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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.



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Test Results :

Test Data : Band 2, BW 5MHz, Single carrier, 2TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 2 BW 5MHz	Single	Bottom	5	2TX	QPSK	4.47
					16QAM	4.46
					64QAM	4.50
					256QAM	4.50
		Middle	5	2TX	QPSK	4.46
					16QAM	4.46
					64QAM	4.50
					256QAM	4.50
		Top	5	2TX	QPSK	4.46
					16QAM	4.47
					64QAM	4.50
					256QAM	4.49

Test Data : Band 2, BW 5MHz, Single carrier, 4TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 2 BW 5MHz	Single	Bottom	7	4TX	QPSK	4.47
					16QAM	4.46
					64QAM	4.50
					256QAM	4.50
		Middle	7	4TX	QPSK	4.46
					16QAM	4.46
					64QAM	4.50
					256QAM	4.50
		Top	7	4TX	QPSK	4.46
					16QAM	4.46
					64QAM	4.50
					256QAM	4.50



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Test Data : Band 2, BW 15MHz, Single carrier, 2TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 2 BW 15MHz	Single	Bottom	5	2TX	QPSK	13.36
					16QAM	13.38
					64QAM	13.39
					256QAM	13.39
		Middle	5	2TX	QPSK	13.38
					16QAM	13.38
					64QAM	13.38
					256QAM	13.39
		Top	5	2TX	QPSK	13.38
					16QAM	13.38
					64QAM	13.39
					256QAM	13.39

Test Data : Band 2, BW 15MHz, Single carrier, 4TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 2 BW 15MHz	Single	Bottom	7	4TX	QPSK	13.37
					16QAM	13.39
					64QAM	13.38
					256QAM	13.38
		Middle	7	4TX	QPSK	13.38
					16QAM	13.38
					64QAM	13.38
					256QAM	13.38
		Top	7	4TX	QPSK	13.38
					16QAM	13.39
					64QAM	13.39
					256QAM	13.39



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Test Data : Band 2, BW 5MHz + BW 5MHz, Multi carrier, 2TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 2 BW 5MHz + BW 5MHz	Multi/ Contiguous	Bottom	5	2TX	QPSK	9.38
					16QAM	9.39
					64QAM	9.43
					256QAM	9.43
		Top	5	2TX	QPSK	9.38
					16QAM	9.39
					64QAM	9.44
					256QAM	9.44

Test Data : Band 2, BW 5MHz + BW 5MHz, Multi carrier, 4TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 2 BW 5MHz + BW 5MHz	Multi/ Contiguous	Bottom	7	4TX	QPSK	9.38
					16QAM	9.38
					64QAM	9.43
					256QAM	9.43
		Top	7	4TX	QPSK	9.38
					16QAM	9.38
					64QAM	9.43
					256QAM	9.43

Test Data : Band 2, BW 5MHz + BW 15MHz, Multi carrier, 2TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 2 BW 5MHz + BW 15MHz	Multi/ Contiguous	Bottom	5	2TX	QPSK	18.83
					16QAM	18.81
					64QAM	18.85
					256QAM	18.85
		Top	5	2TX	QPSK	18.83
					16QAM	18.84
					64QAM	18.84
					256QAM	18.84

Test Data : Band 2, BW 5MHz + BW 15MHz, Multi carrier, 4TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 2 BW 5MHz + BW 15MHz	Multi/ Contiguous	Bottom	7	4TX	QPSK	18.82
					16QAM	18.81
					64QAM	18.85
					256QAM	18.84
		Top	7	4TX	QPSK	18.84
					16QAM	18.81
					64QAM	18.85
					256QAM	18.84



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Test Data : Band 2, BW 5MHz + BW 5MHz, Multi carrier, 2TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 2 BW 5MHz + BW 5MHz	Multi/ Non- Contiguous	Bottom	5	2TX	QPSK	4.46
					16QAM	4.46
					64QAM	4.50
					256QAM	4.50
		Top	5	2TX	QPSK	4.46
					16QAM	4.47
					64QAM	4.50
					256QAM	4.50

Test Data : Band 2, BW 5MHz + BW 5MHz, Multi carrier, 4TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 2 BW 5MHz + BW 5MHz	Multi/ Non- Contiguous	Bottom	7	4TX	QPSK	4.47
					16QAM	4.46
					64QAM	4.50
					256QAM	4.50
		Top	7	4TX	QPSK	4.46
					16QAM	4.47
					64QAM	4.50
					256QAM	4.50

Test Data : Band 2, BW 15MHz + BW 5MHz, Multi carrier, 2TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 2 BW 15MHz + BW 5MHz	Multi/ Non- Contiguous	Bottom	5	2TX	QPSK	13.39
					16QAM	13.39
					64QAM	13.39
					256QAM	13.38
		Top	5	2TX	QPSK	4.46
					16QAM	4.46
					64QAM	4.49
					256QAM	4.49

Test Data : Band 2, BW 15MHz + BW 5MHz, Multi carrier, 4TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 2 BW 15MHz + BW 5MHz	Multi/ Non- Contiguous	Bottom	7	4TX	QPSK	13.39
					16QAM	13.39
					64QAM	13.39
					256QAM	13.39
		Top	7	4TX	QPSK	4.46
					16QAM	4.46
					64QAM	4.49
					256QAM	4.49



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Test Data : Band 66, BW 5MHz, Single carrier, 2TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 66 BW 5MHz	Single	Bottom	5	2TX	QPSK	4.46
					16QAM	4.46
					64QAM	4.49
					256QAM	4.49
		Middle	5	2TX	QPSK	4.47
					16QAM	4.47
					64QAM	4.50
					256QAM	4.50
		Top	5	2TX	QPSK	4.46
					16QAM	4.46
					64QAM	4.50
					256QAM	4.50

Test Data : Band 66, BW 5MHz, Single carrier, 4TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 66 BW 5MHz	Single	Bottom	7	4TX	QPSK	4.46
					16QAM	4.45
					64QAM	4.49
					256QAM	4.49
		Middle	7	4TX	QPSK	4.46
					16QAM	4.46
					64QAM	4.50
					256QAM	4.50
		Top	7	4TX	QPSK	4.45
					16QAM	4.46
					64QAM	4.46
					256QAM	4.47



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Test Data : Band 66, BW 15MHz, Single carrier, 2TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 66 BW 15MHz	Single	Bottom	5	2TX	QPSK	13.37
					16QAM	13.38
					64QAM	13.38
					256QAM	13.38
		Middle	5	2TX	QPSK	13.39
					16QAM	13.39
					64QAM	13.39
					256QAM	13.39
		Top	5	2TX	QPSK	13.38
					16QAM	13.37
					64QAM	13.39
					256QAM	13.39

Test Data : Band 66, BW 15MHz, Single carrier, 4TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 66 BW 15MHz	Single	Bottom	7	4TX	QPSK	13.38
					16QAM	13.38
					64QAM	13.38
					256QAM	13.38
		Middle	7	4TX	QPSK	13.38
					16QAM	13.39
					64QAM	13.39
					256QAM	13.39
		Top	7	4TX	QPSK	13.39
					16QAM	13.38
					64QAM	13.39
					256QAM	13.38



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Test Data : Band 66, BW 5MHz + BW 5MHz, Multi carrier, 2TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 66 BW 5MHz + BW 5MHz	Multi/ Contiguous	Bottom	5	2TX	QPSK	9.37
					16QAM	9.35
					64QAM	9.42
					256QAM	9.42
		Top	5	2TX	QPSK	9.37
					16QAM	9.38
					64QAM	9.43
					256QAM	9.44

Test Data : Band 66, BW 5MHz + BW 5MHz, Multi carrier, 4TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 66 BW 5MHz + BW 5MHz	Multi/ Contiguous	Bottom	7	4TX	QPSK	9.34
					16QAM	9.38
					64QAM	9.42
					256QAM	9.42
		Top	7	4TX	QPSK	9.38
					16QAM	9.38
					64QAM	9.43
					256QAM	9.43

Test Data : Band 66, BW 5MHz + BW 15MHz, Multi carrier, 2TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 66 BW 5MHz + BW 15MHz	Multi/ Contiguous	Bottom	5	2TX	QPSK	18.78
					16QAM	18.78
					64QAM	18.82
					256QAM	18.82
		Top	5	2TX	QPSK	18.81
					16QAM	18.81
					64QAM	18.83
					256QAM	18.84

Test Data : Band 66, BW 5MHz + BW 15MHz, Multi carrier, 4TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 66 BW 5MHz + BW 15MHz	Multi/ Contiguous	Bottom	7	4TX	QPSK	18.79
					16QAM	18.83
					64QAM	18.83
					256QAM	18.82
		Top	7	4TX	QPSK	18.80
					16QAM	18.83
					64QAM	18.83
					256QAM	18.84



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Test Data : Band 66, BW 5MHz + BW 5MHz, Multi carrier, 2TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 66 BW 5MHz + BW 5MHz	Multi/ Non- Contiguous	Bottom	5	2TX	QPSK	4.46
					16QAM	4.45
					64QAM	4.49
					256QAM	4.49
		Top	5	2TX	QPSK	4.46
					16QAM	4.46
					64QAM	4.50
					256QAM	4.50

Test Data : Band 66, BW 5MHz + BW 5MHz, Multi carrier, 4TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 66 BW 5MHz + BW 5MHz	Multi/ Non- Contiguous	Bottom	7	4TX	QPSK	4.45
					16QAM	4.46
					64QAM	4.49
					256QAM	4.49
		Top	7	4TX	QPSK	4.45
					16QAM	4.45
					64QAM	4.50
					256QAM	4.50

Test Data : Band 66, BW 15MHz + BW 5MHz, Multi carrier, 2TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 66 BW 15MHz + BW 5MHz	Multi/ Non- Contiguous	Bottom	5	2TX	QPSK	13.38
					16QAM	13.38
					64QAM	13.38
					256QAM	13.38
		Top	5	2TX	QPSK	4.47
					16QAM	4.46
					64QAM	4.50
					256QAM	4.50

Test Data : Band 66, BW 15MHz + BW 5MHz, Multi carrier, 4TX

Type	Carrier	Channel	Test Ant. port	Output port	Modulation	Occupied Bandwidth(MHz)
Band 66 BW 15MHz + BW 5MHz	Multi/ Non- Contiguous	Bottom	7	4TX	QPSK	13.37
					16QAM	13.37
					64QAM	13.37
					256QAM	13.38
		Top	7	4TX	QPSK	4.47
					16QAM	4.47
					64QAM	4.50
					256QAM	4.50



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Test Plot at Occupied Bandwidth

Band 2, BW 5MHz, Single carrier, 2TX, Bottom

QPSK

16QAM



64QAM

256QAM





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Band 2, BW 5MHz, Single carrier, 2TX, Middle

QPSK



16QAM



64QAM



256QAM





Band 2, BW 5MHz, Single carrier, 2TX, Top

QPSK



16QAM



64QAM



256QAM





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Band 2, BW 15MHz, Single carrier, 2TX, Bottom

QPSK



16QAM



64QAM



256QAM





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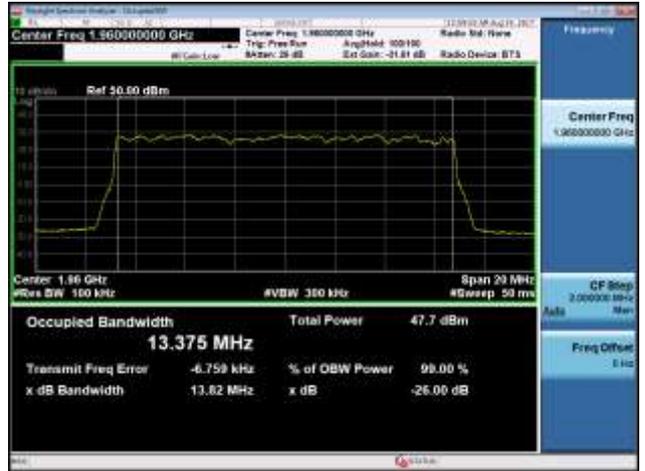
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Band 2, BW 15MHz, Single carrier, 2TX, Middle

QPSK



16QAM



64QAM



256QAM





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Band 2, BW 15MHz, Single carrier, 2TX, Top

QPSK



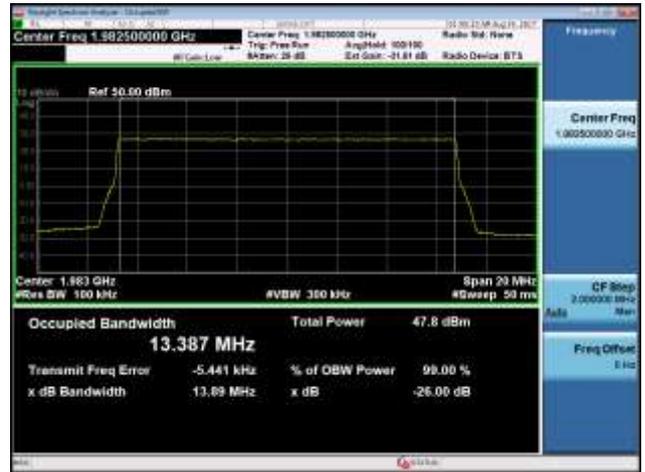
16QAM



64QAM



256QAM





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Band 2, BW 5MHz, Single carrier, 4TX, Bottom

QPSK



16QAM



64QAM



256QAM





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Band 2, BW 5MHz, Single carrier, 4TX, Middle

QPSK



16QAM



64QAM



256QAM





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Band 2, BW 5MHz, Single carrier, 4TX Top

QPSK



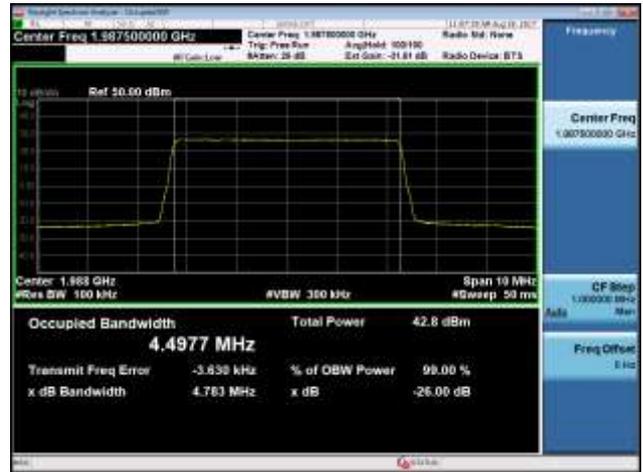
16QAM



64QAM



256QAM





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Band 2, BW 15MHz, Single carrier, 4TX, Bottom

QPSK



16QAM



64QAM



256QAM



Band 2, BW 15MHz, Single carrier, 4TX, Middle

QPSK



16QAM



64QAM



256QAM





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Band 2, BW 15MHz, Single carrier, 4TX Top

QPSK



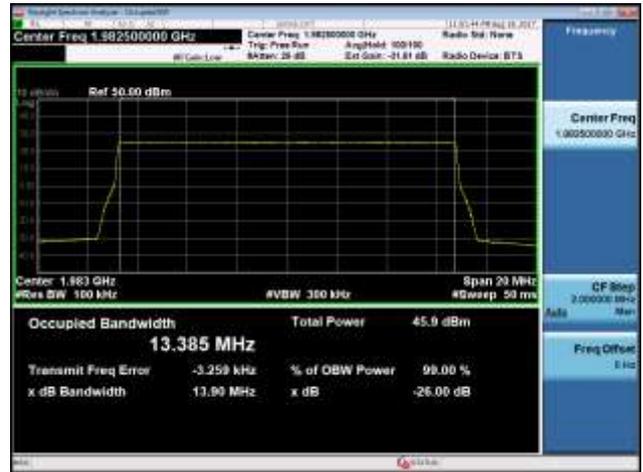
16QAM



64QAM



256QAM





Band 2, BW 5MHz + BW 5MHz, Multi carrier(Contiguous), 2TX, Bottom

QPSK



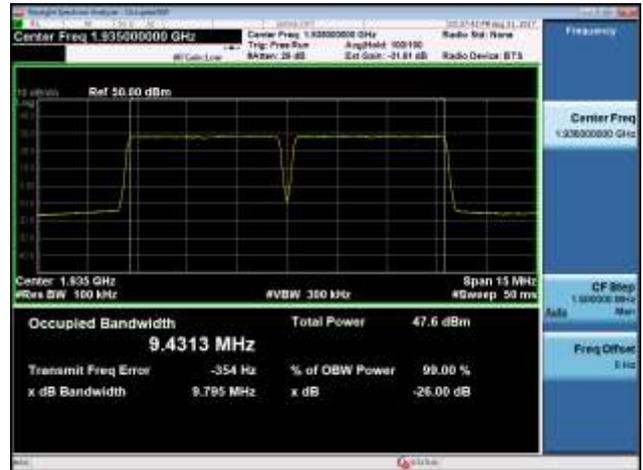
16QAM



64QAM



256QAM





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Band 2, BW 5MHz + BW 5MHz, Multi carrier(Contiguous), 2TX, Top

QPSK



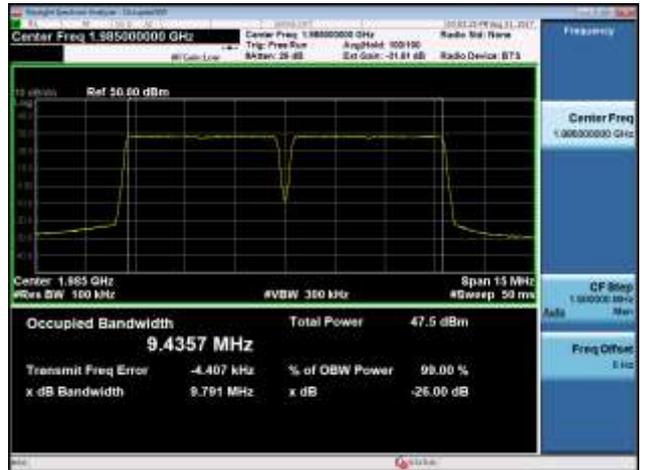
16QAM



64QAM



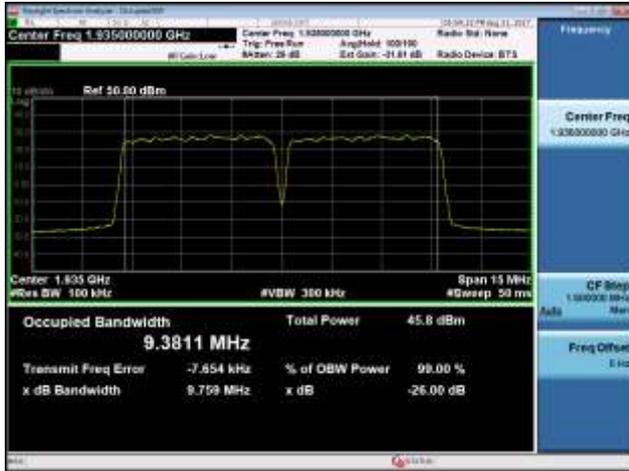
256QAM





Band 2, BW 5MHz + BW 5MHz, Multi carrier(Contiguous), 4TX, Bottom

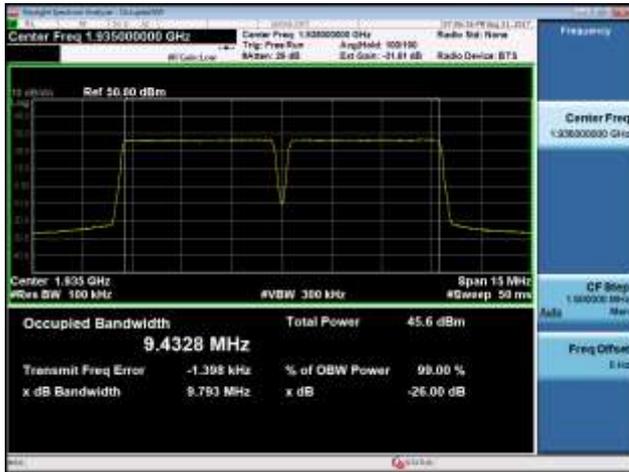
QPSK



16QAM



64QAM



256QAM



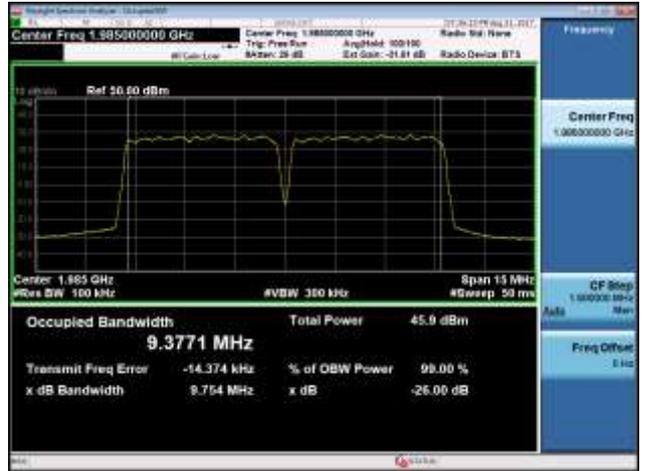


Band 2, BW 5MHz + BW 5MHz, Multi carrier(Contiguous), 4TX, Top

QPSK



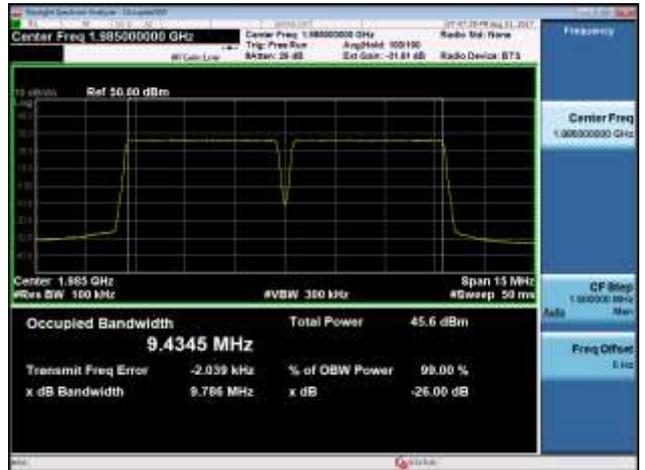
16QAM



64QAM



256QAM





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Band 2, BW 5MHz + BW 15MHz, Multi carrier(Contiguous), 2TX, Bottom

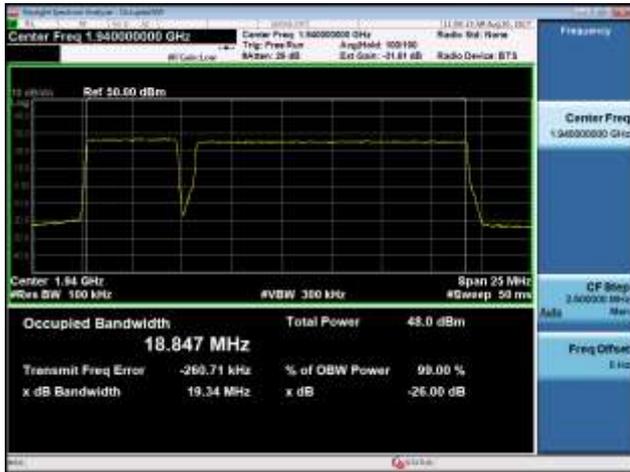
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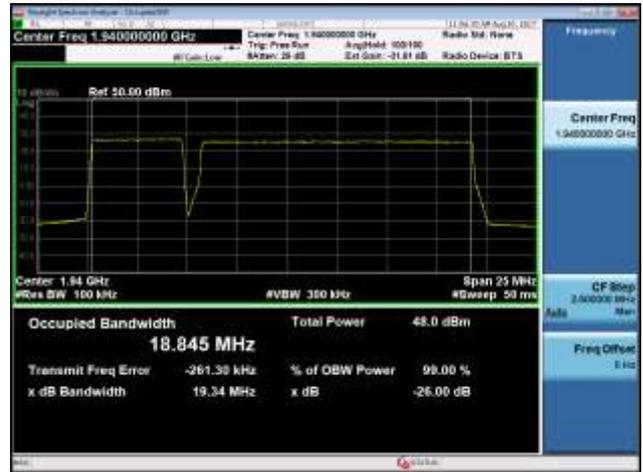
16QAM



64QAM



256QAM





Band 2, BW 5MHz + BW 15MHz, Multi carrier(Contiguous), 2TX, Top

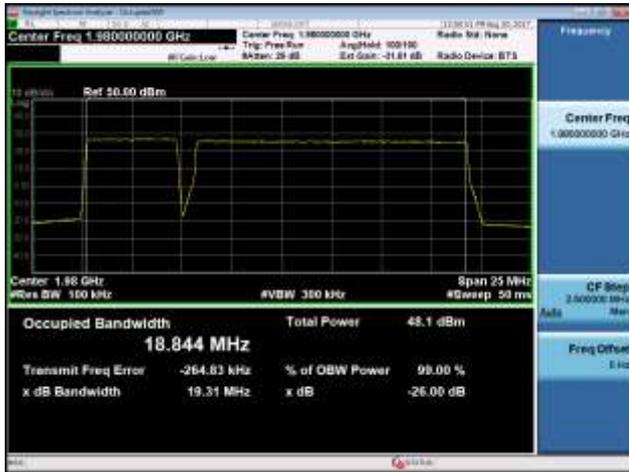
QPSK



16QAM



64QAM



256QAM





Band 2, BW 5MHz + BW 15MHz, Multi carrier(Contiguous), 4TX, Bottom

QPSK



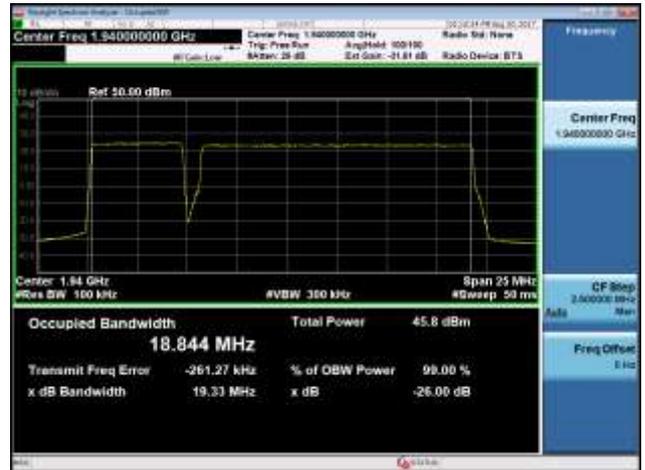
16QAM



64QAM



256QAM





Band 2, BW 5MHz + BW 15MHz, Multi carrier(Contiguous), 4TX, Top

QPSK



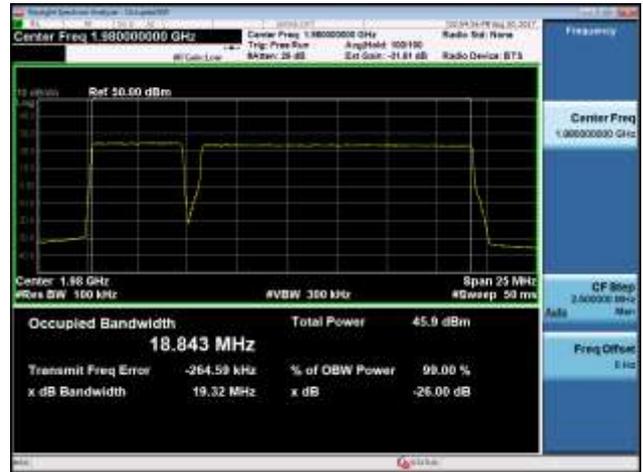
16QAM



64QAM



256QAM





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Band 2, BW 5MHz + BW 5MHz, Multi carrier(Non-Contiguous), 2TX, Bottom

QPSK



16QAM



64QAM



256QAM





Band 2, BW 5MHz + BW 5MHz, Multi carrier(Non-Contiguous), 2TX, Top

QPSK



16QAM



64QAM



256QAM





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Band 2, BW 5MHz + BW 5MHz, Multi carrier(Non-Contiguous), 4TX, Bottom

QPSK



16QAM



64QAM



256QAM





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Band 2, BW 5MHz + BW 5MHz, Multi carrier(Non-Contiguous), 4TX, Top

QPSK



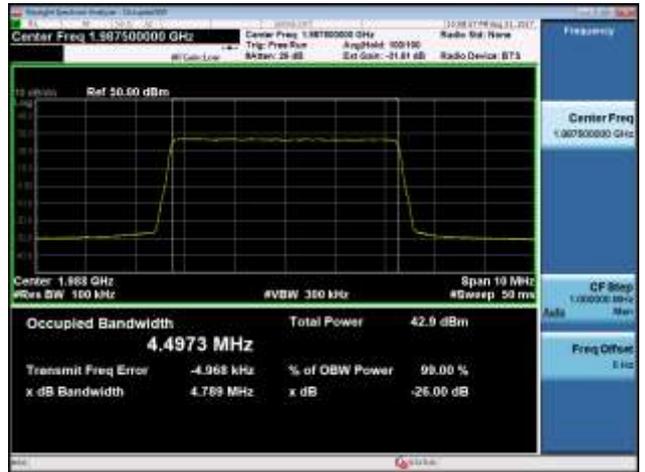
16QAM



64QAM



256QAM





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Band 2, BW 15MHz + BW 5MHz, Multi carrier(Non-Contiguous), 2TX, Bottom

QPSK



16QAM



64QAM



256QAM





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Band 2, BW 15MHz + BW 5MHz, Multi carrier(Non-Contiguous), 2TX, Top

QPSK



16QAM



64QAM



256QAM



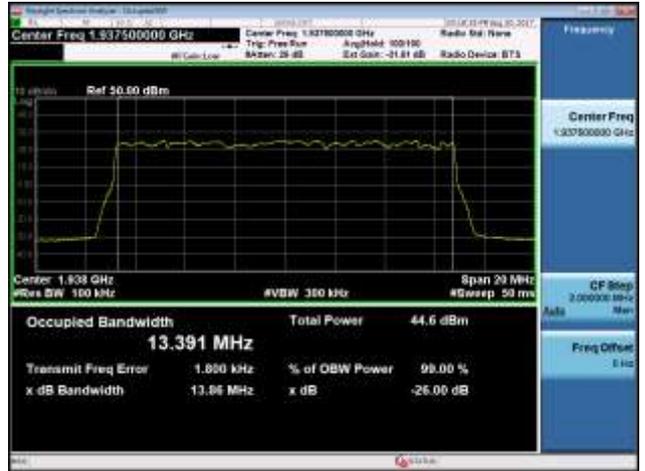


Band 2, BW 15MHz + BW 5MHz, Multi carrier(Non-Contiguous), 4TX, Bottom

QPSK



16QAM



64QAM



256QAM





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Band 2, BW 15MHz + BW 5MHz, Multi carrier(Non-Contiguous), 4TX, Top

QPSK



16QAM



64QAM



256QAM





Band 66, BW 5MHz, Single carrier, 2TX, Bottom

QPSK



16QAM



64QAM



256QAM





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Band 66, BW 5MHz, Single carrier, 2TX, Middle

QPSK



16QAM



64QAM



256QAM





Band 66, BW 5MHz, Single carrier, 2TX, Top

QPSK



16QAM



64QAM



256QAM





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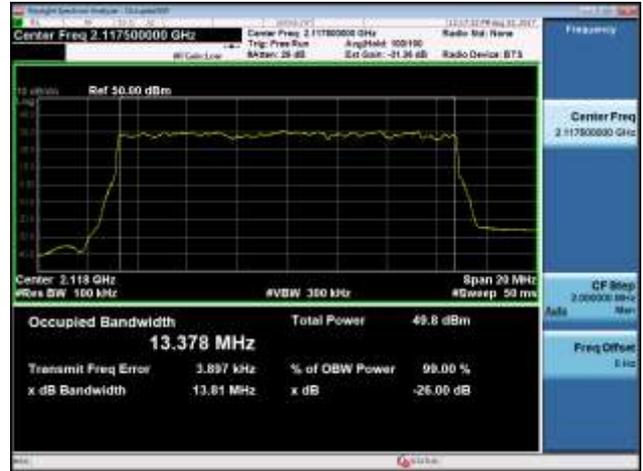
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Band 66, BW 15MHz, Single carrier, 2TX, Bottom

QPSK



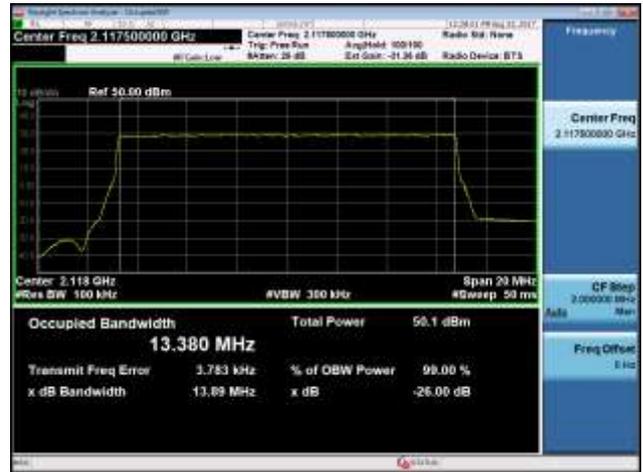
16QAM



64QAM



256QAM





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Band 66, BW 15MHz, Single carrier, 2TX, Middle

QPSK



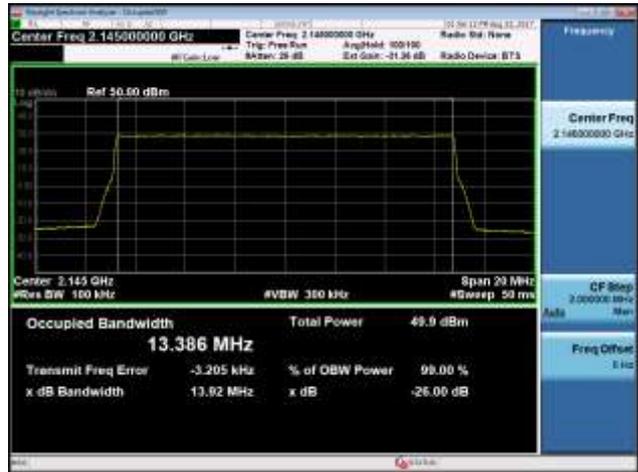
16QAM



64QAM



256QAM





Band 66, BW 15MHz, Single carrier, 2TX, Top

QPSK



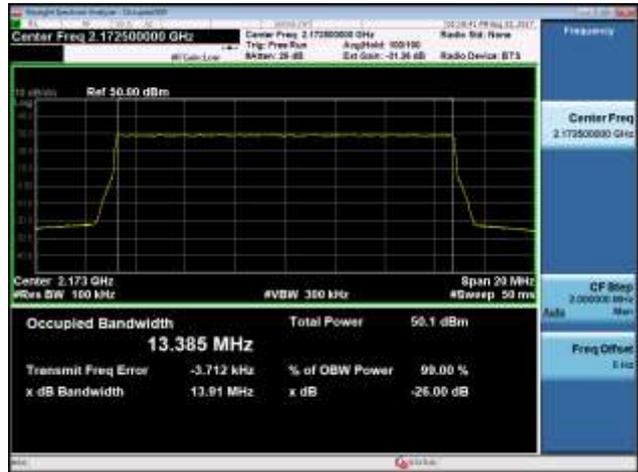
16QAM



64QAM



256QAM





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Band 66, BW 5MHz, Single carrier, 4TX, Bottom

QPSK



16QAM



64QAM



256QAM





Band 66, BW 5MHz, Single carrier, 4TX, Middle

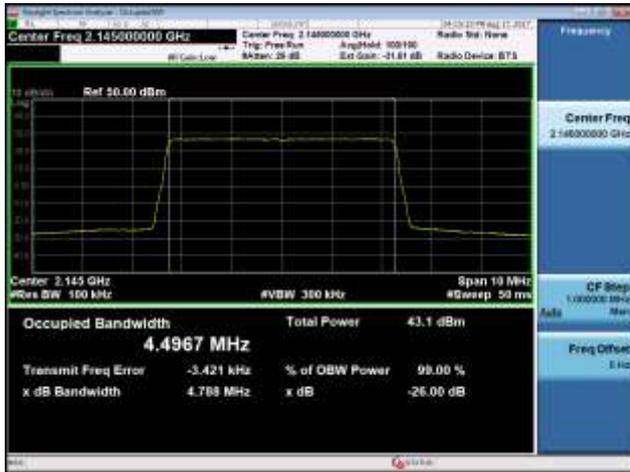
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16QAM



64QAM



256QAM





Band 66, BW 5MHz, Single carrier, 4TX Top

QPSK



16QAM



64QAM



256QAM



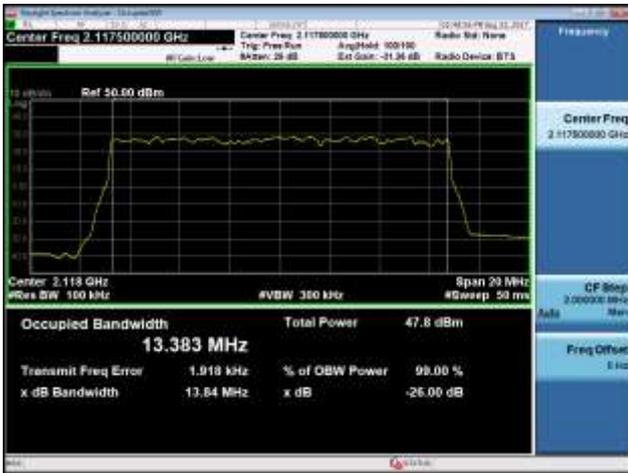


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Band 66, BW 15MHz, Single carrier, 4TX, Bottom

QPSK



16QAM



64QAM



256QAM





Band 66, BW 15MHz, Single carrier, 4TX, Middle

QPSK



16QAM



64QAM



256QAM





Band 66, BW 15MHz, Single carrier, 4TX Top

QPSK



16QAM



64QAM



256QAM





Band 66, BW 5MHz + BW 5MHz, Multi carrier(Contiguous), 2TX, Bottom

QPSK



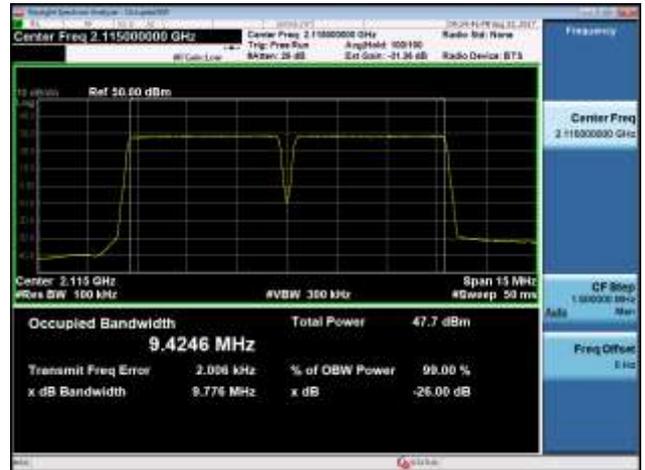
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64QAM



256QAM



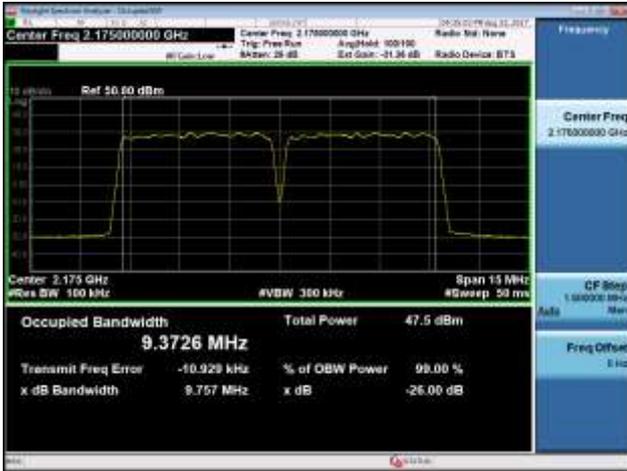


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Band 66, BW 5MHz + BW 5MHz, Multi carrier(Contiguous), 2TX, Top

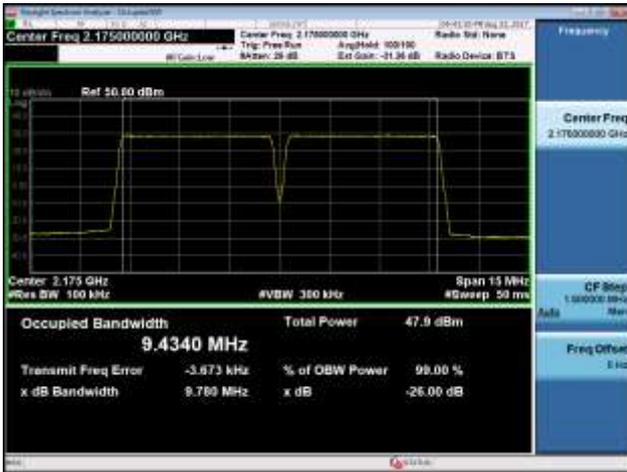
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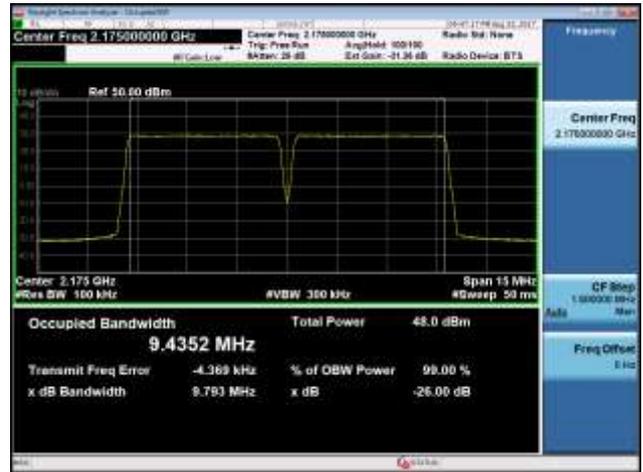
16QAM



64QAM



256QAM





Band 66, BW 5MHz + BW 5MHz, Multi carrier(Contiguous), 4TX, Bottom

QPSK



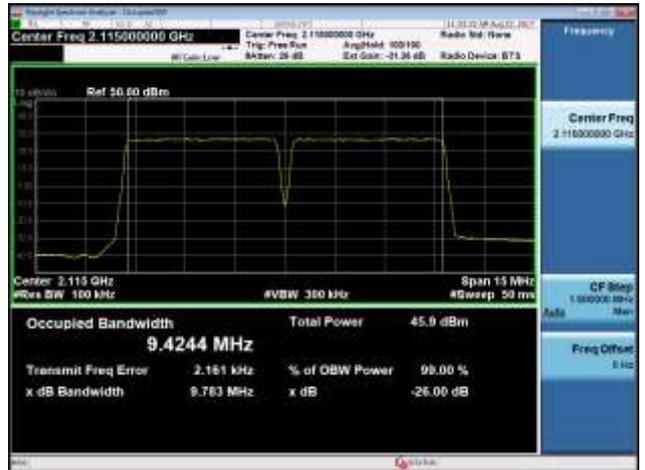
16QAM



64QAM



256QAM





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Band 66, BW 5MHz + BW 5MHz, Multi carrier(Contiguous), 4TX, Top

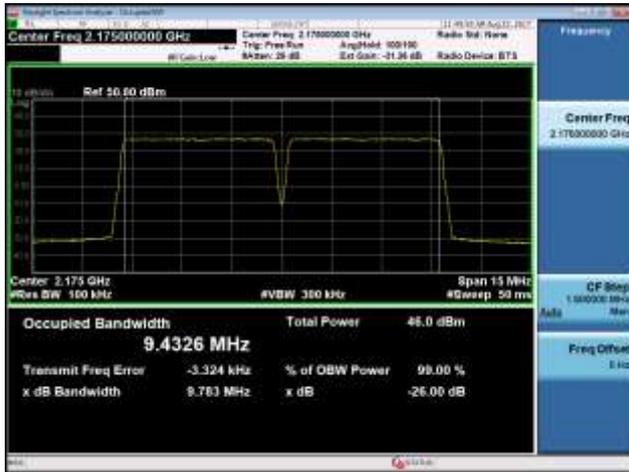
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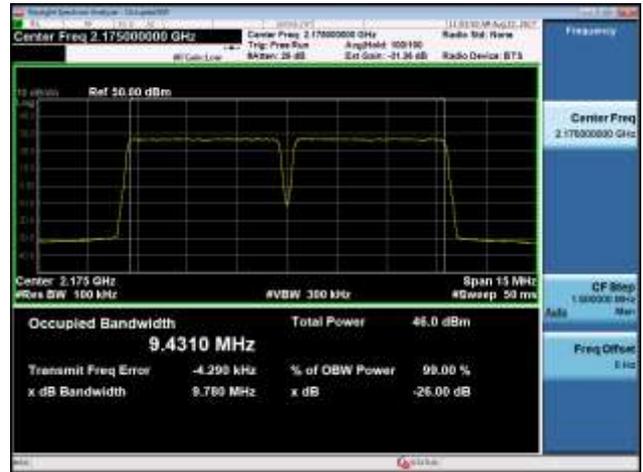
16QAM



64QAM



256QAM





Band 66, BW 5MHz + BW 15MHz, Multi carrier(Contiguous), 2TX, Bottom

QPSK



16QAM



64QAM



256QAM





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Band 66, BW 5MHz + BW 15MHz, Multi carrier(Contiguous), 2TX, Top

QPSK



16QAM



64QAM



256QAM





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Band 66, BW 5MHz + BW 15MHz, Multi carrier(Contiguous), 4TX, Bottom

QPSK



16QAM



64QAM



256QAM



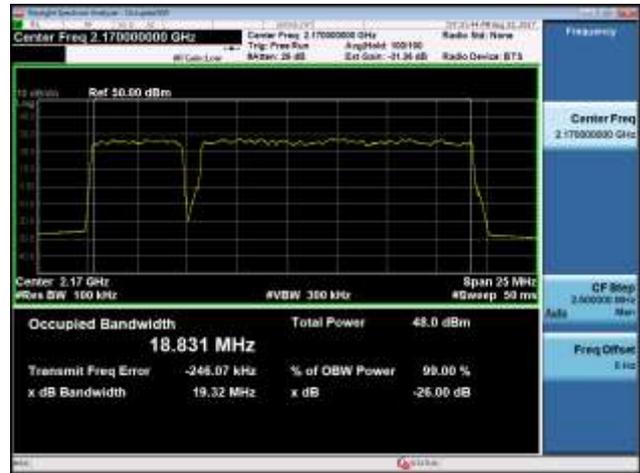


Band 66, BW 5MHz + BW 15MHz, Multi carrier(Contiguous), 4TX, Top

QPSK



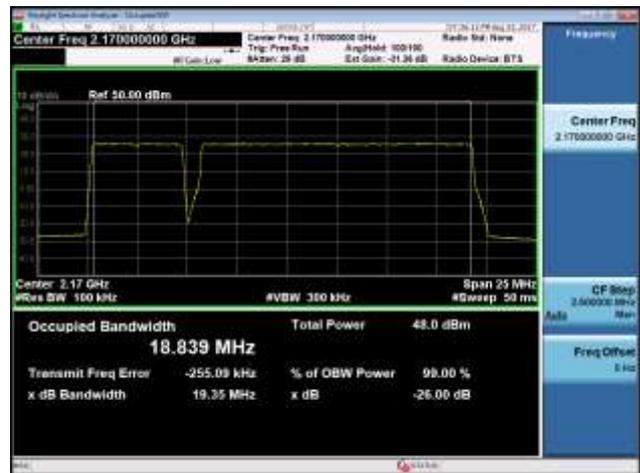
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64QAM



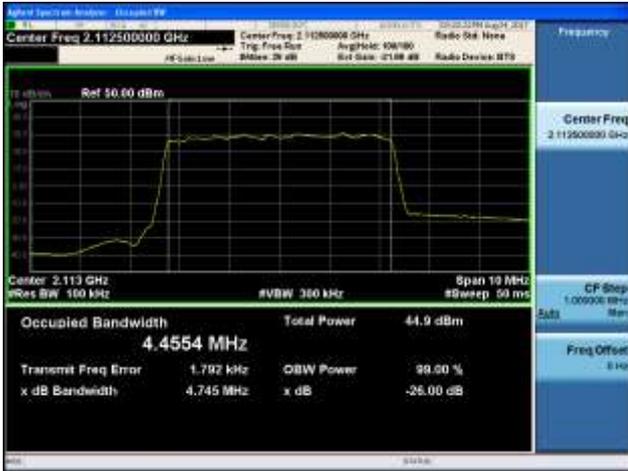
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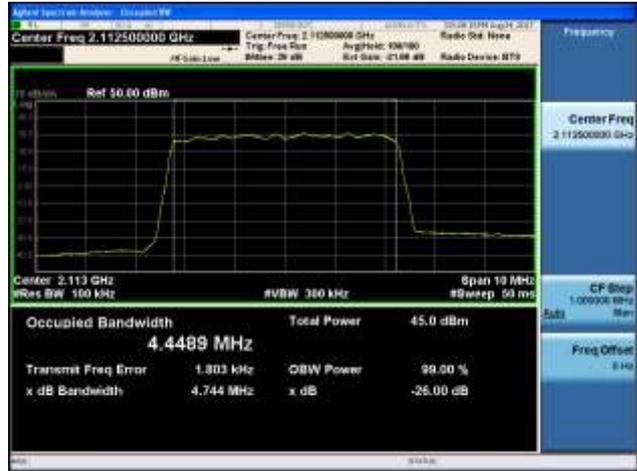


Band 66, BW 5MHz + BW 5MHz, Multi carrier(Non-Contiguous), 2TX, Bottom

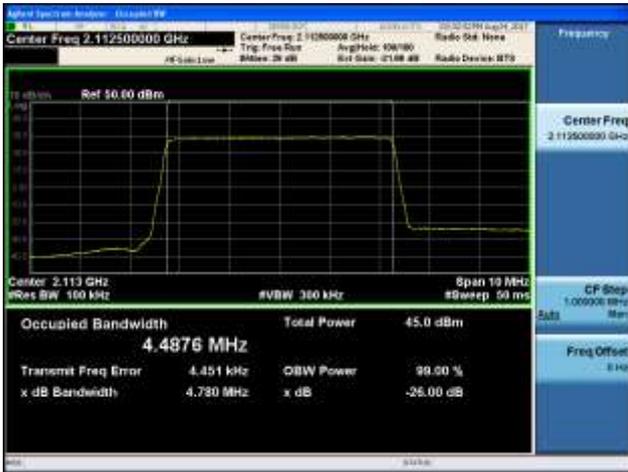
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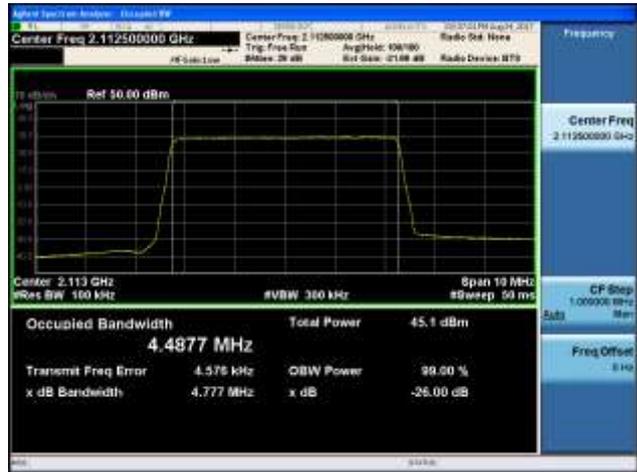
16QAM



64QAM



256QAM





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Band 66, BW 5MHz + BW 5MHz, Multi carrier(Non-Contiguous), 4TX, Bottom

QPSK



16QAM



64QAM



256QAM





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Band 66, BW 5MHz + BW 5MHz, Multi carrier(Non-Contiguous), 4TX, Top

QPSK



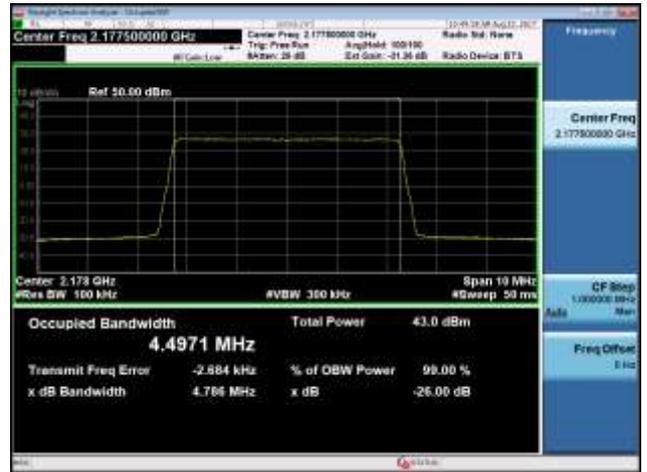
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64QAM



256QAM



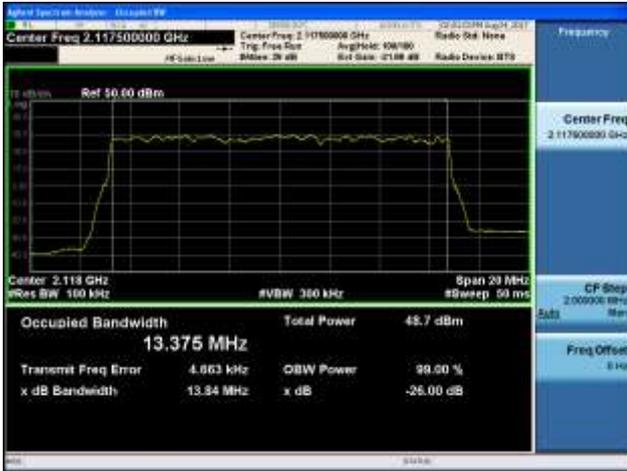


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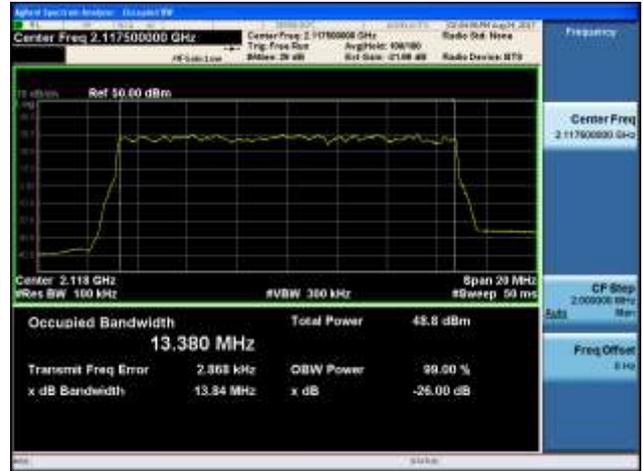
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Band 66, BW 15MHz + BW 5MHz, Multi carrier(Non-Contiguous), 2TX, Bottom

QPSK



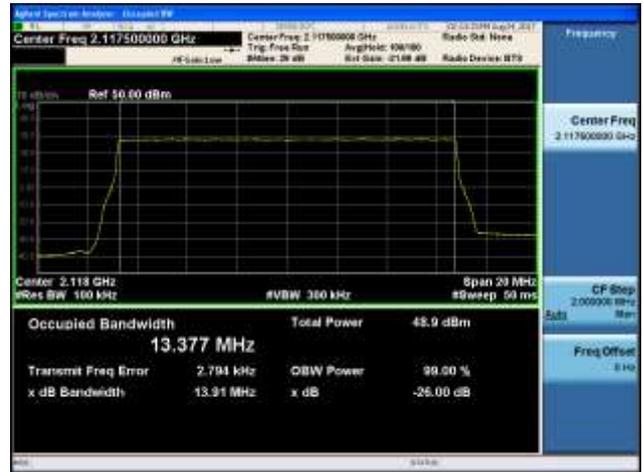
16QAM



64QAM



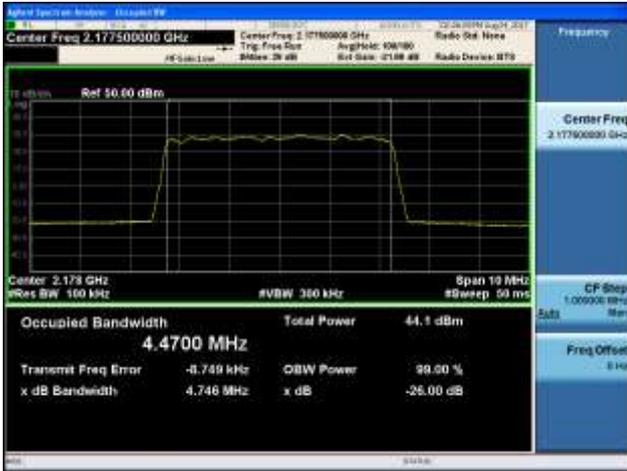
256QAM



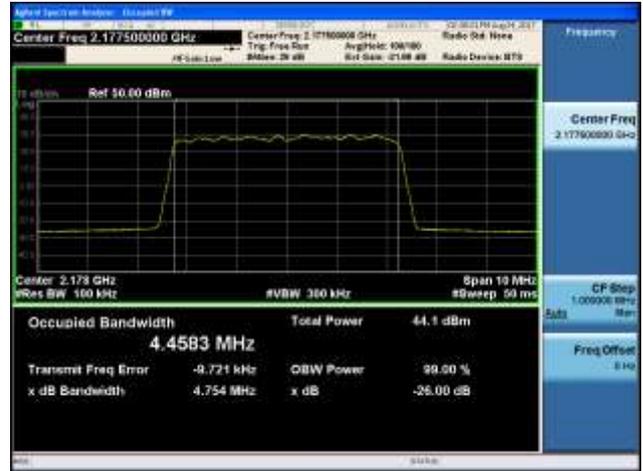


Band 66, BW 15MHz + BW 5MHz, Multi carrier(Non-Contiguous), 2TX, Top

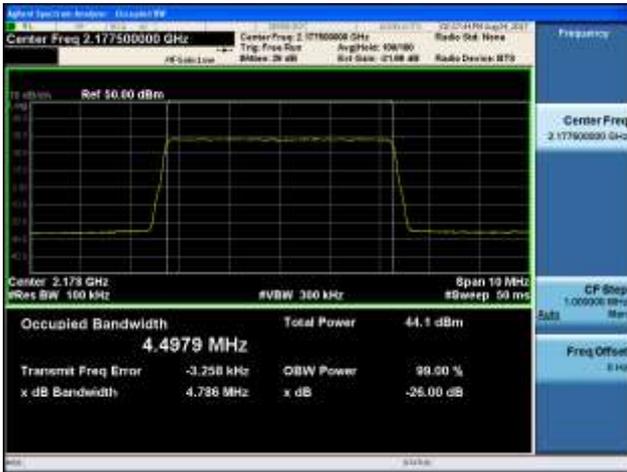
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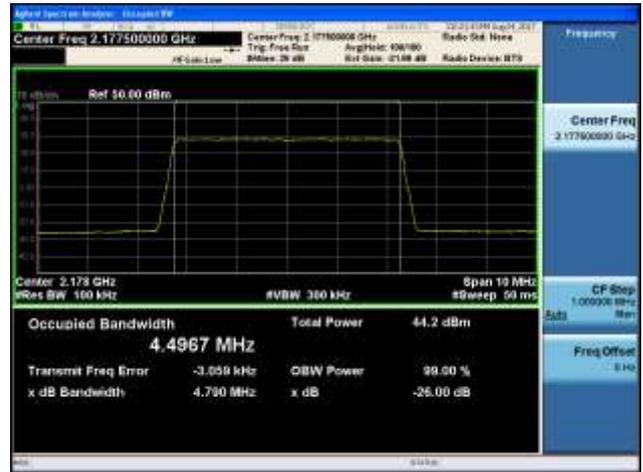
16QAM



64QAM



256QAM





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Band 66, BW 15MHz + BW 5MHz, Multi carrier(Non-Contiguous), 4TX, Bottom

QPSK



16QAM



64QAM



256QAM





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Band 66, BW 15MHz + BW 5MHz, Multi carrier(Non-Contiguous), 4TX, Top

QPSK



16QAM



64QAM



256QAM

