

LTE Band 30
Emission Mask:

Channel Bandwidth: 5MHz

Channel 27685 (2307.5MHz) 256QAM 1 RB / 0 RB Offset Channel 27685 (2307.5MHz) 256QAM 25 RB / 0 RB Offset



Channel 27735 (2312.5MHz) 256QAM 1 RB / 24 RB Offset Channel 27735 (2312.5MHz) 256QAM 25 RB / 0 RB Offset



Channel Bandwidth: 10MHz

Channel 27710
(2310.0MHz)

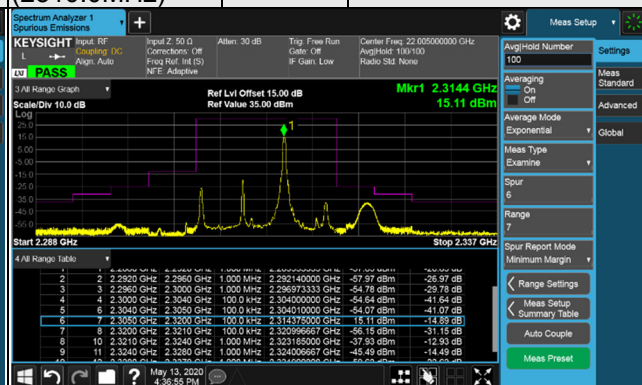
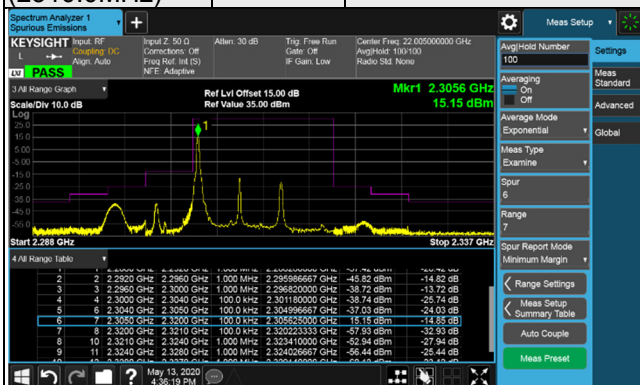
256QAM

1 RB / 0 RB Offset

Channel 27710
(2310.0MHz)

256QAM

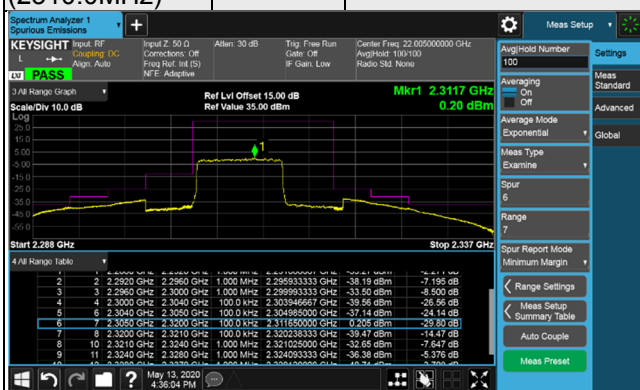
1 RB / 49 RB Offset



Channel 27710
(2310.0MHz)

256QAM

50 RB / 0 RB Offset



LTE Band 66

Channel Bandwidth: 1.4MHz

Channel 131979
(1710.7MHz)

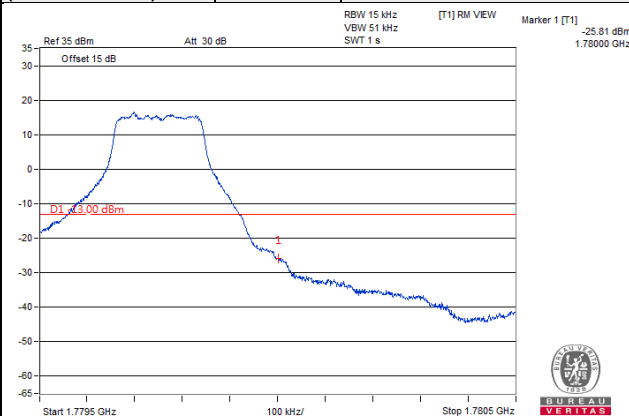
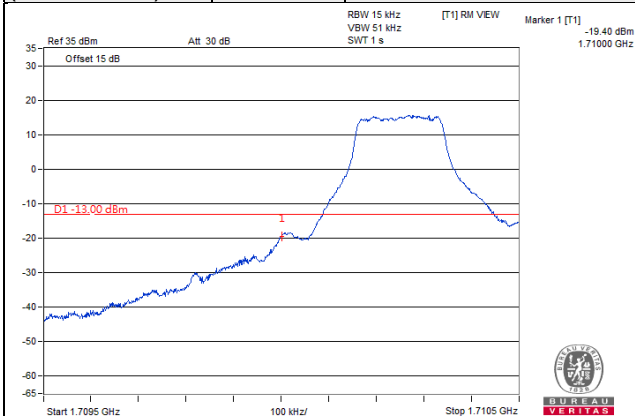
256QAM

1 RB / 0 RB Offset

Channel 132665
(1779.3MHz)

256QAM

1 RB / 5 RB Offset



Channel 131979
(1710.7MHz)

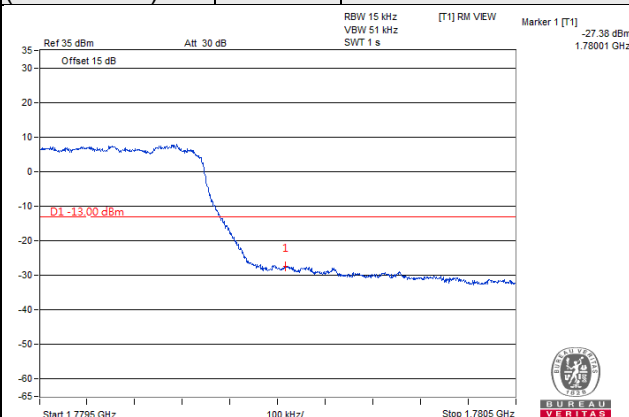
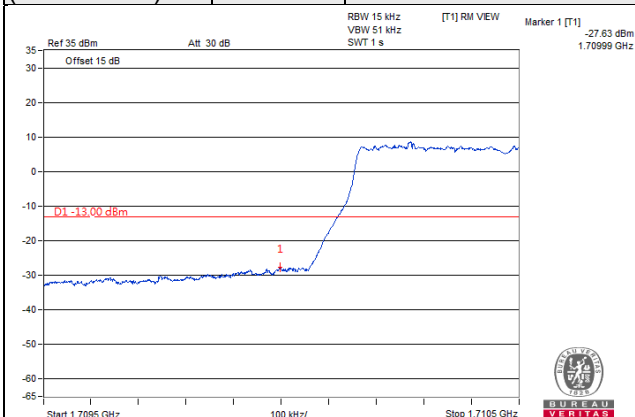
256QAM

6 RB / 0 RB Offset

Channel 132665
(1779.3MHz)

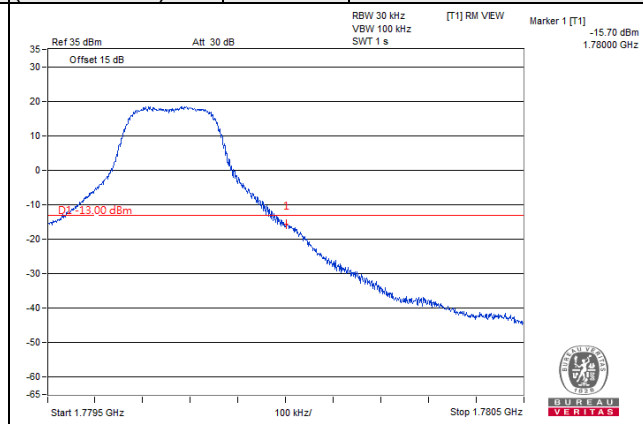
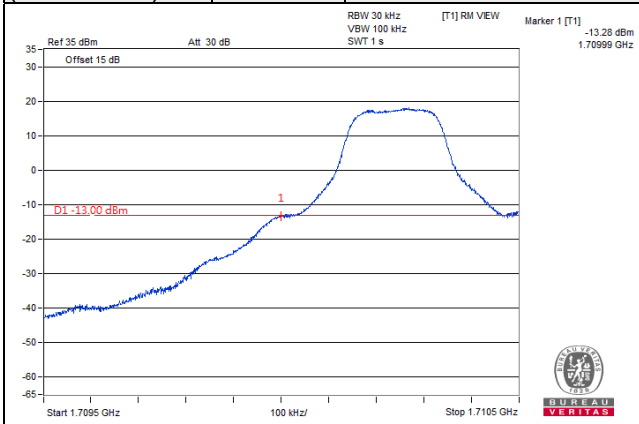
256QAM

6 RB / 0 RB Offset

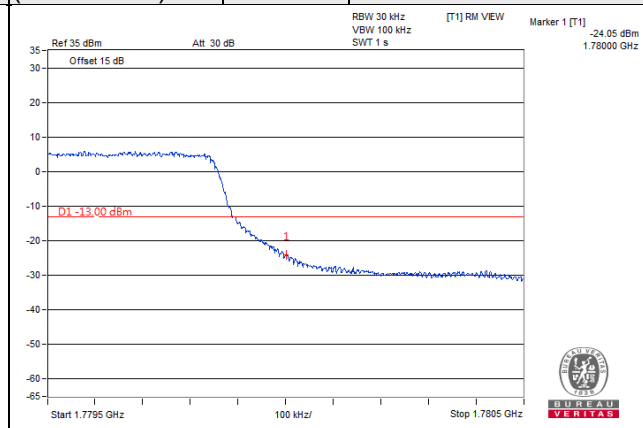
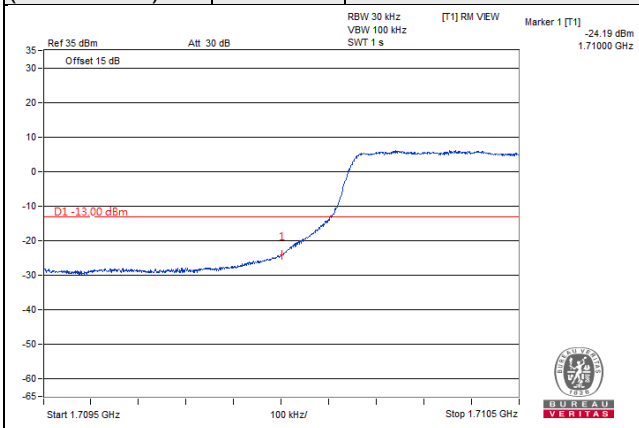


Channel Bandwidth: 3MHz

Channel 131987 (1711.5MHz)	256QAM	1 RB / 0 RB Offset	Channel 132657 (1778.5MHz)	256QAM	1 RB / 14 RB Offset
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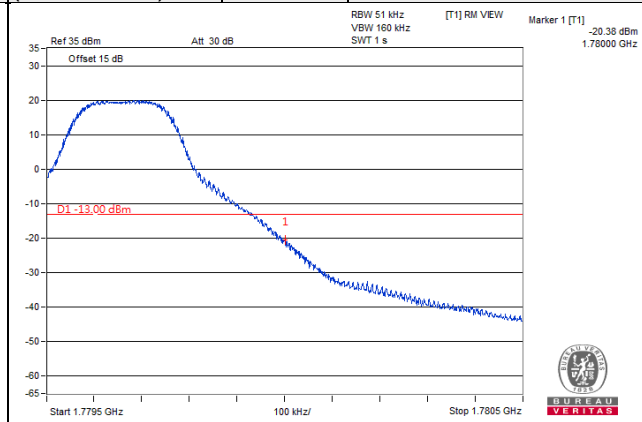
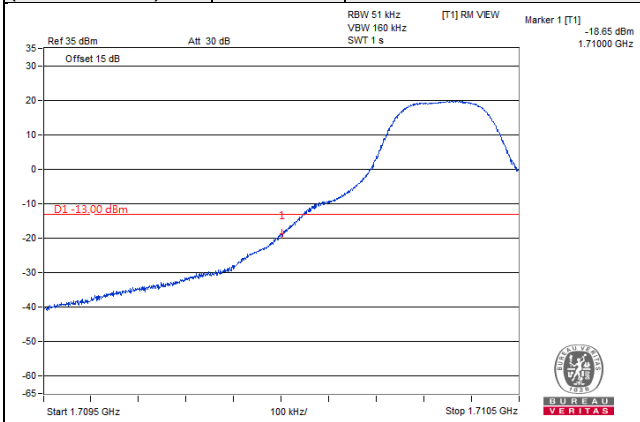


Channel 131987 (1711.5MHz)	256QAM	15 RB / 0 RB Offset	Channel 132657 (1778.5MHz)	256QAM	15 RB / 0 RB Offset
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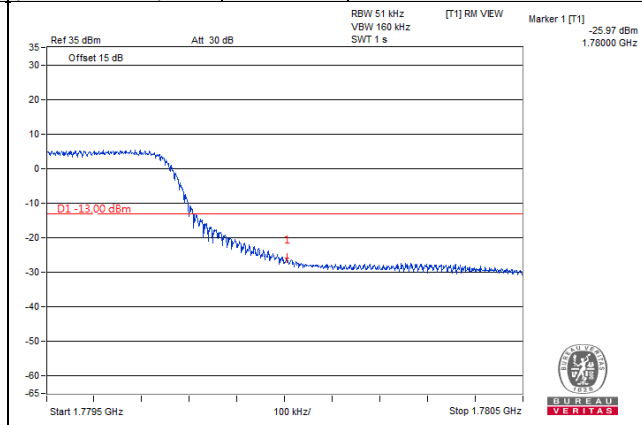
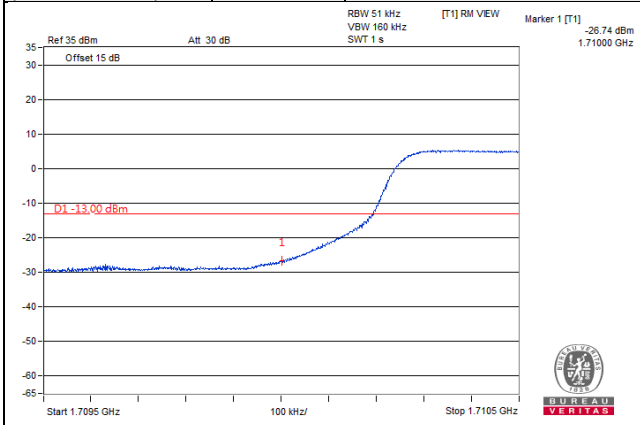


Channel Bandwidth: 5MHz

Channel 131997 (1712.5MHz)	256QAM	1 RB / 0 RB Offset	Channel 132647 (1777.5MHz)	256QAM	1 RB / 24 RB Offset
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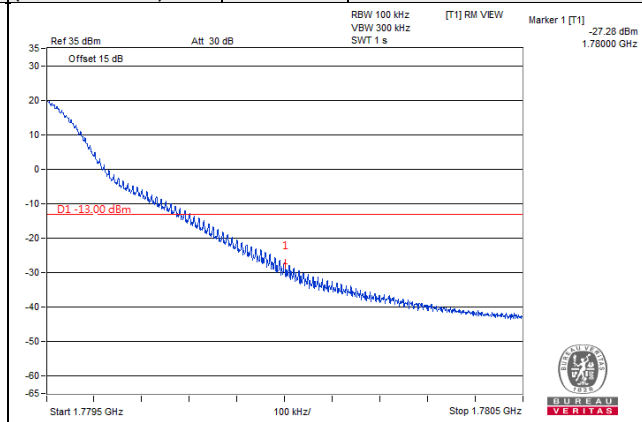
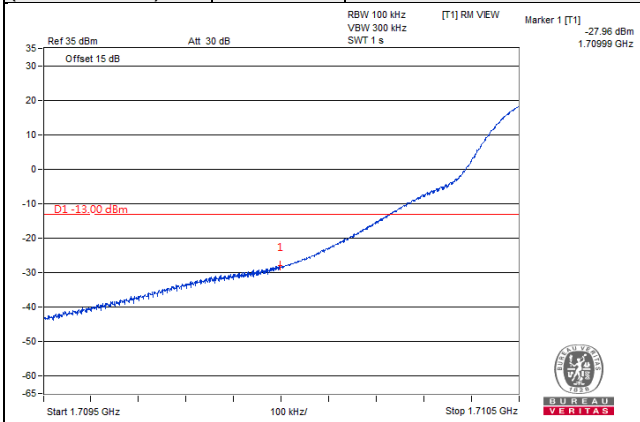


Channel 131997 (1712.5MHz)	256QAM	25 RB / 0 RB Offset	Channel 132647 (1777.5MHz)	256QAM	25 RB / 0 RB Offset
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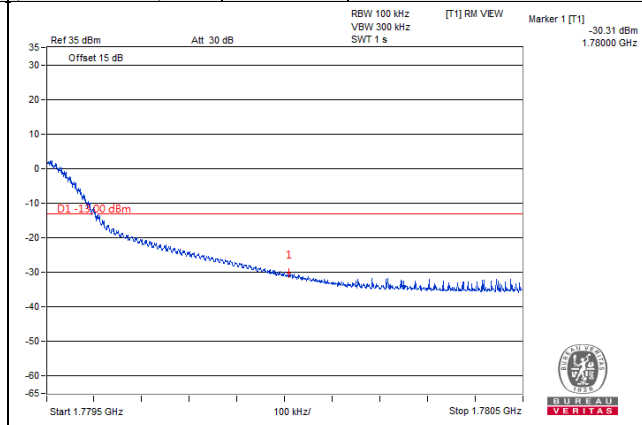
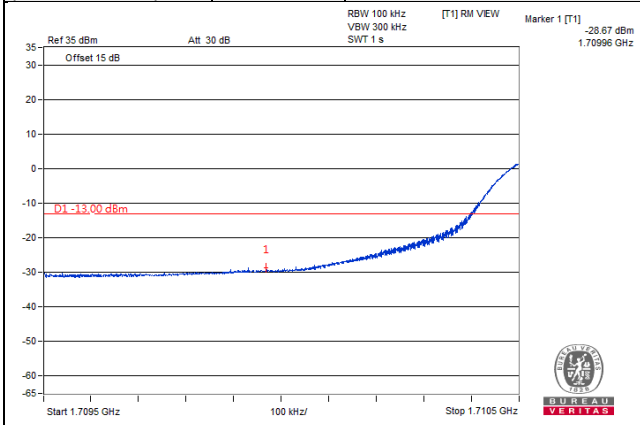


Channel Bandwidth: 10MHz

Channel 132022 (1715.0MHz)	256QAM	1 RB / 0 RB Offset	Channel 132622 (1775.0MHz)	256QAM	1 RB / 49 RB Offset
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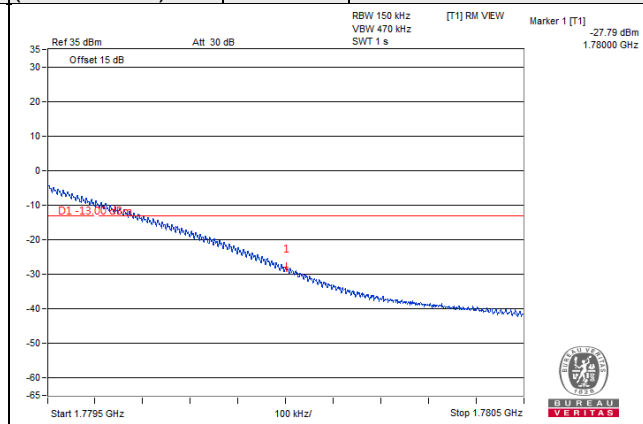
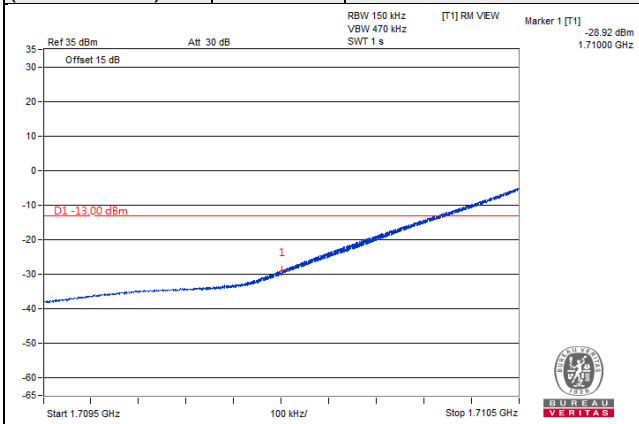


Channel 132022 (1715.0MHz)	256QAM	50 RB / 0 RB Offset	Channel 132622 (1775.0MHz)	256QAM	50 RB / 0 RB Offset
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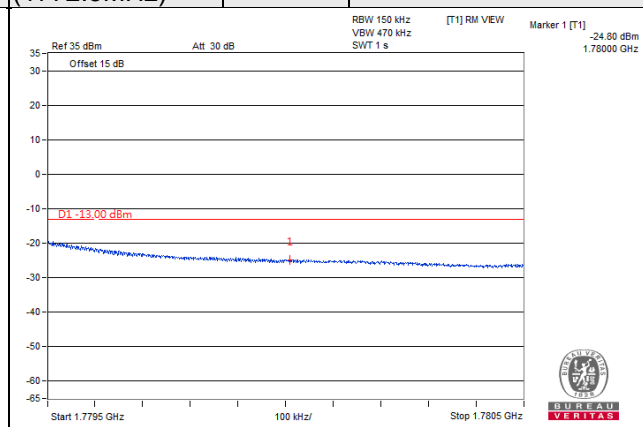
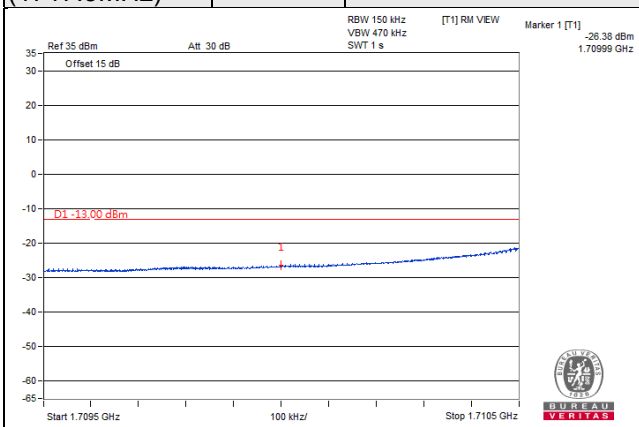


Channel Bandwidth: 15MHz

Channel 132047 (1717.5MHz)	256QAM	1 RB / 0 RB Offset	Channel 132597 (1772.5MHz)	256QAM	1 RB / 74 RB Offset
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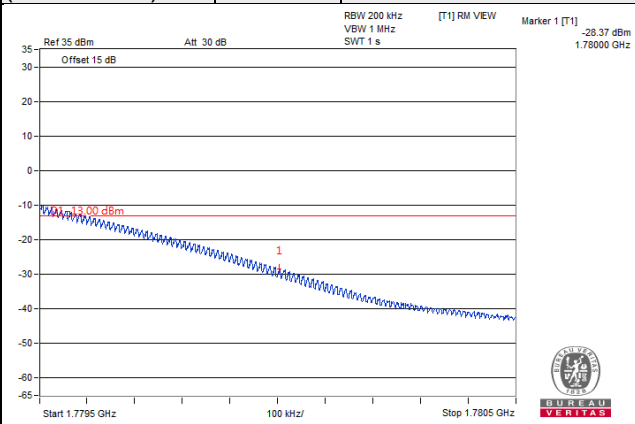
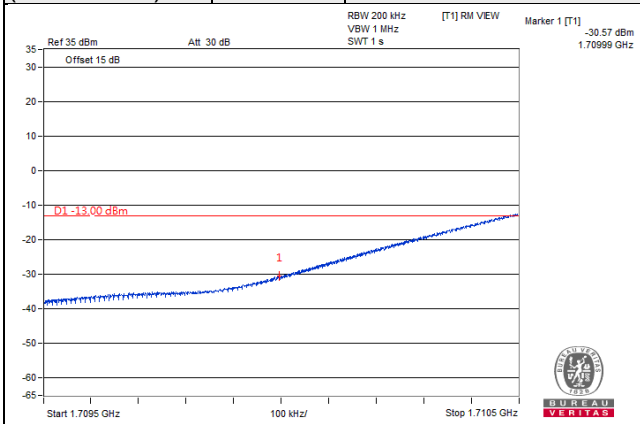


Channel 132047 (1717.5MHz)	256QAM	75 RB / 0 RB Offset	Channel 132597 (1772.5MHz)	256QAM	75 RB / 0 RB Offset
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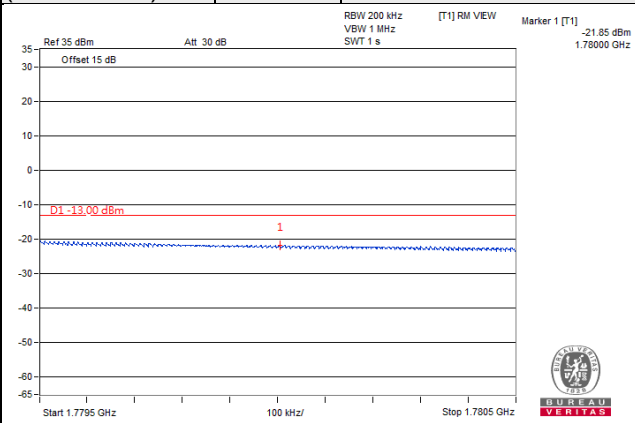
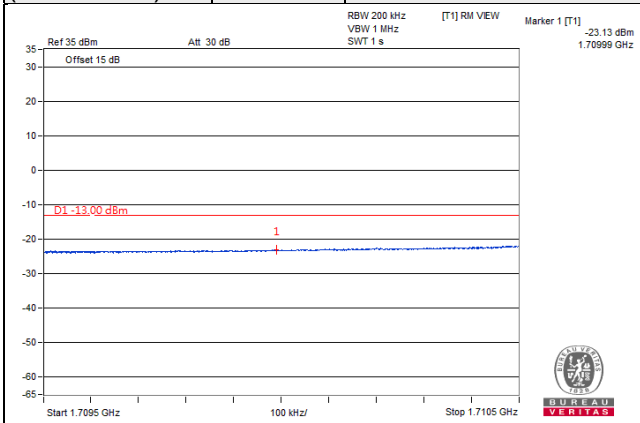


Channel Bandwidth: 20MHz

Channel 132072 (1720.0MHz)	256QAM	1 RB / 0 RB Offset	Channel 132572 (1770.0MHz)	256QAM	1 RB / 99 RB Offset
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Channel 132072 (1720.0MHz)	256QAM	100 RB / 0 RB Offset	Channel 132572 (1770.0MHz)	256QAM	100 RB / 0 RB Offset
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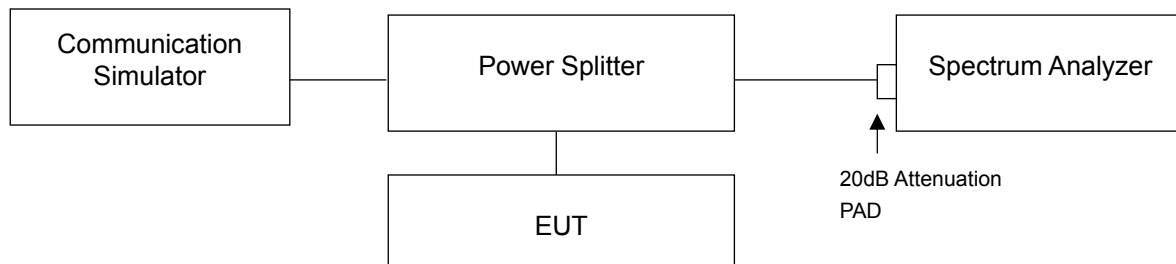


4.6 Peak to Average Ratio

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

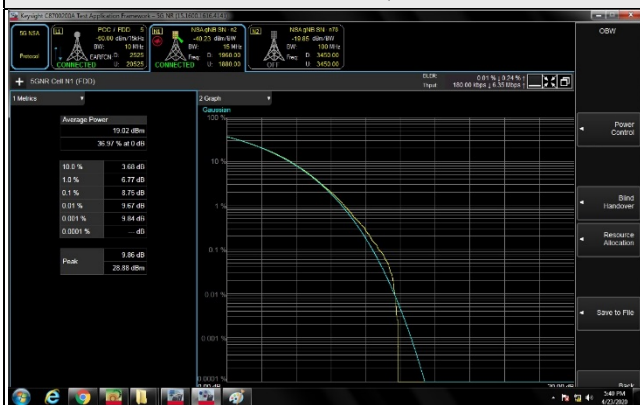
5MHz / 256QAM



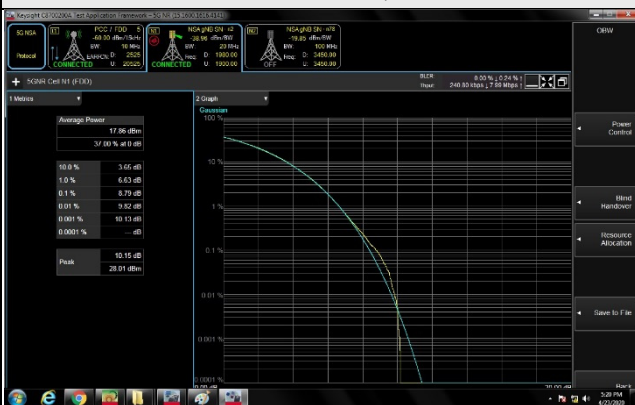
10MHz / 256QAM



15MHz / 256QAM



20MHz / 256QAM

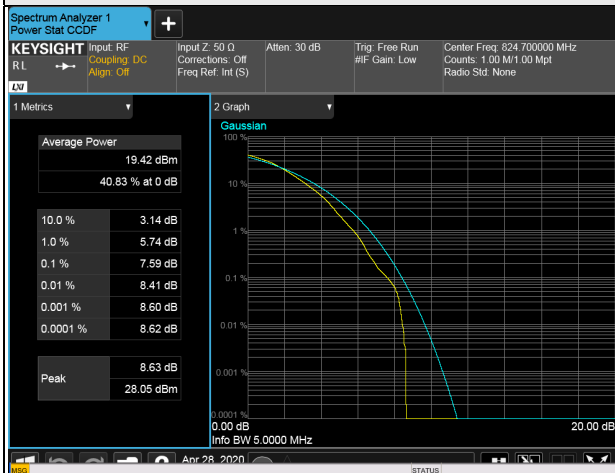


LTE Band 5

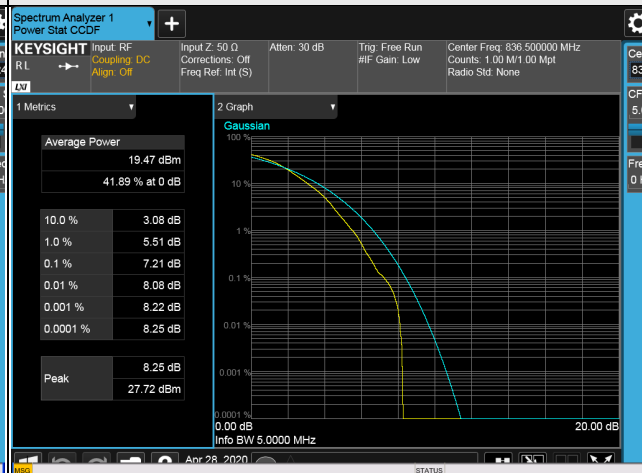
LTE Band 5, Channel Bandwidth 1.4MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
20407	824.7	7.59
20525	836.5	7.23
20643	848.3	7.07
LTE Band 5, Channel Bandwidth 3MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
20415	825.5	6.75
20525	836.5	7.21
20635	847.5	7.05
LTE Band 5, Channel Bandwidth 5MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
20425	826.5	7.50
20525	836.5	7.23
20625	846.5	7.35
LTE Band 5, Channel Bandwidth 10MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
20450	829.0	7.62
20525	836.5	7.45
20600	844.0	6.94

Spectrum Plot of Worst Value

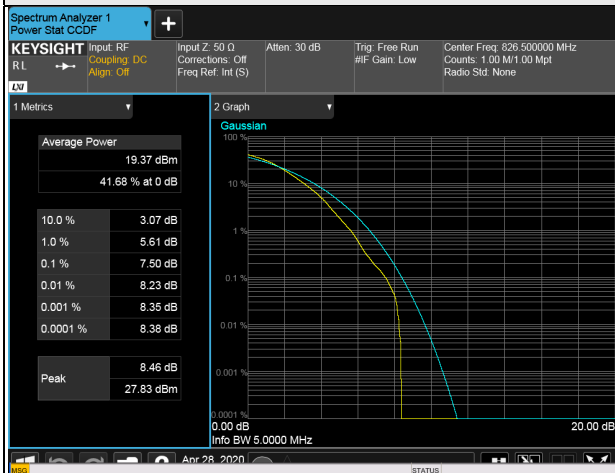
1.4MHz / 256QAM



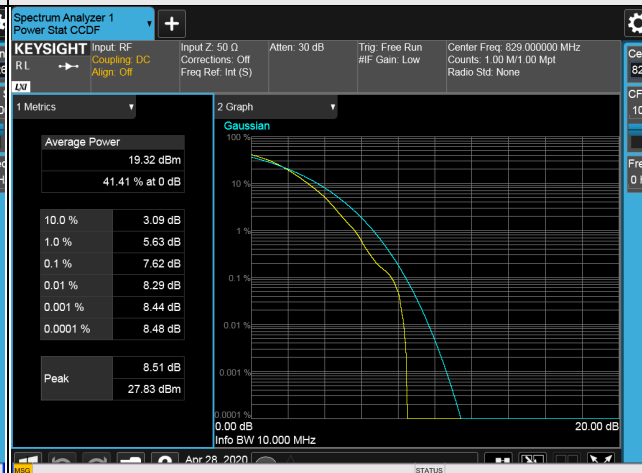
3MHz / 256QAM



5MHz / 256QAM



10MHz / 256QAM

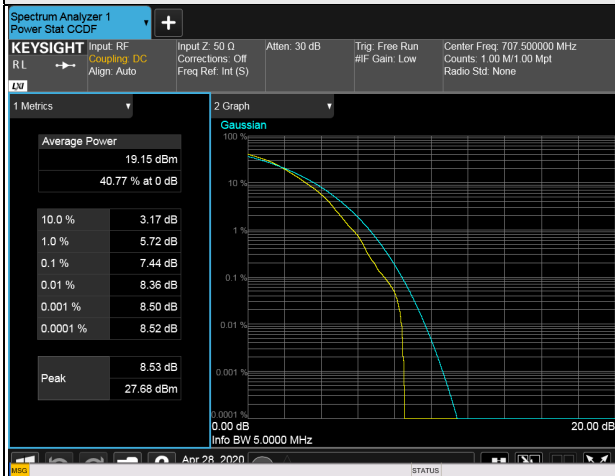


LTE Band 12

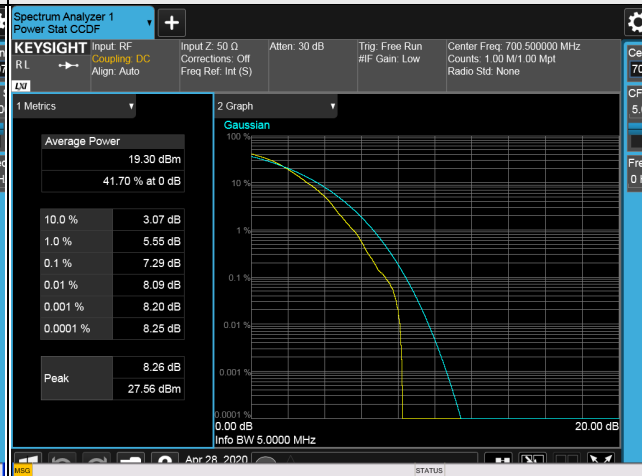
LTE Band 12, Channel Bandwidth 1.4MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
23017	699.7	6.98
23095	707.5	7.44
23173	715.3	6.79
LTE Band 12, Channel Bandwidth 3MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
23025	700.5	7.29
23095	707.5	6.90
23165	714.5	6.85
LTE Band 12, Channel Bandwidth 5MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
23035	701.5	7.00
23095	707.5	6.88
23155	713.5	7.13
LTE Band 12, Channel Bandwidth 10MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
23060	704.0	6.81
23095	707.5	7.04
23130	711.0	7.09

Spectrum Plot of Worst Value

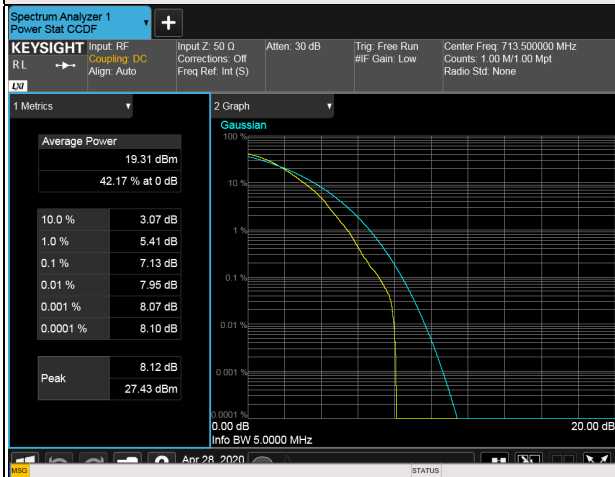
1.4MHz / 256QAM



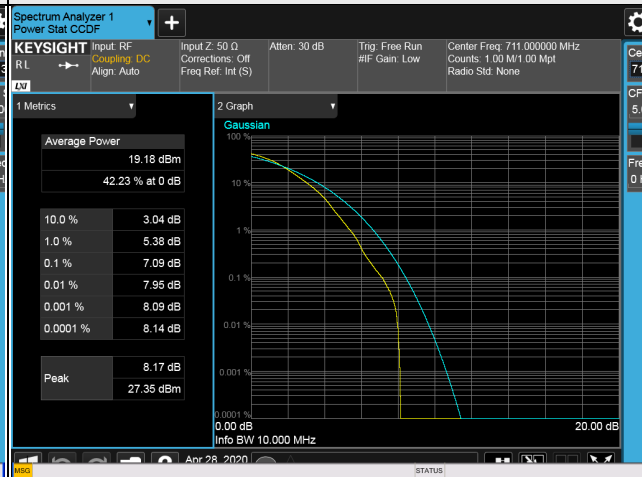
3MHz / 256QAM



5MHz / 256QAM

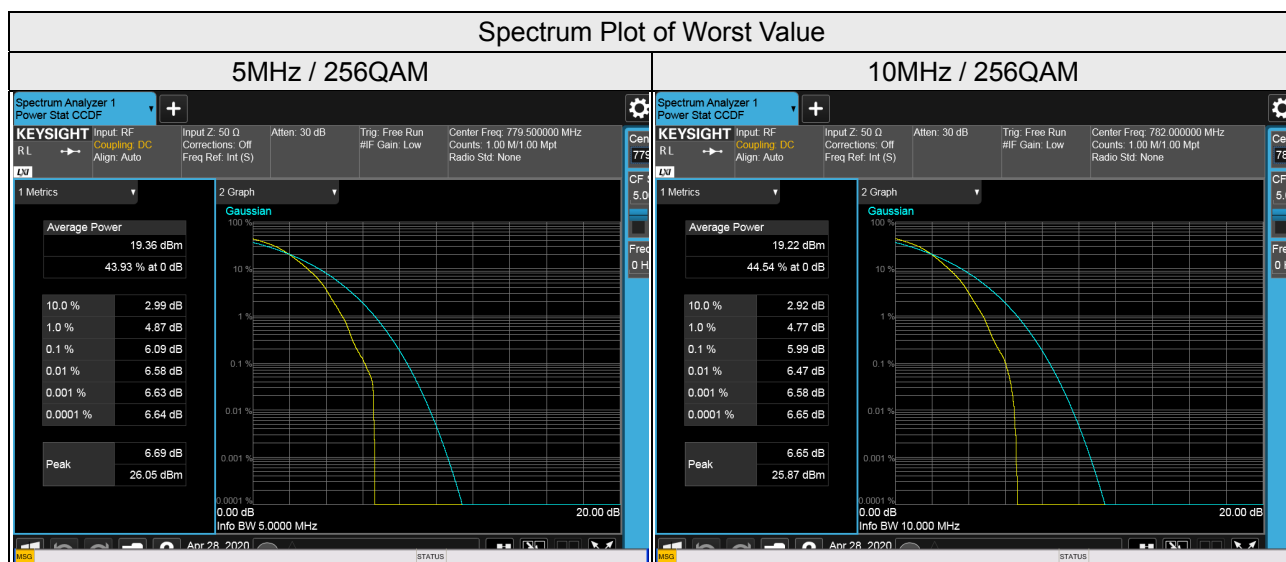


10MHz / 256QAM



LTE Band 13

LTE Band 13, Channel Bandwidth 5MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
23205	779.5	6.09
23230	782.0	5.79
23255	784.5	5.97
LTE Band 13, Channel Bandwidth 10MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
23230	782.0	5.99

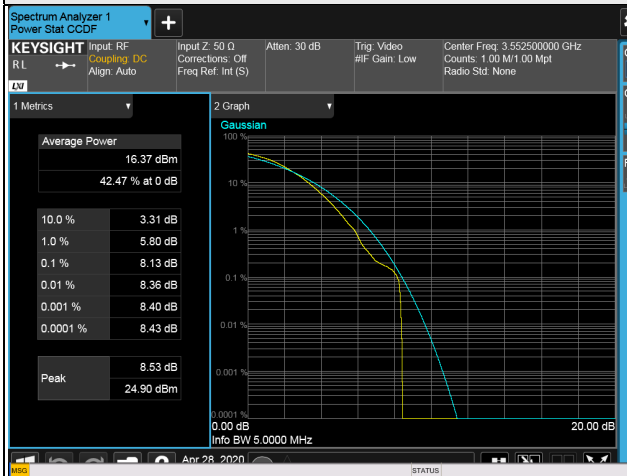


LTE Band 48

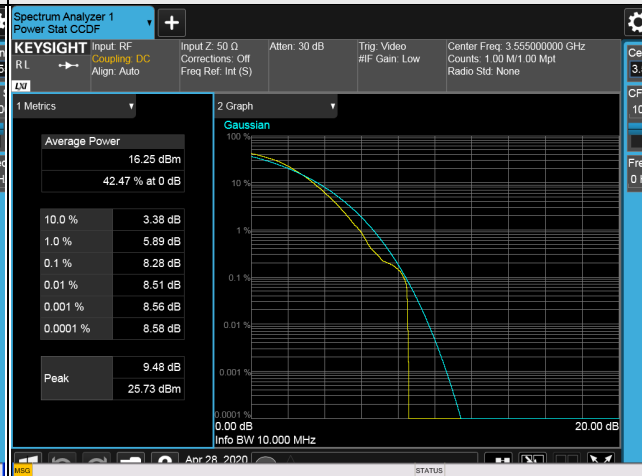
LTE Band 48, Channel Bandwidth 5MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
55265	3552.5	8.13
55990	3625.0	7.89
56715	3697.5	7.72
LTE Band 48, Channel Bandwidth 10MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
55290	3555.0	8.28
55990	3625.0	8.17
56690	3695.0	7.75
LTE Band 48, Channel Bandwidth 15MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
55315	3557.5	7.79
55990	3625.0	7.58
56665	3692.5	7.90
LTE Band 48, Channel Bandwidth 20MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
55340	3560.0	7.79
55990	3625.0	7.71
56640	3690.0	8.12

Spectrum Plot of Worst Value

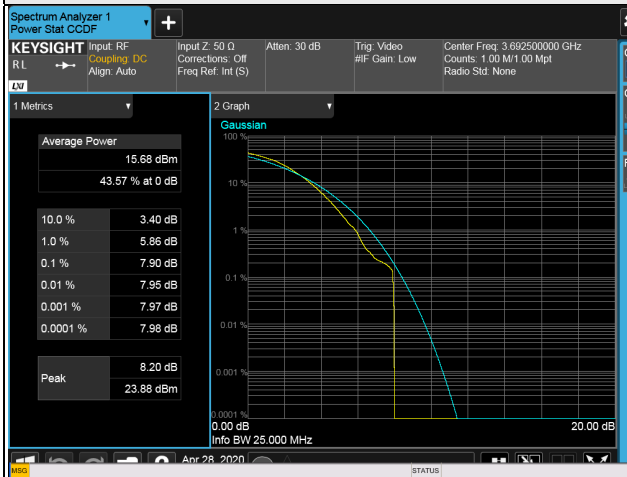
5MHz / 256QAM



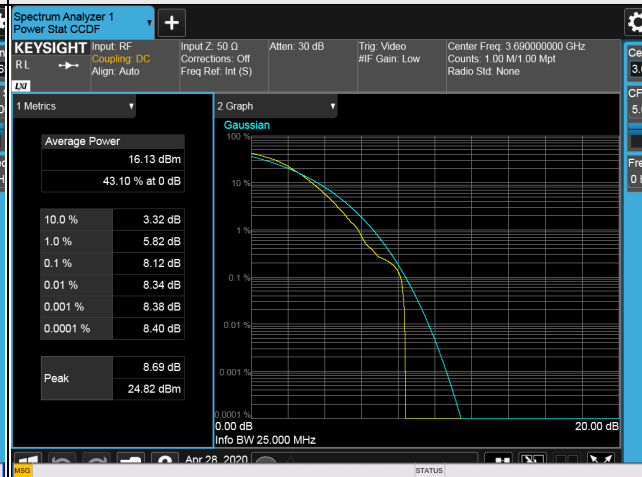
10MHz / 256QAM



15MHz / 256QAM



20MHz / 256QAM



LTE Band 66

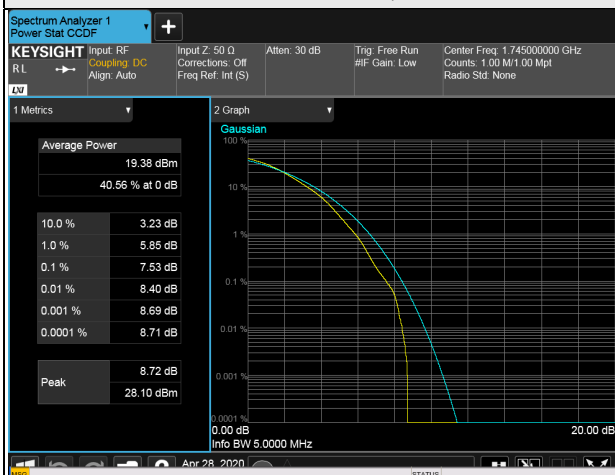
LTE Band 66, Channel Bandwidth 1.4MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
131979	1710.7	7.45
132322	1745.0	7.53
132665	1779.3	7.12
LTE Band 66, Channel Bandwidth 3MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
131987	1711.5	7.45
132322	1745.0	7.38
132657	1778.5	7.23
LTE Band 66, Channel Bandwidth 5MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
131997	1712.5	7.54
132322	1745.0	6.55
132647	1777.5	6.48
LTE Band 66, Channel Bandwidth 10MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
132022	1715.0	7.75
132322	1745.0	7.95
132622	1775.0	7.67
LTE Band 66, Channel Bandwidth 15MHz		
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
132047	1717.5	7.96
132322	1745.0	7.91
132597	1772.5	7.17

LTE Band 66, Channel Bandwidth 20MHz

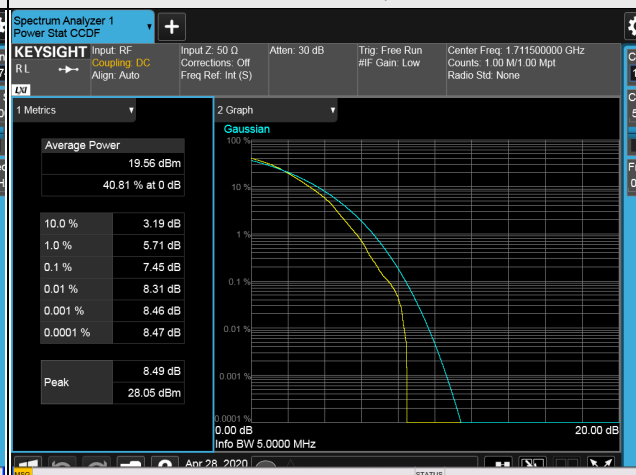
Channel	Frequency (MHz)	Peak To Average Ratio (dB)
		256QAM
132072	1720.0	7.58
132322	1745.0	7.61
132572	1770.0	7.20

Spectrum Plot of Worst Value

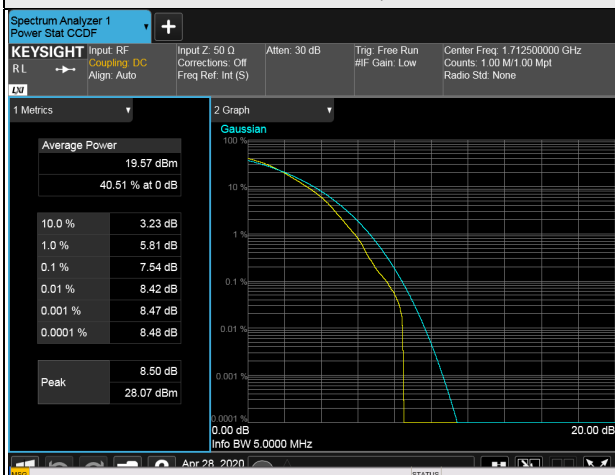
1.4MHz / 256QAM



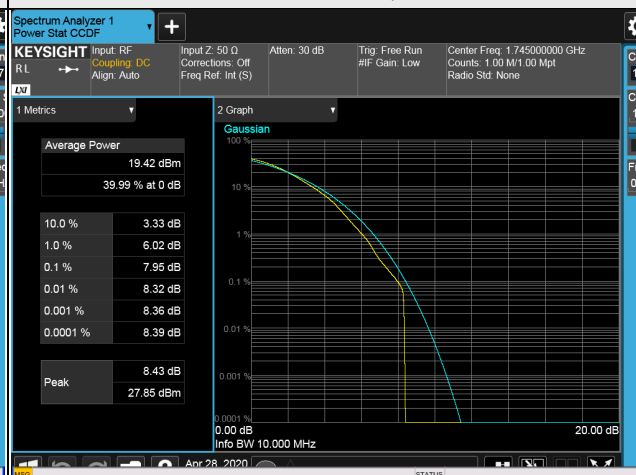
3MHz / 256QAM



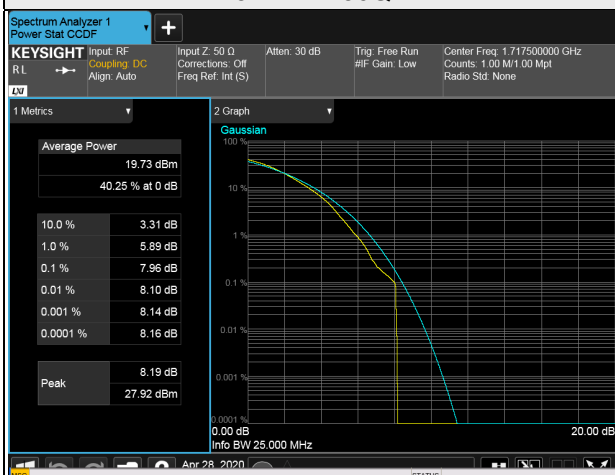
5MHz / 256QAM



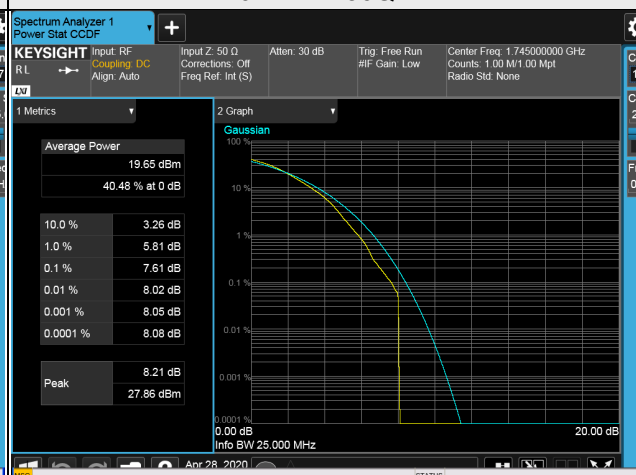
10MHz / 256QAM



15MHz / 256QAM



20MHz / 256QAM



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 -13dBm .

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 .

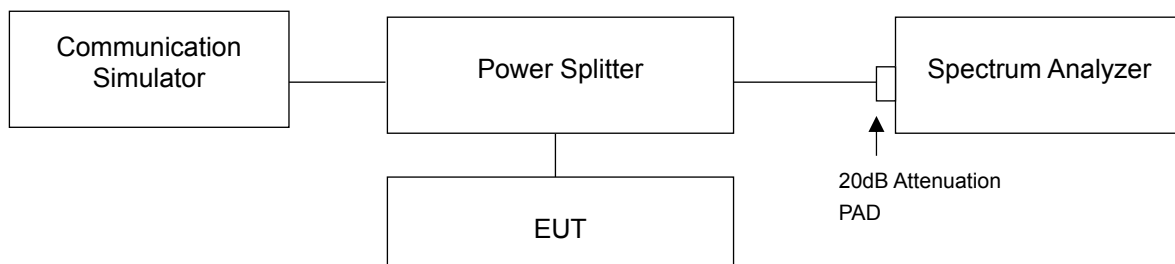
For LTE Band 48

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 -13dBm .

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.

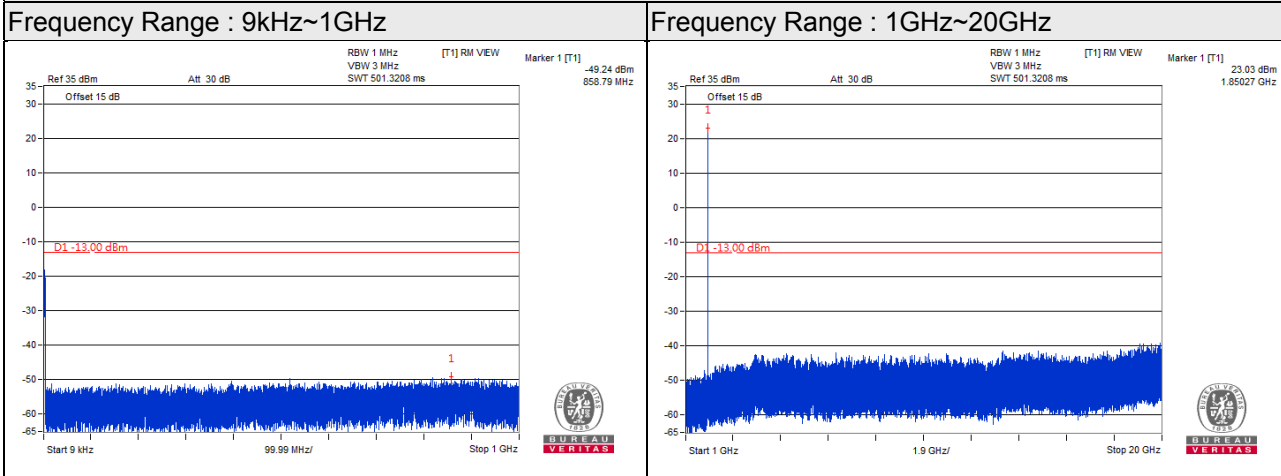
For LTE Band 48

- 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.

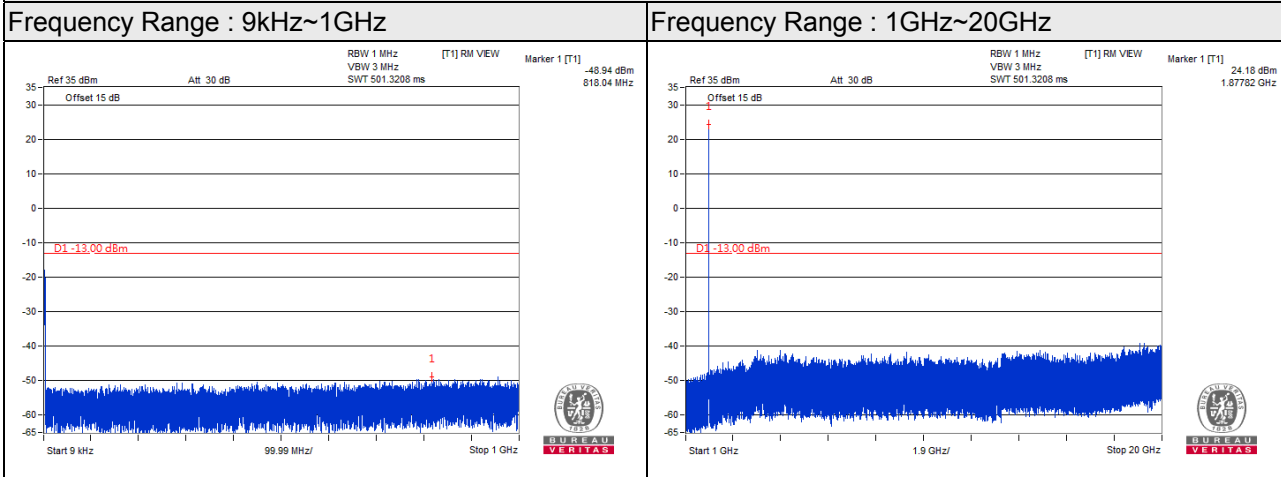
4.7.4 Test Results

n2, Channel Bandwidth 5MHz

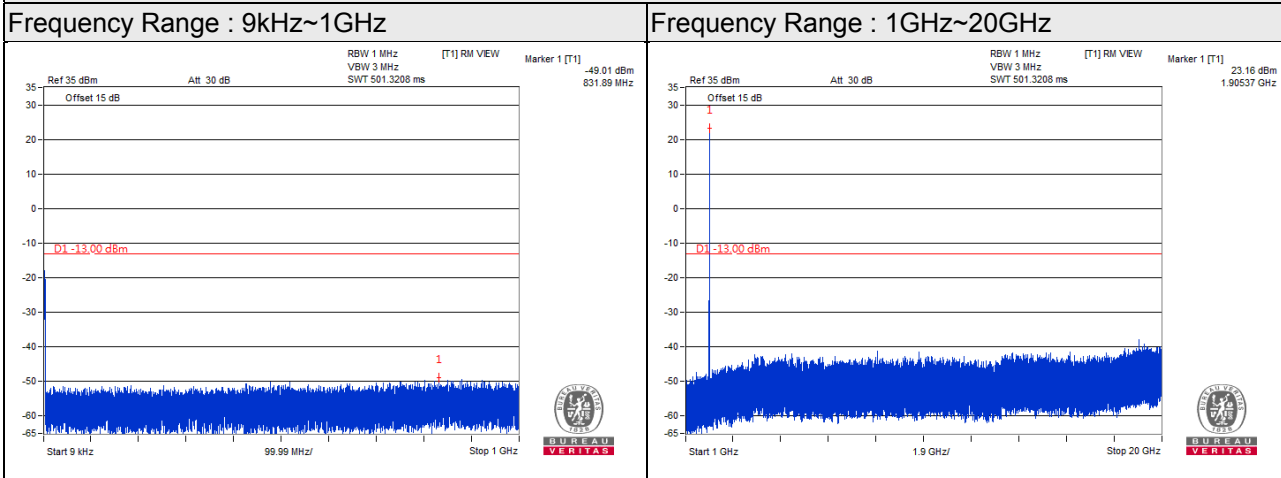
Channel 370500 (1852.50MHz)



Channel 376000 (1880.00MHz)



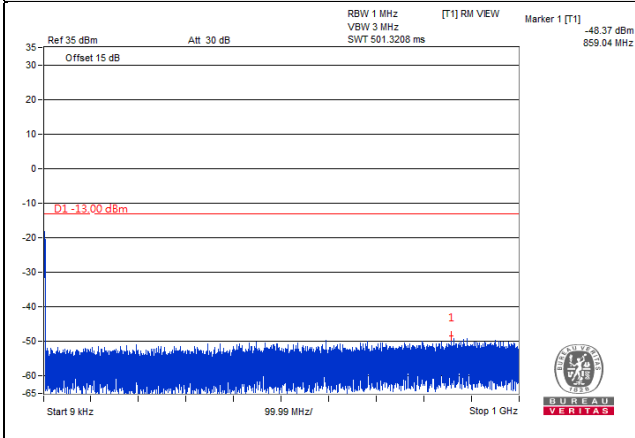
Channel 381500 (1907.50MHz)



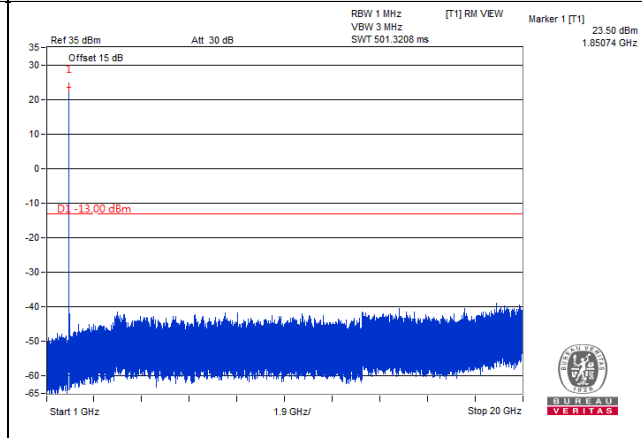
n2, Channel Bandwidth 10MHz

Channel 371000 (1855.00MHz)

Frequency Range : 9kHz~1GHz

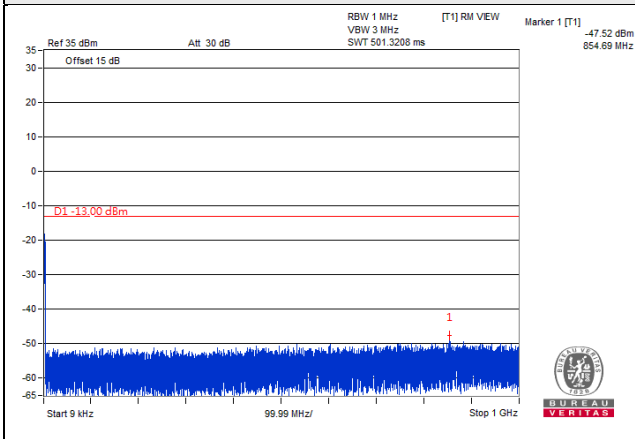


Frequency Range : 1GHz~20GHz

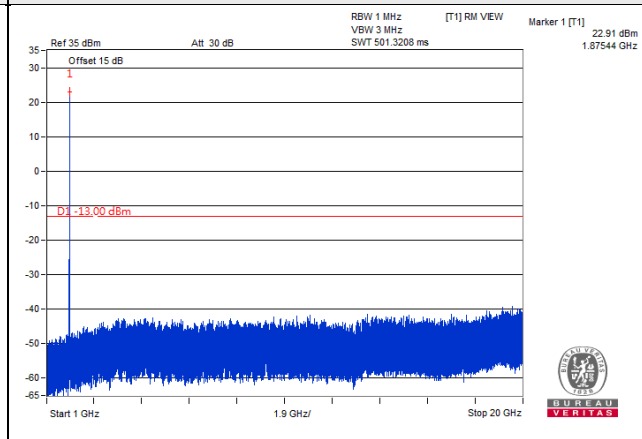


Channel 376000 (1880.00MHz)

Frequency Range : 9kHz~1GHz

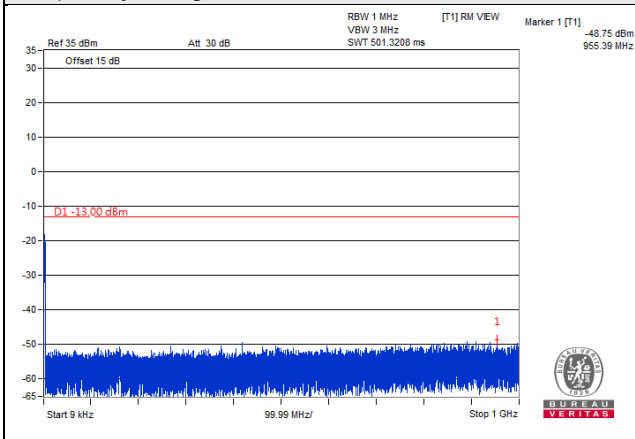


Frequency Range : 1GHz~20GHz

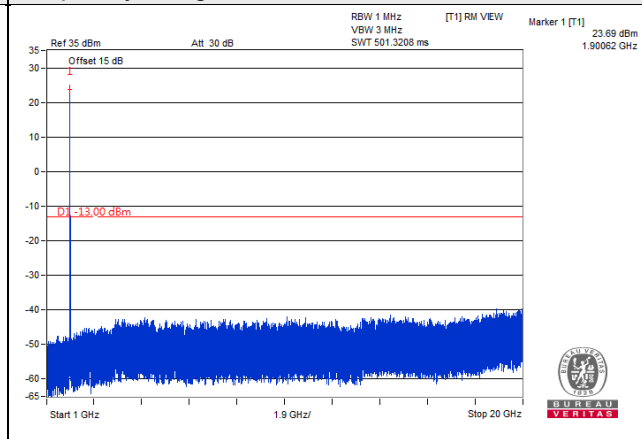


Channel 381000 (1905.00MHz)

Frequency Range : 9kHz~1GHz



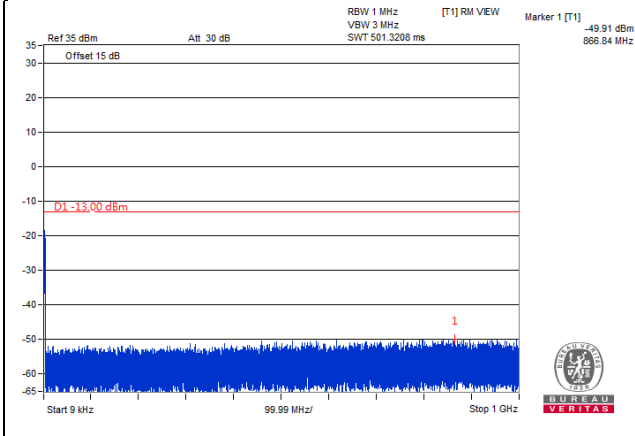
Frequency Range : 1GHz~20GHz



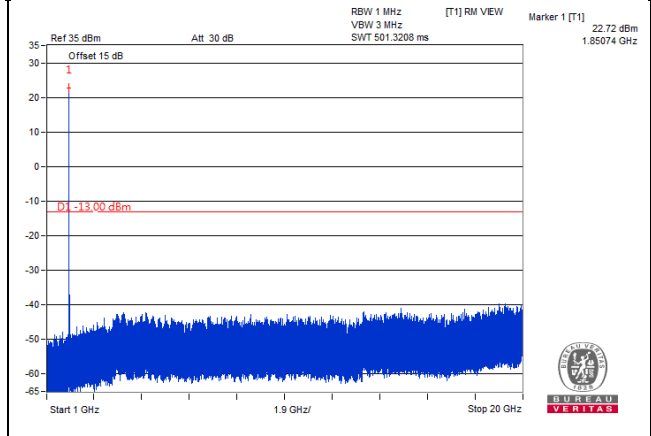
n2, Channel Bandwidth 15MHz

Channel 371500 (1857.50MHz)

Frequency Range : 9kHz~1GHz

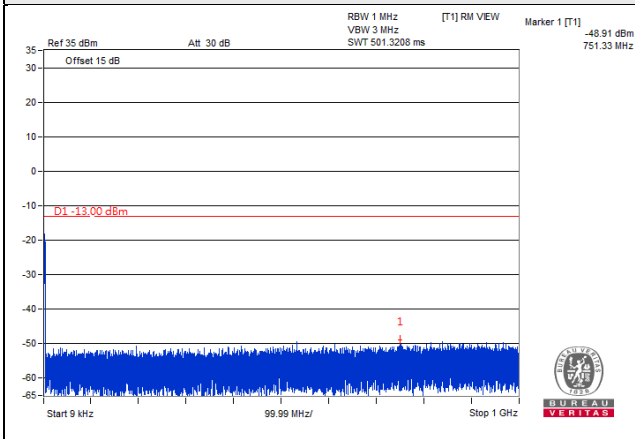


Frequency Range : 1GHz~20GHz

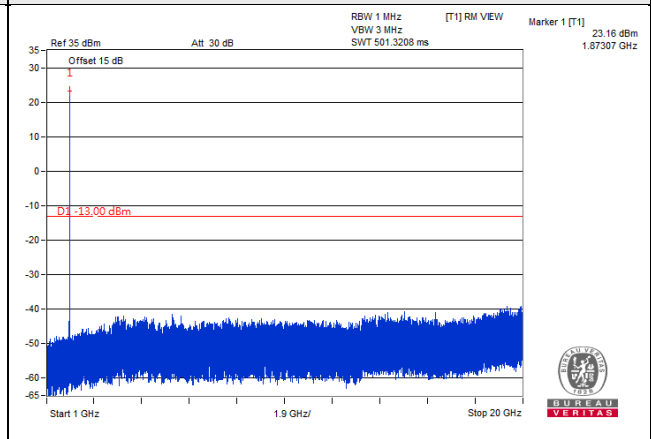


Channel 376000 (1880.00MHz)

Frequency Range : 9kHz~1GHz

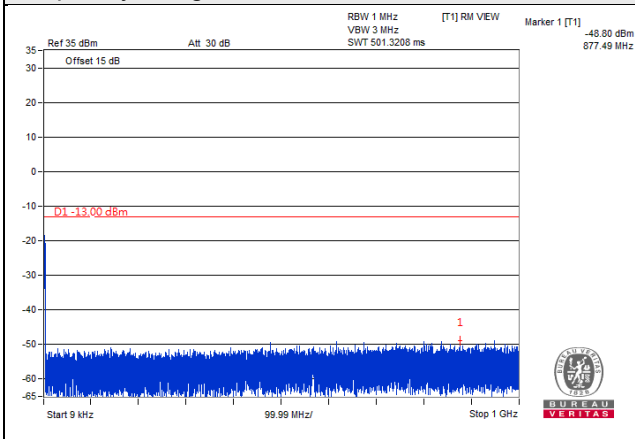


Frequency Range : 1GHz~20GHz

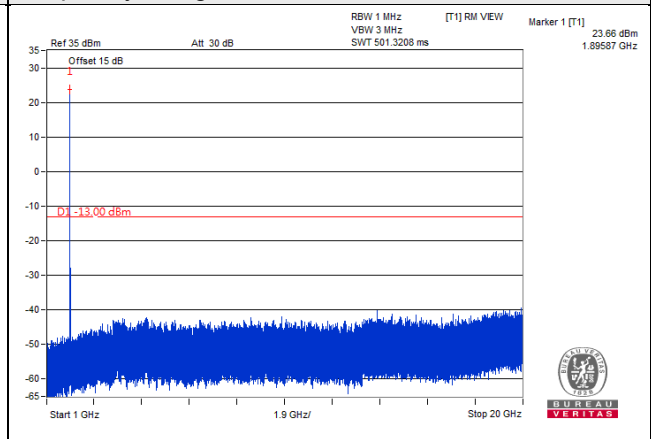


Channel 380500 (1902.50MHz)

Frequency Range : 9kHz~1GHz



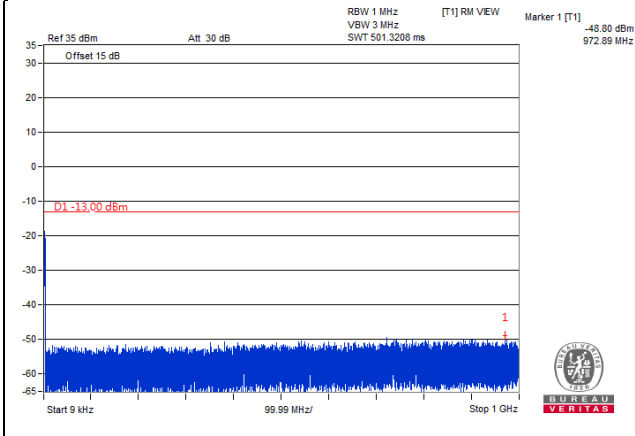
Frequency Range : 1GHz~20GHz



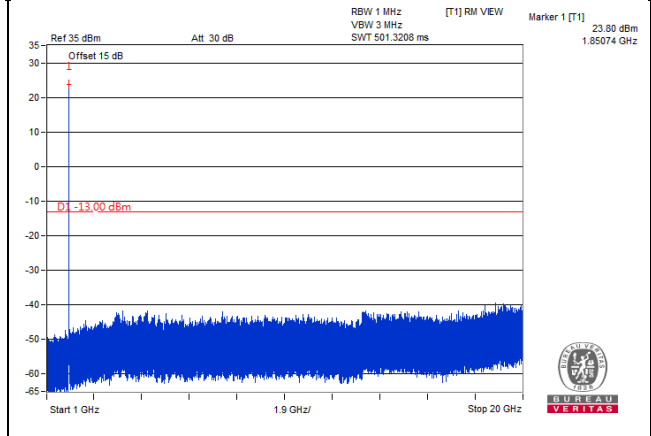
n2, Channel Bandwidth 20MHz

Channel 372000 (1860.00MHz)

Frequency Range : 9kHz~1GHz

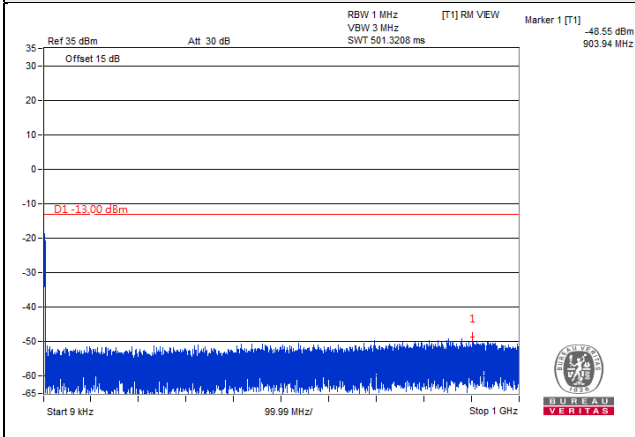


Frequency Range : 1GHz~20GHz

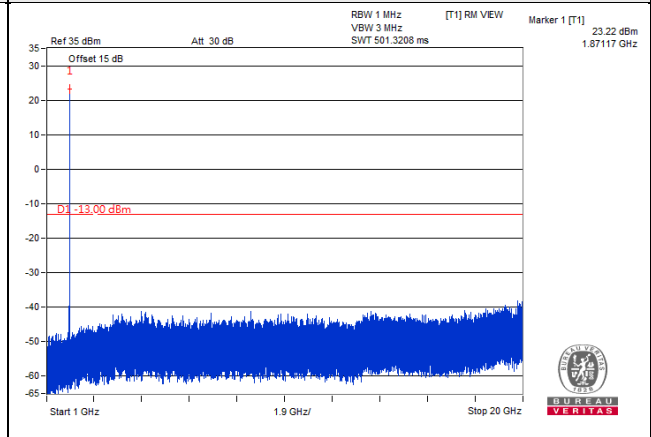


Channel 376000 (1880.00MHz)

Frequency Range : 9kHz~1GHz

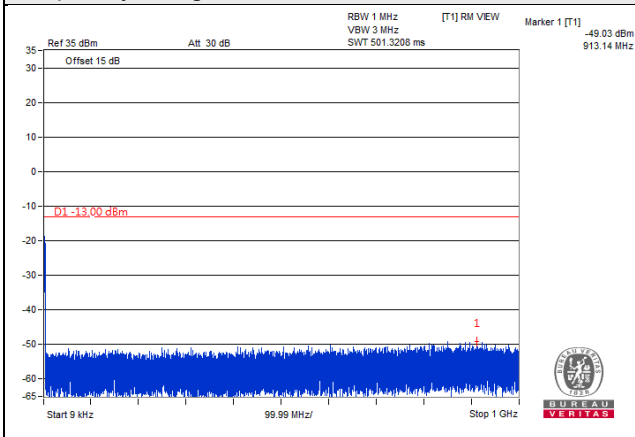


Frequency Range : 1GHz~20GHz

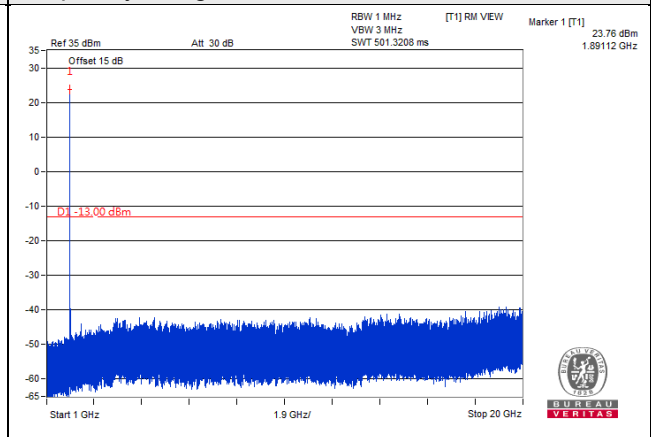


Channel 380000 (1900.00MHz)

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~20GHz

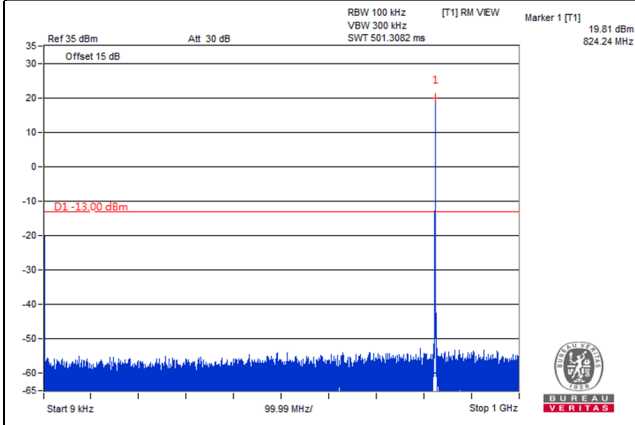


*The 9kHz signal over the limit is from Spectrum.

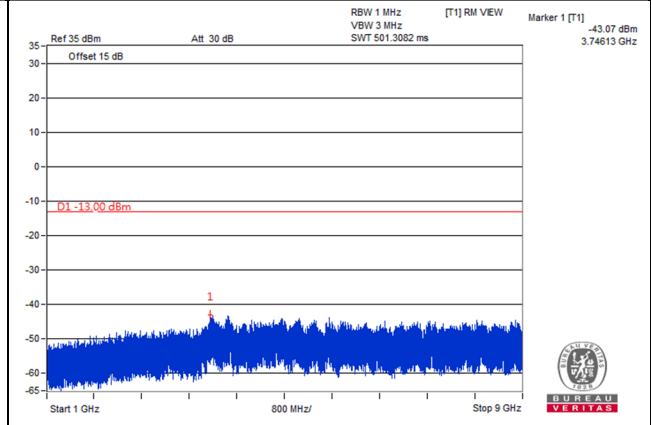
LTE Band 5, Channel Bandwidth 1.4MHz

Channel 20407 (824.7MHz)

Frequency Range : 9kHz~1GHz

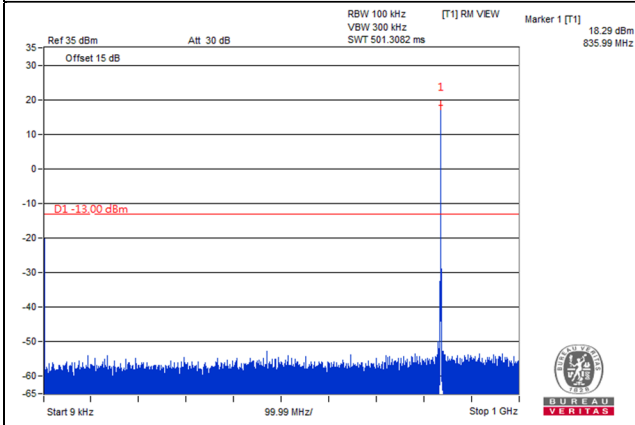


Frequency Range : 1GHz~9GHz

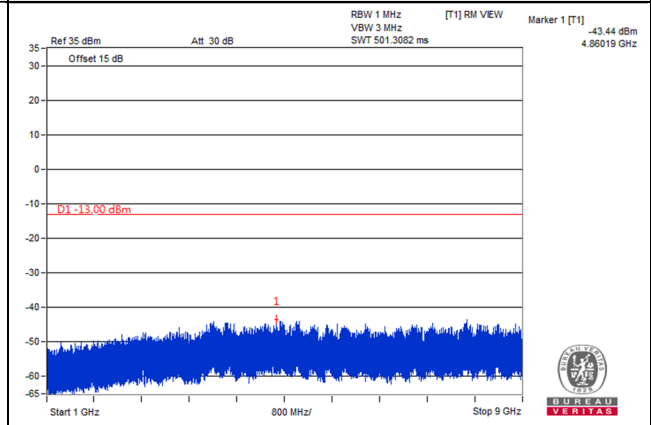


Channel 20525 (836.5MHz)

Frequency Range : 9kHz~1GHz

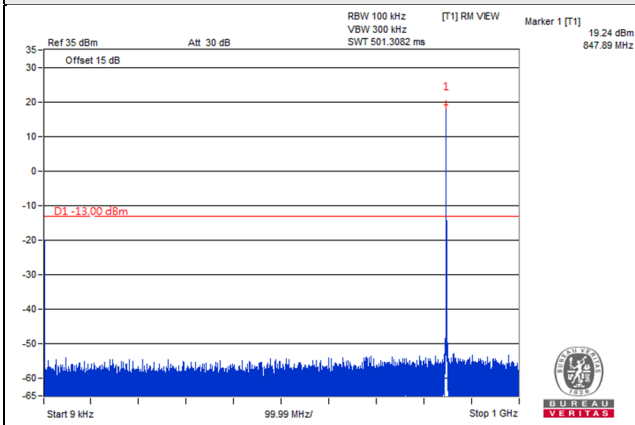


Frequency Range : 1GHz~9GHz

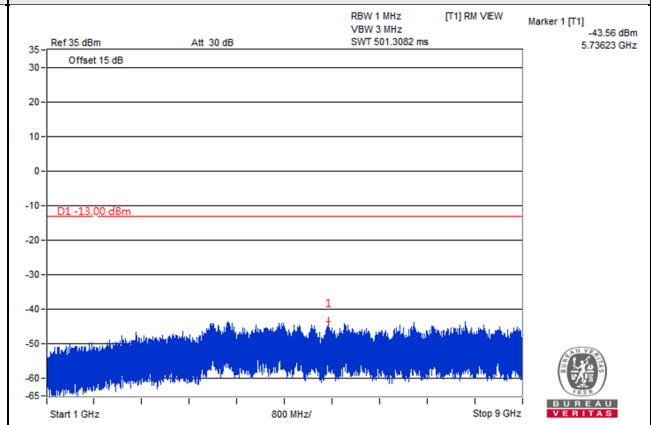


Channel 20643 (848.3MHz)

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~9GHz

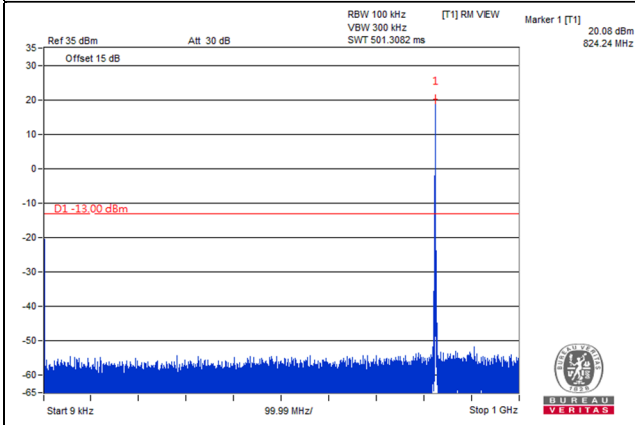


*The 9kHz signal over the limit is from Spectrum.

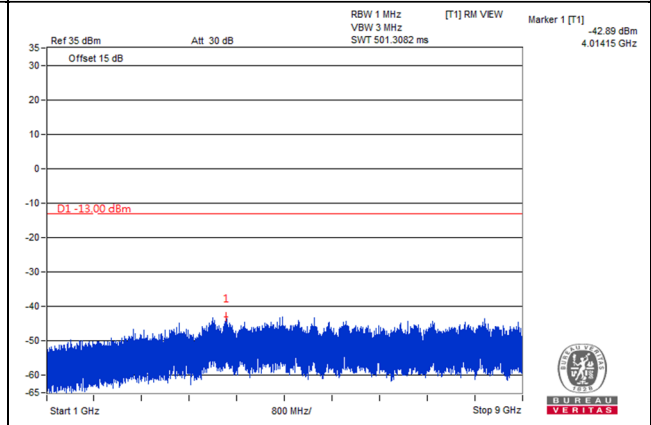
LTE Band 5, Channel Bandwidth 3MHz

Channel 20415 (825.5MHz)

Frequency Range : 9kHz~1GHz

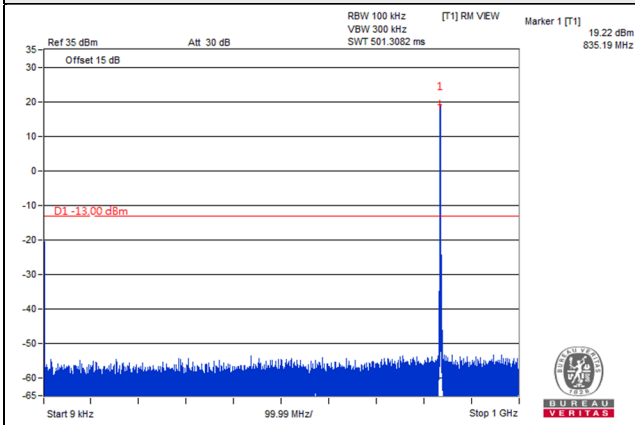


Frequency Range : 1GHz~9GHz

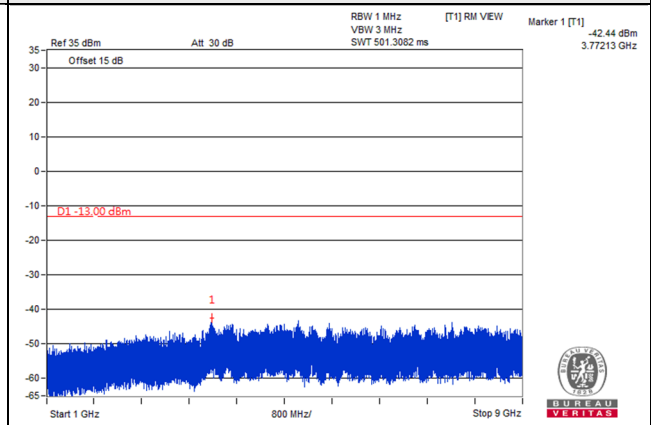


Channel 20525 (836.5MHz)

Frequency Range : 9kHz~1GHz

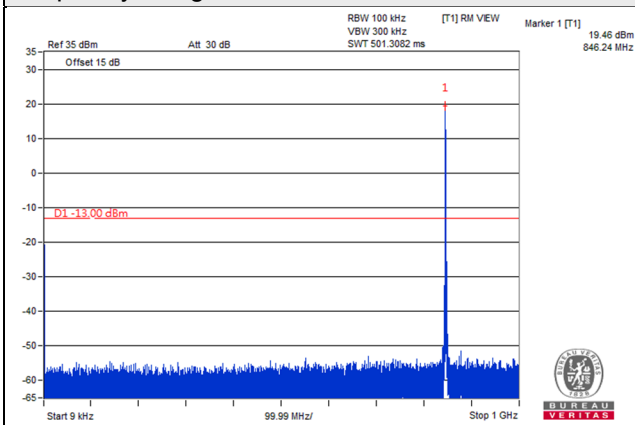


Frequency Range : 1GHz~9GHz

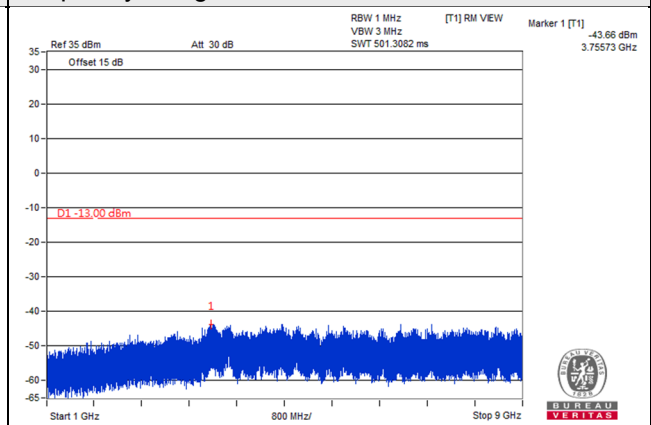


Channel 20635 (847.5MHz)

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~9GHz

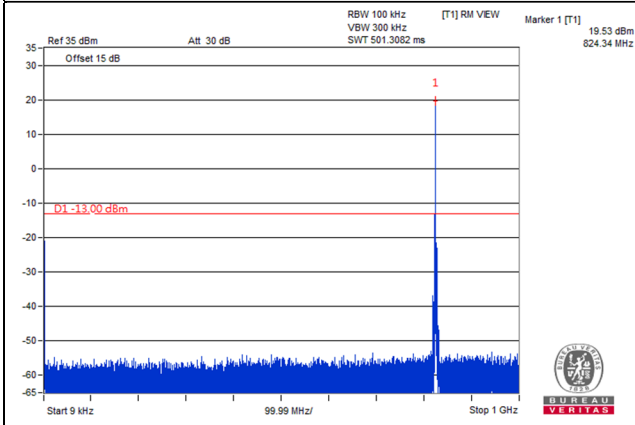


*The 9kHz signal over the limit is from Spectrum.

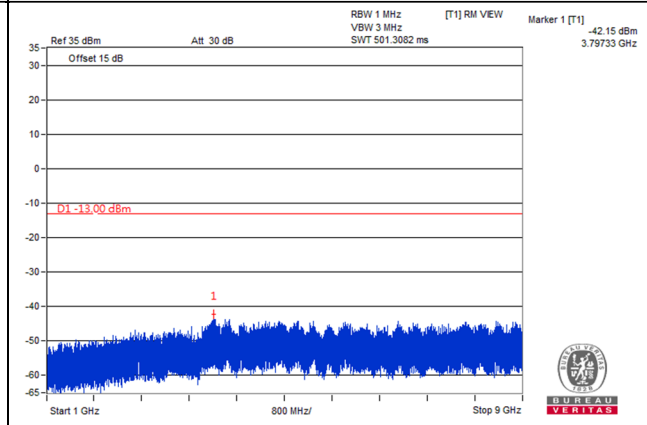
LTE Band 5, Channel Bandwidth 5MHz

Channel 20425 (826.5MHz)

Frequency Range : 9kHz~1GHz

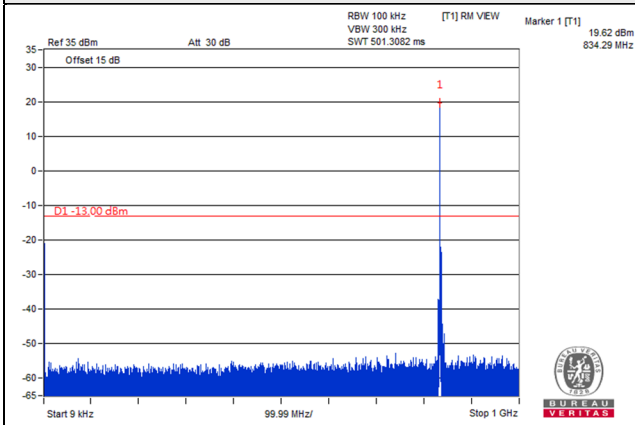


Frequency Range : 1GHz~9GHz

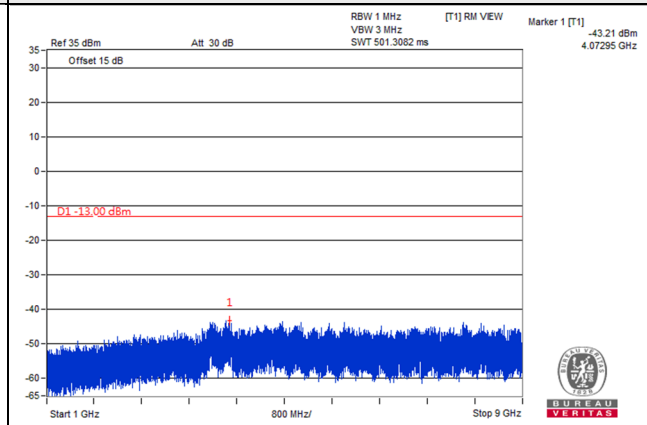


Channel 20525 (836.5MHz)

Frequency Range : 9kHz~1GHz

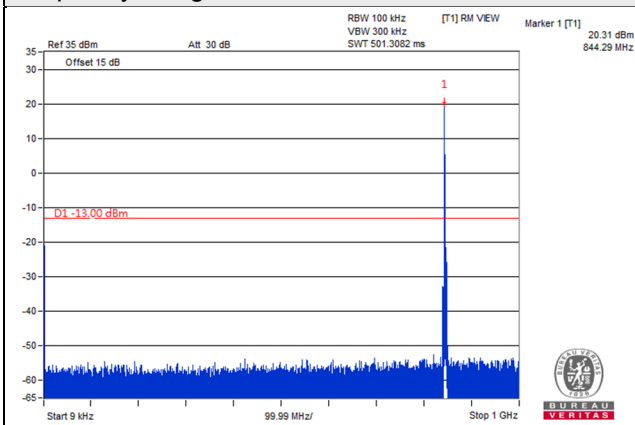


Frequency Range : 1GHz~9GHz

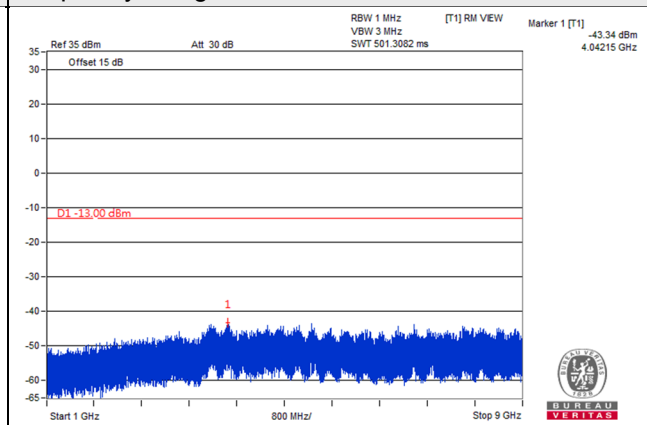


Channel 20625 (846.5MHz)

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~9GHz



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