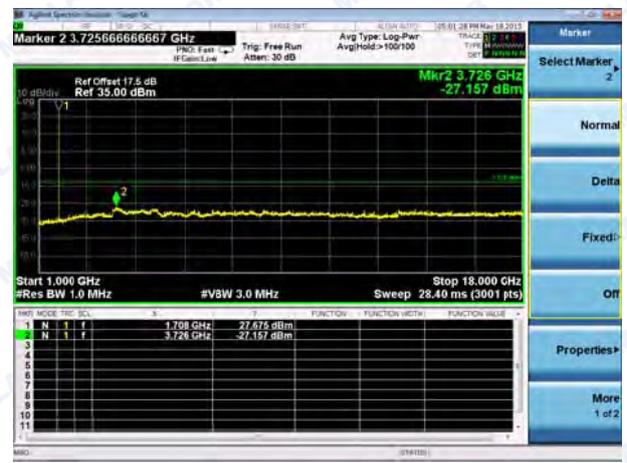
16QAM



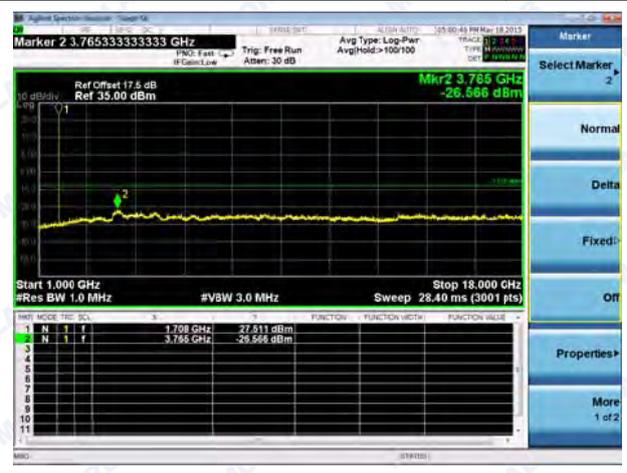


LTE Band 4 1.4MHz BW Low Channel

QPSK



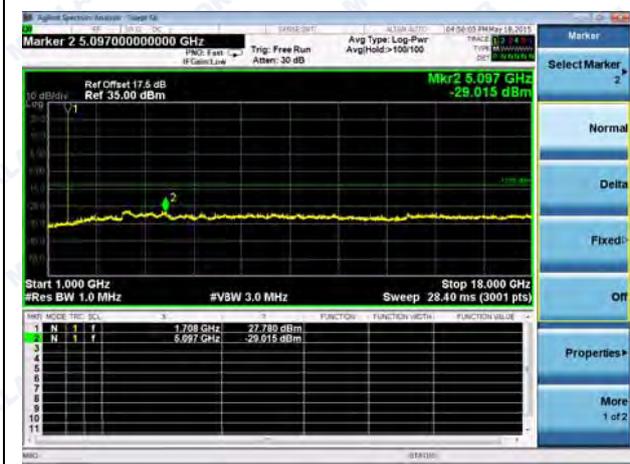
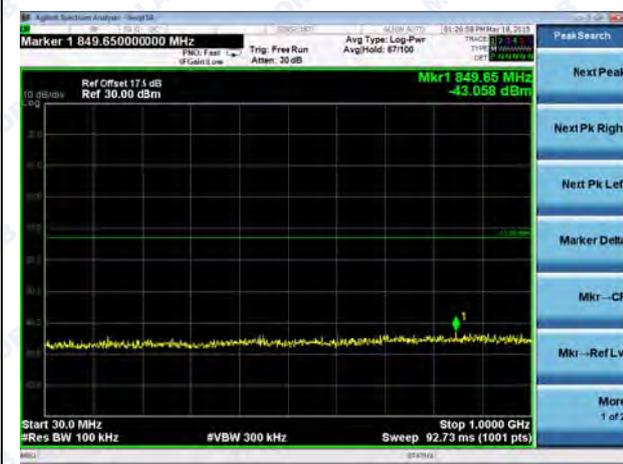
16QAM



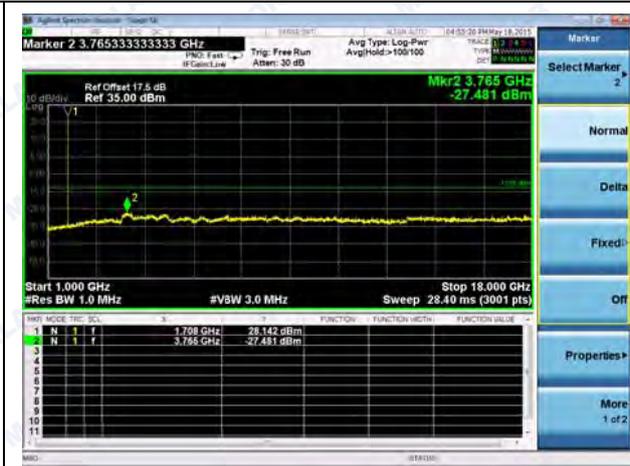
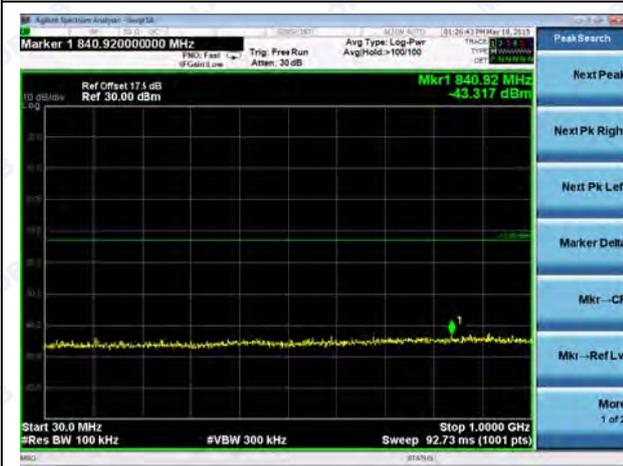


LTE Band 4 3MHz BW Low Channel

QPSK



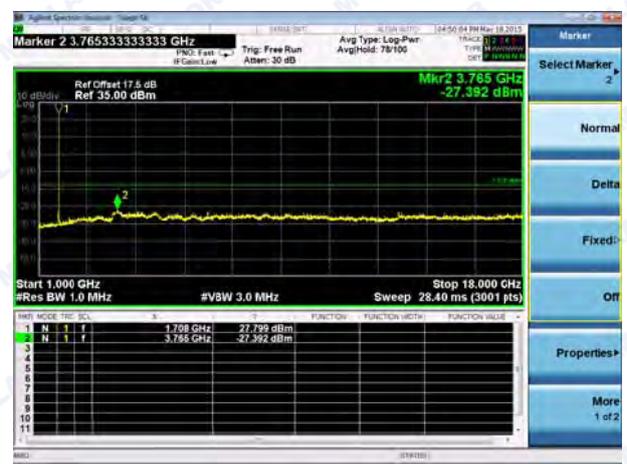
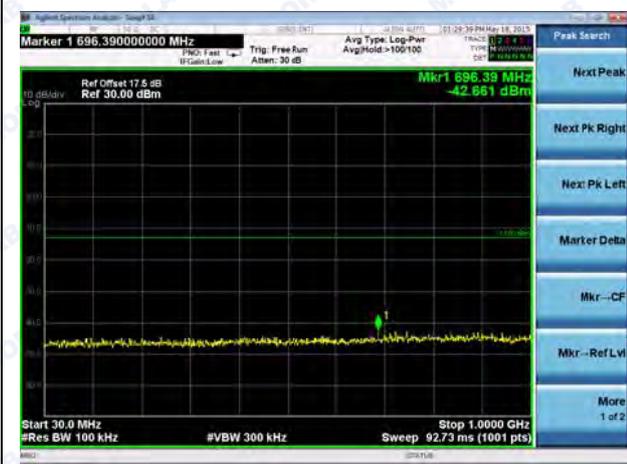
16QAM





LTE Band 4 5MHz BW Low Channel

QPSK



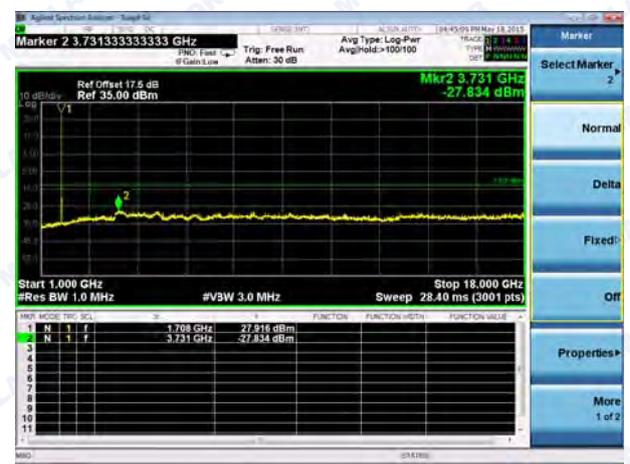
16QAM



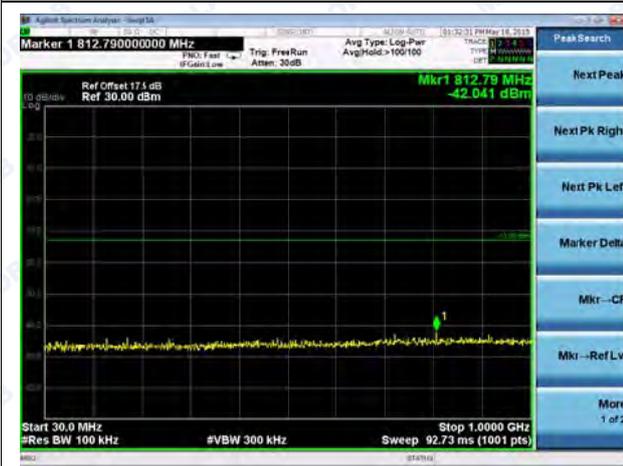


LTE Band 4 10MHz BW Low Channel

QPSK



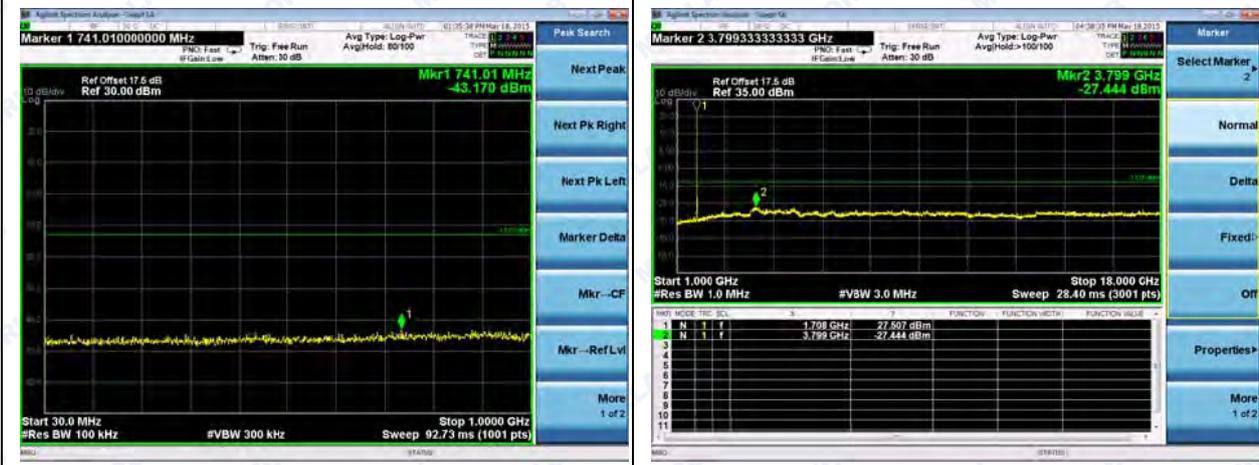
16QAM





LTE Band 4 15MHz BW Low Channel

QPSK



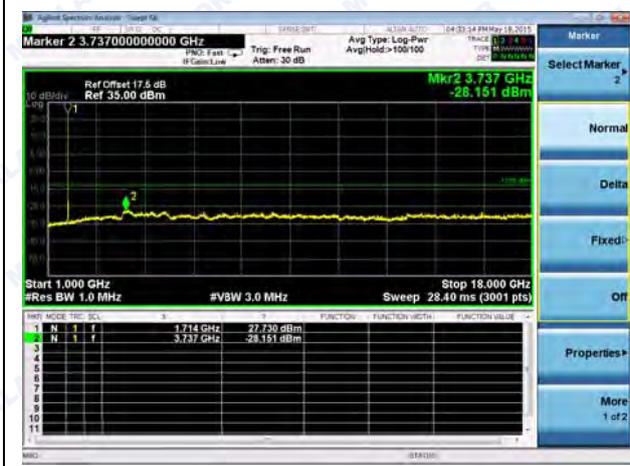
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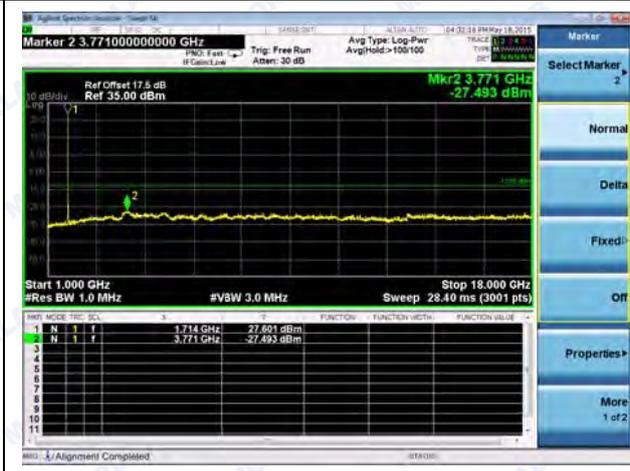


LTE Band 4 20MHz BW Low Channel

QPSK



16QAM

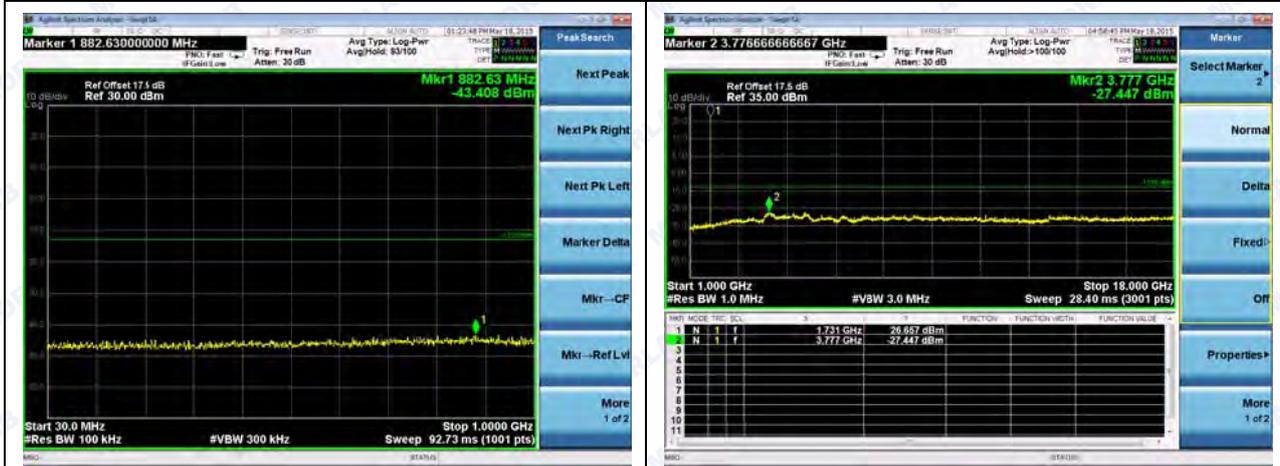




Middle channel:

LTE Band 4 1.4MHz BW Mid Channel

QPSK



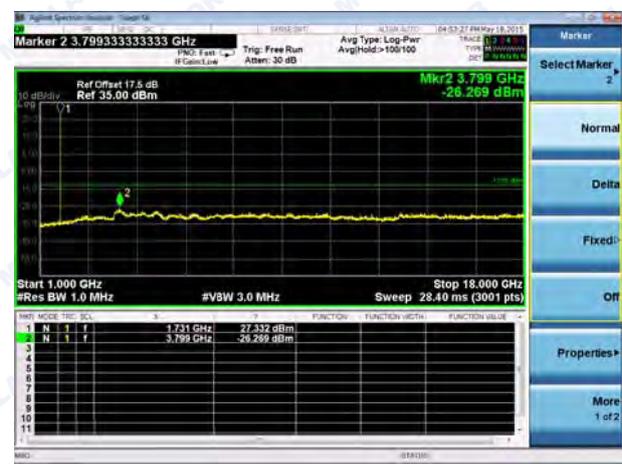
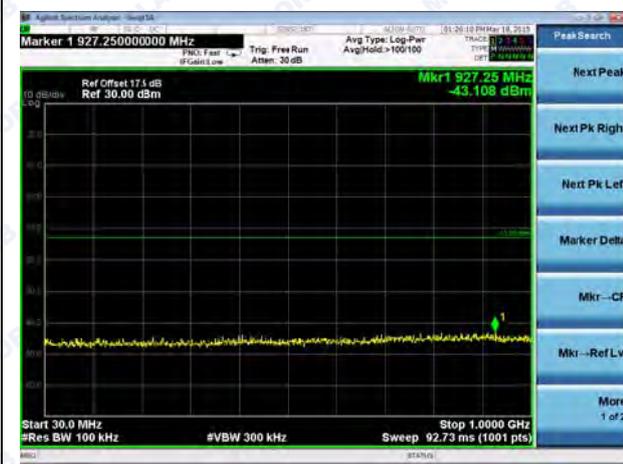
16QAM



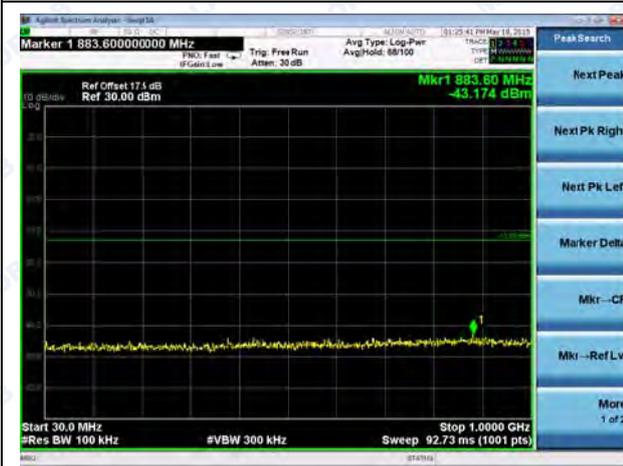


LTE Band 4 3MHz BW Mid Channel

QPSK



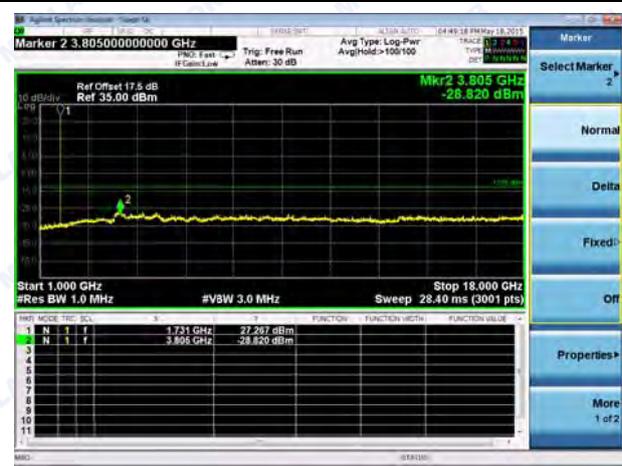
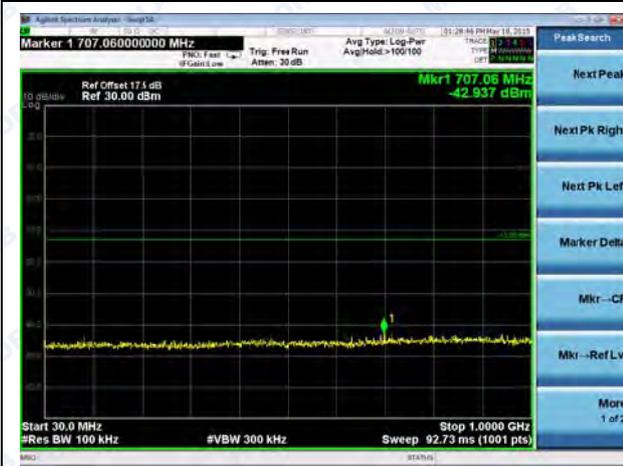
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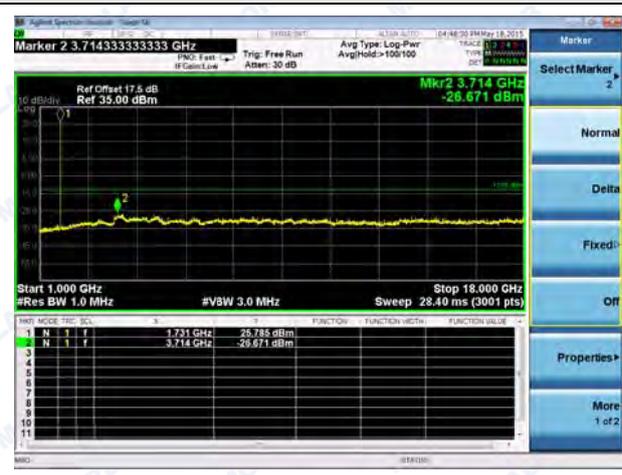


LTE Band 4 5MHz BW Mid Channel

QPSK



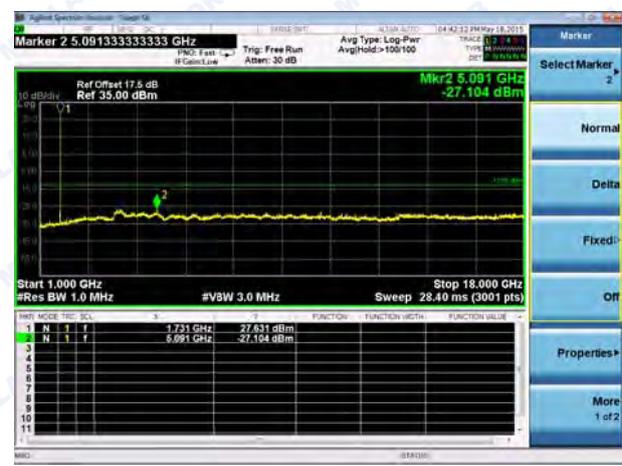
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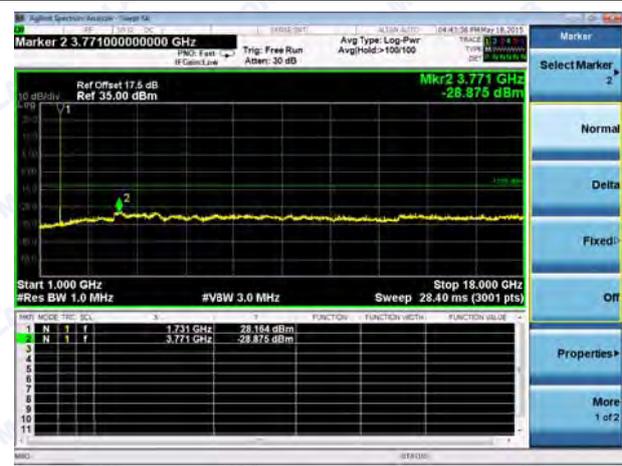
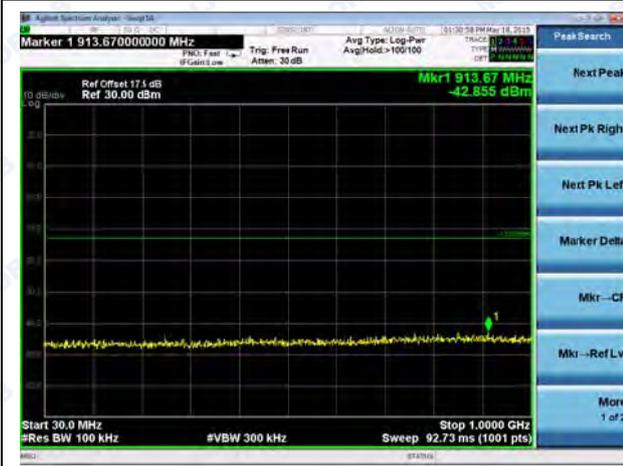


LTE Band 4 10MHz BW Mid Channel

QPSK



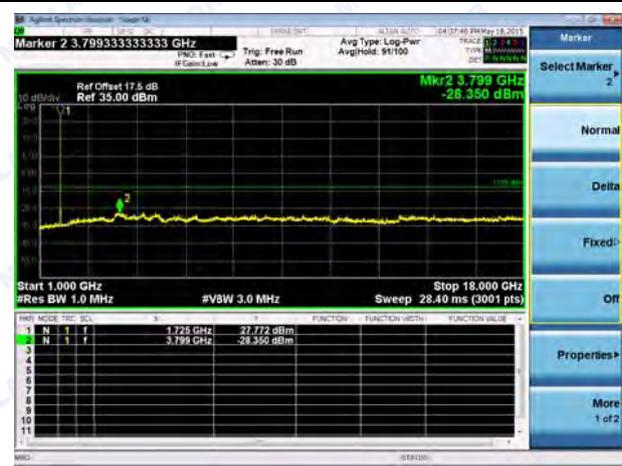
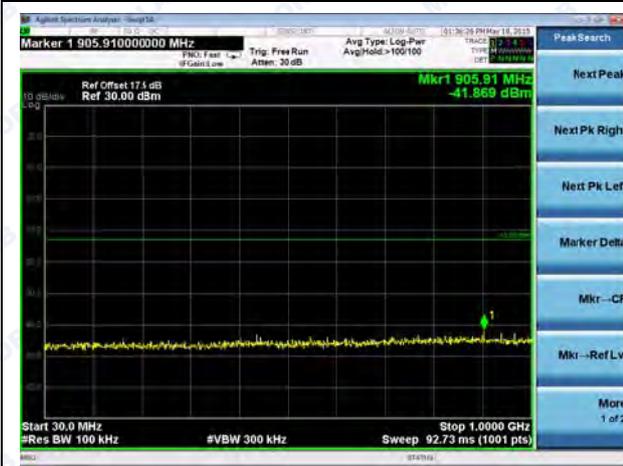
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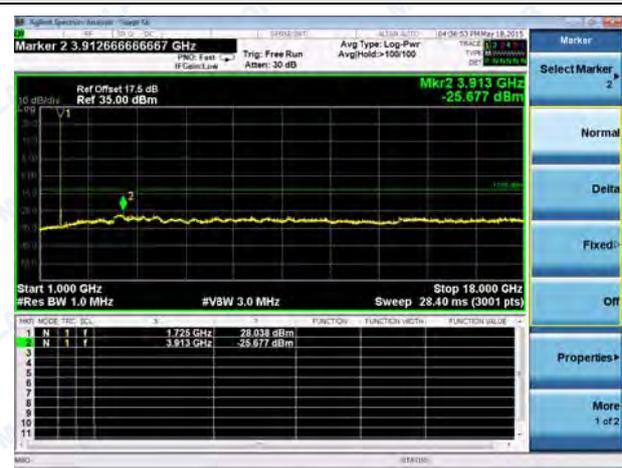
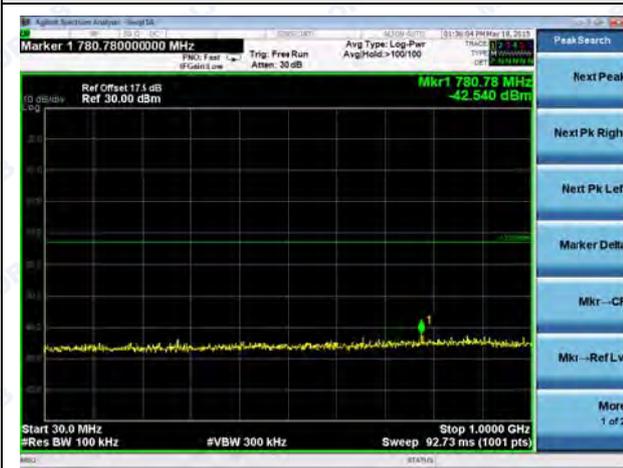


LTE Band 4 15MHz BW Mid Channel

QPSK



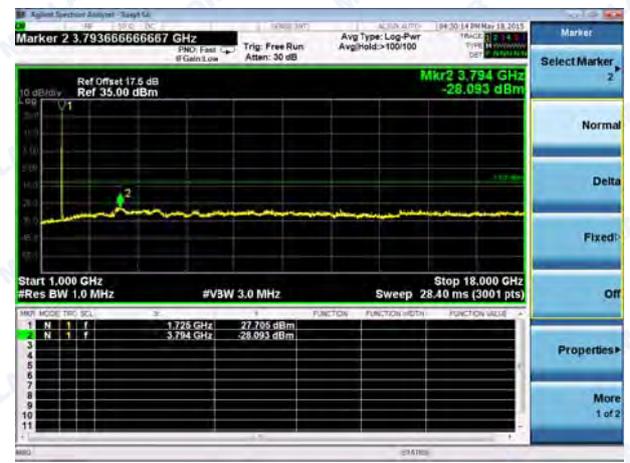
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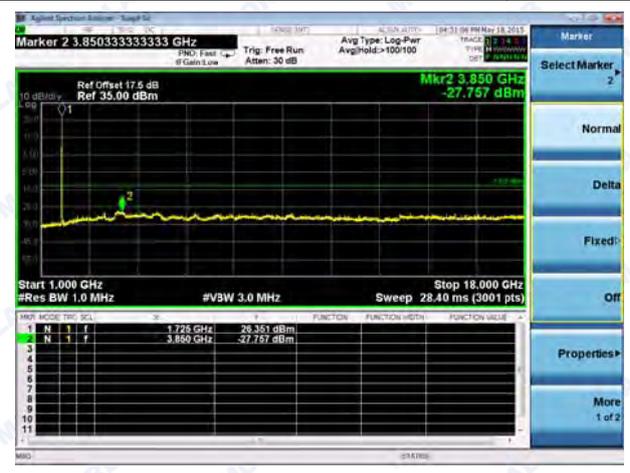
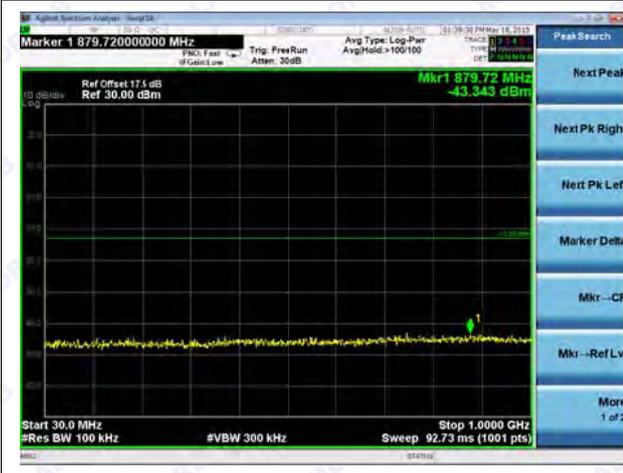


LTE Band 4 20MHz BW Mid Channel

QPSK



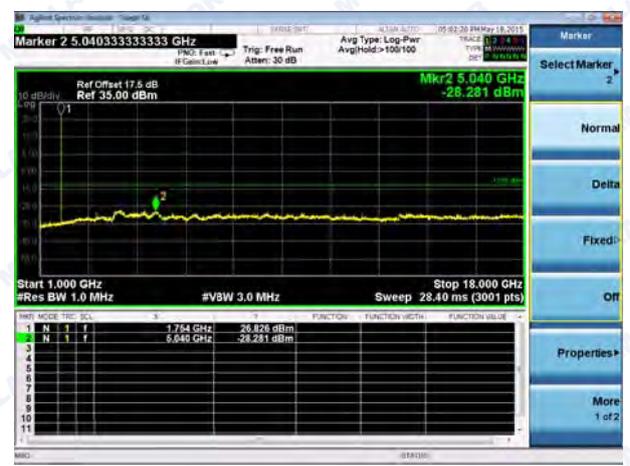
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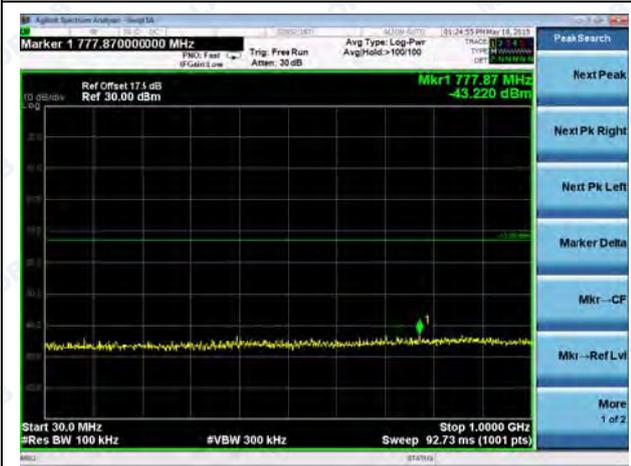


LTE Band 4 1.4MHz BW High Channel

QPSK



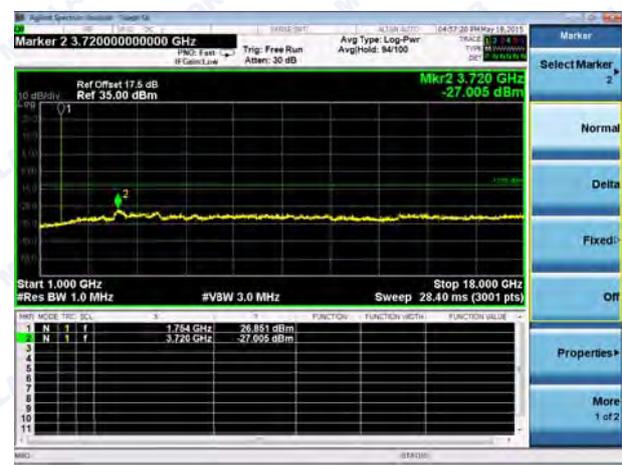
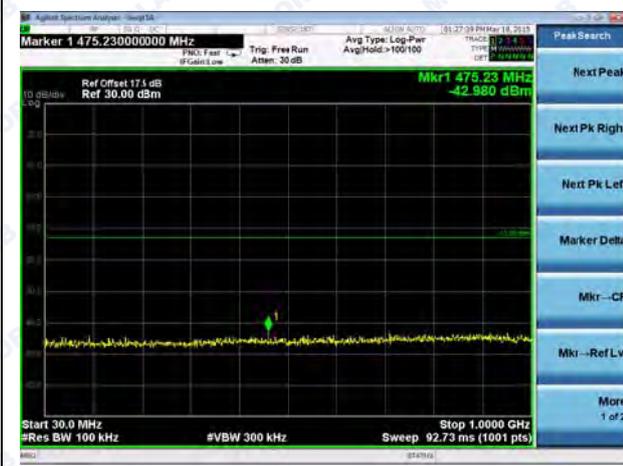
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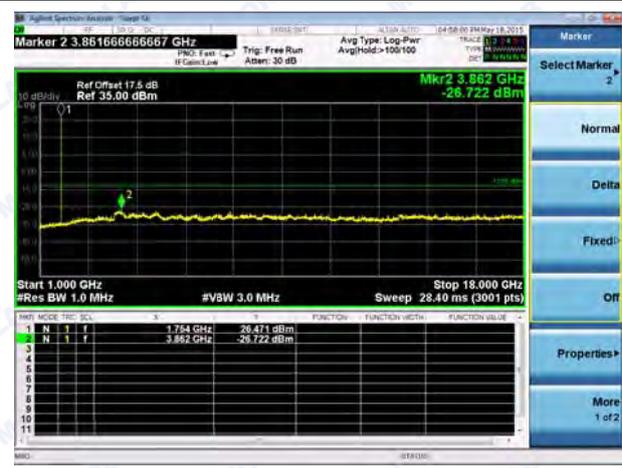


LTE Band 4 3MHz BW High Channel

QPSK



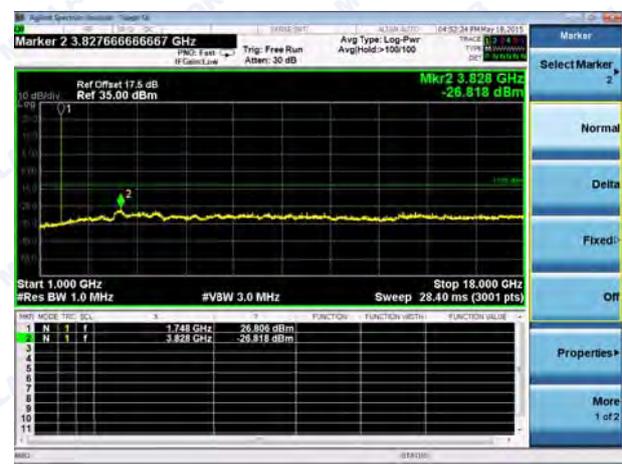
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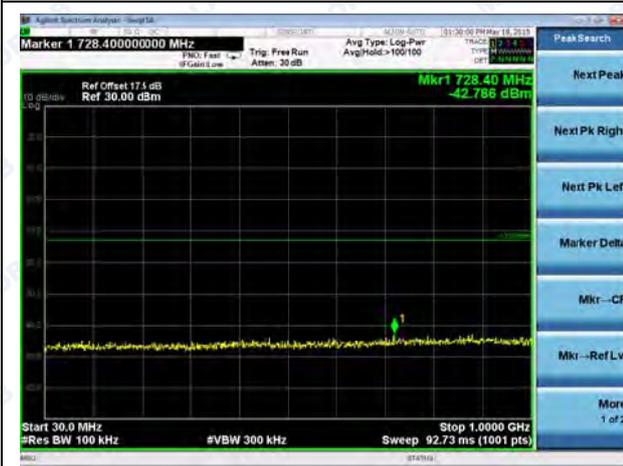


LTE Band 4 5MHz BW High Channel

QPSK



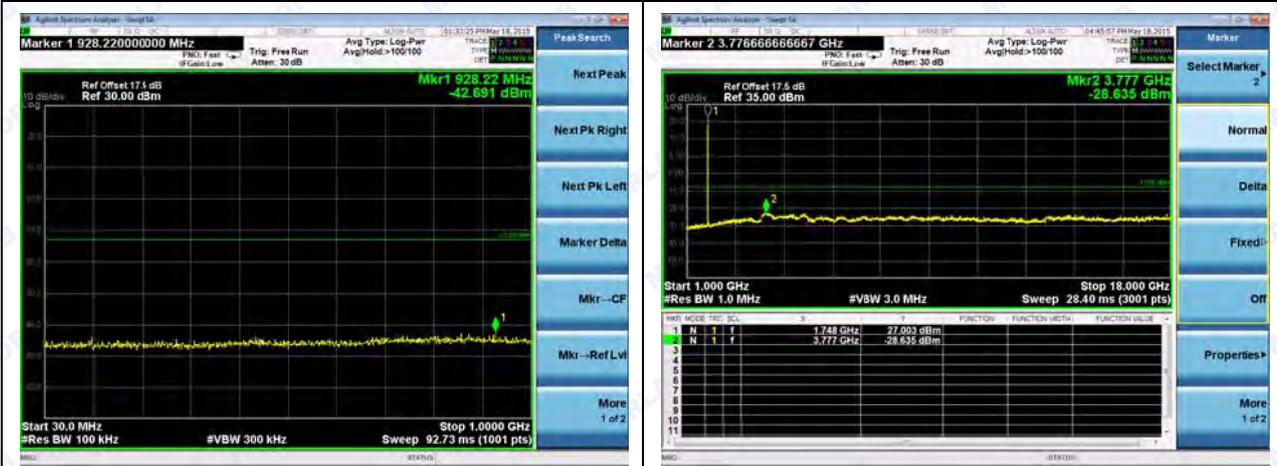
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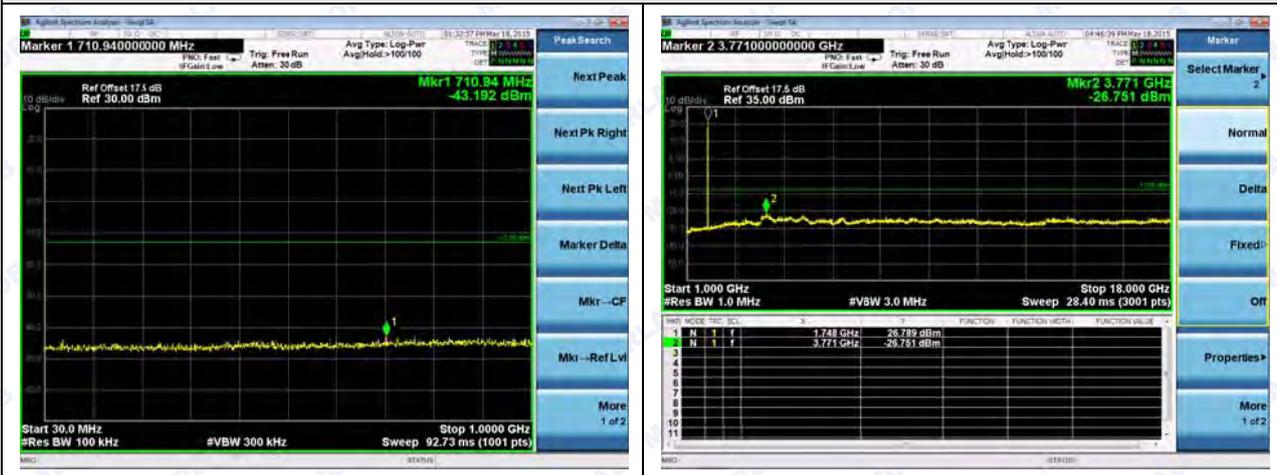


LTE Band 4 10MHz BW High Channel

QPSK



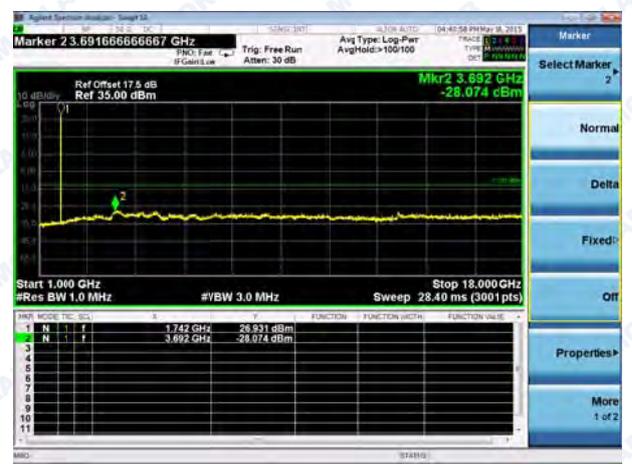
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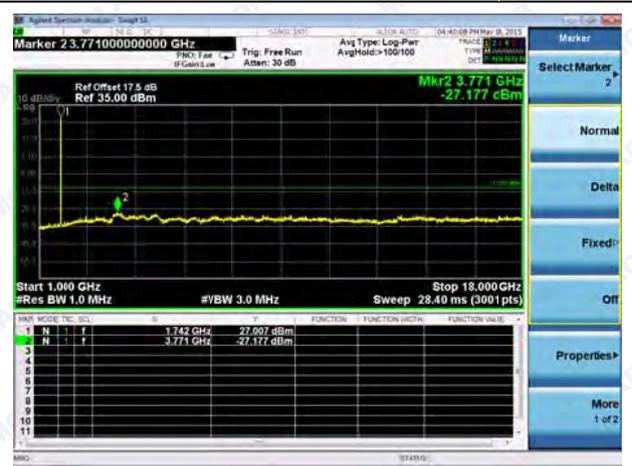


LTE Band 4 15MHz BW High Channel

QPSK



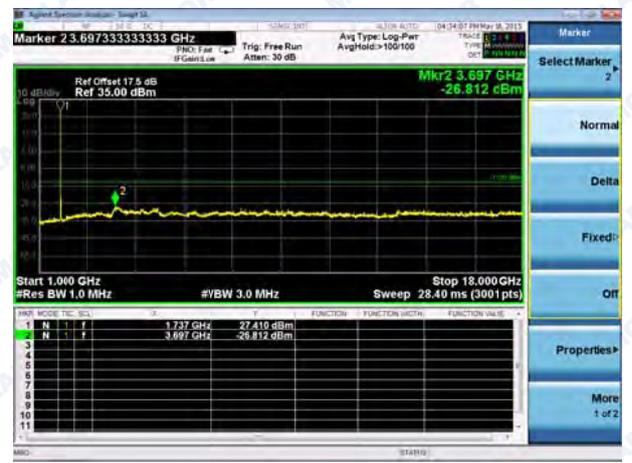
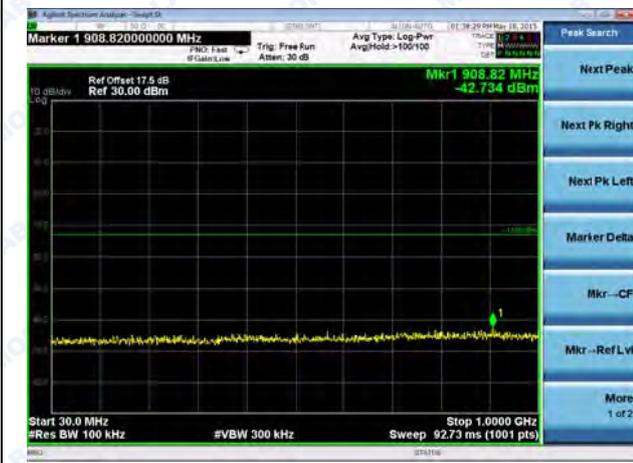
16QAM





LTE Band 4 20MHz BW High Channel

QPSK



16QAM





LTE Band 5 1.4MHz BW Low Channel

QPSK



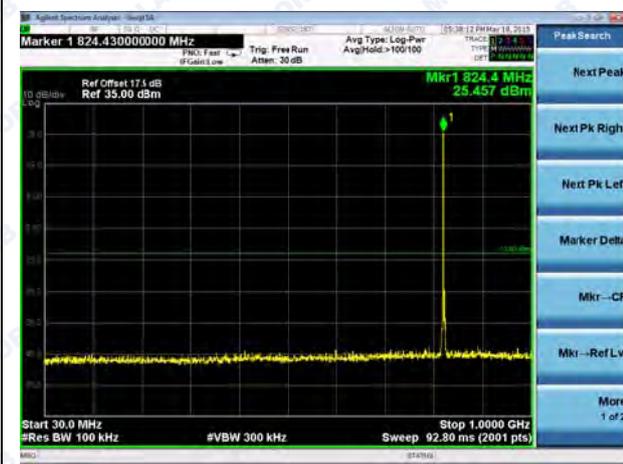
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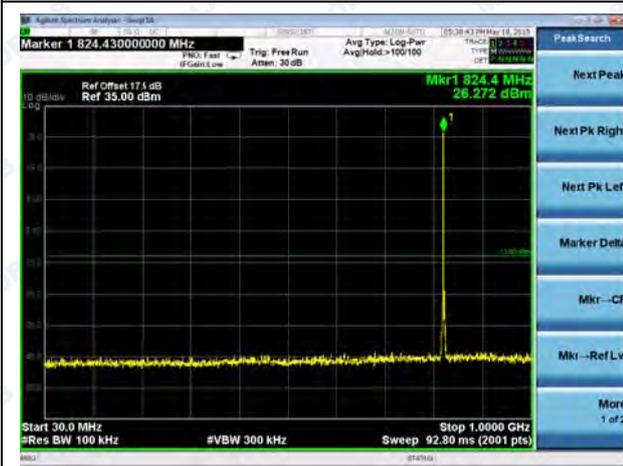


LTE Band 5 3MHz BW Low Channel

QPSK



16QAM



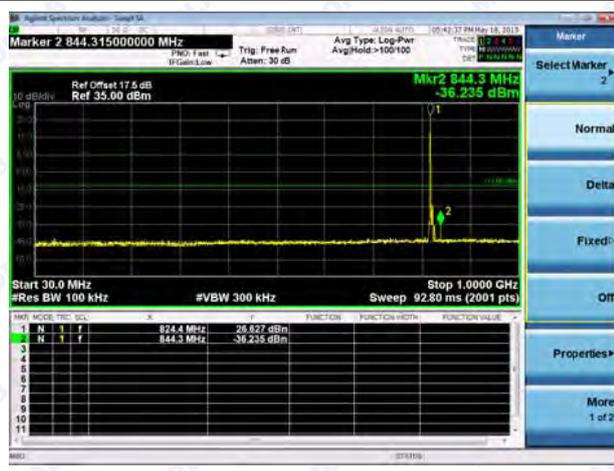


LTE Band 5 5MHz BW Low Channel

QPSK



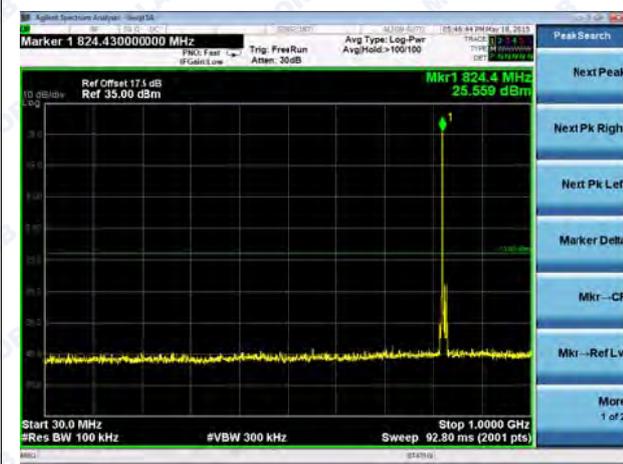
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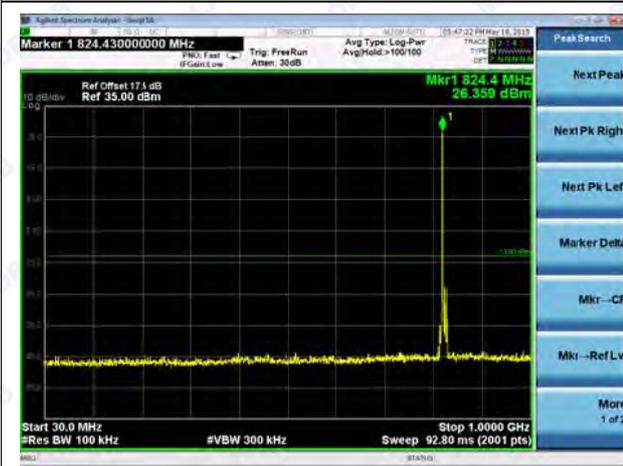


LTE Band 5 10MHz BW Low Channel

QPSK



16QAM





Middle channel:

LTE Band 5 1.4MHz BW Mid Channel

QPSK



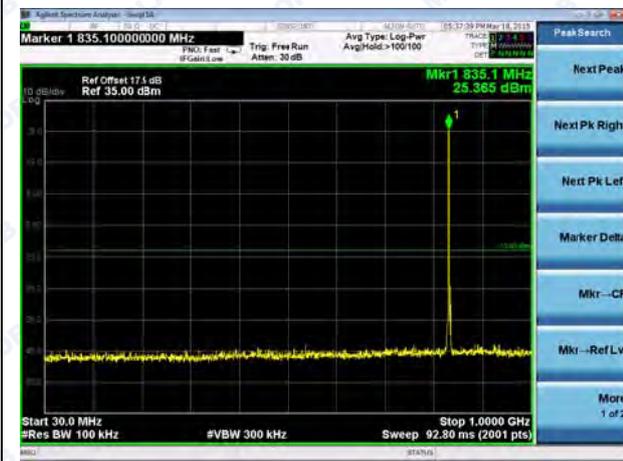
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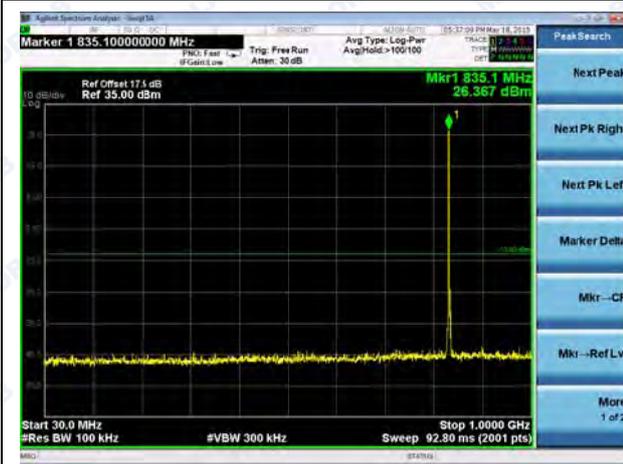


LTE Band 5 3MHz BW Mid Channel

QPSK



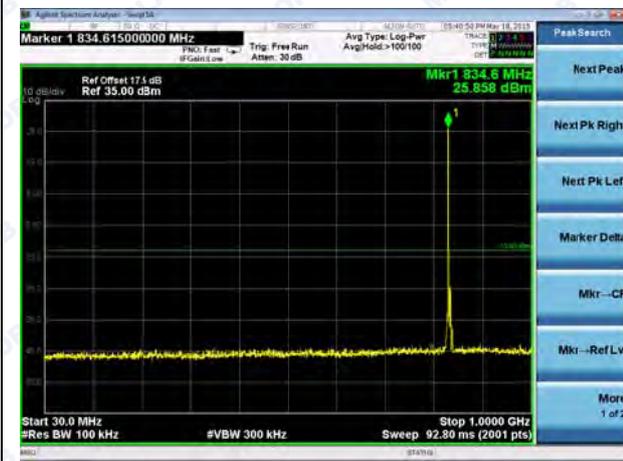
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LTE Band 5 5MHz BW Mid Channel

QPSK



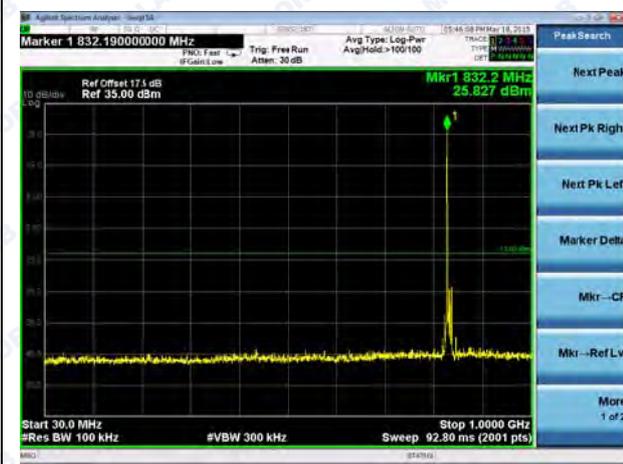
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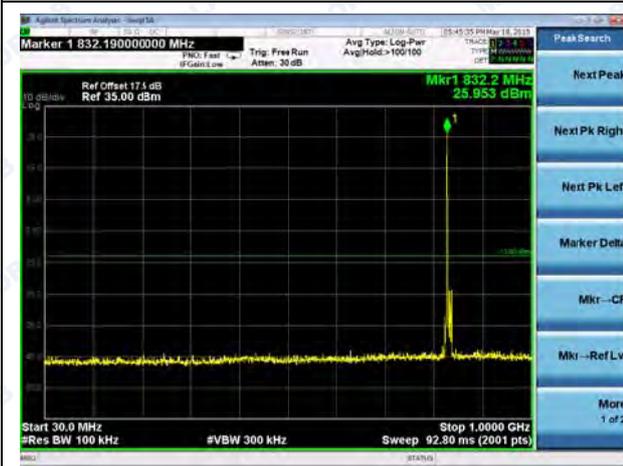


LTE Band 5 10MHz BW Mid Channel

QPSK



16QAM





LTE Band 5 1.4MHz BW High Channel

QPSK



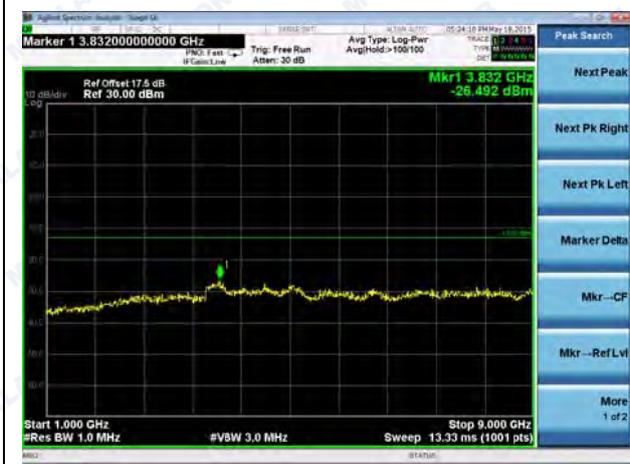
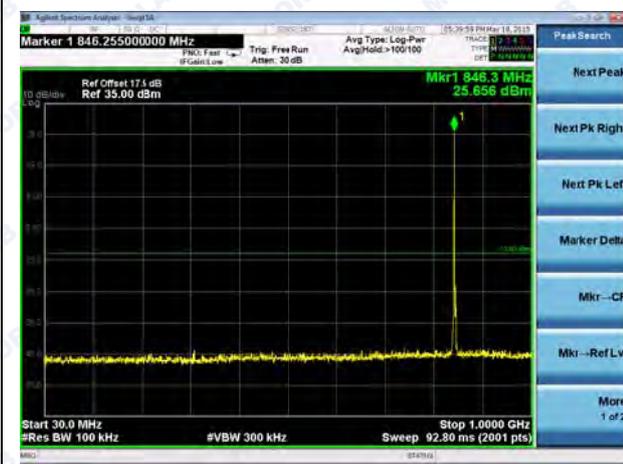
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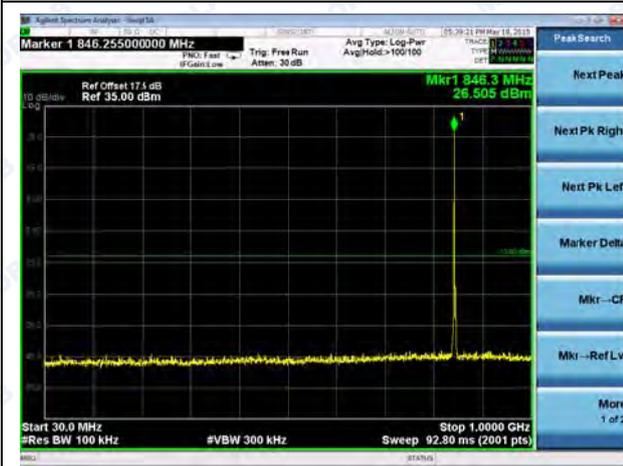


LTE Band 5 3MHz BW High Channel

QPSK



16QAM





LTE Band 5 5MHz BW High Channel

QPSK



16QAM



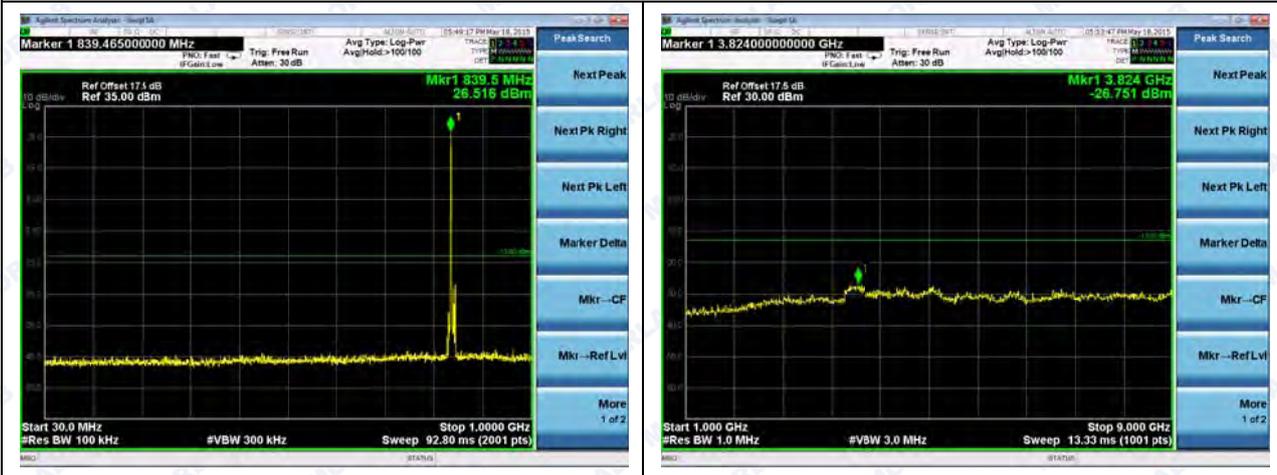


LTE Band 5 10MHz BW High Channel

QPSK



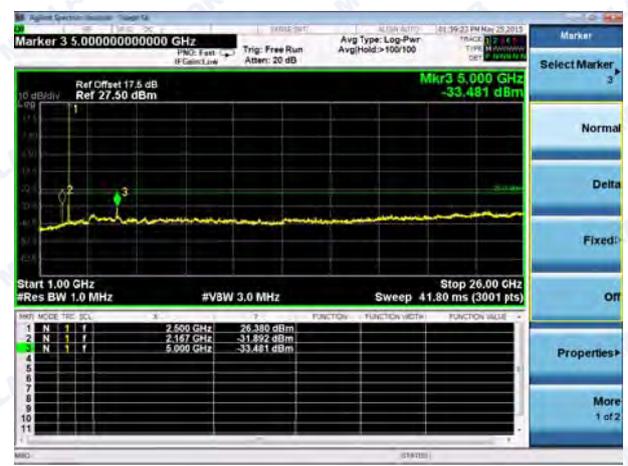
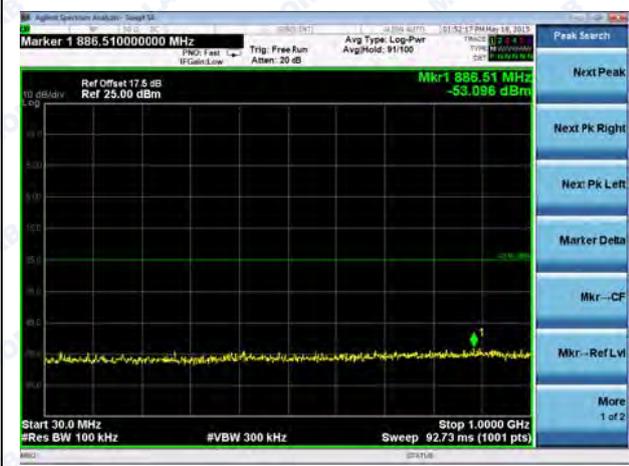
16QAM





LTE Band 7 5MHz BW Low Channel

QPSK



16QAM

