

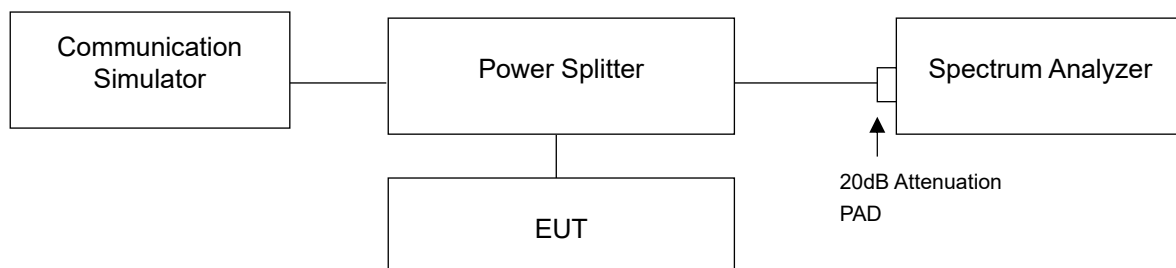
4.4 Occupied Bandwidth Measurement

4.4.1 Test Procedure

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. Measurement method, please refer to section 5.4.4 of ANSI C63.26. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

For the 26dBc bandwidth measurement method, please refer to section 5.4.3 of ANSI C63.26.

4.4.2 Test Setup



4.4.3 Test Result

Occupied Bandwidth

n25, Channel Bandwidth 5MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
370500	1852.5	4.47	4.47	4.48	4.47	4.47
376500	1882.5	4.46	4.47	4.47	4.47	4.47
382500	1912.5	4.47	4.47	4.47	4.47	4.47
n25, Channel Bandwidth 10MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
371000	1855.0	9.16	9.28	9.28	9.28	9.29
376500	1882.5	9.17	9.29	9.28	9.28	9.29
382000	1910.0	9.18	9.29	9.28	9.28	9.28
n25, Channel Bandwidth 15MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
371500	1857.5	13.99	14.11	14.11	14.11	14.11
376500	1882.5	14.00	14.11	14.11	14.12	14.11
381500	1907.5	13.99	14.11	14.11	14.11	14.11
n25, Channel Bandwidth 20MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
372000	1860.0	18.72	18.91	18.91	18.91	18.91
376500	1882.5	18.73	18.91	18.91	18.91	18.91
379000	1895.0	18.73	18.90	18.90	18.90	18.90

Spectrum Plot of Worst Value

5MHz / 16QAM



10MHz / QPSK



15MHz / 64QAM



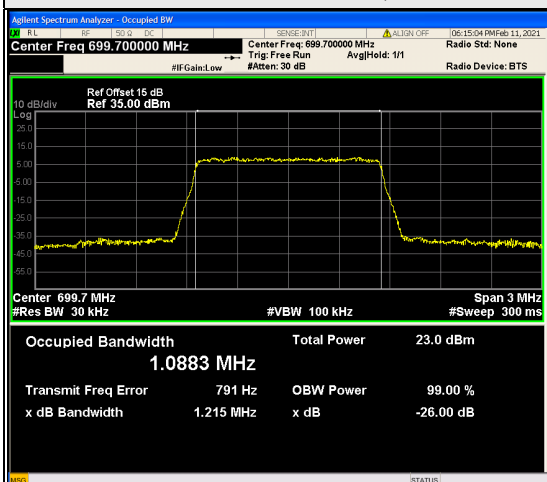
20MHz / 64QAM



LTE Band 12, Channel Bandwidth 1.4MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
23017	699.7	1.09	1.09	1.09	1.08
23095	707.5	1.09	1.09	1.09	1.09
23173	715.3	1.09	1.09	1.09	1.09
LTE Band 12, Channel Bandwidth 3MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
23025	700.5	2.70	2.69	2.69	2.69
23095	707.5	2.70	2.69	2.70	2.69
23165	714.5	2.70	2.69	2.69	2.70
LTE Band 12, Channel Bandwidth 5MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
23035	701.5	4.48	4.49	4.49	4.48
23095	707.5	4.49	4.49	4.49	4.49
23155	713.5	4.48	4.48	4.49	4.48
LTE Band 12, Channel Bandwidth 10MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
23060	704.0	8.95	8.95	8.96	8.95
23095	707.5	8.96	8.96	8.97	8.96
23130	711.0	8.95	8.95	8.96	8.95

Spectrum Plot of Worst Value

1.4MHz / 16QAM



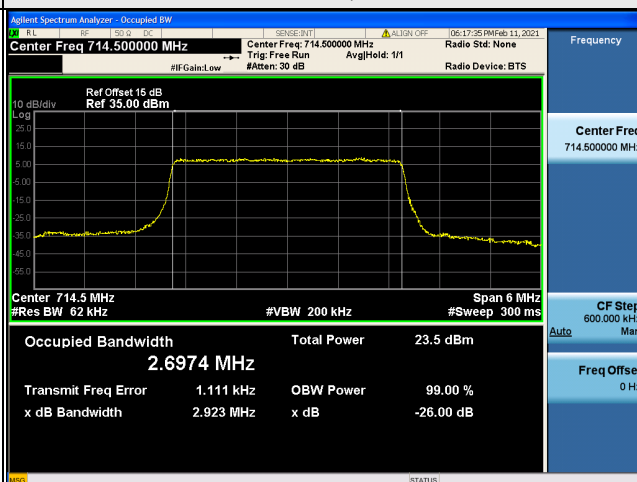
Frequency

Center Freq

CF Step

Freq Offset

3MHz / QPSK



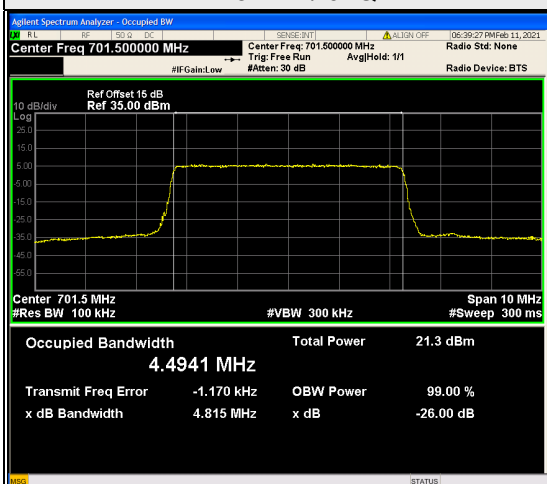
Frequency

Center Freq

CF Step

Freq Offset

5MHz / 64QAM



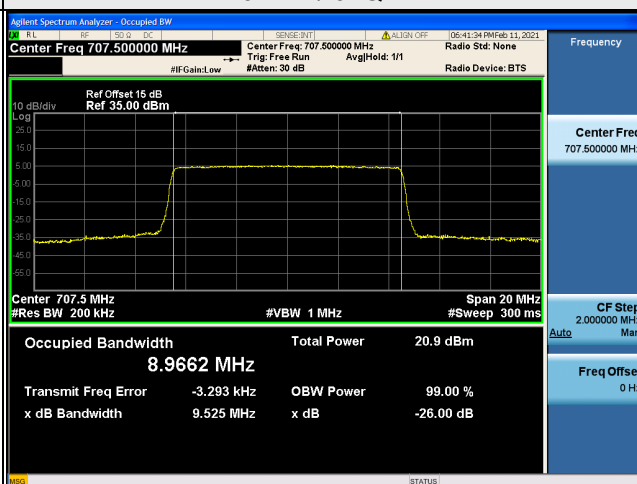
Frequency

Center Freq

CF Step

Freq Offset

10MHz / 64QAM



Frequency

Center Freq

CF Step

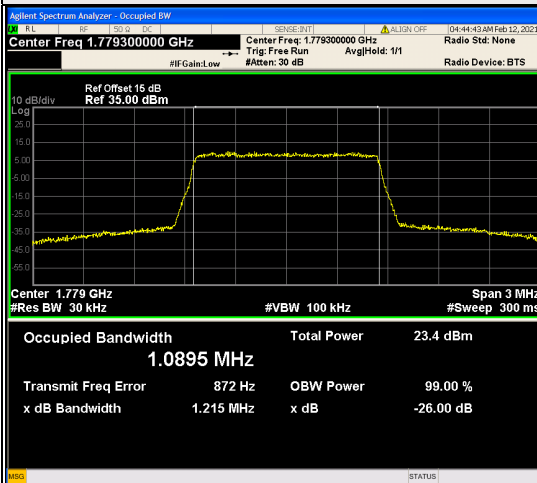
Freq Offset

LTE Band 66, Channel Bandwidth 1.4MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
131979	1710.7	1.09	1.09	1.09	1.08
132322	1745.0	1.09	1.09	1.09	1.09
132665	1779.3	1.09	1.09	1.09	1.09
LTE Band 66, Channel Bandwidth 3MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
131987	1711.5	2.70	2.69	2.69	2.70
132322	1745.0	2.70	2.70	2.69	2.70
132657	1778.5	2.70	2.69	2.69	2.69
LTE Band 66, Channel Bandwidth 5MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
131997	1712.5	4.49	4.49	4.49	4.49
132322	1745.0	4.49	4.49	4.50	4.49
132647	1777.5	4.48	4.49	4.49	4.48
LTE Band 66, Channel Bandwidth 10MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
132022	1715.0	8.96	8.96	8.96	8.95
132322	1745.0	8.95	8.95	8.96	8.95
132622	1775.0	8.95	8.95	8.96	8.95
LTE Band 66, Channel Bandwidth 15MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
132047	1717.5	13.45	13.45	13.44	13.44
132322	1745.0	13.45	13.45	13.44	13.44
132597	1772.5	13.46	13.45	13.44	13.45

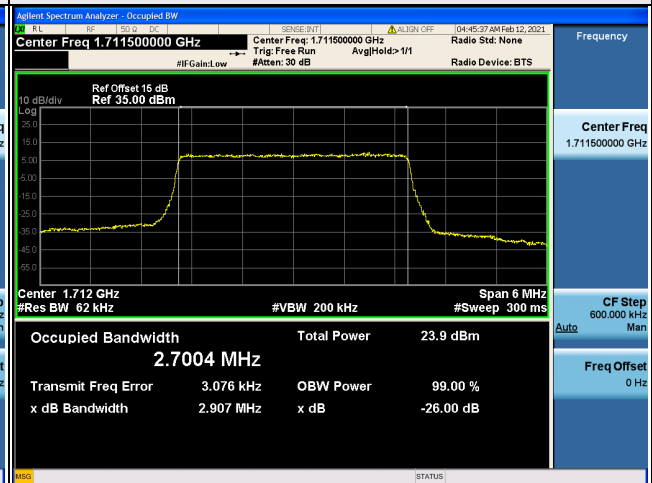
LTE Band 66, Channel Bandwidth 20MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
132072	1720.0	17.90	17.91	17.90	17.91
132322	1745.0	17.91	17.93	17.93	17.94
132572	1770.0	17.93	17.96	17.96	17.96

Spectrum Plot of Worst Value

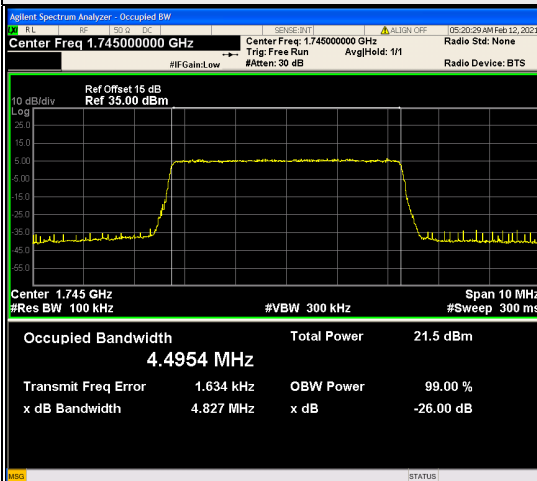
1.4MHz / 16QAM



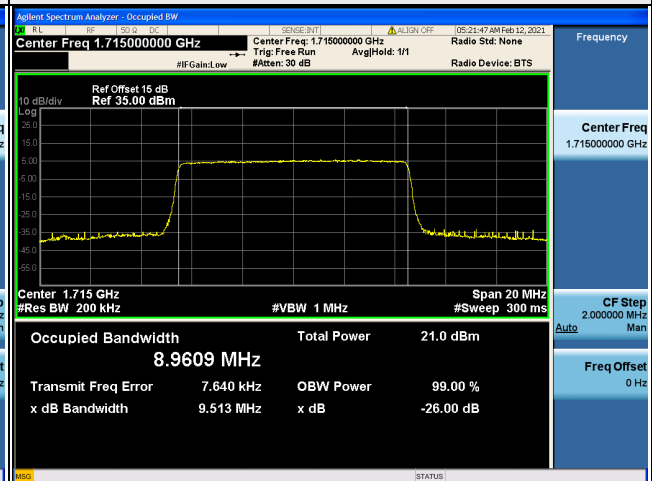
3MHz / QPSK



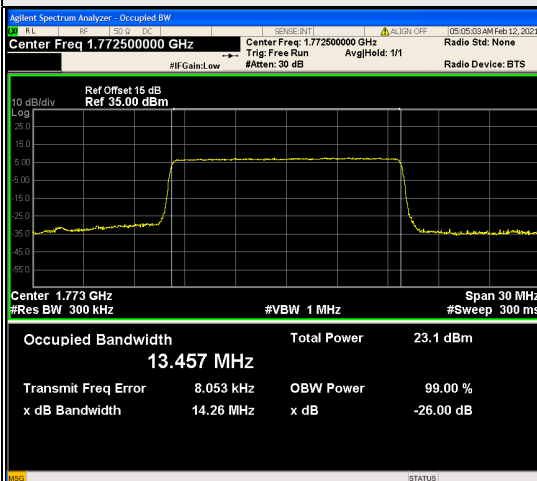
5MHz / 64QAM



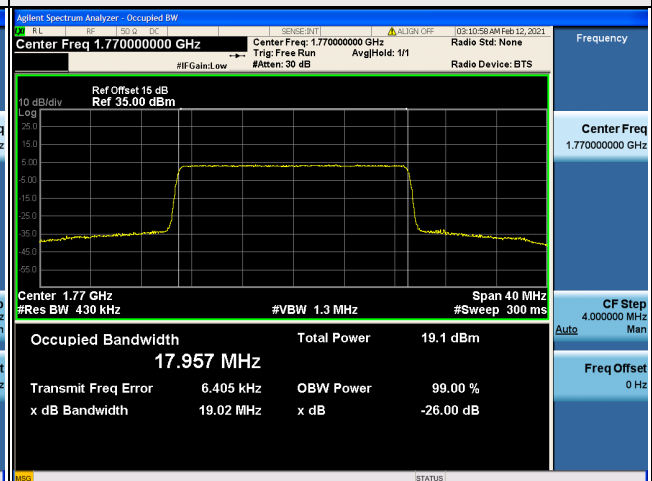
10MHz / 64QAM



15MHz / QPSK



20MHz / 256QAM



26dB Bandwidth

n25, Channel Bandwidth 5MHz						
Channel	Frequency (MHz)	26dB Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
370500	1852.5	4.72	4.71	4.75	4.73	4.71
376500	1882.5	4.71	4.78	4.76	4.78	4.72
382500	1912.5	4.77	4.79	4.77	4.70	4.69
n25, Channel Bandwidth 10MHz						
Channel	Frequency (MHz)	26dB Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
371000	1855.0	9.28	9.69	9.62	9.65	9.65
376500	1882.5	9.28	9.71	9.67	9.67	9.67
382000	1910.0	9.28	9.69	9.63	9.65	9.64
n25, Channel Bandwidth 15MHz						
Channel	Frequency (MHz)	26dB Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
371500	1857.5	13.88	14.64	14.64	14.63	14.61
376500	1882.5	13.88	14.62	14.64	14.64	14.60
381500	1907.5	13.88	14.61	14.62	14.60	14.58
n25, Channel Bandwidth 20MHz						
Channel	Frequency (MHz)	26dB Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
372000	1860.0	18.48	19.58	19.59	19.58	19.56
376500	1882.5	18.48	19.59	19.59	19.56	19.55
379000	1895.0	18.48	19.57	19.58	19.56	19.55

Spectrum Plot of Worst Value

5MHz / QPSK



10MHz / QPSK



15MHz / QPSK



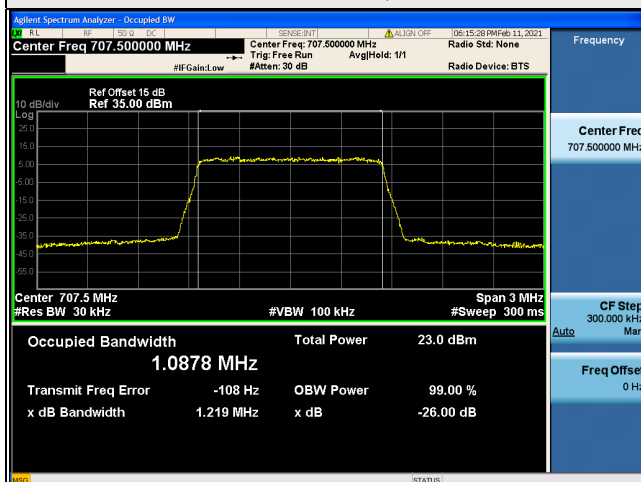
20MHz / QPSK



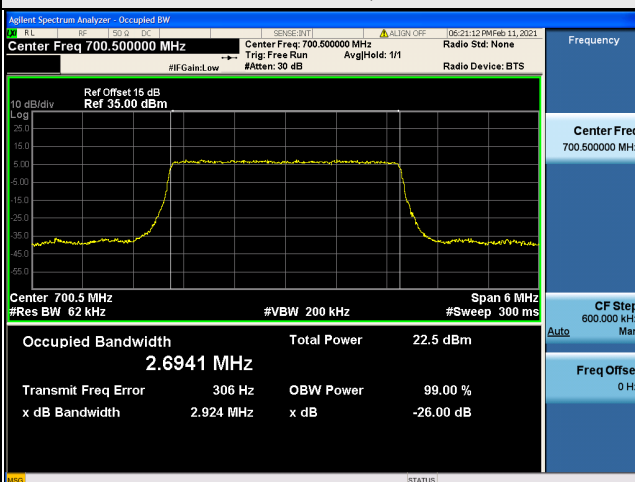
LTE Band 12, Channel Bandwidth 1.4MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
23017	699.7	1.22	1.22	1.21	1.21
23095	707.5	1.21	1.22	1.21	1.21
23173	715.3	1.22	1.22	1.22	1.21
LTE Band 12, Channel Bandwidth 3MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
23025	700.5	2.92	2.92	2.90	2.90
23095	707.5	2.92	2.92	2.91	2.91
23165	714.5	2.92	2.91	2.90	2.90
LTE Band 12, Channel Bandwidth 5MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
23035	701.5	4.80	4.80	4.82	4.80
23095	707.5	4.81	4.79	4.82	4.79
23155	713.5	4.79	4.80	4.80	4.80
LTE Band 12, Channel Bandwidth 10MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
23060	704.0	9.50	9.51	9.52	9.51
23095	707.5	9.51	9.50	9.53	9.50
23130	711.0	9.52	9.51	9.53	9.50

Spectrum Plot of Worst Value

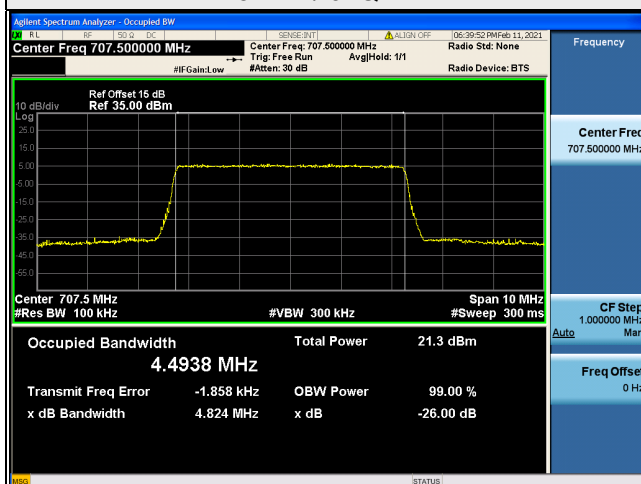
1.4MHz / 16QAM



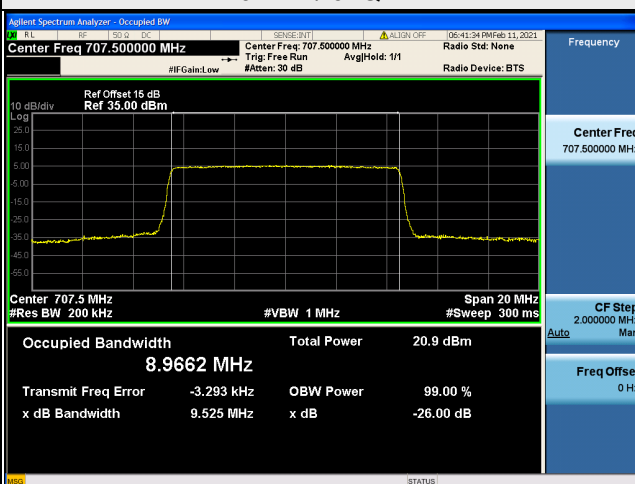
3MHz / 16QAM



5MHz / 64QAM



10MHz / 64QAM

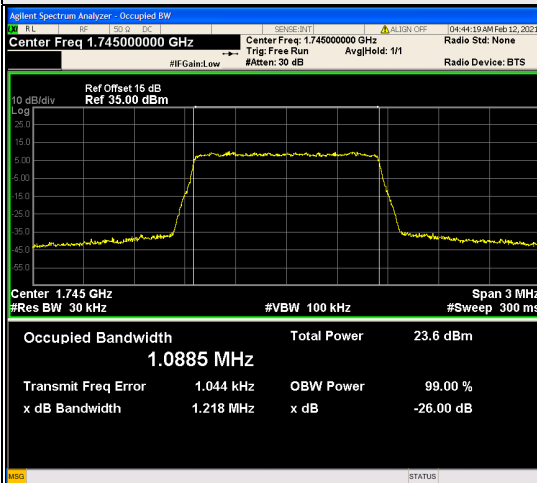


LTE Band 66, Channel Bandwidth 1.4MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
131979	1710.7	1.22	1.22	1.21	1.22
132322	1745.0	1.21	1.22	1.21	1.21
132665	1779.3	1.21	1.22	1.22	1.21
LTE Band 66, Channel Bandwidth 3MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
131987	1711.5	2.91	2.91	2.90	2.91
132322	1745.0	2.91	2.92	2.90	2.91
132657	1778.5	2.91	2.92	2.91	2.90
LTE Band 66, Channel Bandwidth 5MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
131997	1712.5	4.80	4.80	4.79	4.81
132322	1745.0	4.78	4.79	4.83	4.79
132647	1777.5	4.79	4.79	4.82	4.80
LTE Band 66, Channel Bandwidth 10MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
132022	1715.0	9.51	9.51	9.51	9.48
132322	1745.0	9.50	9.50	9.48	9.50
132622	1775.0	9.49	9.50	9.51	9.49
LTE Band 66, Channel Bandwidth 15MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
132047	1717.5	14.24	14.23	14.23	14.22
132322	1745.0	14.26	14.24	14.23	14.23
132597	1772.5	14.26	14.26	14.24	14.24

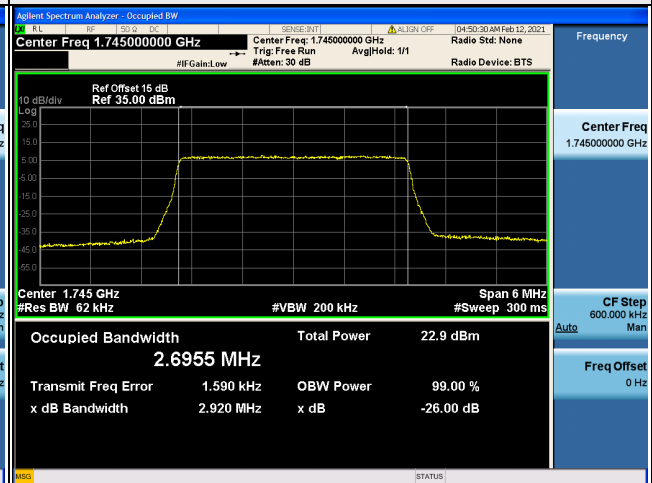
LTE Band 66, Channel Bandwidth 20MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
132072	1720.0	18.99	19.01	18.99	18.99
132322	1745.0	19.01	19.01	19.01	19.01
132572	1770.0	19.03	19.02	19.04	19.02

Spectrum Plot of Worst Value

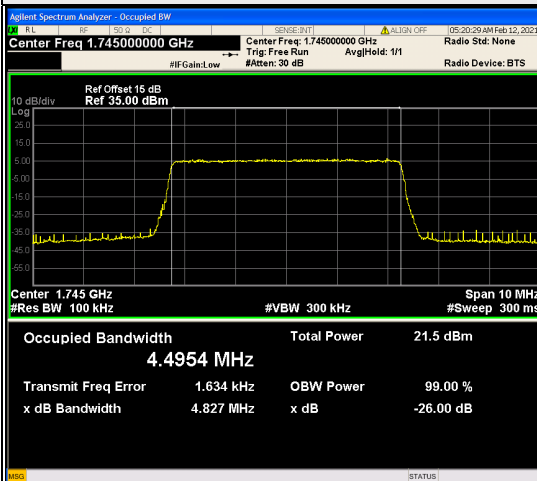
1.4MHz / 16QAM



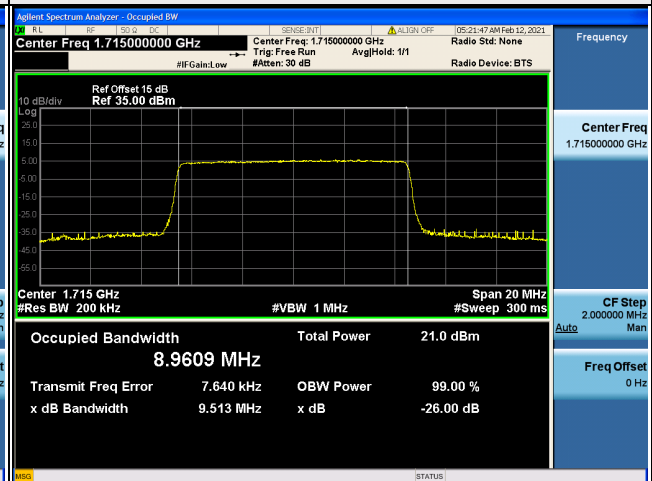
3MHz / 16QAM



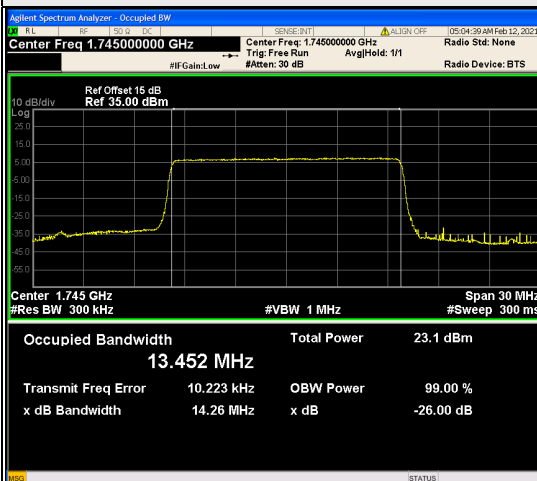
5MHz / 64QAM



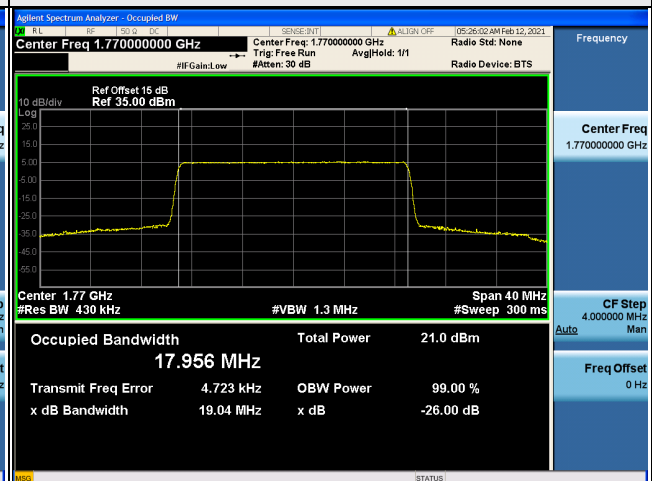
10MHz / 64QAM



15MHz / QPSK



20MHz / 64QAM



4.5 Band Edge Measurement

4.5.1 Limits of Band Edge Measurement

For n25:

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. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

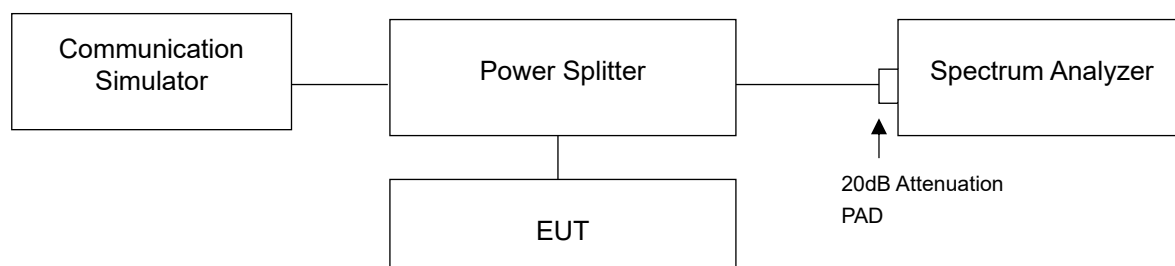
For LTE Band 12:

According to FCC 27.53(g) for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater.

For LTE Band 66:

According to FCC 27.53(h) for operations in the 1695-1710MHz, 1710-1755MHz, 1755-1780 MHz, 1915-1920MHz, 1995-2000 MHz, 2000-2020MHz, 2110-2155MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log(P)$ dB.

4.5.2 Test Setup



4.5.3 Test Procedures

For 5G NR Band:

- a. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 51kHz and VB of the spectrum is 160kHz (Channel Bandwidth 5MHz).
- b. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (Channel Bandwidth 10MHz).
- c. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 150kHz and VB of the spectrum is 470kHz (Channel Bandwidth 15MHz).
- d. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 200kHz and VB of the spectrum is 620kHz (Channel Bandwidth 20MHz).
- e. Record the max trace plot into the test report.

For LTE Band:

- a. All measurements were done at low and high operational frequency range.
- b. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 15kHz and VB of the spectrum is 51kHz (Channel Bandwidth 1.4MHz).
- c. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 30kHz and VB of the spectrum is 100kHz (Channel Bandwidth 3MHz).
- d. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 51kHz and VB of the spectrum is 160kHz (Channel Bandwidth 5MHz).
- e. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (Channel Bandwidth 10MHz).
- f. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 150kHz and VB of the spectrum is 470kHz (Channel Bandwidth 15MHz).
- g. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 200kHz and VB of the spectrum is 1MHz (Channel Bandwidth 20MHz).
- h. Record the max trace plot into the test report.

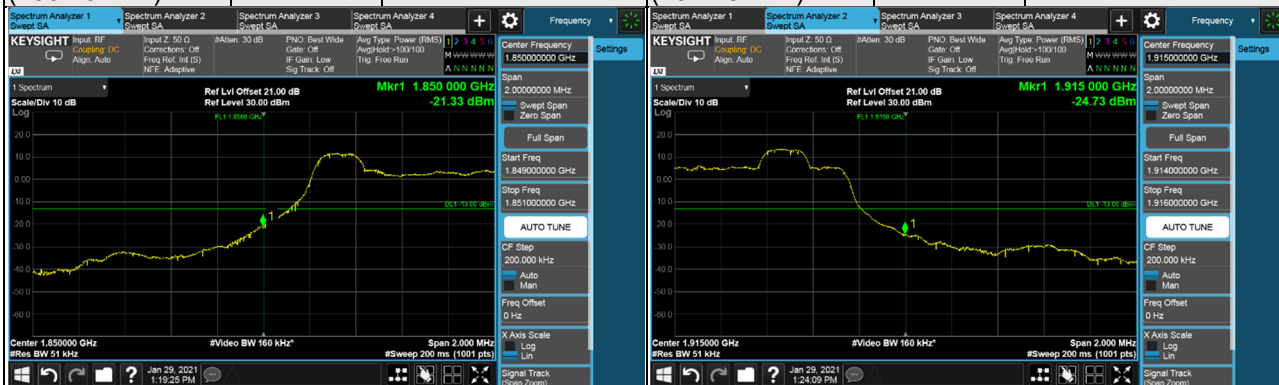
4.5.4 Test Results

n25, Channel Bandwidth 5MHz

Channel 370500 (1852.5MHz)	$\pi/2$ BPSK	1 RB / 0 RB Offset	Channel 382500 (1912.5MHz)	$\pi/2$ BPSK	1 RB / 24 RB Offset
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Channel 370500 (1852.5MHz)	$\pi/2$ BPSK	25 RB / 0 RB Offset	Channel 382500 (1912.5MHz)	$\pi/2$ BPSK	25 RB / 0 RB Offset
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n25, Channel Bandwidth 10MHz

Channel 371000
(1855.0MHz)

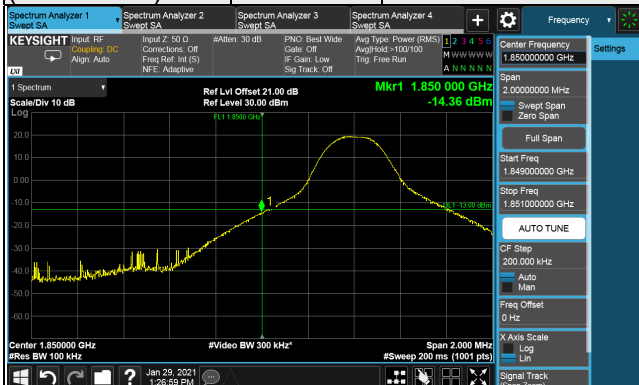
$\pi/2$ BPSK

1 RB / 1 RB Offset

Channel 382000
(1910.0MHz)

$\pi/2$ BPSK

1 RB / 50 RB Offset



Channel 371000
(1855.0MHz)

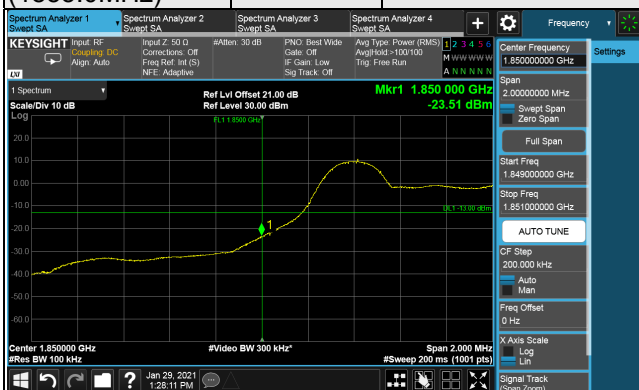
$\pi/2$ BPSK

50 RB / 0 RB Offset

Channel 382000
(1910.0MHz)

$\pi/2$ BPSK

50 RB / 0 RB Offset



n25, Channel Bandwidth 15MHz

Channel 371500
(1857.5MHz)

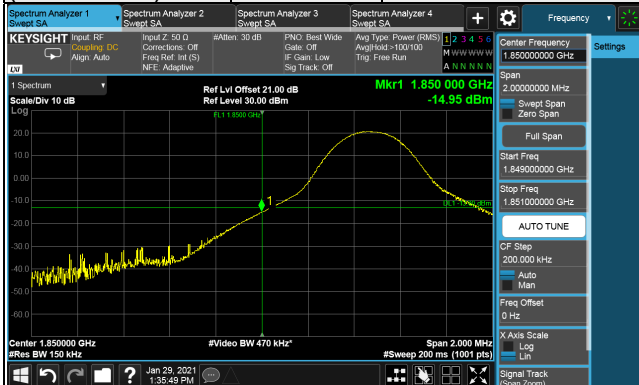
$\pi/2$ BPSK

1 RB / 1 RB Offset

Channel 381500
(1907.5MHz)

$\pi/2$ BPSK

1 RB / 77 RB Offset



Channel 371500
(1857.5MHz)

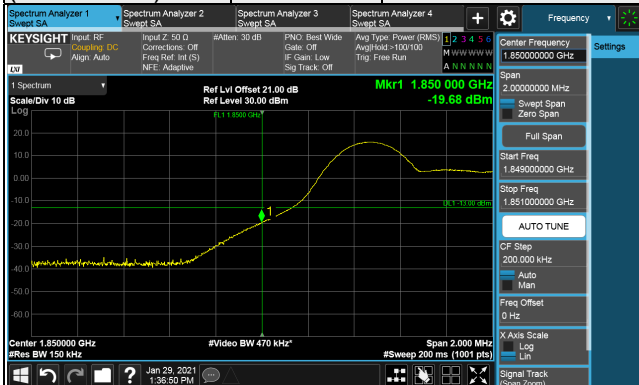
$\pi/2$ BPSK

75 RB / 0 RB Offset

Channel 381500
(1907.5MHz)

$\pi/2$ BPSK

75 RB / 0 RB Offset



n25, Channel Bandwidth 20MHz

Channel 372000
(1860.0MHz)

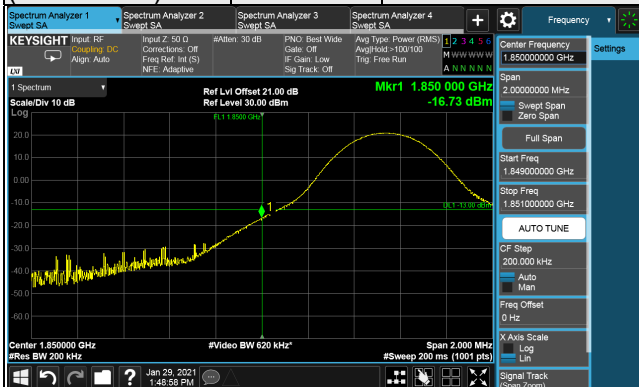
$\pi/2$ BPSK

1 RB / 1 RB Offset

Channel 379000
(1905.0MHz)

$\pi/2$ BPSK

1 RB / 104 RB Offset



Channel 372000
(1860.0MHz)

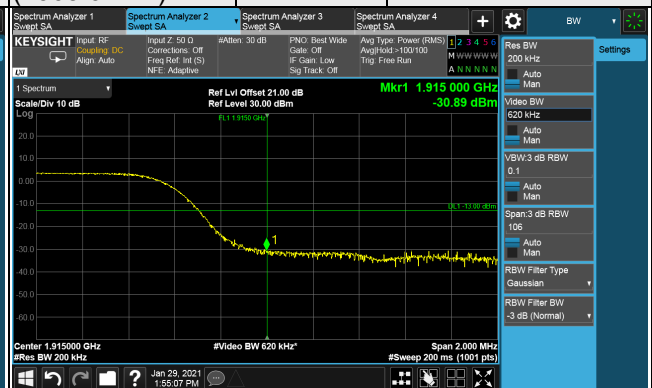
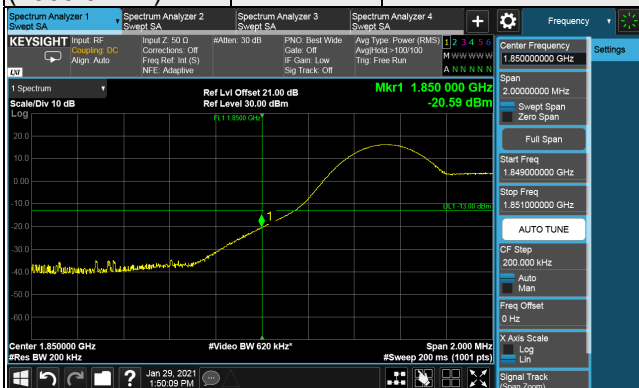
$\pi/2$ BPSK

100 RB / 0 RB Offset

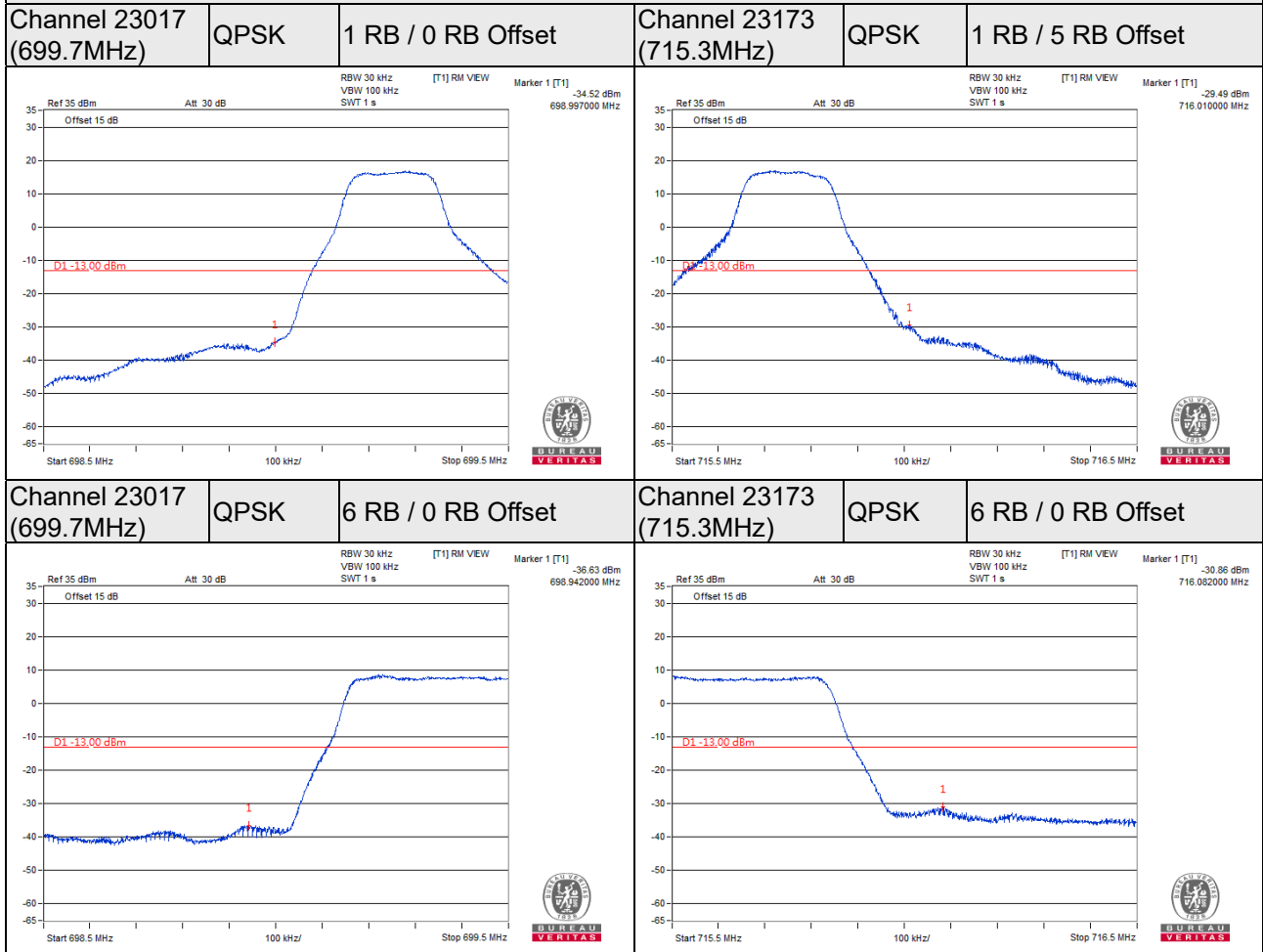
Channel 379000
(1905.0MHz)

$\pi/2$ BPSK

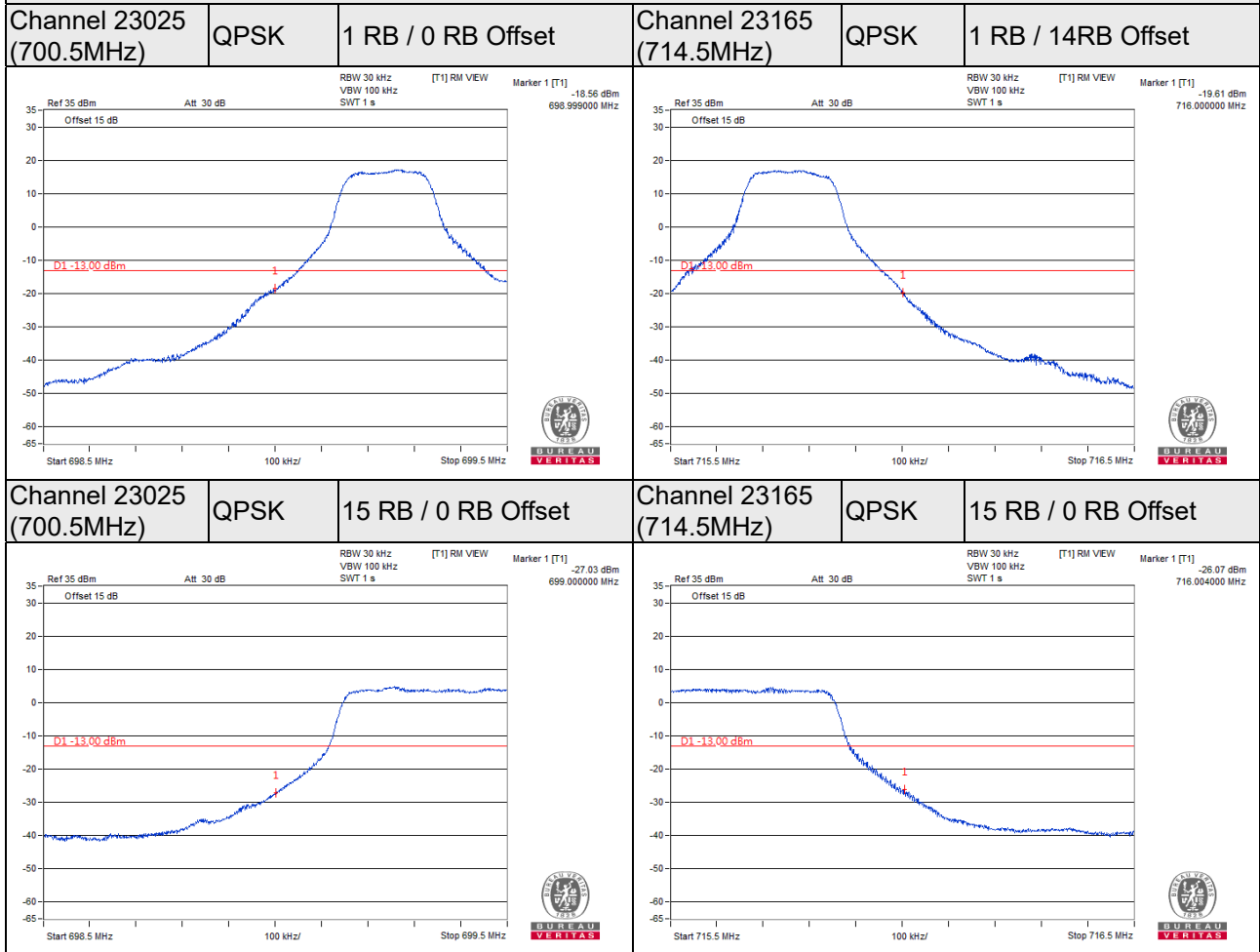
100 RB / 0 RB Offset



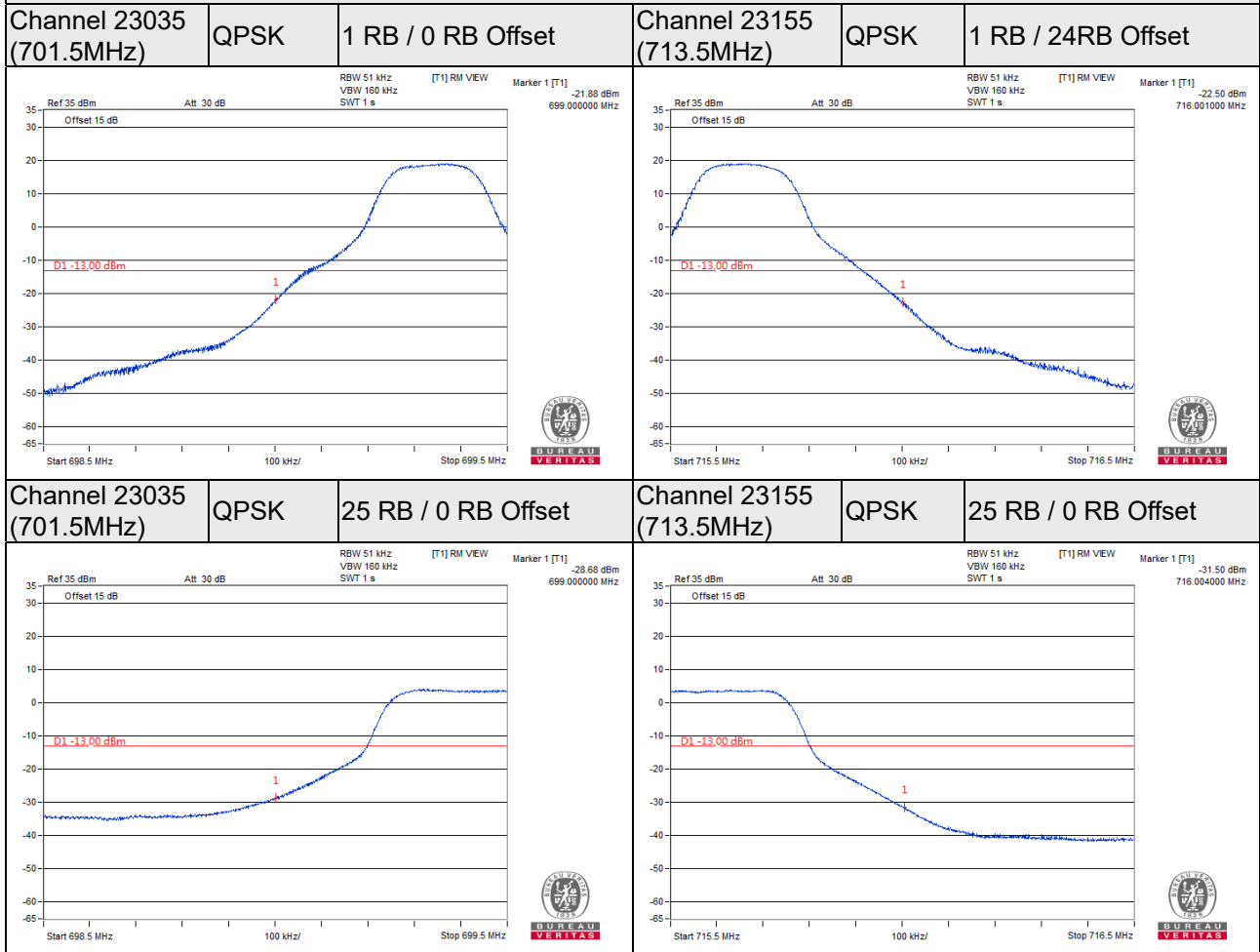
LTE Band 12, Channel Bandwidth 1.4MHz



LTE Band 12, Channel Bandwidth 3MHz

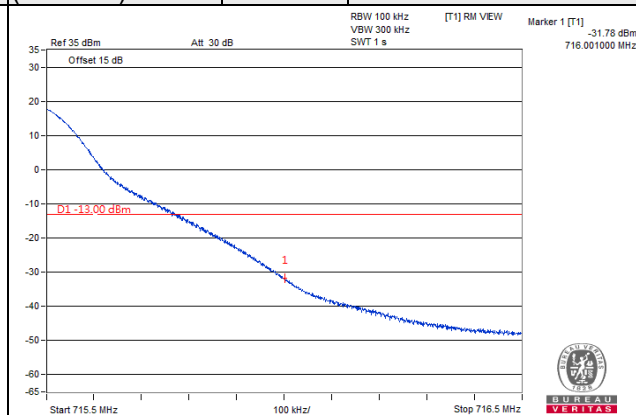
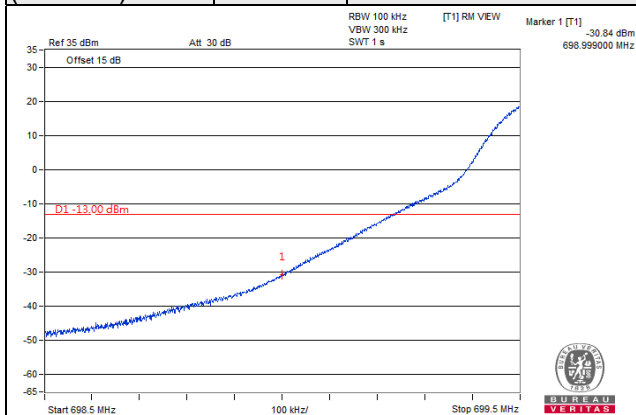


LTE Band 12, Channel Bandwidth 5MHz

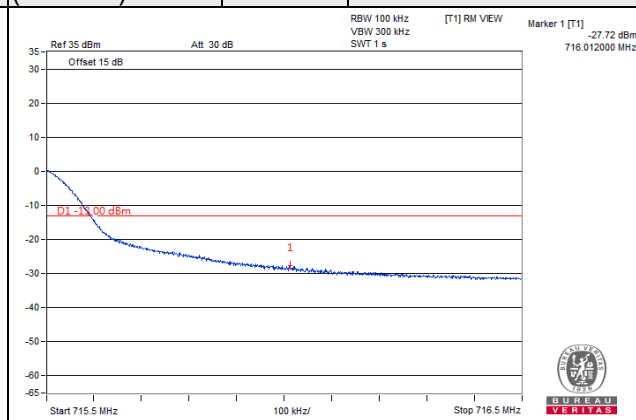
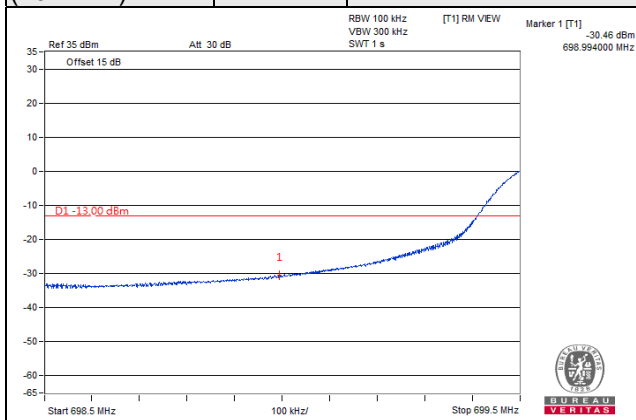


LTE Band 12, Channel Bandwidth 10MHz

Channel 23060 (704MHz)	QPSK	1 RB / 0 RB Offset	Channel 23130 (711MHz)	QPSK	1 RB / 24RB Offset
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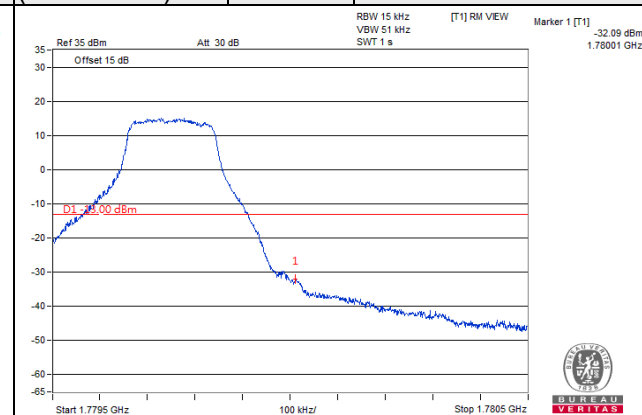
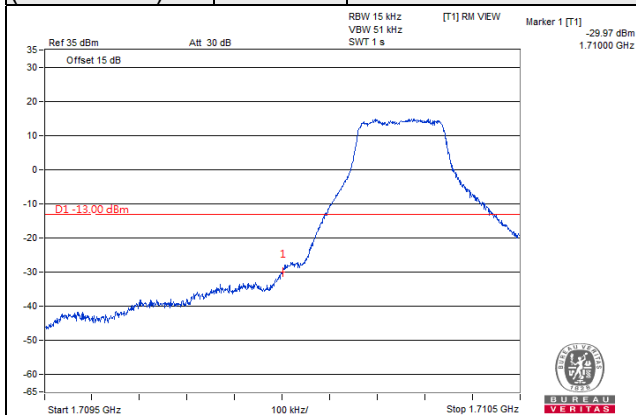


Channel 23060 (704MHz)	QPSK	50 RB / 0 RB Offset	Channel 23130 (711MHz)	QPSK	25 RB / 0 RB Offset
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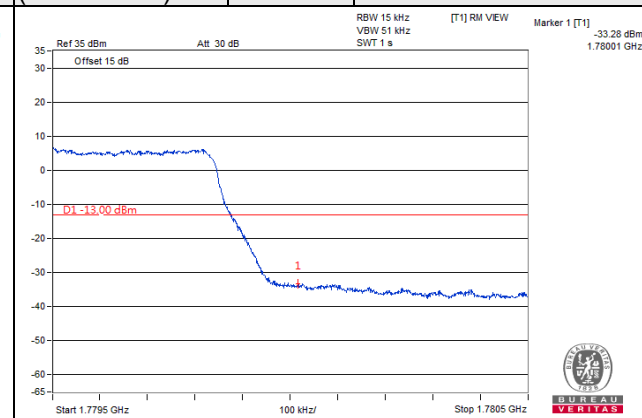
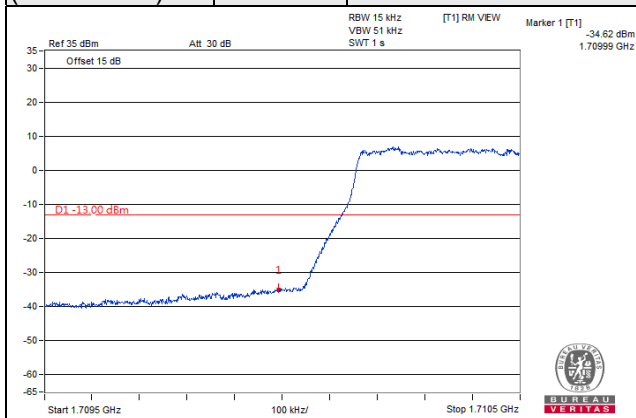


LTE Band 66, Channel Bandwidth 1.4MHz

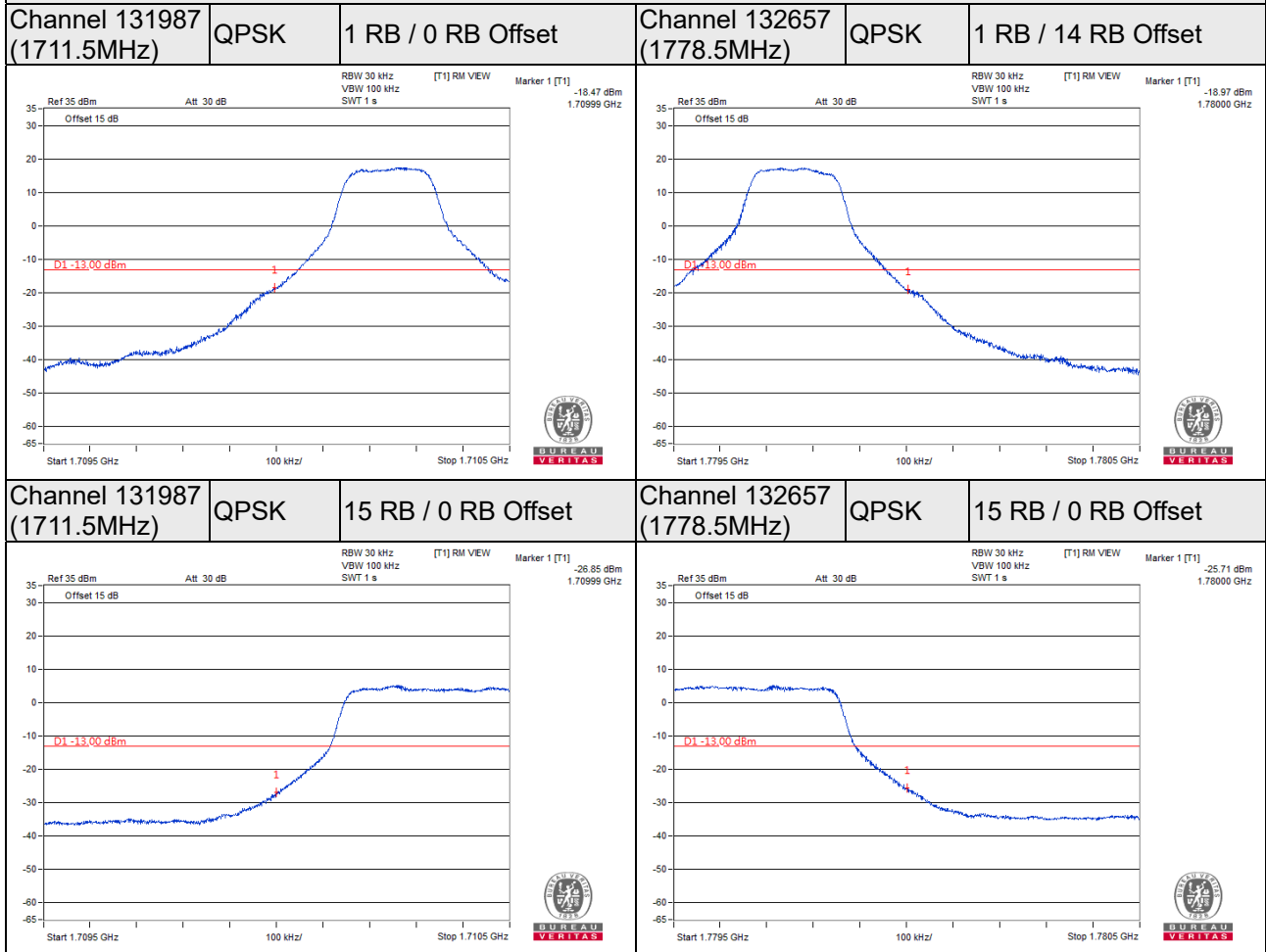
Channel 131979 (1710.7MHz)	QPSK	1 RB / 0 RB Offset	Channel 132665 (1779.3MHz)	QPSK	1 RB / 5 RB Offset
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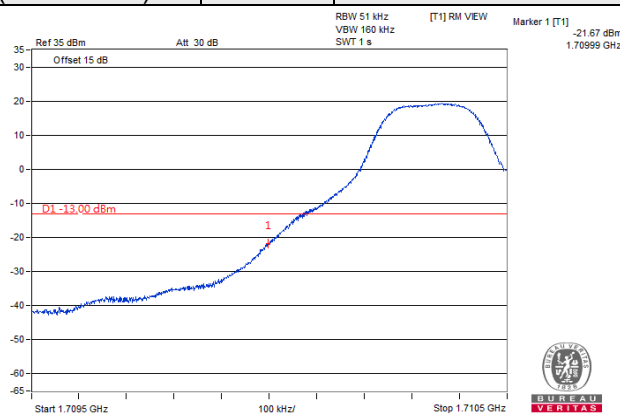
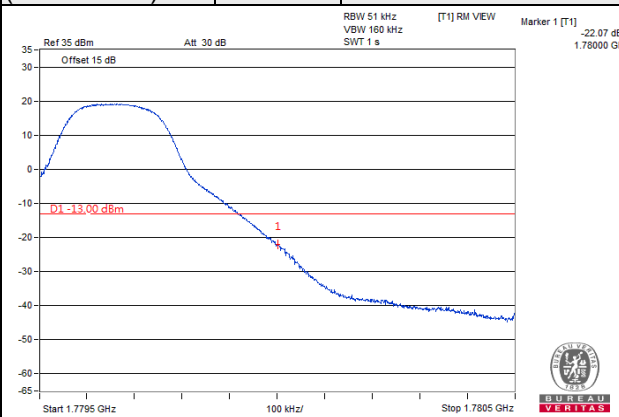
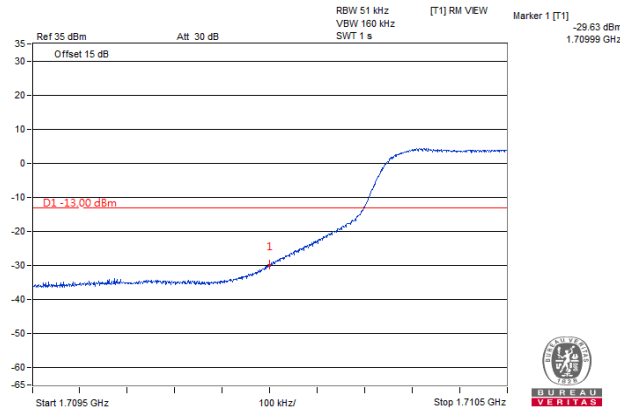
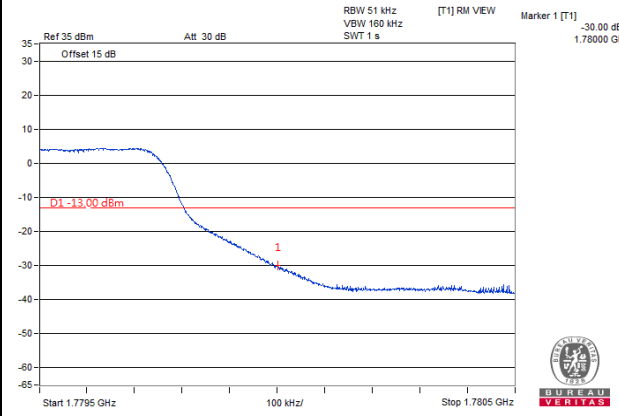
Channel 131979 (1710.7MHz)	QPSK	6 RB / 0 RB Offset	Channel 132665 (1779.3MHz)	QPSK	6 RB / 0 RB Offset
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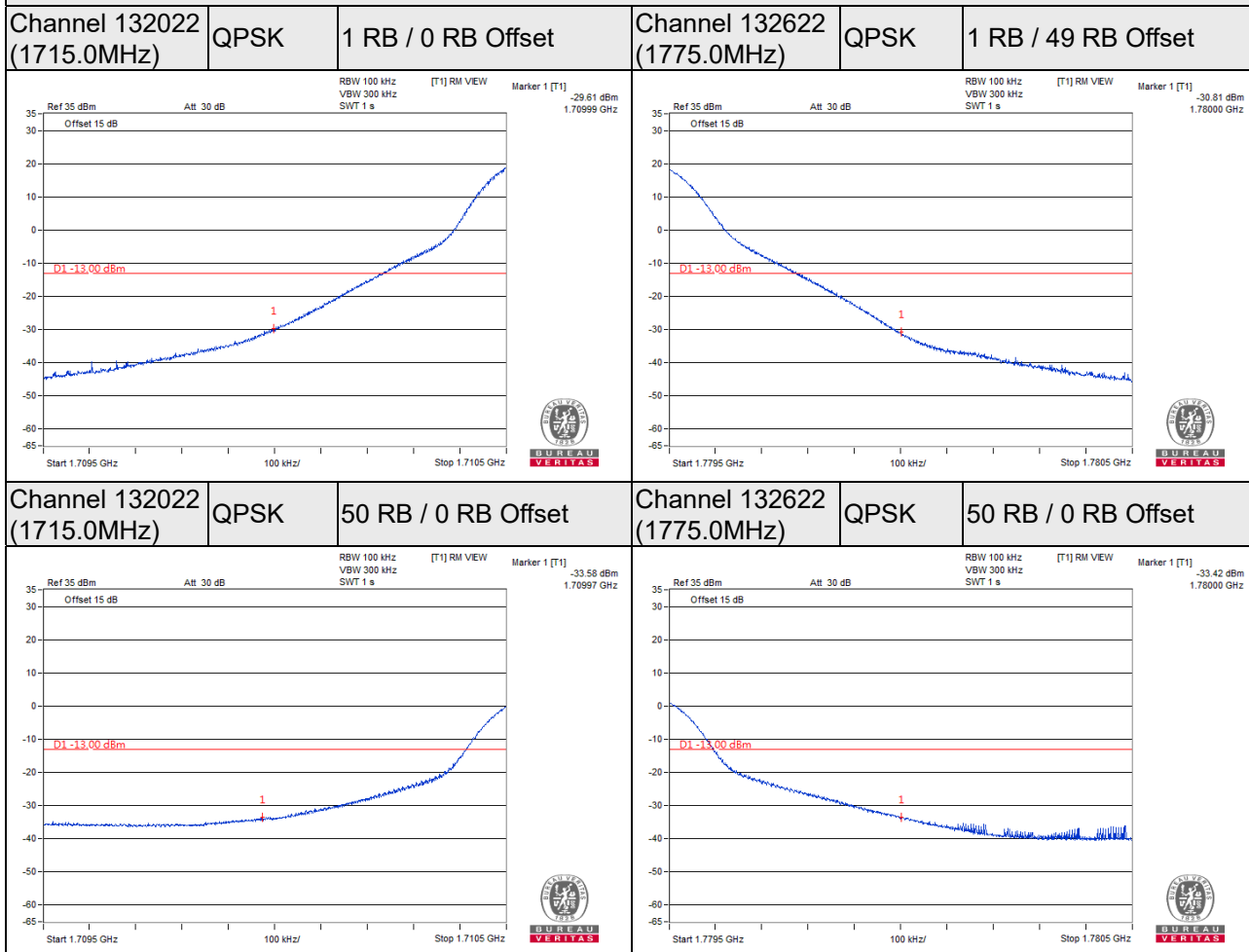
LTE Band 66, Channel Bandwidth 3MHz



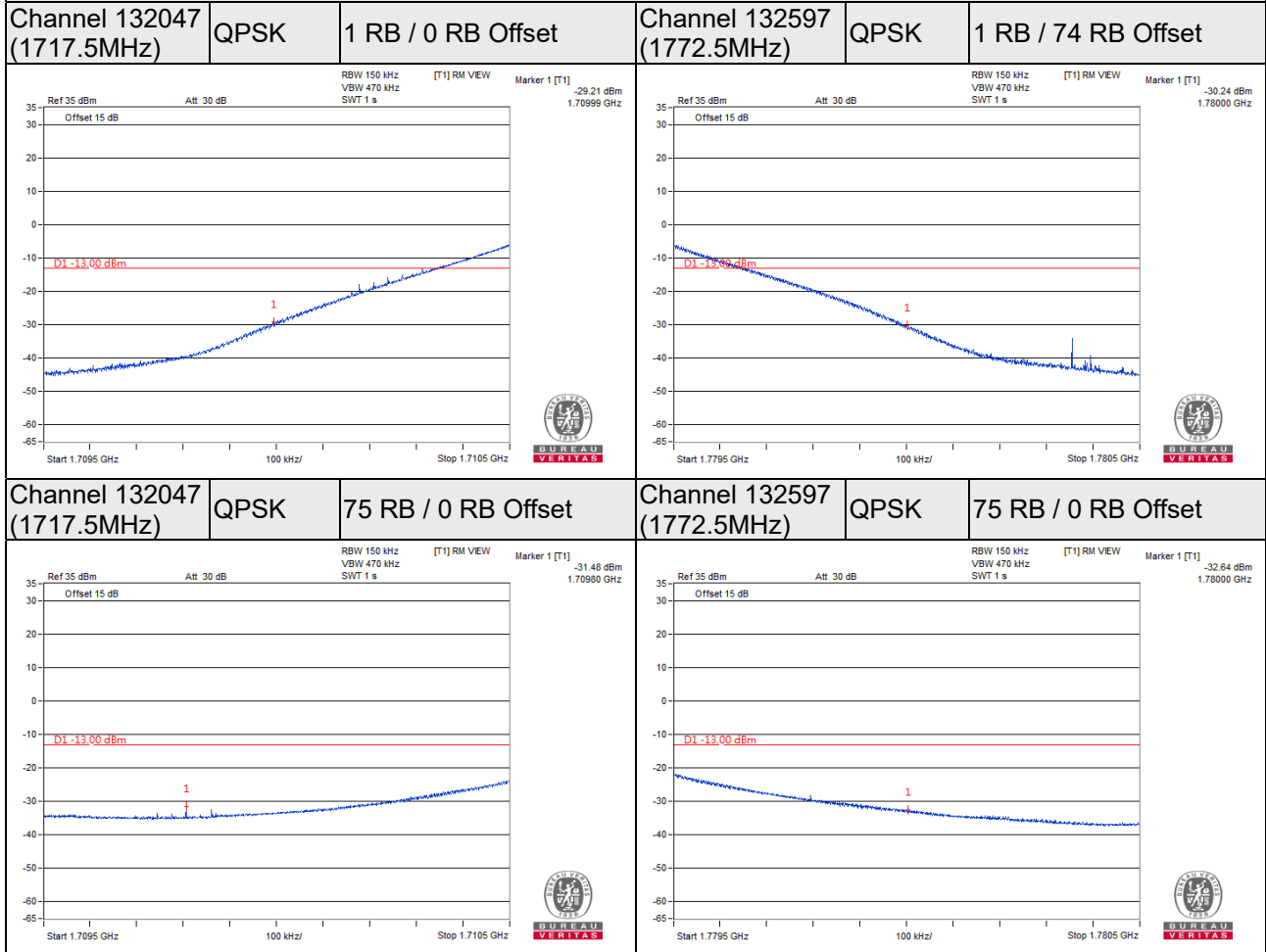
LTE Band 66, Channel Bandwidth 5MHz

Channel 131997 (1712.5MHz)	QPSK	1 RB / 0 RB Offset	Channel 132647 (1777.5MHz)	QPSK	1 RB / 24 RB Offset
					
Channel 131997 (1712.5MHz)	QPSK	25 RB / 0 RB Offset	Channel 132647 (1777.5MHz)	QPSK	25 RB / 0 RB Offset
					

LTE Band 66, Channel Bandwidth 10MHz

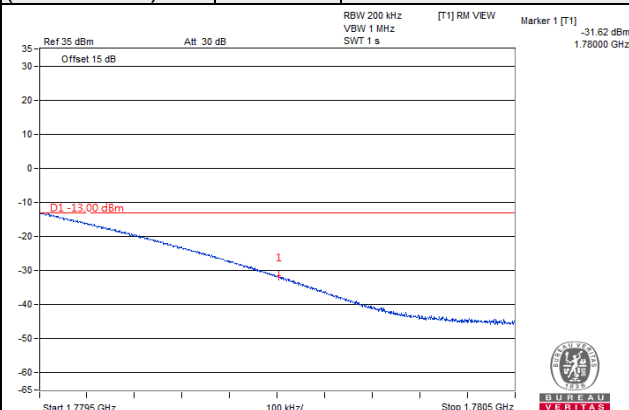
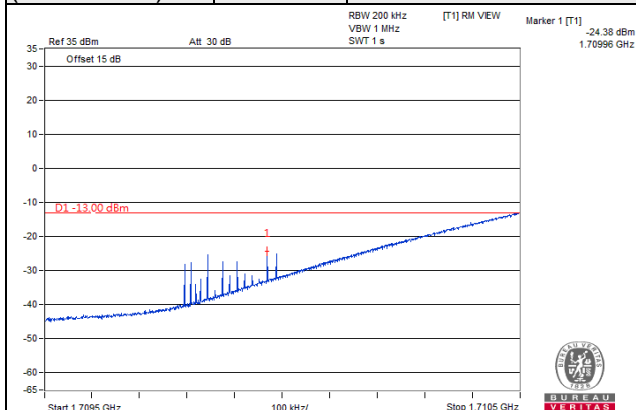


LTE Band 66, Channel Bandwidth 15MHz



LTE Band 66, Channel Bandwidth 20MHz

Channel 132072 (1720.0MHz)	QPSK	1 RB / 0 RB Offset	Channel 132572 (1770.0MHz)	QPSK	1 RB / 99 RB Offset
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Channel 132072 (1720.0MHz)	QPSK	100 RB / 0 RB Offset	Channel 132572 (1770.0MHz)	QPSK	100 RB / 0 RB Offset
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