

LTE Band 12

Channel Bandwidth: 1.4MHz

Channel 23017
(699.7MHz)

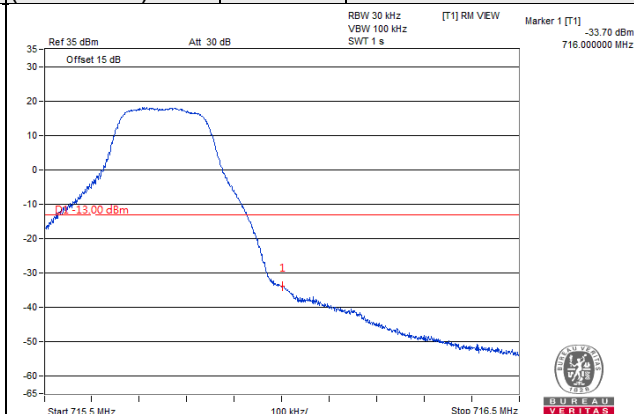
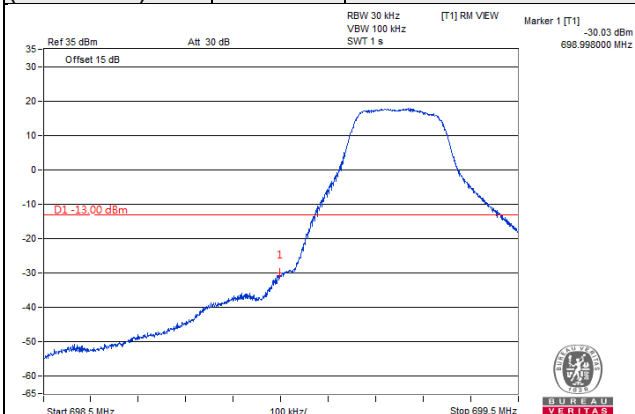
QPSK

1 RB / 0 RB Offset

Channel 23173
(715.3MHz)

QPSK

1 RB / 5 RB Offset



Channel 23017
(699.7MHz)

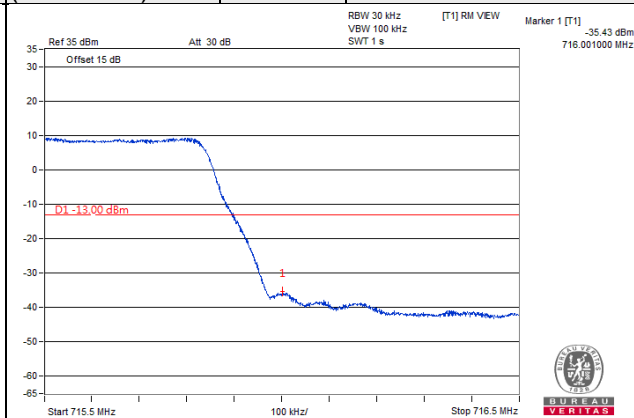
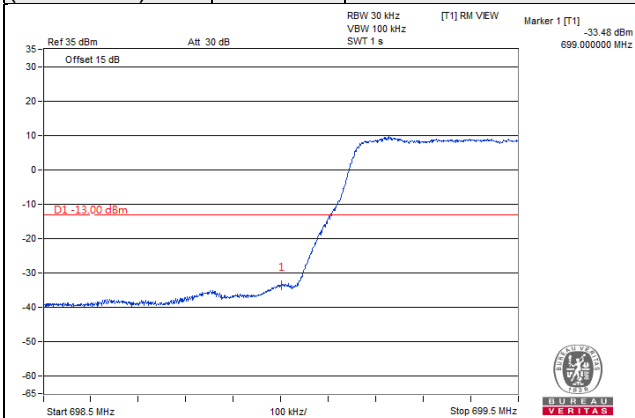
QPSK

6 RB / 0 RB Offset

Channel 23173
(715.3MHz)

QPSK

6 RB / 0 RB Offset



Channel Bandwidth: 3MHz

Channel 23025
(700.5MHz)

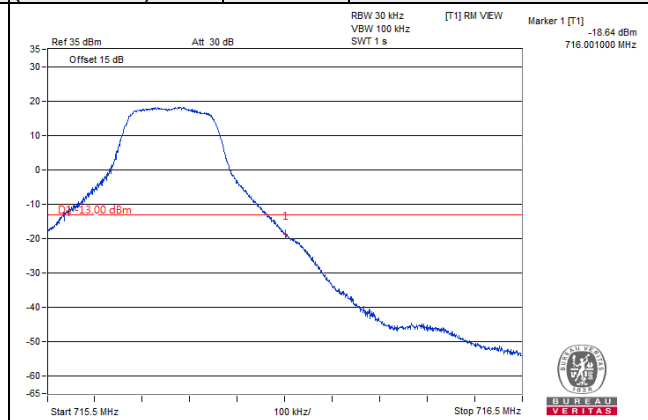
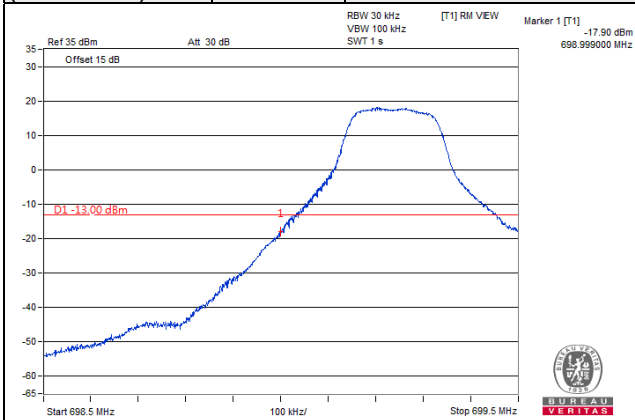
QPSK

1 RB / 0 RB Offset

Channel 23165
(714.5MHz)

QPSK

1 RB / 14RB Offset



Channel 23025
(700.5MHz)

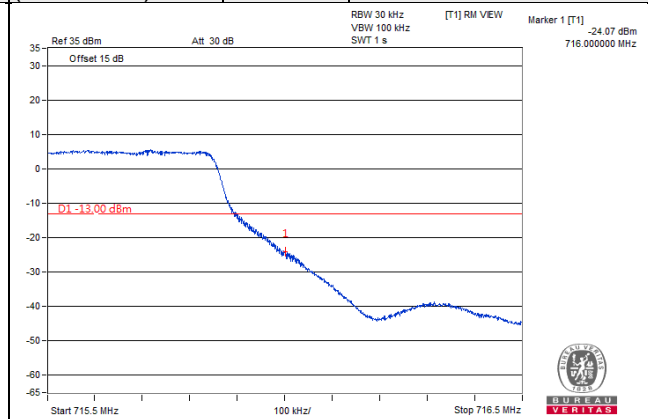
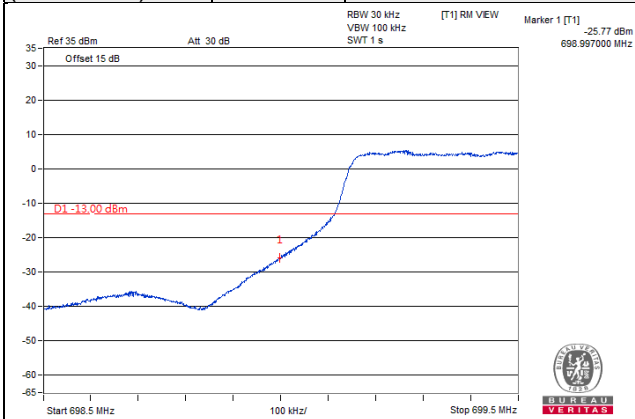
QPSK

15 RB / 0 RB Offset

Channel 23165
(714.5MHz)

QPSK

15 RB / 0 RB Offset





BUREAU VERITAS

Channel Bandwidth: 5MHz

Channel 23035
(701.5MHz)

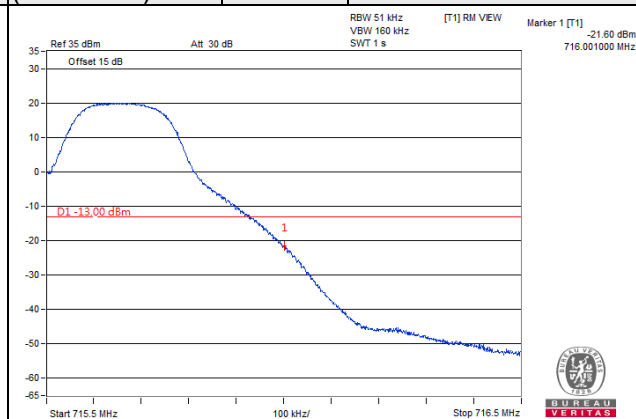
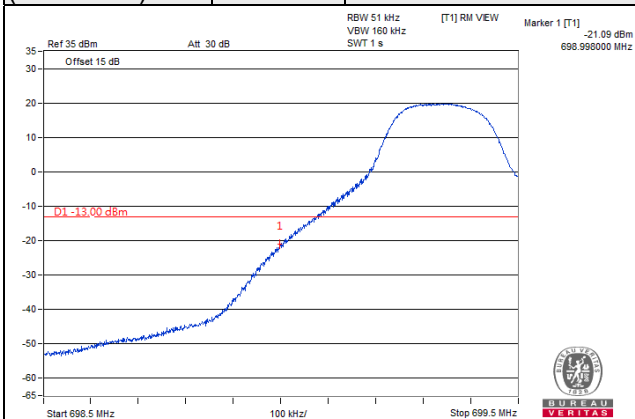
QPSK

1 RB / 0 RB Offset

Channel 23155
(713.5MHz)

QPSK

1 RB / 24RB Offset



Channel 23035
(701.5MHz)

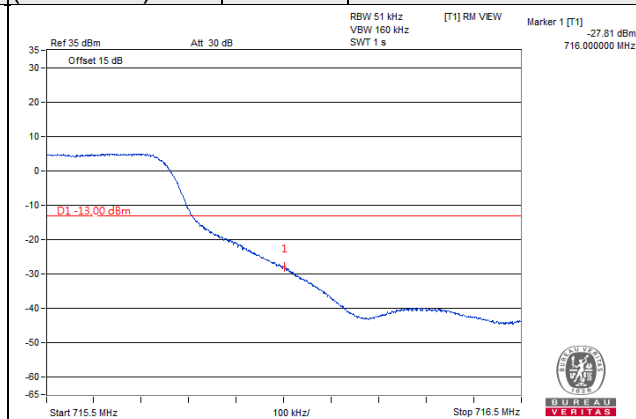
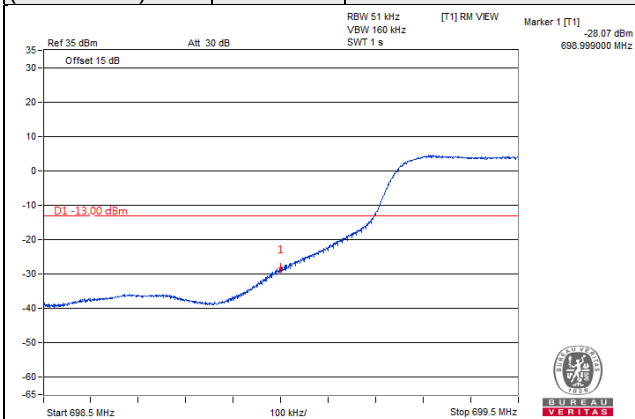
QPSK

25 RB / 0 RB Offset

Channel 23155
(713.5MHz)

QPSK

25 RB / 0 RB Offset



Channel Bandwidth: 10MHz

Channel 23060
(704MHz)

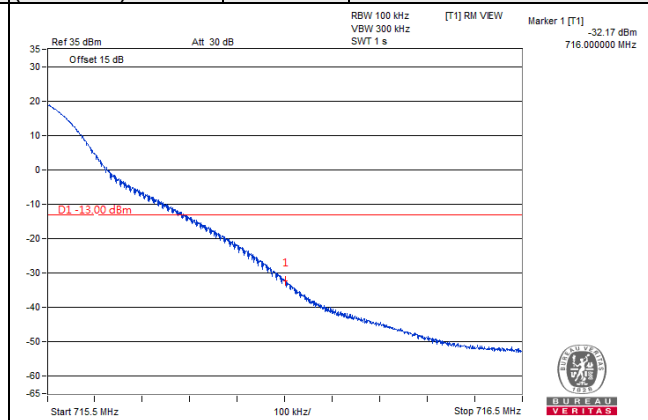
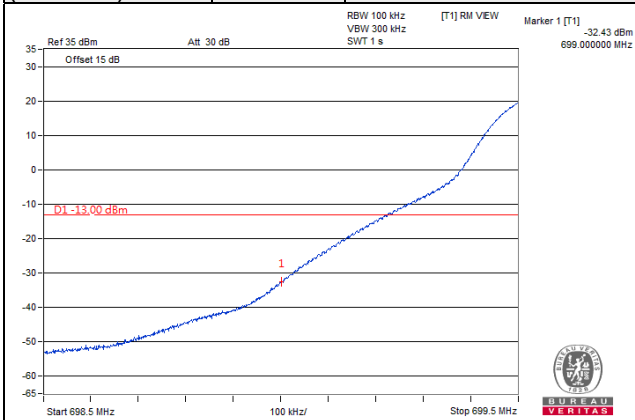
QPSK

1 RB / 0 RB Offset

Channel 23130
(711MHz)

QPSK

1 RB / 24RB Offset



Channel 23060
(704MHz)

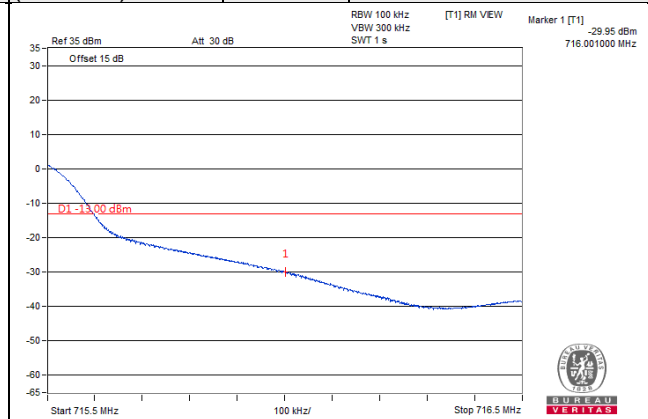
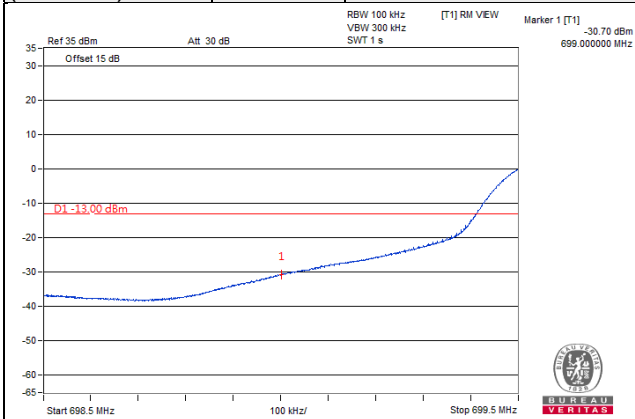
QPSK

50 RB / 0 RB Offset

Channel 23130
(711MHz)

QPSK

25 RB / 0 RB Offset



LTE Band 13

Channel Bandwidth: 5MHz

Channel 23205
(779.5MHz)

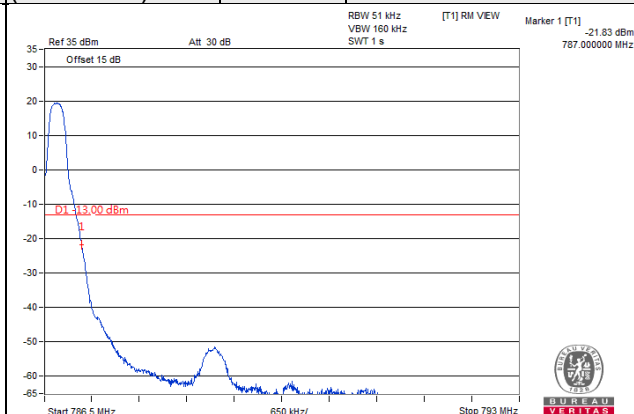
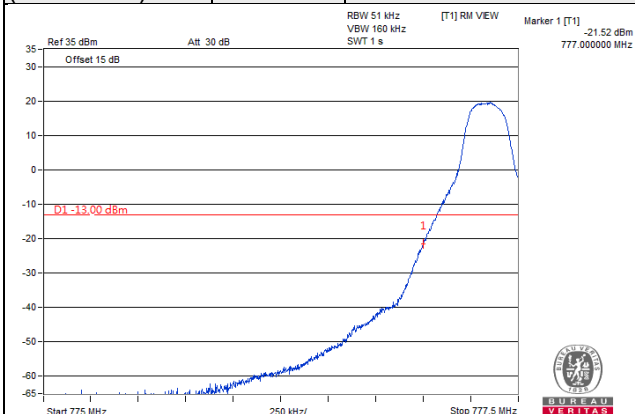
QPSK

1 RB / 0 RB Offset

Channel 23255
(784.5MHz)

QPSK

1 RB / 24 RB Offset



Channel 23205
(779.5MHz)

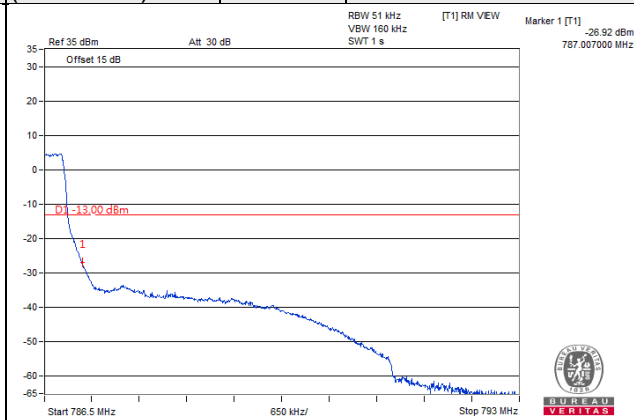
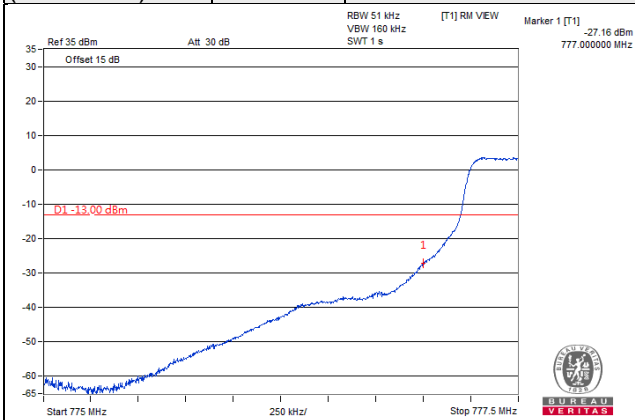
QPSK

25 RB / 0 RB Offset

Channel 23255
(784.5MHz)

QPSK

25 RB / 0 RB Offset





BUREAU VERITAS

Channel Bandwidth: 10MHz

Channel 23230
(782.0MHz)

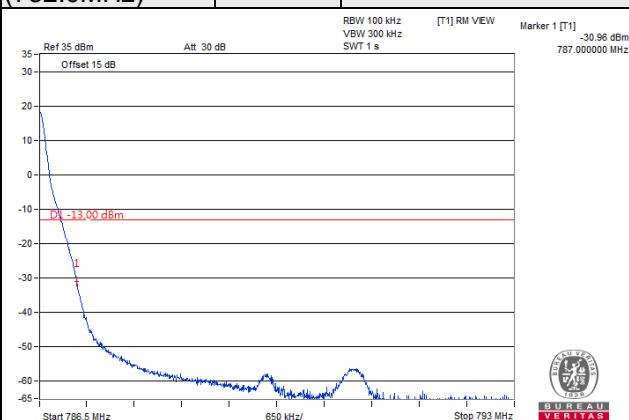
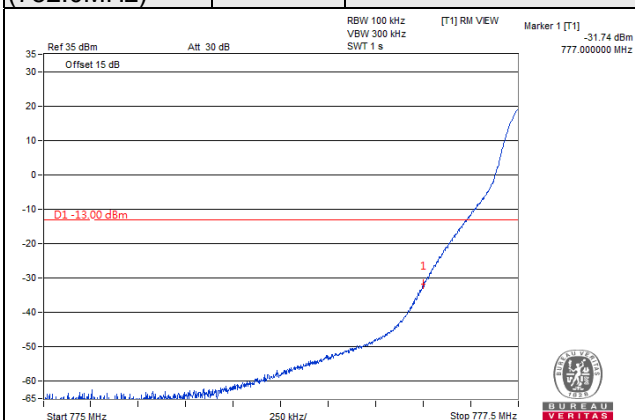
QPSK

1 RB / 0 RB Offset

Channel 23230
(782.0MHz)

QPSK

1 RB / 49 RB Offset



Channel 23230
(782.0MHz)

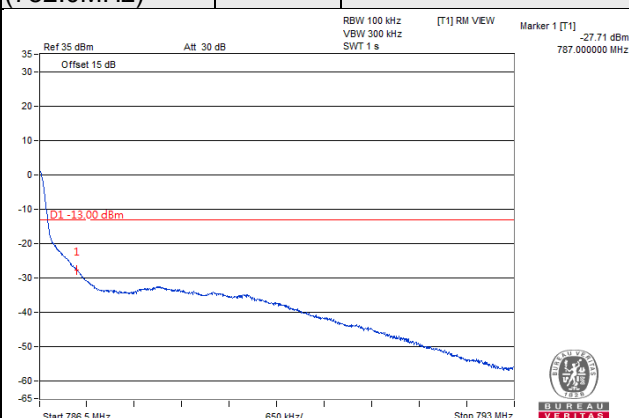
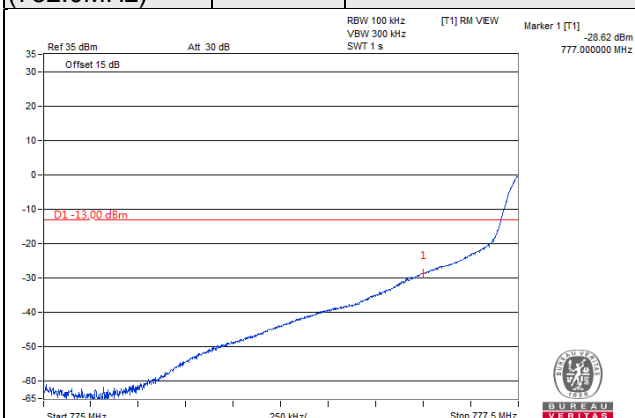
QPSK

50 RB / 0 RB Offset

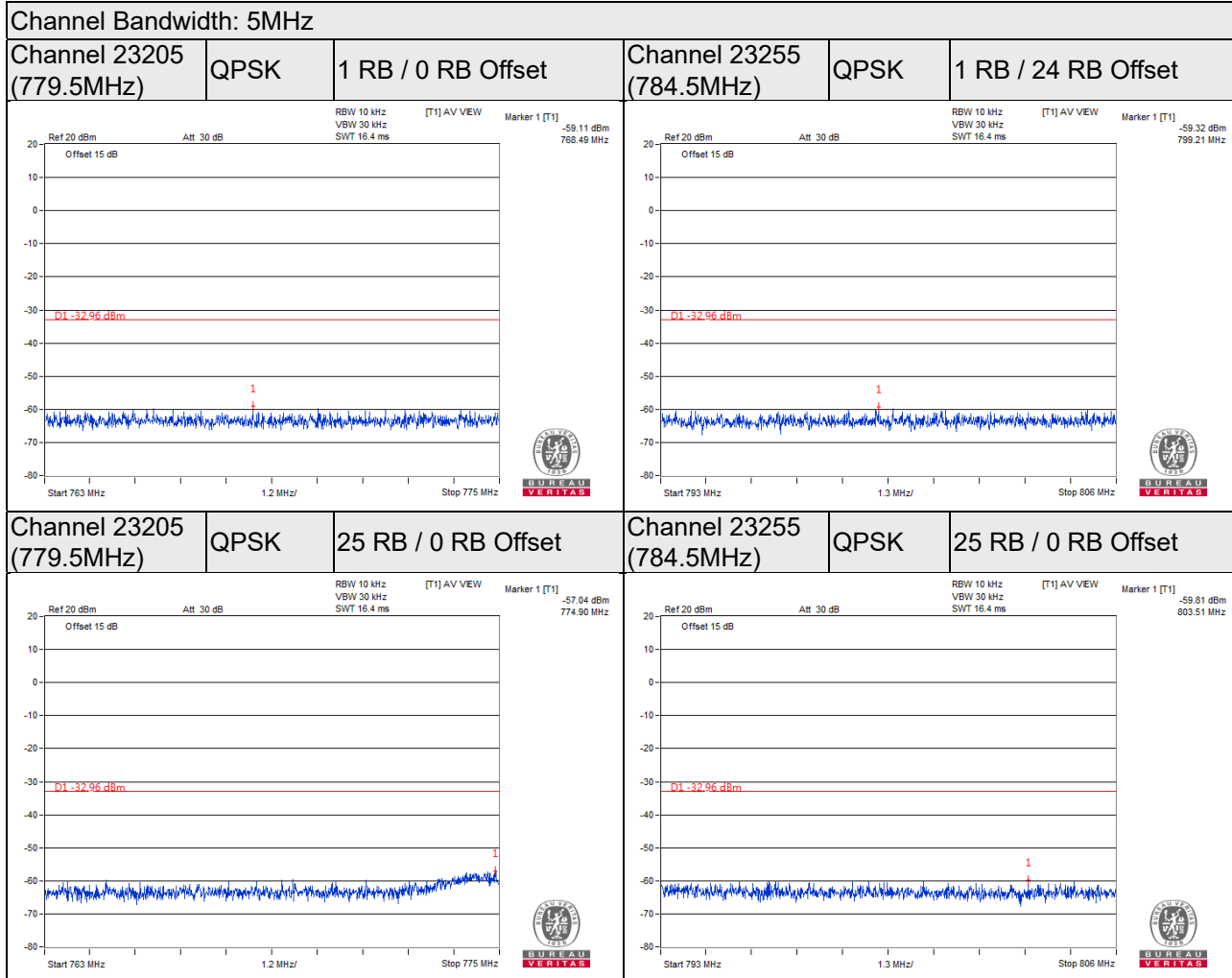
Channel 23230
(782.0MHz)

QPSK

50 RB / 0 RB Offset



Emission Mask



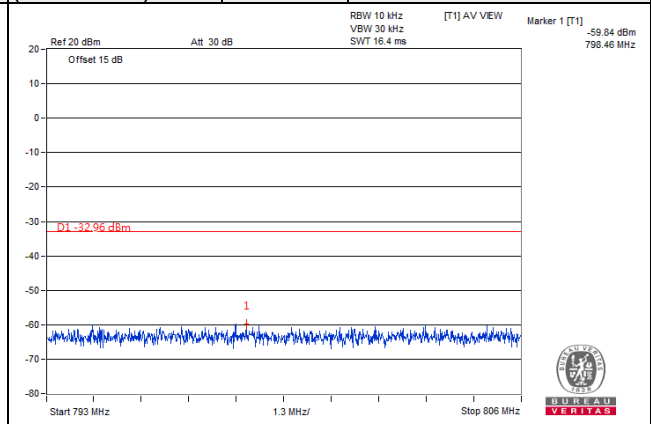
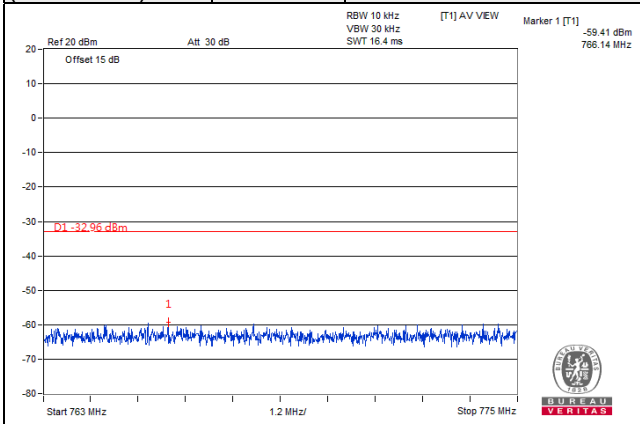
For the 763 - 775 MHz and 793 - 805 MHz band, the FCC limit is $65+10\log(P[\text{watt}])$ in a 6.25 kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance. By using a 10 kHz bandwidth on the spectrum analyzer.

$$10\log(10\text{kHz}/6.25\text{kHz}) = 2.04 \text{ dB}$$

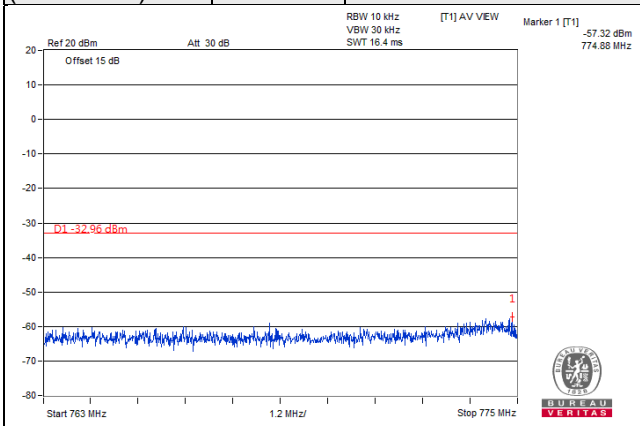
$$\text{Limit line} = -35 \text{ dBm} + 2.04 \text{ dB} = -32.96 \text{ dBm}$$

Channel Bandwidth: 10MHz

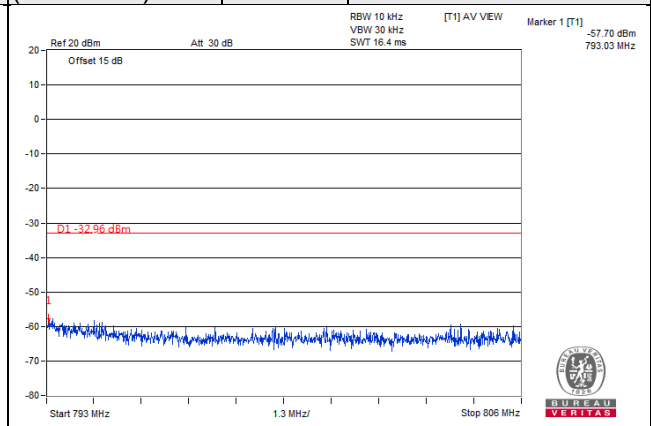
Channel 23230 (782.0MHz)	QPSK	1 RB / 0 RB Offset	Channel 23230 (782.0MHz)	QPSK	1 RB / 49 RB Offset
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Channel 23230 (782.0MHz)	QPSK	50 RB / 0 RB Offset
-----------------------------	------	---------------------



Channel 23230 (782.0MHz)	QPSK	50 RB / 0 RB Offset
-----------------------------	------	---------------------



For the 763 - 775 MHz and 793 - 805 MHz band, the FCC limit is $65 + 10\log(P[\text{watt}])$ in a 6.25 kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance. By using a 10 kHz bandwidth on the spectrum analyzer.

$$10\log(10\text{kHz}/6.25\text{kHz}) = 2.04 \text{ dB}$$

$$\text{Limit line} = -35 \text{ dBm} + 2.04 \text{ dB} = -32.96 \text{ dBm}$$

LTE Band 17

Channel Bandwidth: 5MHz

Channel 23755
(706.5MHz)

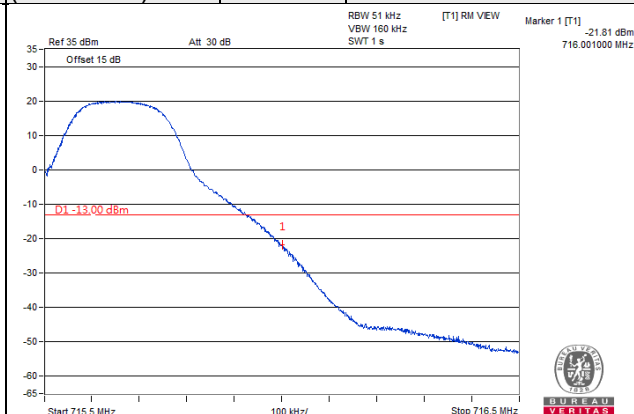
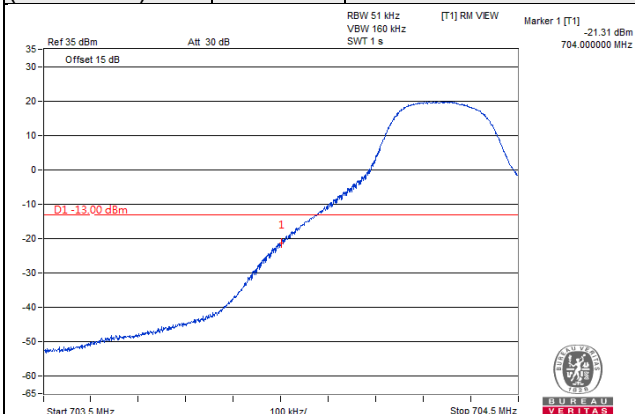
QPSK

1 RB / 0 RB Offset

Channel 23825
(713.5MHz)

QPSK

1 RB / 24 RB Offset



Channel 23755
(706.5MHz)

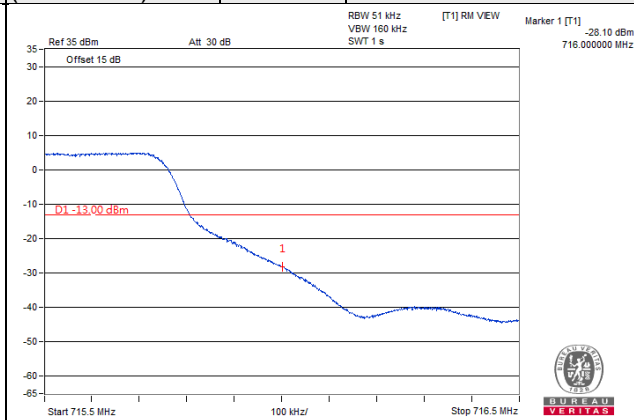
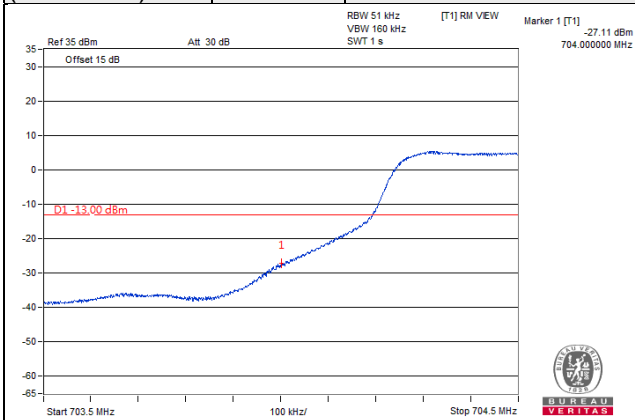
QPSK

25 RB / 0 RB Offset

Channel 23825
(713.5MHz)

QPSK

25 RB / 0 RB Offset



Channel Bandwidth: 10MHz

Channel 23780
(709.0MHz)

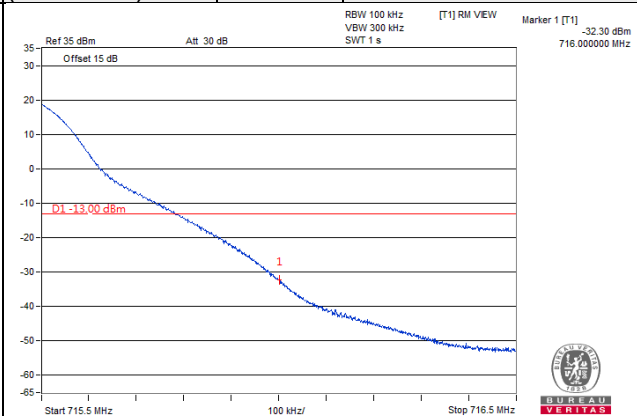
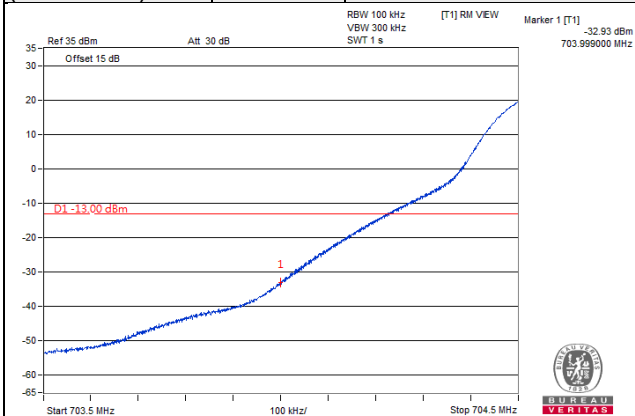
QPSK

1 RB / 0 RB Offset

Channel 23800
(711.0MHz)

QPSK

1 RB / 49 RB Offset



Channel 23780
(709.0MHz)

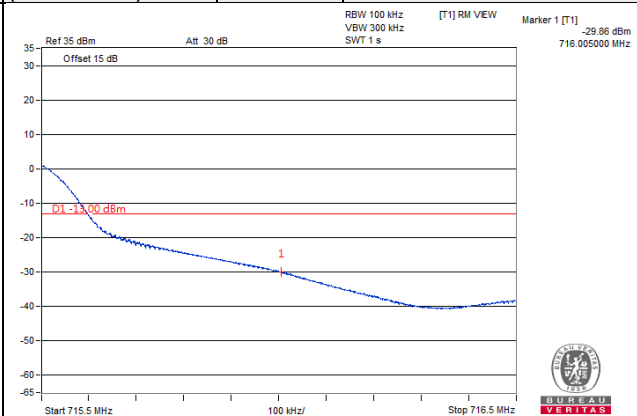
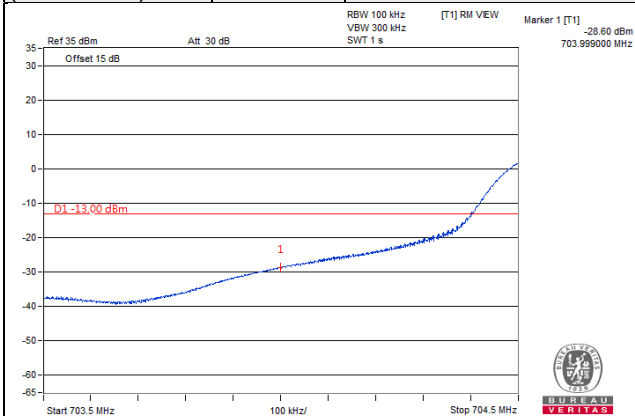
QPSK

50 RB / 0 RB Offset

Channel 23800
(711.0MHz)

QPSK

50 RB / 0 RB Offset

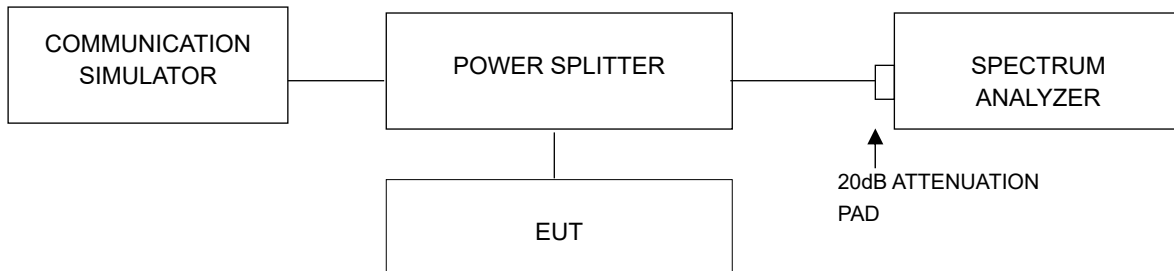


4.6 Peak to Average Ratio

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

LTE Band 4

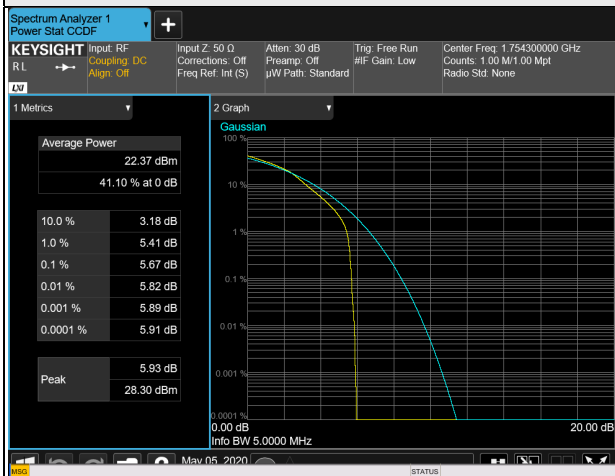
LTE Band 4, Channel Bandwidth 1.4MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
19957	1710.7	3.74	5.01
20175	1732.5	3.59	4.79
20393	1754.3	4.13	5.67
LTE Band 4, Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
19965	1711.5	3.59	4.92
20175	1732.5	3.47	4.76
20385	1753.5	3.97	5.58
LTE Band 4, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
19975	1712.5	3.58	4.91
20175	1732.5	3.53	4.82
20375	1752.5	3.86	5.49
LTE Band 4, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
20000	1715.0	3.53	4.88
20175	1732.5	3.59	4.96
20350	1750.0	3.77	5.33
LTE Band 4, Channel Bandwidth 15MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
20025	1717.5	3.53	4.90
20175	1732.5	3.70	5.14
20325	1747.5	3.48	4.84

LTE Band 4, Channel Bandwidth 20MHz

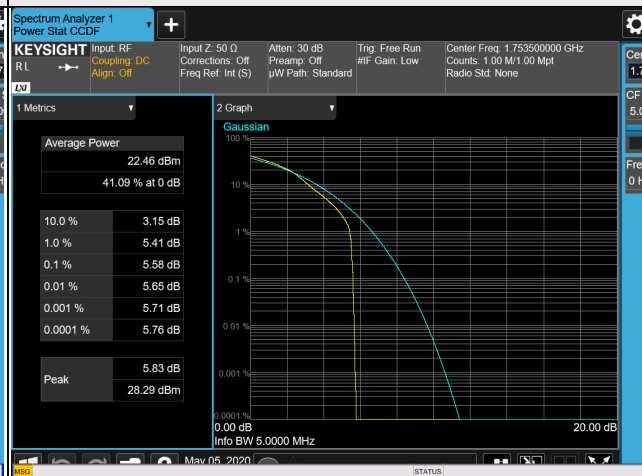
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
20050	1720.0	3.55	4.95
20175	1732.5	3.77	5.33
20300	1745.0	3.34	4.62

Spectrum Plot of Worst Value

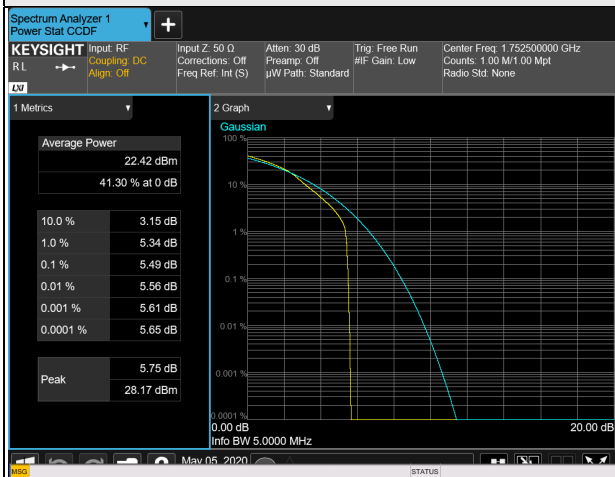
1.4MHz / 16QAM



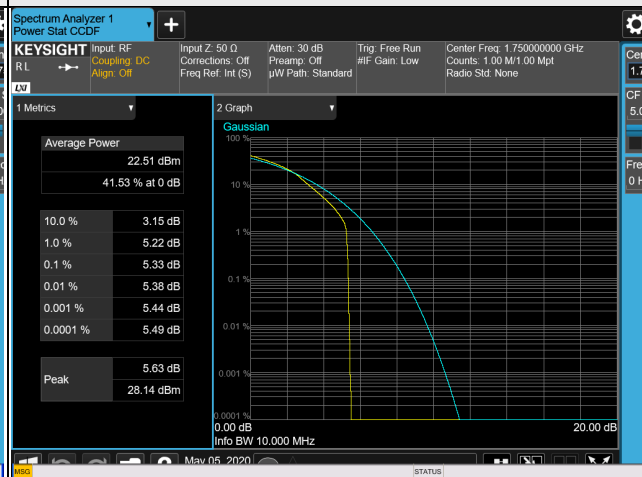
3MHz / 16QAM



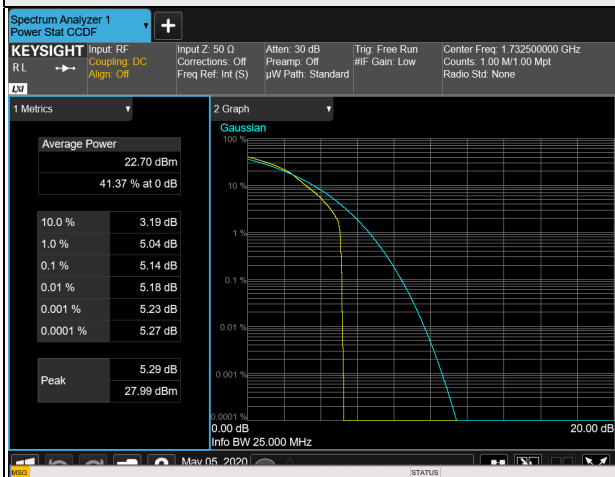
5MHz / 16QAM



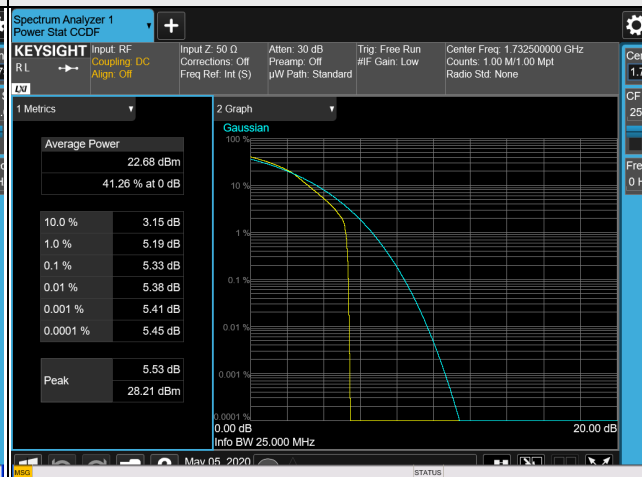
10MHz / 16QAM



15MHz / 16QAM



20MHz / 16QAM

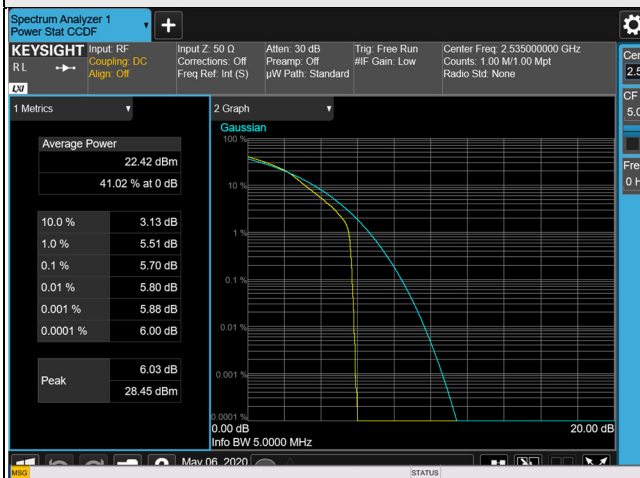


LTE Band 7

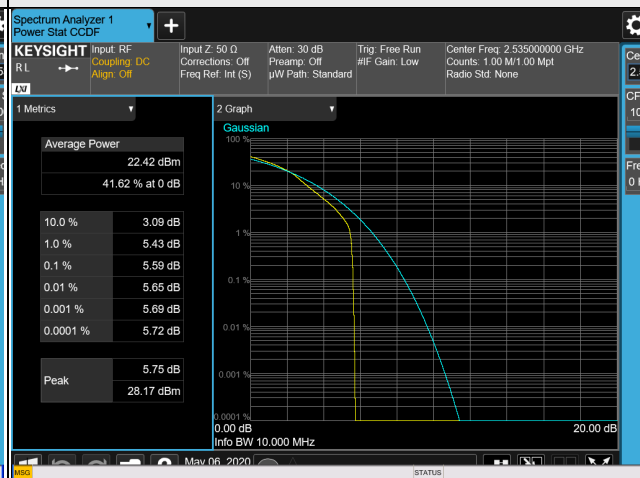
LTE Band 7, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
20775	2502.5	3.85	5.33
21100	2535.0	3.97	5.70
21425	2567.5	3.86	5.47
LTE Band 7, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
20800	2505.0	3.81	5.24
21100	2535.0	3.91	5.59
21400	2565.0	3.81	5.50
LTE Band 7, Channel Bandwidth 15MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
20825	2507.5	3.84	5.45
21100	2535.0	3.86	5.62
21375	2562.5	3.79	5.55
LTE Band 7, Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
20850	2510.0	3.92	5.47
21100	2535.0	3.82	5.59
21350	2560.0	3.78	5.53

Spectrum Plot of Worst Value

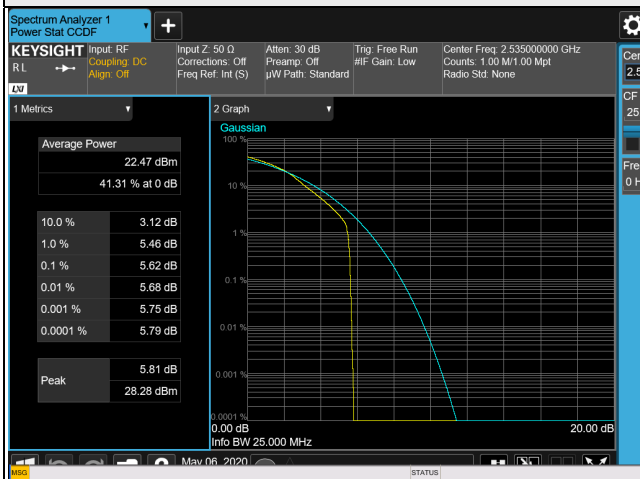
5MHz / 16QAM



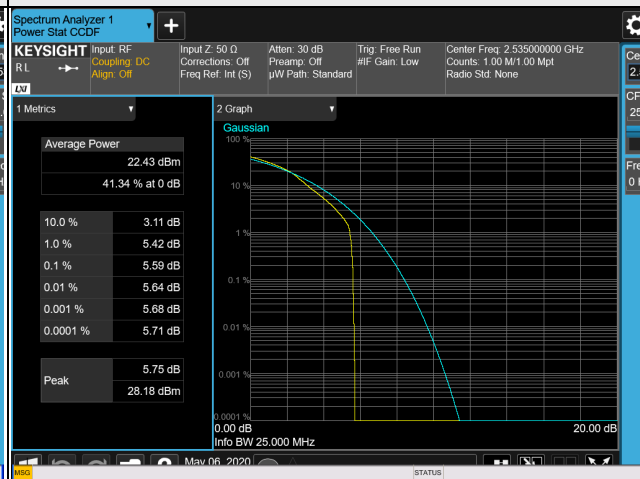
10MHz / 16QAM



15MHz / 16QAM



20MHz / 16QAM

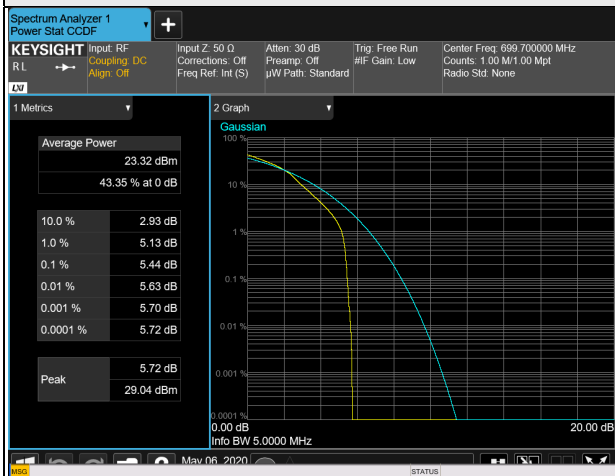


LTE Band 12

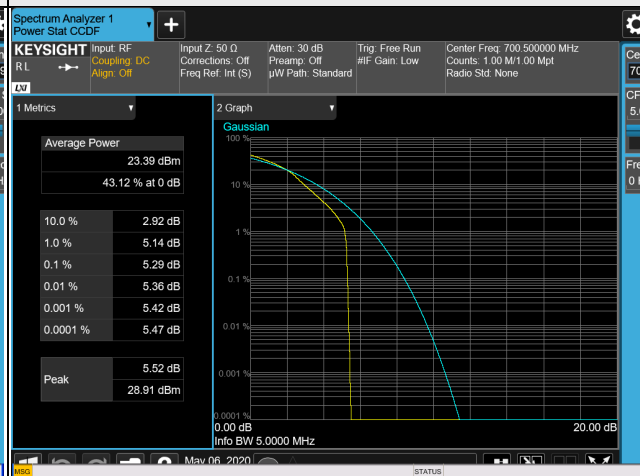
LTE Band 12, Channel Bandwidth 1.4MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23017	699.7	3.81	5.44
23095	707.5	3.78	5.30
23173	715.3	3.75	5.29
LTE Band 12, Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23025	700.5	3.61	5.29
23095	707.5	3.59	5.16
23165	714.5	3.58	5.24
LTE Band 12, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23035	701.5	3.60	5.29
23095	707.5	3.59	5.23
23155	713.5	3.55	5.22
LTE Band 12, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23060	704.0	3.52	5.18
23095	707.5	3.55	5.22
23130	711.0	3.50	5.08

Spectrum Plot of Worst Value

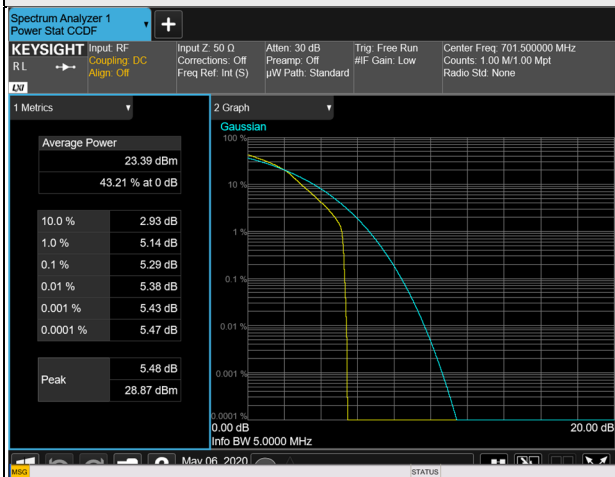
1.4MHz / 16QAM



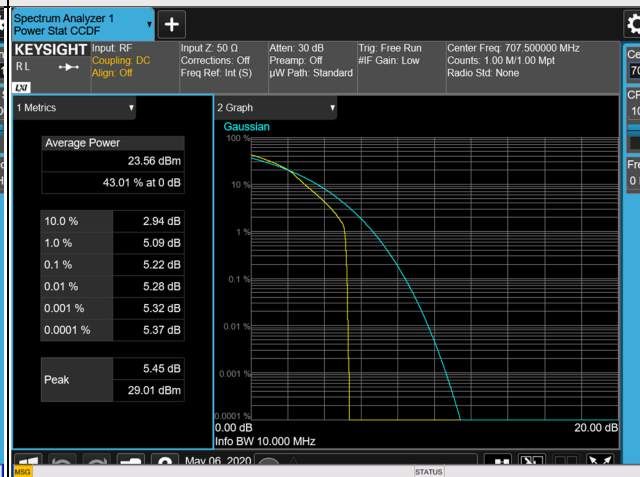
3MHz / 16QAM



5MHz / 16QAM



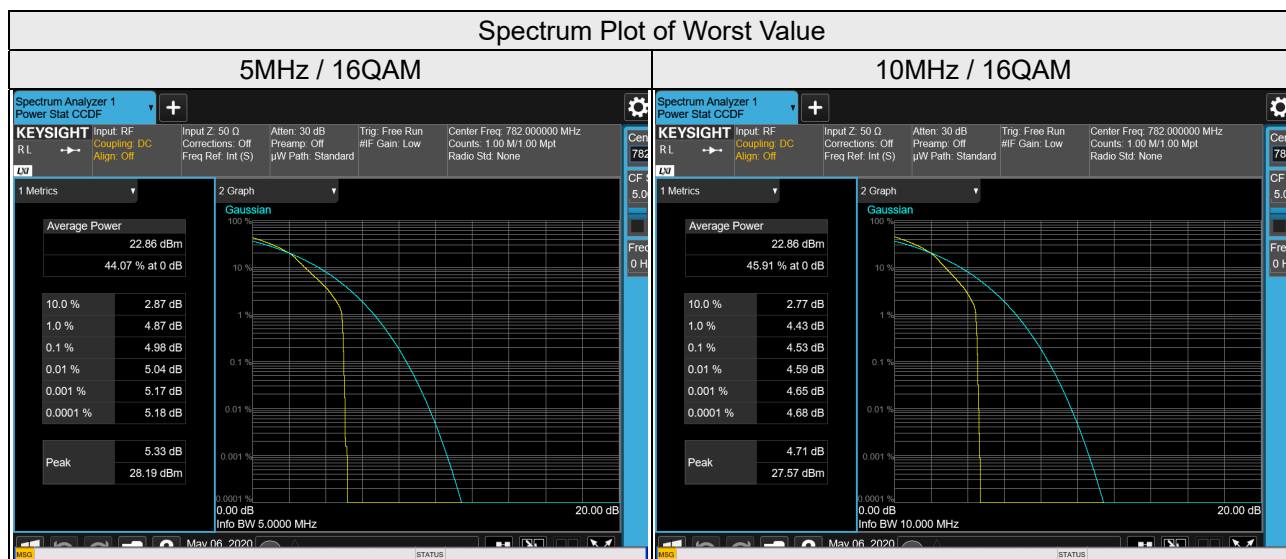
10MHz / 16QAM



LTE Band 13

LTE Band 13, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23205	779.5	3.13	4.41
23230	782.0	3.42	4.98
23255	784.5	3.35	4.92

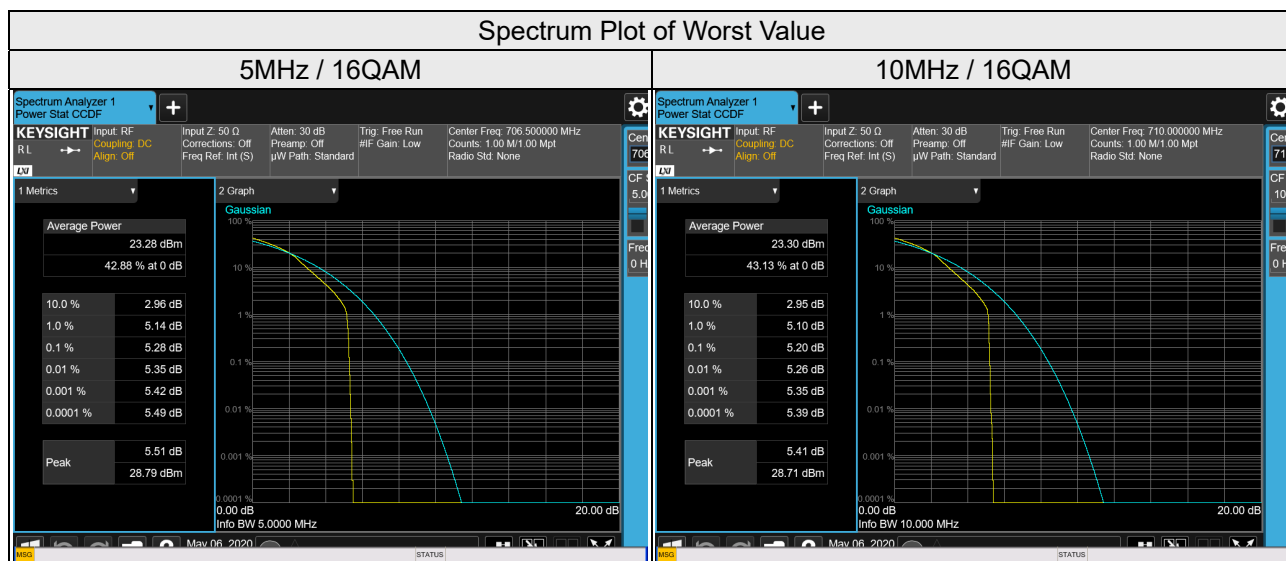
LTE Band 13, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23230	782.0	3.19	4.53



LTE Band 17

LTE Band 17, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23755	706.5	3.62	5.28
23790	710.0	3.52	5.11
23825	713.5	3.53	5.20

LTE Band 17, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23780	709.0	3.55	5.15
23790	710.0	3.55	5.20
23800	711.0	3.53	5.08



4.7 Conducted Spurious Emissions

4.7.1 Limits of Conducted Spurious Emissions Measurement

For LTE Band 4

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 .

For LTE Band 7

In the FCC 27.53(m)(4), 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 $55 + 10 \log (P)$ dB. The emission limit equal to -25dBm .

For LTE Band 13

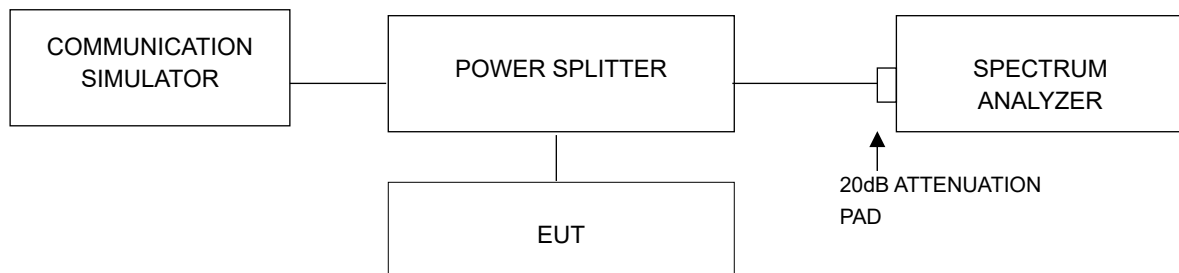
According to FCC 27.53(c)(2) for on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB.

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 12, 17

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.

4.7.2 Test Setup



4.7.3 Test Procedure

- All measurements were done at 3 channels: low, middle and high operational frequency range.
- When the spectrum scanned from 9kHz to 8GHz / 18GHz / 26GHz, it shall be connected to the attenuator with the carried frequency.

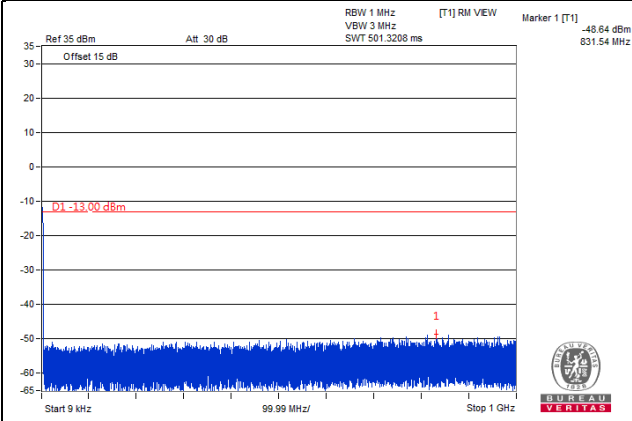
4.7.4 Test Results

LTE Band 4

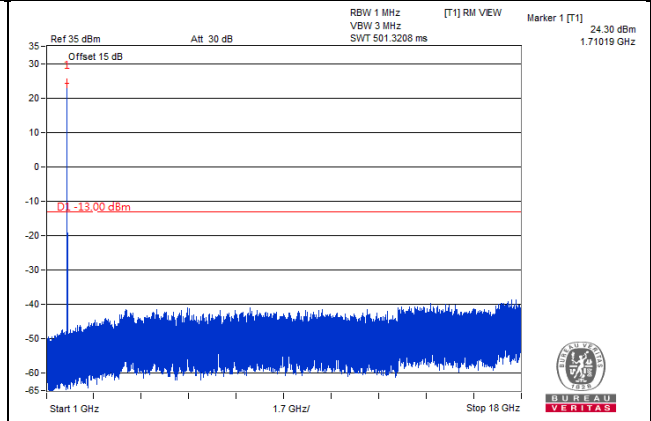
Channel Bandwidth: 1.4MHz

Channel 19957 (1710.7MHz)

Frequency Range : 9kHz~1GHz

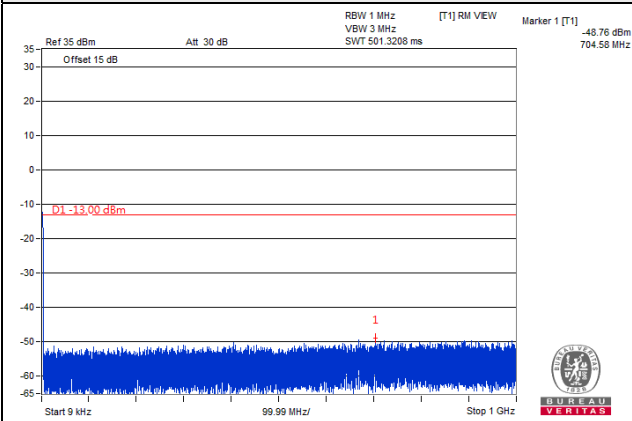


Frequency Range : 1GHz~18GHz

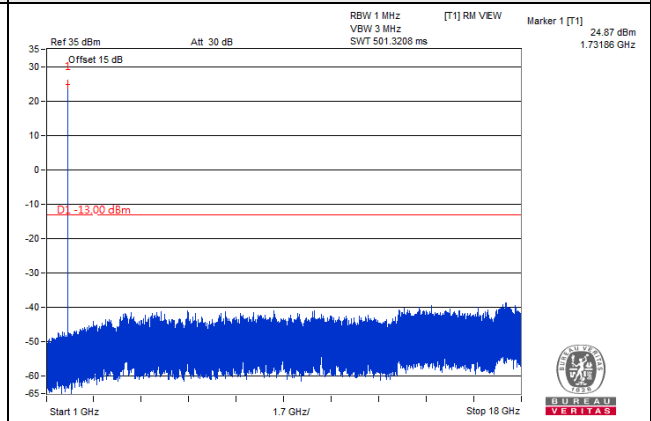


Channel 20175 (1732.5MHz)

Frequency Range : 9kHz~1GHz

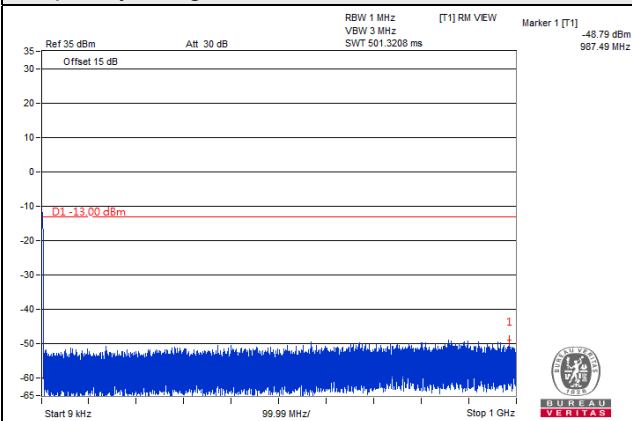


Frequency Range : 1GHz~18GHz

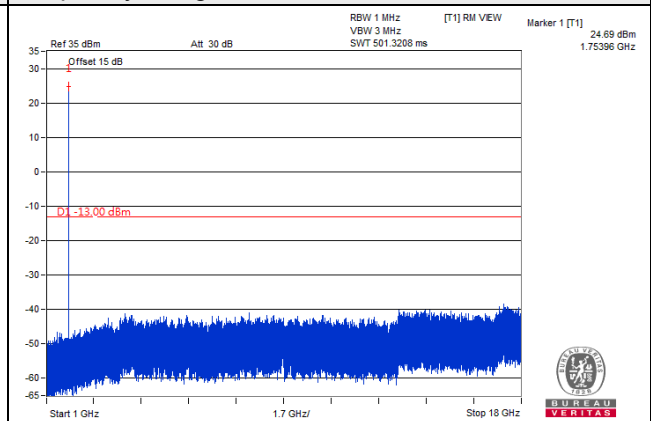


Channel 20393 (1754.3MHz)

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~18GHz

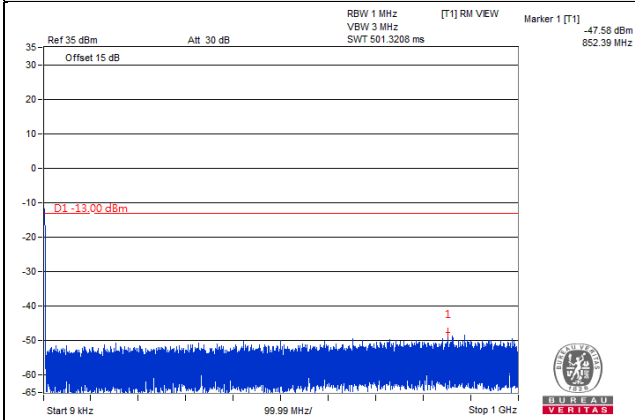


*The 9kHz signal over the limit is from Spectrum.

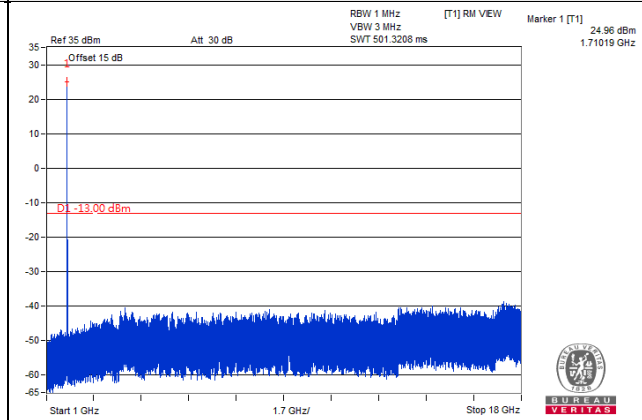
Channel Bandwidth: 3MHz

Channel 19965 (1711.5MHz)

Frequency Range : 9kHz~1GHz

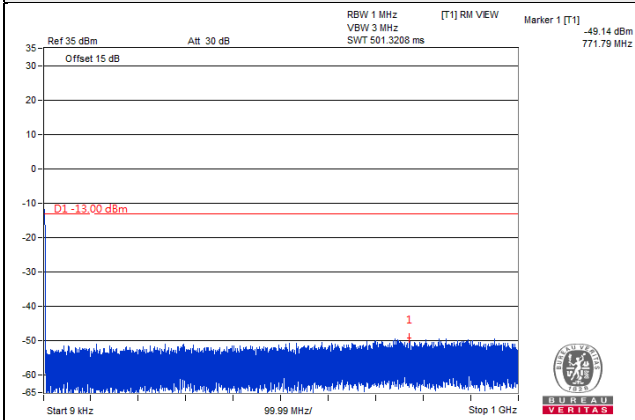


Frequency Range : 1GHz~18GHz

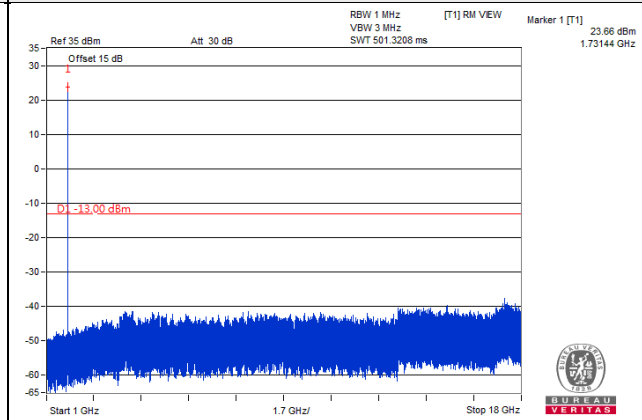


Channel 20175 (1732.5MHz)

Frequency Range : 9kHz~1GHz

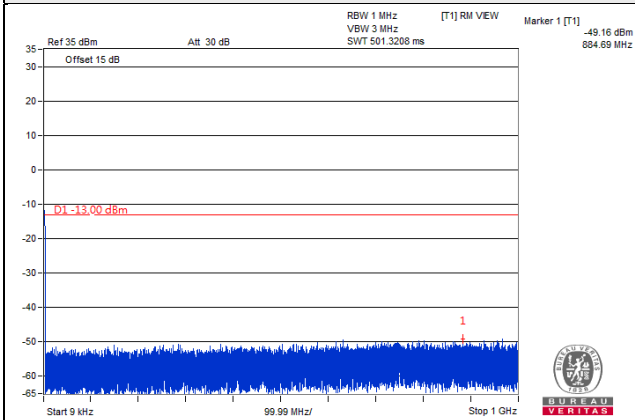


Frequency Range : 1GHz~18GHz

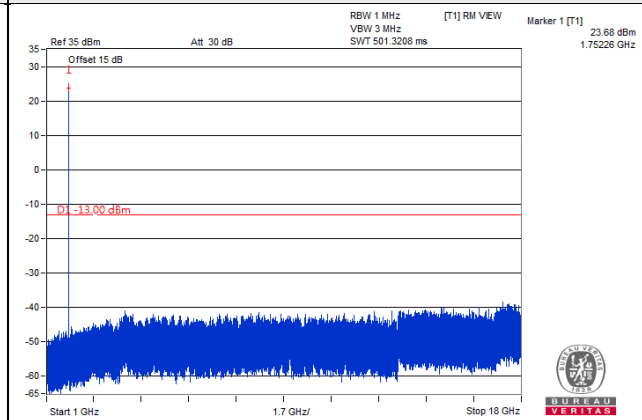


Channel 20385 (1753.5MHz)

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~18GHz

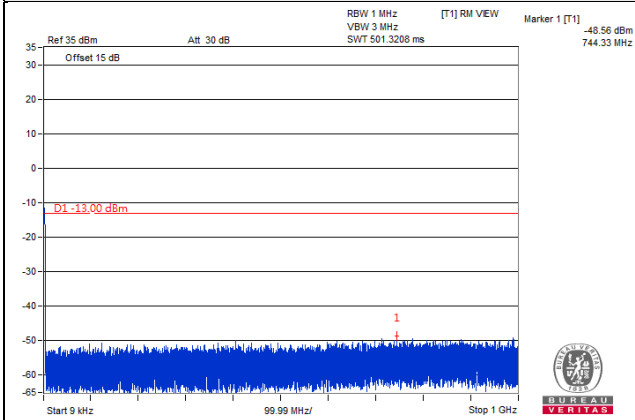


*The 9kHz signal over the limit is from Spectrum.

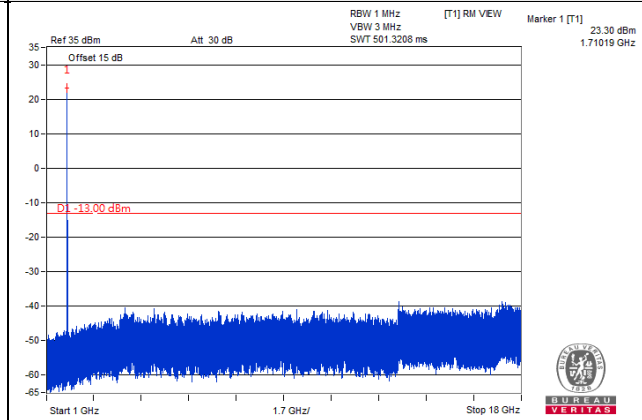
Channel Bandwidth: 5MHz

Channel 19975 (1712.5MHz)

Frequency Range : 9kHz~1GHz

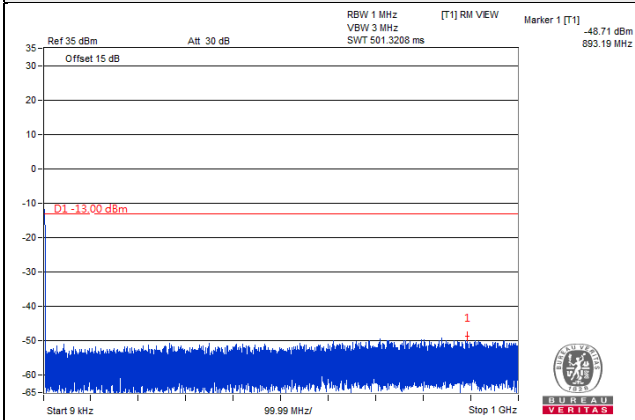


Frequency Range : 1GHz~18GHz

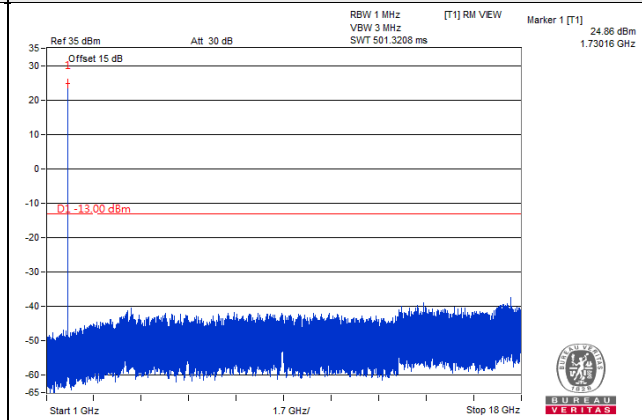


Channel 20175 (1732.5MHz)

Frequency Range : 9kHz~1GHz

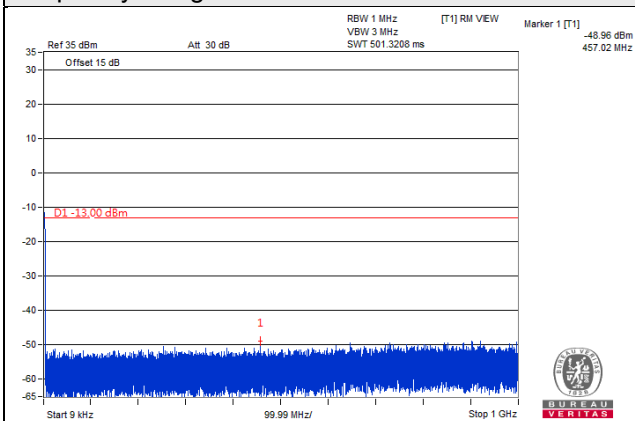


Frequency Range : 1GHz~18GHz

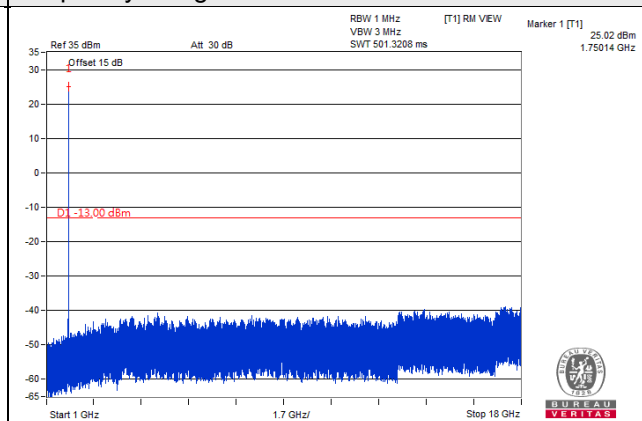


Channel 20375 (1752.5MHz)

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~18GHz

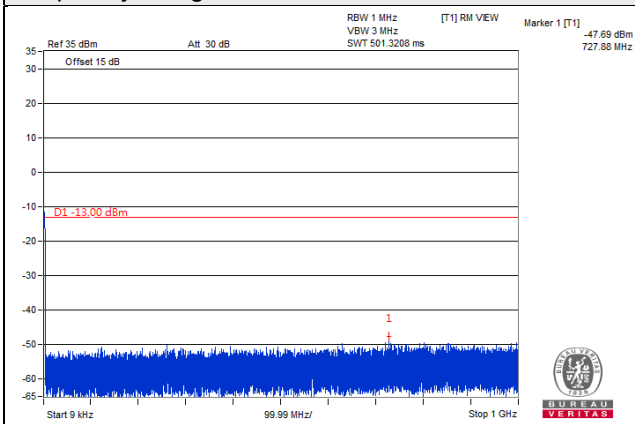


*The 9kHz signal over the limit is from Spectrum.

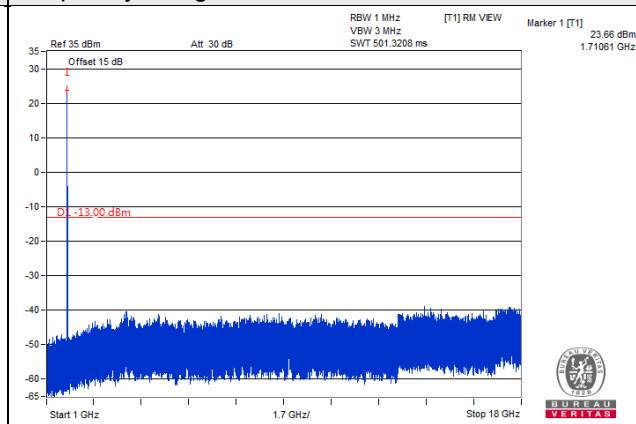
Channel Bandwidth: 10MHz

Channel 20000 (1715.0MHz)

Frequency Range : 9kHz~1GHz

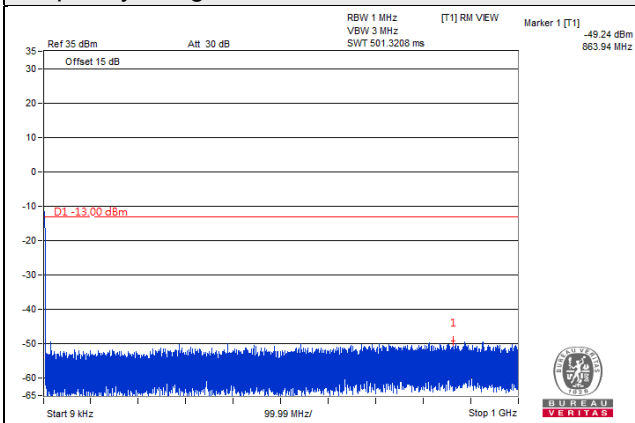


Frequency Range : 1GHz~18GHz

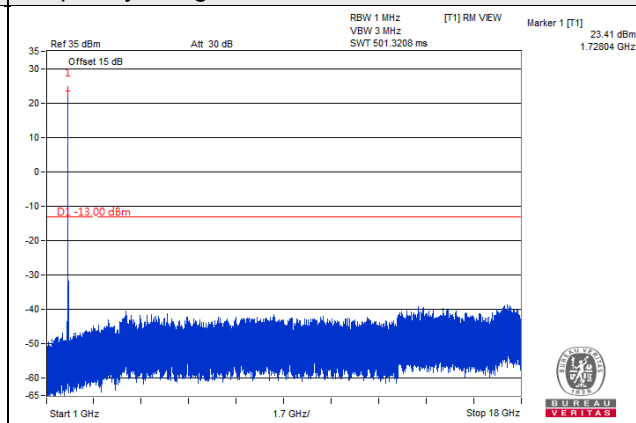


Channel 20175 (1732.5MHz)

Frequency Range : 9kHz~1GHz

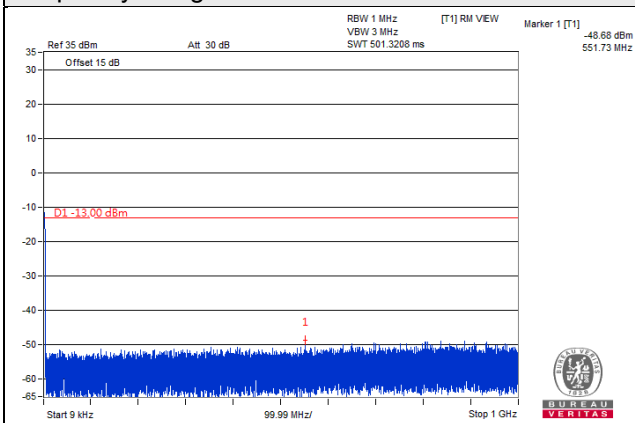


Frequency Range : 1GHz~18GHz

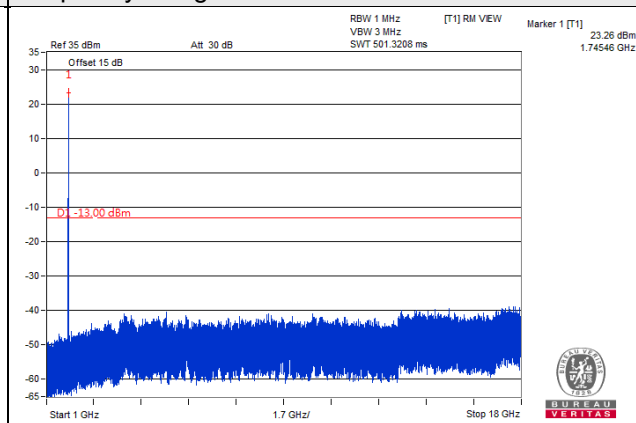


Channel 20350 (1750.0MHz)

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~18GHz

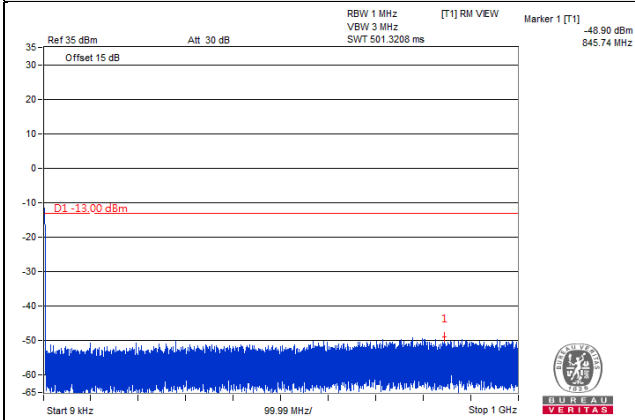


*The 9kHz signal over the limit is from Spectrum.

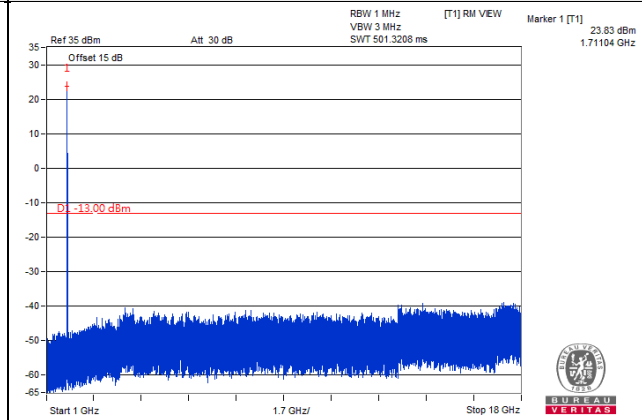
Channel Bandwidth: 15MHz

Channel 20025 (1717.5MHz)

Frequency Range : 9kHz~1GHz

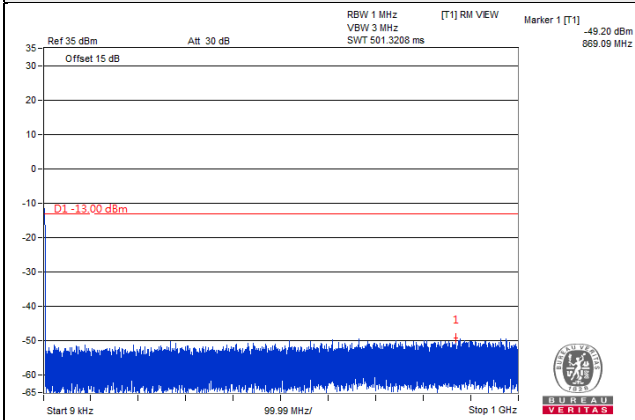


Frequency Range : 1GHz~18GHz

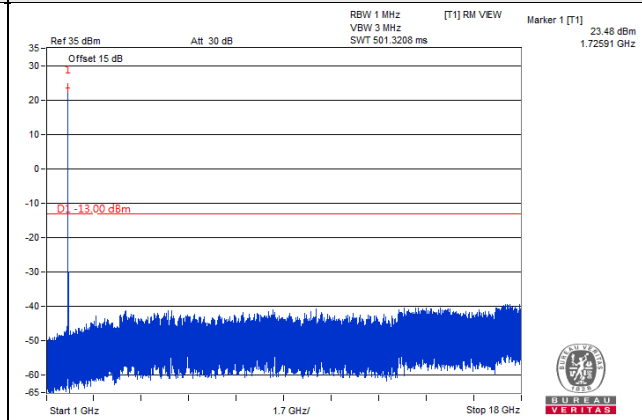


Channel 20175 (1732.5MHz)

Frequency Range : 9kHz~1GHz

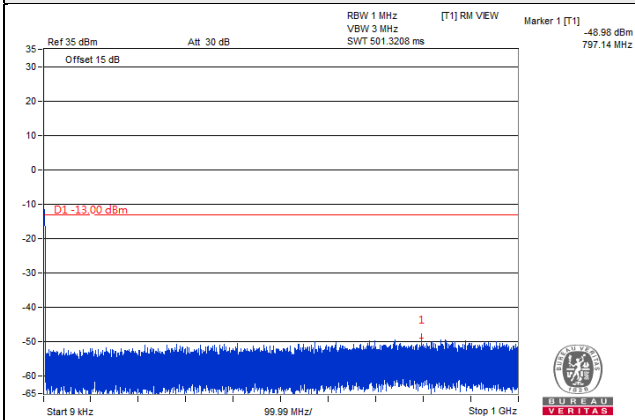


Frequency Range : 1GHz~18GHz

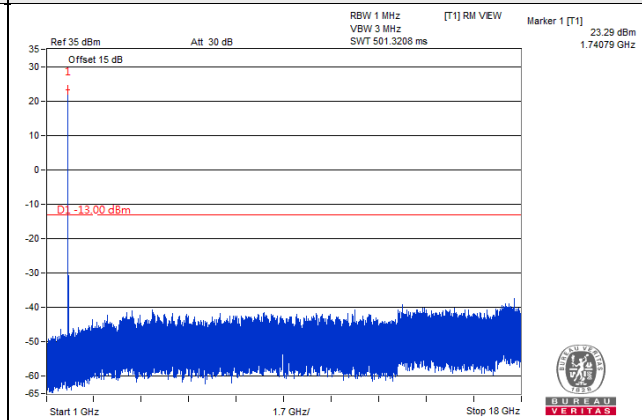


Channel 20325 (1747.5MHz)

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~18GHz

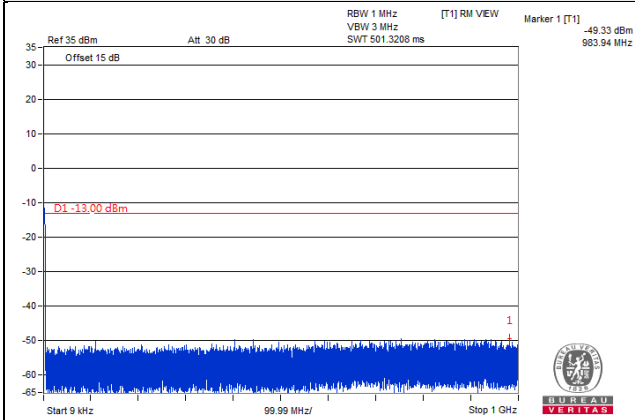


*The 9kHz signal over the limit is from Spectrum.

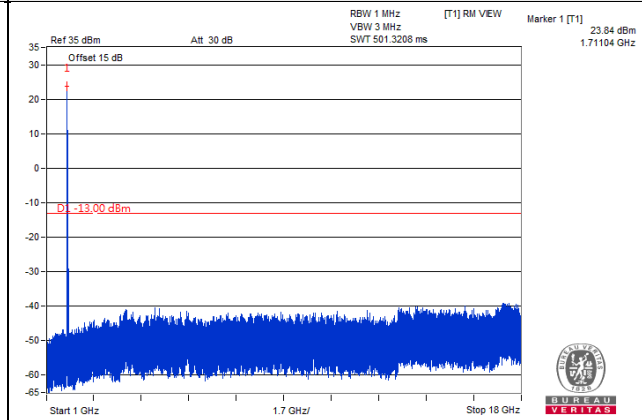
Channel Bandwidth: 20MHz

Channel 20050 (1720.0MHz)

Frequency Range : 9kHz~1GHz

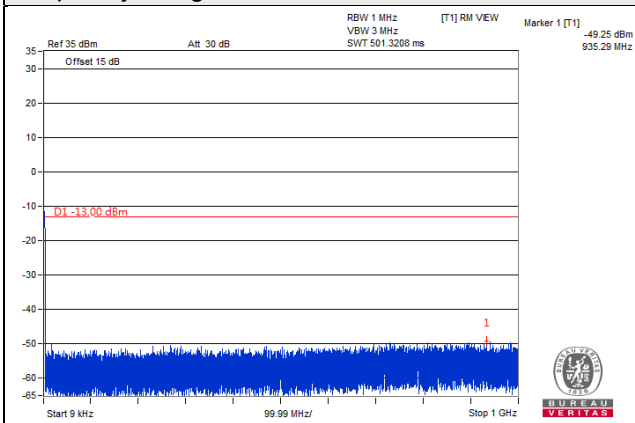


Frequency Range : 1GHz~18GHz

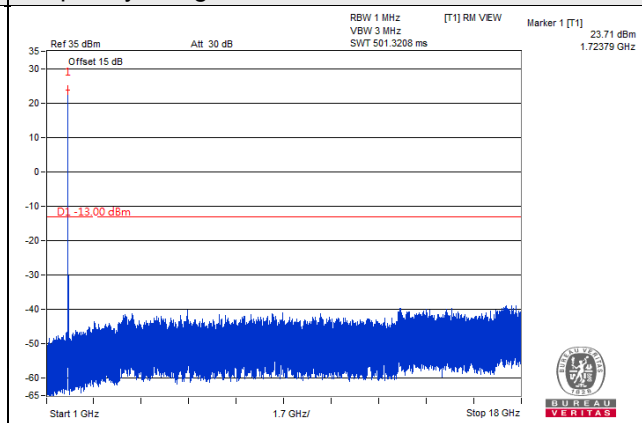


Channel 20175 (1732.5MHz)

Frequency Range : 9kHz~1GHz

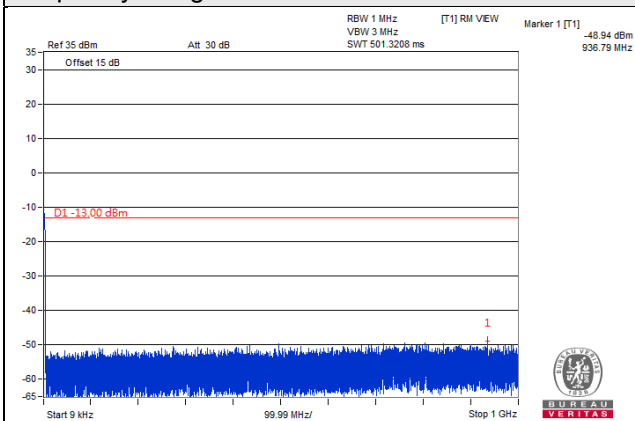


Frequency Range : 1GHz~18GHz

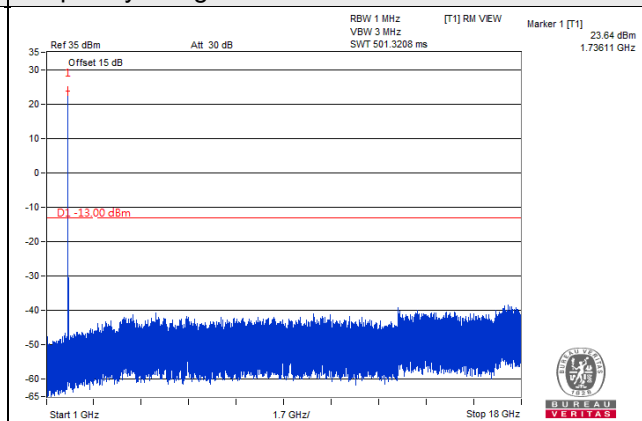


Channel 20300 (1745.0MHz)

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~18GHz



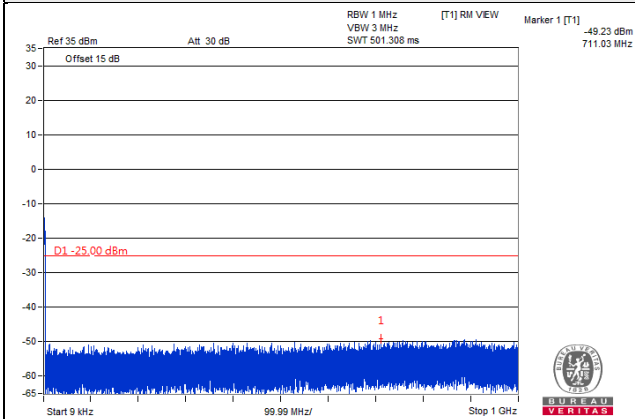
*The 9kHz signal over the limit is from Spectrum.

LTE Band 7

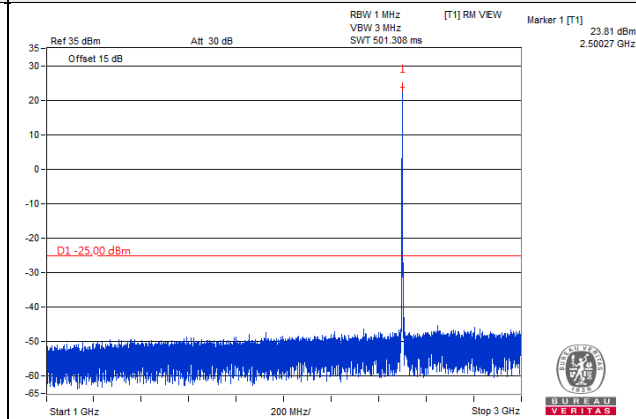
Channel Band width: 5MHz

Channel 20775(2502.5MHz)

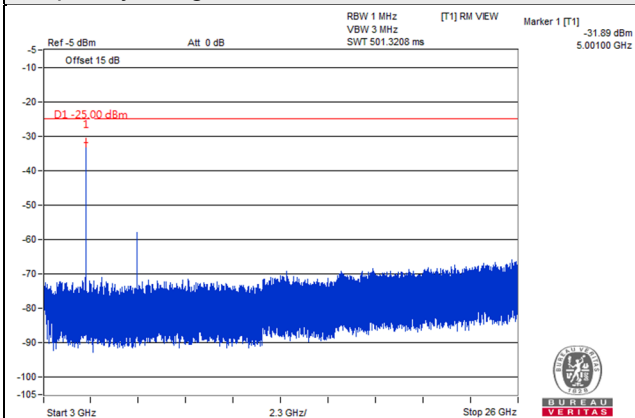
Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~3GHz



Frequency Range : 3GHz~26GHz

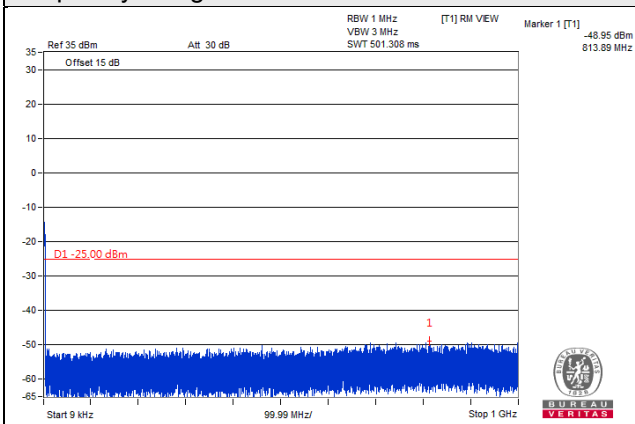


*The 9kHz signal over the limit is from Spectrum.

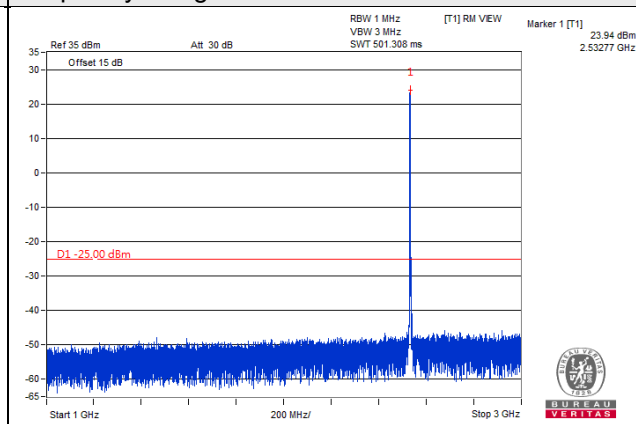
Channel Band width: 5MHz

Channel 21100(2535MHz)

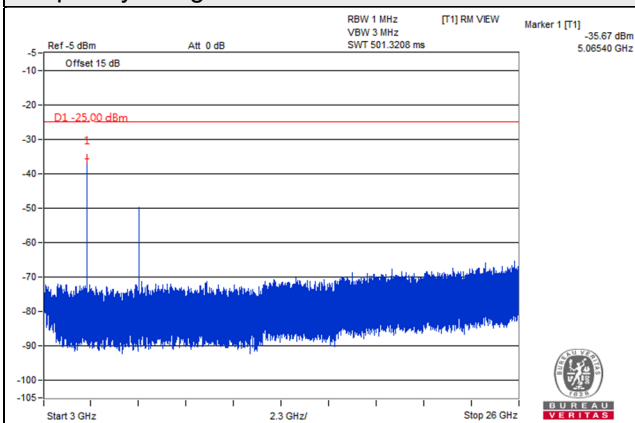
Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~3GHz



Frequency Range : 3GHz~26GHz

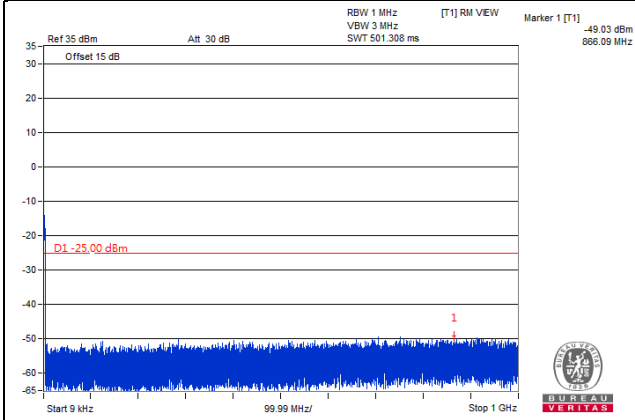


*The 9kHz signal over the limit is from Spectrum.

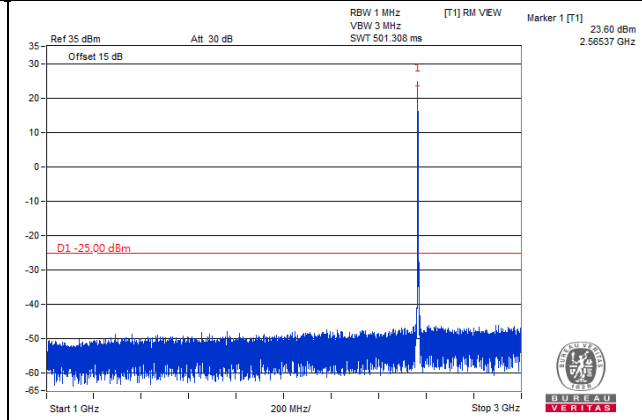
Channel Band width: 5MHz

Channel 21425(2567.5MHz)

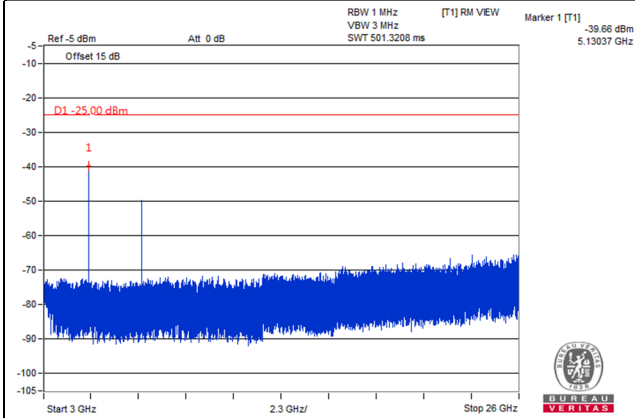
Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~3GHz



Frequency Range : 3GHz~26GHz

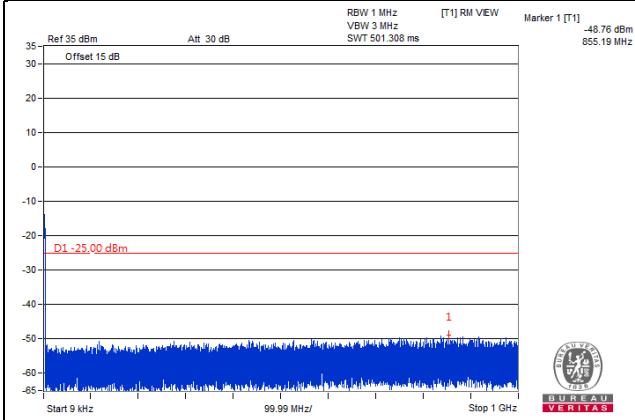


*The 9kHz signal over the limit is from Spectrum.

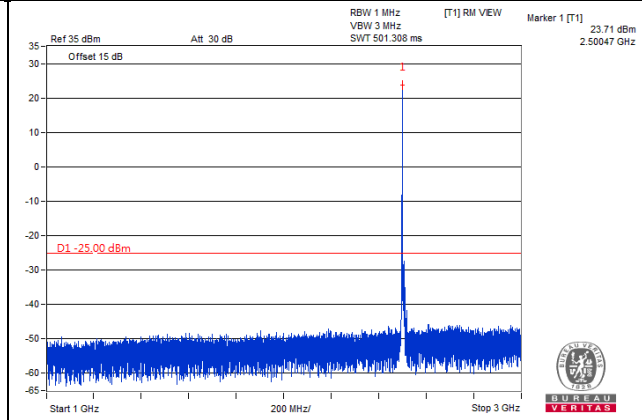
Channel Band width: 10MHz

Channel 20800(2505MHz)

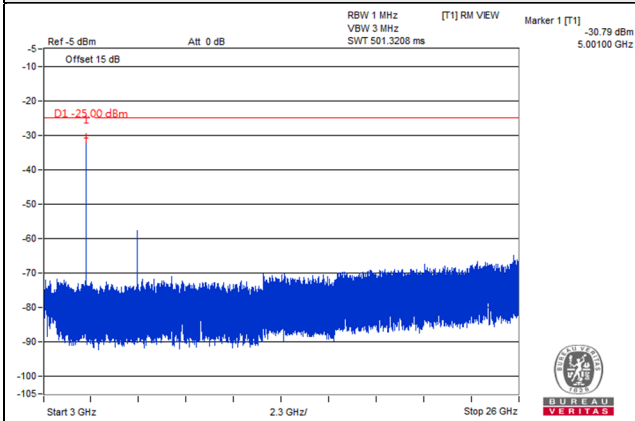
Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~3GHz



Frequency Range : 3GHz~26GHz

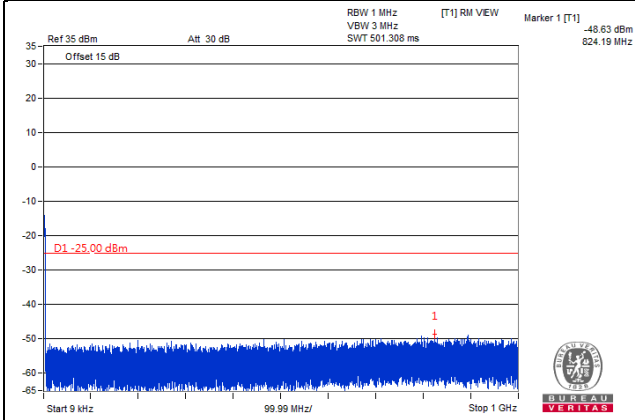


*The 9kHz signal over the limit is from Spectrum.

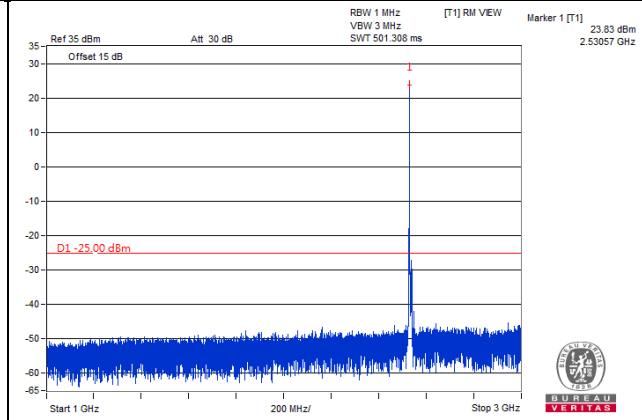
Channel Band width: 10MHz

Channel 21100(2535MHz)

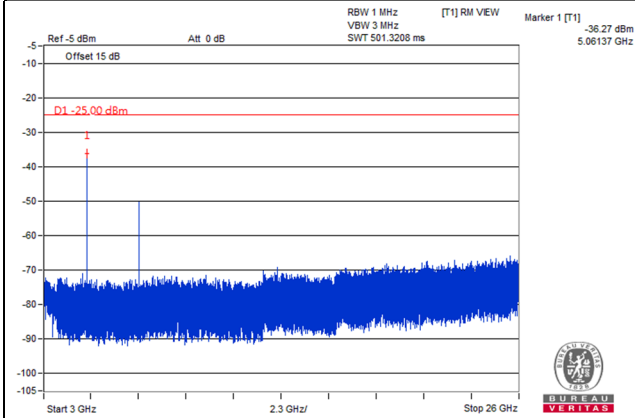
Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~3GHz



Frequency Range : 3GHz~26GHz

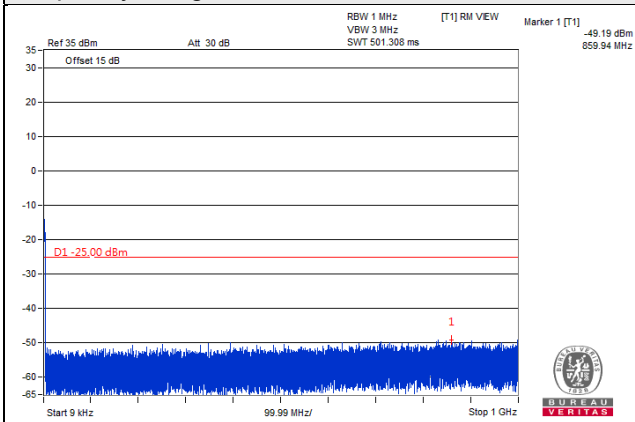


*The 9kHz signal over the limit is from Spectrum.

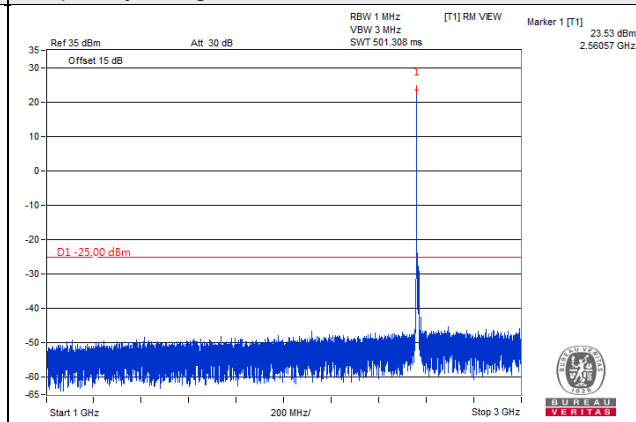
Channel Band width: 10MHz

Channel 21400(2565MHz)

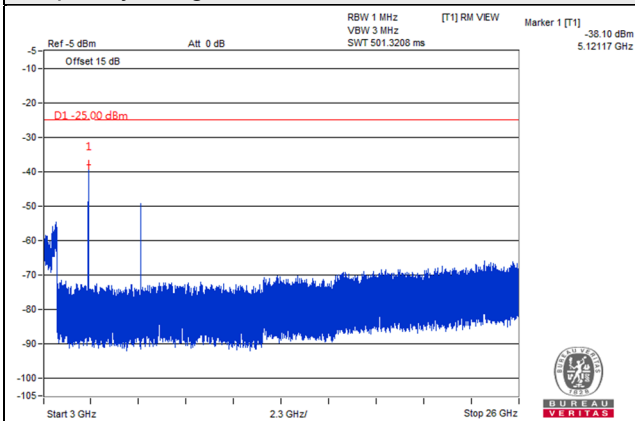
Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~3GHz



Frequency Range : 3GHz~26GHz

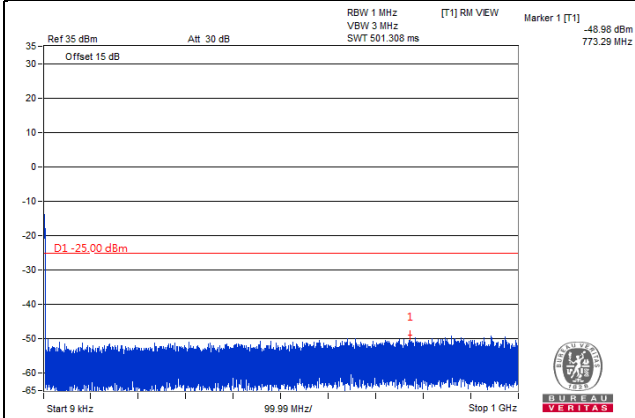


*The 9kHz signal over the limit is from Spectrum.

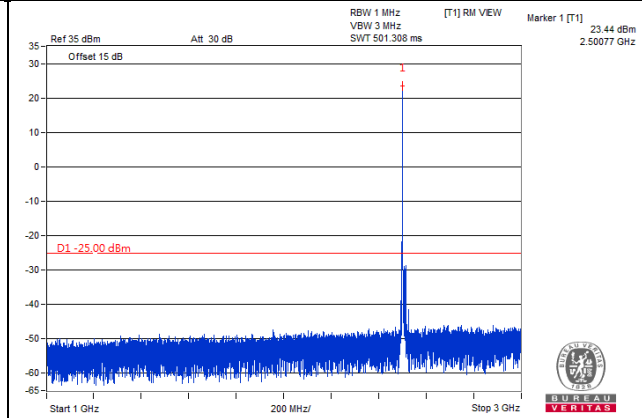
Channel Band width: 15MHz

Channel 20825(2507.5MHz)

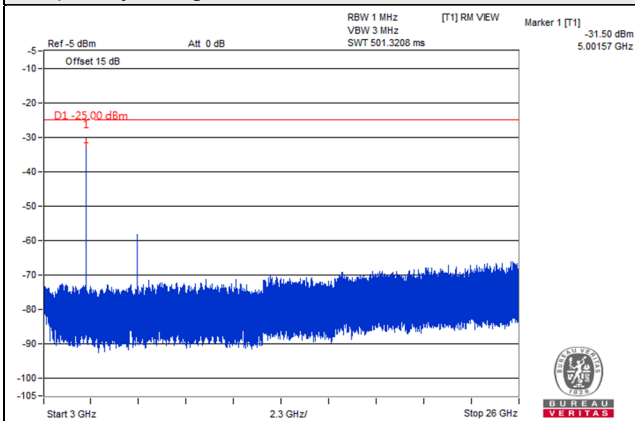
Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~3GHz



Frequency Range : 3GHz~26GHz

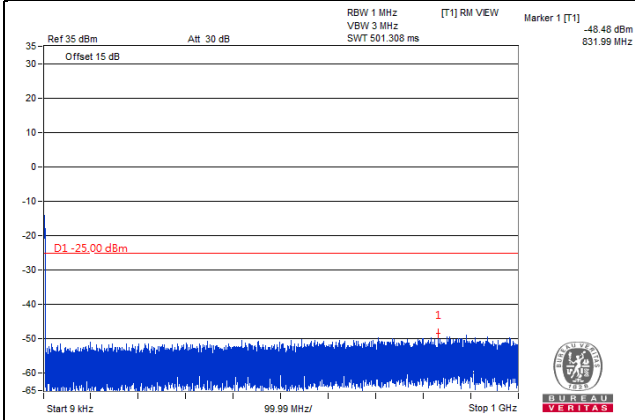


*The 9kHz signal over the limit is from Spectrum.

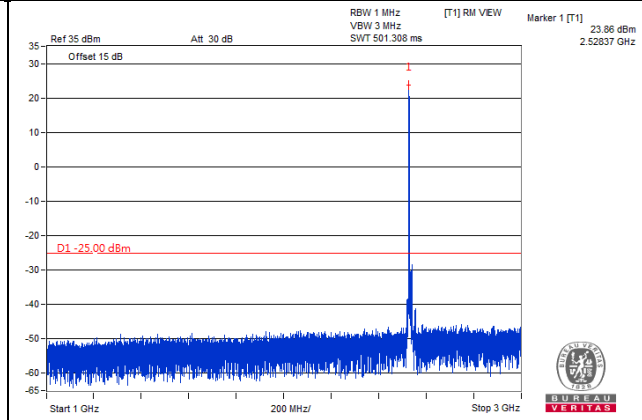
Channel Band width: 15MHz

Channel 21100(2535MHz)

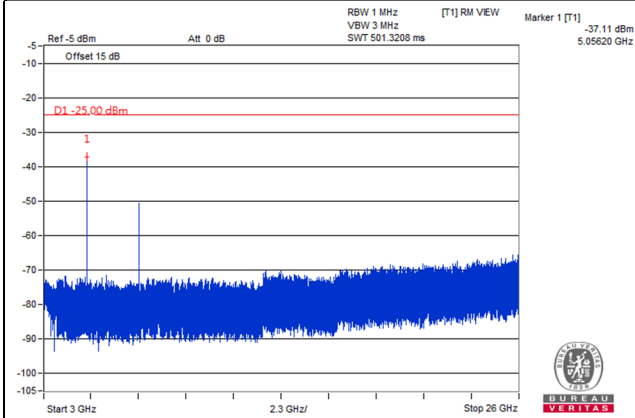
Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~3GHz



Frequency Range : 3GHz~26GHz

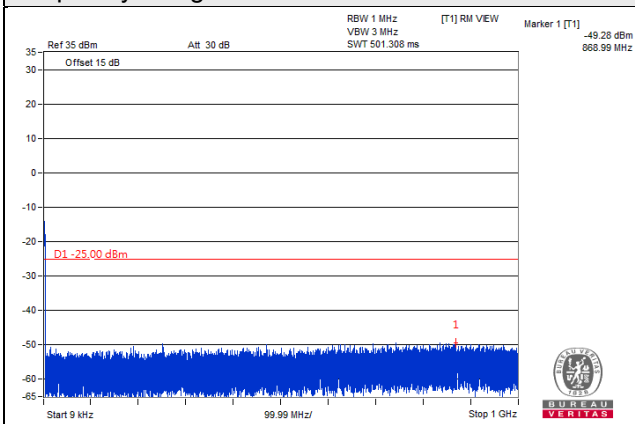


*The 9kHz signal over the limit is from Spectrum.

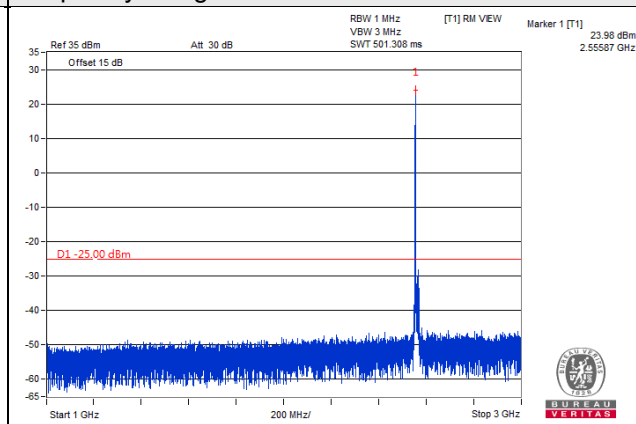
Channel Band width: 15MHz

Channel 21375(2562.5MHz)

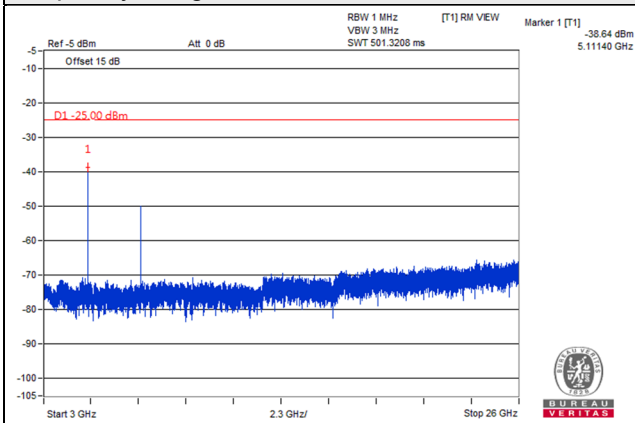
Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~3GHz



Frequency Range : 3GHz~26GHz

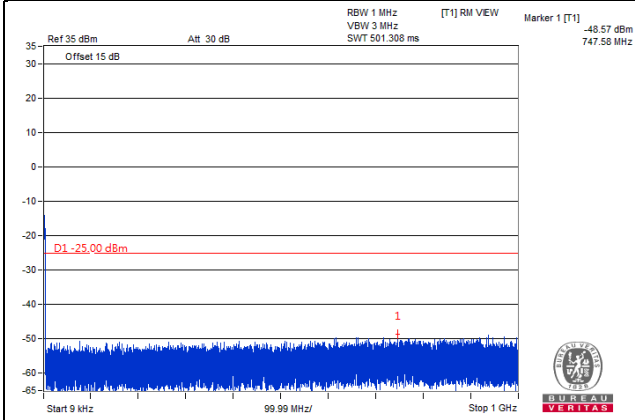


*The 9kHz signal over the limit is from Spectrum.

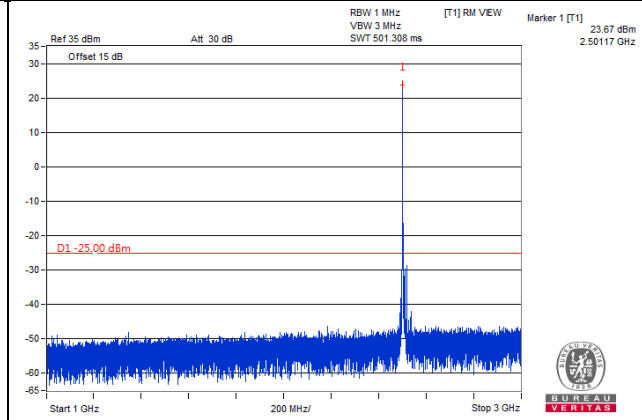
Channel Band width: 20MHz

Channel 20850(2510MHz)

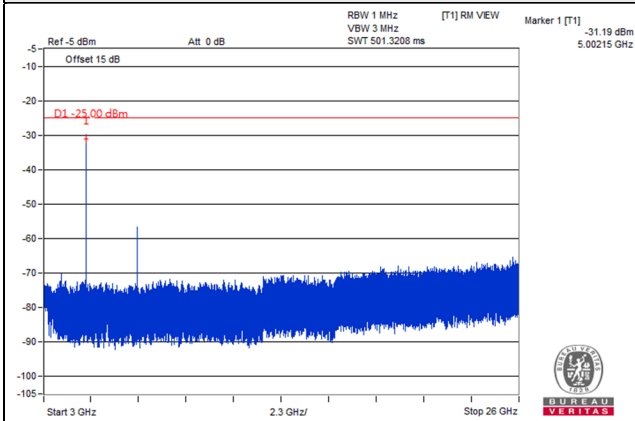
Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~3GHz



Frequency Range : 3GHz~26GHz

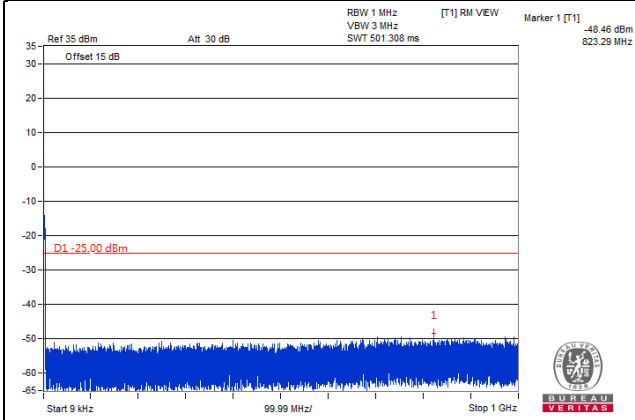


*The 9kHz signal over the limit is from Spectrum.

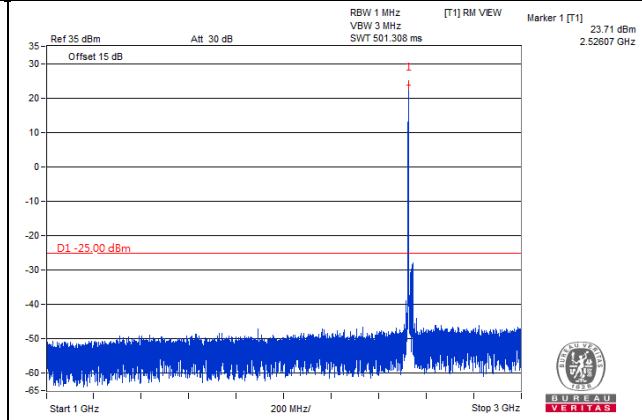
Channel Band width: 20MHz

Channel 21100(2535MHz)

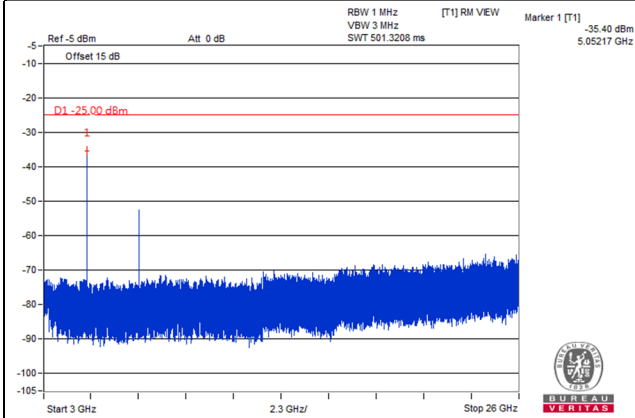
Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~3GHz



Frequency Range : 3GHz~26GHz

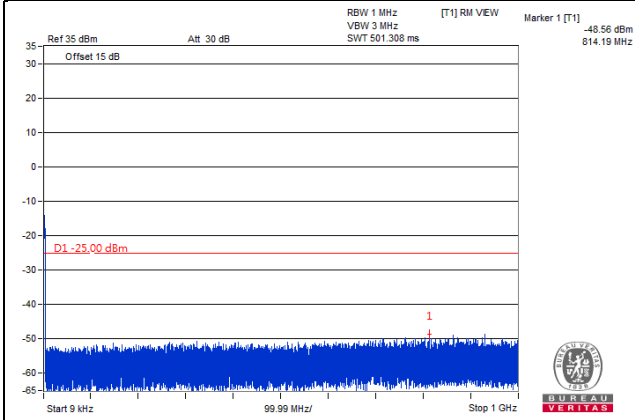


*The 9kHz signal over the limit is from Spectrum.

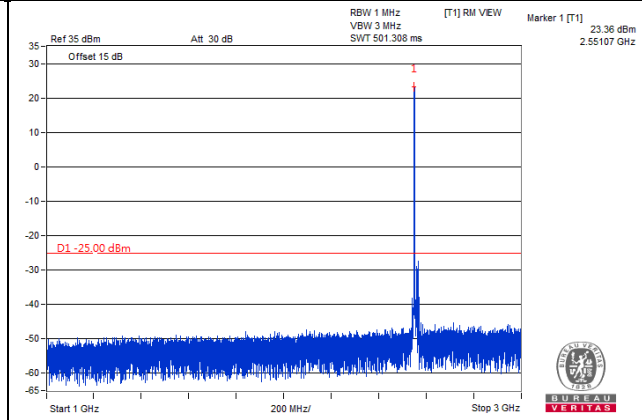
Channel Band width: 20MHz

Channel 21350(2560MHz)

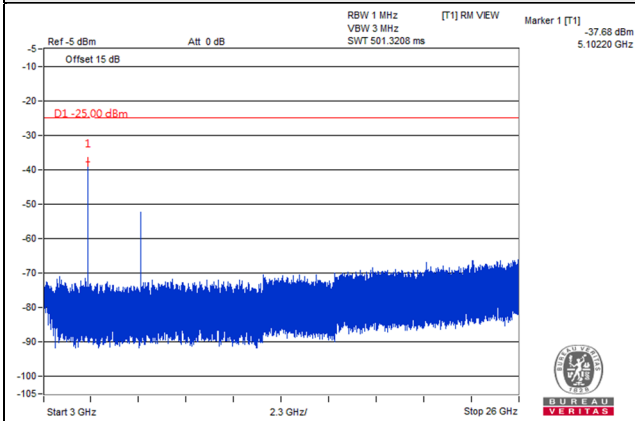
Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~3GHz



Frequency Range : 3GHz~26GHz



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