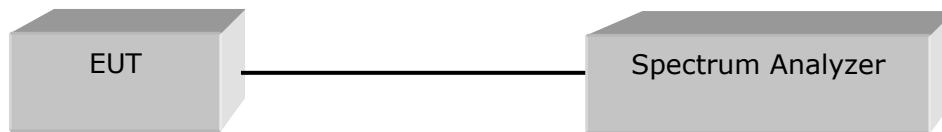


## 4.4 OUTPUT POWER

### Test Procedures

Maximum Conducted Output Power(KDB 789033, Method SA-1)

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.



### Test Settings :

Center frequency = the highest, middle and the lowest channels

- a) RBW = 1 MHz
- b) VBW  $\geq 3 \times$  RBW
- c) Sweep time = auto
- d) Detector = power averaging (rms)
- e) Trace mode = Average at least 100

### Limit

Operating Mode	Band	Mode	ANT Configuration	ANT Gain (dBi)	Limit (dBm)	
					FCC	IC
SISO	UNII 1	802.11a/n/ac	ANT0	6.7	29.30	16.30
		802.11n/ac	ANT1			
		802.11n/ac	ANT2			
		802.11n/ac	ANT3			
	UNII 3	802.11a/n/ac	ANT0	6.7	29.30	29.30
		802.11n/ac	ANT1			
		802.11n/ac	ANT2			
		802.11n/ac	ANT3	4.2	30.00	30.00
MIMO (2Tx)	UNII 1	802.11a/n/ac	ANT0 + ANT1	9.71	26.29	13.29
MIMO (2Tx)	UNII 3				26.29	26.29
MIMO (3Tx)	UNII 1	802.11a/n/ac	ANT0 + ANT1 + ANT2	11.47	24.53	11.53
MIMO (3Tx)	UNII 3				24.53	24.53
MIMO (4Tx)	UNII 1	802.11a/n/ac	ANT0 + ANT1 + ANT2 + ANT3	12.16	23.84	10.84
MIMO (4Tx)	UNII 3				23.84	23.84



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## Test Data

### Ant 0

Mode	Measured Output Power (dBm)		
	802.11a	802.11n_HT20	802.11ac_VHT20
5 180 MHz	2.40	1.48	2.19
5 200 MHz	2.37	1.44	2.18
5 240 MHz	2.53	1.55	2.37
5 745 MHz	16.62	15.63	16.44
5 785 MHz	16.74	15.86	16.63
5 825 MHz	16.86	16.13	16.75

Mode	Measured Output Power (dBm)	
	802.11n_HT40	802.11ac_VHT40
5 190 MHz	3.82	4.04
5 230 MHz	4.04	4.22
5 755 MHz	16.11	16.35
5 795 MHz	16.31	16.52

Mode	Measured Output Power (dBm)
	802.11ac_VHT80
5 210 MHz	4.31
5 775 MHz	13.52



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**Ant 1**

Measured Output Power (dBm)		
Mode	802.11n_HT20	802.11ac_VHT20
Frequency		
5 180 MHz	1.57	1.52
5 200 MHz	1.47	1.53
5 240 MHz	1.82	1.69
5 745 MHz	16.11	16.07
5 785 MHz	16.43	16.44
5 825 MHz	16.36	16.37

Measured Output Power (dBm)		
Mode	802.11n_HT40	802.11ac_VHT40
Frequency		
5 190 MHz	4.29	4.23
5 230 MHz	4.34	4.29
5 755 MHz	16.05	16.06
5 795 MHz	16.23	16.45

Measured Output Power (dBm)	
Mode	802.11ac_VHT80
Frequency	
5 210 MHz	3.59
5 775 MHz	9.20



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**Ant 2**

Measured Output Power (dBm)		
Mode	802.11n_HT20	802.11ac_VHT20
Frequency		
5 180 MHz	2.48	2.53
5 200 MHz	2.40	2.50
5 240 MHz	2.53	2.58
5 745 MHz	15.76	15.78
5 785 MHz	16.28	16.36
5 825 MHz	16.32	16.39

Measured Output Power (dBm)		
Mode	802.11n_HT40	802.11ac_VHT40
Frequency		
5 190 MHz	4.52	4.46
5 230 MHz	4.60	4.58
5 755 MHz	15.78	15.74
5 795 MHz	16.29	16.28

Measured Output Power (dBm)	
Mode	802.11ac_VHT80
Frequency	
5 210 MHz	3.63
5 775 MHz	14.37



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**Ant 3**

Measured Output Power (dBm)		
Mode	802.11n_HT20	802.11ac_VHT20
Frequency		
5 180 MHz	-1.20	-0.52
5 200 MHz	-0.60	-0.05
5 240 MHz	0.57	1.04
5 745 MHz	16.09	16.00
5 785 MHz	16.27	16.15
5 825 MHz	15.90	15.94

Measured Output Power (dBm)		
Mode	802.11n_HT40	802.11ac_VHT40
Frequency		
5 190 MHz	3.85	3.89
5 230 MHz	4.22	4.18
5 755 MHz	16.00	15.84
5 795 MHz	16.01	15.86

Measured Output Power (dBm)	
Mode	802.11ac_VHT80
Frequency	
5 210 MHz	4.53
5 775 MHz	9.55



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**Ant 0 + Ant 1**

		Measured Output Power (dBm)		
Mode	Frequency	802.11a	802.11n_HT20	802.11ac_VHT20
	5 180 MHz	5.14	4.54	4.88
	5 200 MHz	5.08	4.47	4.88
	5 240 MHz	5.28	4.70	5.05
	5 745 MHz	19.41	18.89	19.27
	5 785 MHz	19.68	19.16	19.55
	5 825 MHz	19.70	19.26	19.57

		Measured Output Power (dBm)	
Mode	Frequency	802.11n_HT40	802.11ac_VHT40
	5 190 MHz	7.07	7.15
	5 230 MHz	7.20	7.27
	5 755 MHz	19.09	19.22
	5 795 MHz	19.28	19.50

		Measured Output Power (dBm)
Mode	Frequency	802.11ac_VHT80
	5 210 MHz	6.98
	5 775 MHz	14.89



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### Ant 0 + Ant 1 + Ant 2

		Measured Output Power (dBm)		
Mode		802.11a	802.11n_HT20	802.11ac_VHT20
Frequency				
5 180 MHz		7.09	6.64	6.87
5 200 MHz		7.01	6.56	6.86
5 240 MHz		7.18	6.76	7.00
5 745 MHz		21.01	20.61	20.88
5 785 MHz		21.39	20.97	21.25
5 825 MHz		21.40	21.04	21.28

		Measured Output Power (dBm)	
Mode		802.11n_HT40	802.11ac_VHT40
Frequency			
5 190 MHz		8.99	9.02
5 230 MHz		9.10	9.14
5 755 MHz		20.75	20.83
5 795 MHz		21.05	21.19

		Measured Output Power (dBm)
Mode		802.11ac_VHT80
Frequency		
5 210 MHz		8.63
5 775 MHz		17.65



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**Ant 0 + Ant 1 + Ant 2 + Ant3**

		Measured Output Power (dBm)		
Mode	Frequency	802.11a	802.11n_HT20	802.11ac_VHT20
		5 180 MHz	7.72	7.30
	5 200 MHz	7.71	7.33	7.66
	5 240 MHz	8.03	7.69	7.98
	5 745 MHz	22.21	21.92	22.10
	5 785 MHz	22.54	22.24	22.42
	5 825 MHz	22.48	22.20	22.39

		Measured Output Power (dBm)	
Mode	Frequency	802.11n_HT40	802.11ac_VHT40
		5 190 MHz	10.15
	5 230 MHz	10.33	10.34
	5 755 MHz	22.01	22.02
	5 795 MHz	22.23	22.31

		Measured Output Power (dBm)
Mode	Frequency	802.11ac_VHT80
		5 210 MHz
	5 775 MHz	18.27

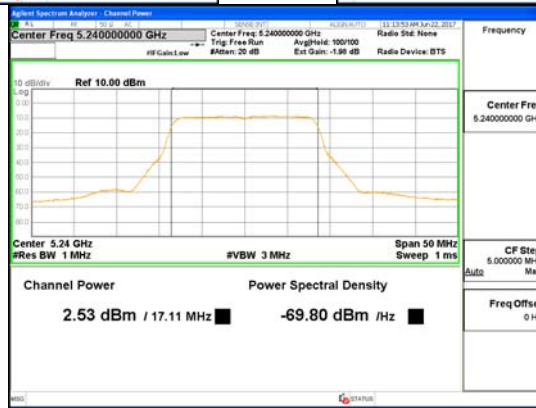
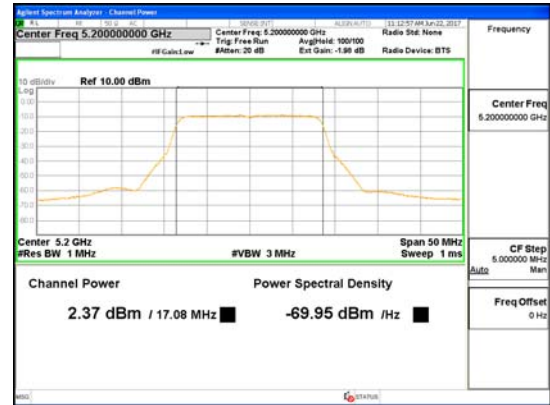
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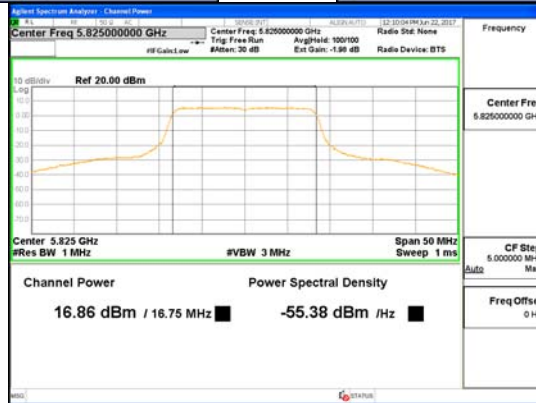
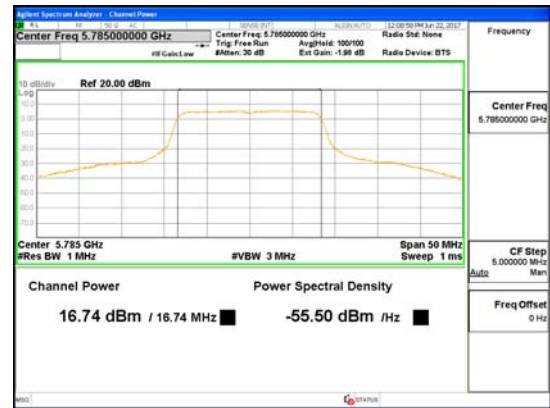


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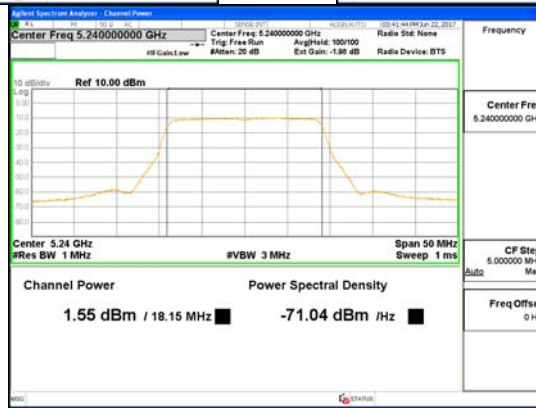
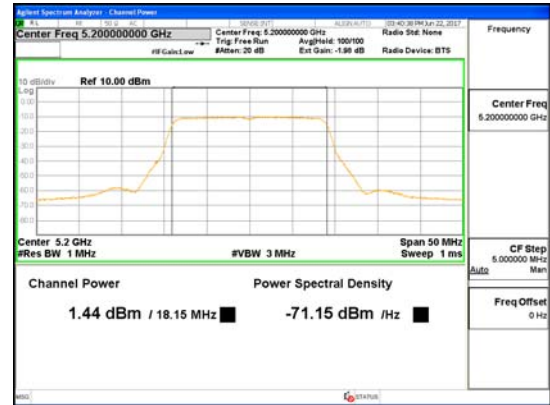


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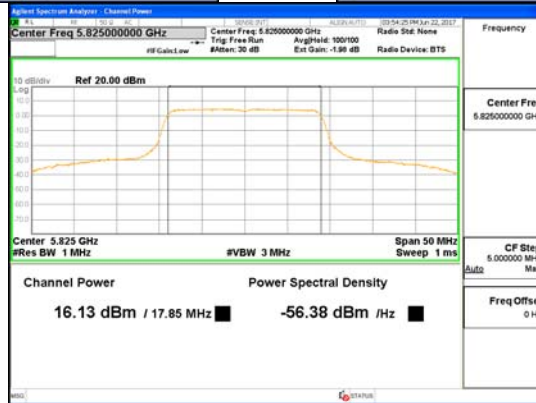
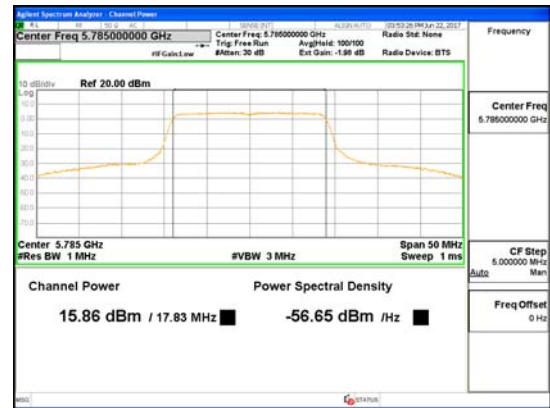
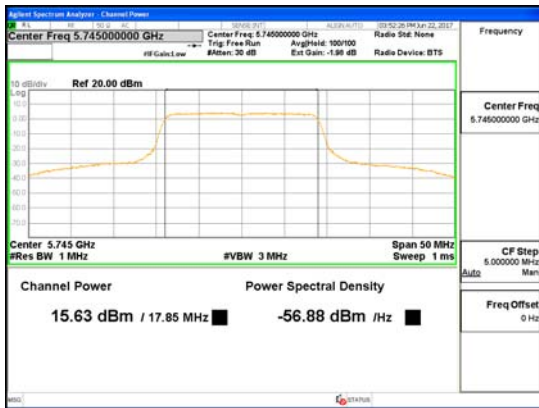


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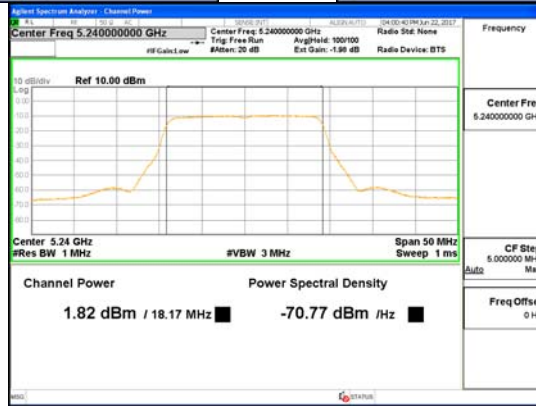


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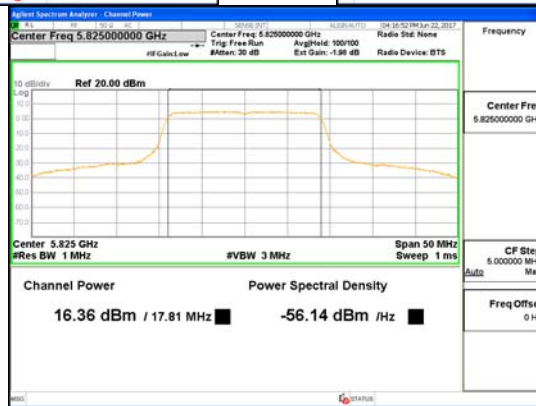
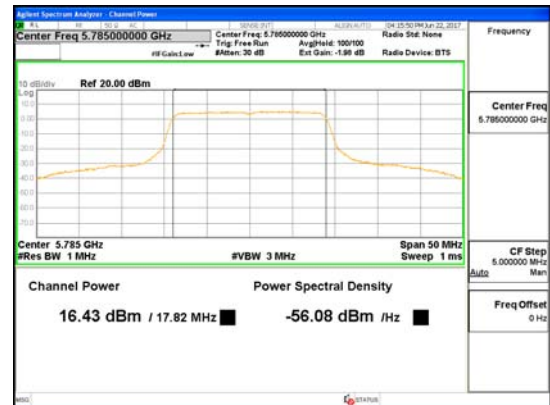
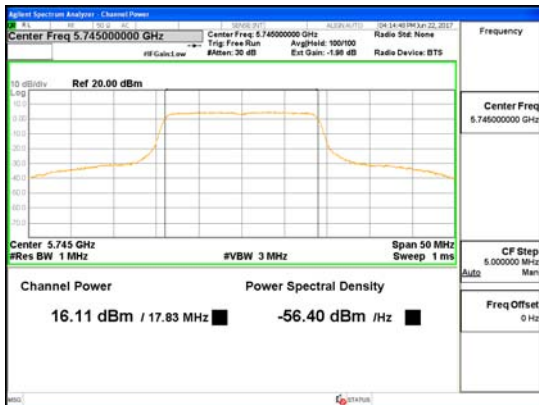


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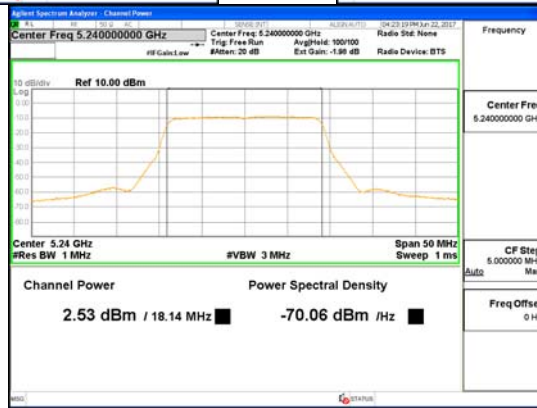
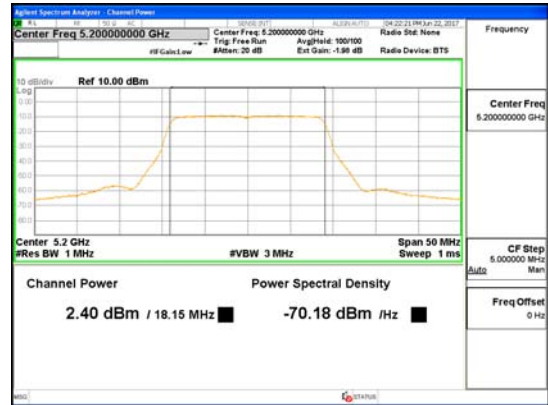


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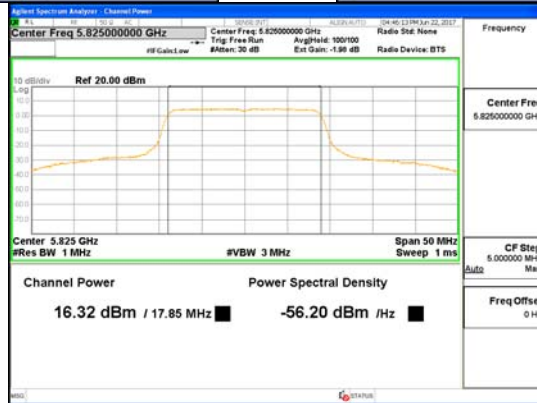
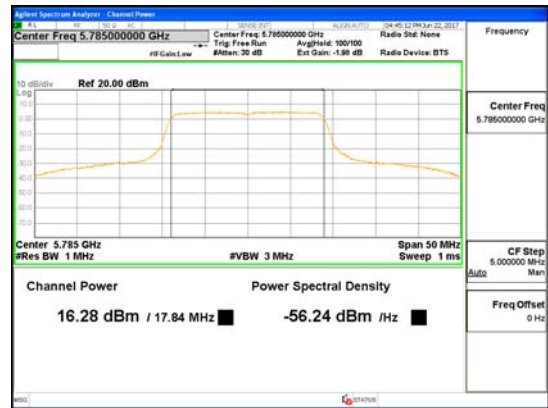
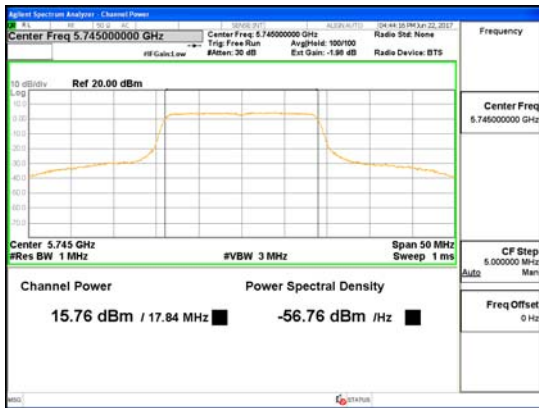


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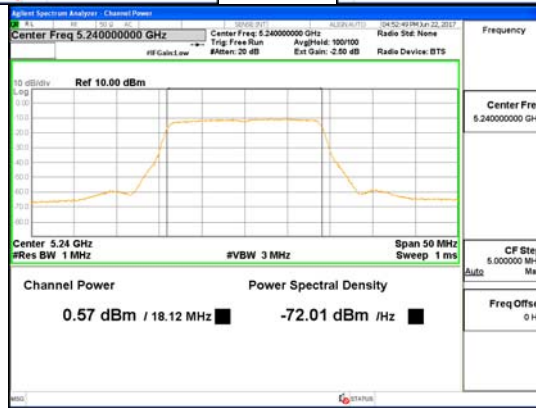
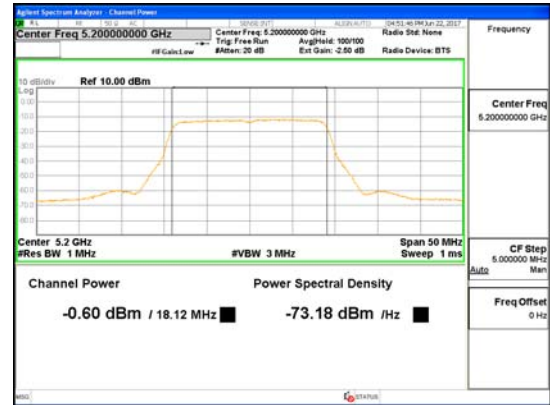


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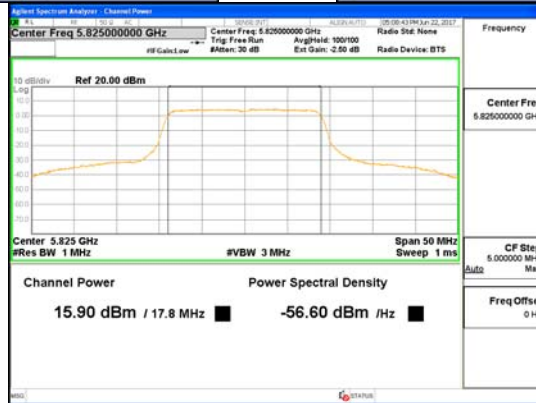
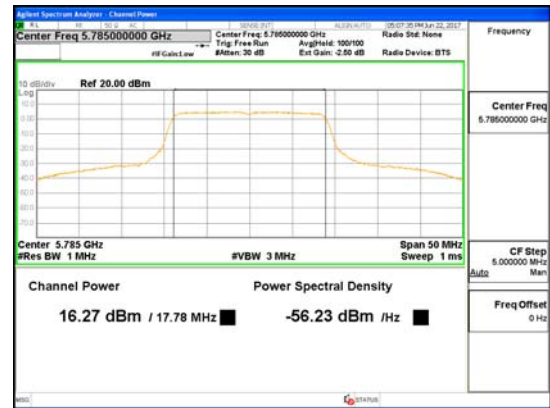
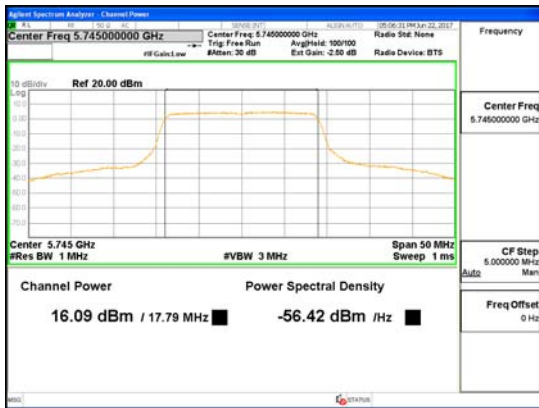


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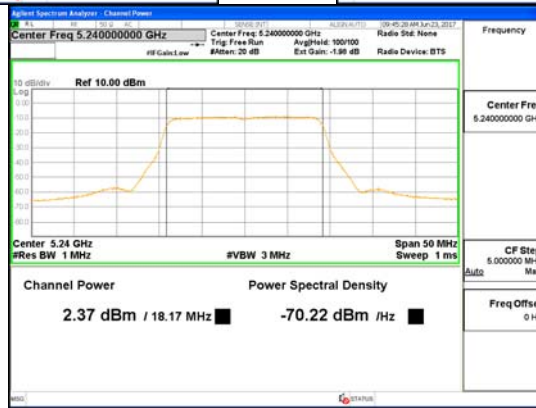
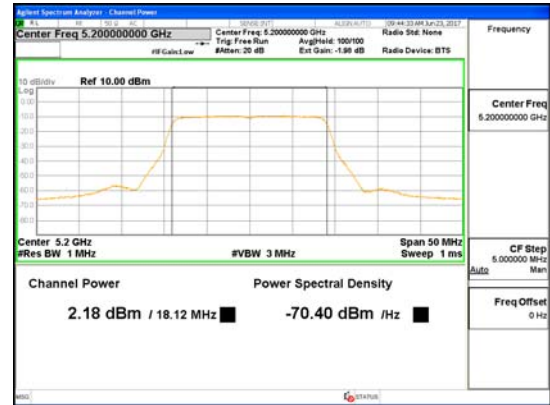
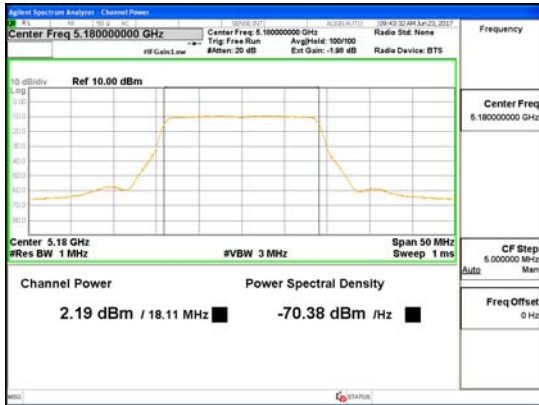


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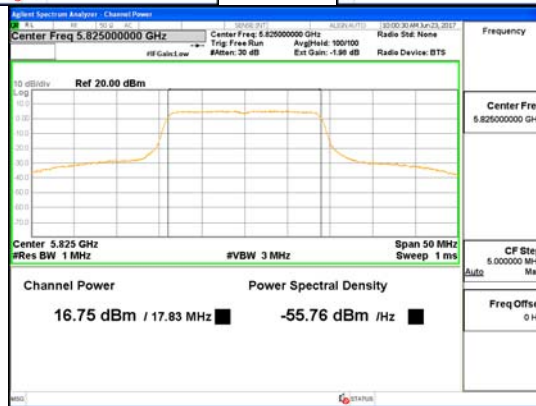
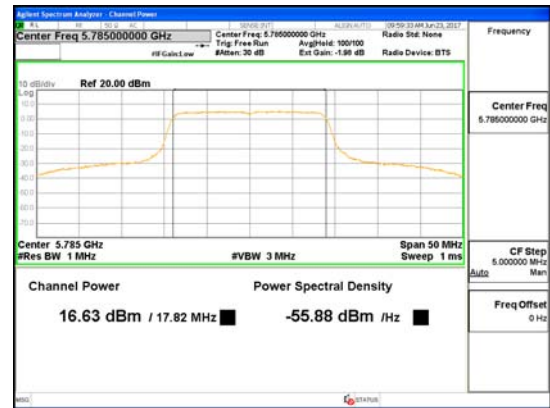
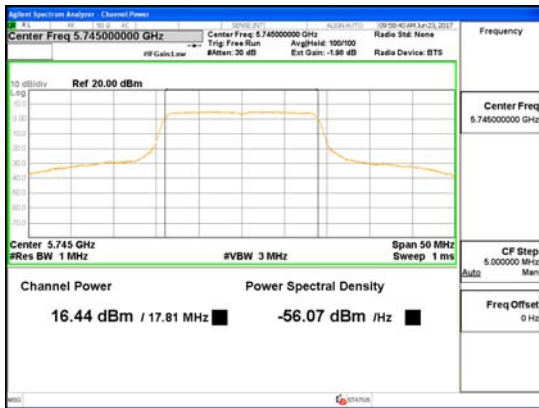


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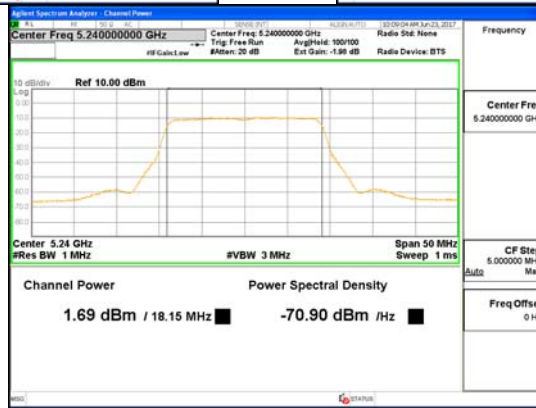


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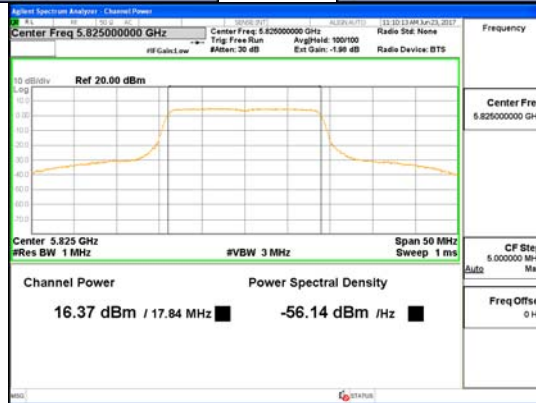
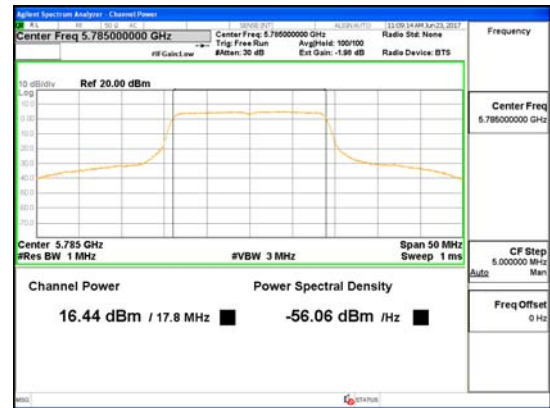
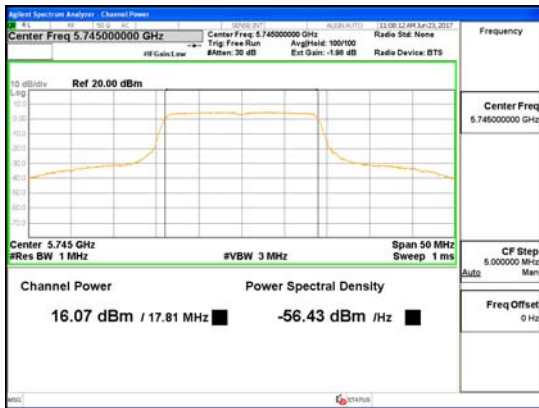


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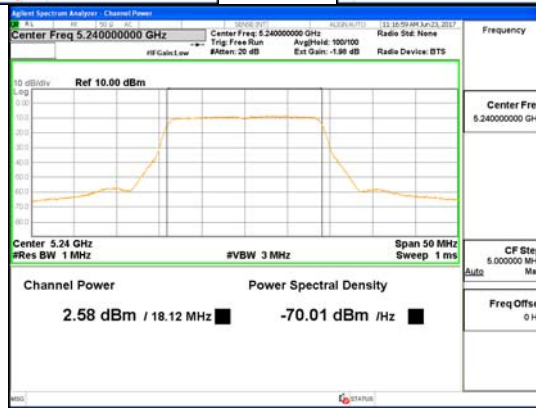
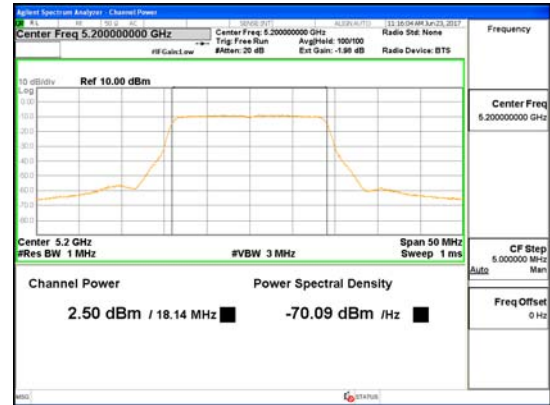
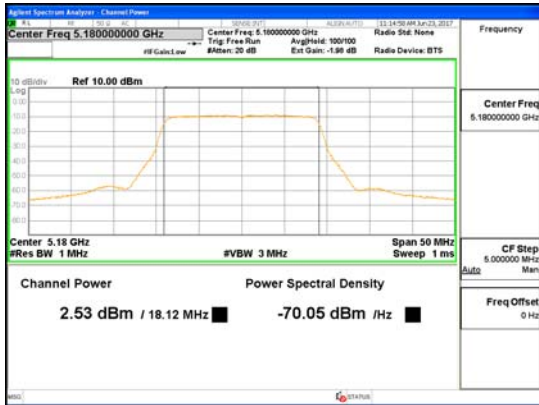


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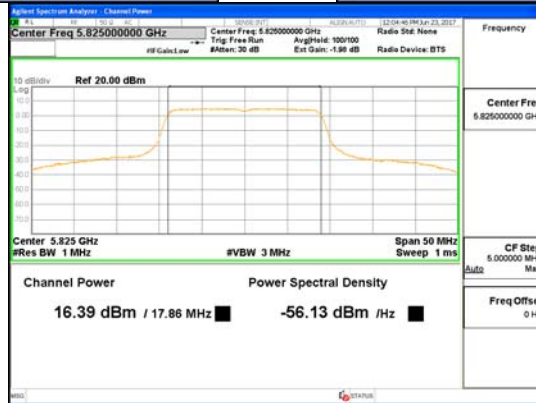
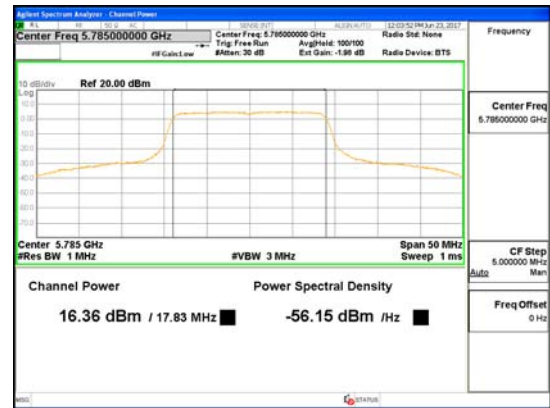
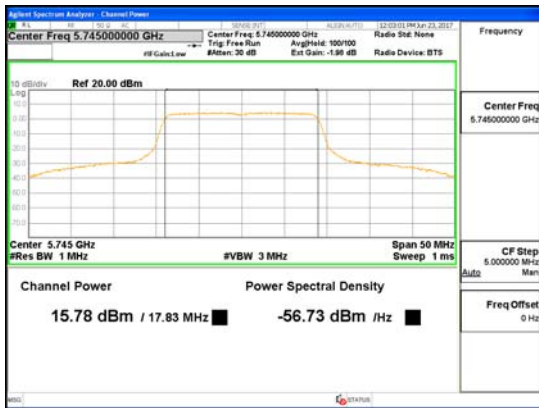


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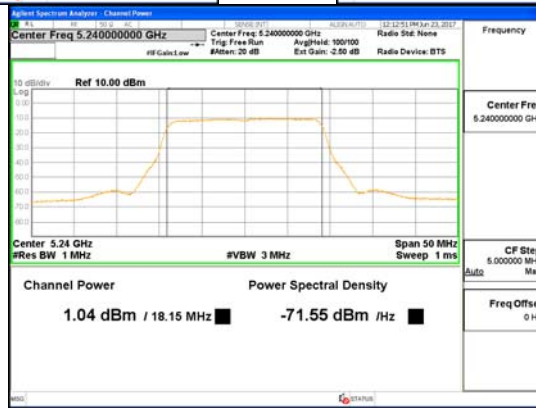
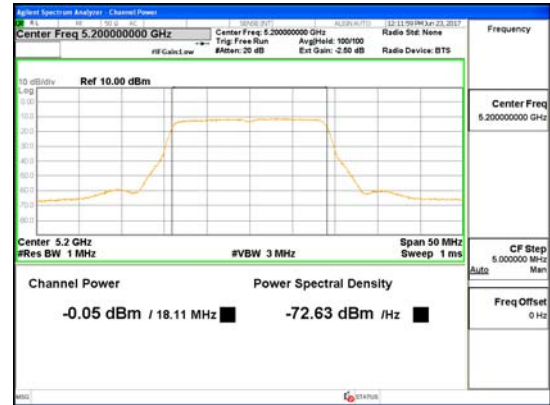
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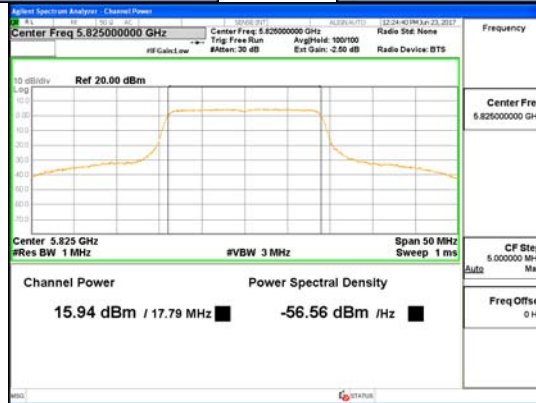
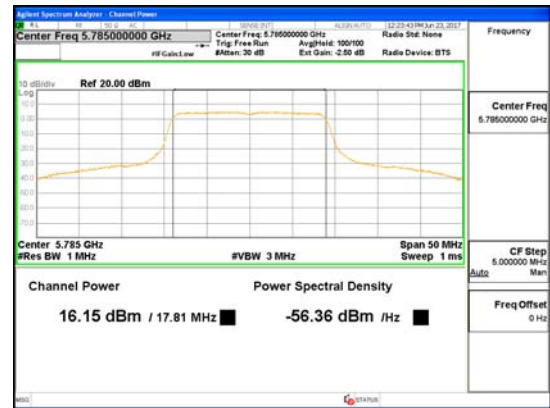
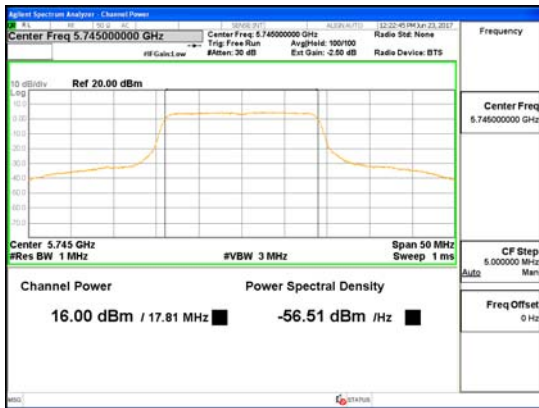


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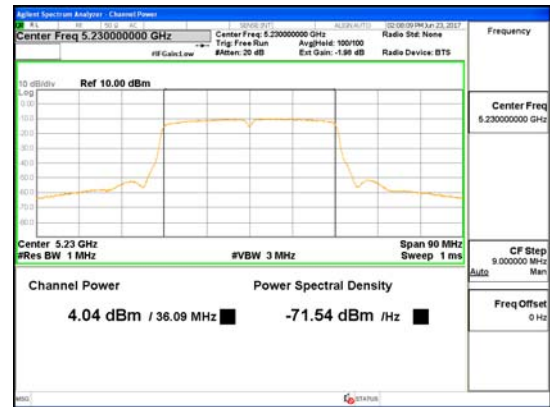


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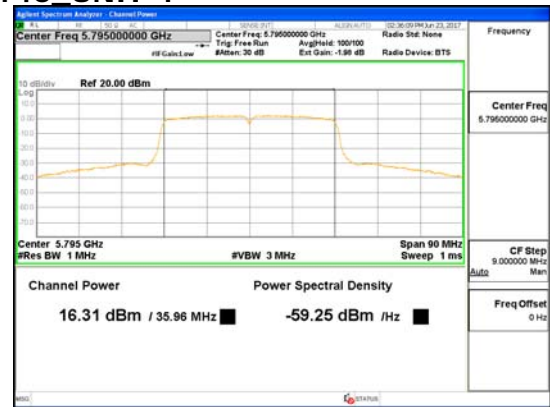
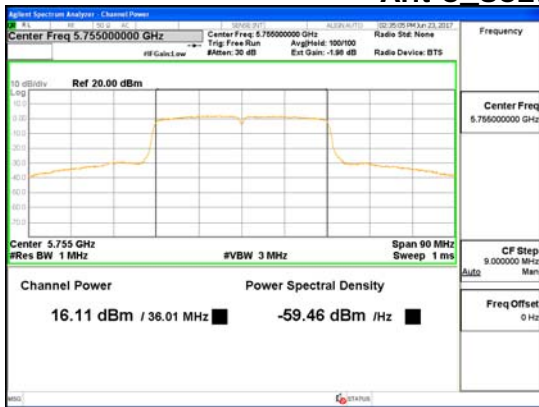


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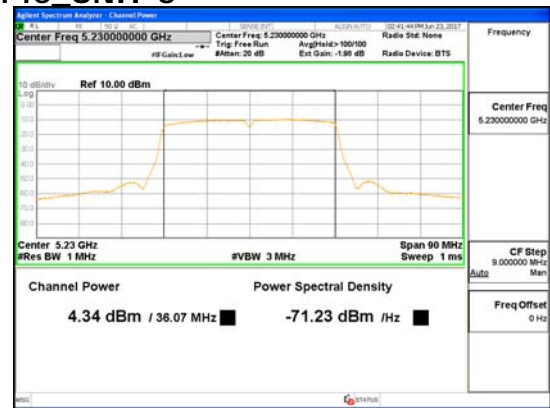
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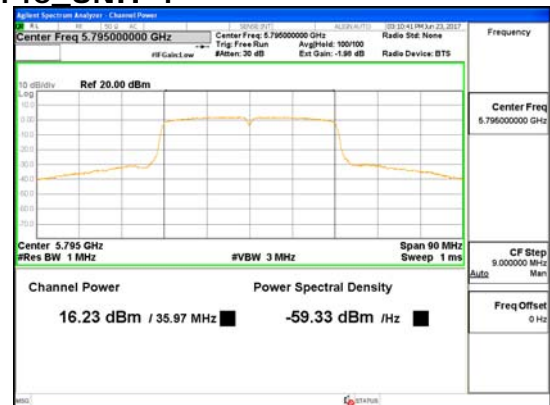
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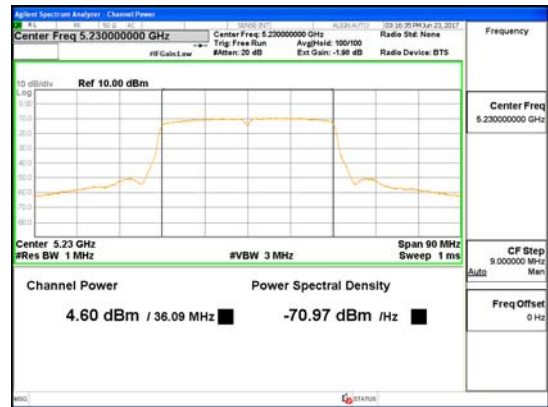


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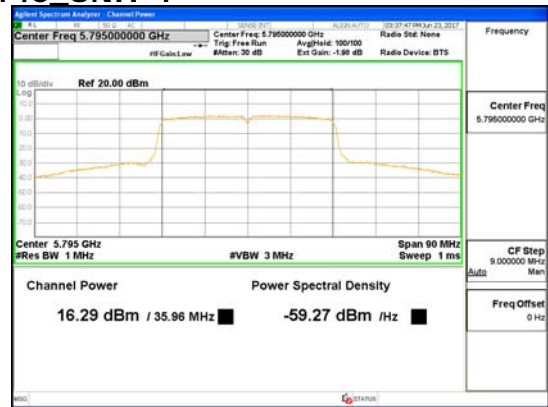
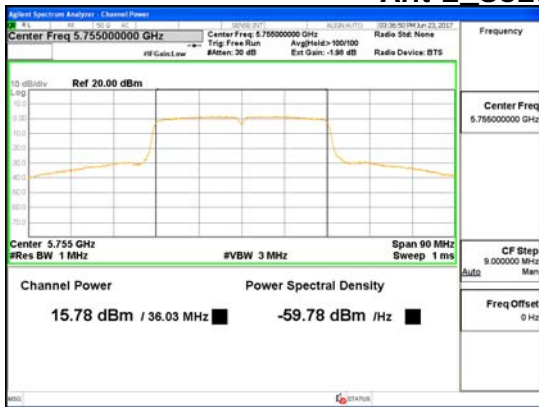


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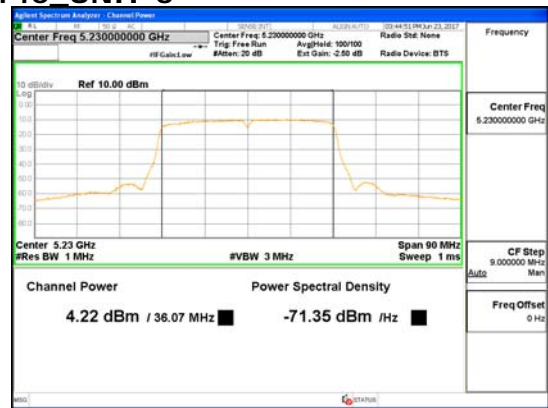
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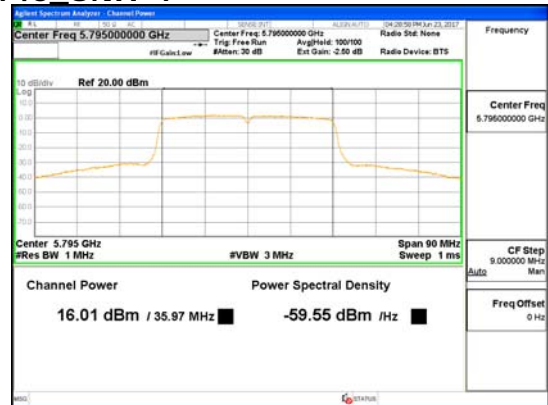
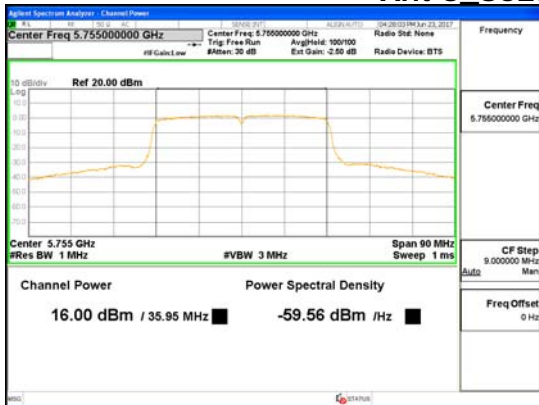
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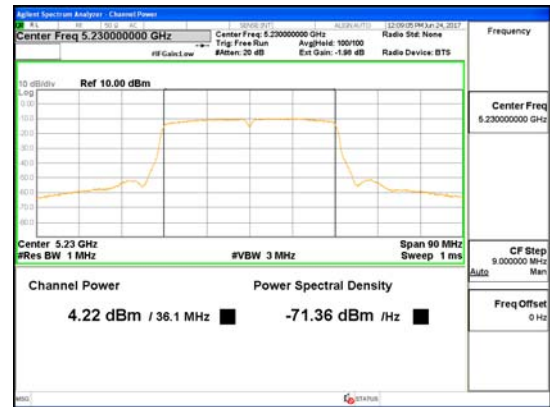


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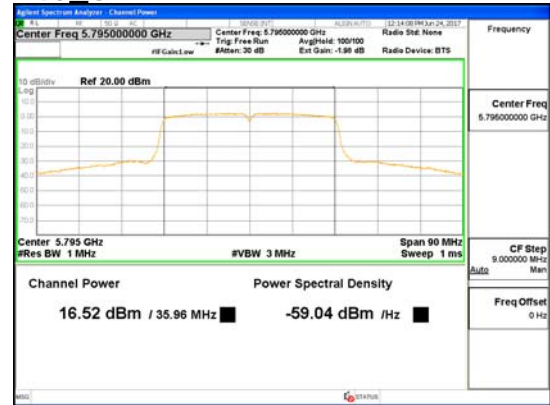


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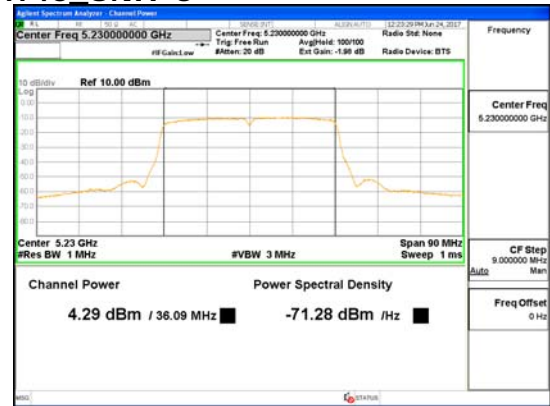
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Ant 0\_802.11ac\_VHT40\_UNII-3



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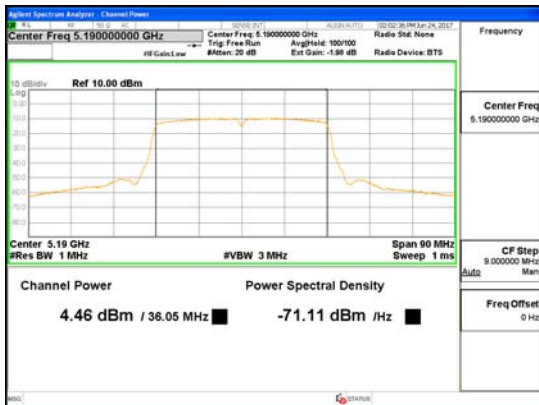


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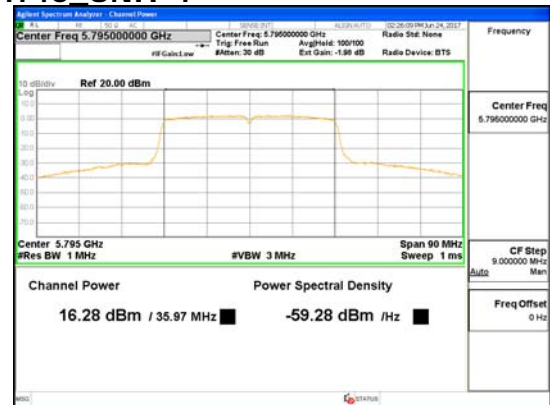
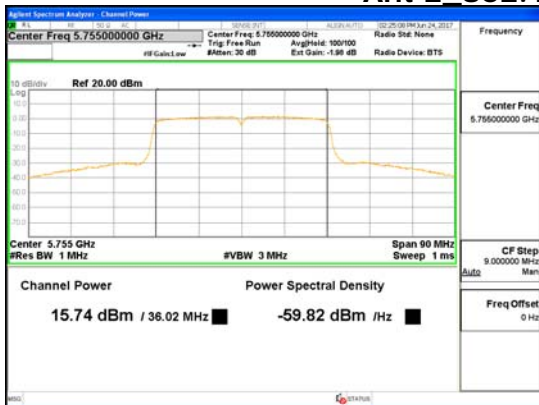


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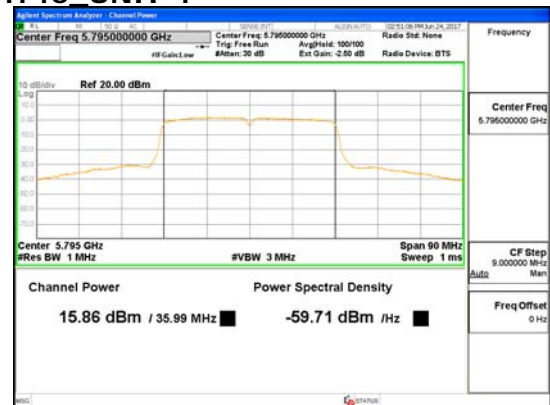
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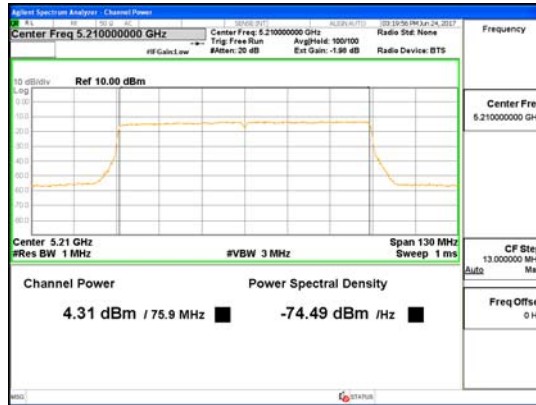
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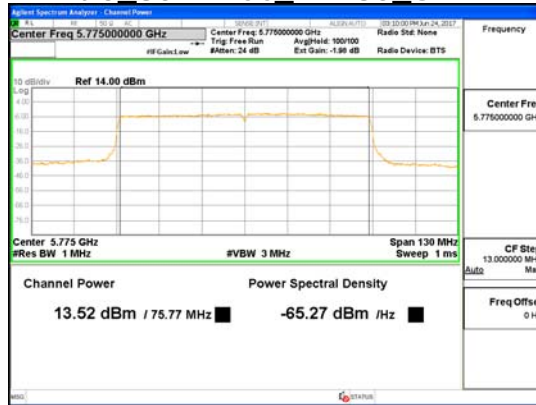
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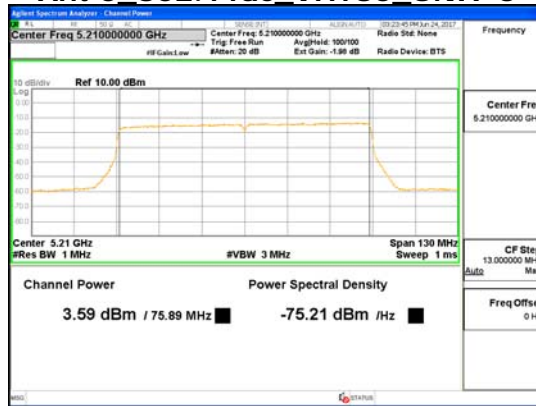
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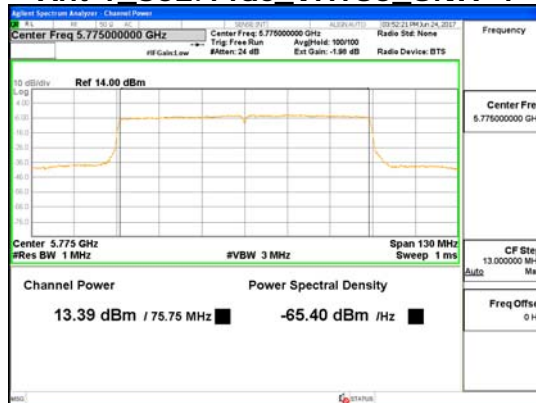
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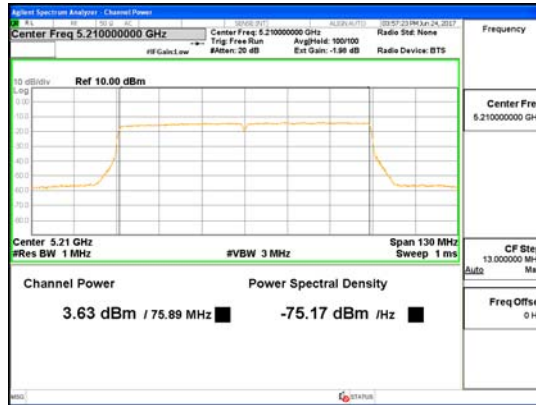
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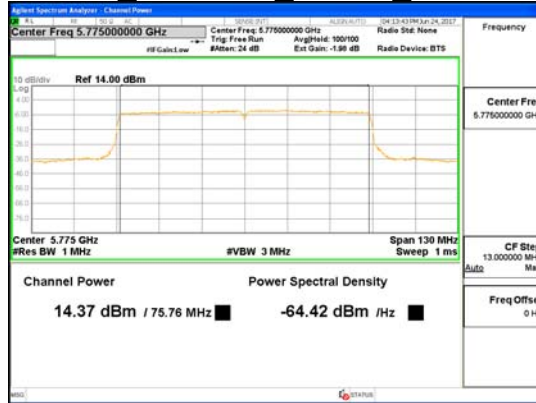
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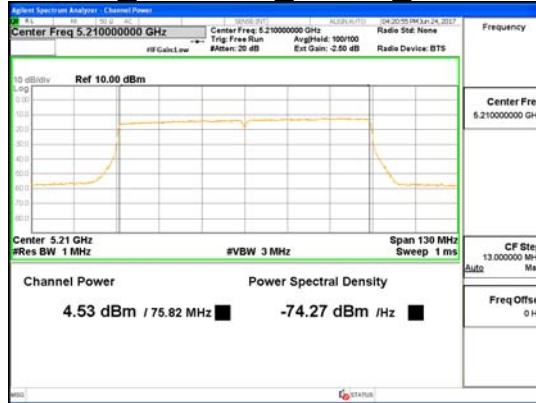
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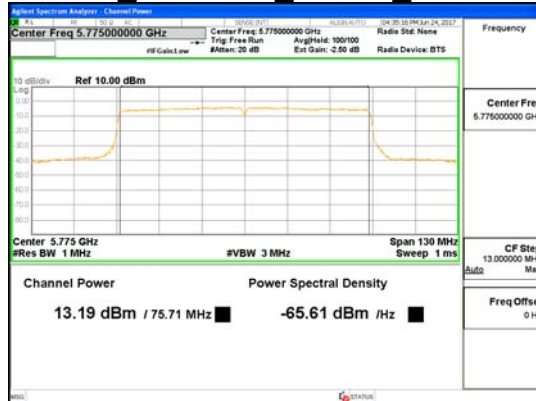
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**Ant 3\_802.11ac\_VHT80\_UNII-1**



**Ant 3\_802.11ac\_VHT80\_UNII-3**

## 4.5 Power Spectral Density

### Test Procedures

Maximum Power Spectral Density (KDB 789033, Method SA-1)

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

### Test Settings :

Center frequency = the highest, middle and the lowest channels

- a) RBW = 1 MHz, 500 KHz (UNII 3)
- b) VBW = 3 MHz, 1.5 MHz (UNII 3)
- c) Sweep time = auto
- d) Detector = power averaging (rms)
- e) Trace mode = Average at least 100

### Limit

Operating Mode	Band	Mode	ANT Configuration	ANT Gain (dBi)	Limit (dBm)	
					FCC	IC
SISO	UNII 1	802.11a/n/ac	ANT0	6.7	16.30	3.30
		802.11n/ac	ANT1			
		802.11n/ac	ANT2			
		802.11n/ac	ANT3			
	UNII 3	802.11a/n/ac	ANT0	6.7	29.30	29.30
		802.11n/ac	ANT1			
		802.11n/ac	ANT2			
		802.11n/ac	ANT3	4.2	30.00	30.00
MIMO (2Tx)	UNII 1	802.11a/n/ac	ANT0 + ANT1	9.71	13.29	0.29
MIMO (2Tx)	UNII 3				26.29	26.29
MIMO (3Tx)	UNII 1	802.11a/n/ac	ANT0 + ANT1 + ANT2	11.47	11.53	-1.47
MIMO (3Tx)	UNII 3				24.53	24.53
MIMO (4Tx)	UNII 1	802.11a/n/ac	ANT0 + ANT1 + ANT2 + ANT3	12.16	10.84	-2.16
MIMO (4Tx)	UNII 3				23.84	23.84





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## Test Data

### Ant 0

Mode	Measured Power Density (dBm)		
	802.11a	802.11n_HT20	802.11ac_VHT20
5 180 MHz	-8.76	-9.71	-9.18
5 200 MHz	-8.67	-9.83	-9.21
5 240 MHz	-8.49	-9.85	-8.85
5 745 MHz	2.77	1.36	2.31
5 785 MHz	2.75	1.72	2.51
5 825 MHz	2.97	1.78	2.60

Mode	Measured Power Density (dBm)	
	802.11n_HT40	802.11ac_VHT40
5 190 MHz	-10.16	-10.12
5 230 MHz	-10.02	-9.84
5 755 MHz	-0.91	-0.76
5 795 MHz	-0.74	-0.50

Mode	Measured Power Density (dBm)
	802.11ac_VHT80
5 210 MHz	-13.13
5 775 MHz	-6.60



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**Ant 1**

Measured Power Density (dBm)		
Mode	802.11n_HT20	802.11ac_VHT20
Frequency		
5 180 MHz	-9.65	-9.94
5 200 MHz	-9.93	-9.59
5 240 MHz	-9.43	-9.30
5 745 MHz	1.65	2.15
5 785 MHz	2.23	2.34
5 825 MHz	2.07	2.31

Measured Power Density (dBm)		
Mode	802.11n_HT40	802.11ac_VHT40
Frequency		
5 190 MHz	-9.92	-9.91
5 230 MHz	-9.55	-9.72
5 755 MHz	-1.04	-1.07
5 795 MHz	-0.62	-0.66

Measured Power Density (dBm)	
Mode	802.11ac_VHT80
Frequency	
5 210 MHz	-13.42
5 775 MHz	-6.89



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**Ant 2**

Measured Power Density (dBm)		
Mode	802.11n_HT20	802.11ac_VHT20
Frequency		
5 180 MHz	-8.81	-8.77
5 200 MHz	-8.88	-8.82
5 240 MHz	-8.71	-8.67
5 745 MHz	1.54	1.74
5 785 MHz	2.06	2.11
5 825 MHz	1.96	2.19

Measured Power Density (dBm)		
Mode	802.11n_HT40	802.11ac_VHT40
Frequency		
5 190 MHz	-9.65	-9.58
5 230 MHz	-9.44	-9.23
5 755 MHz	-1.24	-1.42
5 795 MHz	-0.67	-0.72

Measured Power Density (dBm)	
Mode	802.11ac_VHT80
Frequency	
5 210 MHz	-13.65
5 775 MHz	-5.87



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**Ant 3**

Measured Power Density (dBm)		
Mode	802.11n_HT20	802.11ac_VHT20
Frequency		
5 180 MHz	-12.55	-11.58
5 200 MHz	-11.85	-11.06
5 240 MHz	-10.57	-10.07
5 745 MHz	1.80	1.92
5 785 MHz	2.08	2.02
5 825 MHz	1.62	2.12

Measured Power Density (dBm)		
Mode	802.11n_HT40	802.11ac_VHT40
Frequency		
5 190 MHz	-10.20	-9.91
5 230 MHz	-9.68	-9.75
5 755 MHz	-1.03	-1.10
5 795 MHz	-0.71	-1.23

Measured Power Density (dBm)	
Mode	802.11ac_VHT80
Frequency	
5 210 MHz	-12.28
5 775 MHz	-7.02



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**Ant 0 + Ant 1**

		Measured Power Density (dBm)		
Mode	Frequency	802.11a	802.11n_HT20	802.11ac_VHT20
	5 180 MHz	-5.96	-6.67	-6.53
	5 200 MHz	-5.96	-6.87	-6.39
	5 240 MHz	-5.72	-6.62	-6.06
	5 745 MHz	5.47	4.52	5.24
	5 785 MHz	5.75	4.99	5.44
	5 825 MHz	5.77	4.94	5.47

		Measured Power Density (dBm)	
Mode	Frequency	802.11n_HT40	802.11ac_VHT40
	5 190 MHz	-7.03	-7.00
	5 230 MHz	-6.77	-6.77
	5 755 MHz	2.04	2.10
	5 795 MHz	2.33	2.43

		Measured Power Density (dBm)
Mode	Frequency	802.11ac_VHT80
	5 210 MHz	-10.26
	5 775 MHz	-3.73



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**Ant 0 + Ant 1 + Ant2**

Measured Power Density (dBm)			
Mode	802.11a	802.11n_HT20	802.11ac_VHT20
Frequency			
5 180 MHz	-4.04	-4.60	-4.50
5 200 MHz	-4.07	-4.75	-4.42
5 240 MHz	-3.87	-4.53	-4.16
5 745 MHz	7.03	6.29	6.84
5 785 MHz	7.44	6.78	7.09
5 825 MHz	7.43	6.71	7.14
Measurement uncertainty	± 3 dB		

Measured Power Density (dBm)		
Mode	802.11n_HT40	802.11ac_VHT40
Frequency		
5 190 MHz	-5.13	-5.09
5 230 MHz	-4.89	-4.82
5 755 MHz	3.71	3.70
5 795 MHz	4.09	4.15
Measurement uncertainty	± 3 dB	

Measured Power Density (dBm)	
Mode	802.11ac_VHT80
Frequency	
5 210 MHz	-8.62
5 775 MHz	-1.66
Measurement uncertainty	± 3 dB



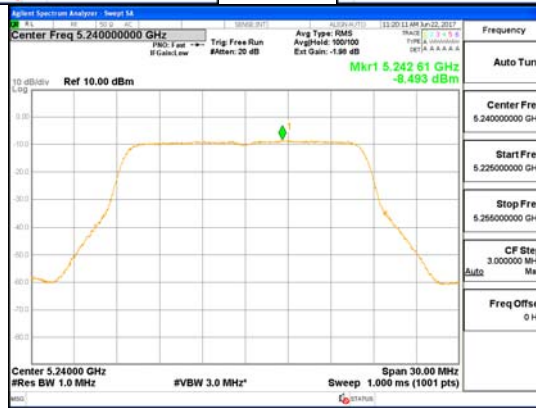
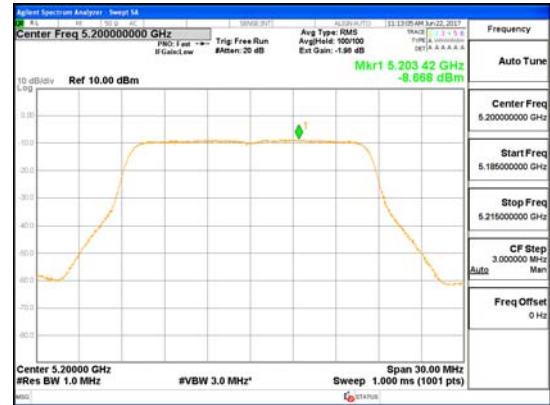
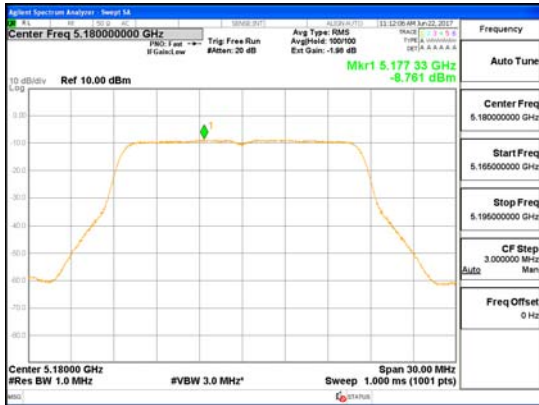
**Ant 0 + Ant 1 + Ant2 + Ant3**

		Measured Power Density (dBm)		
Mode		802.11a	802.11n_HT20	802.11ac_VHT20
Frequency				
5 180 MHz		-3.38	-3.95	-3.72
5 200 MHz		-3.34	-3.98	-3.57
5 240 MHz		-2.99	-3.57	-3.17
5 745 MHz		8.24	7.61	8.06
5 785 MHz		8.55	8.05	8.27
5 825 MHz		8.57	7.88	8.33

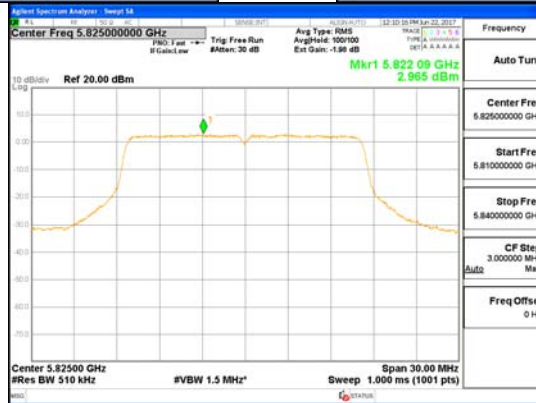
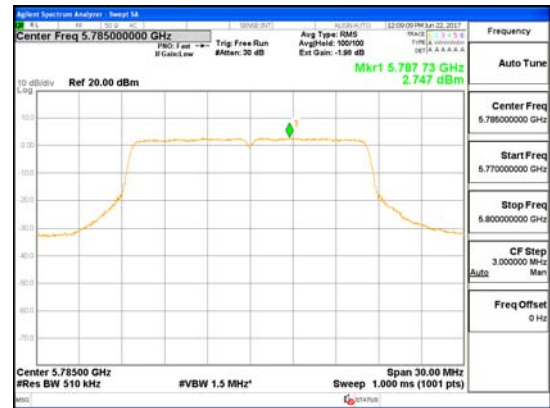
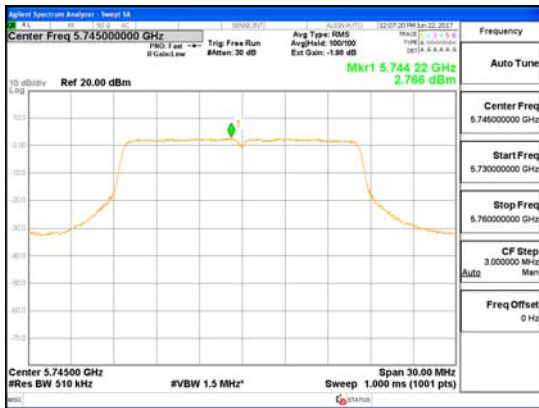
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Mode		802.11n_HT40	802.11ac_VHT40
Frequency			
5 190 MHz		-3.96	-3.86
5 230 MHz		-3.65	-3.61
5 755 MHz		4.97	4.94
5 795 MHz		5.34	5.25

		Measured Power Density (dBm)
Mode		802.11ac_VHT80
Frequency		
5 210 MHz		-7.07
5 775 MHz		-0.55

See next pages for actual measured spectrum plots.



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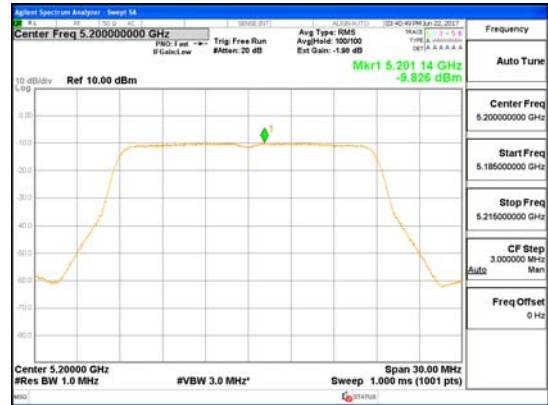
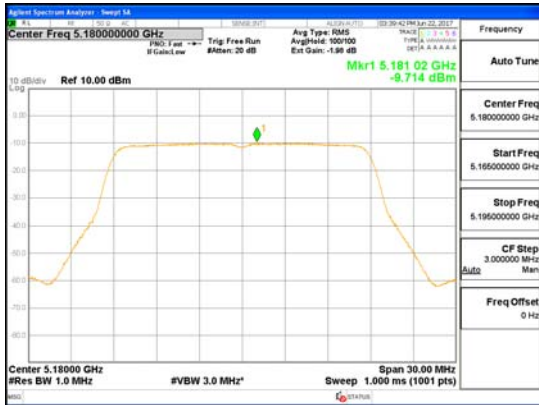
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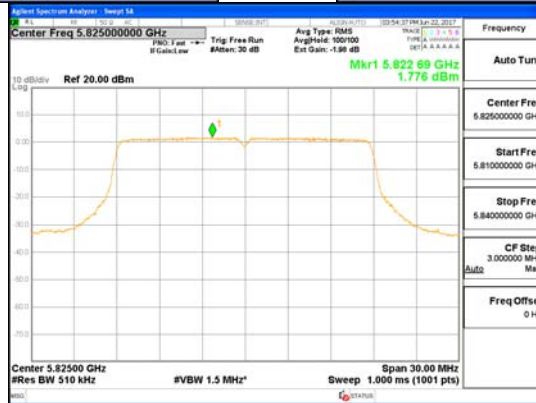
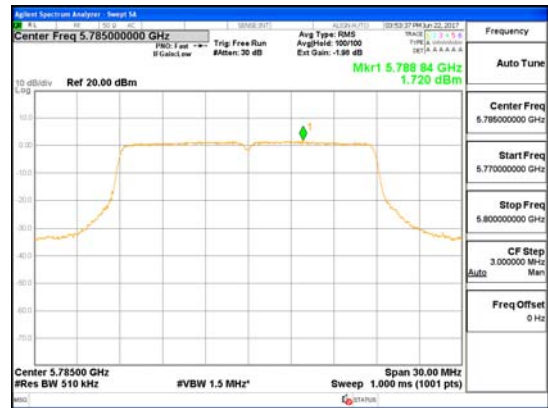
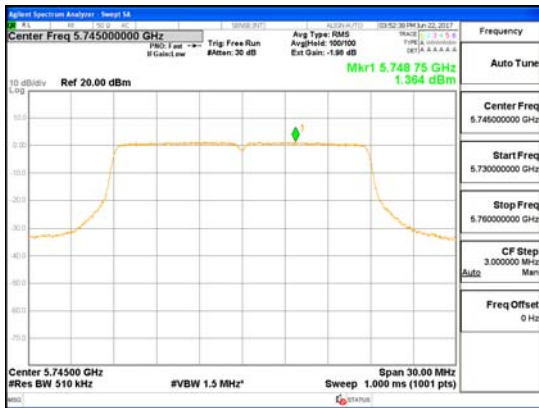


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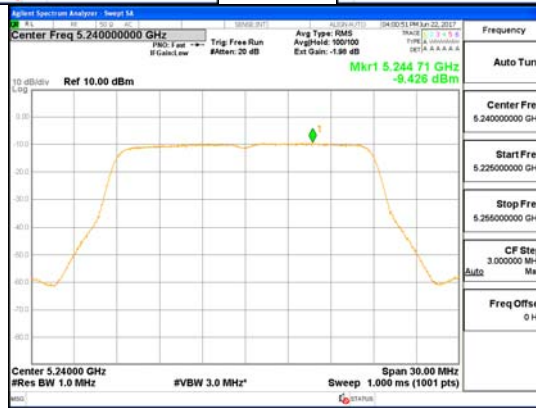
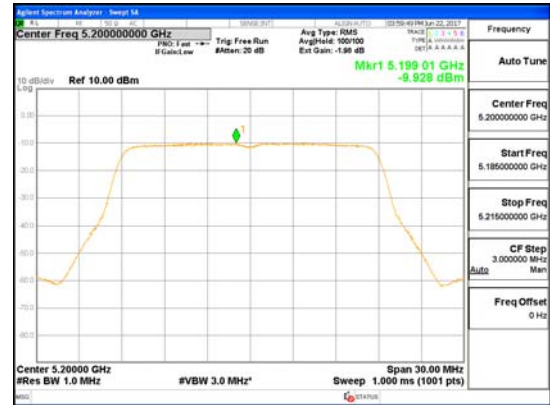
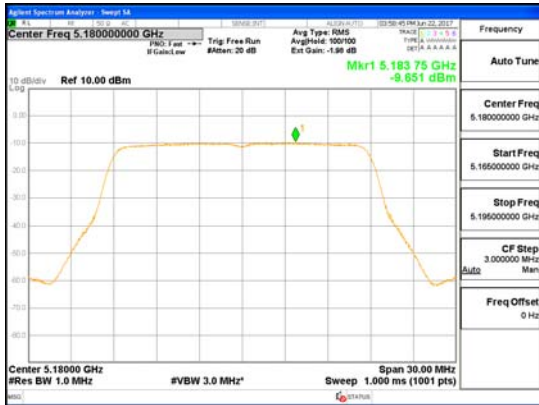


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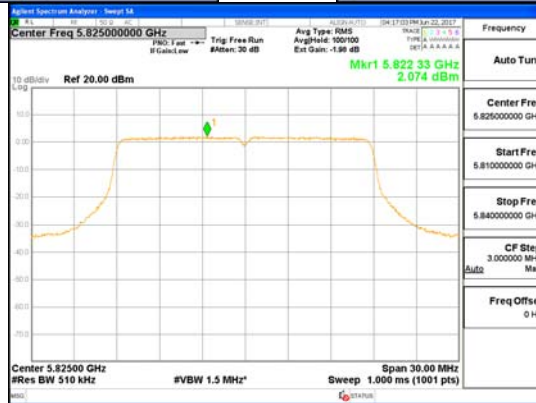
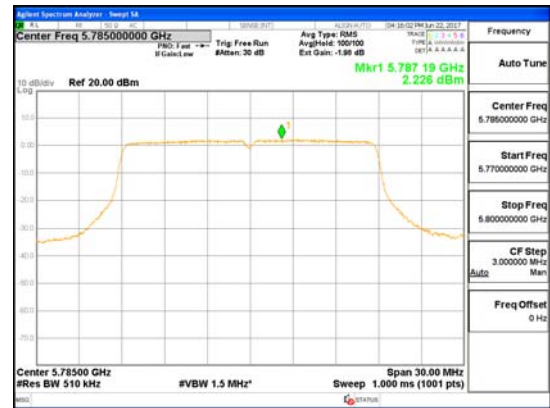
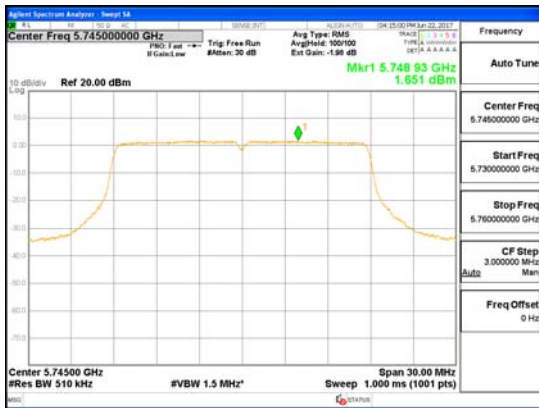


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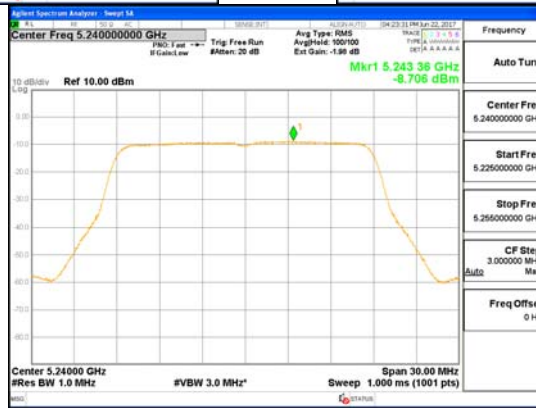
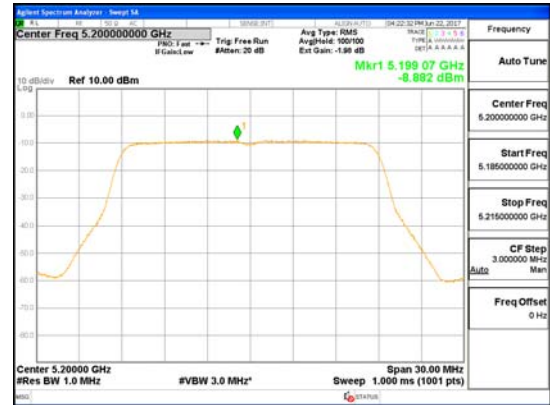
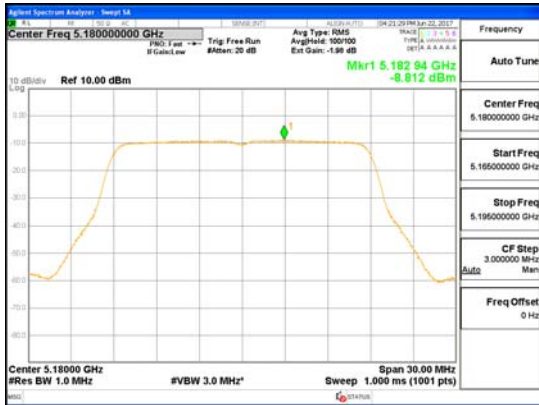


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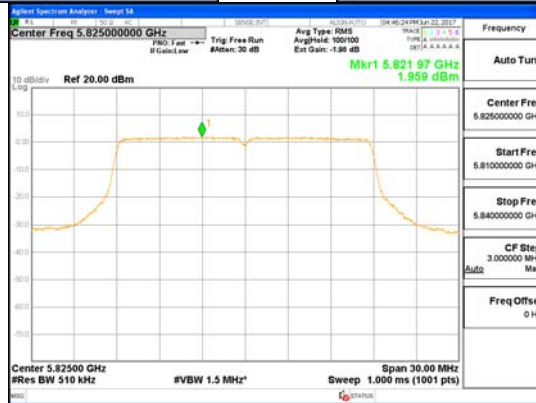
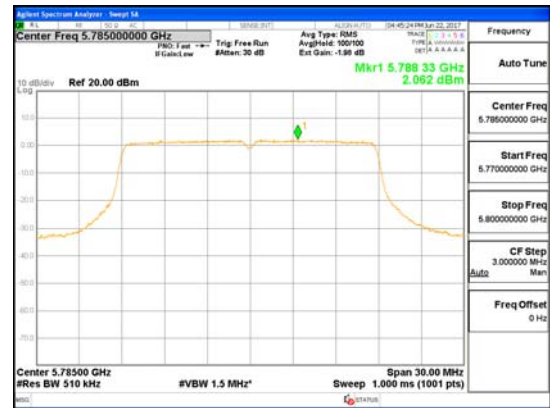
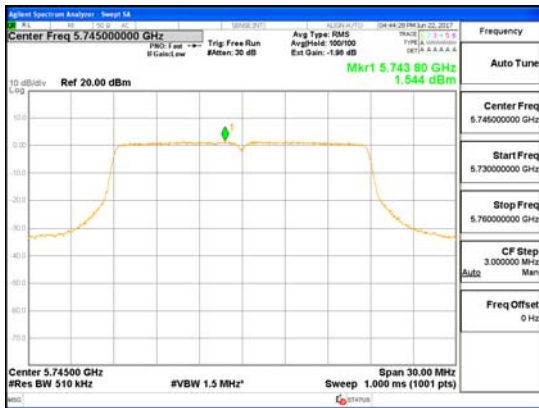


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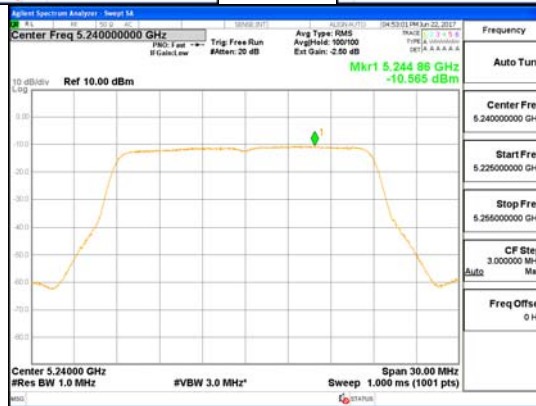
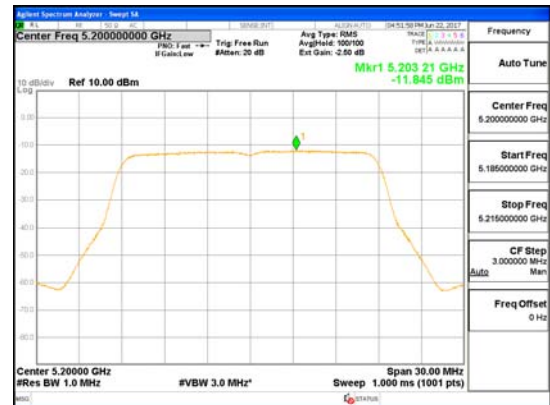
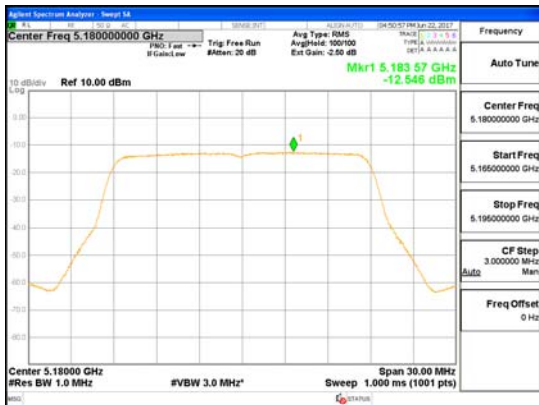


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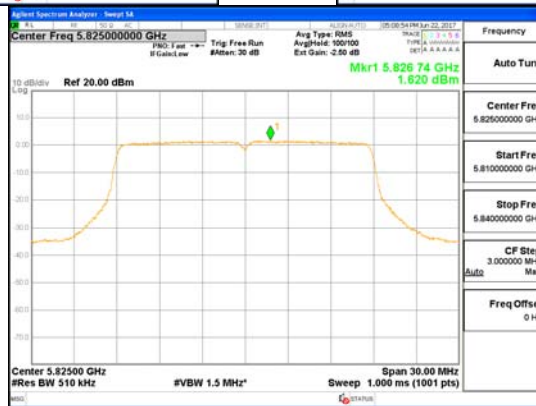
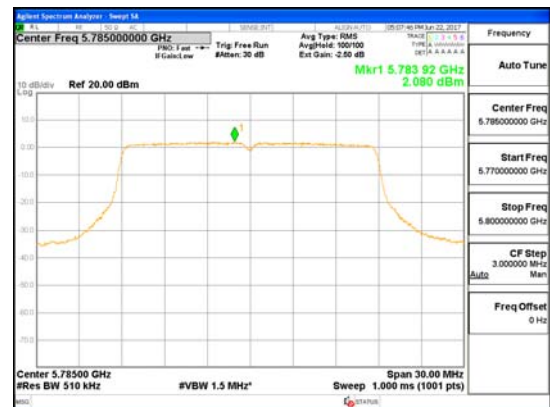
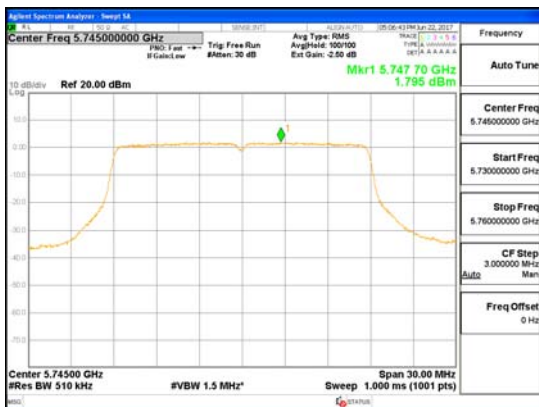


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Ant 3\_802.11n\_HT20\_UNII-1

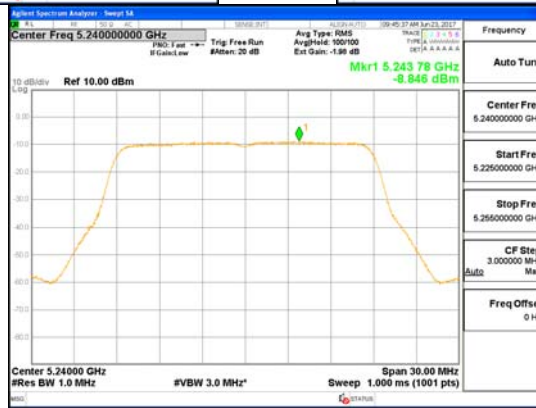
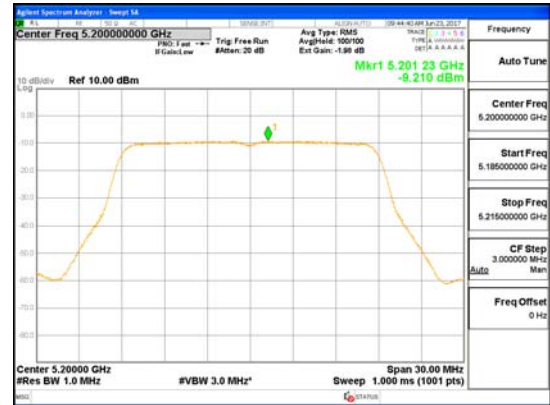
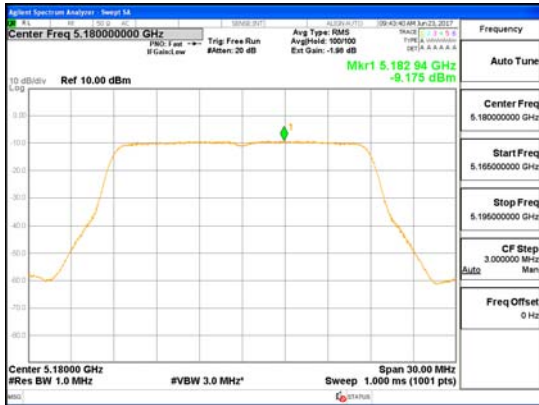


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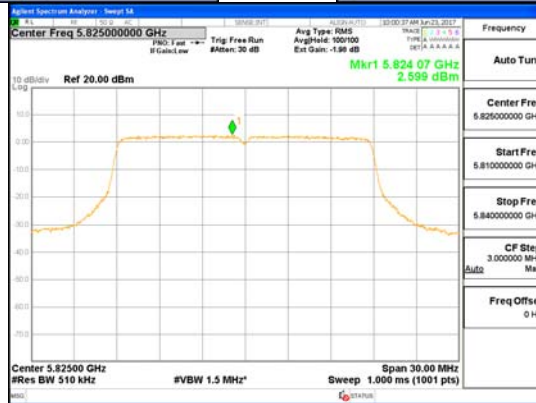
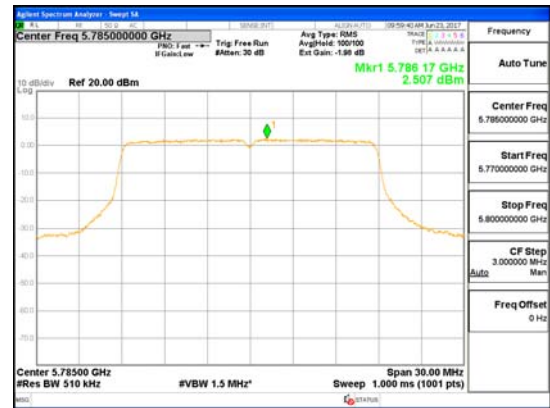
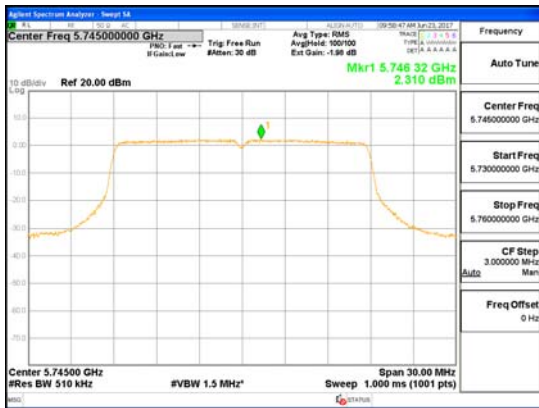


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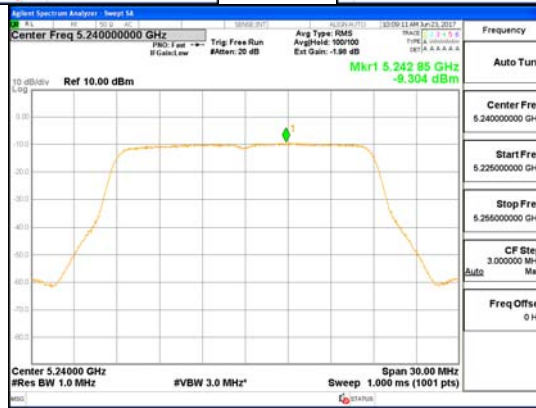
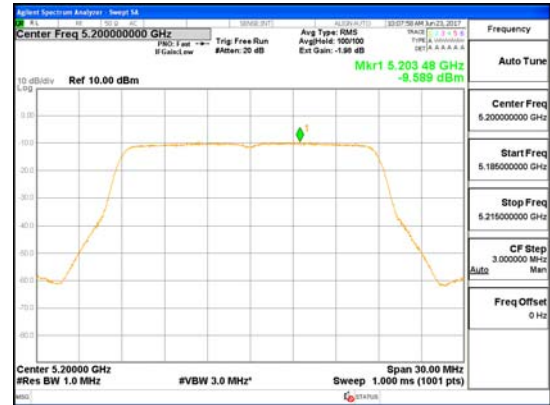
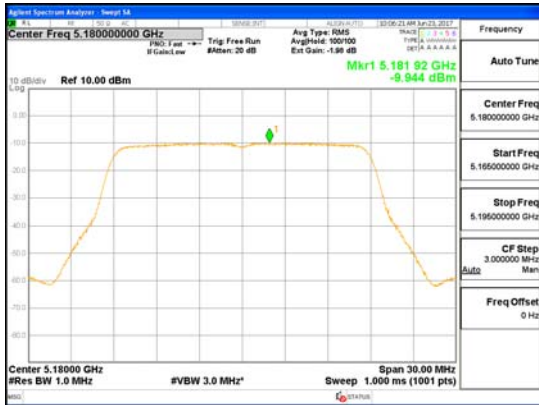


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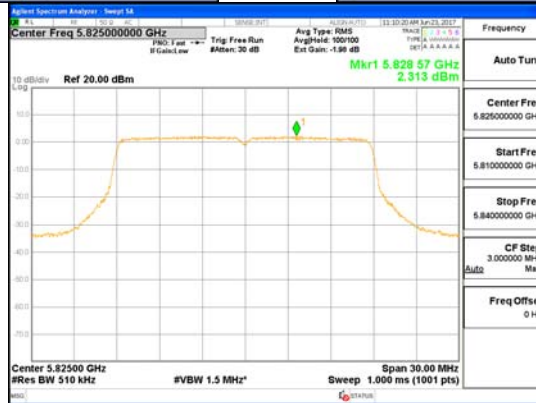
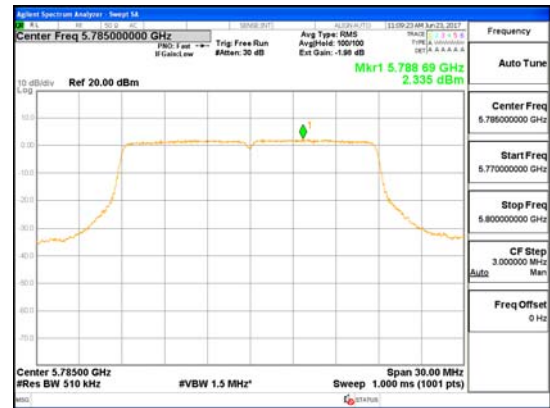
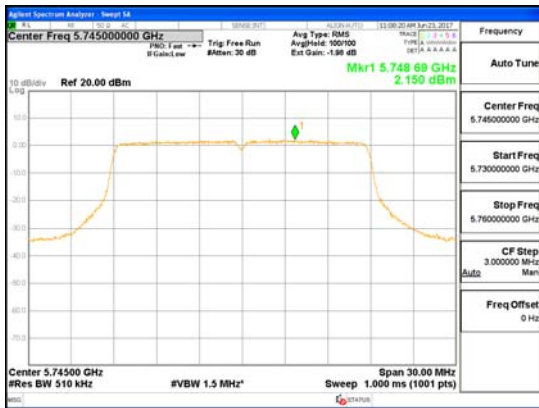


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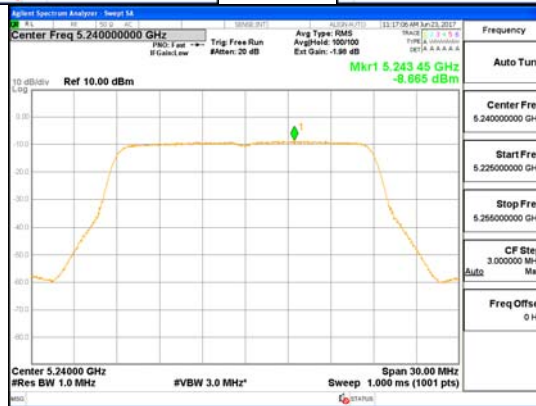
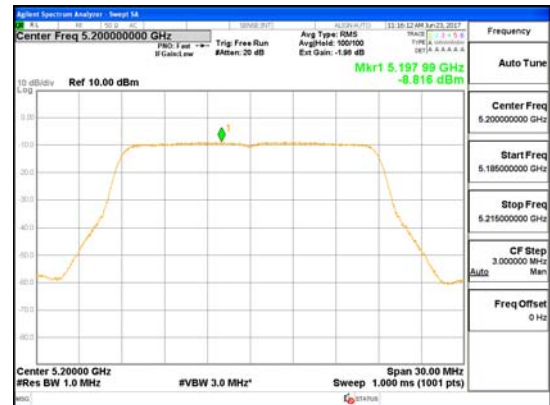
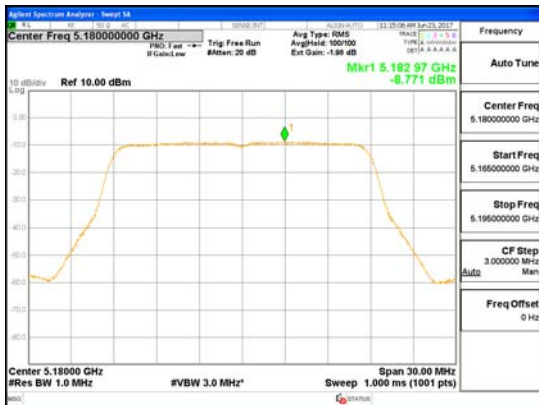


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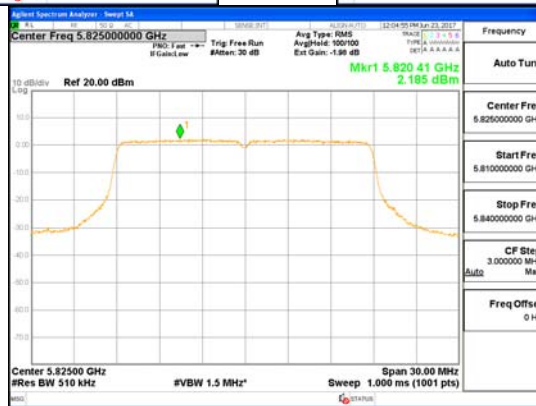
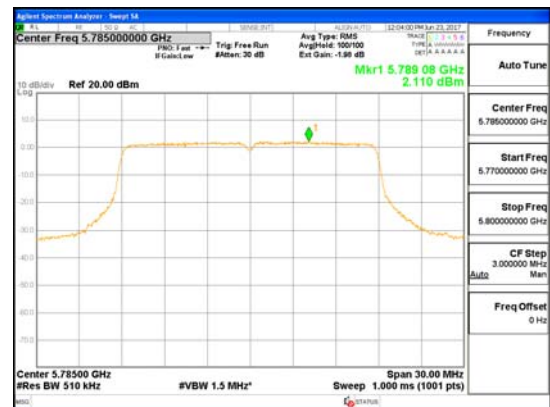
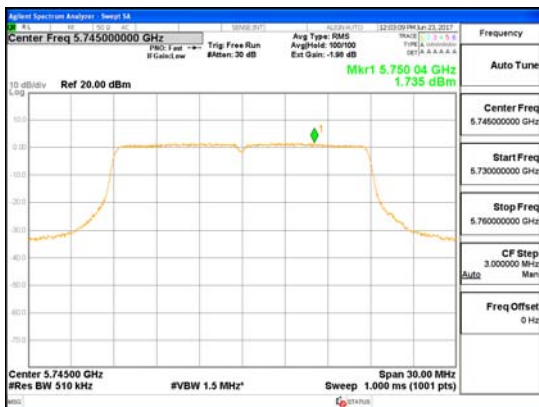


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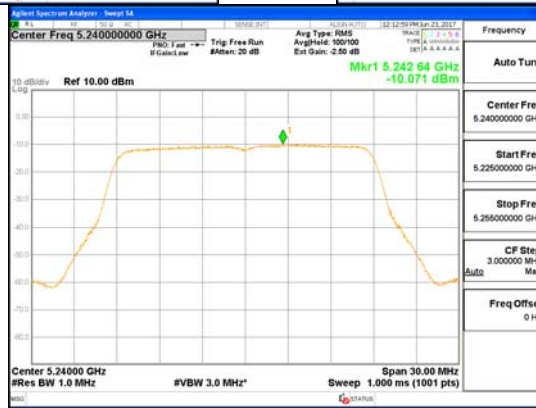
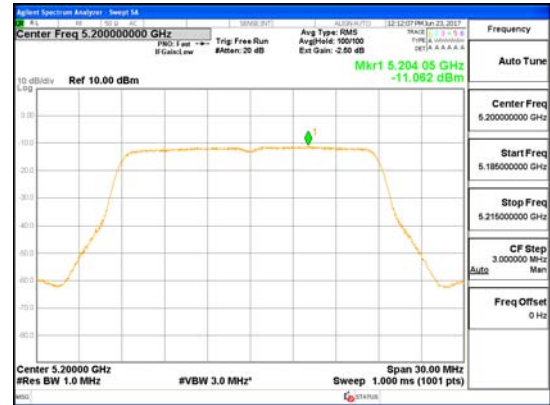
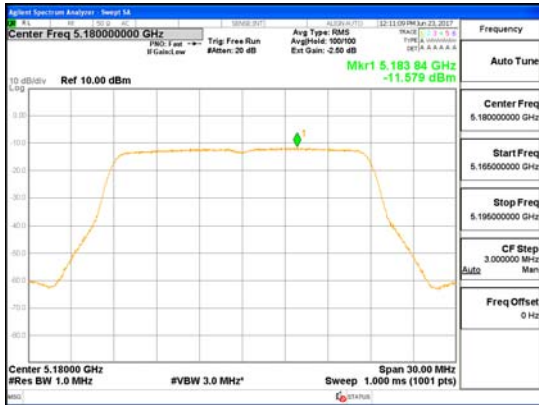


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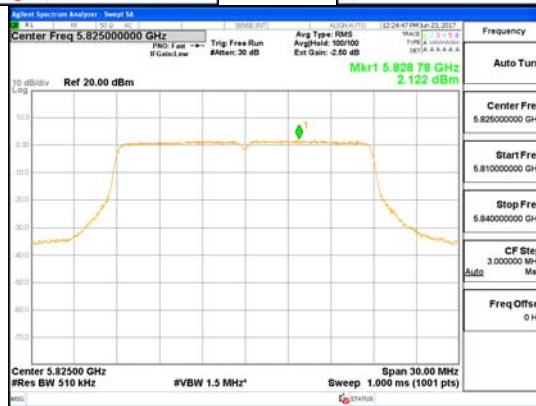
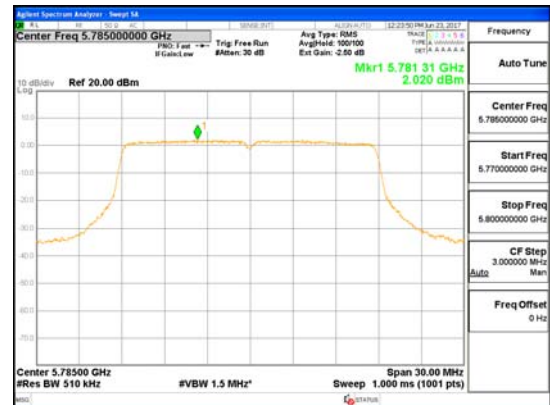
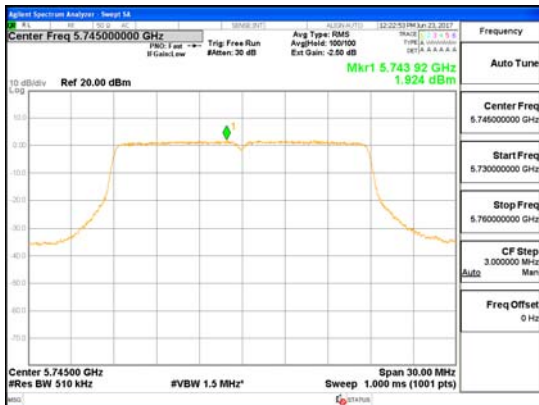


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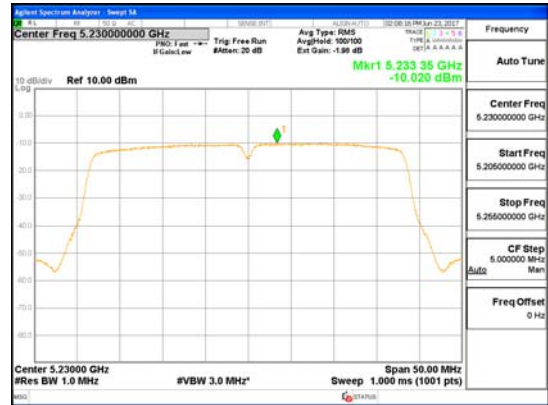
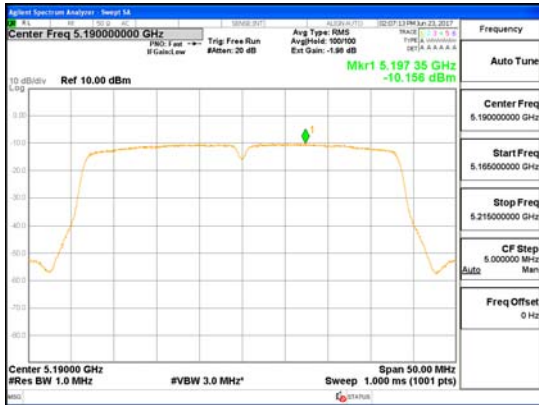
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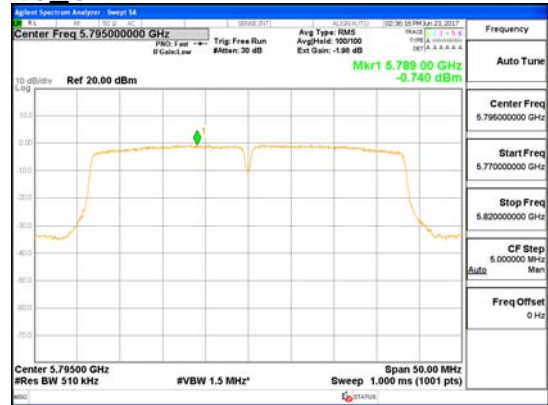
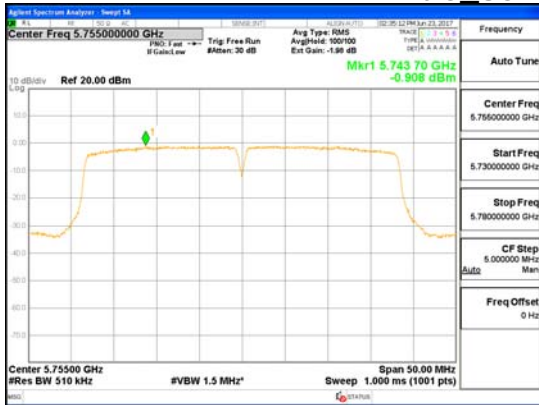


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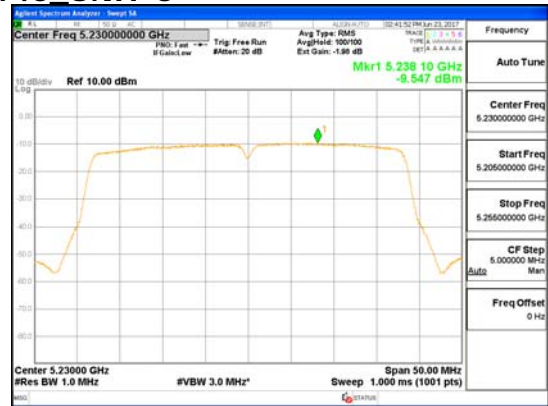
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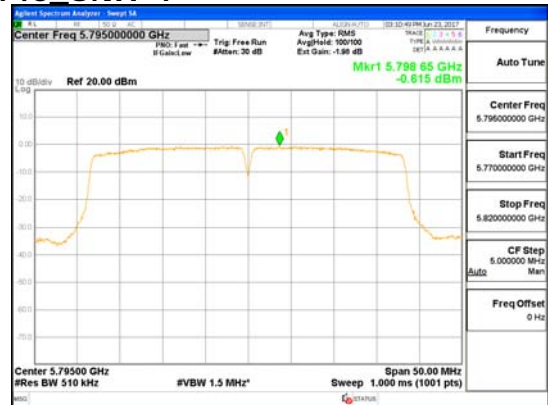
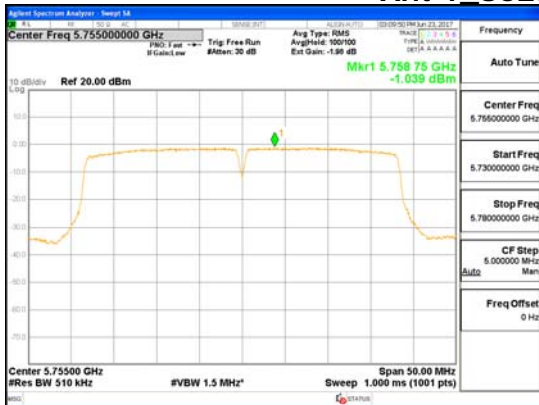
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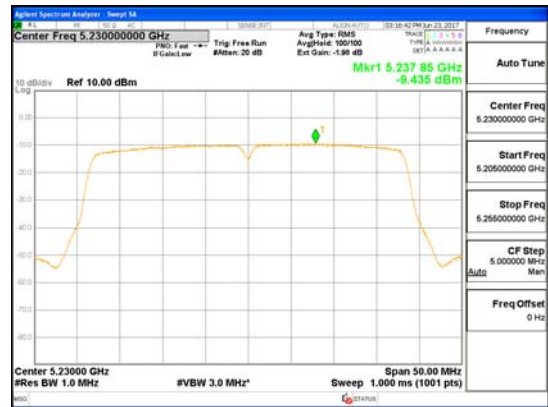
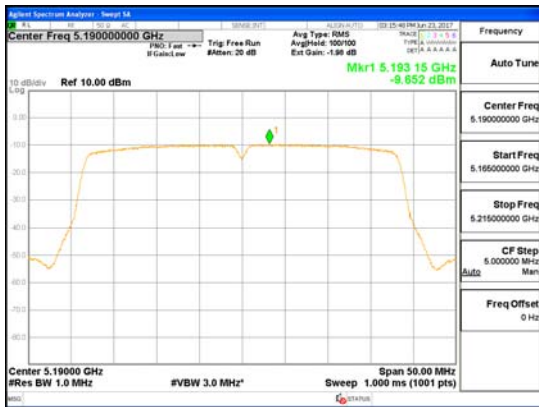


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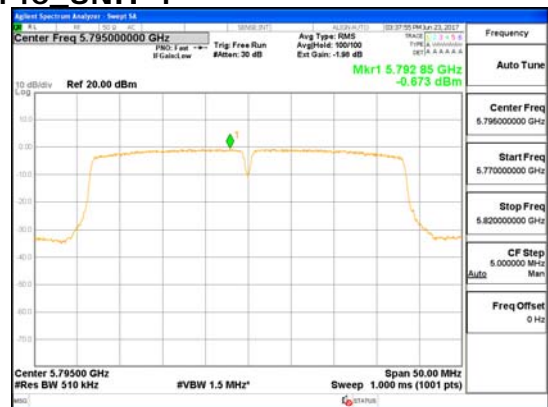
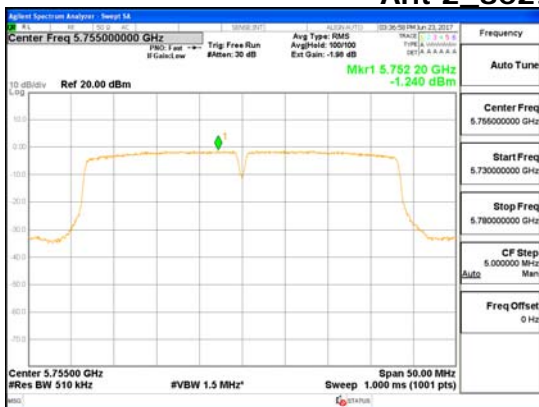


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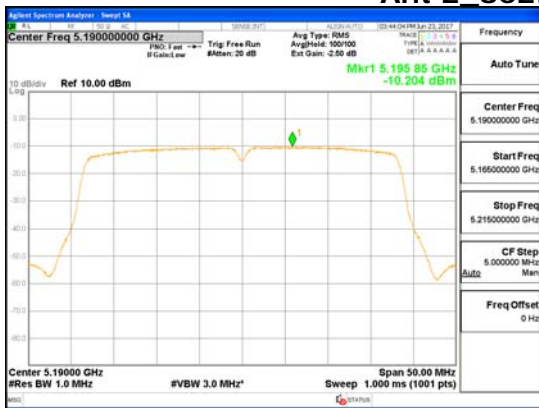
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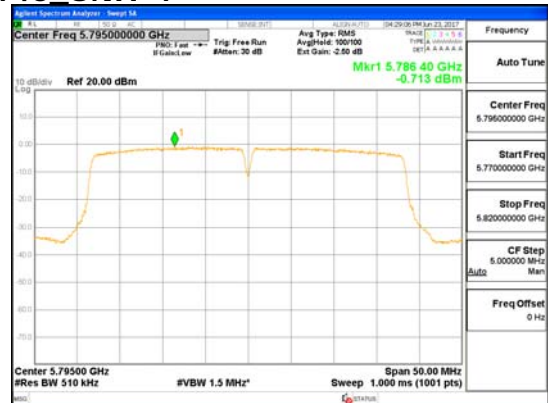
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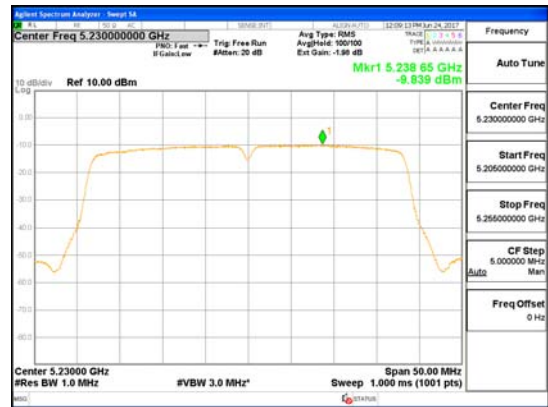
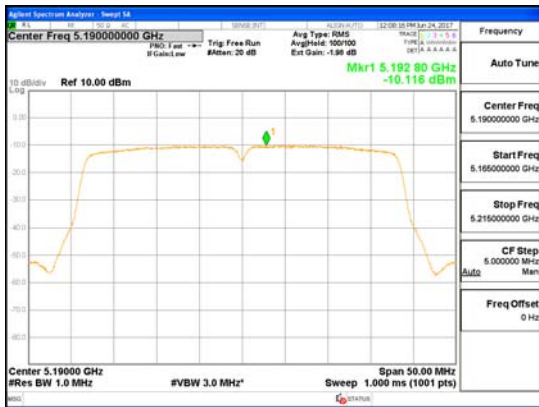


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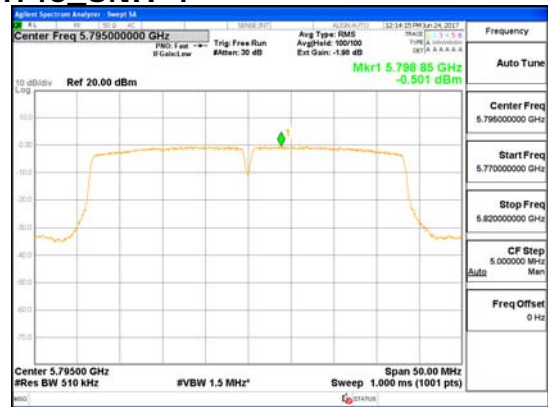
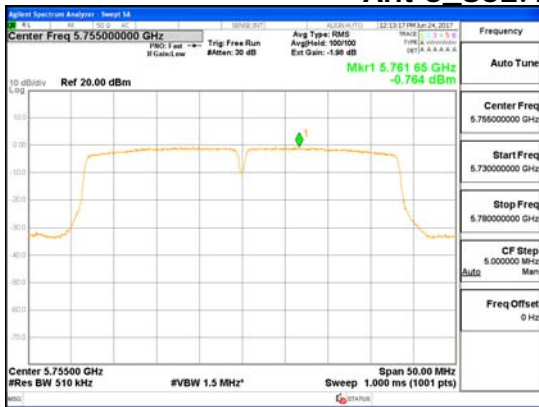


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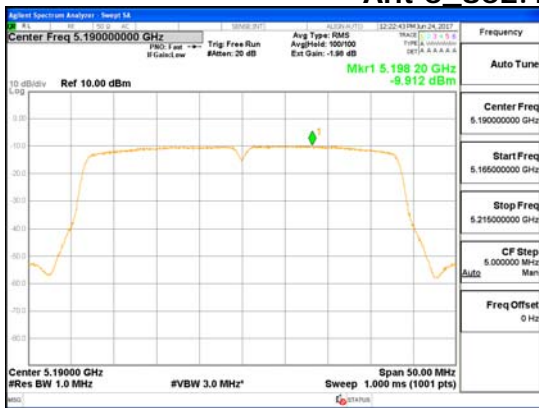
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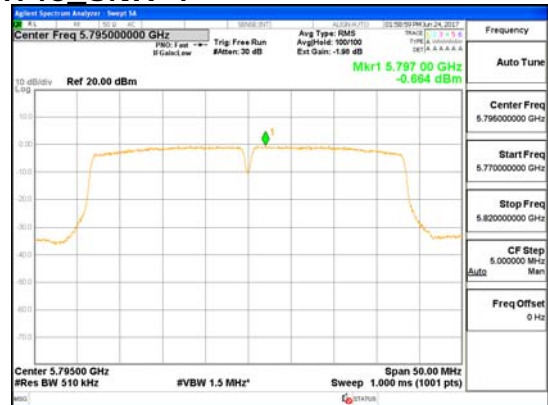
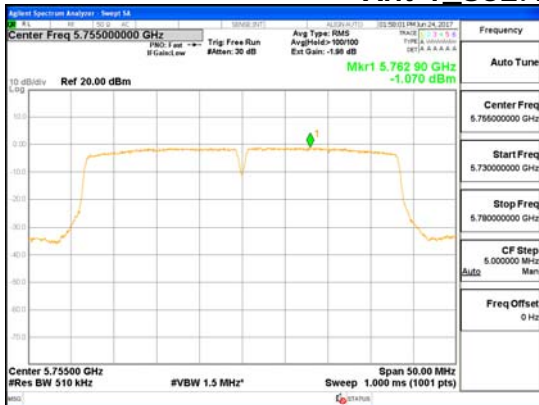
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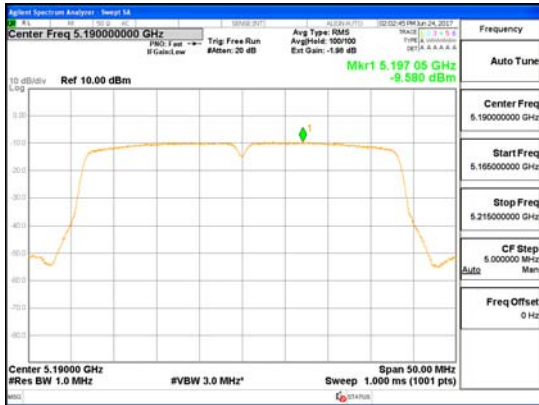


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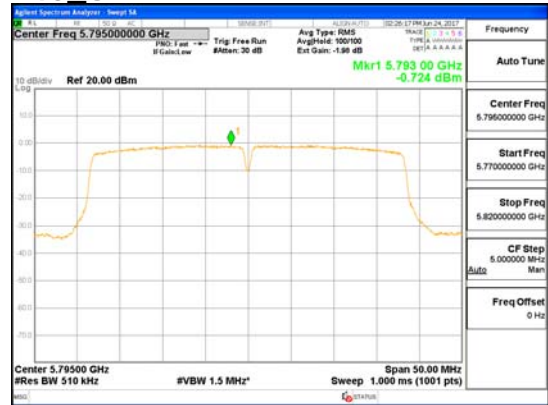
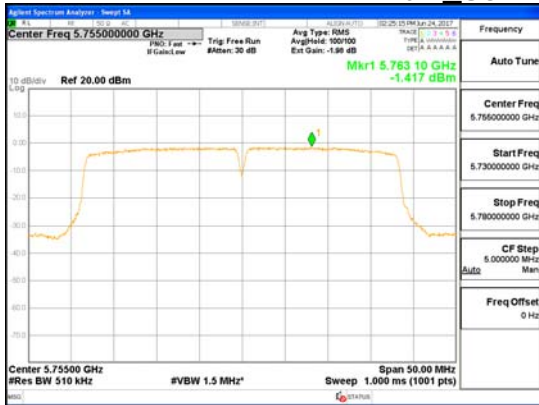


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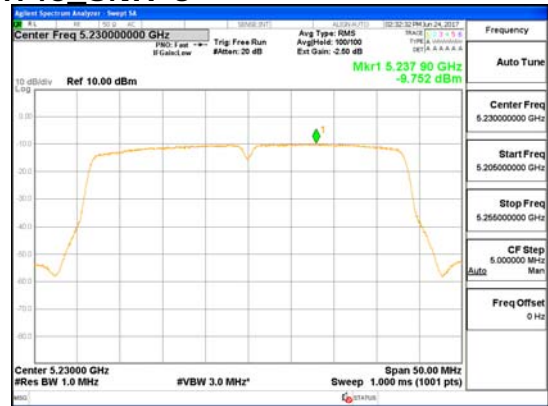
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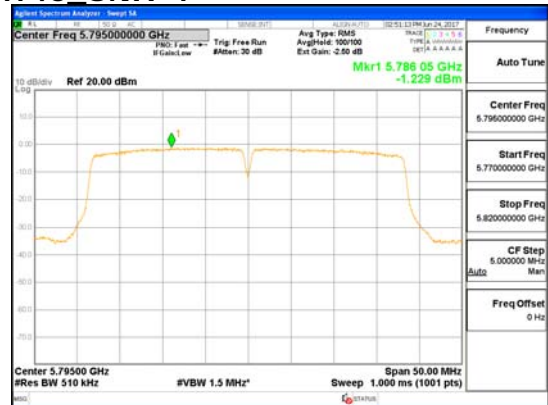
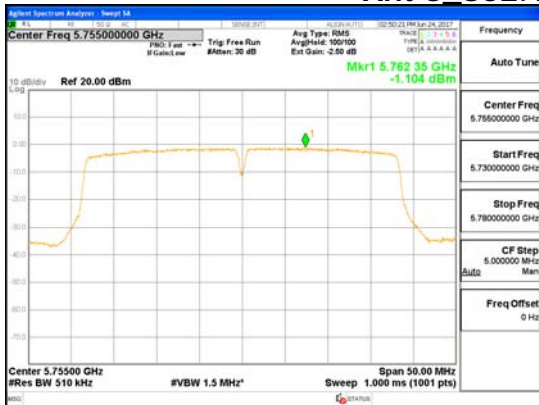
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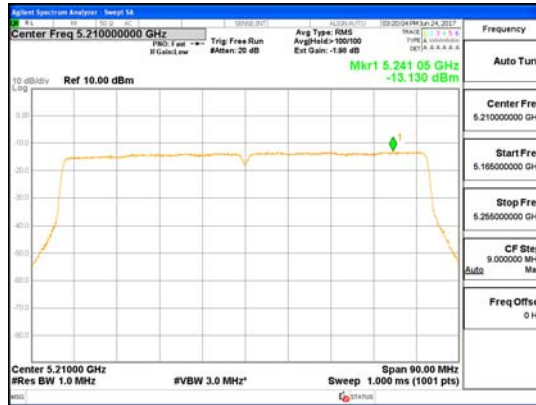
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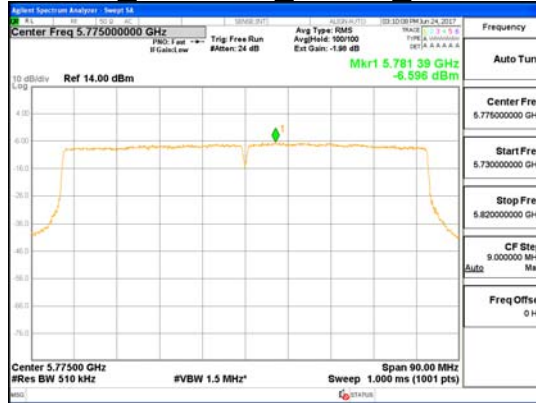
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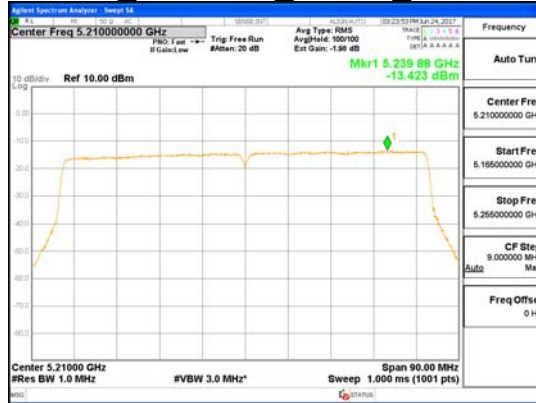
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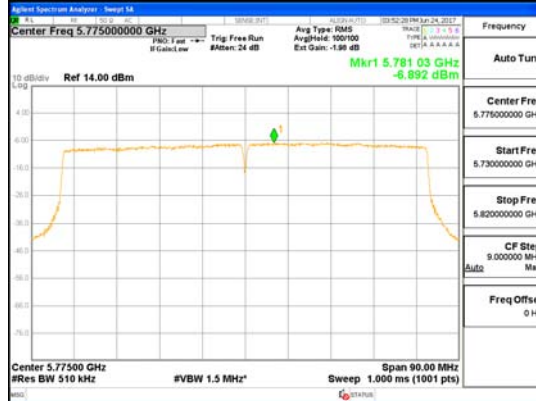
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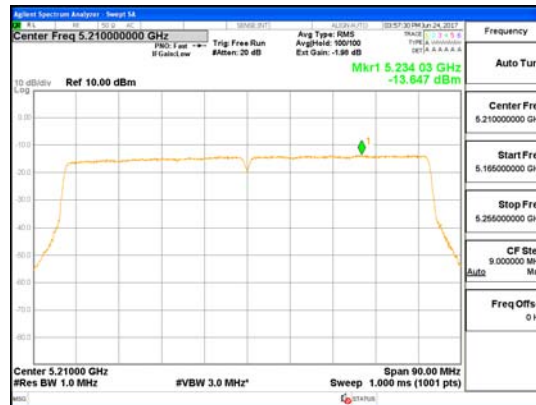
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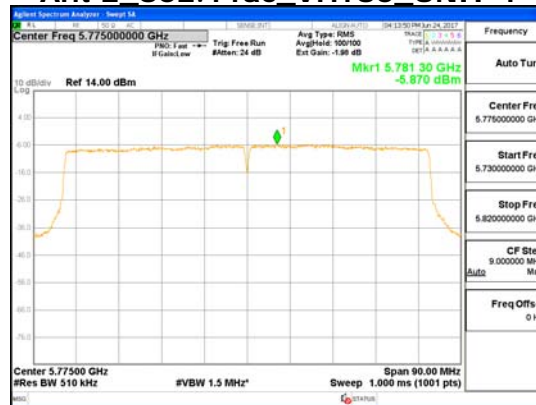
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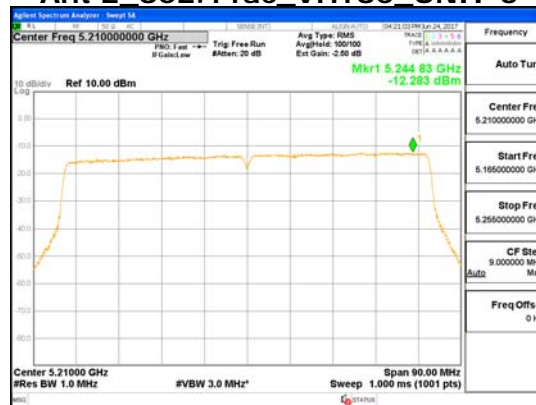
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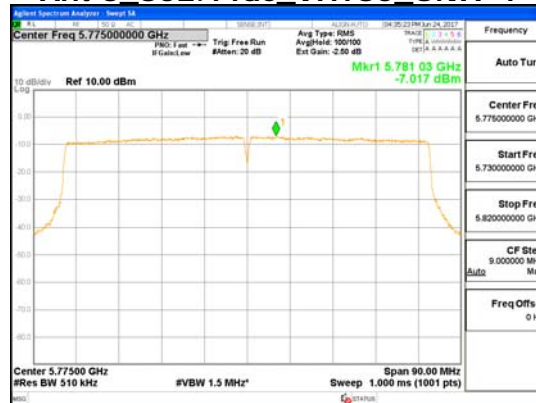
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**Ant 2\_802.11ac\_VHT80\_UNII-3**



**Ant 3\_802.11ac\_VHT80\_UNII-1**



**Ant 3\_802.11ac\_VHT80\_UNII-3**

## 4.6 Frequency Stability

### Test Procedures

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between 0 °C and +45 °C (Declaration by the Manufacturer). The temperature was incremented by 10 °C (5 °C) intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

Data for the worst case channel is shown below.

Temperature (°C)	0	10	20	30	40	45
Frequency	Measured Frequency Error (kHz)					
5 180 MHz	9.171	1.183	-10.595	-28.343	-39.578	-40.034
5 200 MHz	9.276	809	-11.948	-29.224	-40.023	-40.016
5 240 MHz	9.305	709	-12.626	-29.487	-40.353	-40.247
5 745 MHz	10.272	653	-15.508	-32.621	-44.360	-44.009
5 785 MHz	10.302	650	-15.700	-32.969	-44.662	-44.337
5 825 MHz	10.334	642	-15.837	-33.437	-44.973	-44.653

### Note :

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature range as tested.