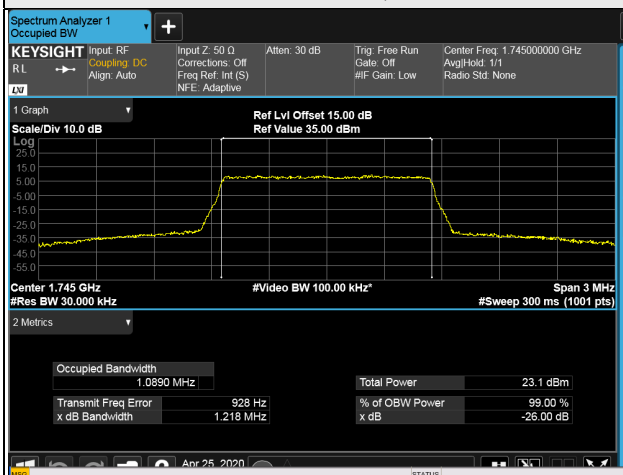
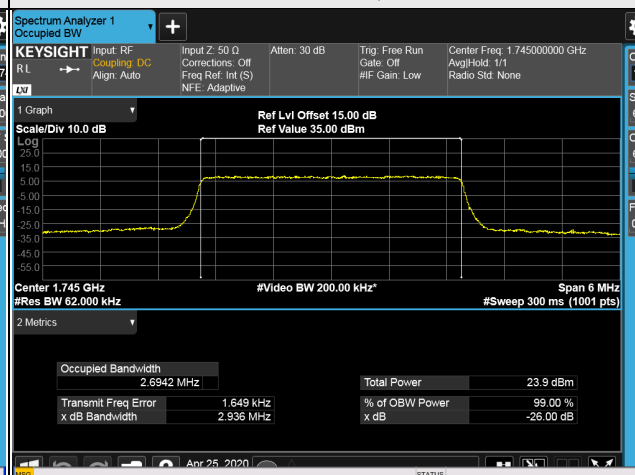


### Spectrum Plot of Worst Value

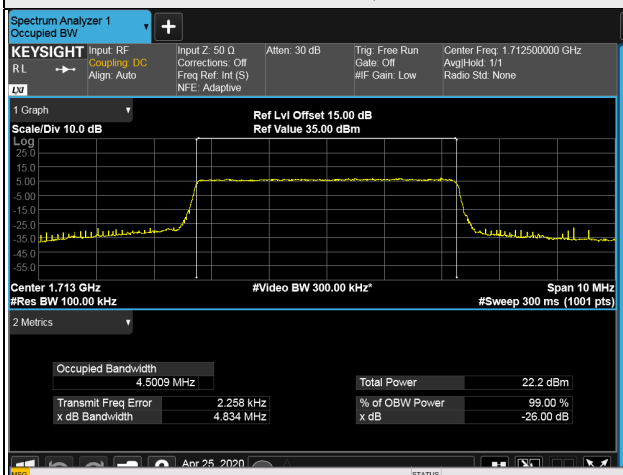
#### 1.4MHz / 64QAM



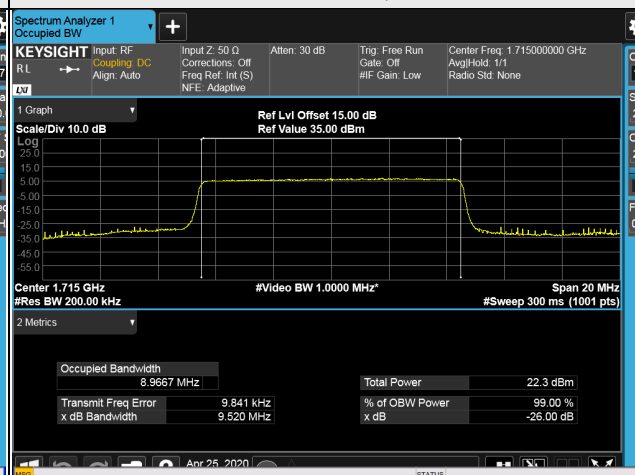
#### 3MHz / 16QAM



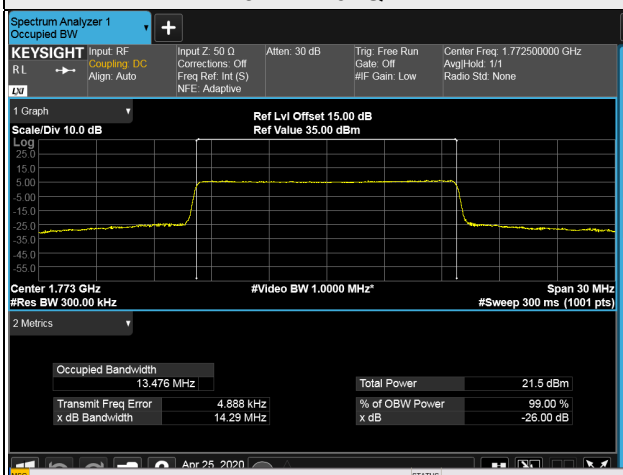
#### 5MHz / 64QAM



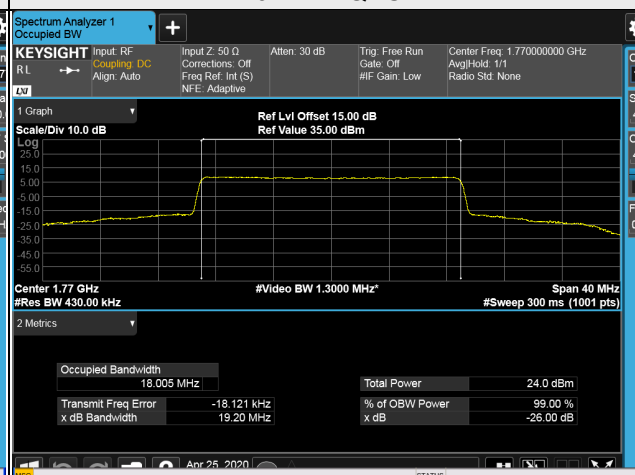
#### 10MHz / 64QAM



#### 15MHz / 64QAM



#### 20MHz / QPSK



## 4.5 Band Edge Measurement

### 4.5.1 Limits of Band Edge Measurement

For n2, LTE Band 5

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 13

According to FCC 27.53(c)(2) for on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB.

According to 27.53(c)(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than  $65 + 10 \log(P)$  dB in a 6.25 kHz band segment, for mobile and portable stations

For LTE Band 30

According to FCC 27.53(a) (4) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:

- (i) By a factor of not less than:  $43 + 10 \log(P)$  dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than  $55 + 10 \log(P)$  dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than  $61 + 10 \log(P)$  dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than  $67 + 10 \log(P)$  dB on all frequencies between 2328 and 2337 MHz;
- (ii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2300 and 2305 MHz,  $55 + 10 \log(P)$  dB on all frequencies between 2296 and 2300 MHz,  $61 + 10 \log(P)$  dB on all frequencies between 2292 and 2296 MHz,  $67 + 10 \log(P)$  dB on all frequencies between 2288 and 2292 MHz, and  $70 + 10 \log(P)$  dB below 2288 MHz;
- (iii) By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2360 and 2365 MHz, and not less than  $70 + 10 \log(P)$  dB above 2365 MHz.

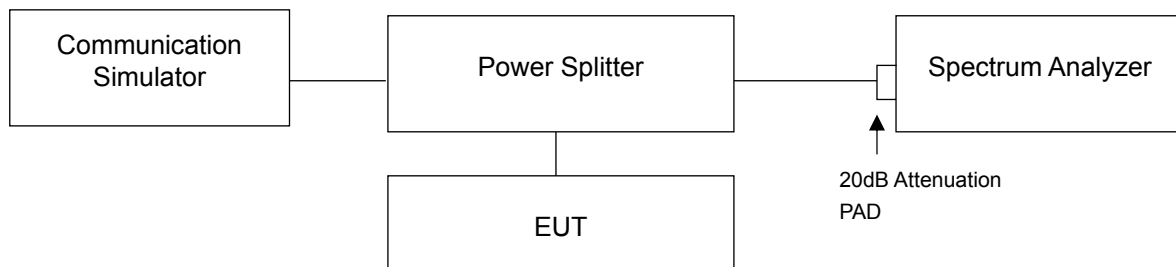
For LTE Band 48

Power of any emissions outside the Fundamental	Limit
Within 0-10MHz above the Assigned Channel	-13 dBm/MHz
Within 0-10MHz below the Assigned Channel	
Greater than 0-10MHz above the Assigned Channel	-25 dBm/MHz
Greater than 0-10MHz below the Assigned Channel	
Power of any emission below 3530MHz	-40 dBm/MHz
Power of any emission above 3720MHz	

For LTE Band 66

According to FCC 27.53(h) for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 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.

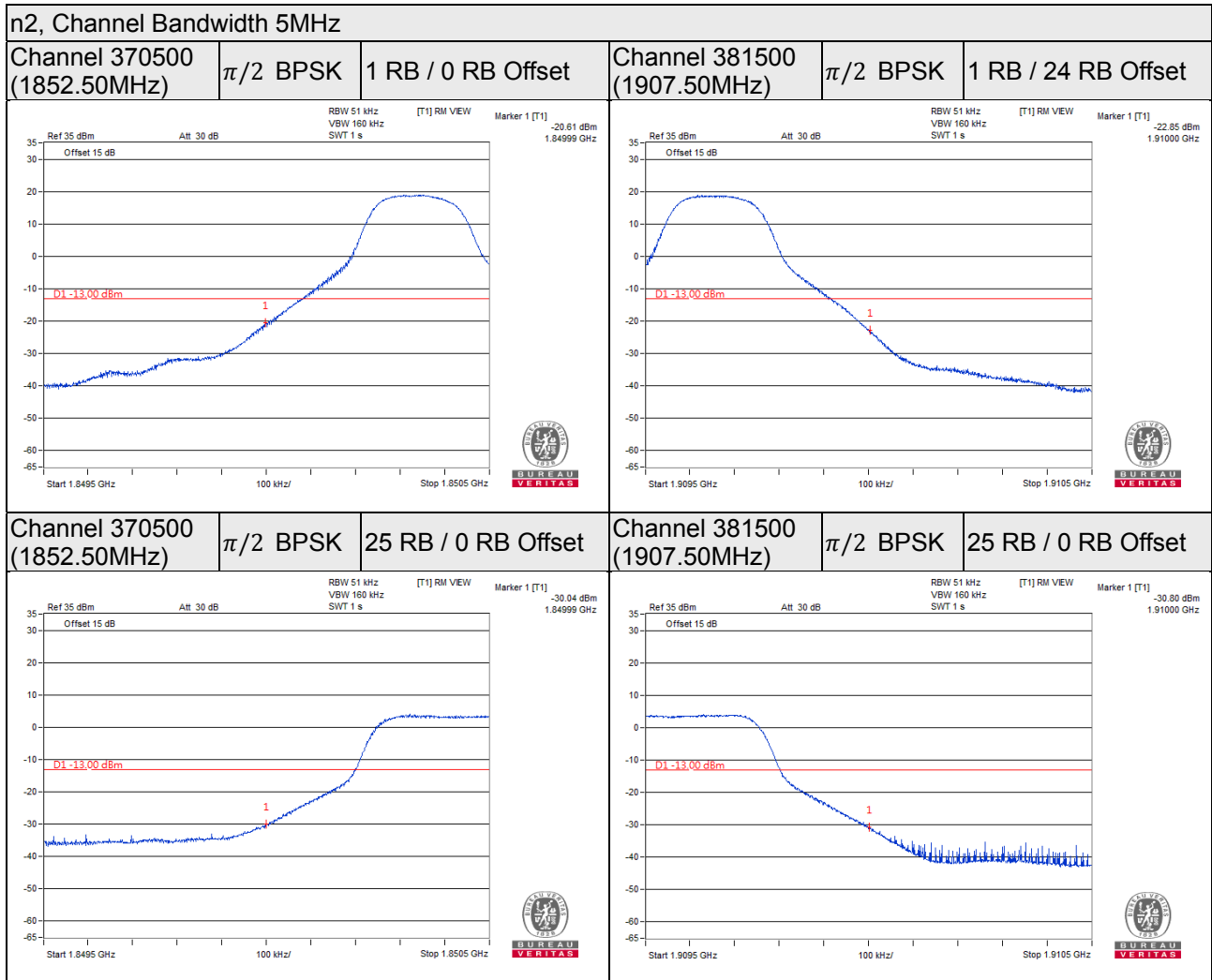
#### 4.5.2 Test Setup



#### 4.5.3 Test Procedures

- All measurements were done at low and high operational frequency range.
- 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 (LTE Channel Bandwidth 1.4MHz).
- 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 (LTE Channel Bandwidth 3MHz).
- 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 (LTE Channel Bandwidth 5MHz).
- 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 (LTE Channel Bandwidth 10MHz).
- 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 (LTE Channel Bandwidth 15MHz).
- 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 (LTE Channel Bandwidth 20MHz).
- Record the max trace plot into the test report.

### 4.5.4 Test Results



**n2, Channel Bandwidth 10MHz**

**Channel 371000  
(1855.00MHz)**

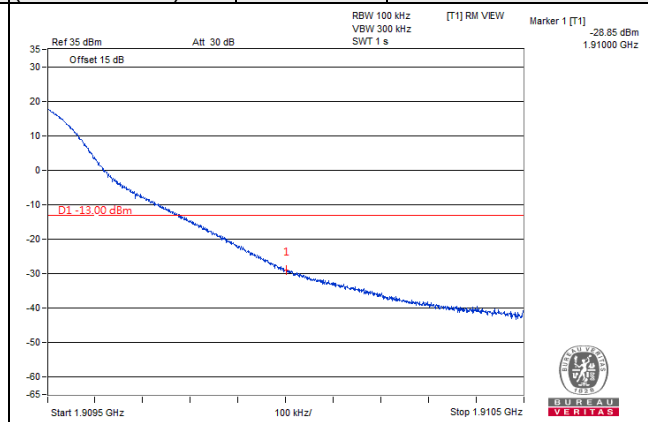
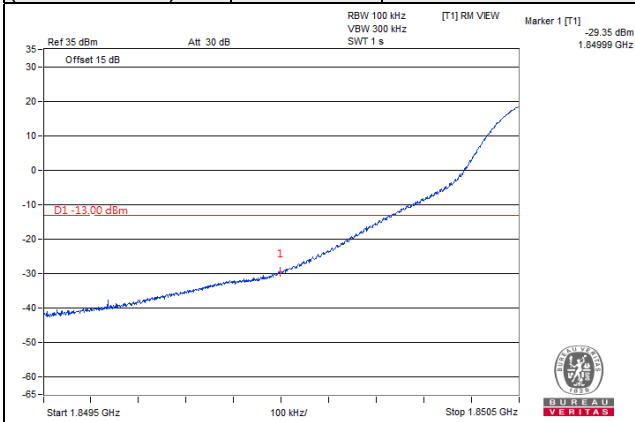
$\pi/2$  BPSK

1 RB / 0 RB Offset

**Channel 381000  
(1905.00MHz)**

$\pi/2$  BPSK

1 RB / 51 RB Offset



**Channel 371000  
(1855.00MHz)**

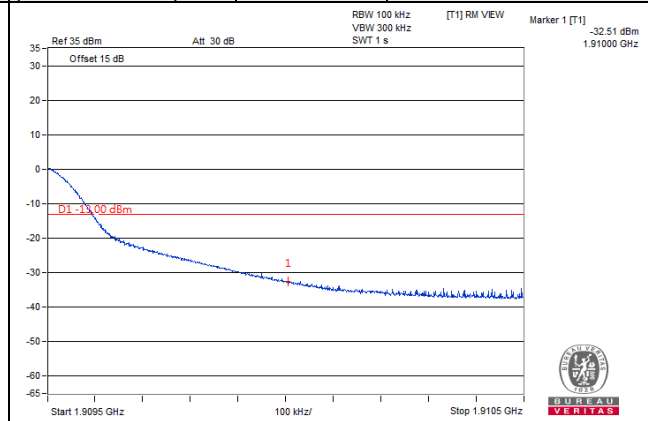
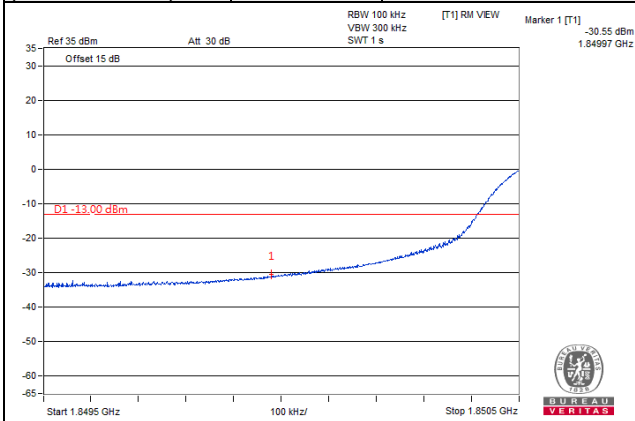
$\pi/2$  BPSK

52 RB / 0 RB Offset

**Channel 381000  
(1905.00MHz)**

$\pi/2$  BPSK

52 RB / 0 RB Offset



**n2, Channel Bandwidth 15MHz**

**Channel 371500  
(1857.50MHz)**

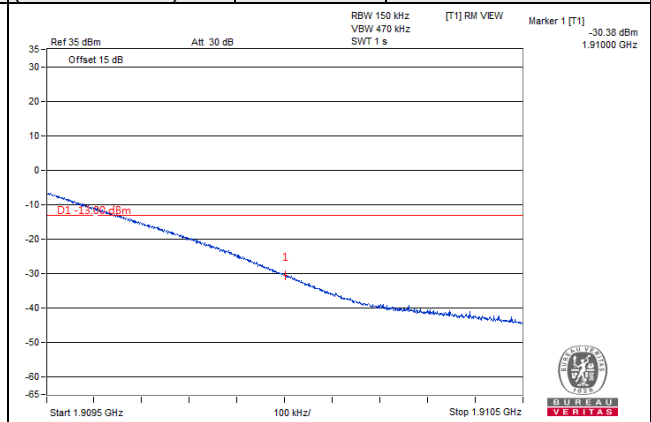
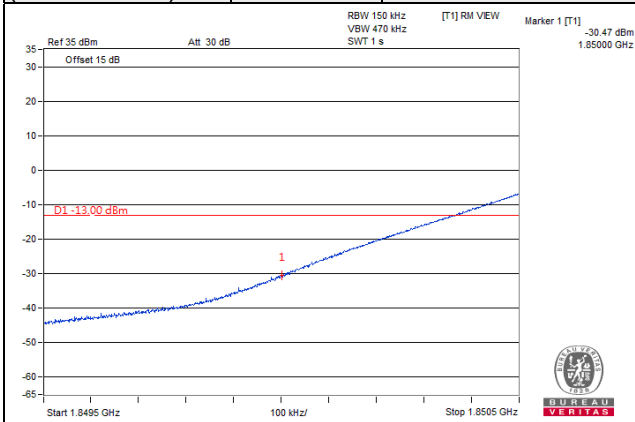
$\pi/2$  BPSK

1 RB / 0 RB Offset

**Channel 380500  
(1902.50MHz)**

$\pi/2$  BPSK

1 RB / 78 RB Offset



**Channel 371500  
(1857.50MHz)**

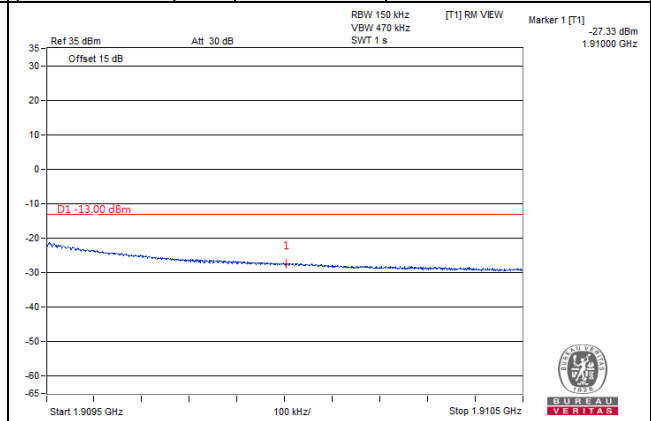
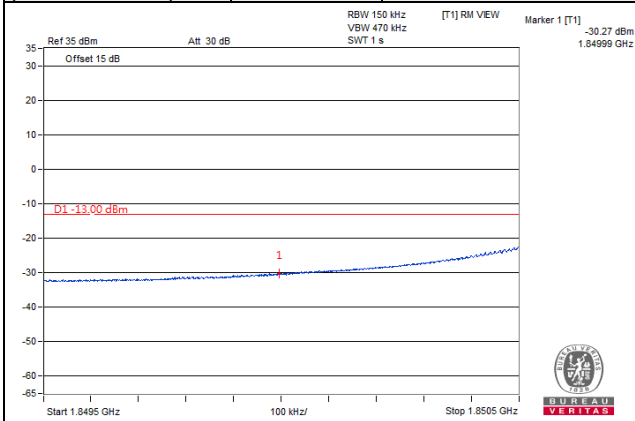
$\pi/2$  BPSK

79 RB / 0 RB Offset

**Channel 380500  
(1902.50MHz)**

$\pi/2$  BPSK

79 RB / 0 RB Offset



n2, Channel Bandwidth 20MHz

Channel 372000  
(1860.00MHz)

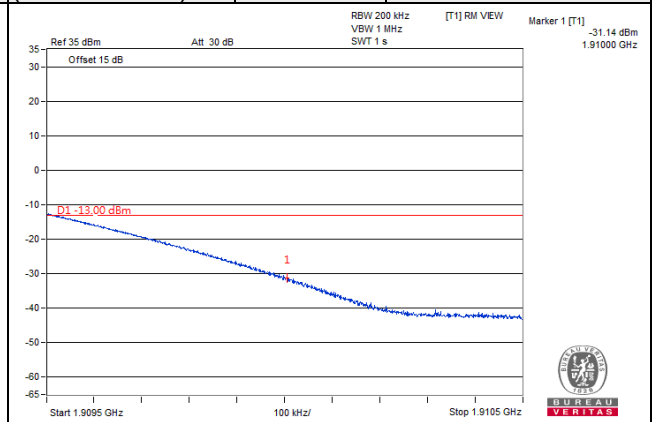
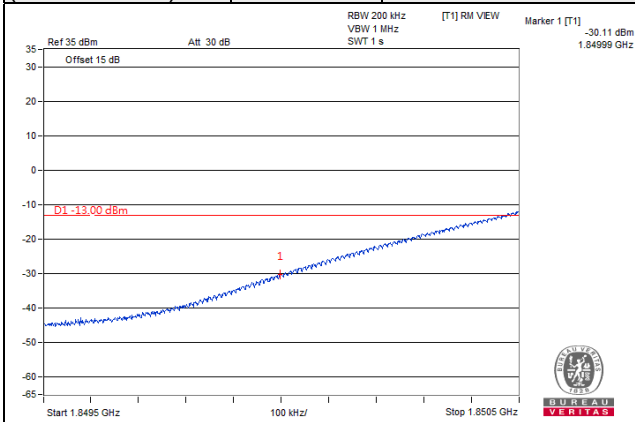
$\pi/2$  BPSK

1 RB / 0 RB Offset

Channel 380000  
(1900.00 MHz)

$\pi/2$  BPSK

1 RB / 105 RB Offset



Channel 372000  
(1860.00MHz)

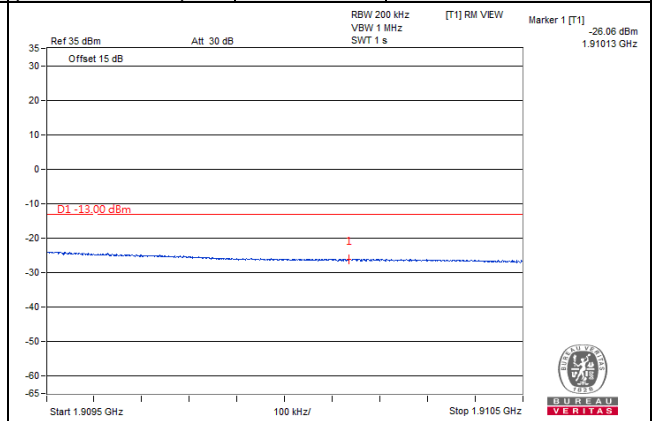
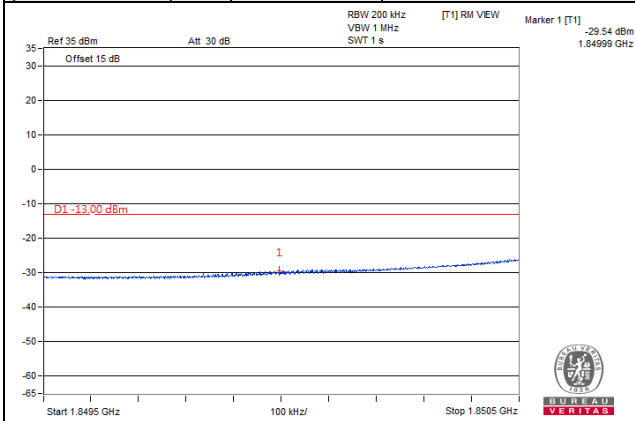
$\pi/2$  BPSK

106 RB / 0 RB Offset

Channel 380000  
(1900.00 MHz)

$\pi/2$  BPSK

106 RB / 0 RB Offset



LTE Band 5, Channel Bandwidth 1.4MHz

Channel 20407  
(824.7MHz)

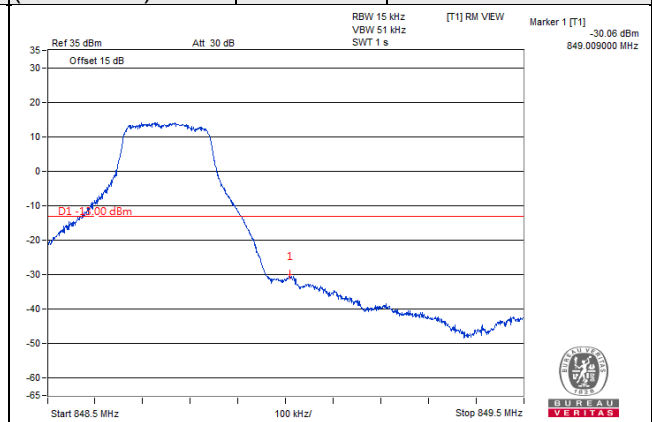
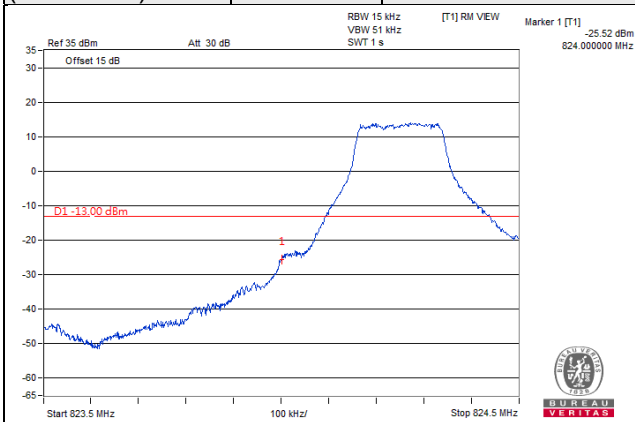
QPSK

1 RB / 0 RB Offset

Channel 20643  
(848.3MHz)

QPSK

1 RB / 5 RB Offset



Channel 20407  
(824.7MHz)

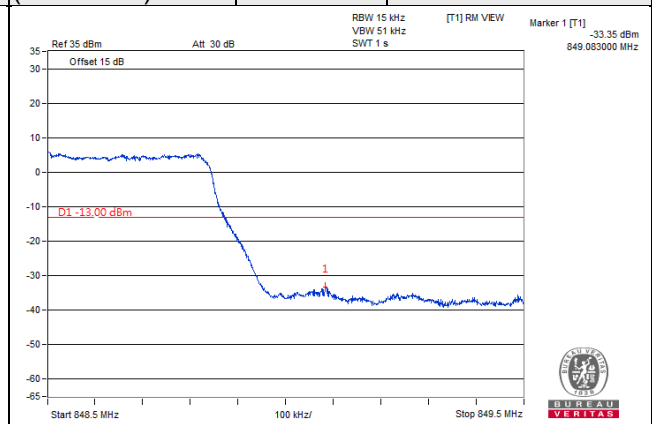
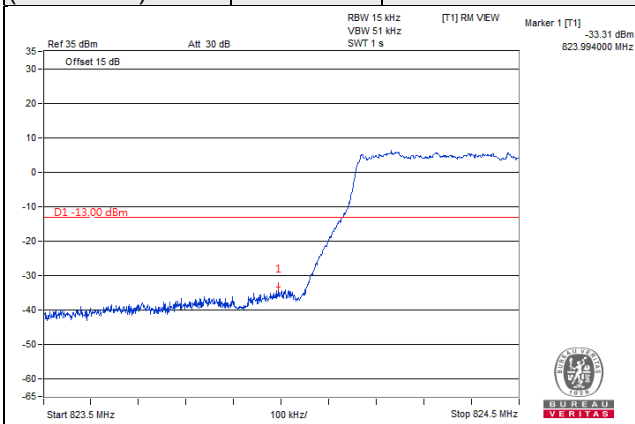
QPSK

6 RB / 0 RB Offset

Channel 20643  
(848.3MHz)

QPSK

6 RB / 0 RB Offset





LTE Band 5, Channel Bandwidth 3MHz

Channel 20415  
(825.5MHz)

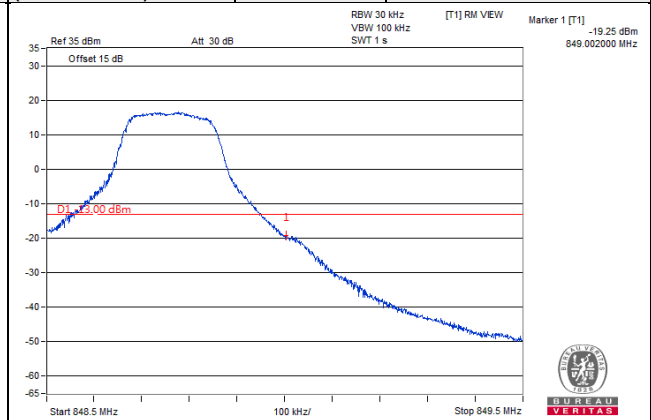
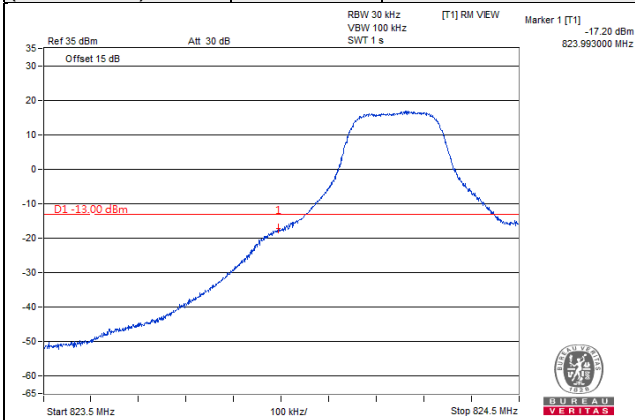
QPSK

1 RB / 0 RB Offset

Channel 20635  
(847.5MHz)

QPSK

1 RB / 14 RB Offset



Channel 20415  
(825.5MHz)

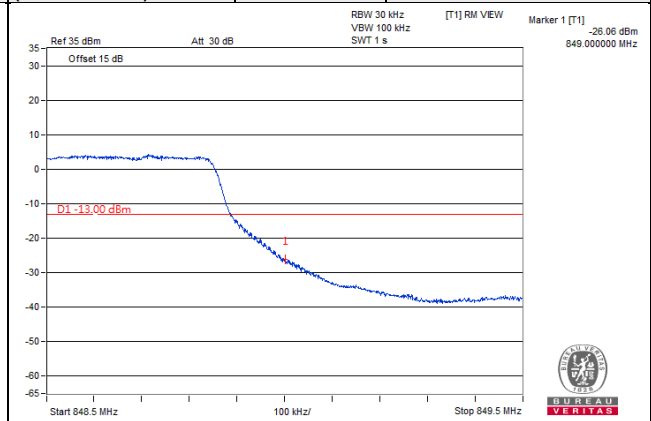
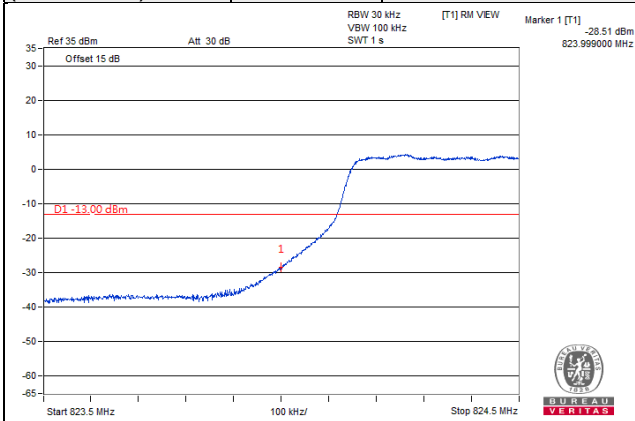
QPSK

15 RB / 0 RB Offset

Channel 20635  
(847.5MHz)

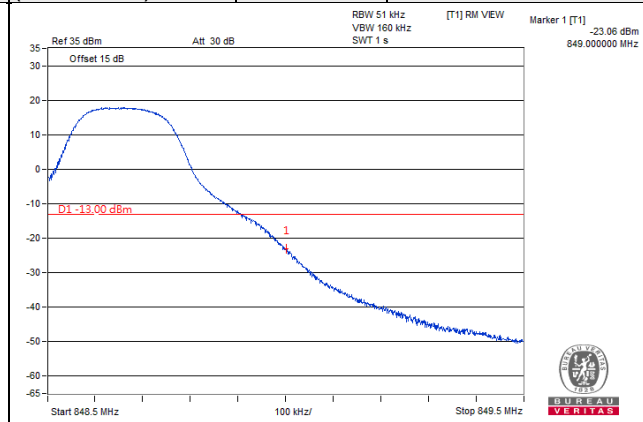
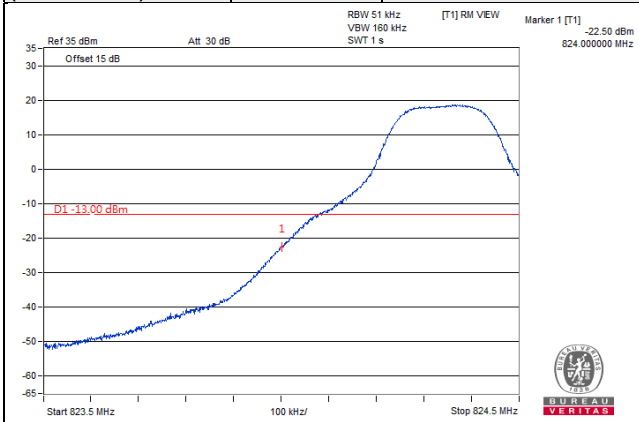
QPSK

15 RB / 0 RB Offset

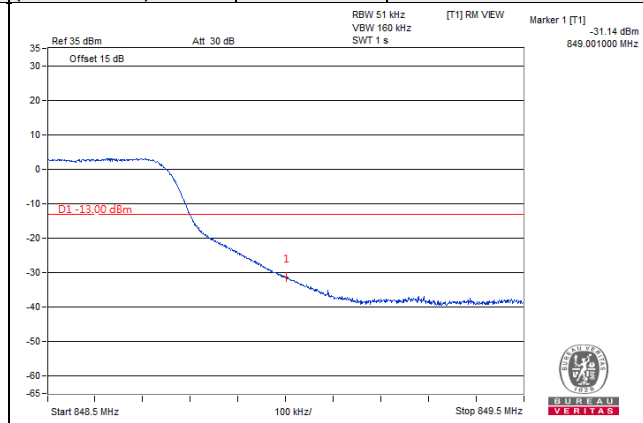
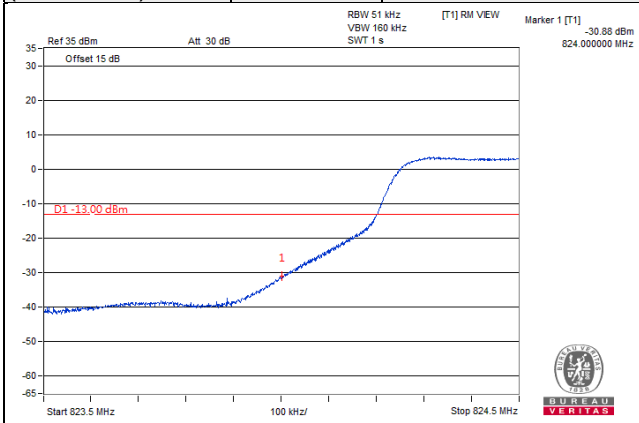


**LTE Band 5, Channel Bandwidth 5MHz**

<b>Channel 20425 (826.5MHz)</b>	<b>QPSK</b>	<b>1 RB / 0 RB Offset</b>	<b>Channel 20625 (846.5MHz)</b>	<b>QPSK</b>	<b>1 RB / 24 RB Offset</b>
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<b>Channel 20425 (826.5MHz)</b>	<b>QPSK</b>	<b>25 RB / 0 RB Offset</b>	<b>Channel 20625 (846.5MHz)</b>	<b>QPSK</b>	<b>25 RB / 0 RB Offset</b>
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LTE Band 5, Channel Bandwidth 10MHz

Channel 20450  
(829.0MHz)

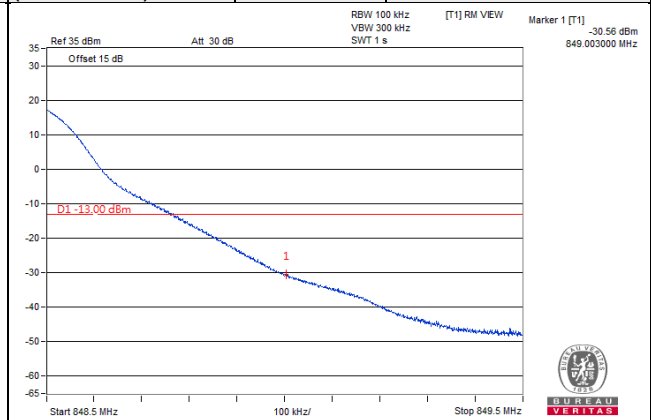
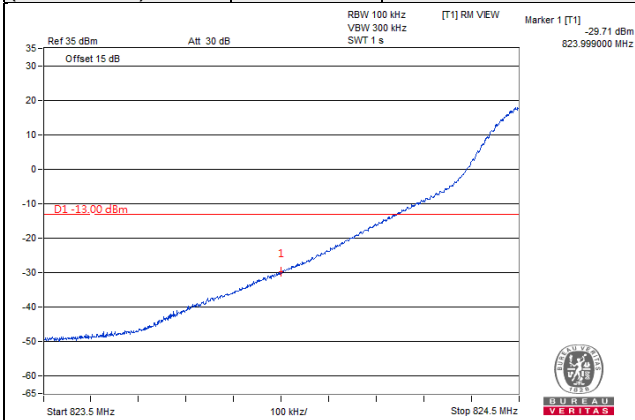
QPSK

1 RB / 0 RB Offset

Channel 20600  
(844.0MHz)

QPSK

1 RB / 49 RB Offset



Channel 20450  
(829.0MHz)

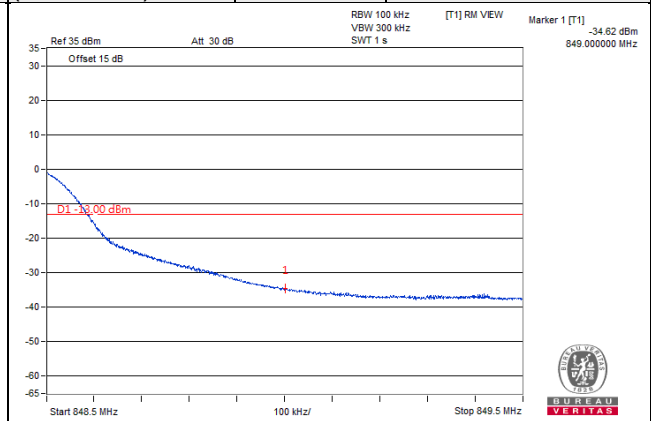
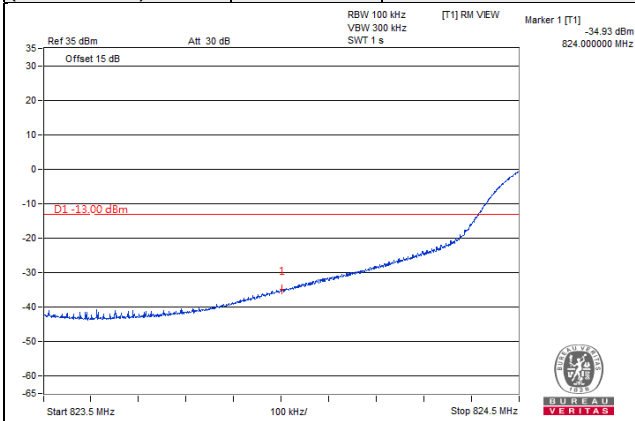
QPSK

50 RB / 0 RB Offset

Channel 20600  
(844.0MHz)

QPSK

50 RB / 0 RB Offset





BUREAU VERITAS

### LTE Band 12

Channel Bandwidth: 1.4MHz

Channel 23017  
(699.7MHz)

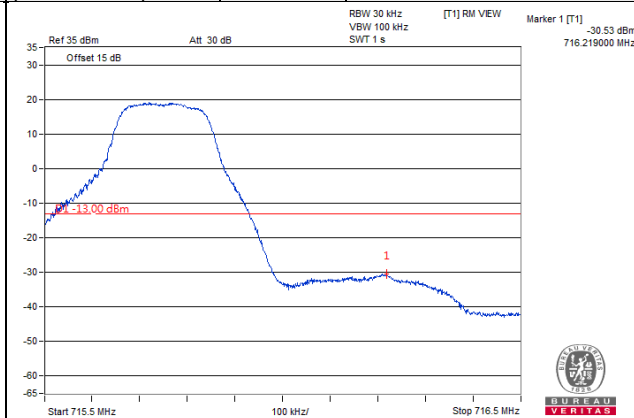
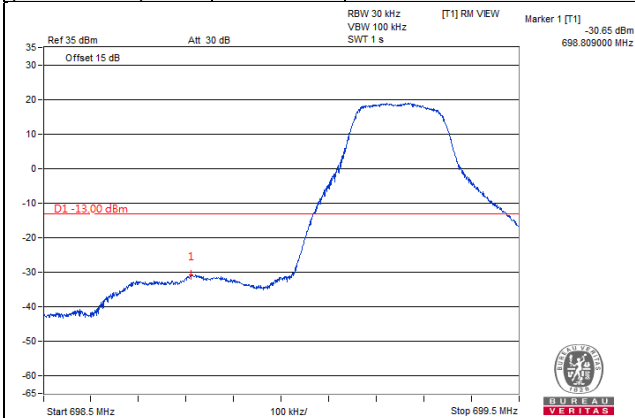
QPSK

1 RB / 0 RB Offset

Channel 23173  
(715.3MHz)

QPSK

1 RB / 5 RB Offset



Channel 23017  
(699.7MHz)

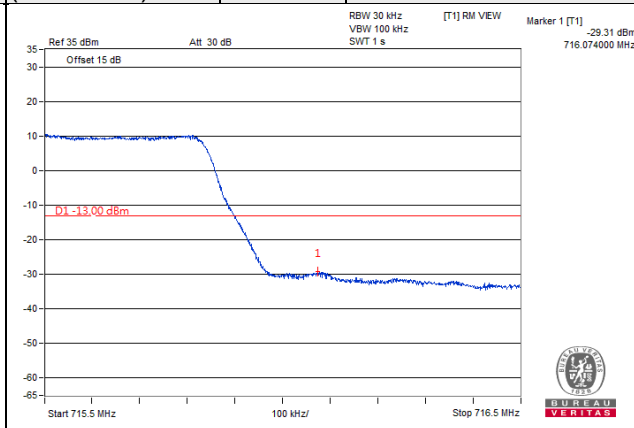
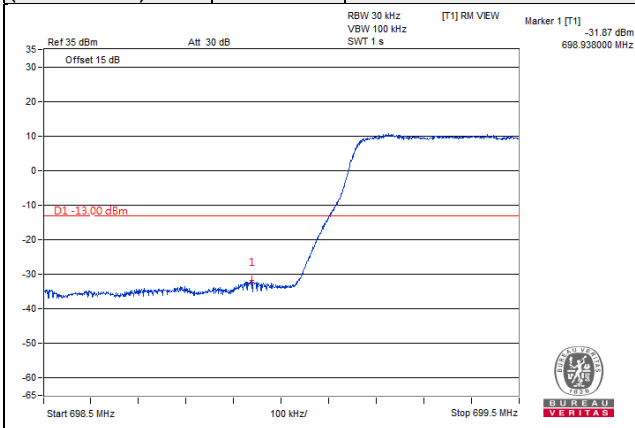
QPSK

6 RB / 0 RB Offset

Channel 23173  
(715.3MHz)

QPSK

6 RB / 0 RB Offset



Channel Bandwidth: 3MHz

Channel 23025  
(700.5MHz)

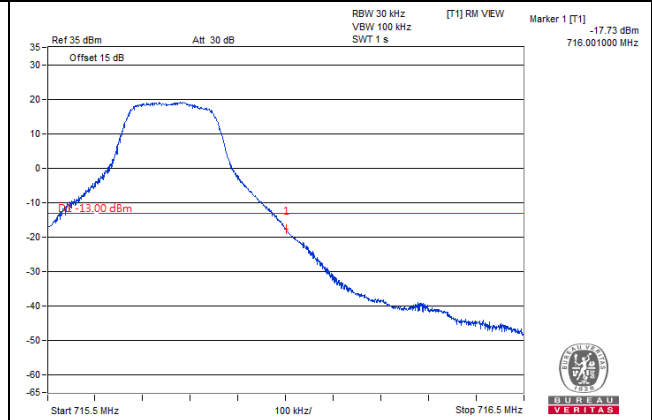
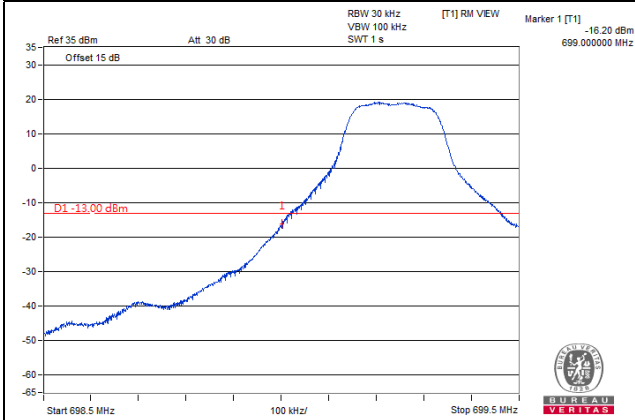
QPSK

1 RB / 0 RB Offset

Channel 23165  
(714.5MHz)

QPSK

1 RB / 14RB Offset



Channel 23025  
(700.5MHz)

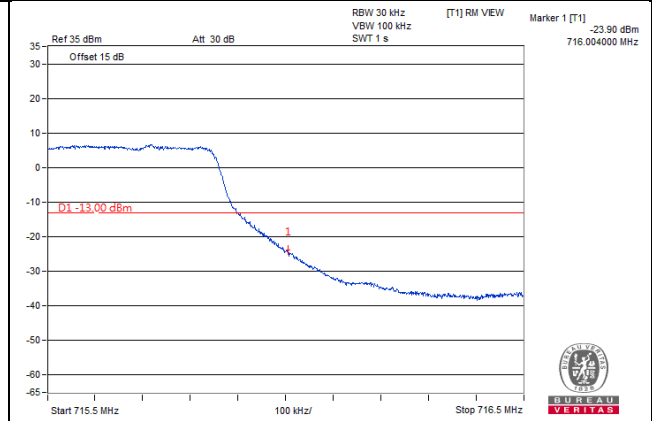
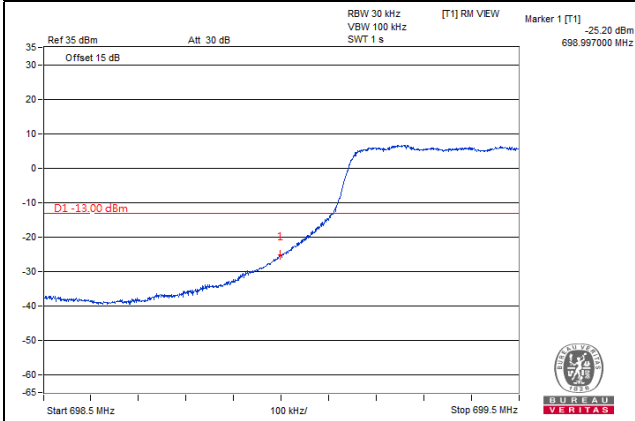
QPSK

15 RB / 0 RB Offset

Channel 23165  
(714.5MHz)

QPSK

15 RB / 0 RB Offset





BUREAU  
VERITAS

Channel Bandwidth: 5MHz

Channel 23035  
(701.5MHz)

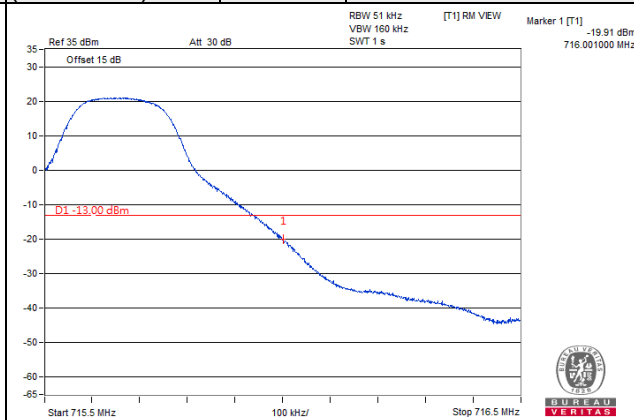
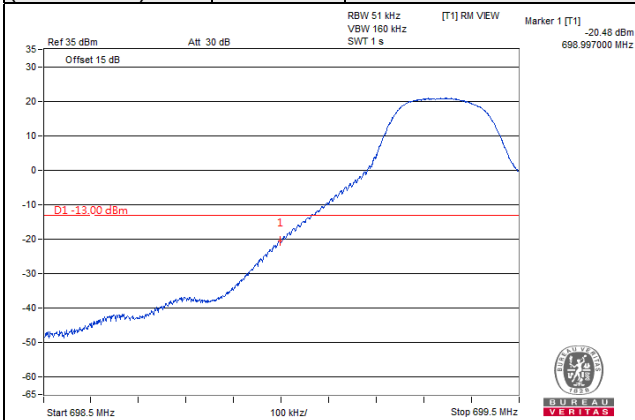
QPSK

1 RB / 0 RB Offset

Channel 23155  
(713.5MHz)

QPSK

1 RB / 24RB Offset



Channel 23035  
(701.5MHz)

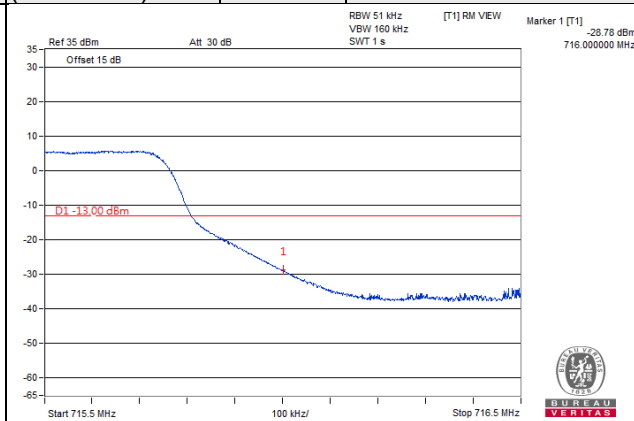
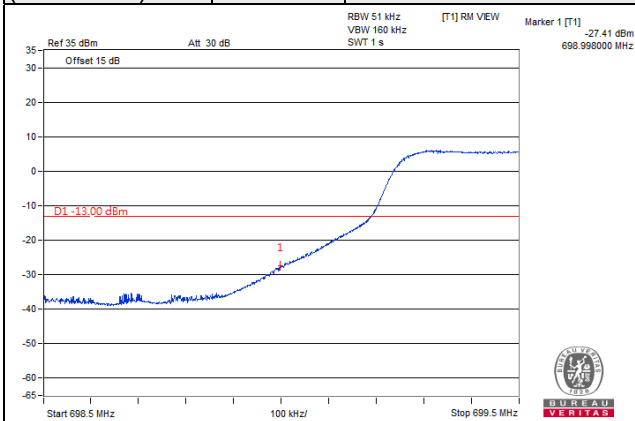
QPSK

25 RB / 0 RB Offset

Channel 23155  
(713.5MHz)

QPSK

25 RB / 0 RB Offset





BUREAU VERITAS

Channel Bandwidth: 10MHz

Channel 23060  
(704MHz)

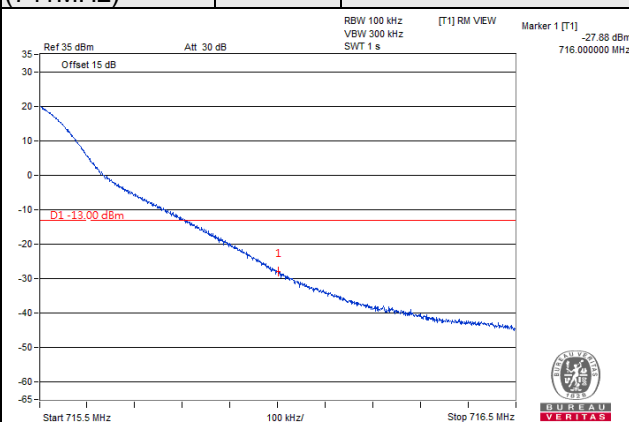
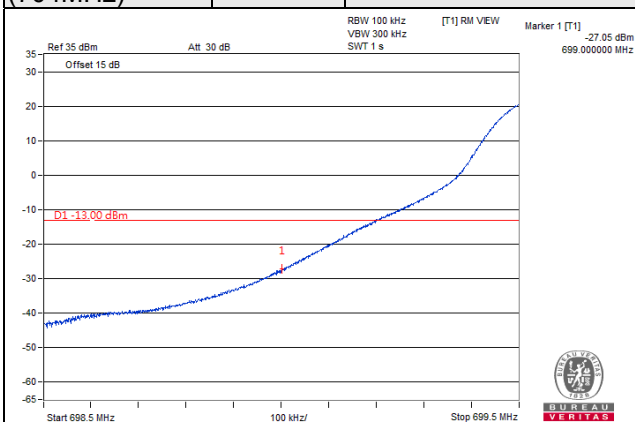
QPSK

1 RB / 0 RB Offset

Channel 23130  
(711MHz)

QPSK

1 RB / 24RB Offset



Channel 23060  
(704MHz)

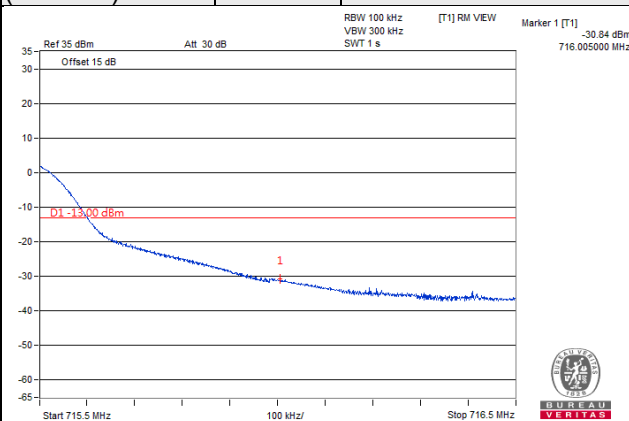
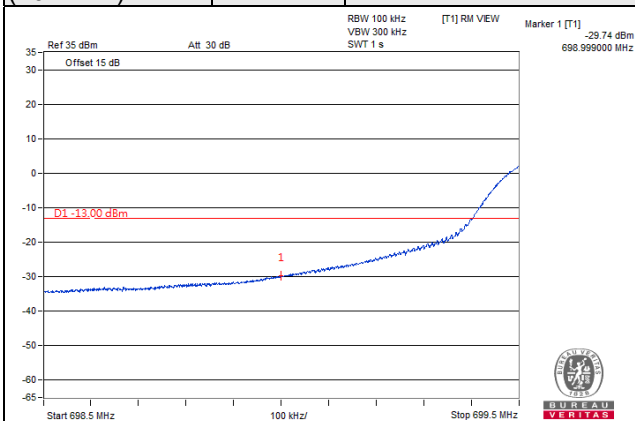
QPSK

50 RB / 0 RB Offset

Channel 23130  
(711MHz)

QPSK

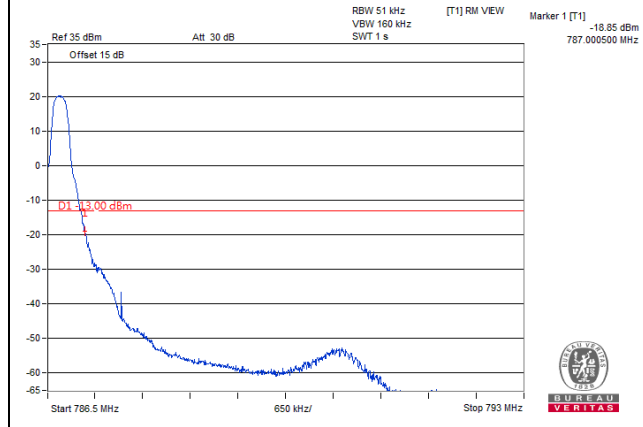
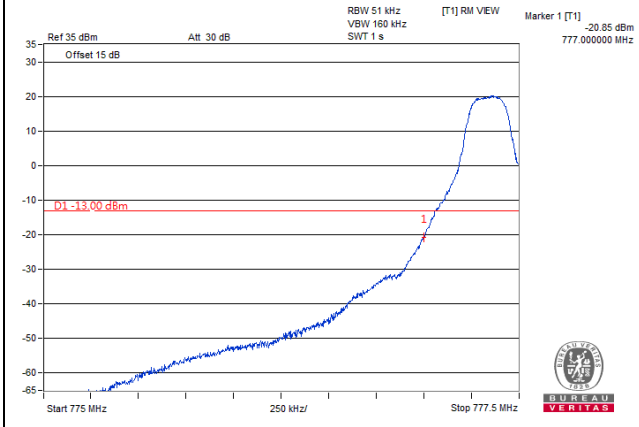
25 RB / 0 RB Offset



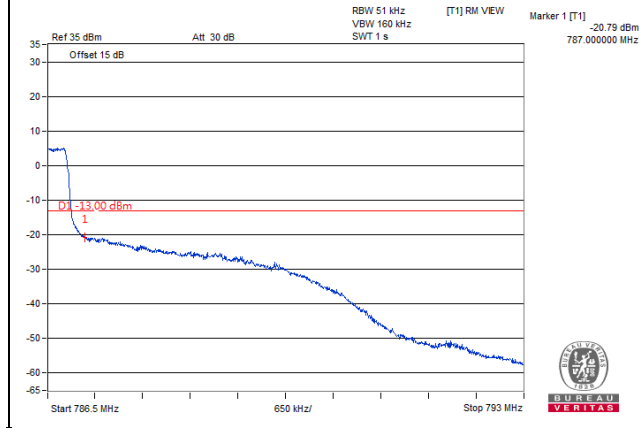
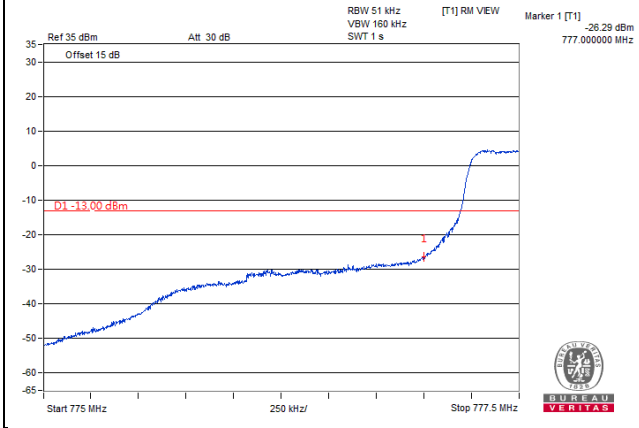
LTE Band 13

Channel Bandwidth: 5MHz

Channel 23205 (779.5MHz)	QPSK	1 RB / 0 RB Offset	Channel 23255 (784.5MHz)	QPSK	1 RB / 24 RB Offset
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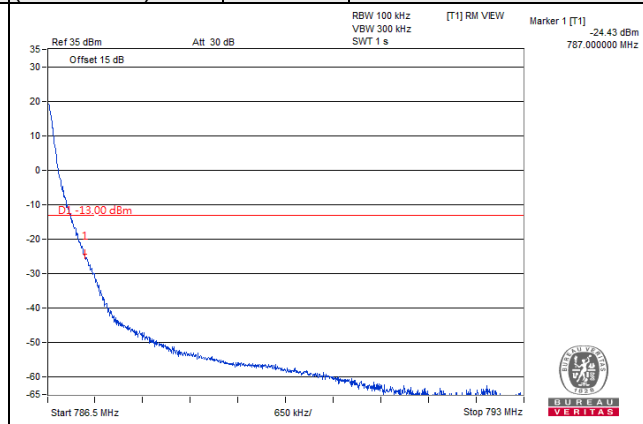
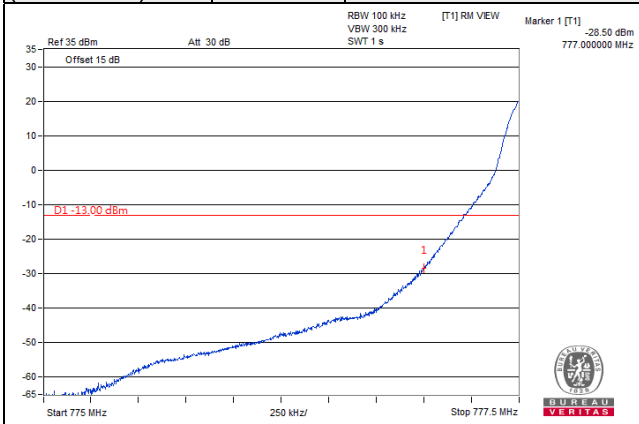
Channel 23205 (779.5MHz)	QPSK	25 RB / 0 RB Offset	Channel 23255 (784.5MHz)	QPSK	25 RB / 0 RB Offset
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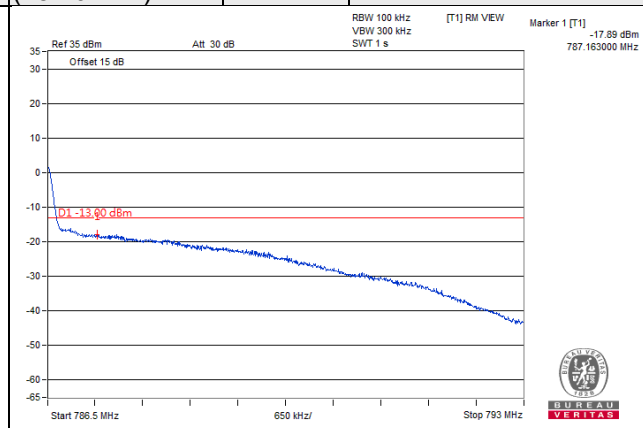
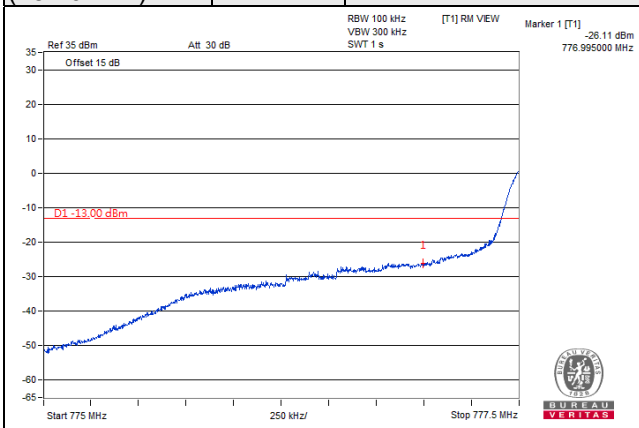


Channel Bandwidth: 10MHz

Channel 23230 (782.0MHz)	QPSK	1 RB / 0 RB Offset	Channel 23230 (782.0MHz)	QPSK	1 RB / 49 RB Offset
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Channel 23230 (782.0MHz)	QPSK	50 RB / 0 RB Offset	Channel 23230 (782.0MHz)	QPSK	50 RB / 0 RB Offset
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LTE Band 30  
Emission Mask:

Channel Bandwidth: 5MHz

Channel 27685 (2307.5MHz) QPSK 1 RB / 0 RB Offset Channel 27685 (2307.5MHz) QPSK 25 RB / 0 RB Offset



Channel 27735 (2312.5MHz) QPSK 1 RB / 24 RB Offset Channel 27735 (2312.5MHz) QPSK 25 RB / 0 RB Offset



Channel Bandwidth: 10MHz

Channel 27710  
(2310.0MHz)

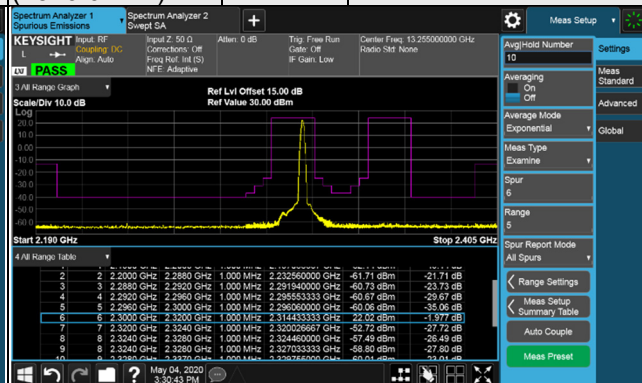
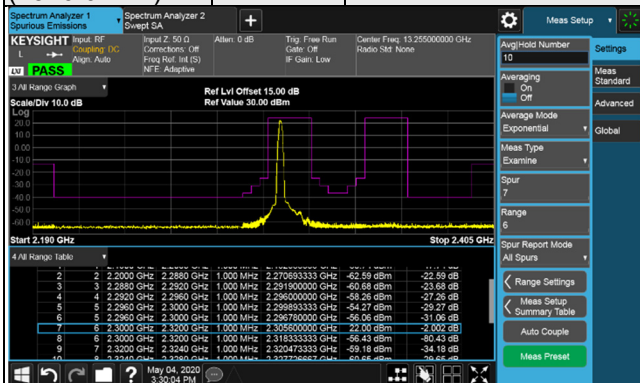
QPSK

1 RB / 0 RB Offset

Channel 27710  
(2310.0MHz)

QPSK

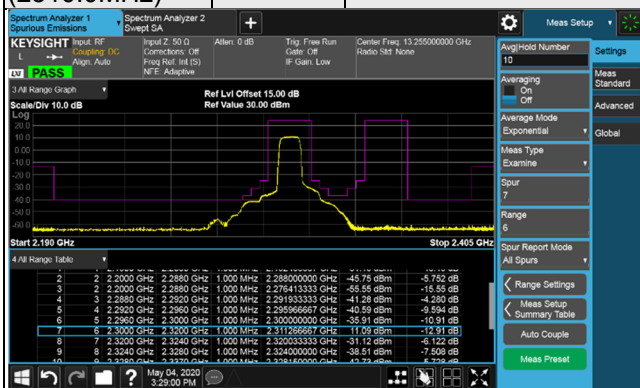
1 RB / 49 RB Offset



Channel 27710  
(2310.0MHz)

QPSK

50 RB / 0 RB Offset



LTE Band 66

Channel Bandwidth: 1.4MHz

Channel 131979  
(1710.7MHz)

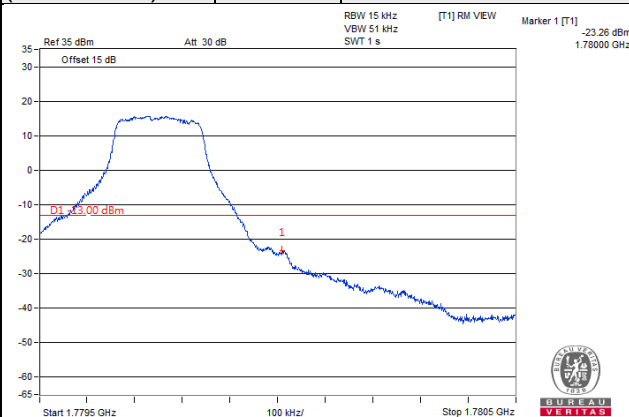
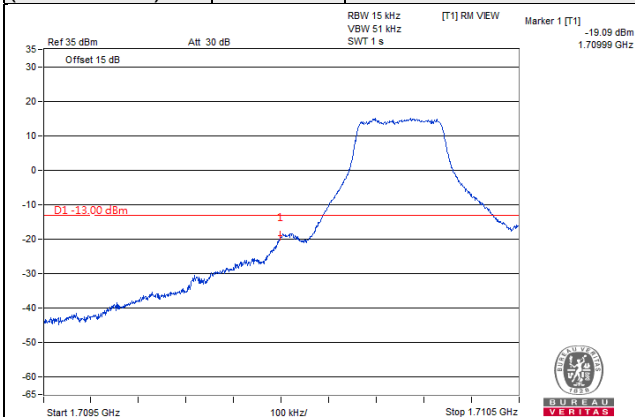
QPSK

1 RB / 0 RB Offset

Channel 132665  
(1779.3MHz)

QPSK

1 RB / 5 RB Offset



Channel 131979  
(1710.7MHz)

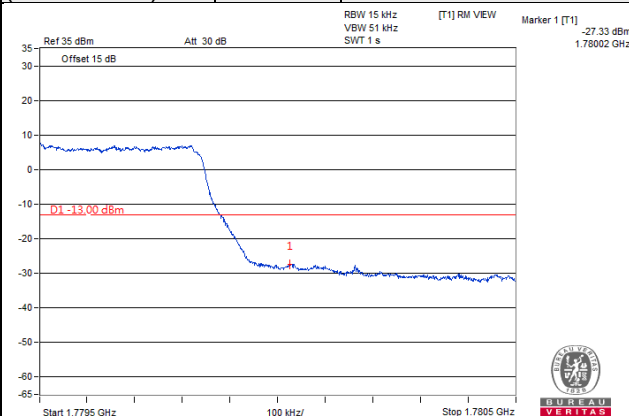
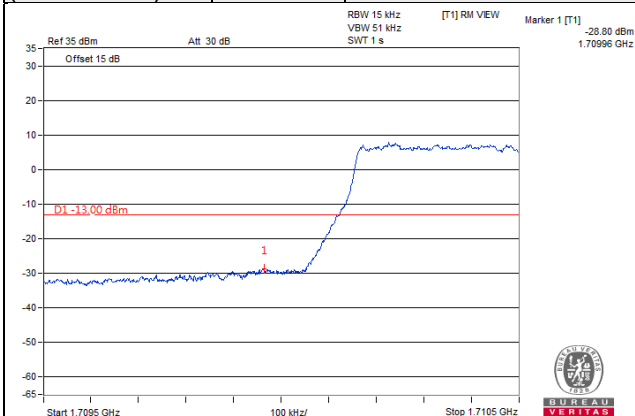
QPSK

6 RB / 0 RB Offset

Channel 132665  
(1779.3MHz)

QPSK

6 RB / 0 RB Offset



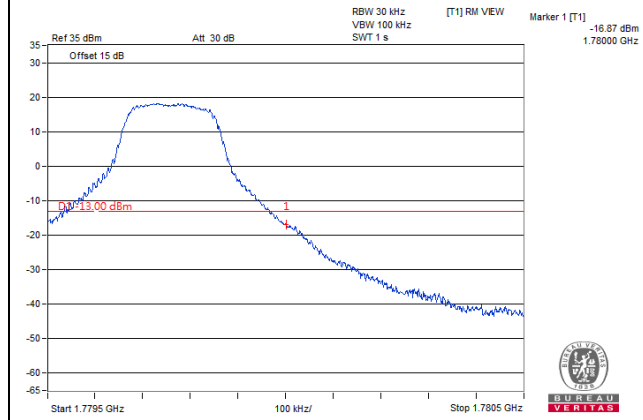
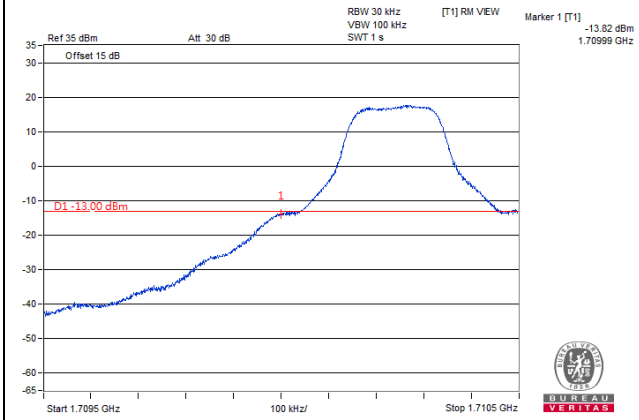
**Channel Bandwidth: 3MHz**

**Channel 131987  
(1711.5MHz)**

**QPSK      1 RB / 0 RB Offset**

**Channel 132657  
(1778.5MHz)**

**QPSK      1 RB / 14 RB Offset**

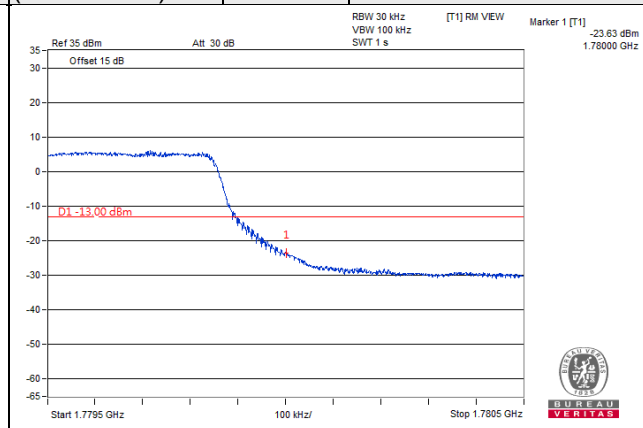
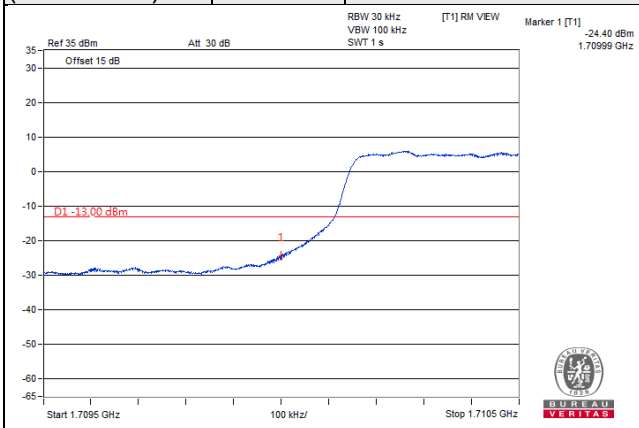


**Channel 131987  
(1711.5MHz)**

**QPSK      15 RB / 0 RB Offset**

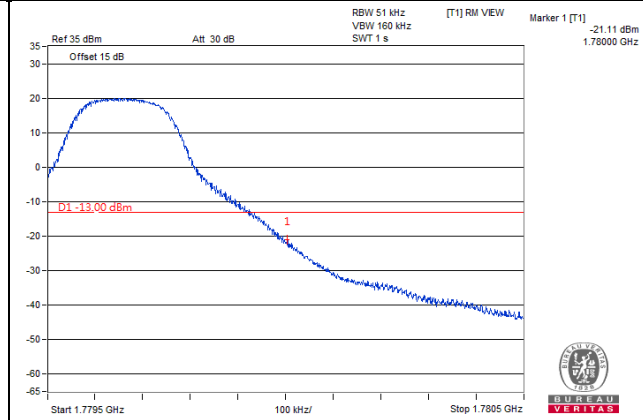
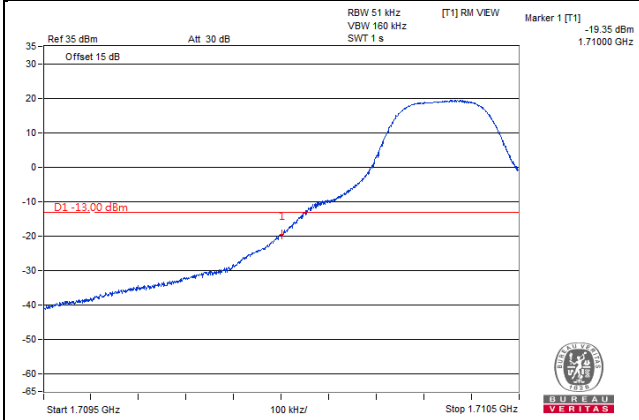
**Channel 132657  
(1778.5MHz)**

**QPSK      15 RB / 0 RB Offset**

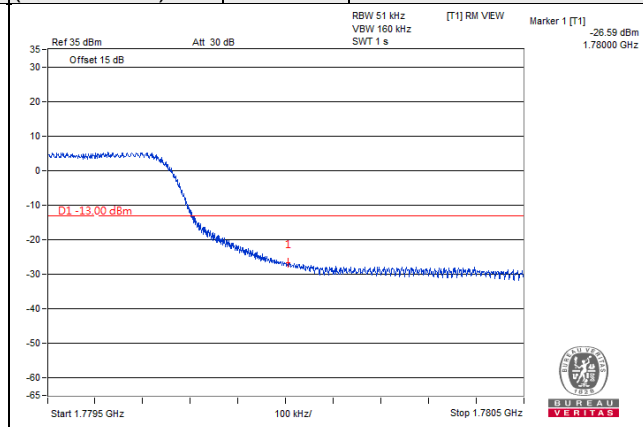
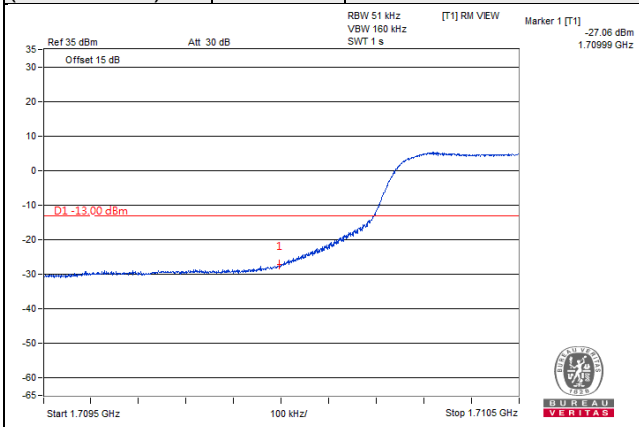


Channel Bandwidth: 5MHz

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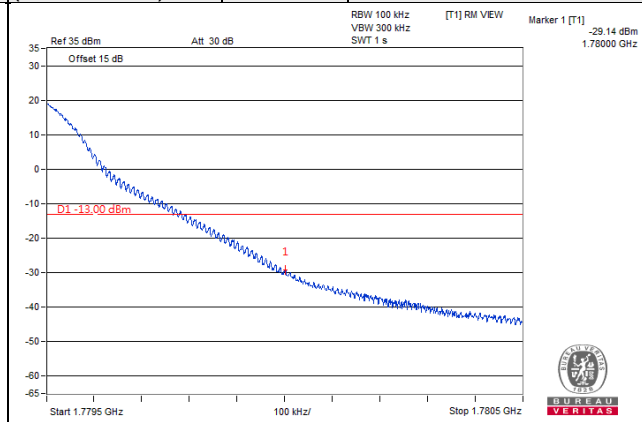
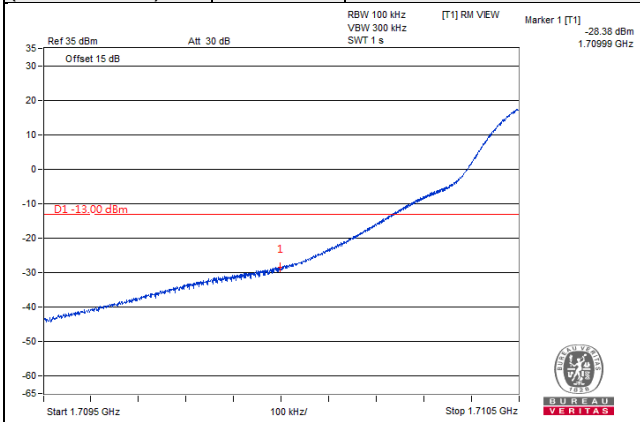


Channel 131997 (1712.5MHz)	QPSK	25 RB / 0 RB Offset	Channel 132647 (1777.5MHz)	QPSK	25 RB / 0 RB Offset
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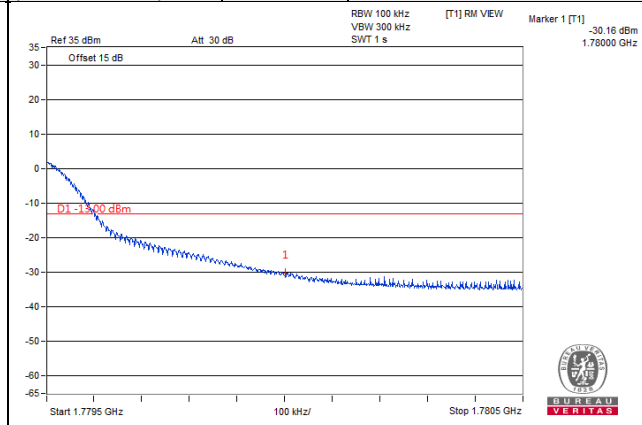
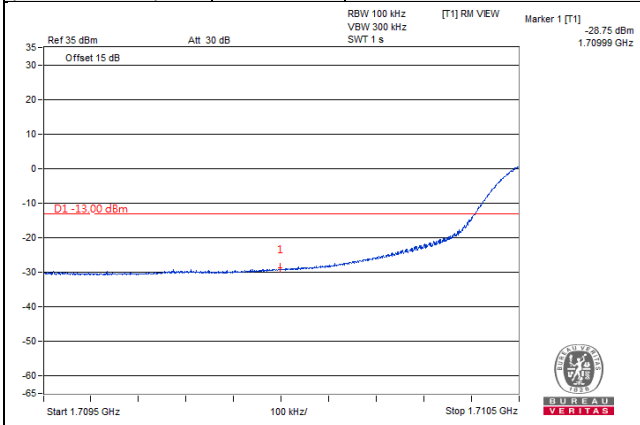


Channel Bandwidth: 10MHz

Channel 132022 (1715.0MHz)	QPSK	1 RB / 0 RB Offset	Channel 132622 (1775.0MHz)	QPSK	1 RB / 49 RB Offset
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Channel 132022 (1715.0MHz)	QPSK	50 RB / 0 RB Offset	Channel 132622 (1775.0MHz)	QPSK	50 RB / 0 RB Offset
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BUREAU  
VERITAS

Channel Bandwidth: 15MHz

Channel 132047  
(1717.5MHz)

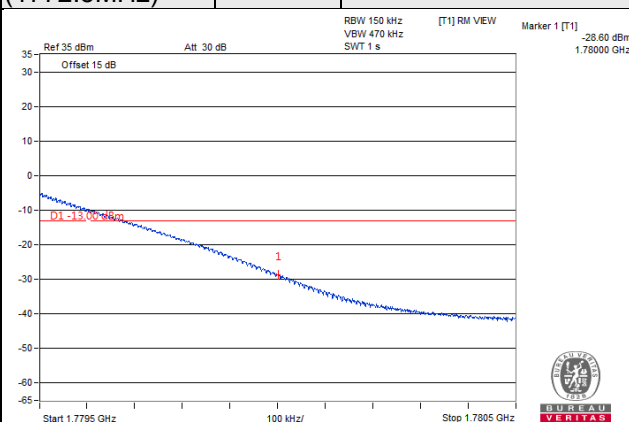
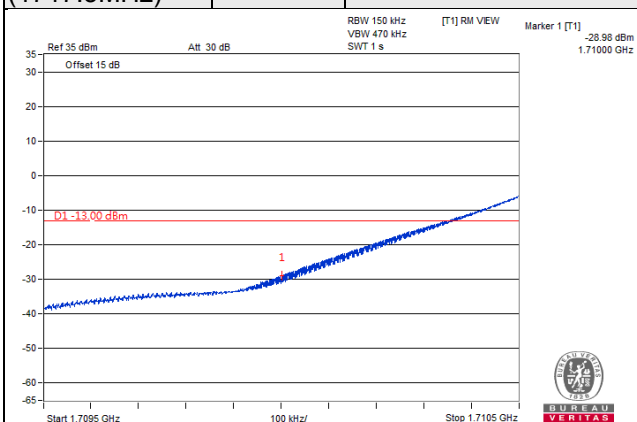
QPSK

1 RB / 0 RB Offset

Channel 132597  
(1772.5MHz)

QPSK

1 RB / 74 RB Offset



Channel 132047  
(1717.5MHz)

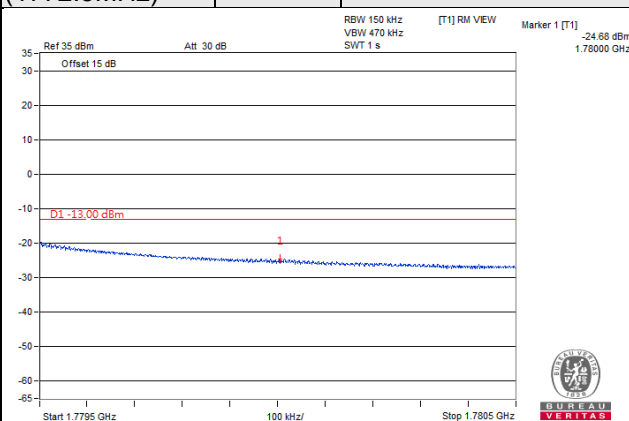
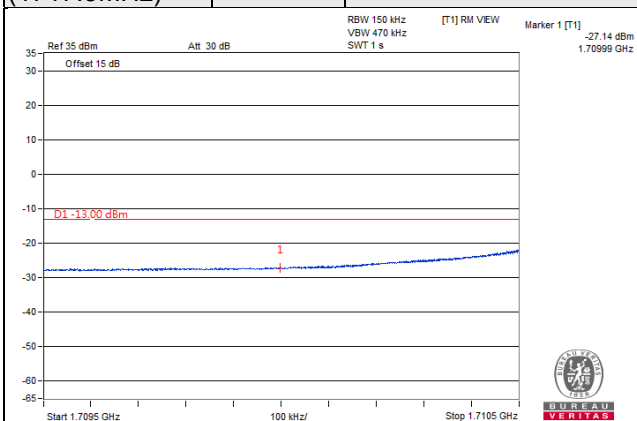
QPSK

75 RB / 0 RB Offset

Channel 132597  
(1772.5MHz)

QPSK

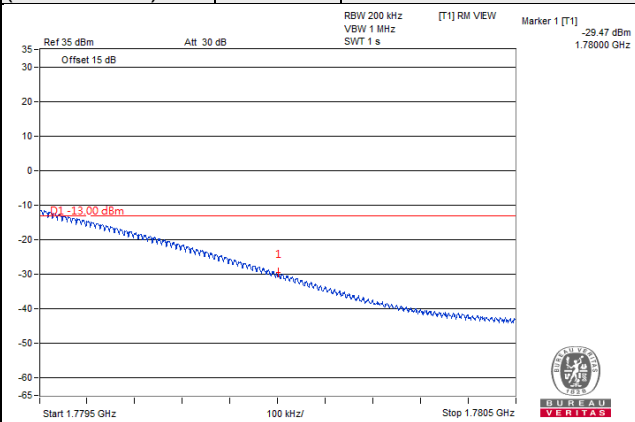
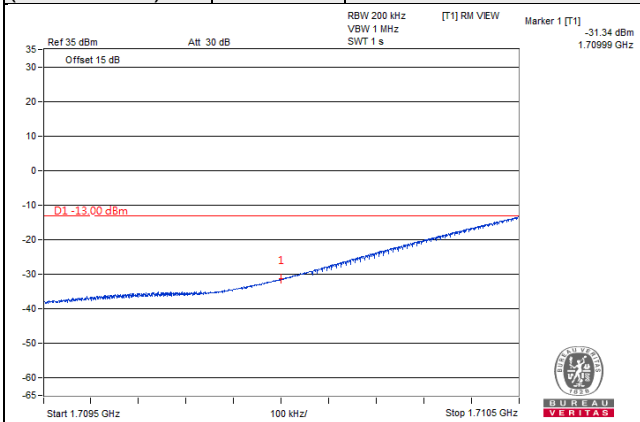
75 RB / 0 RB Offset



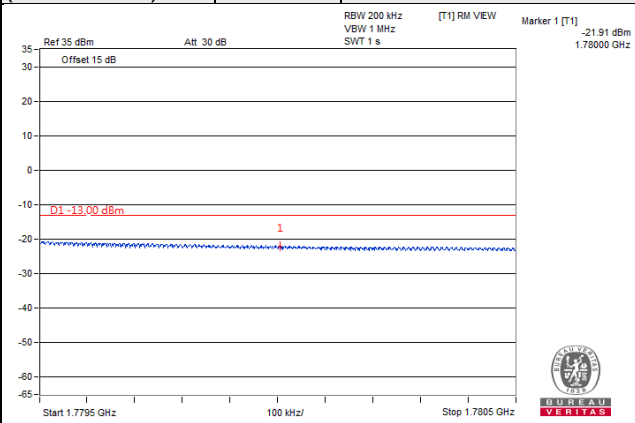
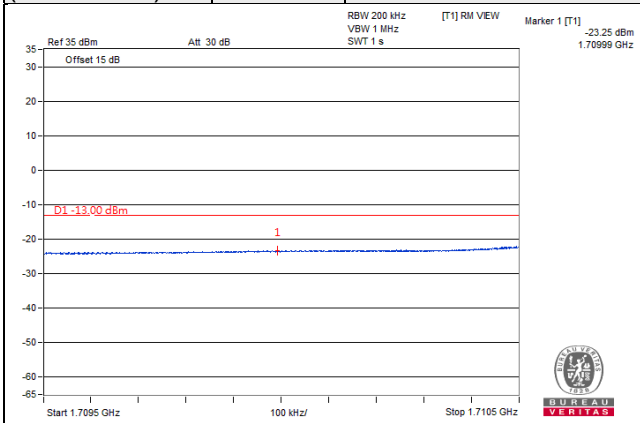


Channel Bandwidth: 20MHz

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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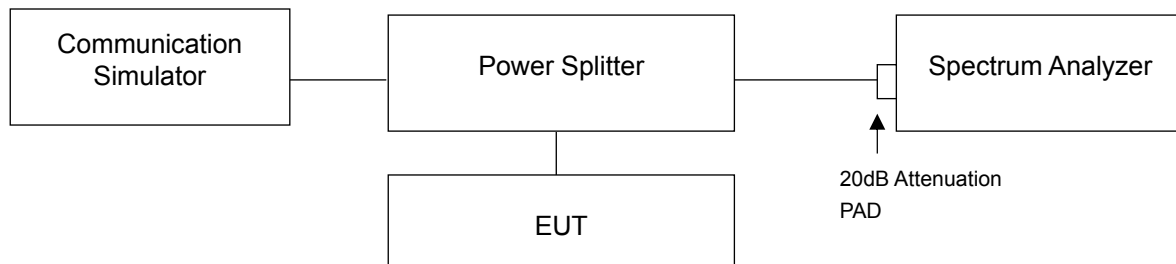


## 4.6 Peak to Average Ratio

### 4.6.1 Limits of Peak to Average Ratio Measurement

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB

### 4.6.2 Test Setup



### 4.6.3 Test Procedures

- Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
- Set the number of counts to a value that stabilizes the measured CCDF curve;
- Record the maximum PAPR level associated with a probability of 0.1%.

#### 4.6.4 Test Results

n2, Channel Bandwidth 5MHz						
Channel	Frequency (MHz)	Peak To Average Ratio (dB)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
370500	1852.5	4.04	3.79	5.56	5.63	8.46
376000	1880.0	4.01	3.77	5.68	5.70	8.32
381500	1907.5	4.10	3.69	5.40	5.49	8.16
n2, Channel Bandwidth 10MHz						
Channel	Frequency (MHz)	Peak To Average Ratio (dB)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
371000	1855.0	4.72	3.87	5.69	5.89	8.23
376000	1880.0	4.31	3.87	5.64	5.73	8.29
381000	1905.0	4.36	3.65	4.72	4.66	8.38
n2, Channel Bandwidth 15MHz						
Channel	Frequency (MHz)	Peak To Average Ratio (dB)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
371500	1857.5	4.68	3.95	5.55	5.72	8.71
376000	1880.0	4.29	3.64	5.26	5.46	8.75
380500	1902.5	4.25	3.47	4.40	4.35	8.46
n2, Channel Bandwidth 20MHz						
Channel	Frequency (MHz)	Peak To Average Ratio (dB)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
372000	1860.0	4.73	3.74	5.54	5.67	8.73
376000	1880.0	4.35	3.55	5.40	5.35	8.62
380000	1900.0	4.67	3.47	5.08	5.13	8.79

### Spectrum Plot of Worst Value

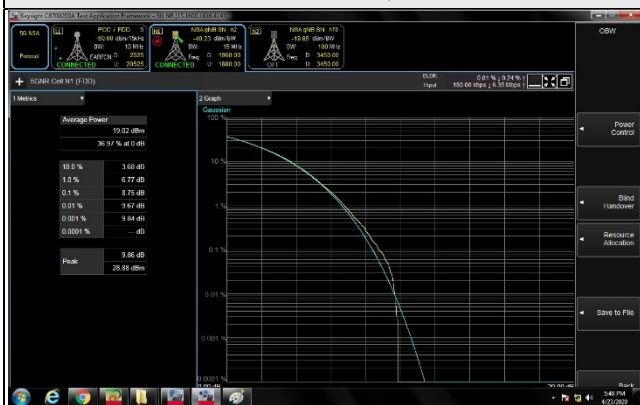
5MHz / 256QAM



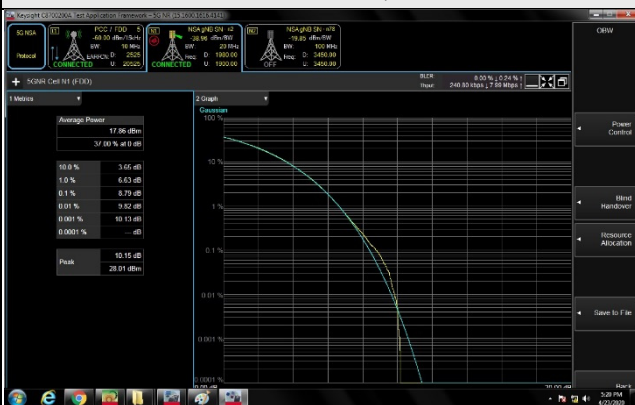
10MHz / 256QAM



15MHz / 256QAM



20MHz / 256QAM

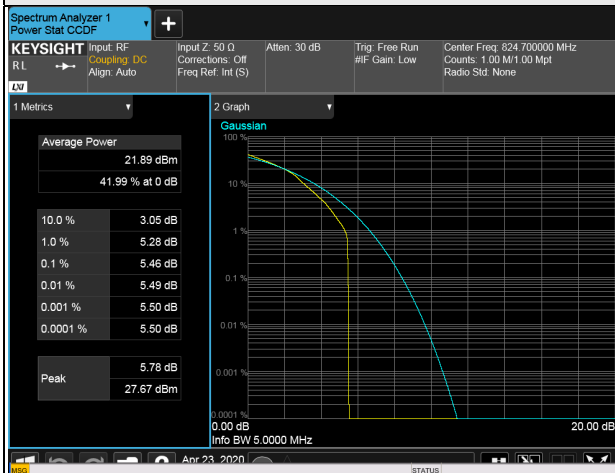


LTE Band 5

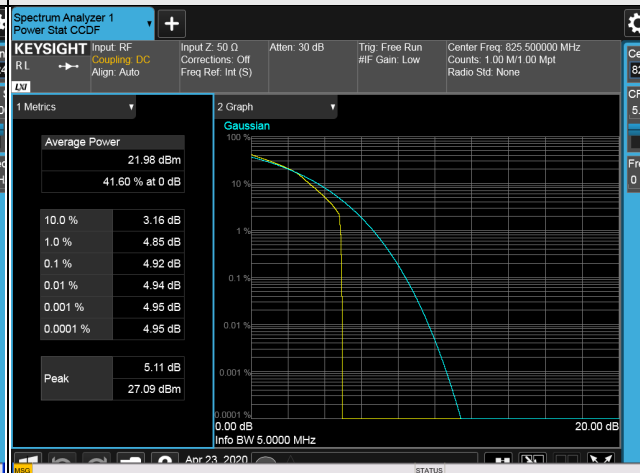
LTE Band 5, Channel Bandwidth 1.4MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
20407	824.7	4.16	4.89	5.46
20525	836.5	3.99	5.34	5.34
20643	848.3	3.50	4.21	4.30
LTE Band 5, Channel Bandwidth 3MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
20415	825.5	3.94	4.82	4.92
20525	836.5	3.87	4.70	4.90
20635	847.5	3.57	4.28	4.40
LTE Band 5, Channel Bandwidth 5MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
20425	826.5	3.82	5.26	5.41
20525	836.5	3.86	4.96	5.02
20625	846.5	3.68	5.08	5.17
LTE Band 5, Channel Bandwidth 10MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
20450	829.0	3.86	5.41	5.61
20525	836.5	3.96	5.42	5.63
20600	844.0	3.71	5.42	5.53

### Spectrum Plot of Worst Value

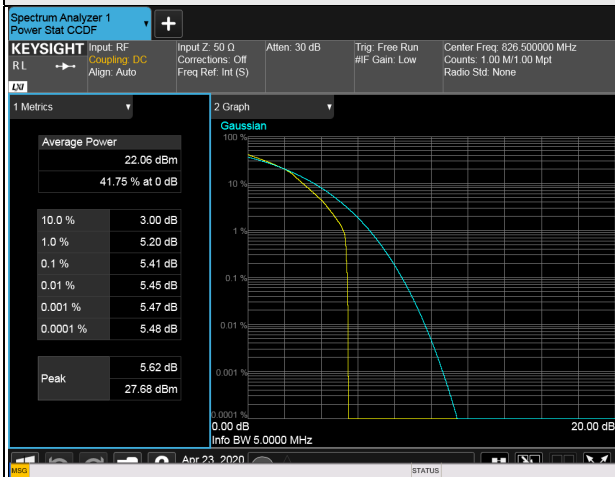
#### 1.4MHz / 64QAM



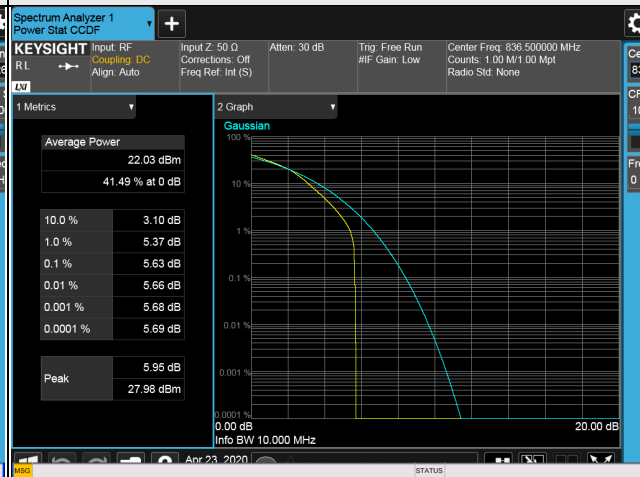
#### 3MHz / 64QAM



#### 5MHz / 64QAM



#### 10MHz / 64QAM

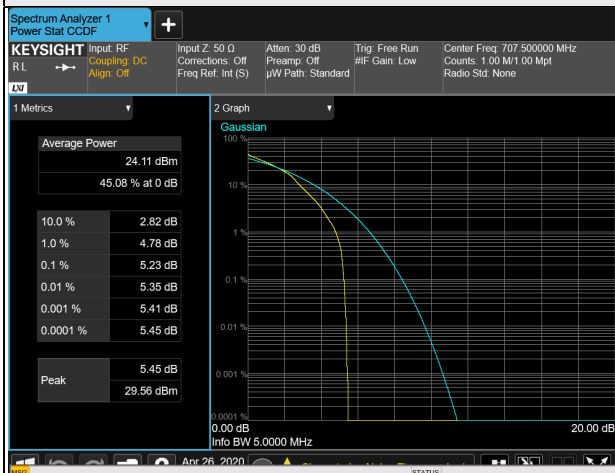


LTE Band 12

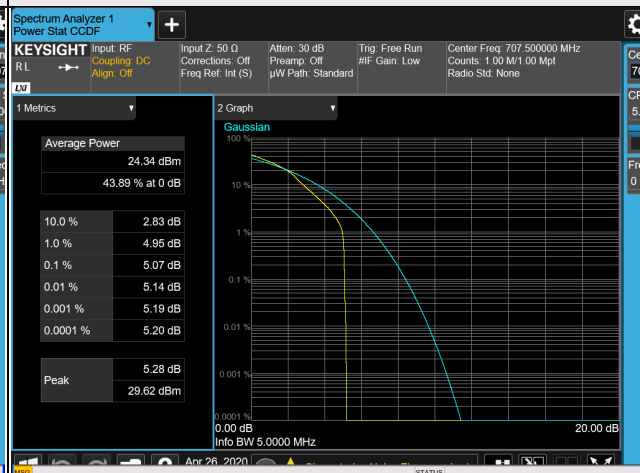
LTE Band 12, Channel Bandwidth 1.4MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
23017	699.7	3.74	4.50	4.60
23095	707.5	3.62	5.10	5.23
23173	715.3	3.64	4.47	4.52
LTE Band 12, Channel Bandwidth 3MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
23025	700.5	3.55	4.36	4.42
23095	707.5	3.43	5.07	5.03
23165	714.5	3.44	4.63	4.67
LTE Band 12, Channel Bandwidth 5MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
23035	701.5	3.52	4.41	4.50
23095	707.5	3.43	5.01	5.10
23155	713.5	3.50	5.01	5.09
LTE Band 12, Channel Bandwidth 10MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
23060	704.0	3.29	4.76	4.70
23095	707.5	3.25	4.74	4.75
23130	711.0	3.60	5.16	5.22

### Spectrum Plot of Worst Value

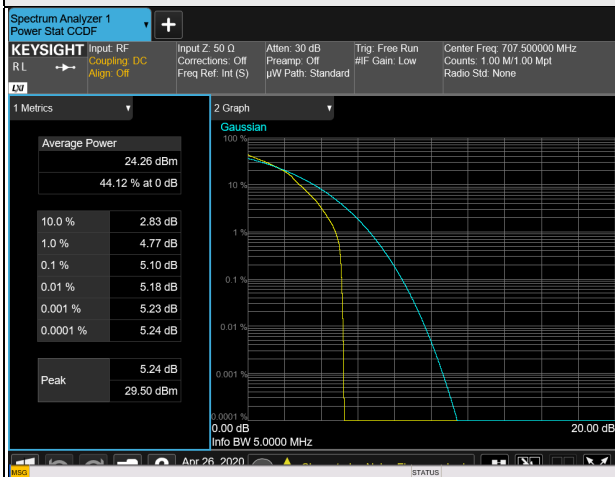
#### 1.4MHz / 64QAM



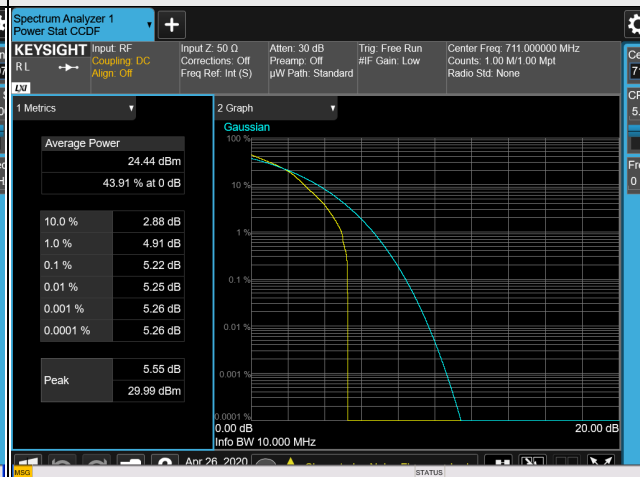
#### 3MHz / 16QAM



#### 5MHz / 64QAM



#### 10MHz / 64QAM



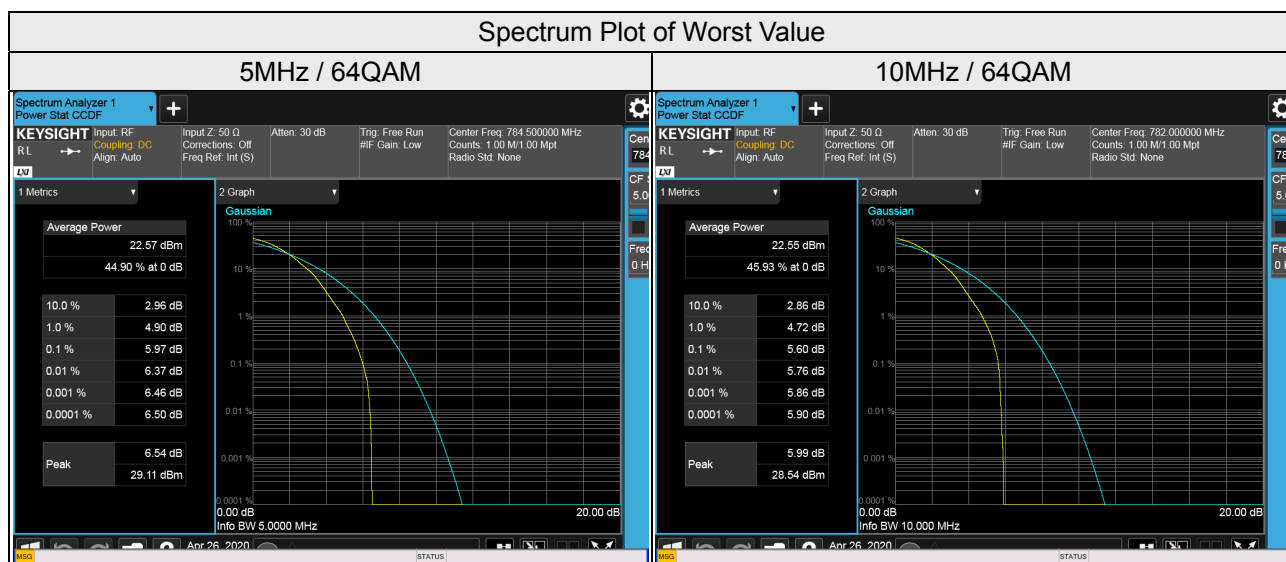


### LTE Band 13

LTE Band 13, Channel Bandwidth 5MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
23205	779.5	3.23	4.54	5.60
23230	782.0	3.04	4.51	5.80
23255	784.5	2.80	4.70	5.97

LTE Band 13, Channel Bandwidth 10MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
23230	782.0	3.22	4.59	5.60

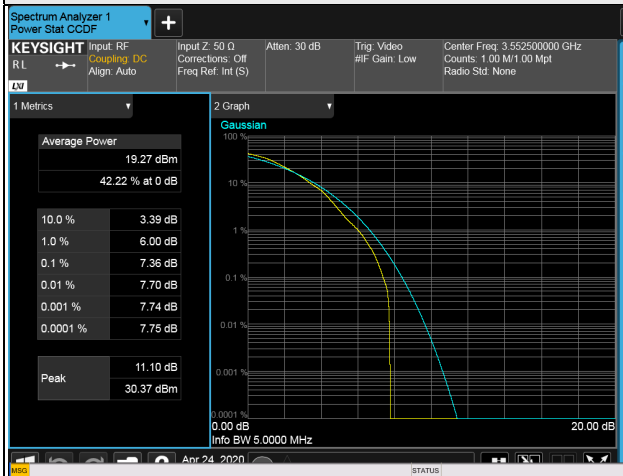


LTE Band 48

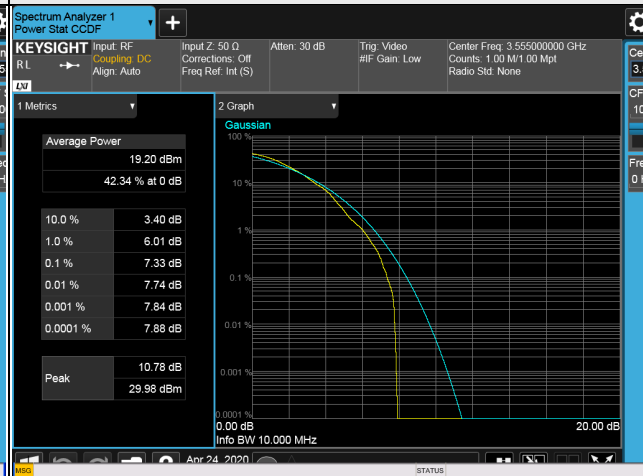
LTE Band 48, Channel Bandwidth 5MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
55265	3552.5	3.83	5.61	7.36
55990	3625.0	3.78	5.66	7.05
56715	3697.5	3.77	5.89	7.05
LTE Band 48, Channel Bandwidth 10MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
55290	3555.0	3.79	6.44	7.33
55990	3625.0	3.80	6.39	7.10
56690	3695.0	3.71	5.93	7.01
LTE Band 48, Channel Bandwidth 15MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
55315	3557.5	6.94	5.60	7.38
55990	3625.0	7.05	5.56	6.85
56665	3692.5	4.80	5.70	7.00
LTE Band 48, Channel Bandwidth 20MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
55340	3560.0	4.67	5.76	6.98
55990	3625.0	5.31	5.56	6.80
56640	3690.0	4.89	6.90	6.93

### Spectrum Plot of Worst Value

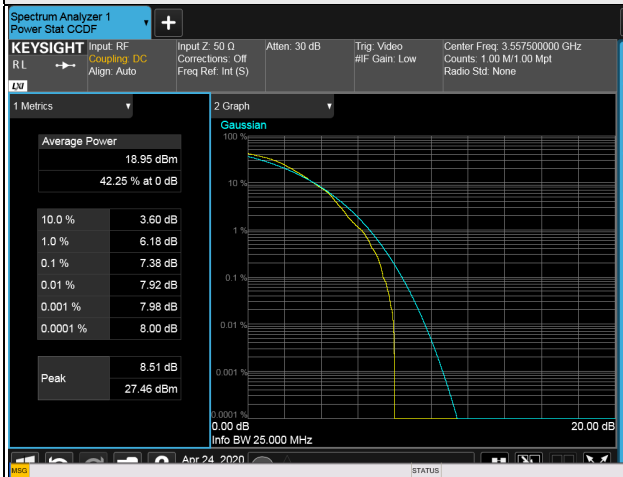
#### 5MHz / 64QAM



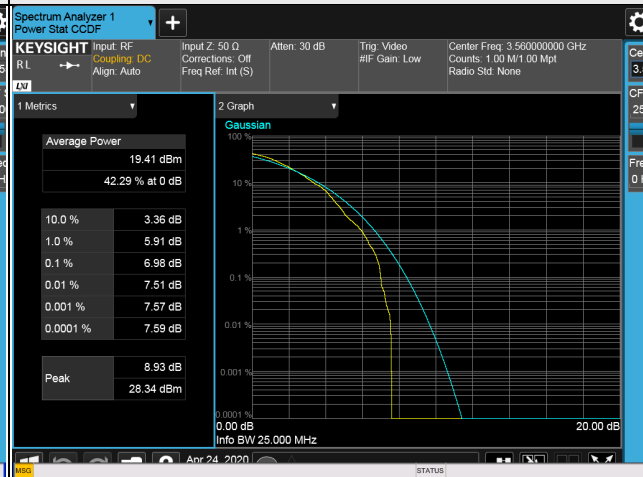
#### 10MHz / 64QAM



#### 15MHz / 64QAM



#### 20MHz / 64QAM



LTE Band 66

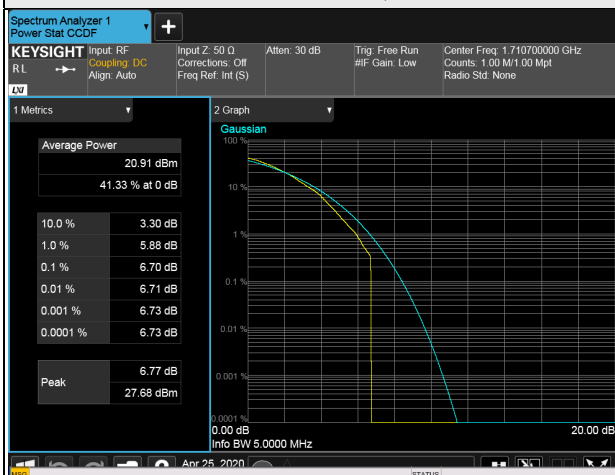
LTE Band 66, Channel Bandwidth 1.4MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
131979	1710.7	3.71	4.50	6.70
132322	1745.0	3.66	4.44	6.61
132665	1779.3	3.95	5.02	6.36
LTE Band 66, Channel Bandwidth 3MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
131987	1711.5	3.63	4.40	6.54
132322	1745.0	3.59	4.41	6.66
132657	1778.5	3.75	5.07	6.39
LTE Band 66, Channel Bandwidth 5MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
131997	1712.5	3.66	4.46	6.56
132322	1745.0	3.69	4.47	6.68
132647	1777.5	3.77	4.85	6.42
LTE Band 66, Channel Bandwidth 10MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
132022	1715.0	3.81	4.56	6.93
132322	1745.0	3.76	4.54	6.83
132622	1775.0	3.58	4.37	6.64
LTE Band 66, Channel Bandwidth 15MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
132047	1717.5	3.74	4.51	6.65
132322	1745.0	3.60	4.51	6.76
132597	1772.5	3.46	4.24	6.30

LTE Band 66, Channel Bandwidth 20MHz

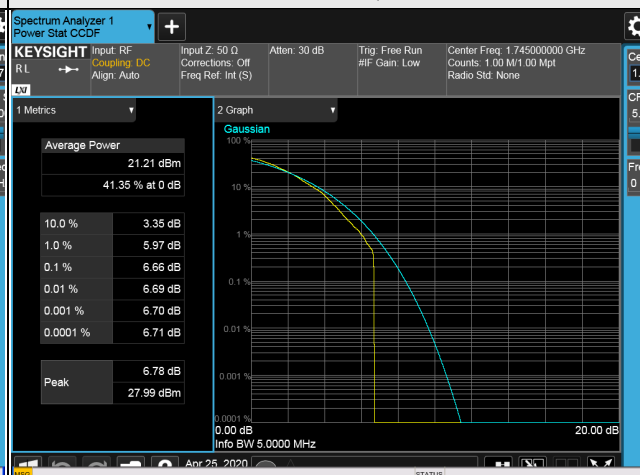
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
132072	1720.0	3.79	4.53	6.90
132322	1745.0	3.73	4.56	6.80
132572	1770.0	3.65	4.79	6.25

### Spectrum Plot of Worst Value

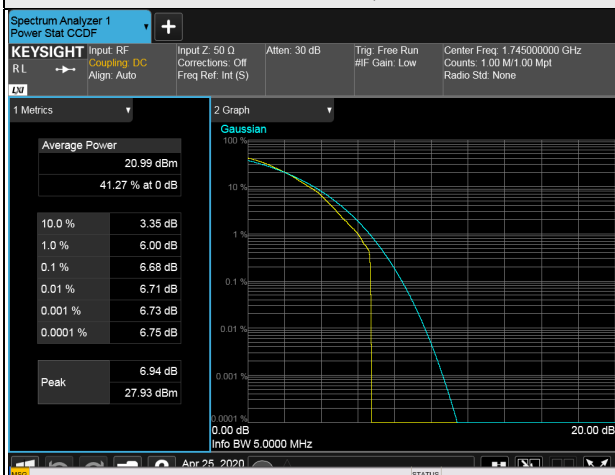
#### 1.4MHz / 64QAM



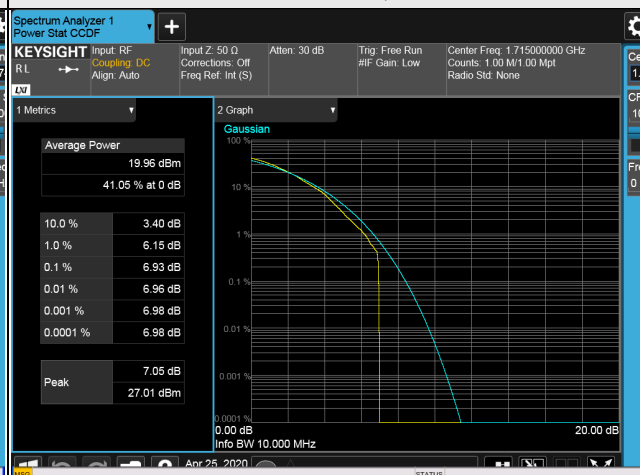
#### 3MHz / 64QAM



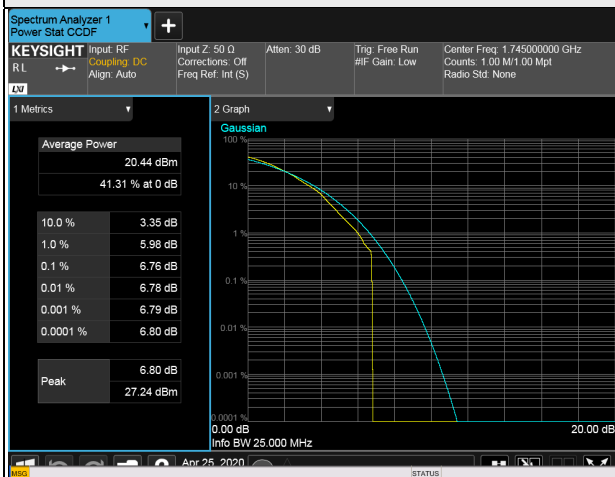
#### 5MHz / 64QAM



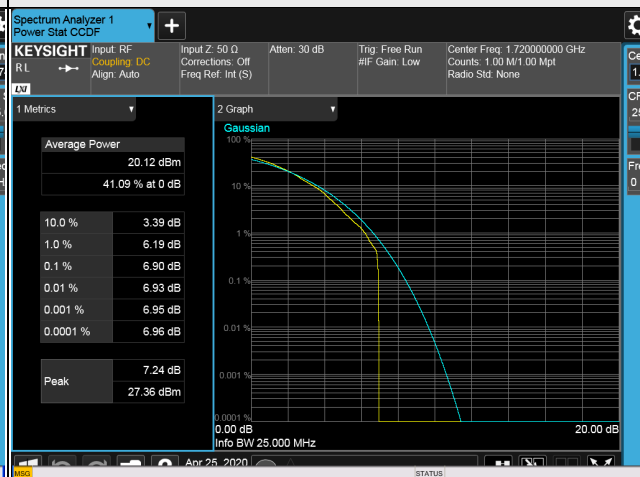
#### 10MHz / 64QAM



#### 15MHz / 64QAM



#### 20MHz / 64QAM



## 4.7 Conducted Spurious Emissions

### 4.7.1 Limits of Conducted Spurious Emissions Measurement

For LTE Band 5

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. The emission limit equal to  $-13\text{dBm}$ .

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 13

According to FCC 27.53(c)(2) for on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB.

According to FCC 27.53(f) for operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to  $-70$  dBW/MHz. The limit of emissions is equal to  $-40$  dBm

For LTE Band 30

In the FCC 27.53(a)(4)(iii), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $70 + 10 \log(P)$  dB. The limit of emission is equal to  $-40$  dBm.

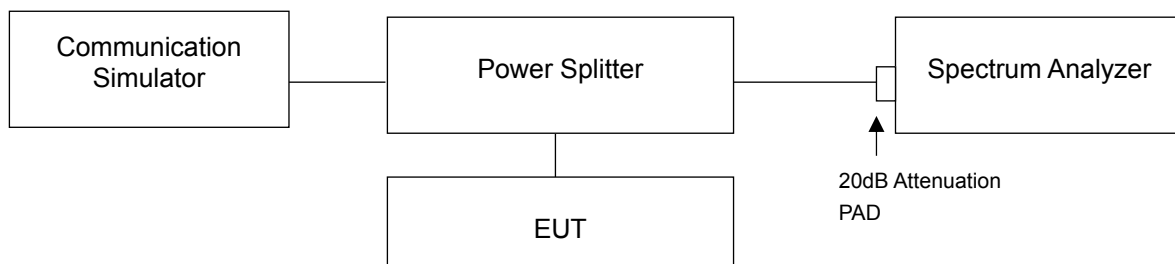
For LTE Band 48

Power of any emissions outside the Fundamental	Limit
Within 0-10MHz above the Assigned Channel	-13 dBm/MHz
Within 0-10MHz below the Assigned Channel	
Greater than 0-10MHz above the Assigned Channel	-25 dBm/MHz
Greater than 0-10MHz below the Assigned Channel	
Power of any emission below 3530MHz	-40 dBm/MHz
Power of any emission above 3720MHz	

For LTE Band 66

In the FCC 27.53(h), On any frequency outside a licensee's frequency block, The power of any emission shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB. The emission limit equal to  $-13\text{dBm}$ .

### 4.7.2 Test Setup



#### 4.7.3 Test Procedure

- a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- b. Measuring frequency range is from 9kHz to 9GHz /10GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

For LTE Band 48

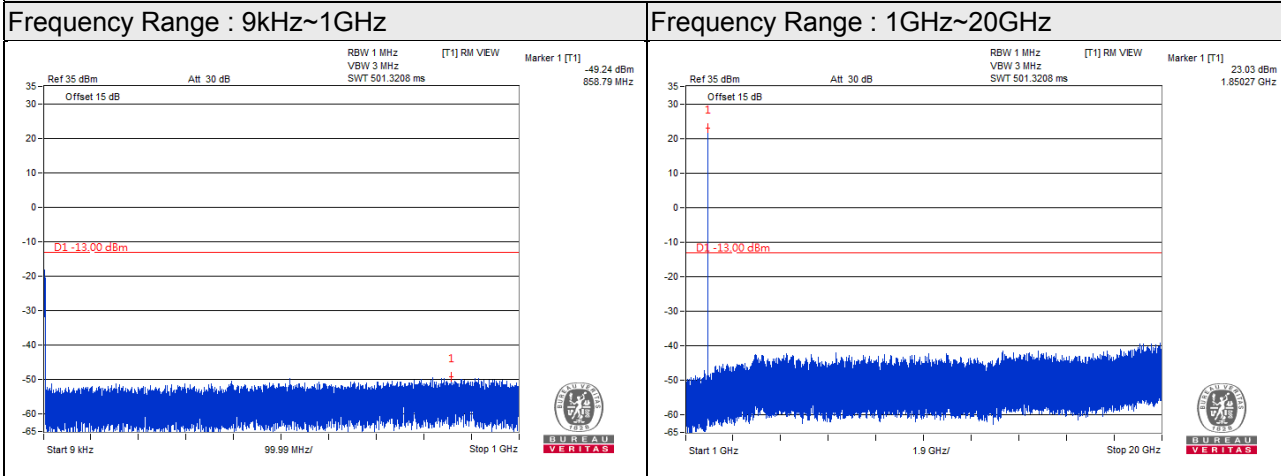
- a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- b. Measuring frequency range is from 9 kHz to 37 GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.
- c. Measuring frequency band edge, 20dB attenuation pad is connected with spectrum. 1% of the fundamental emission bandwidth is used for conducted emission measurement.
- d. For 5MHz channel BW mode, extend the 1% range from 1M to 2M above and below the channel edge and then reduce the limit further by  $10 \log (1000/51)=13\text{dB}$  (i.e. total  $-13 + -13=-26\text{dB}$ ) to compensate for the integration from 51k to 1M.



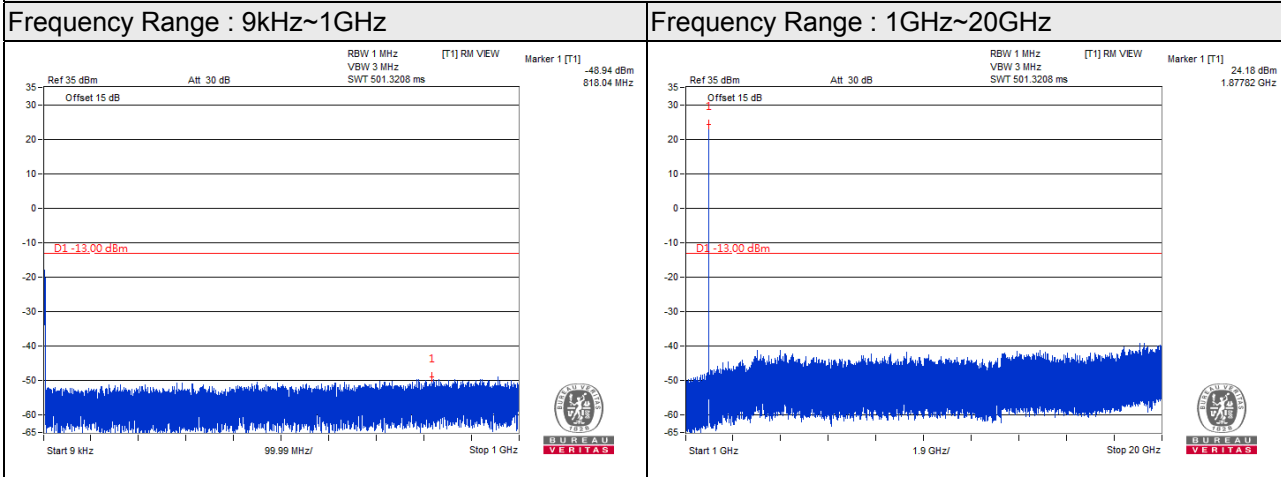
### 4.7.4 Test Results

n2, Channel Bandwidth 5MHz

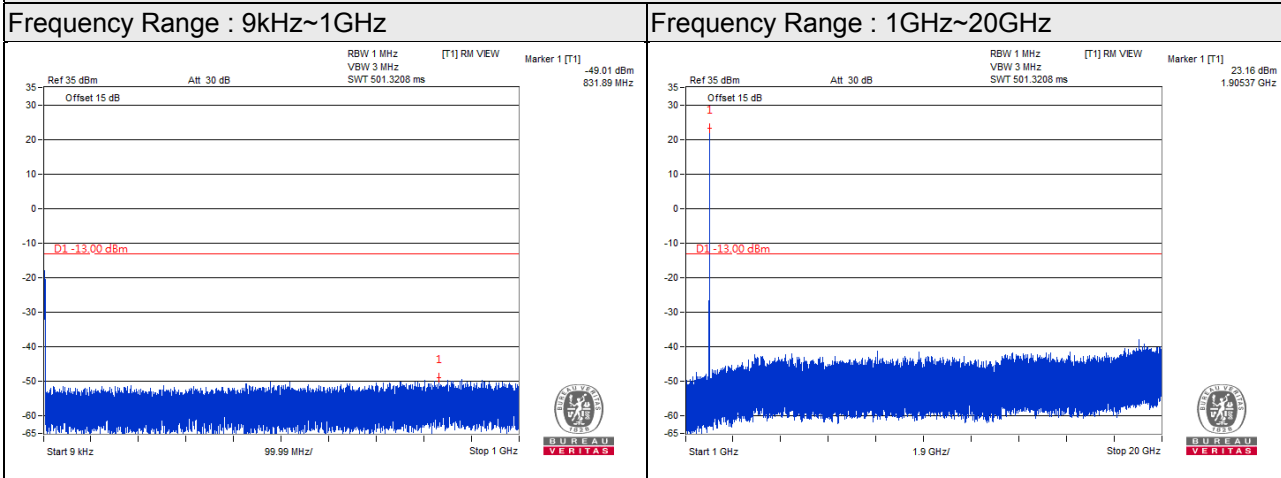
Channel 370500 (1852.50MHz)



Channel 376000 (1880.00MHz)



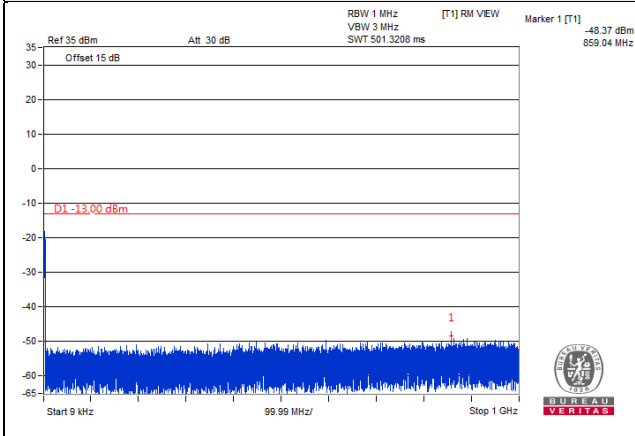
Channel 381500 (1907.50MHz)



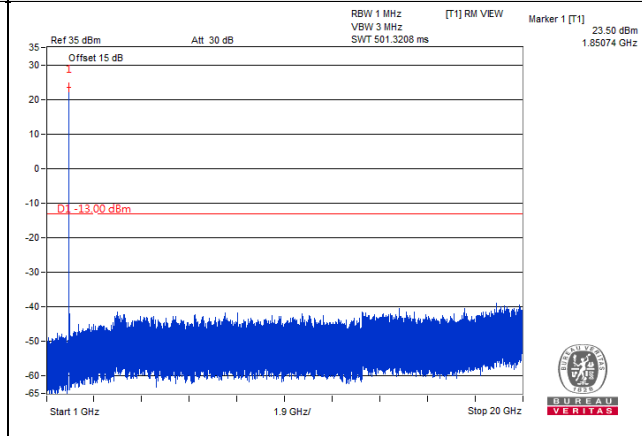
n2, Channel Bandwidth 10MHz

Channel 371000 (1855.00MHz)

Frequency Range : 9kHz~1GHz

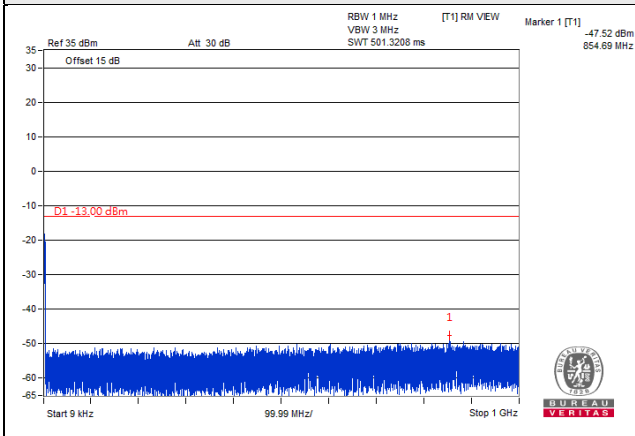


Frequency Range : 1GHz~20GHz

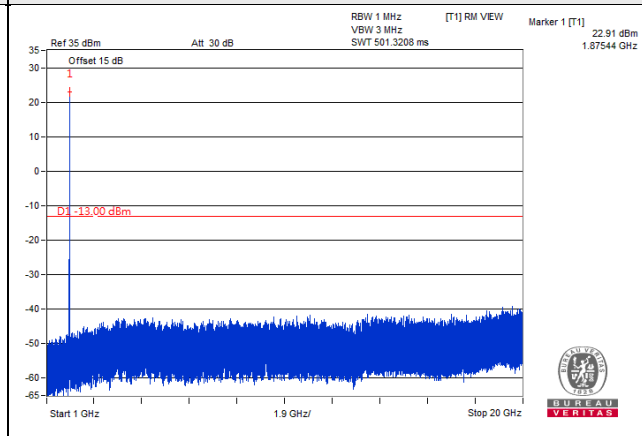


Channel 376000 (1880.00MHz)

Frequency Range : 9kHz~1GHz

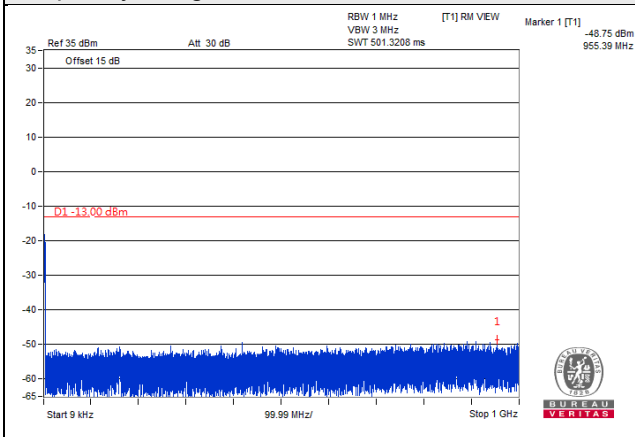


Frequency Range : 1GHz~20GHz

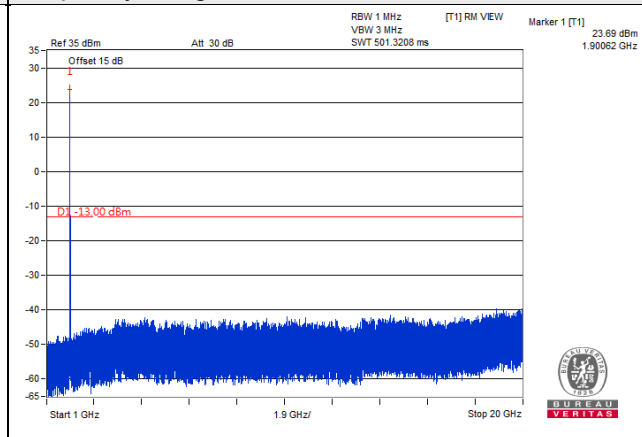


Channel 381000 (1905.00MHz)

Frequency Range : 9kHz~1GHz



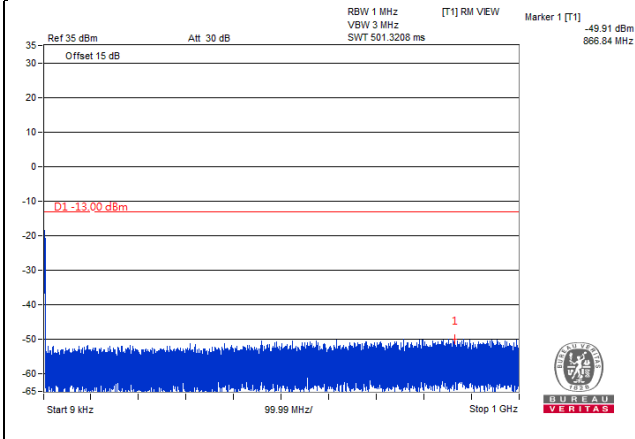
Frequency Range : 1GHz~20GHz



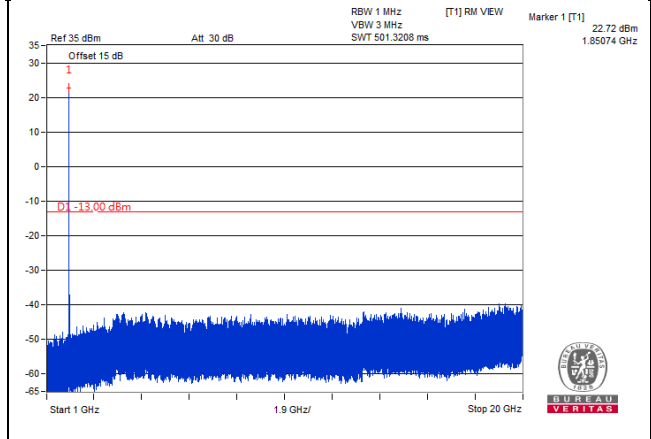
n2, Channel Bandwidth 15MHz

Channel 371500 (1857.50MHz)

Frequency Range : 9kHz~1GHz

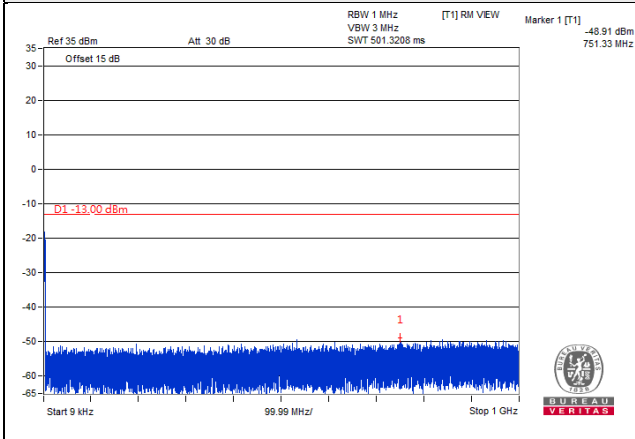


Frequency Range : 1GHz~20GHz

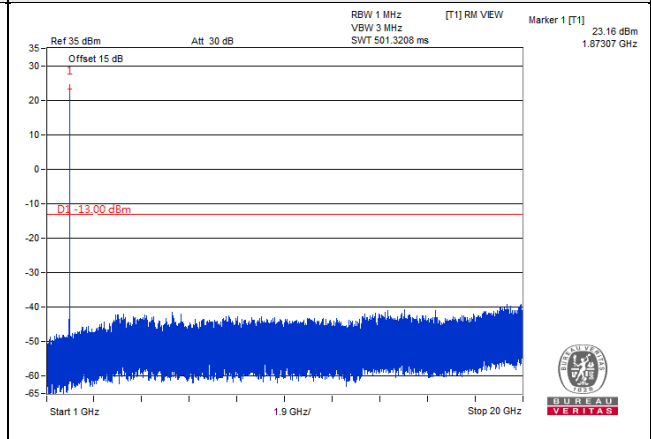


Channel 376000 (1880.00MHz)

Frequency Range : 9kHz~1GHz

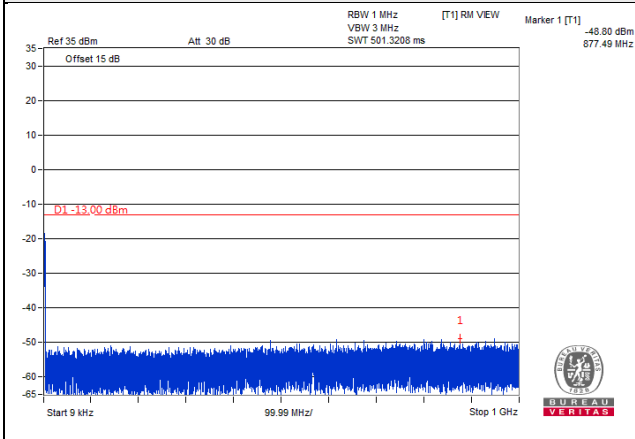


Frequency Range : 1GHz~20GHz

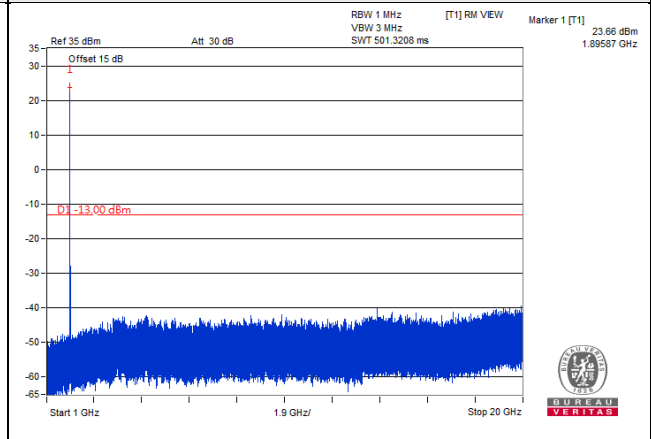


Channel 380500 (1902.50MHz)

Frequency Range : 9kHz~1GHz



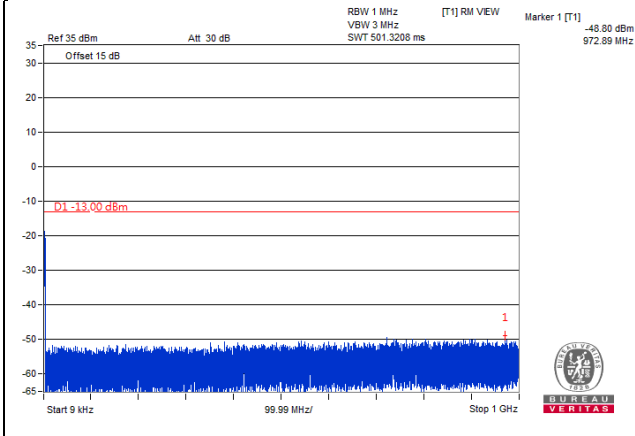
Frequency Range : 1GHz~20GHz



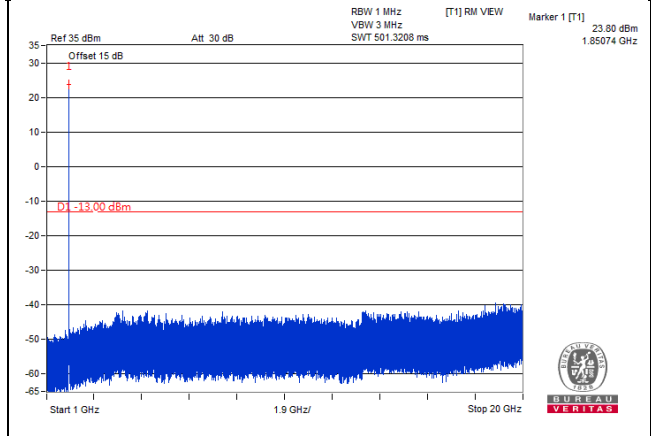
n2, Channel Bandwidth 20MHz

Channel 372000 (1860.00MHz)

Frequency Range : 9kHz~1GHz

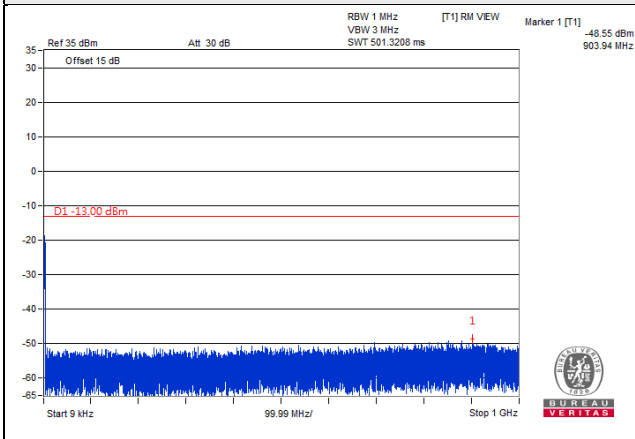


Frequency Range : 1GHz~20GHz

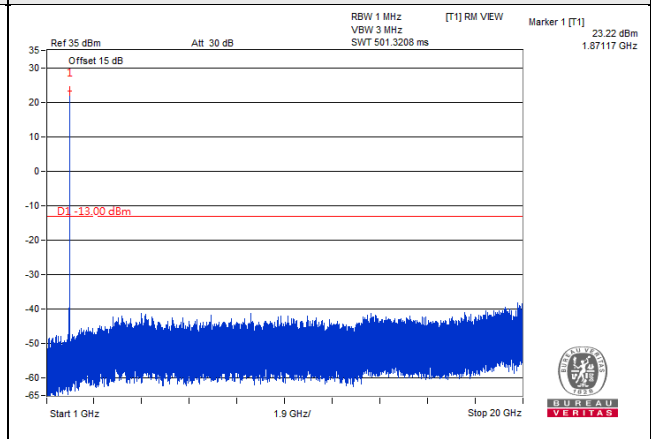


Channel 376000 (1880.00MHz)

Frequency Range : 9kHz~1GHz

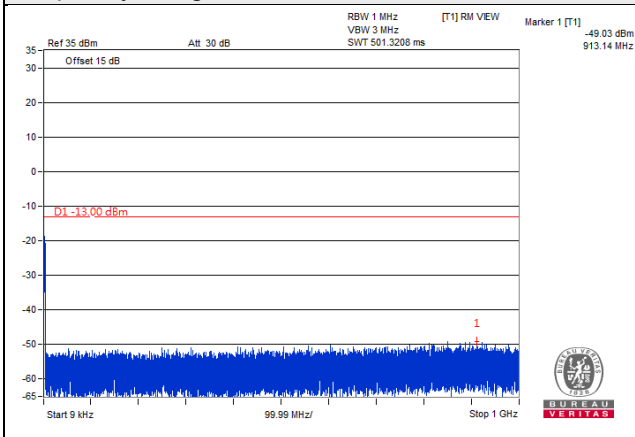


Frequency Range : 1GHz~20GHz

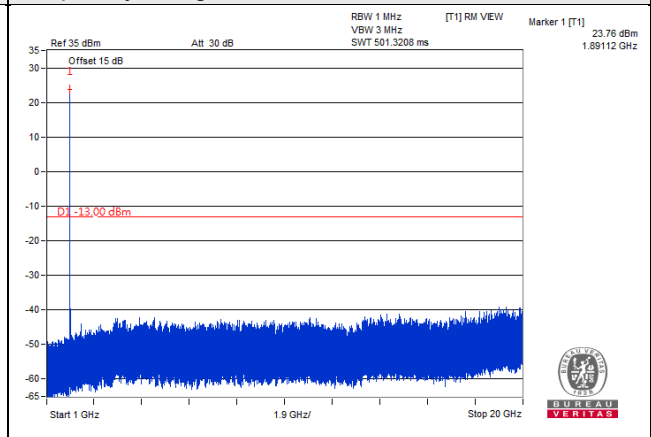


Channel 380000 (1900.00MHz)

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~20GHz

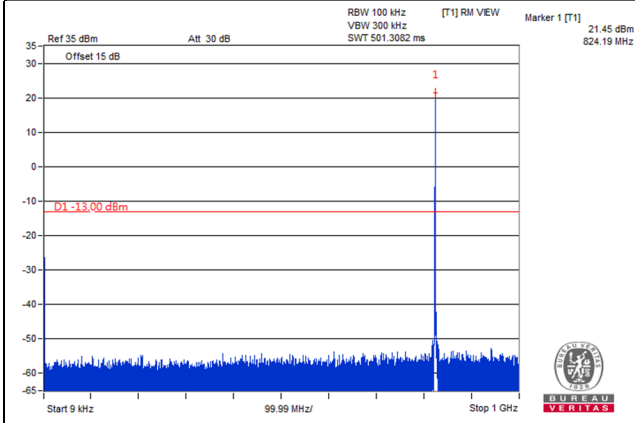


\*The 9kHz signal over the limit is from Spectrum.

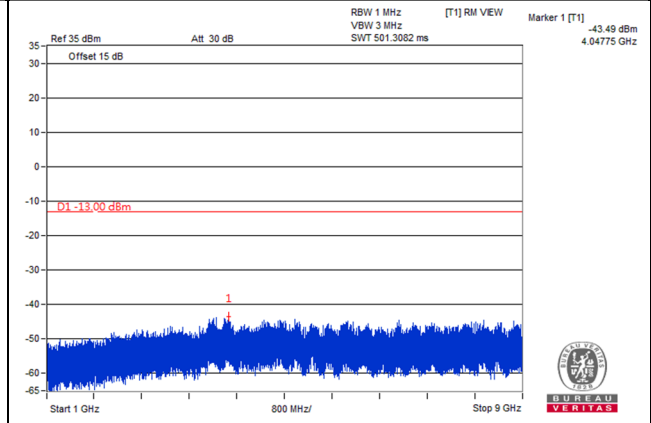
LTE Band 5, Channel Bandwidth 1.4MHz

Channel 20407 (824.7MHz)

Frequency Range : 9kHz~1GHz

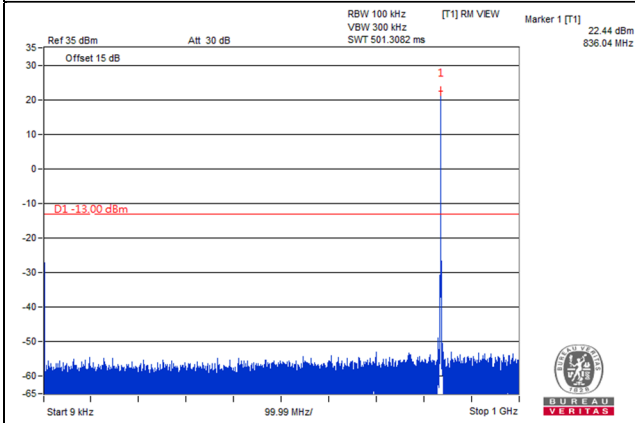


Frequency Range : 1GHz~9GHz

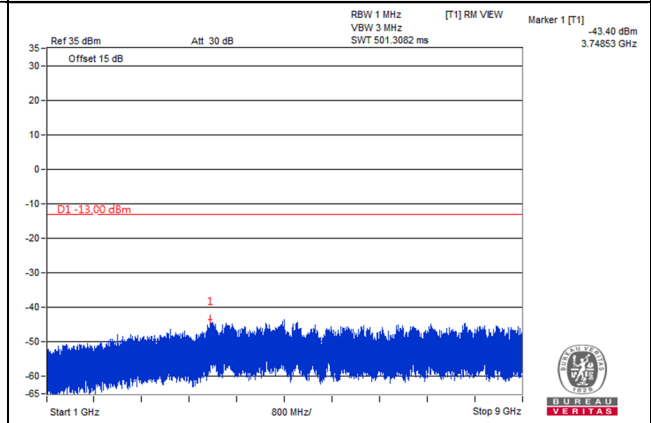


Channel 20525 (836.5MHz)

Frequency Range : 9kHz~1GHz

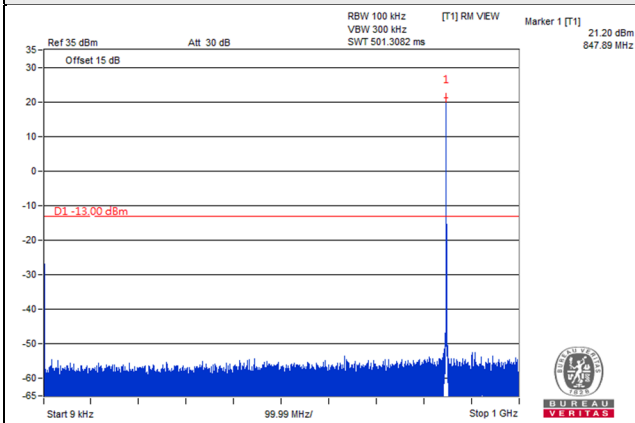


Frequency Range : 1GHz~9GHz

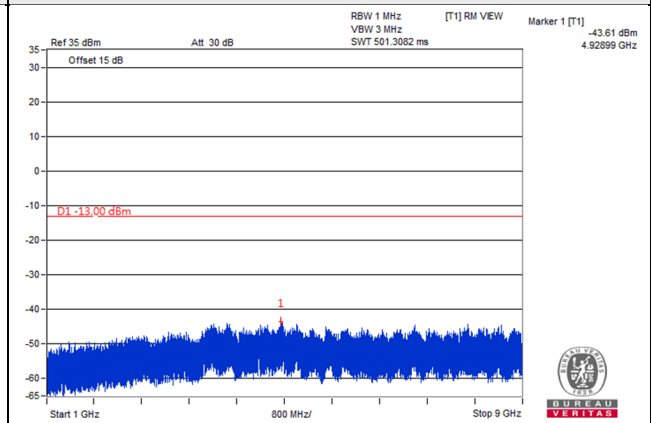


Channel 20643 (848.3MHz)

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~9GHz



\*The 9kHz signal over the limit is from Spectrum.