

**BW 20MHz+5MHz+5MHz, Multi 3 carrier(Non-Contiguous), 4Tx, Top
ANT1**

QPSK



16QAM



64QAM



256QAM

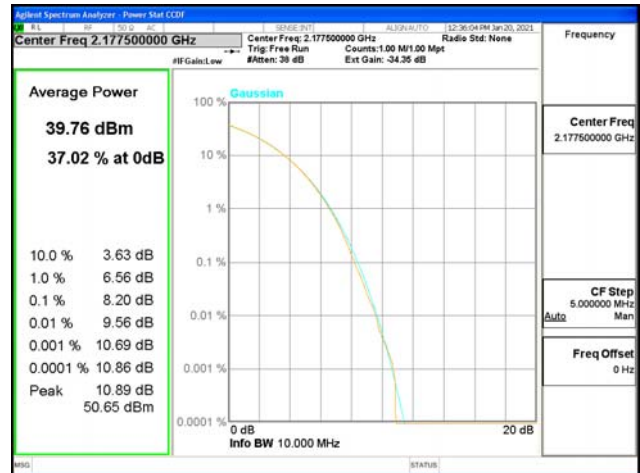


ANT2

QPSK



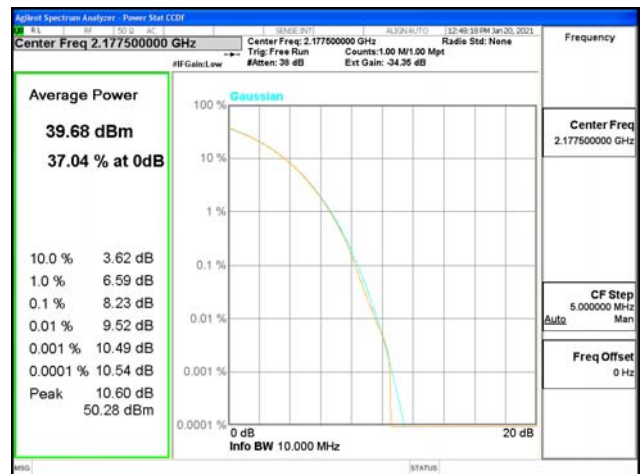
16QAM



64QAM



256QAM

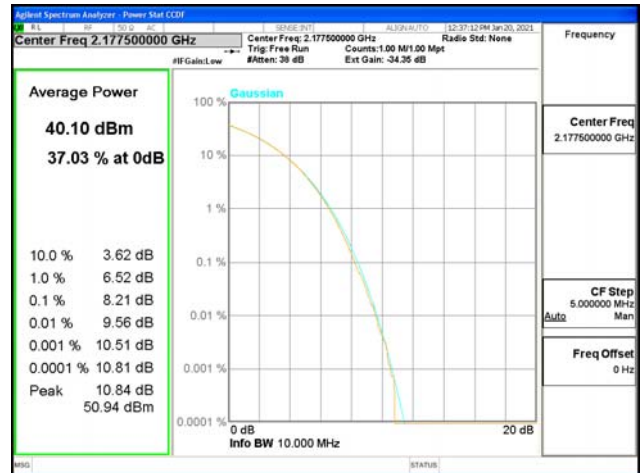


ANT3

QPSK



16QAM



64QAM

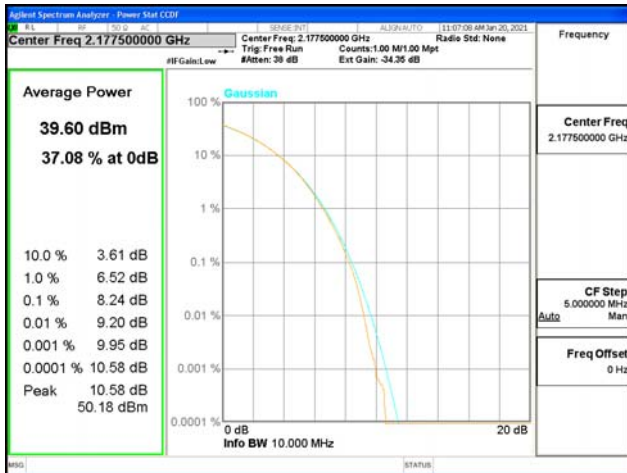


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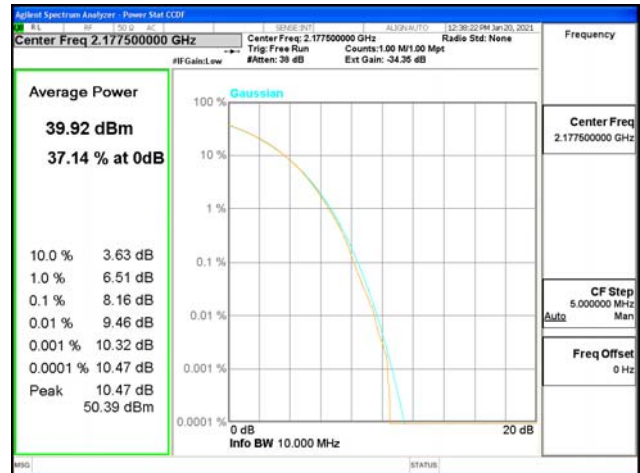


ANT4

QPSK



16QAM



64QAM



256QAM

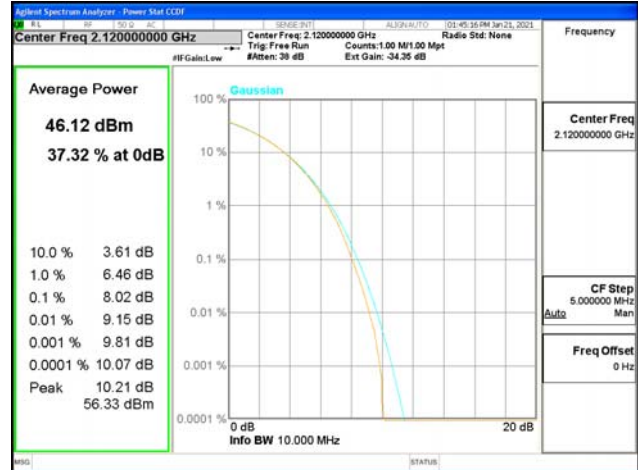


**BW 15MHz+5MHz+5MHz, Multi 3 carrier(Non-Contiguous), 2Tx, Bottom
ANT1**

QPSK



16QAM



64QAM

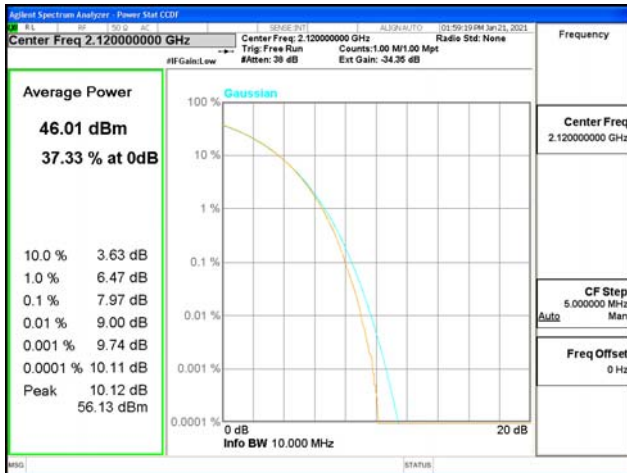


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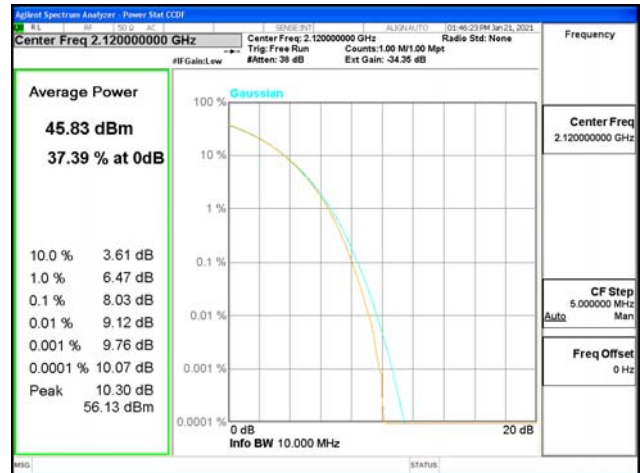


ANT2

QPSK



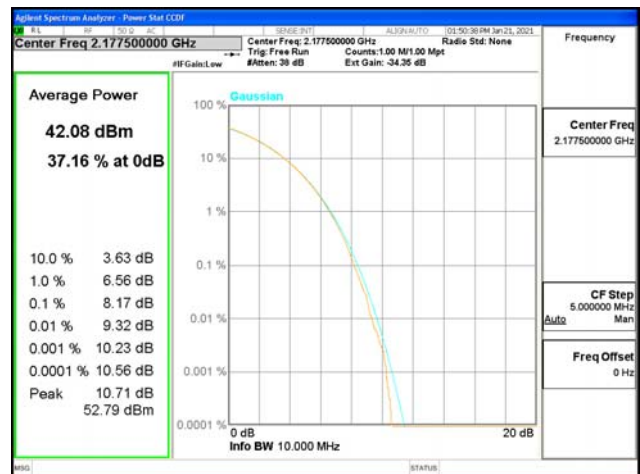
16QAM



64QAM



256QAM



**BW 15MHz+5MHz+5MHz, Multi 3 carrier(Non-Contiguous), 2Tx, Top
ANT1**

QPSK



16QAM



64QAM



256QAM

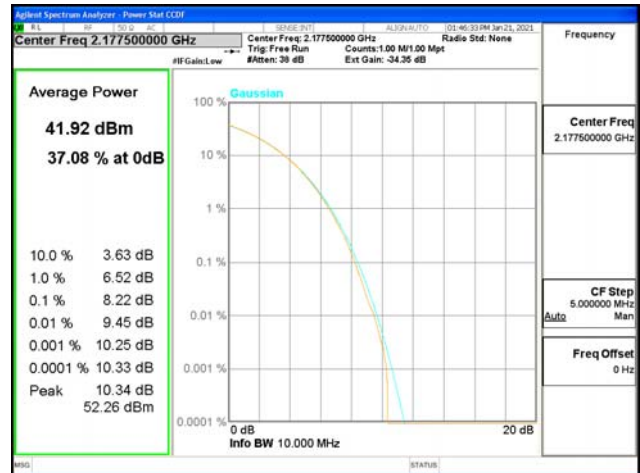


ANT2

QPSK



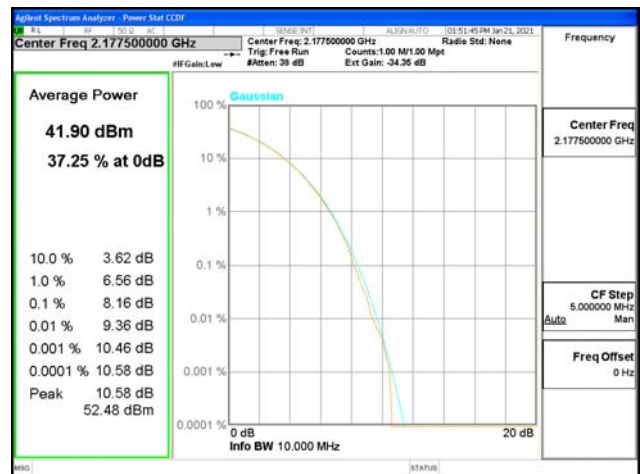
16QAM



64QAM

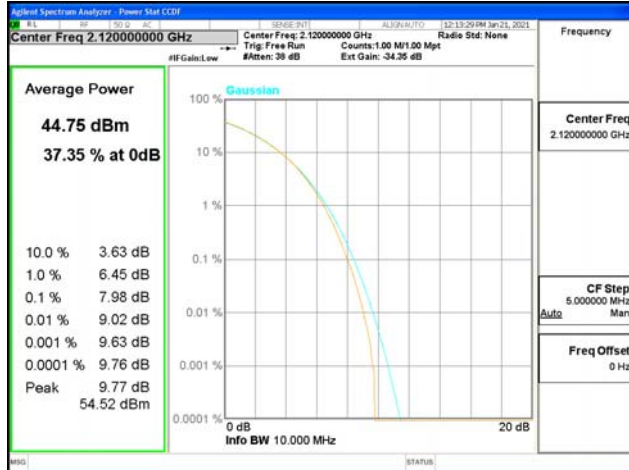


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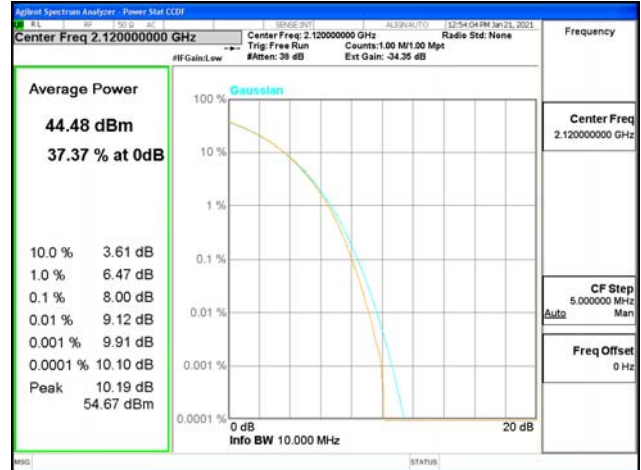


**BW 15MHz+5MHz+5MHz, Multi 3 carrier(Non-Contiguous), 4Tx, Bottom
ANT1**

QPSK



16QAM



64QAM

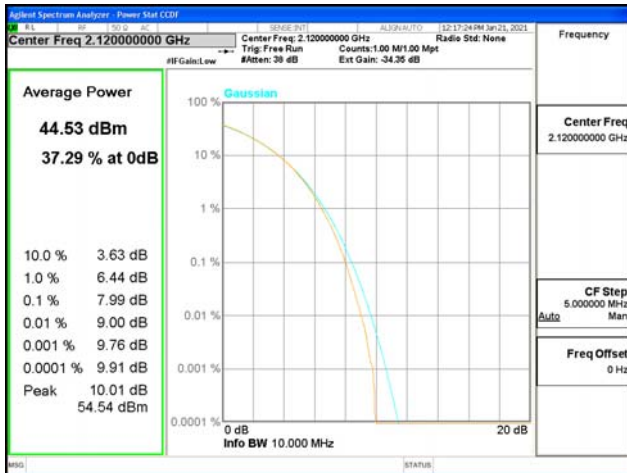


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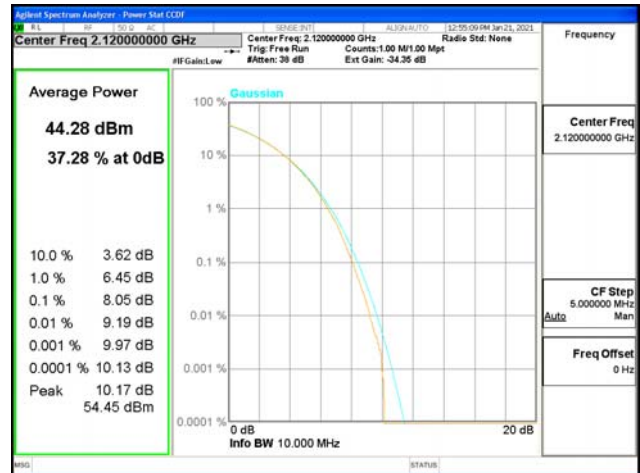


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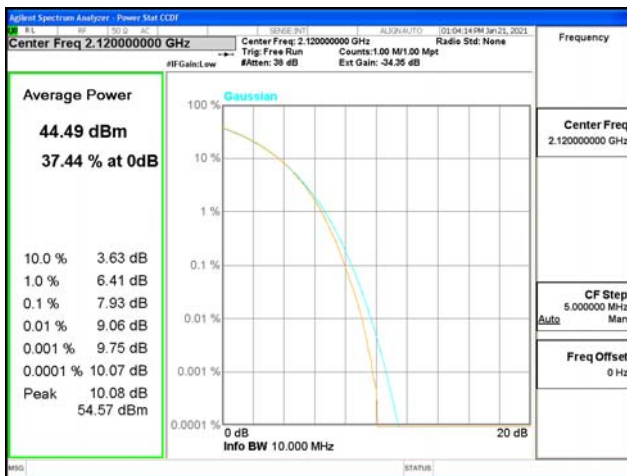
QPSK



16QAM



64QAM

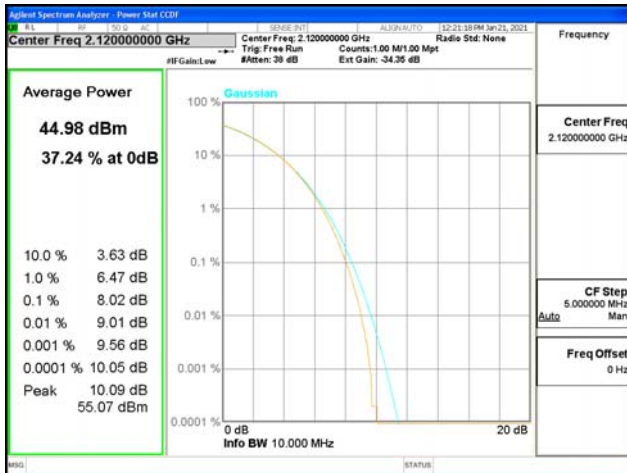


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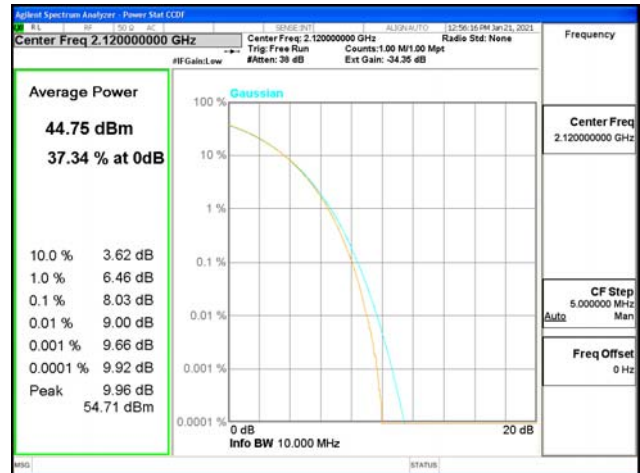


ANT3

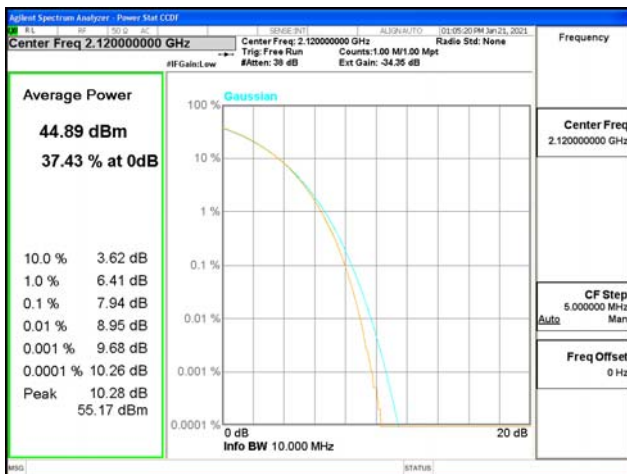
QPSK



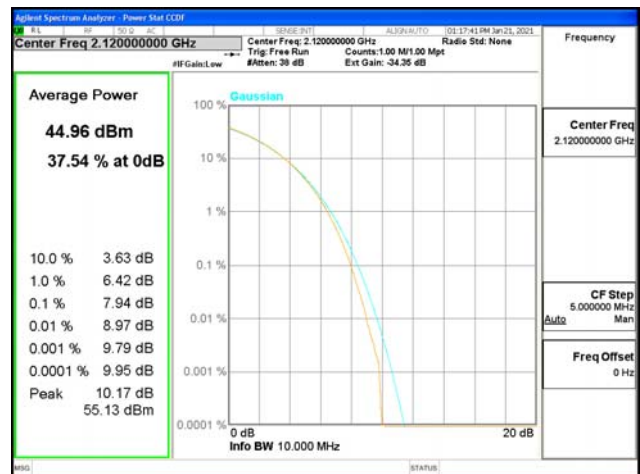
16QAM



64QAM

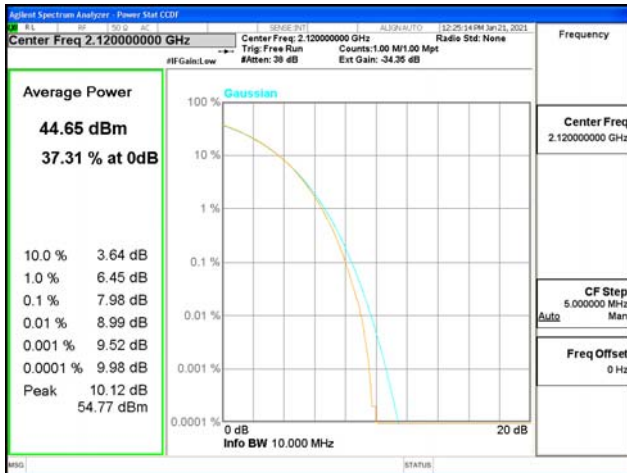


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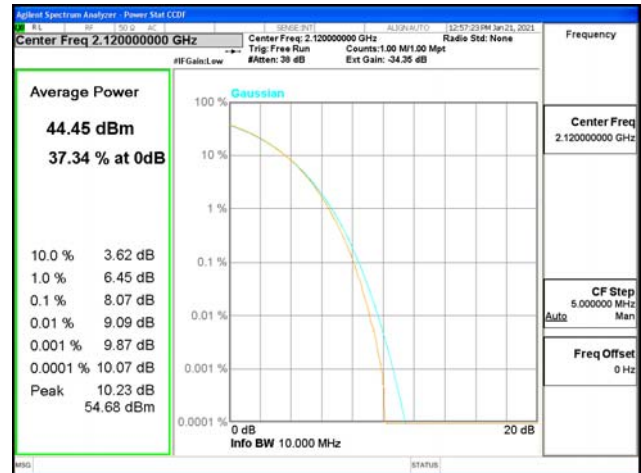


ANT4

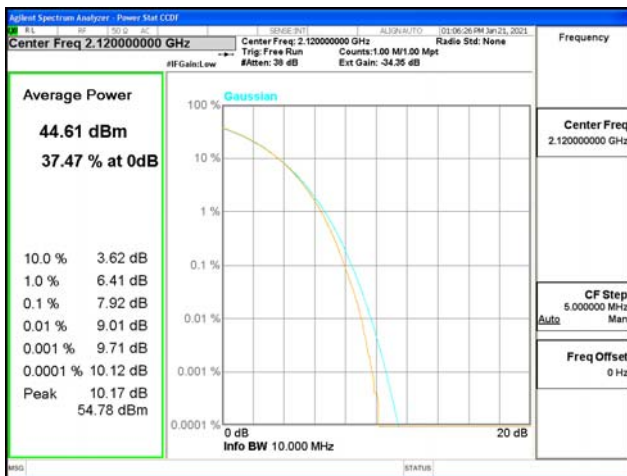
QPSK



16QAM



64QAM



256QAM



**BW 15MHz+5MHz+5MHz, Multi 3 carrier(Non-Contiguous), 4Tx, Top
ANT1**

QPSK



16QAM



64QAM

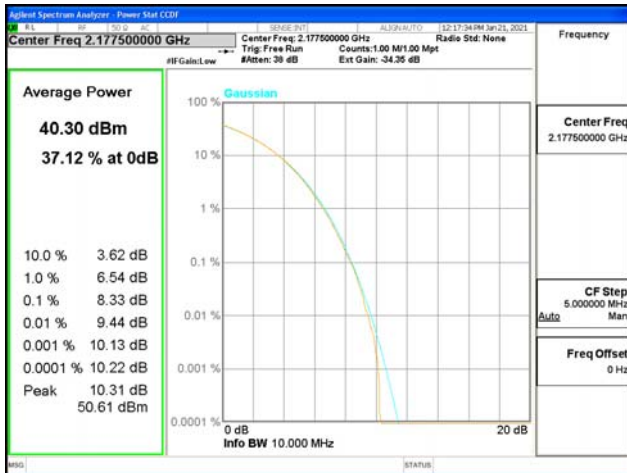


256QAM

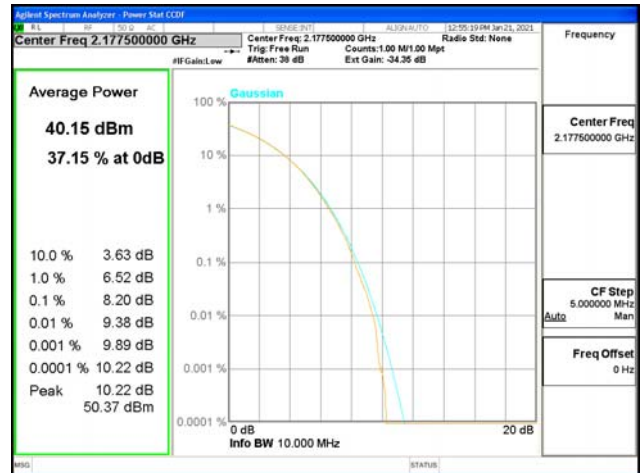


ANT2

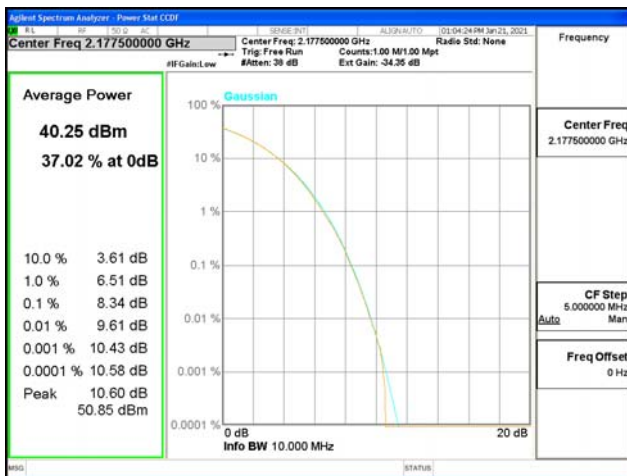
QPSK



16QAM



64QAM

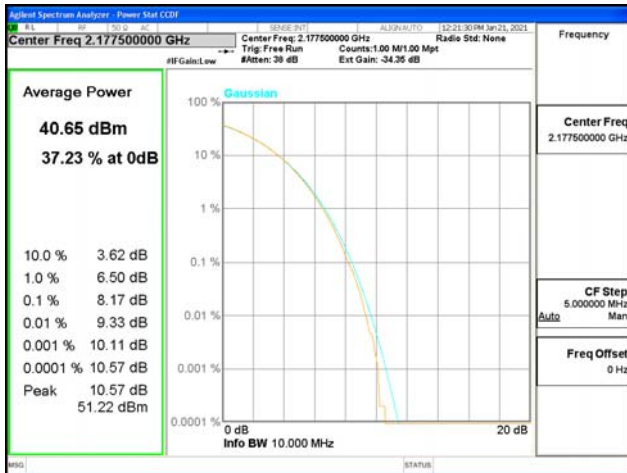


256QAM

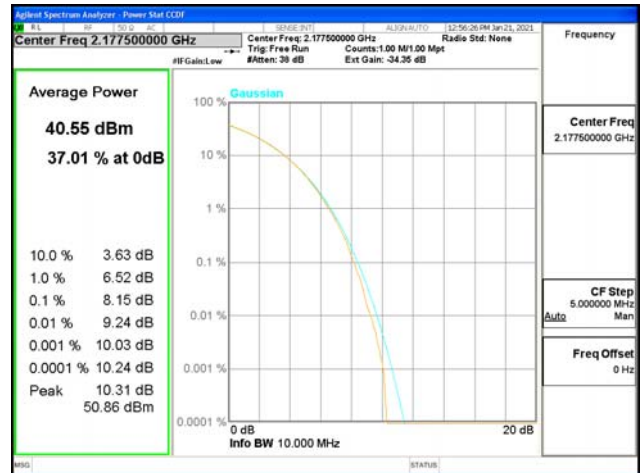


ANT3

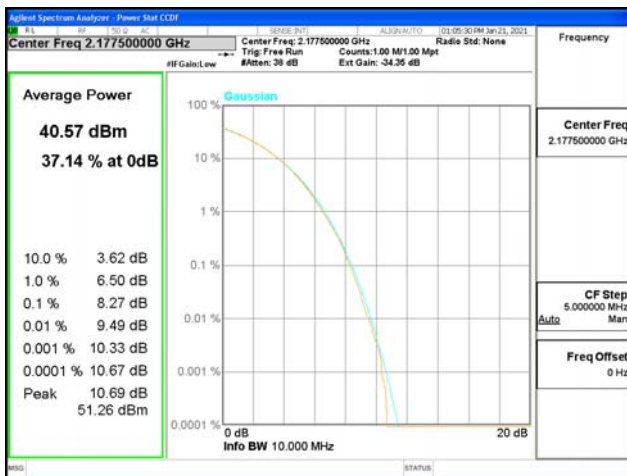
QPSK



16QAM



64QAM

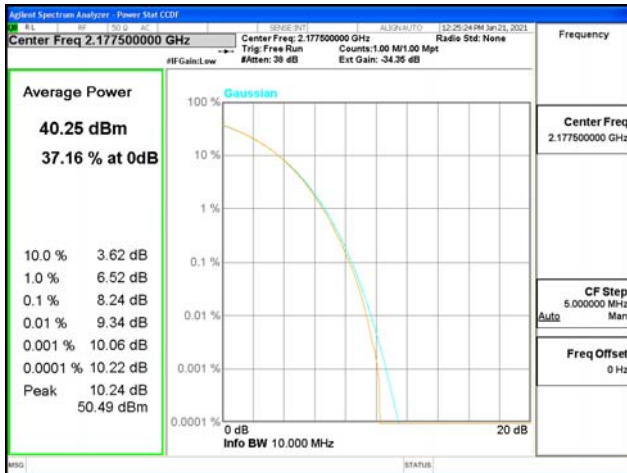


256QAM

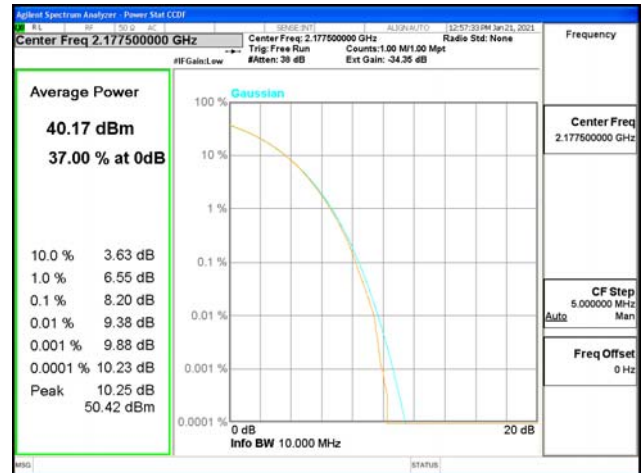


ANT4

QPSK



16QAM



64QAM



256QAM



 CTK Co., Ltd. The Prime Leader of Global Regulatory Certification	CTK Co., Ltd. (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501	Report No.: CTK-2021-00288 Page (145) / (428) Pages	
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5. Occupied Bandwidth

Test Requirements :

§ 2.1049 Measurements required : Occupied bandwidth

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of § 2.1049(a) through (i) as applicable.

Test Procedures :

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation. The EUT was connected to a spectrum analyzer enabled with an occupied bandwidth in accordance with FCC Part 2.1049. The occupied bandwidth was measured from the fundamental emission at the bottom, middle and top channels. The occupied bandwidth was measured using the built in occupied bandwidth function of the spectrum analyzer. It was set to measure the bandwidth where 99% of the signal power was contained. The analyzer automatically configures the measurement bandwidths to make an accurate measurement based on the channel bandwidth and channel spacing of the EUT.

Test Results :

Test Data : BW 15MHz+15MHz, Multi 2 carrier, 2Tx

Type	Channel	Modulation	Occupied Bandwidth(MHz)			
			Test antenna port			
			1	2	3	4
Contiguous	Bottom	QPSK	28.63	28.63		
		16QAM	28.58	28.58		
		64QAM	28.64	28.63		
		256QAM	28.63	28.62		
	Middle	QPSK	28.66	28.66		
		16QAM	28.61	28.61		
		64QAM	28.67	28.67		
		256QAM	28.66	28.66		
	Top	QPSK	28.66	28.66		
		16QAM	28.62	28.61		
		64QAM	28.67	28.66		
		256QAM	28.66	28.66		
Non-Contiguous	Bottom	QPSK	13.67	13.67		
		16QAM	13.66	13.67		
		64QAM	13.67	13.67		
		256QAM	13.67	13.66		
	Top	QPSK	13.69	13.69		
		16QAM	13.68	13.67		
		64QAM	13.70	13.69		
		256QAM	13.69	13.69		

Test Data : BW 15MHz+15MHz, Multi 2 carrier, 4Tx

Type	Channel	Modulation	Occupied Bandwidth(MHz)			
			Test antenna port			
			1	2	3	4
Contiguous	Bottom	QPSK	28.63	28.63	28.63	28.63
		16QAM	28.59	28.67	28.57	28.58
		64QAM	28.63	28.64	28.64	28.63
		256QAM	28.62	28.63	28.63	28.63
	Middle	QPSK	28.66	28.66	28.66	28.66
		16QAM	28.61	28.60	28.59	28.61
		64QAM	28.66	28.67	28.66	28.66
		256QAM	28.66	28.65	28.65	28.66
	Top	QPSK	28.66	28.66	28.66	28.66
		16QAM	28.60	28.61	28.60	28.61
		64QAM	28.66	28.67	28.66	28.66
		256QAM	28.66	28.66	28.65	28.66
Non-Contiguous	Bottom	QPSK	13.67	13.67	13.67	13.67
		16QAM	13.66	13.66	13.65	13.67
		64QAM	13.67	13.67	13.67	13.67
		256QAM	13.67	13.66	13.67	13.67
	Top	QPSK	13.69	13.69	13.68	13.68
		16QAM	13.68	13.68	13.67	13.67
		64QAM	13.69	13.69	13.69	13.69
		256QAM	13.69	13.69	13.69	13.68

Test Data : BW 20MHz+5MHz+5MHz, Multi 3 carrier, 2Tx

Type	Channel	Modulation	Occupied Bandwidth(MHz)			
			Test antenna port			
			1	2	3	4
Contiguous	Bottom	QPSK	28.89	28.89		
		16QAM	28.86	28.84		
		64QAM	28.88	28.88		
		256QAM	28.89	28.88		
	Middle	QPSK	28.92	28.91		
		16QAM	28.89	28.89		
		64QAM	28.91	28.90		
		256QAM	28.92	28.91		
	Top	QPSK	28.92	28.91		
		16QAM	28.86	28.87		
		64QAM	28.91	28.90		
		256QAM	28.92	28.91		
Non-Contiguous	Bottom	QPSK	23.99	24.00		
		16QAM	23.94	23.96		
		64QAM	23.99	23.99		
		256QAM	23.99	24.00		
	Top	QPSK	4.57	4.57		
		16QAM	4.54	4.53		
		64QAM	4.57	4.57		
		256QAM	4.57	4.57		

Test Data : BW 20MHz+5MHz+5MHz, Multi 3 carrier, 4Tx

Type	Channel	Modulation	Occupied Bandwidth(MHz)			
			Test antenna port			
			1	2	3	4
Contiguous	Bottom	QPSK	28.89	28.89	28.89	28.88
		16QAM	28.84	28.85	28.84	28.84
		64QAM	28.87	28.88	28.89	28.88
		256QAM	28.89	28.89	28.89	28.88
	Middle	QPSK	28.90	28.91	28.91	28.91
		16QAM	28.87	28.84	28.85	28.87
		64QAM	28.91	28.91	28.90	28.91
		256QAM	28.91	28.92	28.91	28.92
	Top	QPSK	28.91	28.91	28.91	28.91
		16QAM	28.89	28.86	28.87	28.86
		64QAM	28.91	28.91	28.90	28.91
		256QAM	28.92	28.92	28.91	28.92
Non-Contiguous	Bottom	QPSK	23.99	23.99	23.99	23.99
		16QAM	23.95	23.95	23.94	23.95
		64QAM	23.99	23.99	23.98	23.98
		256QAM	23.99	24.00	23.99	23.99
	Top	QPSK	4.57	4.57	4.57	4.57
		16QAM	4.54	4.54	4.54	4.54
		64QAM	4.57	4.57	4.57	4.57
		256QAM	4.57	4.57	4.57	4.57

Test Data : BW 15MHz+5MHz+5MHz, Multi 3 carrier, 2Tx

Type	Channel	Modulation	Occupied Bandwidth(MHz)			
			Test antenna port			
			1	2	3	4
Contiguous	Bottom	QPSK	24.24	24.24		
		16QAM	24.19	24.17		
		64QAM	24.24	24.24		
		256QAM	24.24	24.24		
	Middle	QPSK	24.27	24.27		
		16QAM	24.20	24.21		
		64QAM	24.27	24.27		
		256QAM	24.28	24.27		
	Top	QPSK	24.28	24.27		
		16QAM	24.20	24.21		
		64QAM	24.27	24.27		
		256QAM	24.28	24.27		
Non-Contiguous	Bottom	QPSK	19.21	19.21		
		16QAM	19.14	19.16		
		64QAM	19.20	19.21		
		256QAM	19.20	19.21		
	Top	QPSK	4.57	4.57		
		16QAM	4.53	4.55		
		64QAM	4.57	4.57		
		256QAM	4.57	4.57		

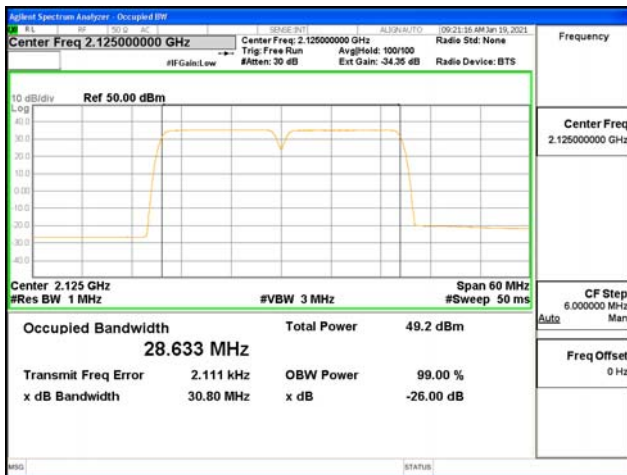
Test Data : BW 15MHz+5MHz+5MHz, Multi 3 carrier, 4Tx

Type	Channel	Modulation	Occupied Bandwidth(MHz)			
			Test antenna port			
			1	2	3	4
Contiguous	Bottom	QPSK	24.23	24.24	24.23	24.24
		16QAM	24.17	24.18	24.16	24.17
		64QAM	24.23	24.24	24.23	24.24
		256QAM	24.23	24.24	24.24	24.24
	Middle	QPSK	24.26	24.27	24.27	24.27
		16QAM	24.20	24.20	24.21	24.21
		64QAM	24.26	24.27	24.26	24.27
		256QAM	24.27	24.27	24.26	24.27
	Top	QPSK	24.27	24.27	24.27	24.27
		16QAM	24.22	24.21	24.21	24.22
		64QAM	24.28	24.27	24.27	24.27
		256QAM	24.28	24.27	24.27	24.27
Non-Contiguous	Bottom	QPSK	19.20	19.21	19.21	19.20
		16QAM	19.13	19.15	19.14	19.13
		64QAM	19.20	19.20	19.20	19.20
		256QAM	19.20	19.20	19.20	19.20
	Top	QPSK	4.57	4.57	4.57	4.57
		16QAM	4.54	4.53	4.54	4.54
		64QAM	4.57	4.57	4.57	4.57
		256QAM	4.57	4.57	4.57	4.57

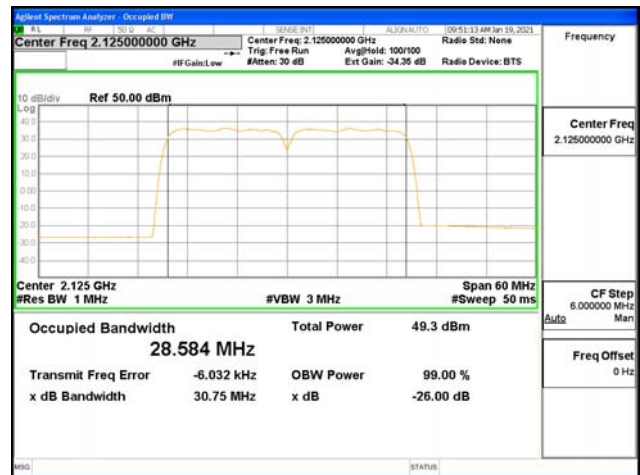
Test Plot at Occupied Bandwidth

**BW 15MHz+15MHz, Multi 2 carrier(Contiguous), 2Tx, Bottom
ANT 1**

QPSK



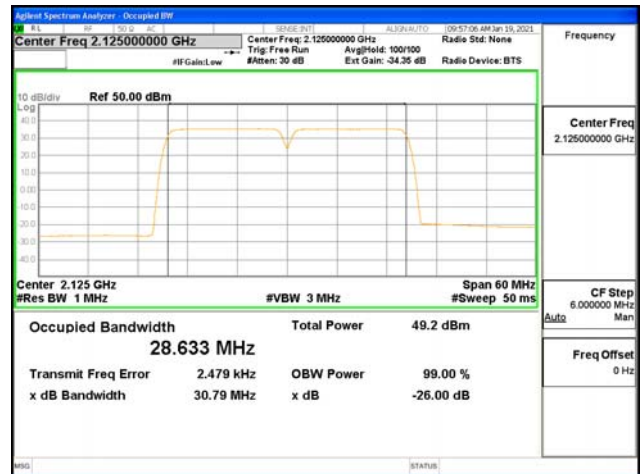
16QAM



64QAM

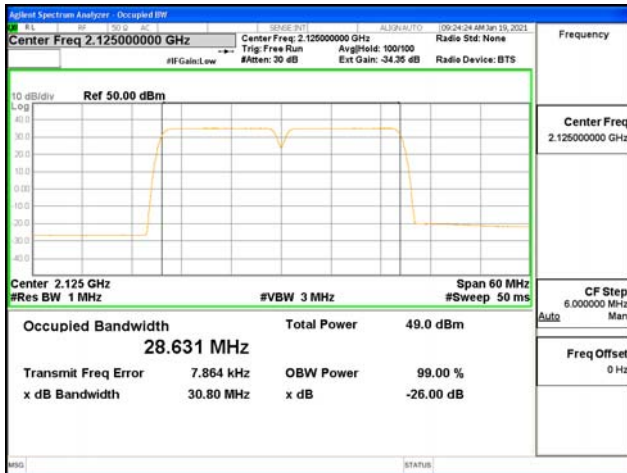


256QAM

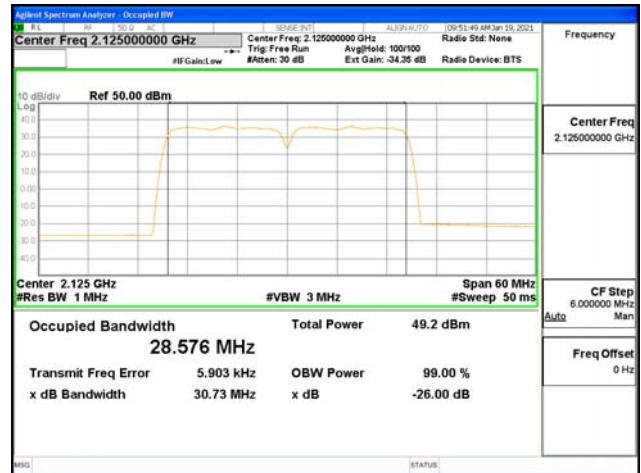


ANT 2

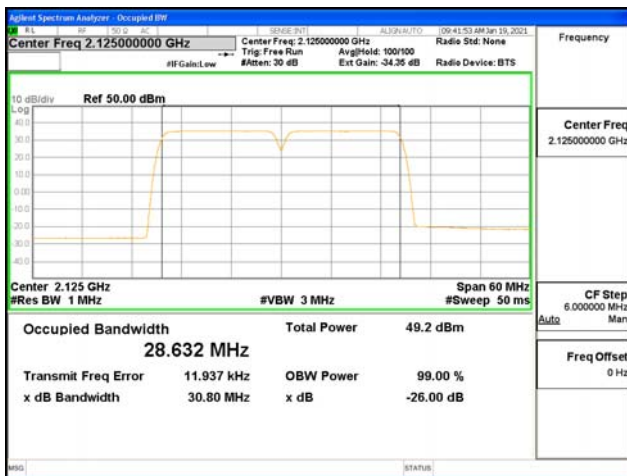
QPSK



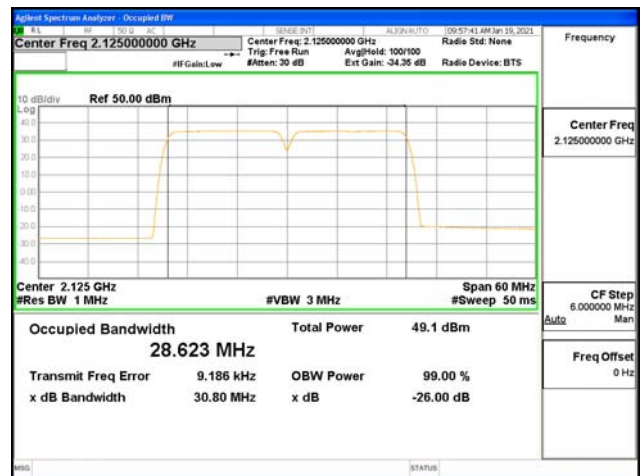
16QAM



64QAM

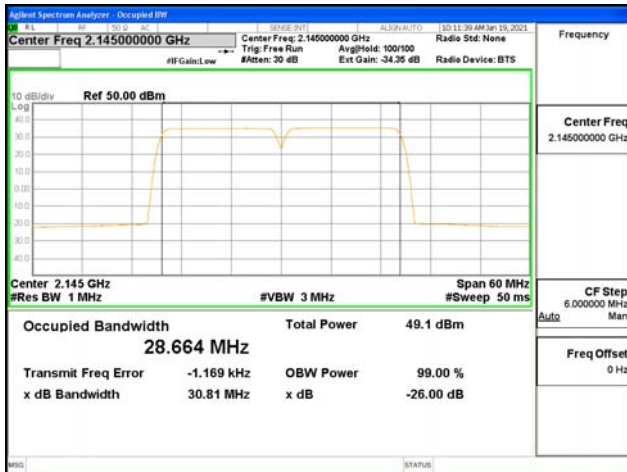


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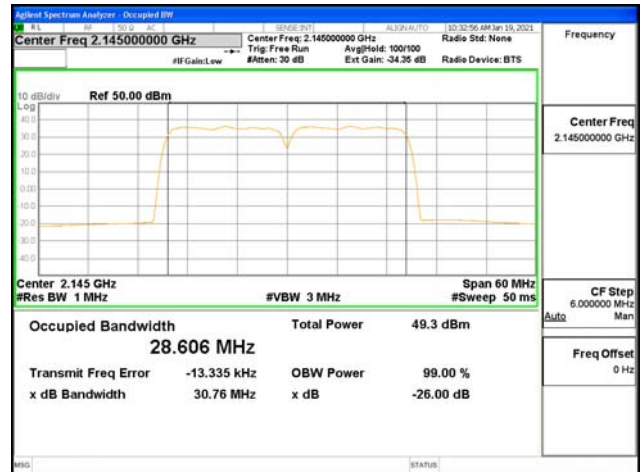


**BW 15MHz+15MHz, Multi 2 carrier(Contiguous), 2Tx, Middle
ANT 1**

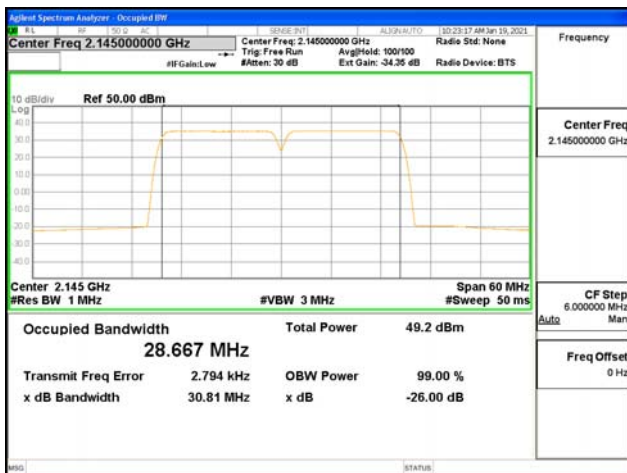
QPSK



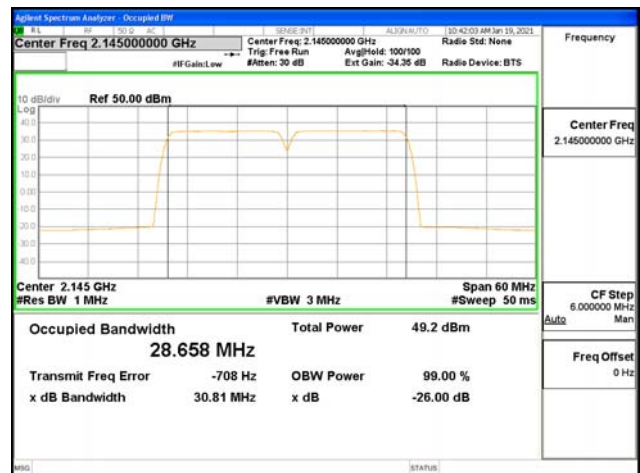
16QAM



64QAM

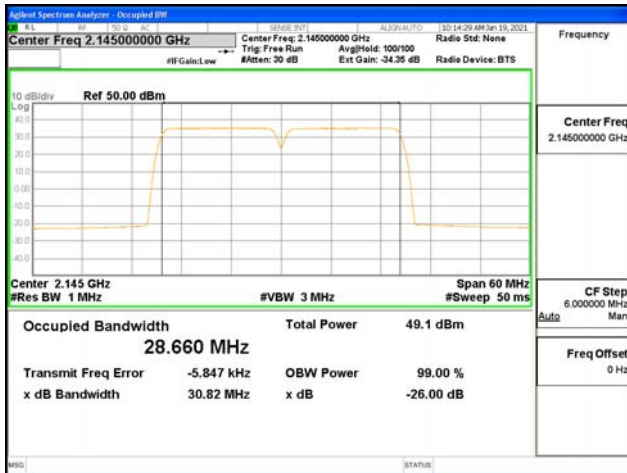


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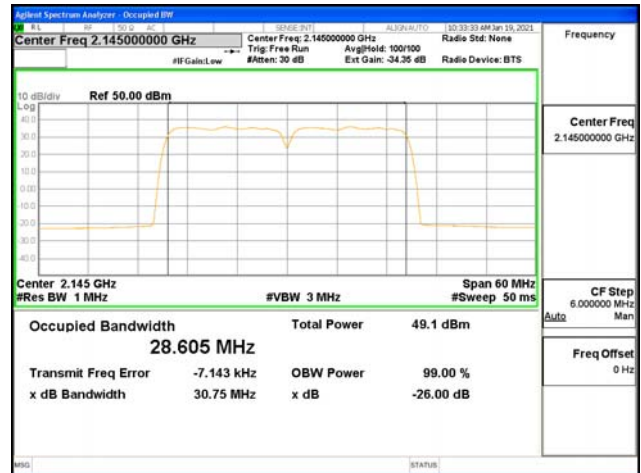


ANT 2

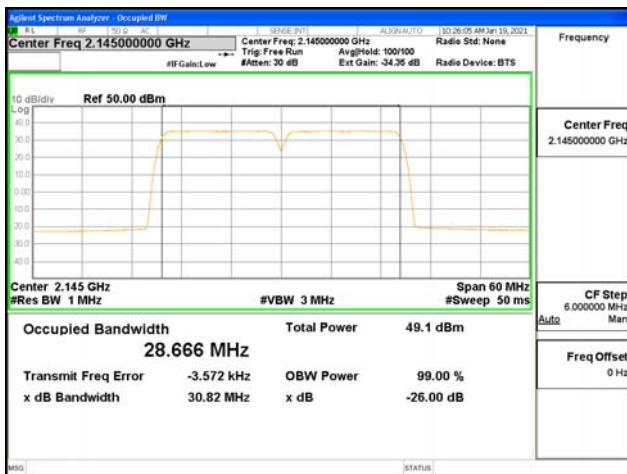
QPSK



16QAM



64QAM

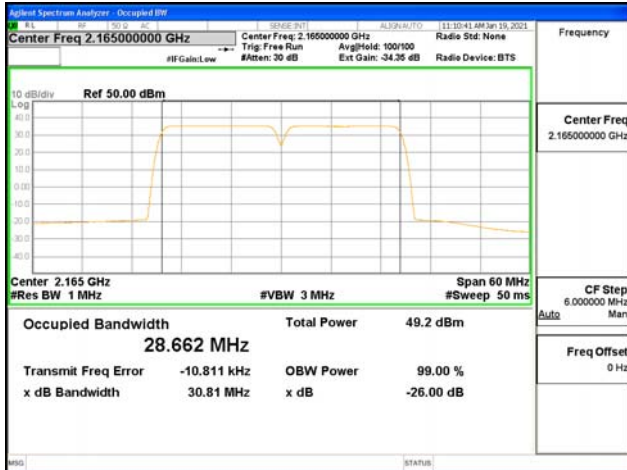


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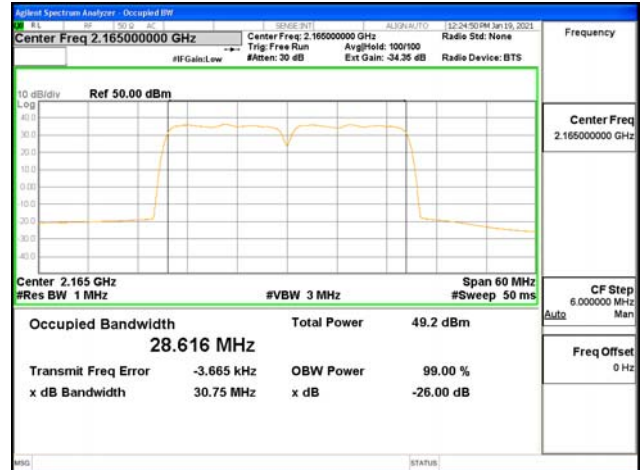


**BW 15MHz+15MHz, Multi 2 carrier(Contiguous), 2Tx, Top
ANT 1**

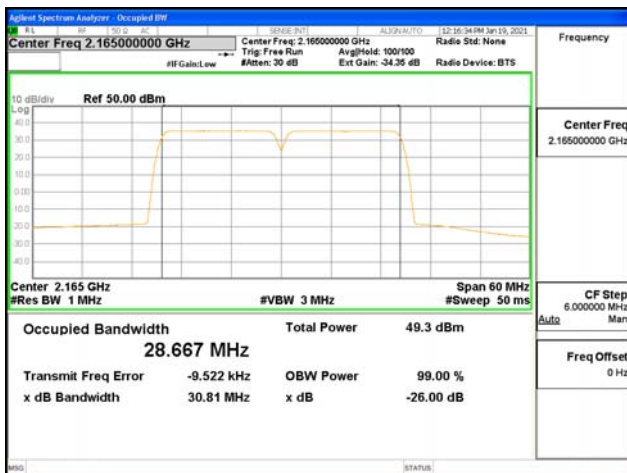
QPSK



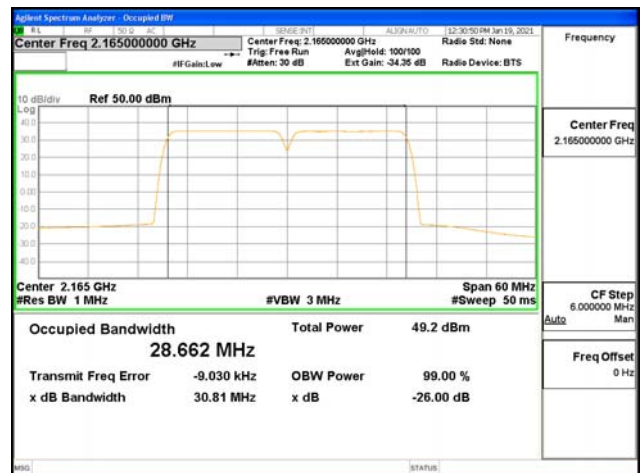
16QAM



64QAM

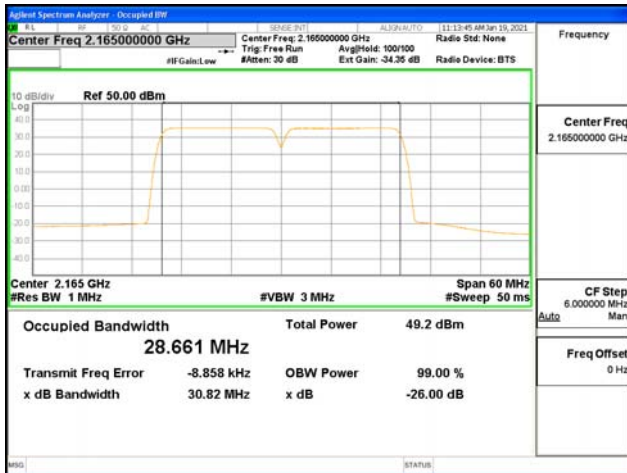


256QAM

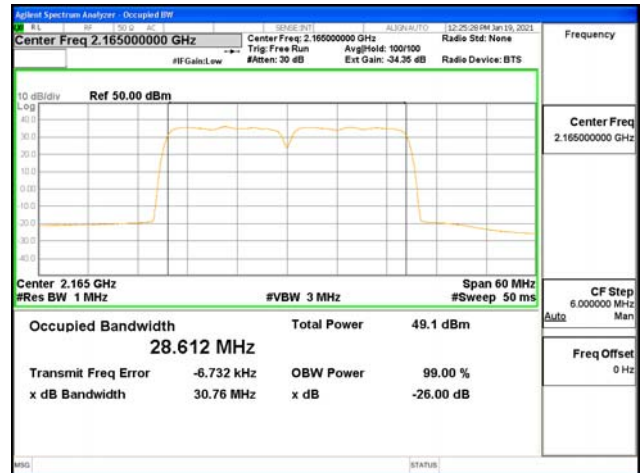


ANT 2

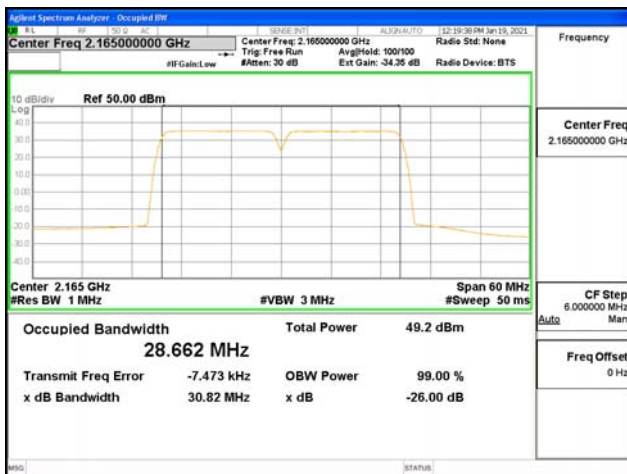
QPSK



16QAM



64QAM

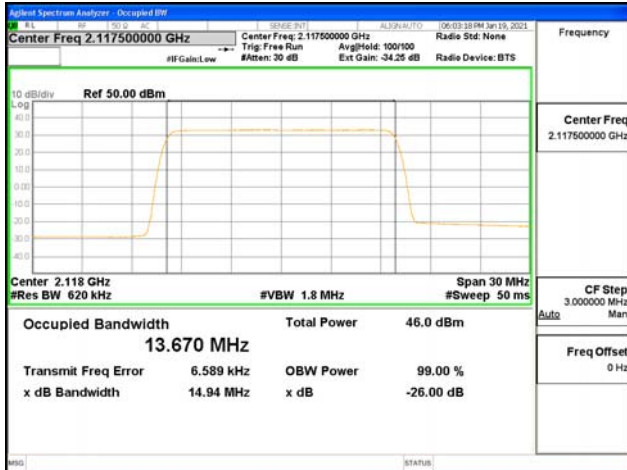


256QAM

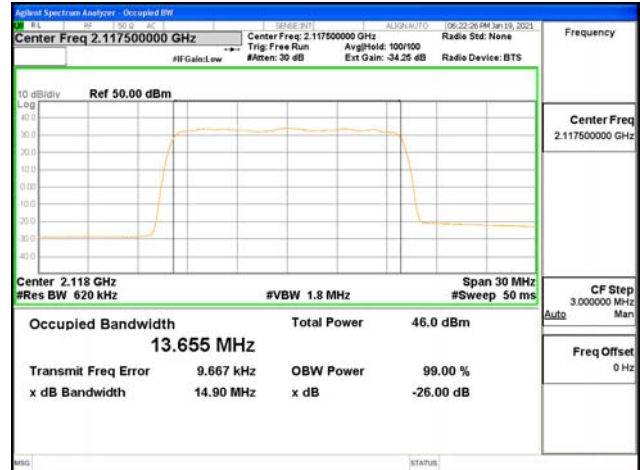


**BW 15MHz+15MHz, Multi 2 carrier(Non-Contiguous), 2Tx, Bottom
ANT 1**

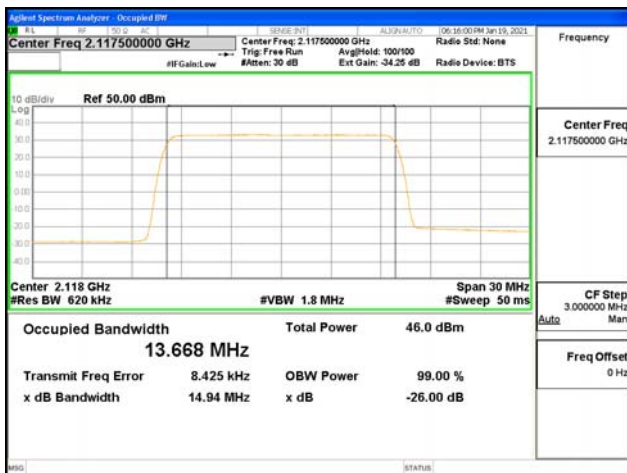
QPSK



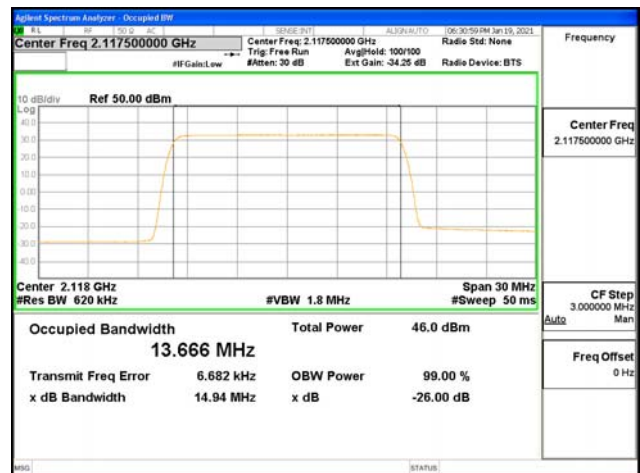
16QAM



64QAM

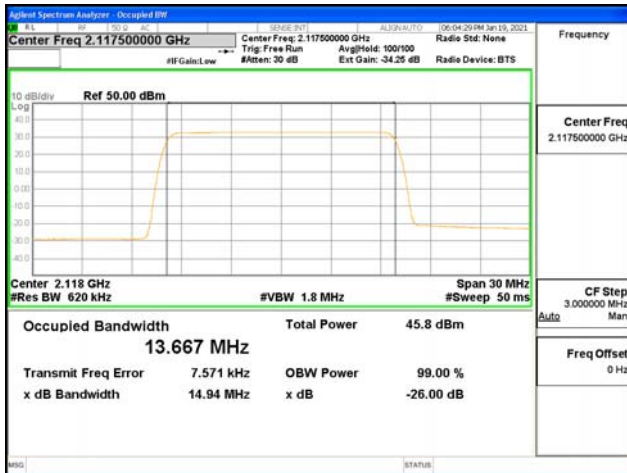


256QAM

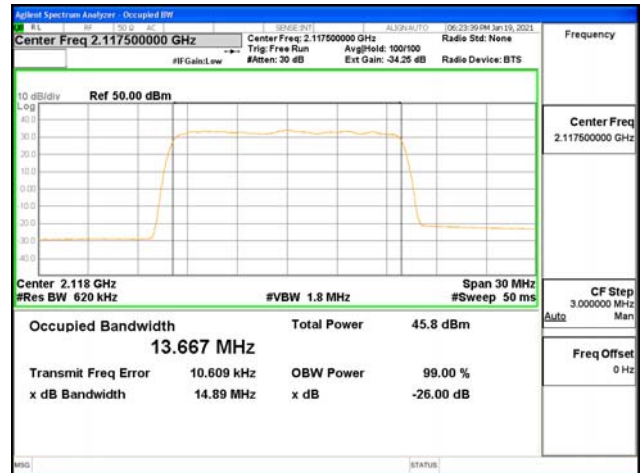


ANT 2

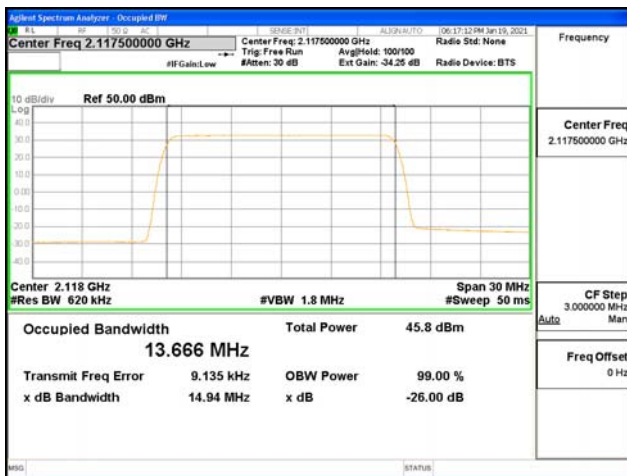
QPSK



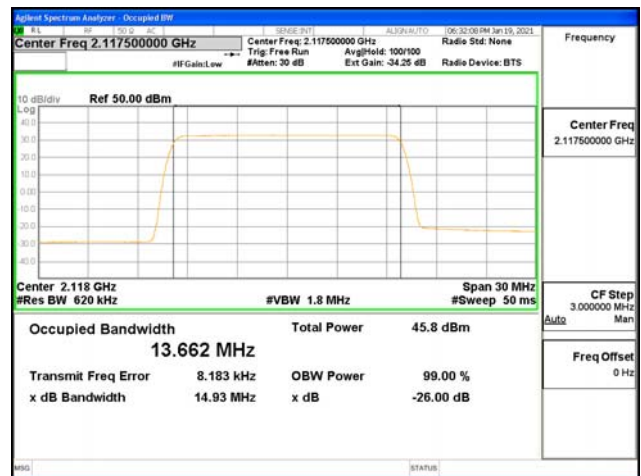
16QAM



64QAM

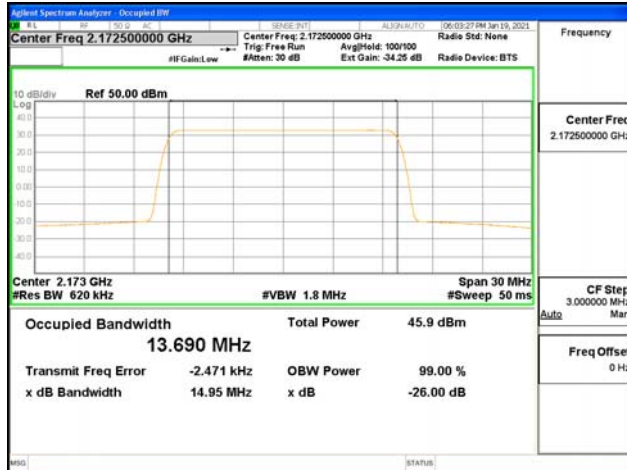


256QAM

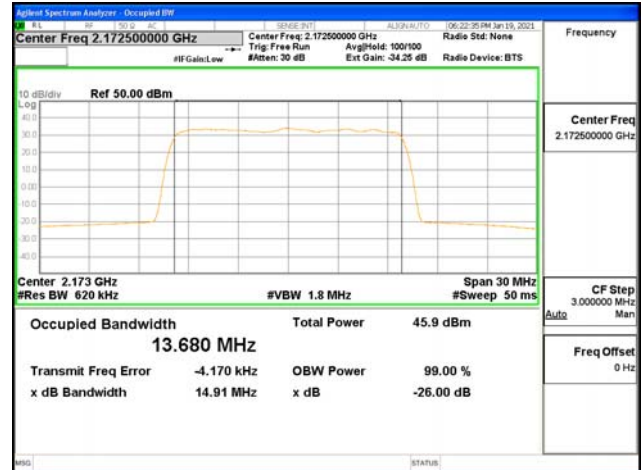


**BW 15MHz+15MHz, Multi 2 carrier(Non-Contiguous), 2Tx, Top
ANT 1**

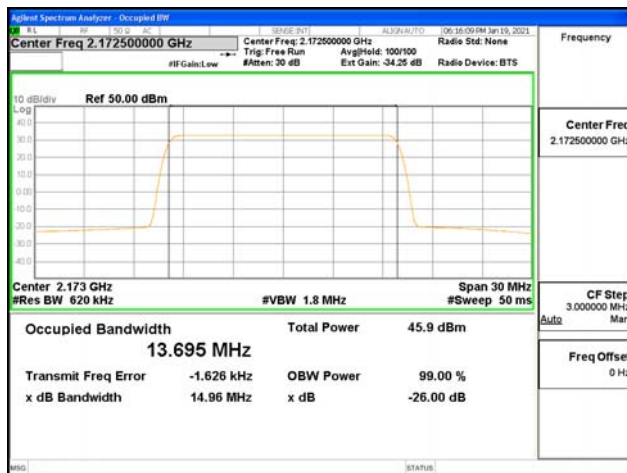
QPSK



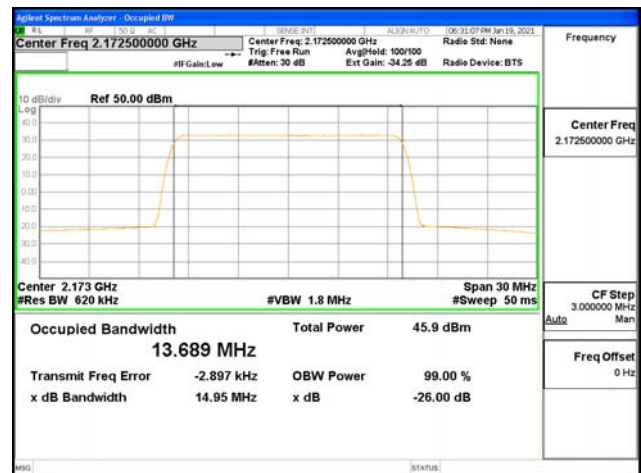
16QAM



64QAM

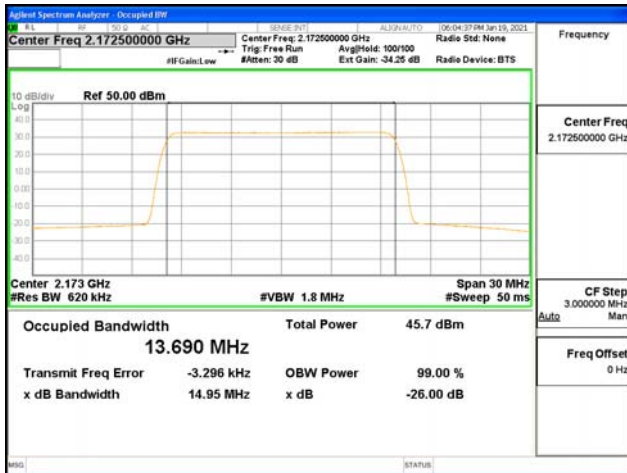


256QAM

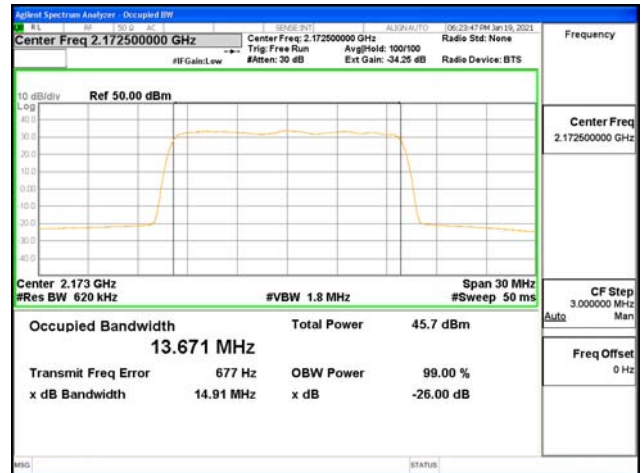


ANT 2

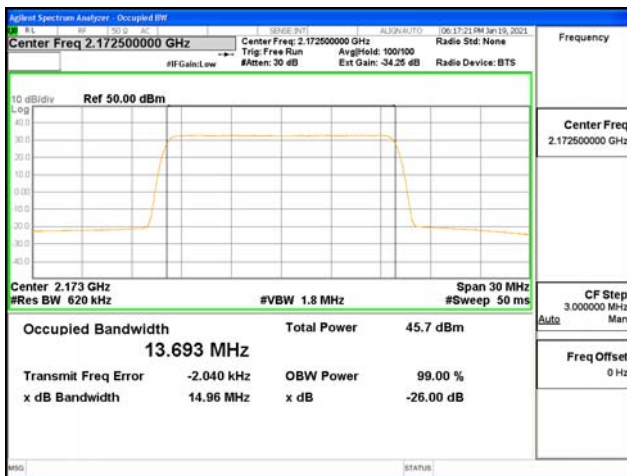
QPSK



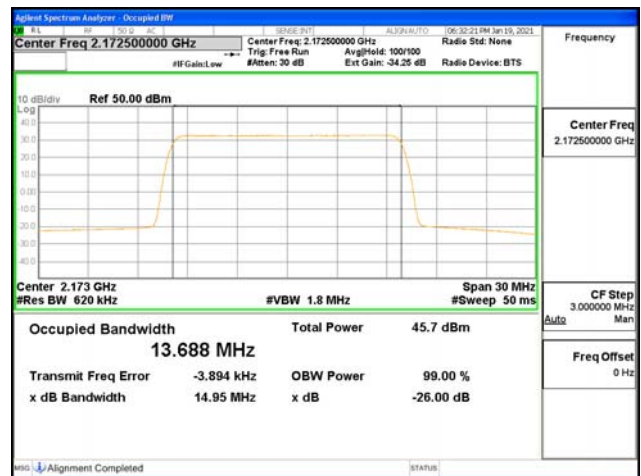
16QAM



64QAM

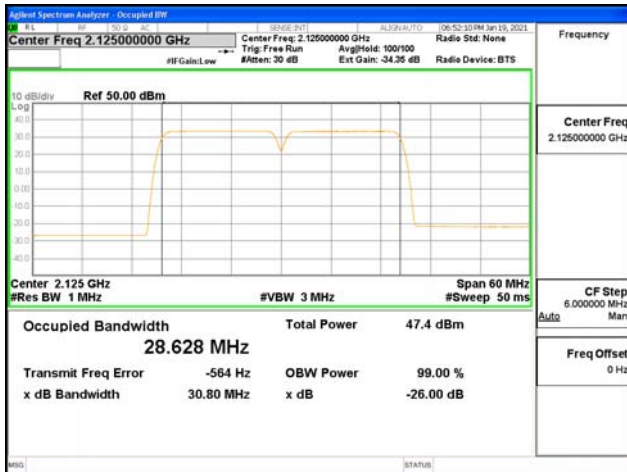


256QAM

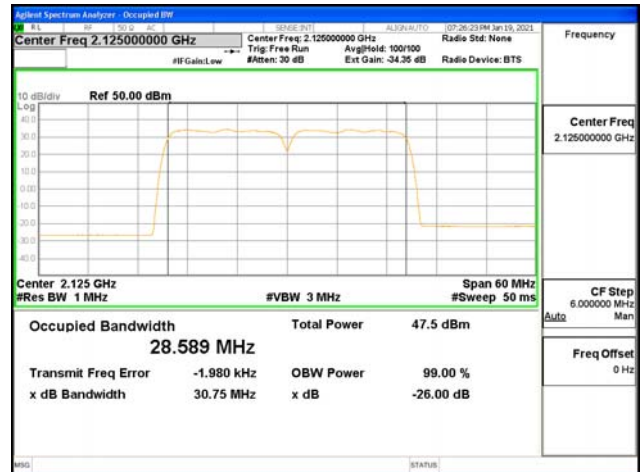


**BW 15MHz+15MHz, Multi 2 carrier(Contiguous), 4Tx, Bottom
ANT 1**

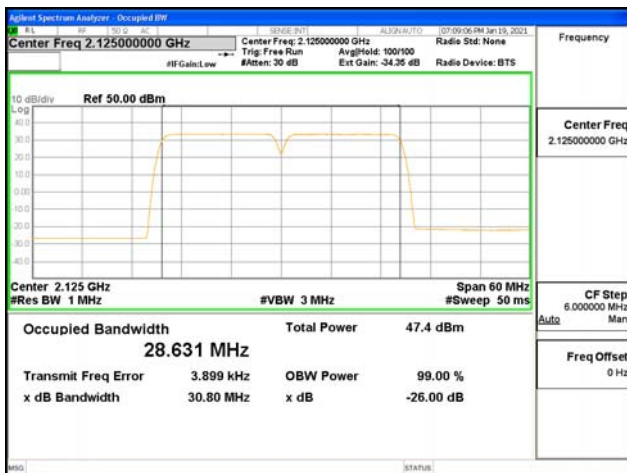
QPSK



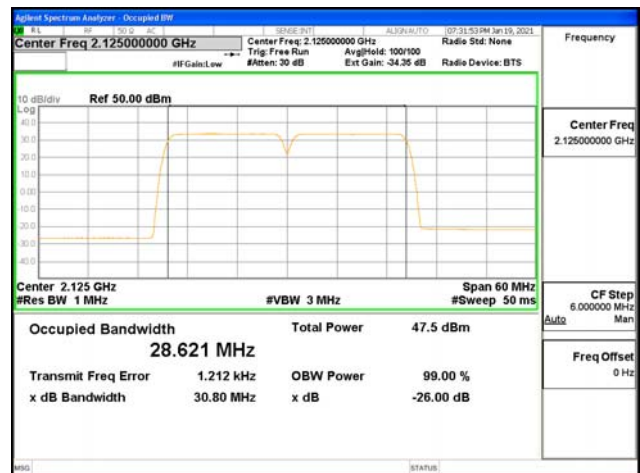
16QAM



64QAM

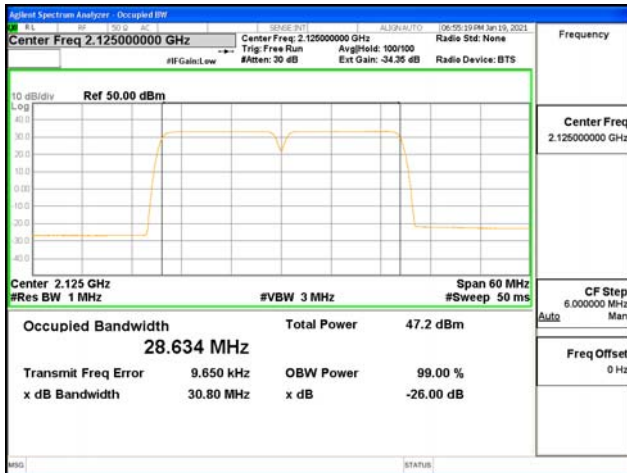


256QAM

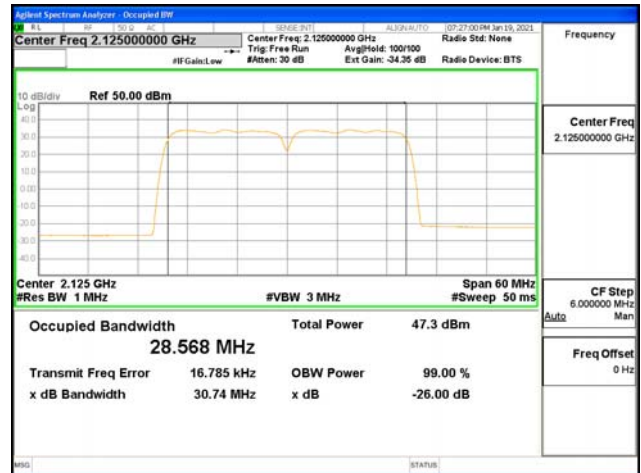


ANT 2

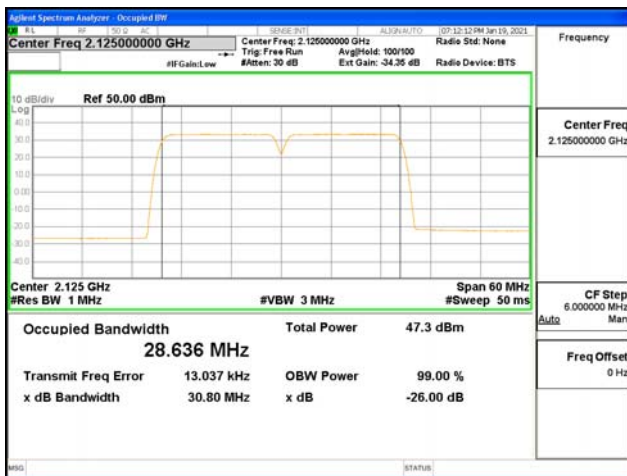
QPSK



16QAM



64QAM



256QAM

