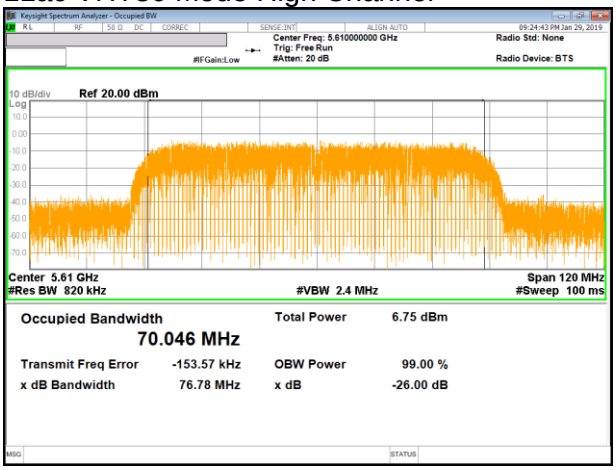
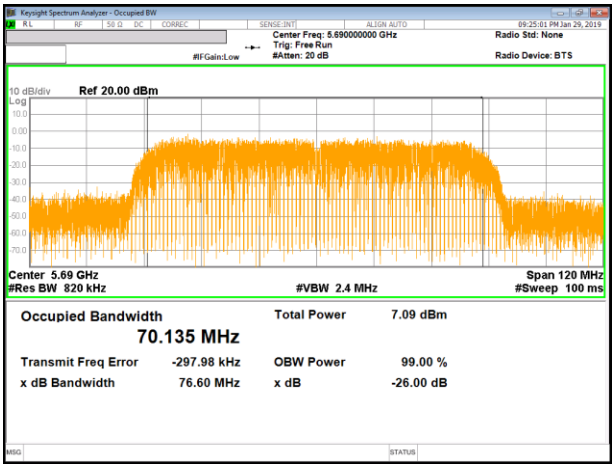
UNII 5.5 GHz IEEE 802.11ac VHT80 mode

11ac VHT80 Mode Low Channel

11ac VHT80 Mode High Channel



11ac VHT80 Mode Straddle Channel



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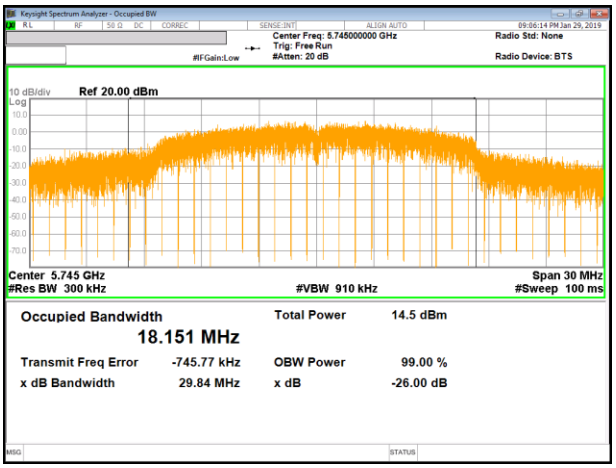
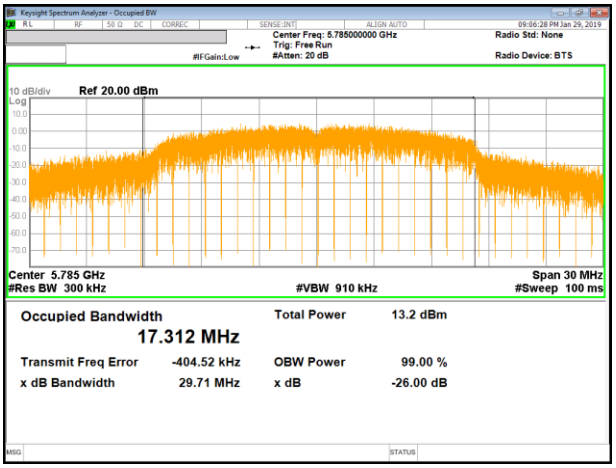
UNII 5.8 GHz IEEE 802.11a mode

11a Mode Low Channel



11a Mode Middle Channel



11a Mode High Channel

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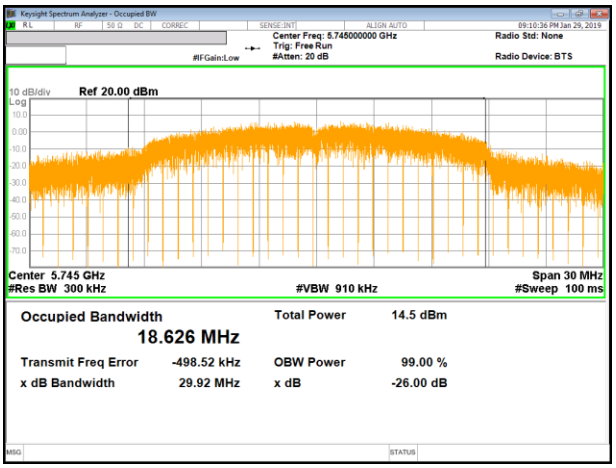
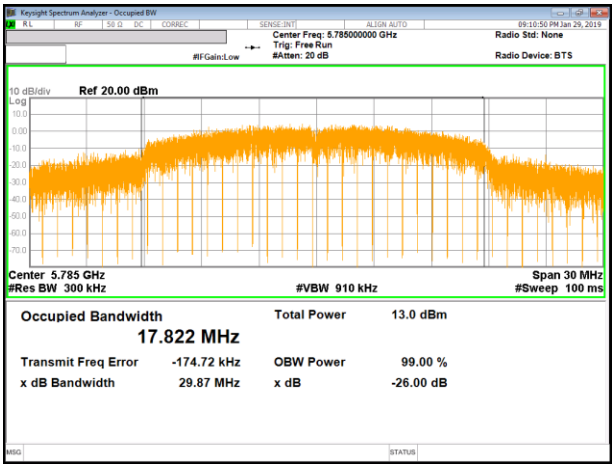
UNII 5.8 GHz IEEE 802.11n HT20 mode

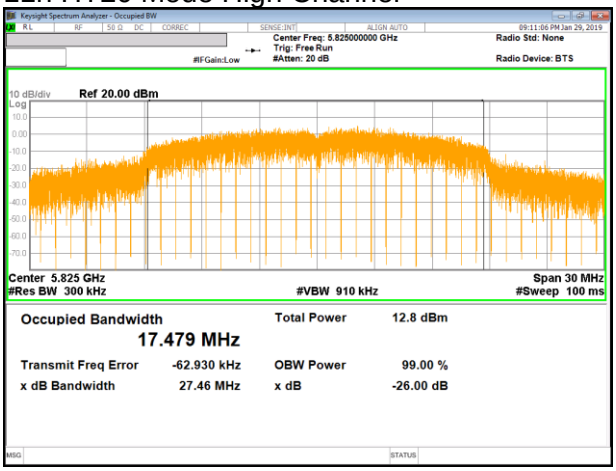
11n HT20 Mode Low Channel



11n HT20 Mode Middle Channel



11n HT20 Mode High Channel



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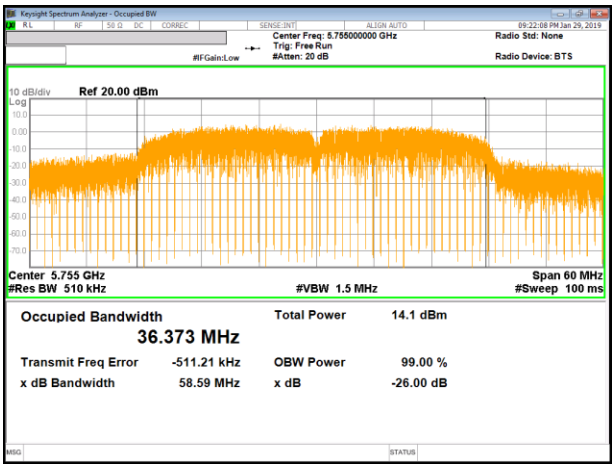
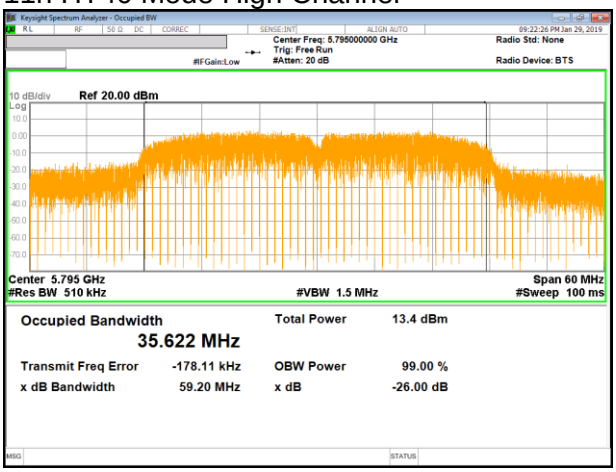
UNII 5.8 GHz IEEE 802.11n HT40 mode

11n HT40 Mode Low Channel

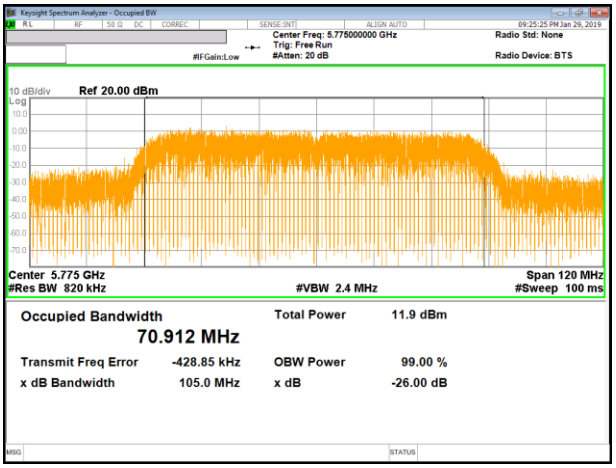


11n HT40 Mode High Channel



UNII 5.8 GHz IEEE 802.11ac VHT80 mode

11ac VHT80 Mode Middle Channel



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10. ANTENNA PORT TEST RESULTS

10.1. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

Reference to 789033 D02 General UNII Test Procedures New Rules v01r03: The transmitter output is connected to a spectrum analyzer with the RBW set to100KHz, the VBW >= 3 x RBW, peak detector and max hold.

RESULTS

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10.1.1. 802.11a MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Straddle	5720	0.98	0.5
Low	5745	13.89	0.5
Mid	5785	13.76	0.5
High	5825	13.20	0.5
Worst		0.98	

10.1.2. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Straddle	5720	1.90	0.5
Low	5745	13.79	0.5
Mid	5785	13.21	0.5
High	5825	11.98	0.5
Worst		1.90	

10.1.3. 802.11n HT40 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Straddle	5710	0.64	0.5
Low	5755	32.52	0.5
High	5795	31.30	0.5
Worst		0.64	

10.1.4. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Straddle	5690	0.00	0.5
Middle	5775	67.59	0.5
Worst		67.59	

Note: The 6dB bandwidth of straddle channel(5690 MHz) don’t incloud the 5.8 GHz band.

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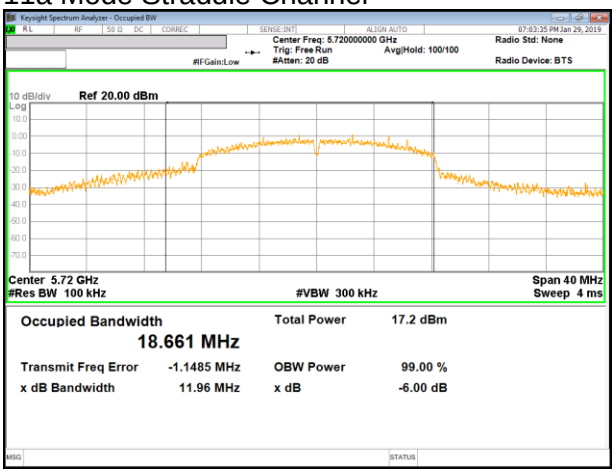
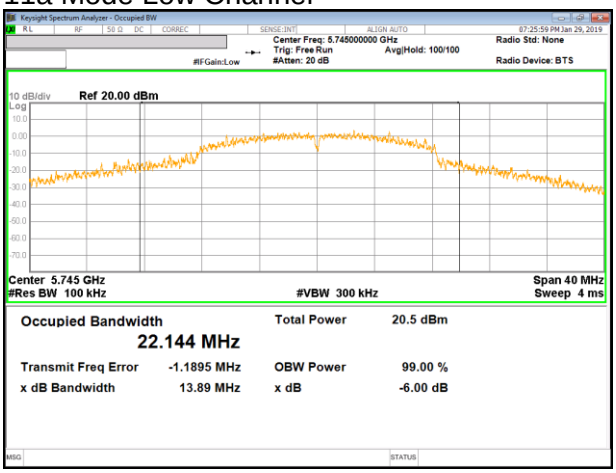
10.1.5. 6 dB BANDWIDTH PLOTS

UNII 5.8 GHz IEEE 802.11a mode

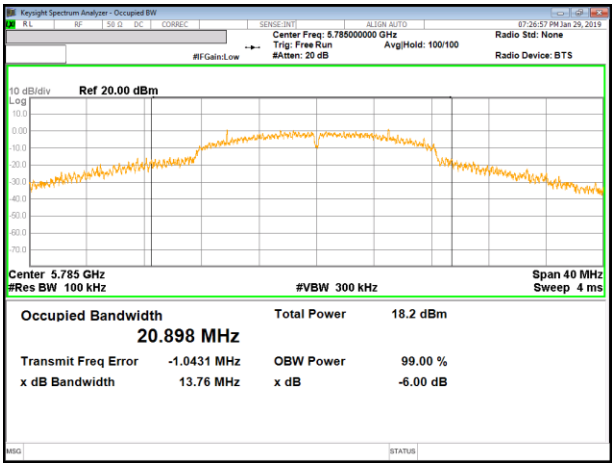
11a Mode Straddle Channel



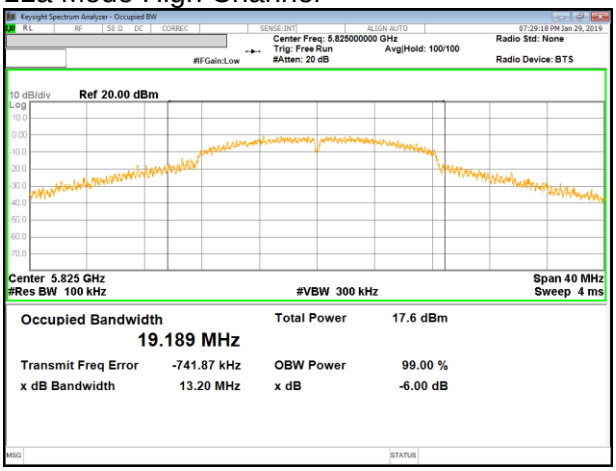
11a Mode Low Channel



11a Mode Middle Channel



11a Mode High Channel



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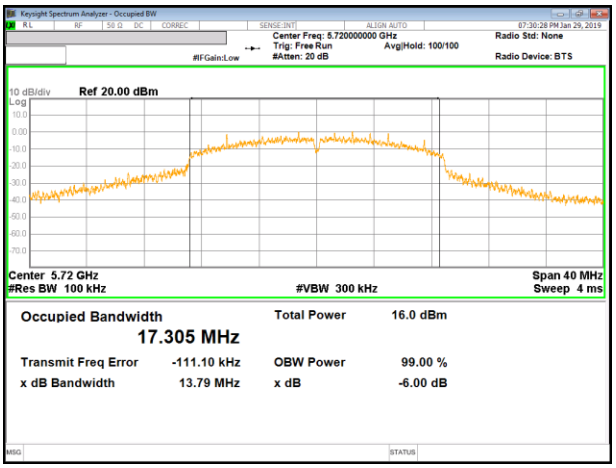
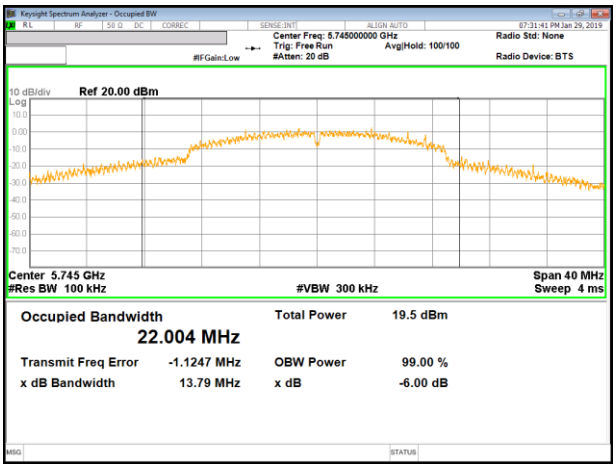
UNII 5.8 GHz IEEE 802.11n HT20 mode

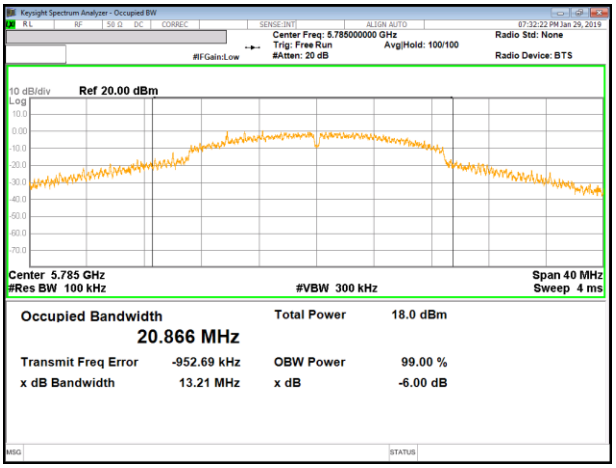
11n HT20 Mode Straddle Channel



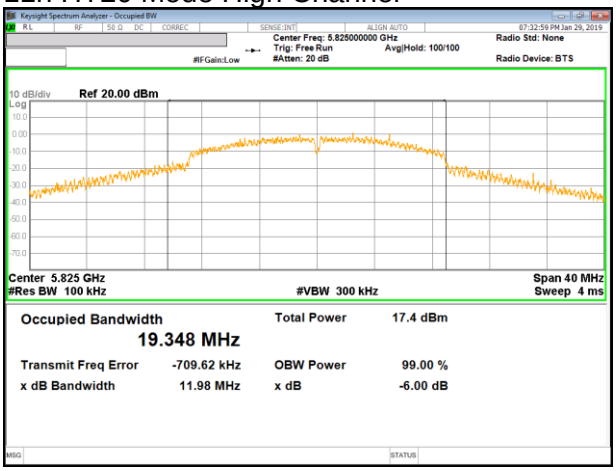
11n HT20 Mode Low Channel



11n HT20 Mode Middle Channel



11n HT20 Mode High Channel



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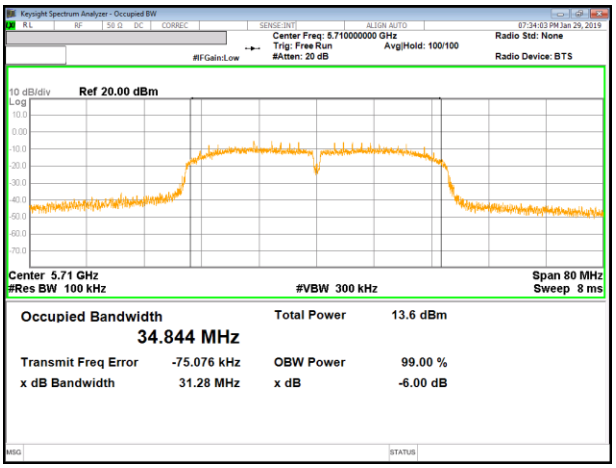
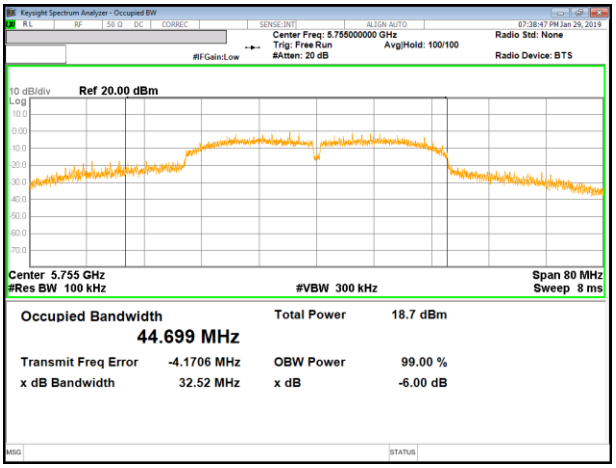
UNII 5.8 GHz IEEE 802.11n HT40 mode

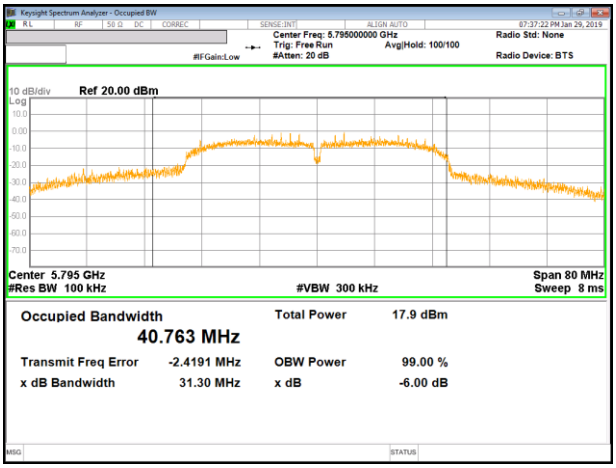
11n HT40 Mode Straddle Channel



11n HT40 Mode Low Channel



11n HT40 Mode Middle Channel



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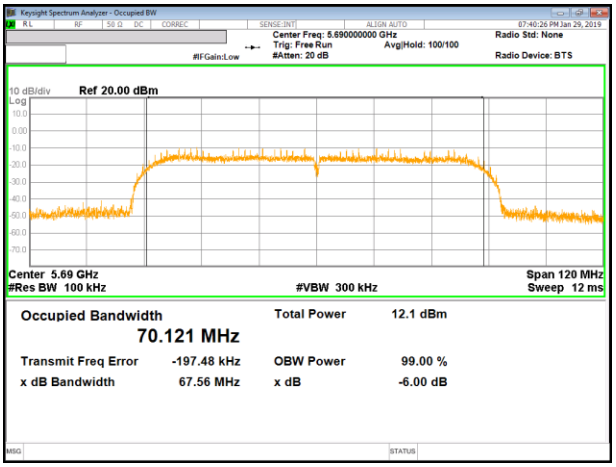
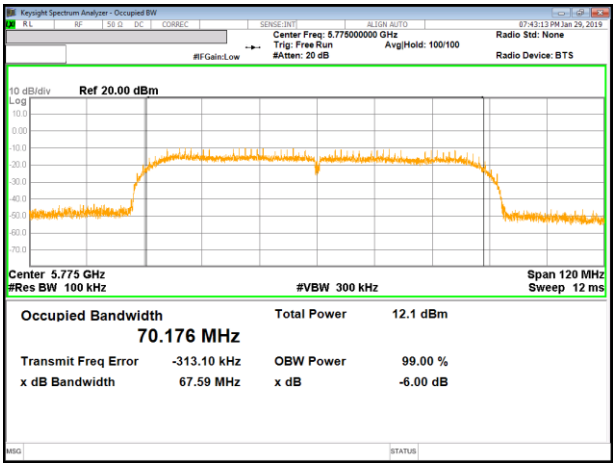
UNII 5.8 GHz IEEE 802.11ac VHT80 mode

11ac VHT80 Mode Straddle Channel



11ac VHT80 Mode Middle Channel



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10.2. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1) (2) (3)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

TEST PROCEDURE

KDB 789033 Method SA-1 and SA-2 are used for PPSD. RBW set to1MHz(500kHz for the band 5.725-5.85 GHz, the VBW >= 3 x RBW, RMS detector and trace averaging). Peak marker value of the spectrum is used for PSD. Add duty cycle correction factor for all mode.

KDB 789033 Method PM is used for output power.

DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

5 GHz

Frequency Band [MHz]	Antenna Gain [dBi]
5150 - 5250	-3.57
5250 - 5350	-2.01
5470 - 5725	-1.41
5725 - 5850	-1.88

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RESULTS

10.2.1. 802.11a MODE IN THE 5.2 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5180	23.83	-3.57	-3.57
Mid	5200	23.27	-3.57	-3.57
High	5240	24.22	-3.57	-3.57

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5180	24.00	24.00	11.00
Mid	5200	24.00	24.00	11.00
High	5240	24.00	24.00	11.00

Duty Cycle CF [dB]	0.10	**Included in Calculations of Corr'd Power & PPSD**

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5180	14.68	14.78	24.00	-9.22
Mid	5200	14.66	14.76	24.00	-9.24
High	5240	14.32	14.42	24.00	-9.58

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5180	1.40	1.50	11.00	-9.50
Mid	5200	2.97	3.07	11.00	-7.93
High	5240	1.34	1.44	11.00	-9.56

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10.2.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5180	24.76	-3.57	-3.57
Mid	5200	21.70	-3.57	-3.57
High	5240	23.51	-3.57	-3.57

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5180	24.00	24.00	11.00
Mid	5200	24.00	24.00	11.00
High	5240	24.00	24.00	11.00

Duty Cycle CF [dB]	0.11	**Included in Calculations of Corr'd Power & PPSD**

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5180	15.04	15.15	24.00	-8.85
Mid	5200	15.01	15.12	24.00	-8.88
High	5240	14.29	14.40	24.00	-9.60

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5180	0.82	0.93	11.00	-10.07
Mid	5200	0.61	0.72	11.00	-10.28
High	5240	0.56	0.67	11.00	-10.33

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10.2.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5190	38.49	-3.57	-3.57
High	5230	39.17	-3.57	-3.57

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5190	24.00	24.00	11.00
High	5230	24.00	24.00	11.00

Duty Cycle CF [dB]	0.31	Included in Calculations of Corr'd Power & PPSD

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5190	11.24	11.55	24.00	-12.45
High	5230	11.31	11.62	24.00	-12.38

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5190	-6.12	-5.81	11.00	-16.81
High	5230	-5.80	-5.50	11.00	-16.50

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10.2.4. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Middle	5210	77.23	-3.57	-3.57

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Middle	5210	24.00	24.00	11.00

Duty Cycle CF [dB]	0.67	**Included in Calculations of Corr'd Power & PPSD**

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Middle	5210	9.78	10.45	24.00	-13.55

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Middle	5210	-10.44	-9.76	11.00	-20.76

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10.2.5. 802.11a MODE IN THE 5.3 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5260	17.69	-2.01	-2.01
Mid	5300	18.04	-2.01	-2.01
High	5320	18.36	-2.01	-2.01

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5260	23.48	23.48	11.00
Mid	5300	23.56	23.56	11.00
High	5320	23.64	23.64	11.00

Duty Cycle CF [dB]	0.10	**Included in Calculations of Corr'd Power & PPSD**

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5260	9.08	9.18	23.48	-14.30
Mid	5300	9.91	10.01	23.56	-13.55
High	5320	9.86	9.96	23.64	-13.68

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5260	-2.38	-2.28	11.00	-13.28
Mid	5300	-1.42	-1.31	11.00	-12.31
High	5320	-1.63	-1.53	11.00	-12.53

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10.2.6. 802.11n HT20 MODE IN THE 5.3 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5260	18.71	-2.01	-2.01
Mid	5300	18.68	-2.01	-2.01
High	5320	18.76	-2.01	-2.01

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5260	23.72	23.72	11.00
Mid	5300	23.71	23.71	11.00
High	5320	23.73	23.73	11.00

Duty Cycle CF [dB]	0.11	**Included in Calculations of Corr'd Power & PPSD**

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5260	8.70	8.81	23.72	-14.91
Mid	5300	9.34	9.45	23.71	-14.26
High	5320	9.62	9.73	23.73	-14.00

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5260	-3.19	-3.09	11.00	-14.09
Mid	5300	-2.41	-2.31	11.00	-13.31
High	5320	-1.97	-1.86	11.00	-12.86

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10.2.7. 802.11n HT40 MODE IN THE 5.3 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5270	38.39	-2.01	-2.01
High	5310	38.35	-2.01	-2.01

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5270	24.00	24.00	11.00
High	5310	24.00	24.00	11.00

Duty Cycle CF [dB]	0.31	**Included in Calculations of Corr'd Power & PPSD**

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5270	7.17	7.48	24.00	-16.52
High	5310	7.75	8.06	24.00	-15.94

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5270	-8.95	-8.65	11.00	-19.65
High	5310	-8.01	-7.70	11.00	-18.70

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10.2.8. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Middle	5290	76.85	-2.01	-2.01

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	PPSD Limit [dBm]
Middle	5290	24.00	24.00	11.00

Duty Cycle CF [dB]	0.67	Included in Calculations of Corr'd Power & PPSD

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Middle	5290	6.53	7.20	24.00	-16.80

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Middle	5290	-12.76	-12.08	11.00	-23.08

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10.2.9. 802.11a MODE IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5500	34.15	-1.41	-1.41
Mid	5580	34.09	-1.41	-1.41
High	5700	32.23	-1.41	-1.41

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5500	24.00	24.00	11.00
Mid	5580	24.00	24.00	11.00
High	5700	24.00	24.00	11.00

Duty Cycle CF [dB]	0.10	**Included in Calculations of Corr'd Power & PPSD**

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5500	13.05	13.15	24.00	-10.85
Mid	5580	12.41	12.51	24.00	-11.49
High	5700	12.65	12.75	24.00	-11.25

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5500	4.60	4.70	11.00	-6.30
Mid	5580	5.01	5.11	11.00	-5.89
High	5700	4.30	4.40	11.00	-6.60

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10.2.10. 802.11n HT20 MODE IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5500	33.78	-1.41	-1.41
Mid	5580	33.62	-1.41	-1.41
High	5700	29.73	-1.41	-1.41

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5500	24.00	24.00	11.00
Mid	5580	24.00	24.00	11.00
High	5700	24.00	24.00	11.00

Duty Cycle CF [dB]	0.11	**Included in Calculations of Corr'd Power & PPSD**

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5500	12.72	12.83	24.00	-11.17
Mid	5580	12.05	12.16	24.00	-11.84
High	5700	12.01	12.12	24.00	-11.88

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5500	3.58	3.69	11.00	-7.31
Mid	5580	2.77	2.87	11.00	-8.13
High	5700	3.69	3.79	11.00	-7.21

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10.2.11. 802.11n HT40 MODE IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5510	75.46	-1.41	-1.41
Mid	5590	44.17	-1.41	-1.41
High	5670	39.22	-1.41	-1.41

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5510	24.00	24.00	11.00
Mid	5590	24.00	24.00	11.00
High	5670	24.00	24.00	11.00

Duty Cycle CF [dB]	0.31	**Included in Calculations of Corr'd Power & PPSD**

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5510	9.83	10.14	24.00	-13.86
Mid	5590	9.28	9.59	24.00	-14.41
High	5670	9.09	9.40	24.00	-14.60

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5510	-3.40	-3.09	11.00	-14.09
Mid	5590	-3.55	-3.24	11.00	-14.24
High	5670	-3.38	-3.07	11.00	-14.07

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10.2.12. 802.11ac VHT80 MODE IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5530	77.07	-1.41	-1.41
High	5610	76.88	-1.41	-1.41

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5530	24.00	24.00	11.00
High	5610	24.00	24.00	11.00

Duty Cycle CF [dB]	0.67	**Included in Calculations of Corr'd Power & PPSD**

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5530	8.18	8.85	24.00	-15.15
High	5610	7.48	8.15	24.00	-15.85

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5530	-10.48	-9.81	11.00	-20.81
High	5610	-10.01	-9.34	11.00	-20.34

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10.2.13. 802.11a MODE IN THE 5.8 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5745	35.05	-1.88	-1.88
Mid	5785	32.82	-1.88	-1.88
High	5825	31.28	-1.88	-1.88

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm/500kHz]
Low	5745	30.00	30.00	30.00
Mid	5785	30.00	30.00	30.00
High	5825	30.00	30.00	30.00

Duty Cycle CF [dB]	0.10	**Included in Calculations of Corr'd Power & PPSD**

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5745	15.30	15.40	30.00	-14.60
Mid	5785	14.81	14.91	30.00	-15.09
High	5825	14.97	15.07	30.00	-14.93

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm/500kHz]	Total Corr'd PPSD [dBm/500kHz]	PPSD Limit [dBm/500kHz]	PPSD Margin [dB]
Low	5745	2.68	2.78	30.00	-27.22
Mid	5785	1.63	1.73	30.00	-28.27
High	5825	1.14	1.24	30.00	-28.76

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10.2.14. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5745	34.65	-1.88	-1.88
Mid	5785	33.36	-1.88	-1.88
High	5825	30.72	-1.88	-1.88

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm/500kHz]
Low	5745	30.00	30.00	30.00
Mid	5785	30.00	30.00	30.00
High	5825	30.00	30.00	30.00

Duty Cycle CF [dB]	0.11	**Included in Calculations of Corr'd Power & PPSD**

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5745	14.59	14.70	30.00	-15.30
Mid	5785	14.10	14.21	30.00	-15.79
High	5825	14.21	14.32	30.00	-15.68

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm/500kHz]	Total Corr'd PPSD [dBm/500kHz]	PPSD Limit [dBm/500kHz]	PPSD Margin [dB]
Low	5745	2.75	2.86	30.00	-27.14
Mid	5785	1.28	1.38	30.00	-28.62
High	5825	1.06	1.17	30.00	-28.83

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10.2.15. 802.11n HT40 MODE IN THE 5.8 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5755	74.30	-1.88	-1.88
High	5795	71.10	-1.88	-1.88

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm/500kHz]
Low	5755	30.00	30.00	30.00
High	5795	30.00	30.00	30.00

Duty Cycle CF [dB]	0.31	**Included in Calculations of Corr'd Power & PPSD**

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5755	13.39	13.70	30.00	-16.30
High	5795	13.57	13.88	30.00	-16.12

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm/500kHz]	Total Corr'd PPSD [dBm/500kHz]	PPSD Limit [dBm/500kHz]	PPSD Margin [dB]
Low	5755	-1.89	-1.59	30.00	-31.59
High	5795	-2.75	-2.44	30.00	-32.44

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10.2.16. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Middle	5775	76.89	-1.88	-1.88

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Middle	5775	24.00	24.00	30.00

Duty Cycle CF [dB]	0.67	Included in Calculations of Corr'd Power & PPSD

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Middle	5775	12.03	12.70	24.00	-11.30

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Middle	5775	-6.71	-6.03	30.00	-36.03

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10.2.17. 802.11a MODE IN THE Straddle Channel

Bandwidth and Antenna Gain

Portion	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
UNII-2C	5720	18.38	-1.41	-1.41
UNII-3	5720	8.38	-1.41	-1.41
Whole	5720	26.75	-1.41	-1.41

Limits

Portion	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
UNII-2C	5720	23.64	23.64	11.00
UNII-3	5720	20.23	20.23	11.00
Whole	5720	24.00	24.00	11.00

Duty Cycle CF [dB]	0.10	**Included in Calculations of Corr'd Power & PPSD**

Output Power Results

Portion	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
UNII-2C	5720	12.48	12.58	23.64	-11.06
UNII-3	5720	3.50	3.60	20.23	-16.63
Whole	5720	13.00	13.10	24.00	-10.90

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
144	5720	4.20	4.30	11.00	-6.70

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10.2.18. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Bandwidth and Antenna Gain

Portion	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
UNII-2C	5720	19.33	-1.41	-1.41
UNII-3	5720	9.33	-1.41	-1.41
Whole	5720	28.66	-1.41	-1.41

Limits

Portion	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
UNII-2C	5720	23.86	23.86	11.00
UNII-3	5720	20.70	20.70	11.00
Whole	5720	24.00	24.00	11.00

Duty Cycle CF [dB]	0.11	**Included in Calculations of Corr'd Power & PPSD**

Output Power Results

Portion	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
UNII-2C	5720	11.10	11.21	23.86	-12.66
UNII-3	5720	2.27	2.38	20.70	-18.32
Whole	5720	11.63	11.74	24.00	-12.26

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
144	5720	2.87	2.97	11.00	-8.03

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10.2.19. 802.11n HT40 MODE IN THE 5.8 GHz BAND

Bandwidth and Antenna Gain

Portion	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
UNII-2C	5710	34.55	-1.41	-1.41
UNII-3	5710	4.55	-1.41	-1.41
Whole	5710	39.09	-1.41	-1.41

Limits

Portion	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
UNII-2C	5710	24.00	24.00	11.00
UNII-3	5710	17.58	17.58	11.00
Whole	5710	24.00	24.00	11.00

Duty Cycle CF [dB]	0.31	**Included in Calculations of Corr'd Power & PPSD**

Output Power Results

Portion	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
UNII-2C	5710	8.86	9.16	24.00	-14.84
UNII-3	5710	-5.90	-5.59	17.58	-23.17
Whole	5710	9.00	9.30	24.00	-14.70

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
142	5710	-4.21	-3.91	11.00	-14.91

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10.2.20. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

Bandwidth and Antenna Gain

Portion	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
UNII-2C	5690	73.44	-1.41	-1.41
UNII-3	5690	3.44	-1.41	-1.41
Whole	5690	76.89	-1.41	-1.41

Limits

Portion	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
UNII-2C	5690	24.00	24.00	11.00
UNII-3	5690	16.37	19.29	11.00
Whole	5690	24.00	24.00	11.00

Duty Cycle CF [dB]	0.67	**Included in Calculations of Corr'd Power & PPSD**

Output Power Results

Portion	Frequency [MHz]	Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
UNII-2C	5690	7.60	8.27	24.00	-15.73
UNII-3	5690	-15.86	-15.18	19.29	-34.47
Whole	5690	7.62	8.29	24.00	-15.71

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
138	5690	-8.38	-7.71	11.00	-18.71

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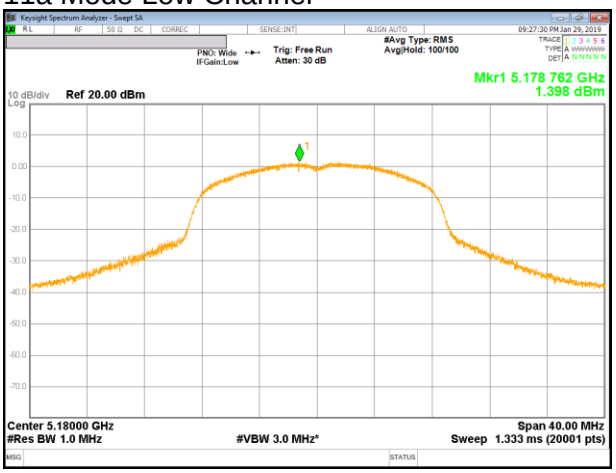
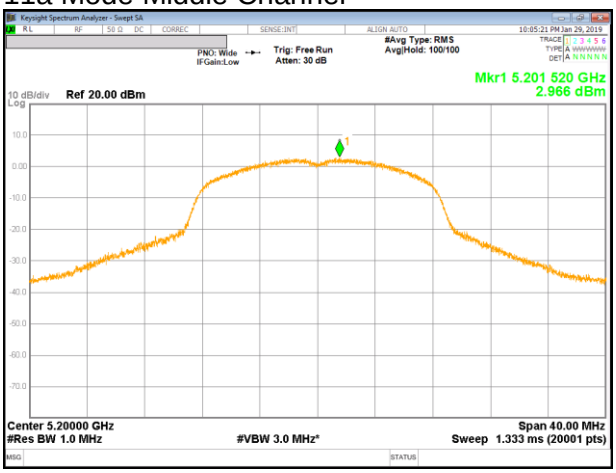
10.2.21. OUTPUT POWER AND PPSD PLOTS

UNII 5.2 GHz IEEE 802.11a mode

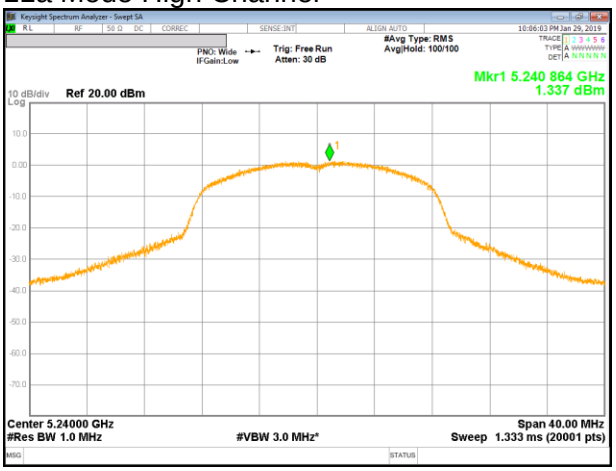
11a Mode Low Channel



11a Mode Middle Channel



11a Mode High Channel



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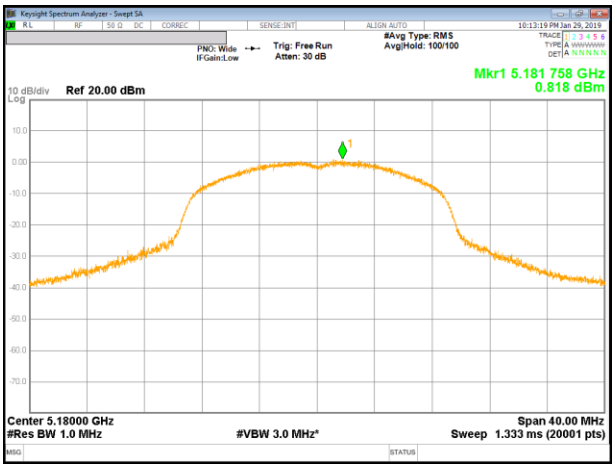
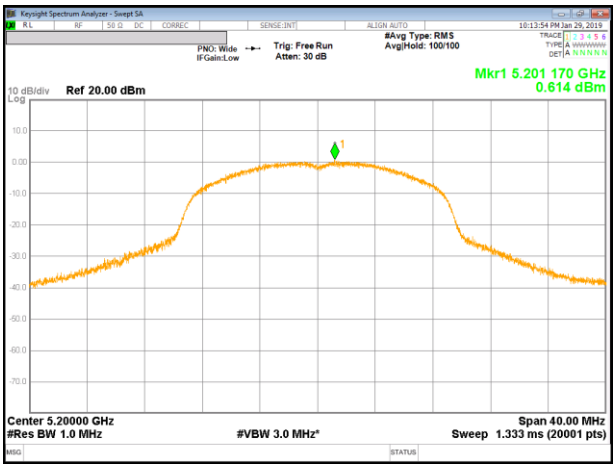
UNII 5.2 GHz IEEE 802.11n HT20 mode

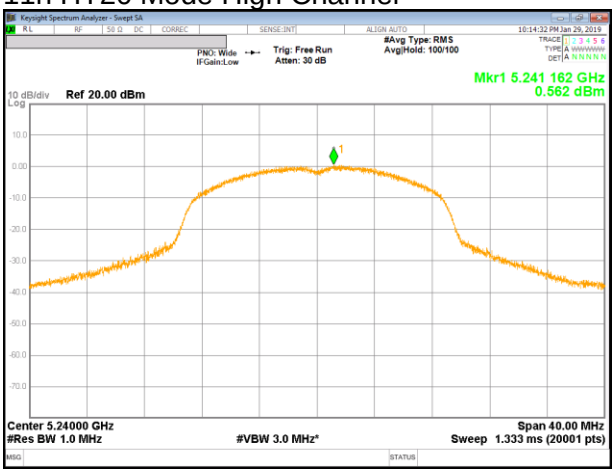
11n HT20 Mode Low Channel



11n HT20 Mode Middle Channel



11n HT20 Mode High Channel



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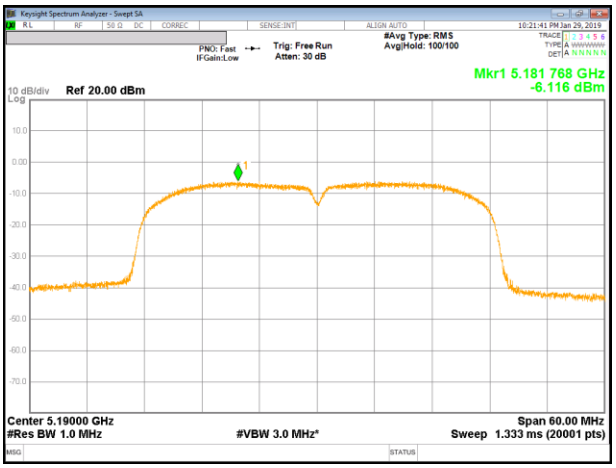
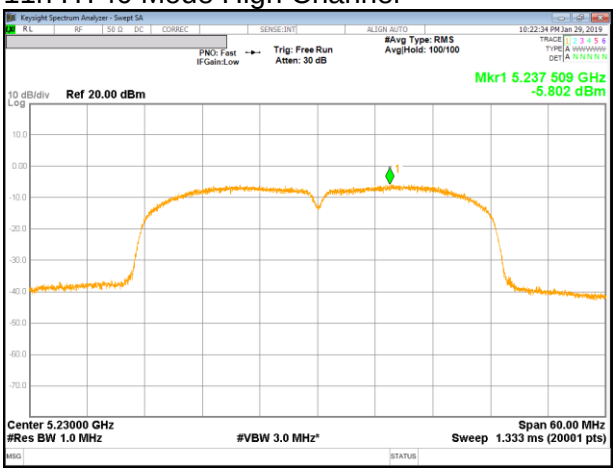
UNII 5.2 GHz IEEE 802.11n HT40 mode

11n HT40 Mode Low Channel

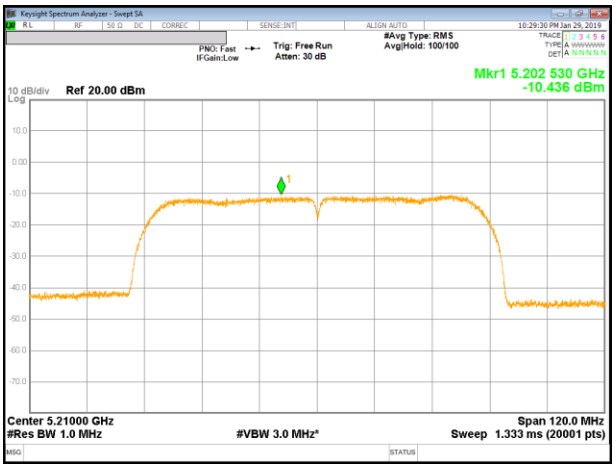


11n HT40 Mode High Channel



UNII 5.2 GHz IEEE 802.11ac VHT80 mode

11ac VHT80 Mode Middle Channel



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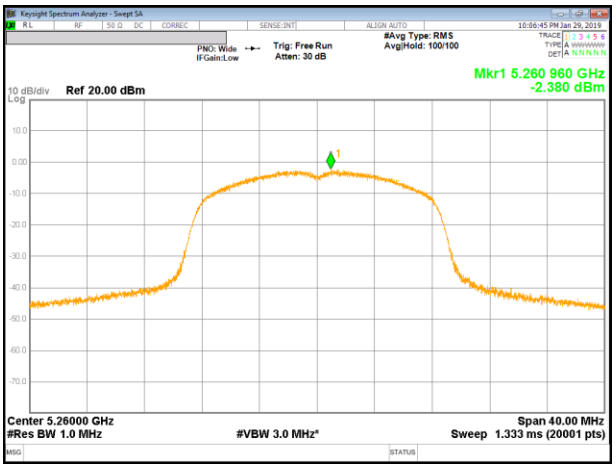
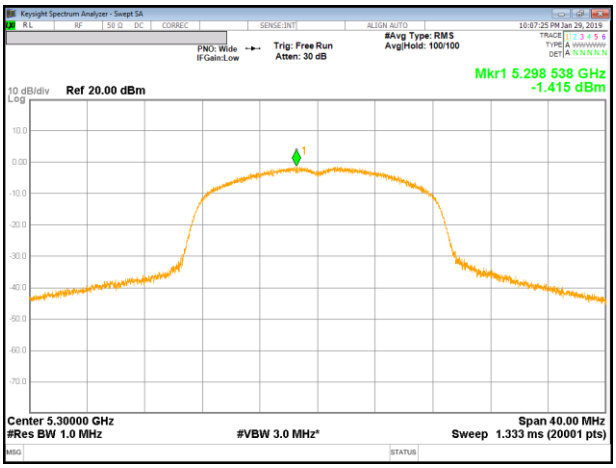
UNII 5.3 GHz IEEE 802.11a mode

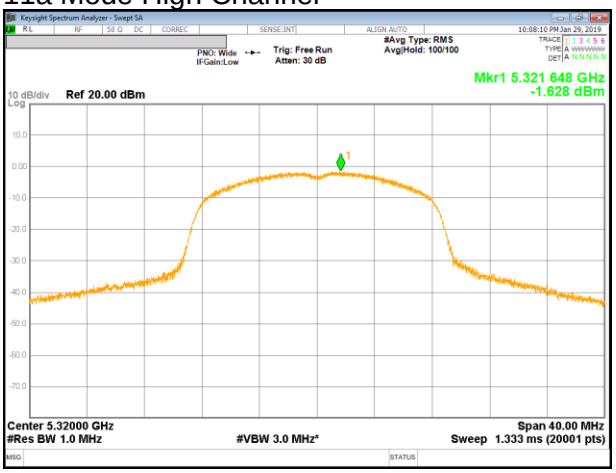
11a Mode Low Channel



11a Mode Middle Channel



11a Mode High Channel



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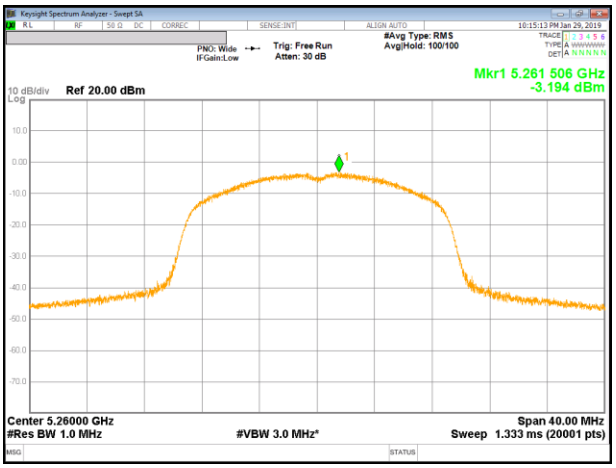
UNII 5.3 GHz IEEE 802.11n HT20 mode

11n HT20 Mode Low Channel



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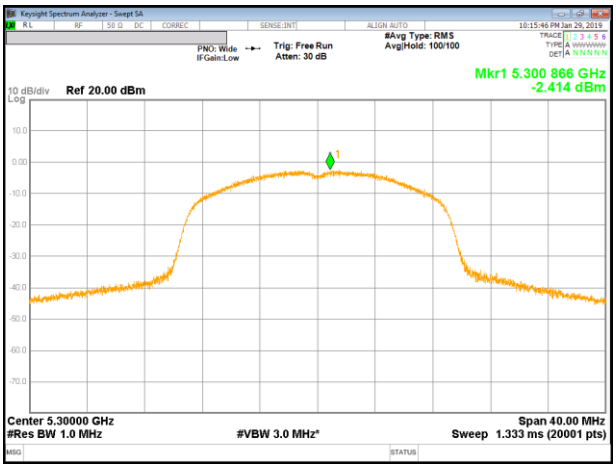

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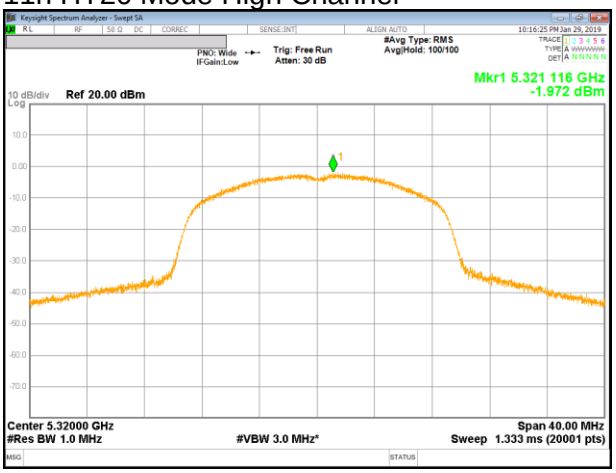

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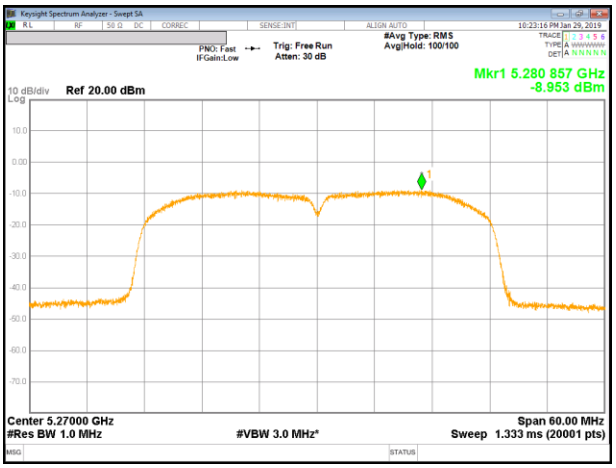
UNII 5.3 GHz IEEE 802.11n HT40 mode

11n HT40 Mode Low Channel



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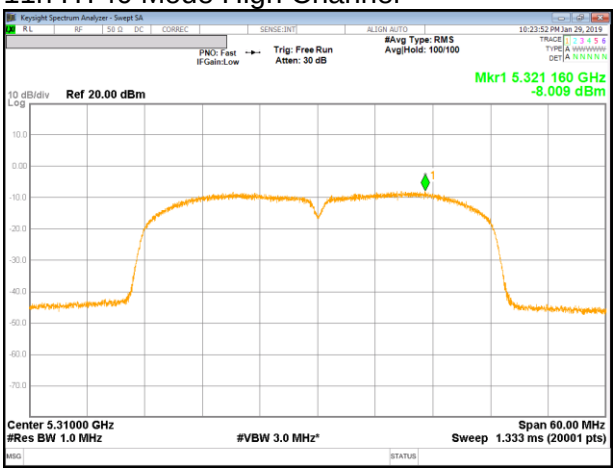
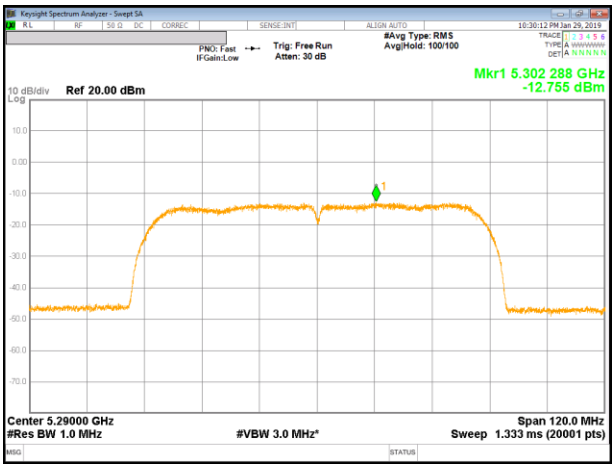


UNII 5.3 GHz IEEE 802.11ac VHT80 mode

11ac VHT80 Mode Middle Channel



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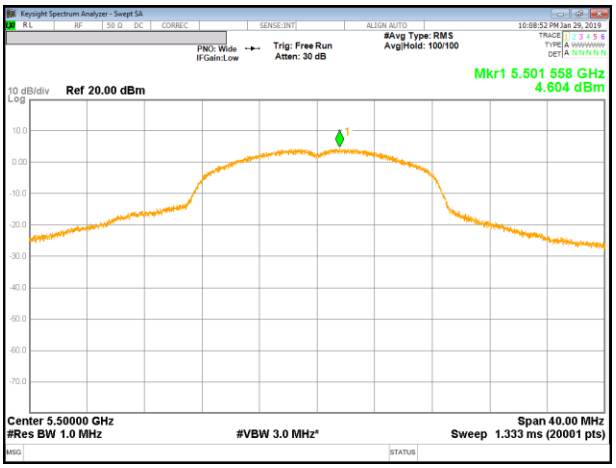
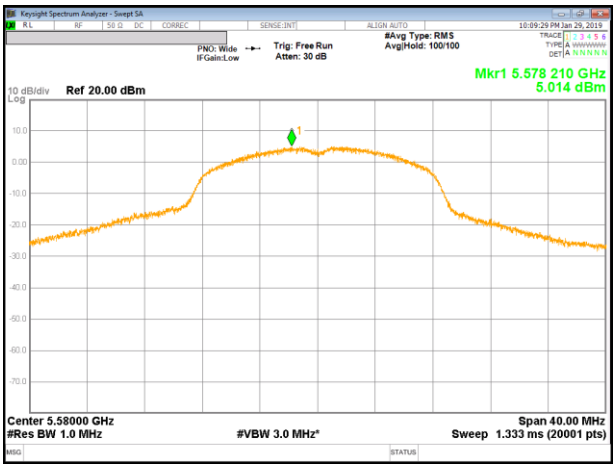
UNII 5.5 GHz IEEE 802.11a mode

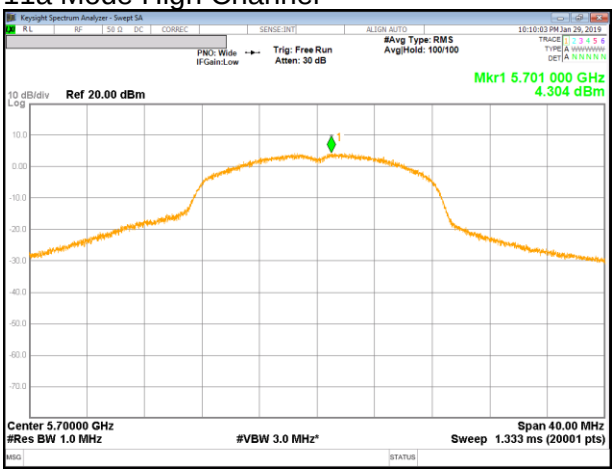
11a Mode Low Channel



11a Mode Middle Channel



11a Mode High Channel



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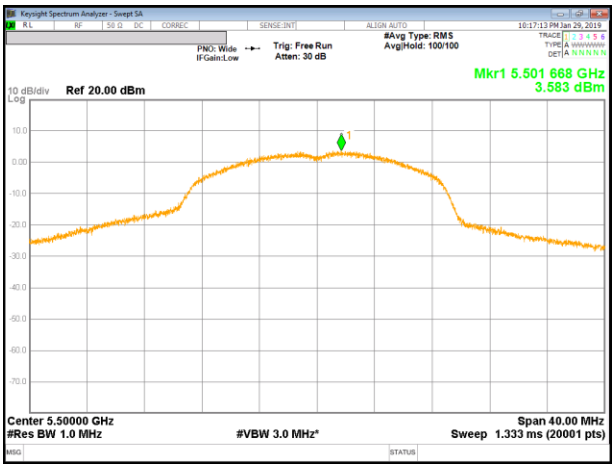
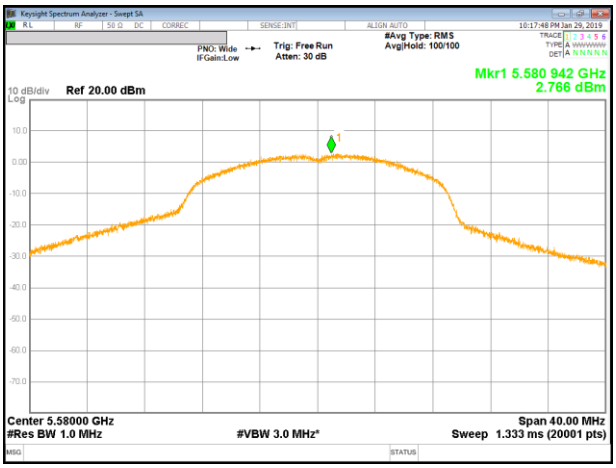
UNII 5.5 GHz IEEE 802.11n HT20 mode

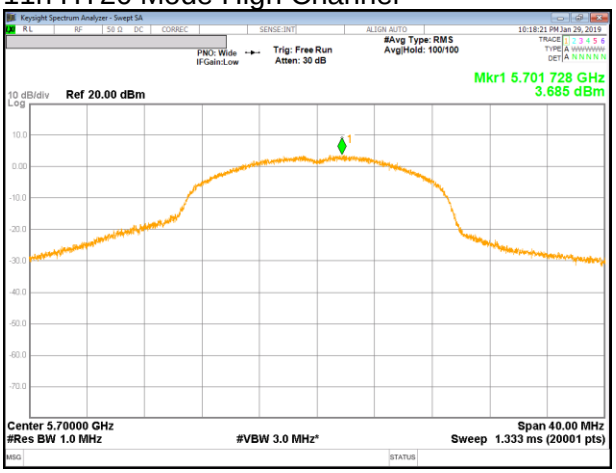
11n HT20 Mode Low Channel



11n HT20 Mode Middle Channel



11n HT20 Mode High Channel



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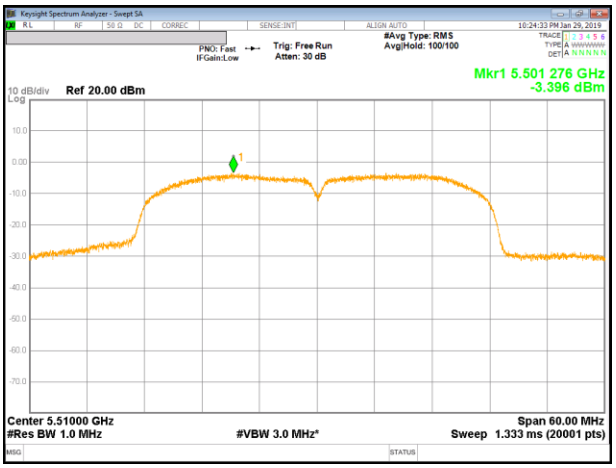
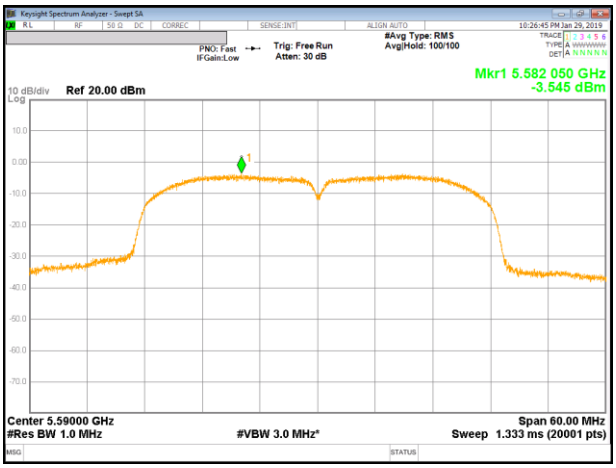
UNII 5.5 GHz IEEE 802.11n HT40 mode

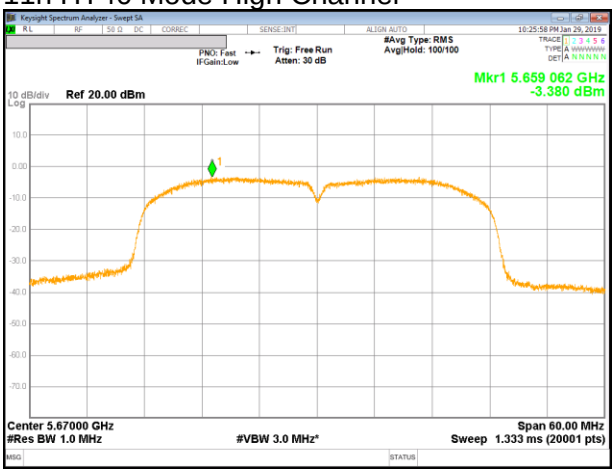
11n HT40 Mode Low Channel



11n HT40 Mode Middle Channel



11n HT40 Mode High Channel



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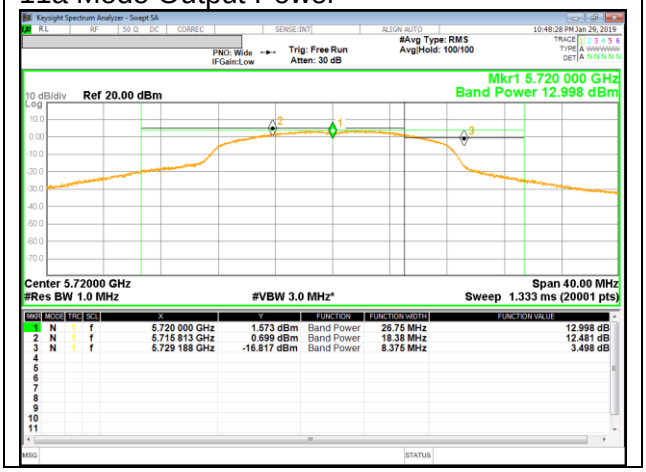
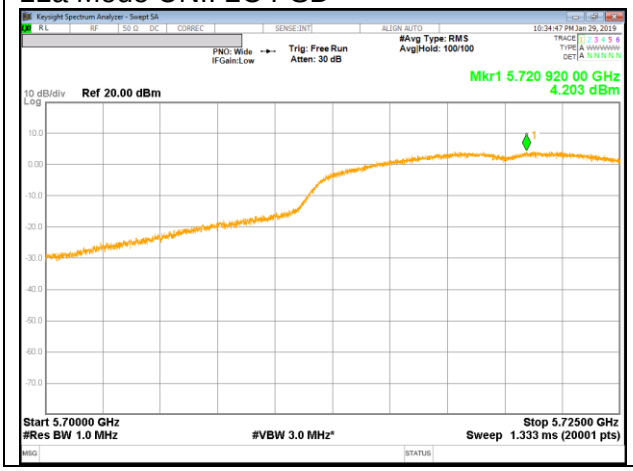
UNII Straddle Ch. IEEE 802.11a mode Ourput Power and PSD

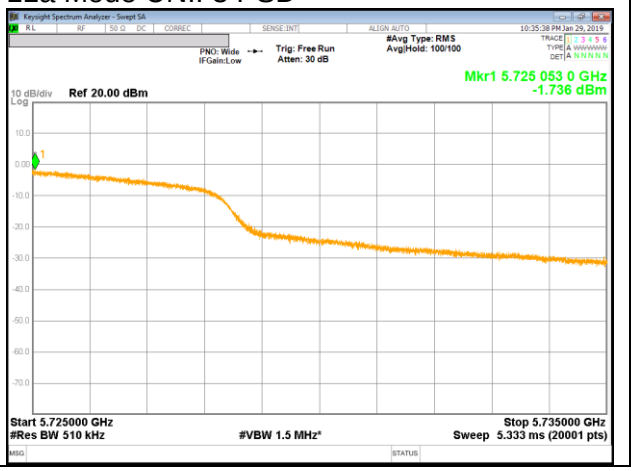
11a Mode Output Power



11a Mode UNII 2C PSD



11a Mode UNII 3 PSD



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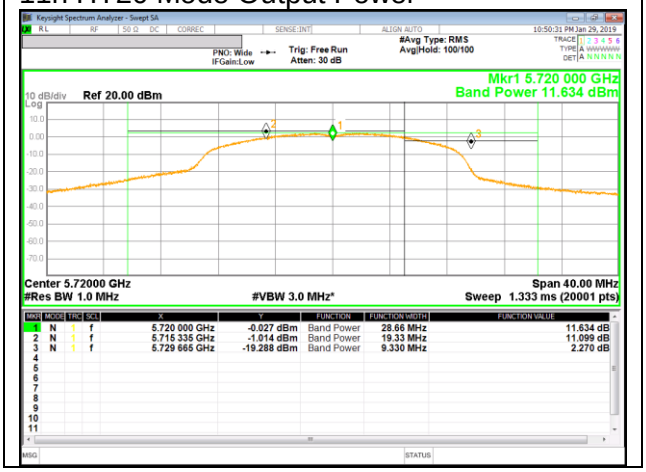
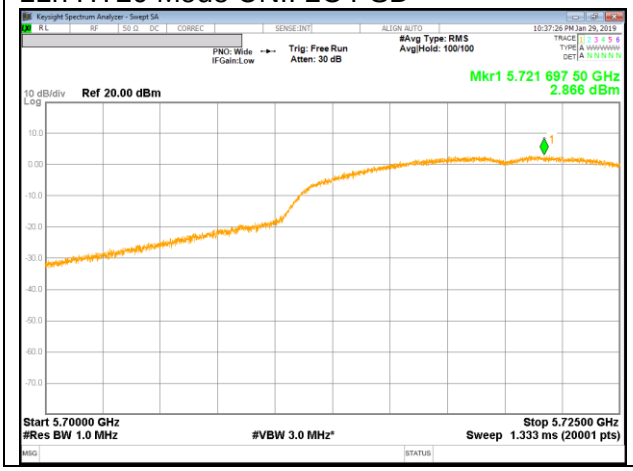
UNII Straddle Ch. IEEE 802.11n HT20 mode Ourput Power and PSD

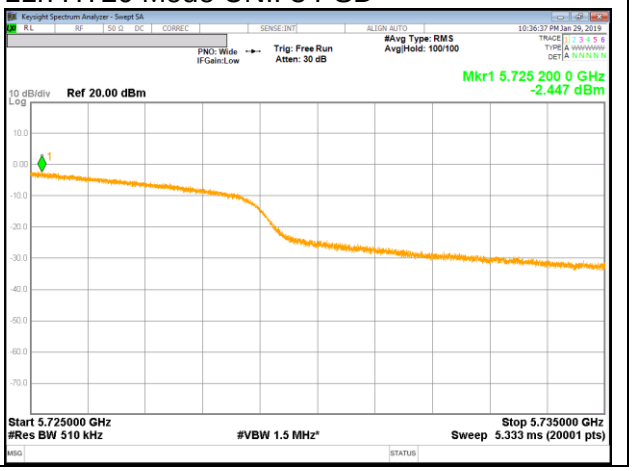
11n HT20 Mode Output Power



11n HT20 Mode UNII 2C PSD



11n HT20 Mode UNII 3 PSD



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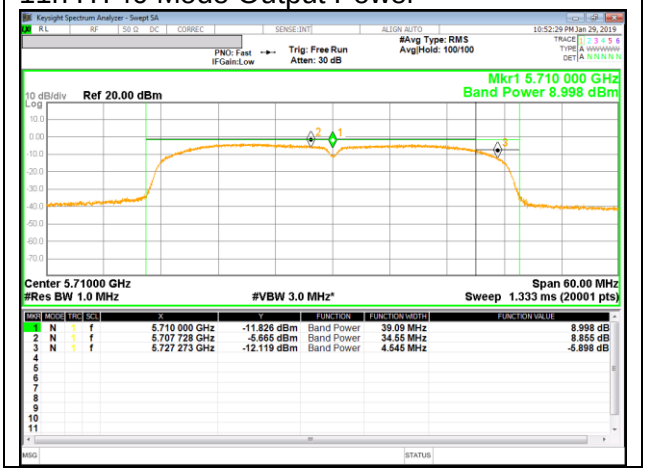
UNII Straddle Ch. IEEE 802.11n HT40 mode Ourput Power and PSD

11n HT40 Mode Output Power



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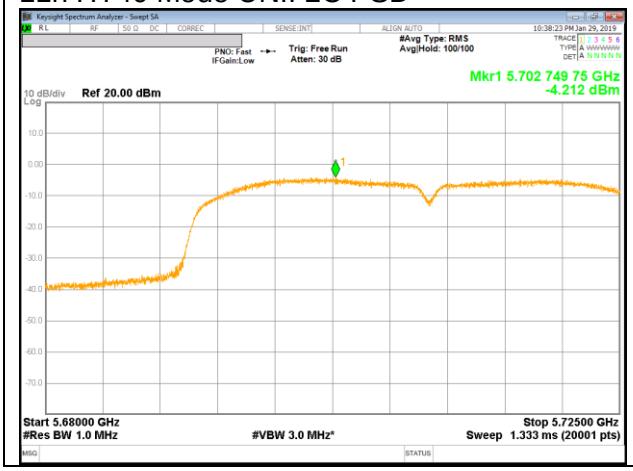

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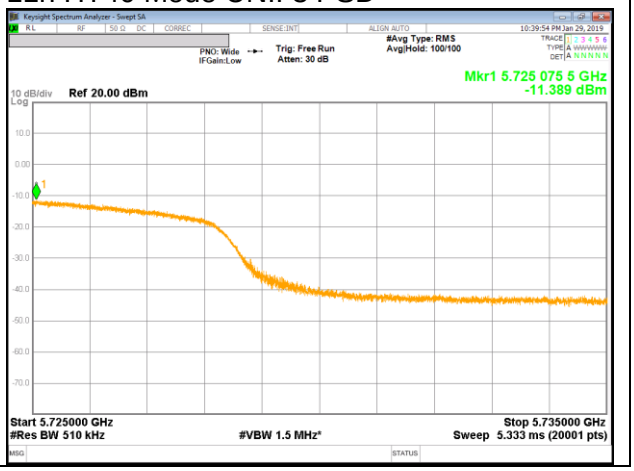

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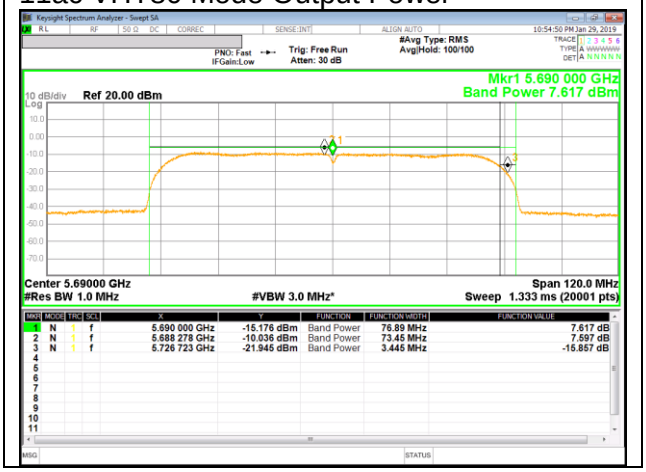
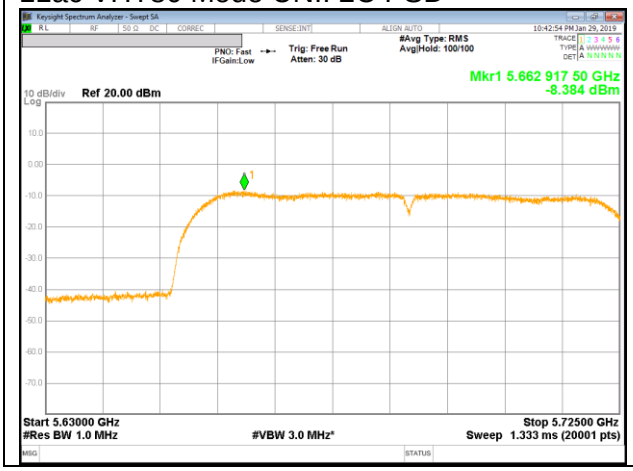
UNII Straddle Ch. IEEE 802.11ac VHT80 mode Ourput Power and PSD

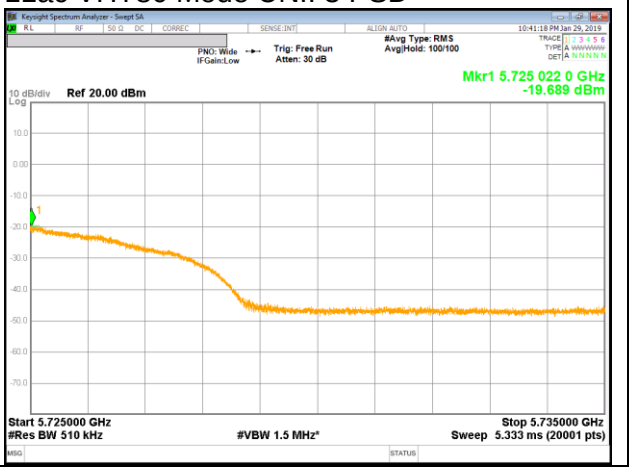
11ac VHT80 Mode Output Power



11ac VHT80 Mode UNII 2C PSD



11ac VHT80 Mode UNII 3 PSD



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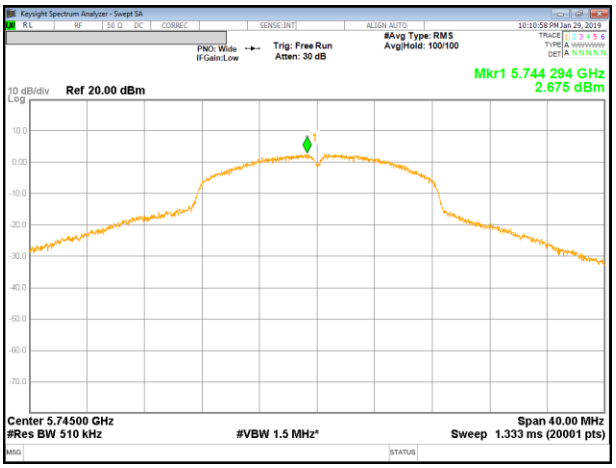
UNII 5.8 GHz IEEE 802.11a mode

11a Mode Low Channel



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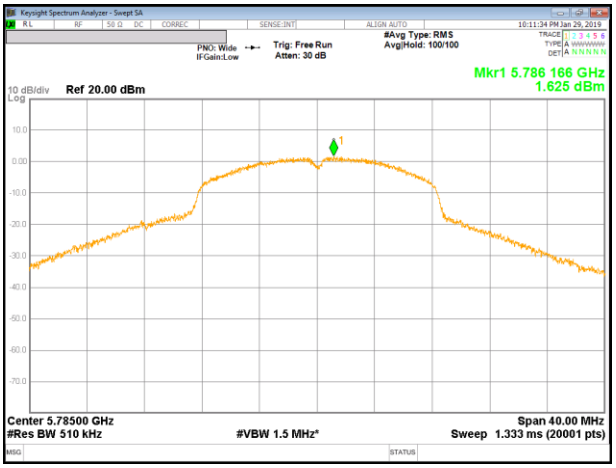
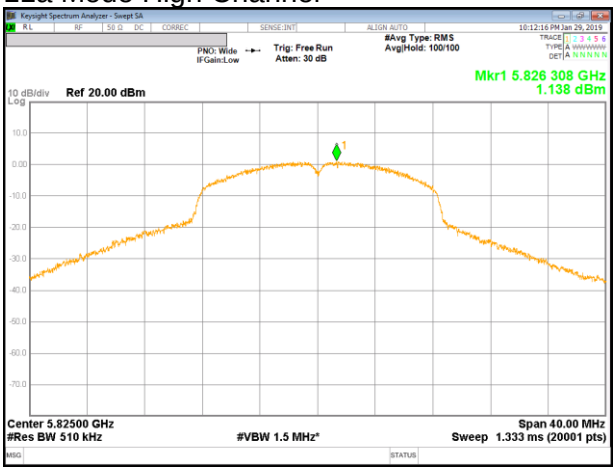


11a Mode High Channel



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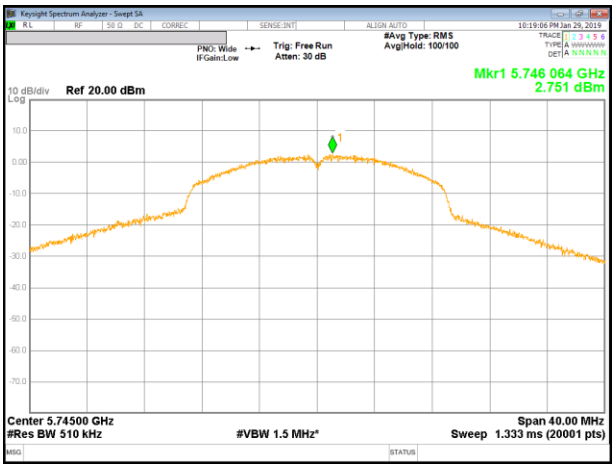
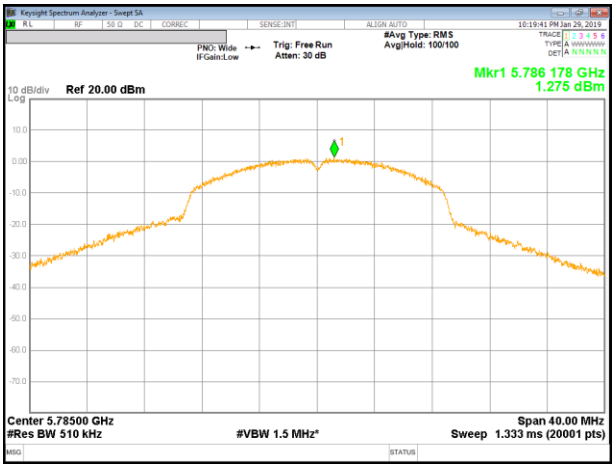
UNII 5.8 GHz IEEE 802.11n HT20 mode

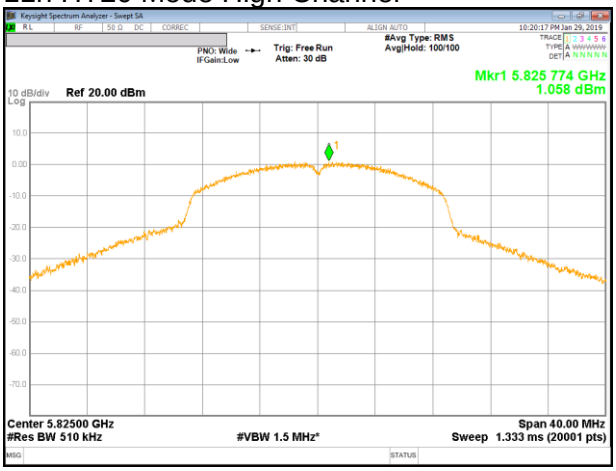
11n HT20 Mode Low Channel



11n HT20 Mode Middle Channel



11n HT20 Mode High Channel



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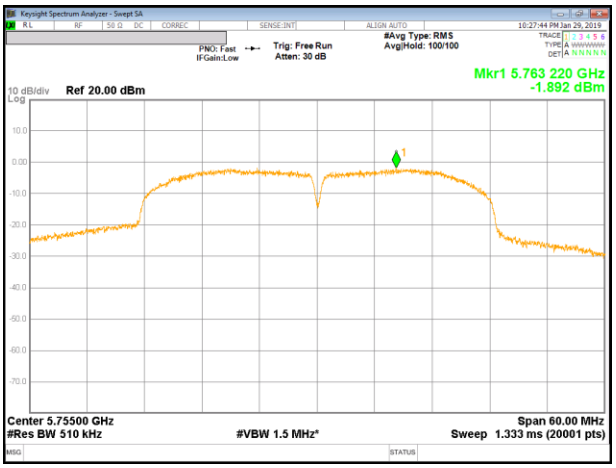
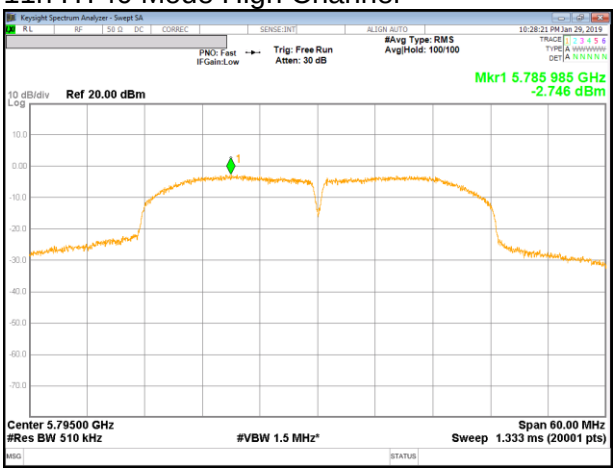
UNII 5.8 GHz IEEE 802.11n HT40 mode

11n HT40 Mode Low Channel

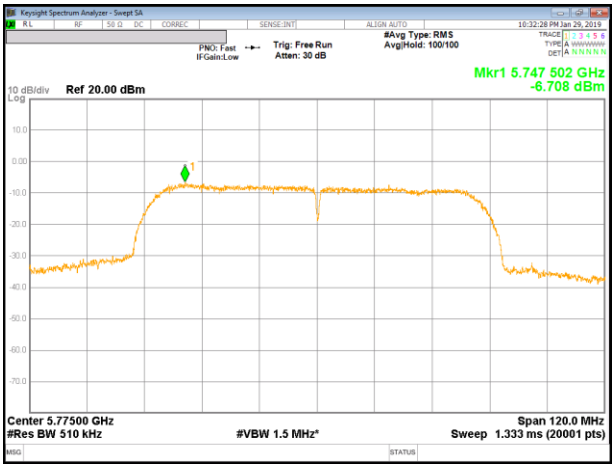


11n HT40 Mode High Channel



UNII 5.8 GHz IEEE 802.11ac VHT80 mode

11ac VHT80 Mode Low Channel



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11. TRANSMITTER ABOVE 1 GHz

LIMITS

FCC §15.205 and §15.209

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

FCC §15.407 (b)

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(4) For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth

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in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
(7) The provisions of §15.205 apply to intentional radiators operating under this section.
(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

Note

- Limit translation to field strength level (FCC §15.407)

E[dBuV/m] = EIRP[dBm] + 95.2 = -27dBm + 95.2 = 68.2dBuV/m
E[dBuV/m] = EIRP[dBm] + 95.2 = -17dBm + 95.2 = 78.2dBuV/m

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 150 cm for above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Reference to KDB 789033 D02 v02r01 UNII part G) 6) c) Method AD:
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor to the reading offset for average measurements.
Pre-scans to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

The spectrum from 1 GHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.
(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

Note : Emission was pre-scanned from 9KHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).
Per FCC part 15.31(o), test results were not reported.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.

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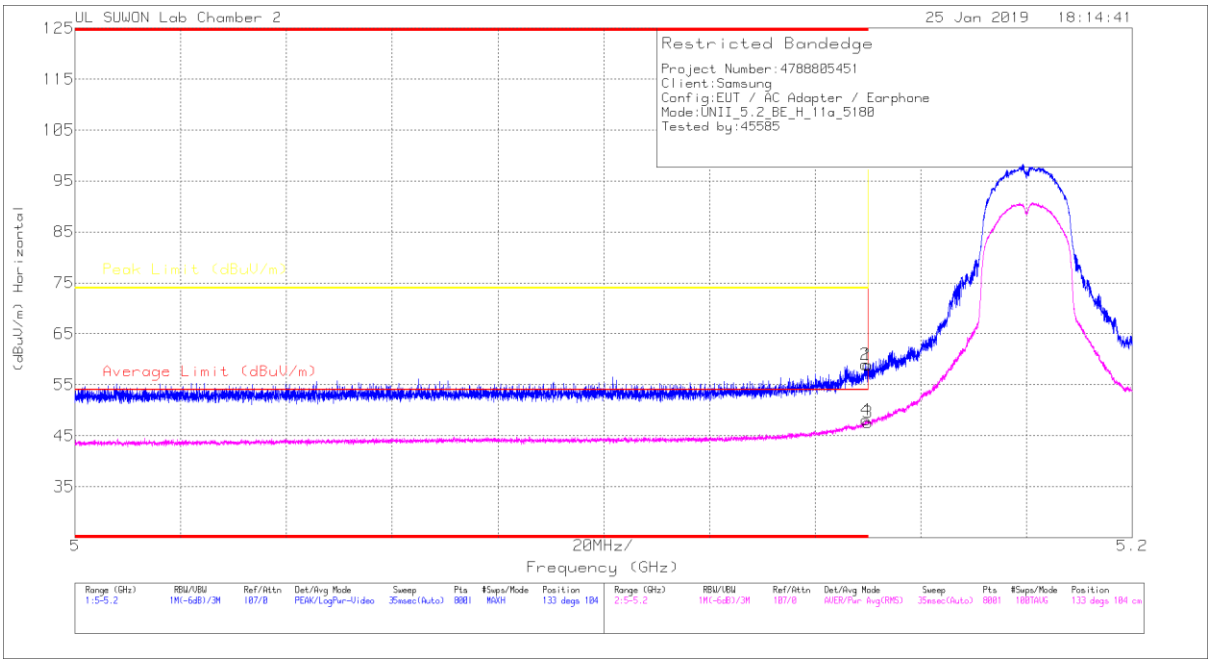
11.1. 5.2 GHz

11.1.1. TX Above 1GHz 802.11a MODE IN THE 5.2GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.15	42.75	Pk	34.3	-18.2	0	58.85	-	-	74	-15.15	133	104	H
2	* 5.15	42.85	Pk	34.3	-18.2	0	58.95	-	-	74	-15.05	133	104	H
3	5.15	30.53	RMS	34.3	-17.3	.1	47.63	54	-6.37	-	-	133	104	H
4	* 5.15	30.97	RMS	34.3	-17.3	.1	48.07	54	-5.93	-	-	133	104	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

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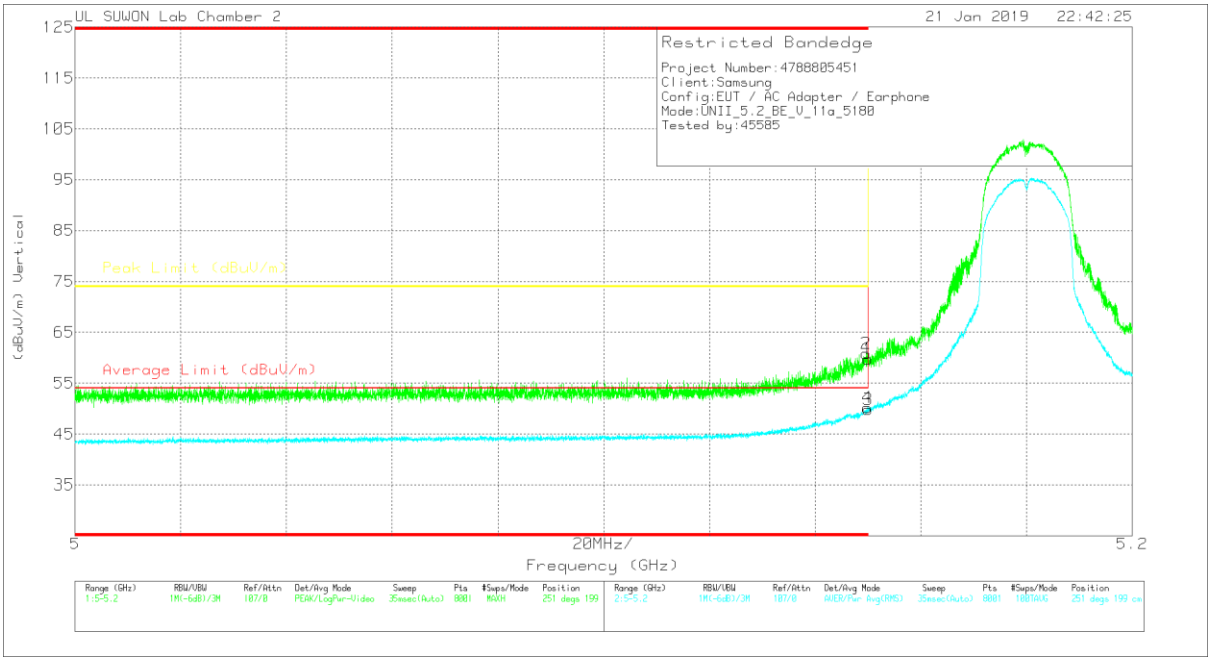
VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.15	43.65	Pk	34.3	-18.2	0	59.75	-	-	74	-14.25	251	199	V
2	* 5.15	44.73	Pk	34.3	-18.2	0	60.83	-	-	74	-13.17	251	199	V
3	5.15	32.75	RMS	34.3	-17.3	.1	49.85	54	-4.15	-	-	251	199	V
4	* 5.15	33.09	RMS	34.3	-17.3	.1	50.19	54	-3.81	-	-	251	199	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

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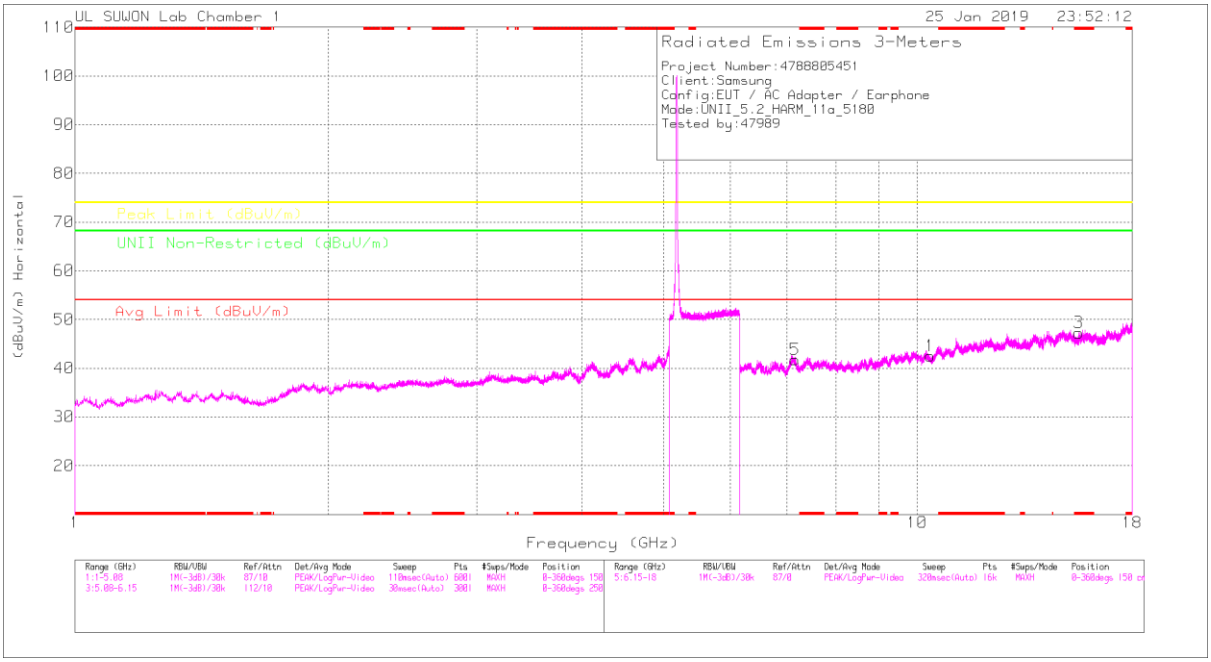
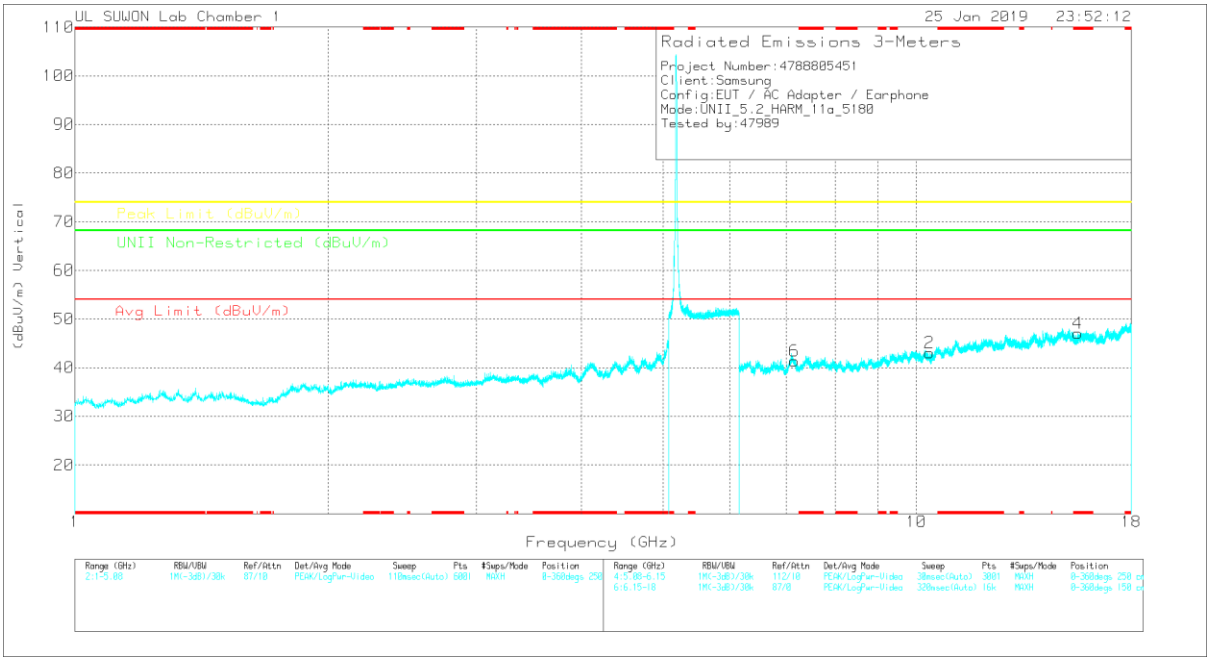
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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LOW CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	6GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	10.363	25.97	PK	37.6	-21	0	42.57	-	-	-	-	68.2	-25.63	0-360	150	H
3	* 15.537	27.05	PK	39.9	-19.7	0	47.25	-	-	74	-26.75	-	-	0-360	250	H
5	7.161	30.41	PK	36	-24.7	0	41.71	-	-	-	-	68.2	-26.49	0-360	250	H
2	10.36	26.49	PK	37.5	-21	0	42.99	-	-	-	-	68.2	-25.21	0-360	250	V
4	* 15.541	26.82	PK	39.9	-19.7	0	47.02	-	-	74	-26.98	-	-	0-360	250	V
6	7.161	30.02	PK	36	-24.7	0	41.32	-	-	-	-	68.2	-26.88	0-360	250	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK – Peak Detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

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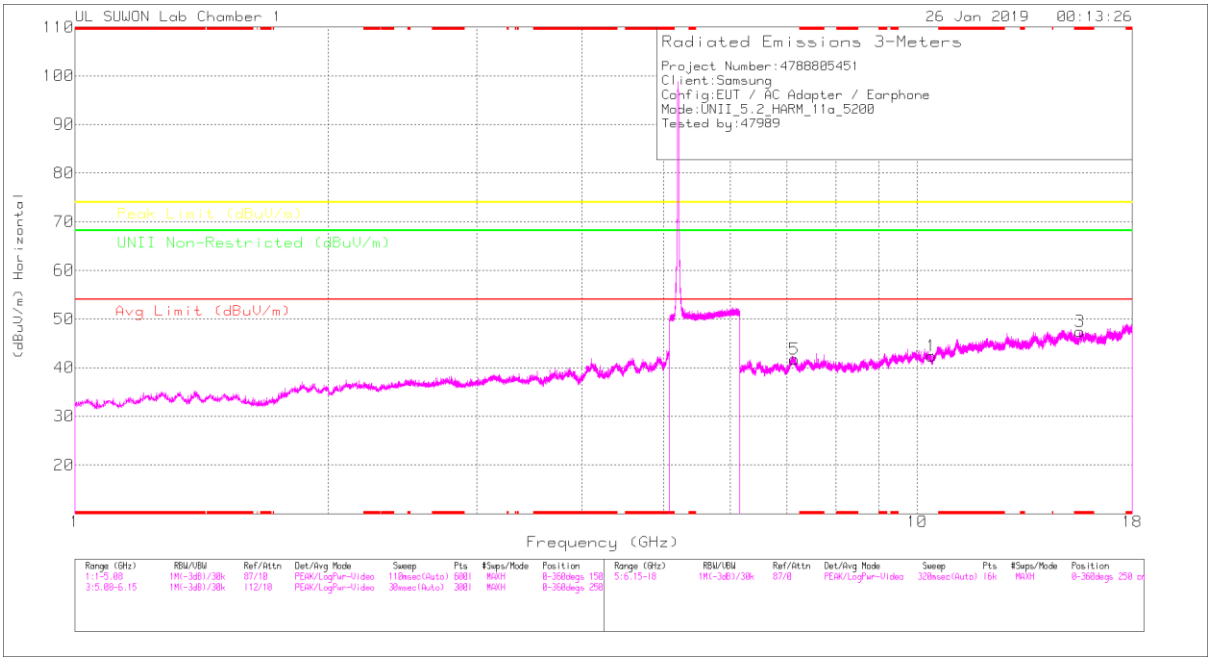
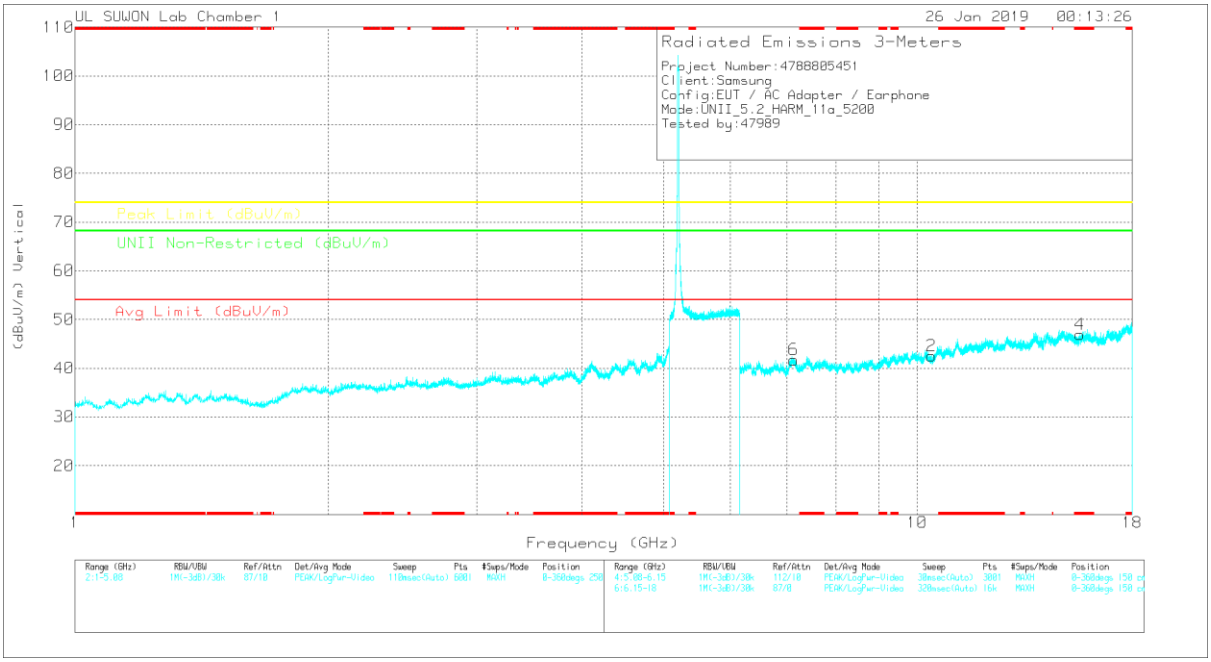
MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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MID CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	6GHz_HP(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	10.401	25.83	PK	37.6	-21	0	42.43	-	-	-	-	68.2	-25.77	0-360	250	H
3	* 15.605	27.26	PK	40	-19.8	0	47.46	-	-	74	-26.54	-	-	0-360	150	H
5	7.143	30.09	PK	36	-24.3	0	41.79	-	-	-	-	68.2	-26.41	0-360	250	H
2	10.399	25.78	PK	37.6	-20.9	0	42.48	-	-	-	-	68.2	-25.72	0-360	250	V
4	* 15.603	26.74	PK	40	-19.8	0	46.94	-	-	74	-27.06	-	-	0-360	250	V
6	7.141	29.89	PK	36	-24.2	0	41.69	-	-	-	-	68.2	-26.51	0-360	250	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK – Peak Detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

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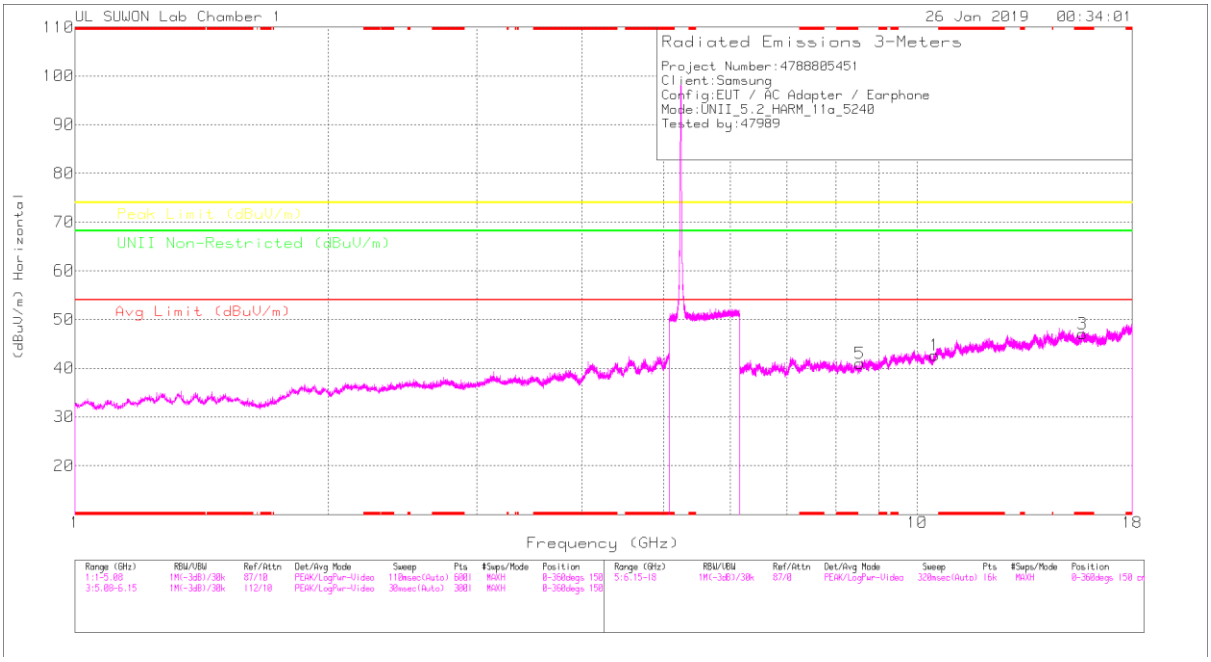
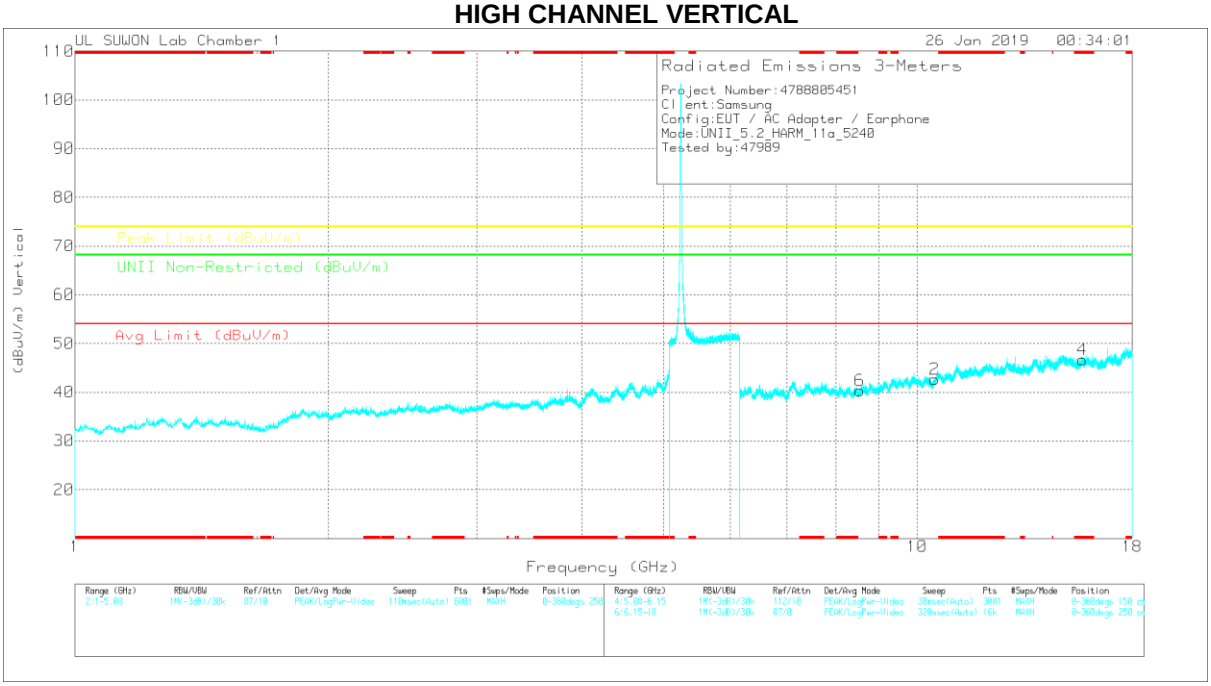
HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	6GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	10.482	25.8	PK	37.7	-20.8	0	42.7	-	-	-	-	68.2	-25.5	0-360	250	H
3	* 15.713	26.44	PK	40.2	-19.6	0	47.04	-	-	74	-26.96	-	-	0-360	150	H
5	8.544	27.77	PK	36.1	-22.9	0	40.97	-	-	-	-	68.2	-27.23	0-360	150	H
2	10.485	25.9	PK	37.7	-20.9	0	42.7	-	-	-	-	68.2	-25.5	0-360	250	V
4	* 15.717	26.07	PK	40.2	-19.6	0	46.67	-	-	74	-27.33	-	-	0-360	250	V
6	8.544	27.09	PK	36.1	-22.9	0	40.29	-	-	-	-	68.2	-27.91	0-360	150	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK – Peak Detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

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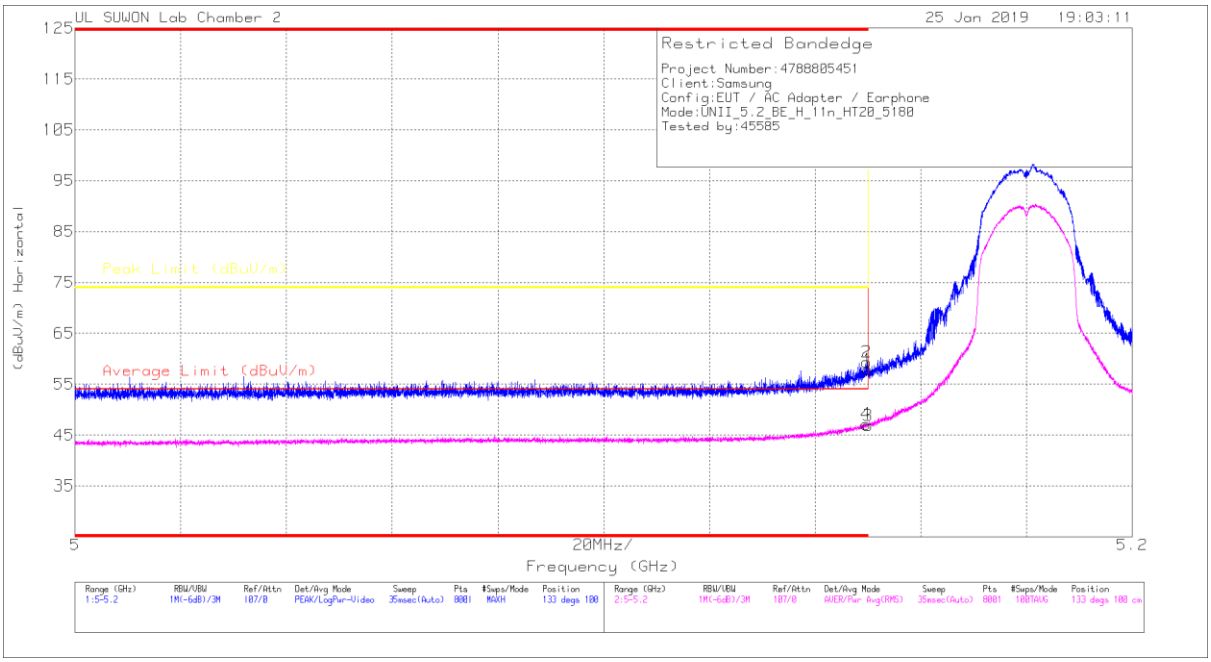
11.1.2.TX Above 1GHz 802.11n HT20 MODE IN THE 5.2GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.15	41.73	Pk	34.3	-18.2	0	57.83	-	-	74	-16.17	133	100	H
2	* 5.15	43.29	Pk	34.3	-18.2	0	59.39	-	-	74	-14.61	133	100	H
3	5.15	29.8	RMS	34.3	-17.3	.11	46.91	54	-7.09	-	-	133	100	H
4	* 5.15	30.06	RMS	34.3	-17.3	.11	47.17	54	-6.83	-	-	133	100	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

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