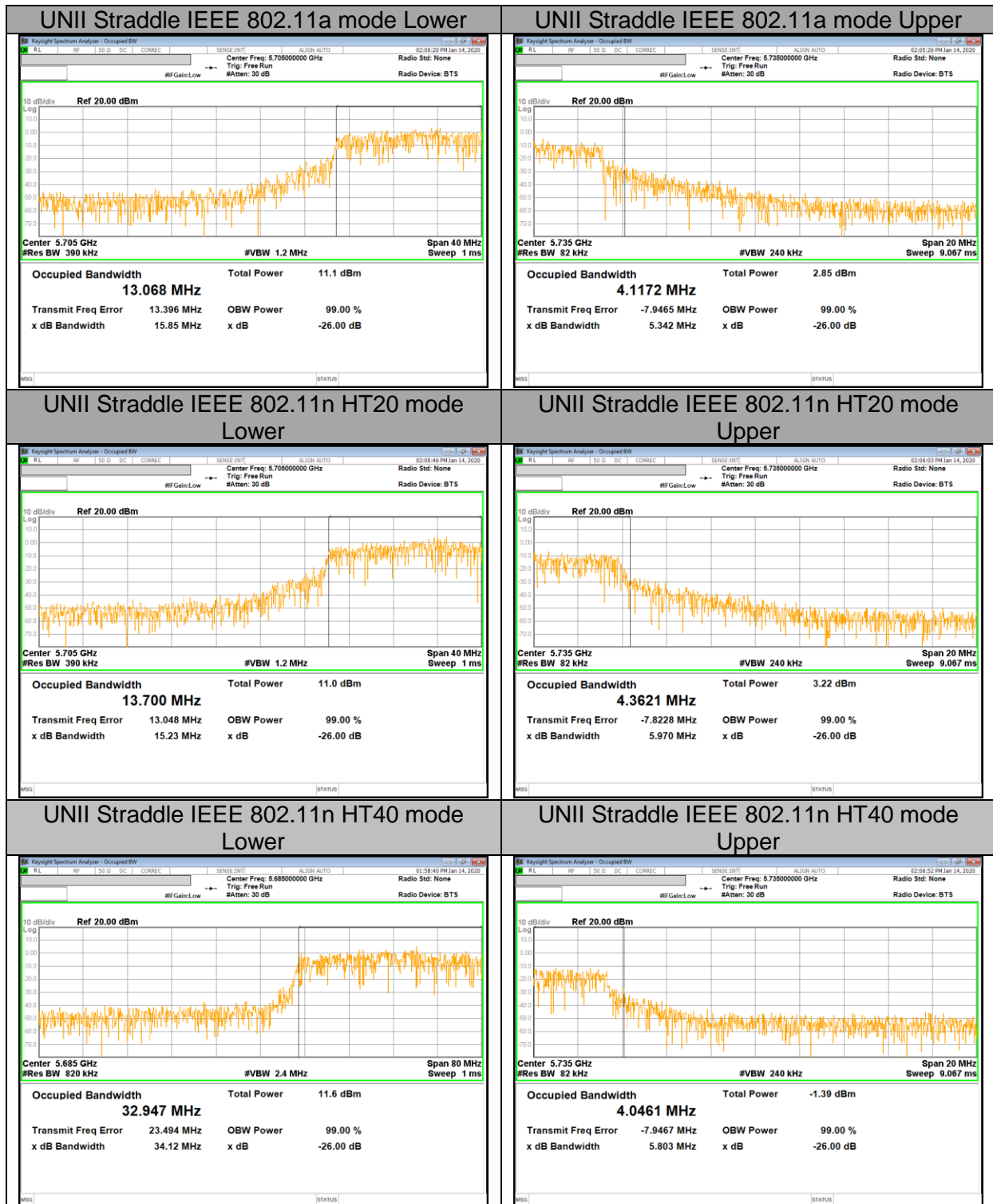
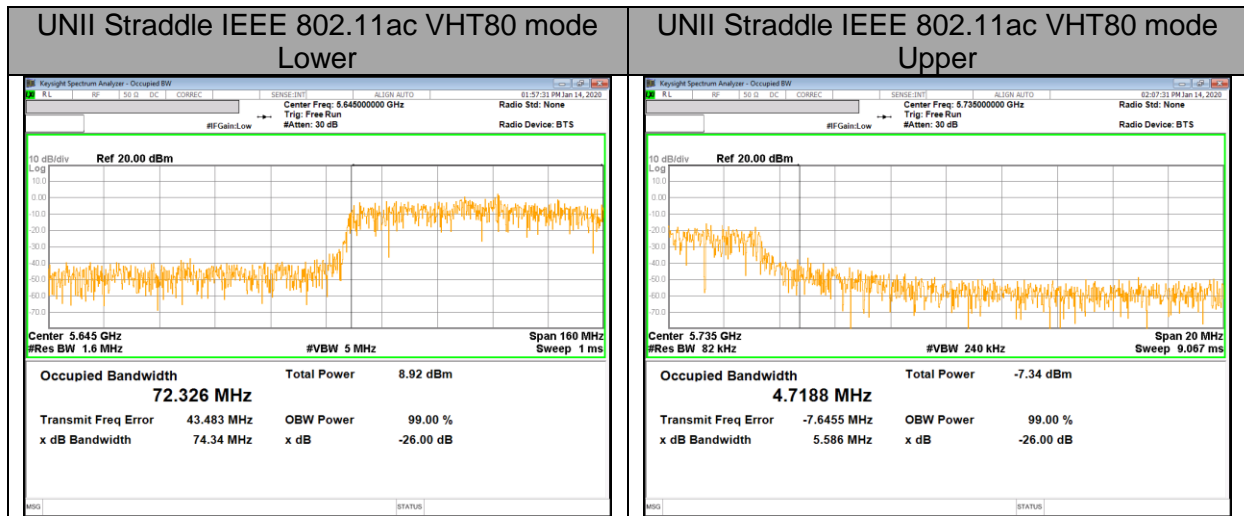


UNII Straddle Channel





10. ANTENNA PORT TEST RESULTS

10.1. 6 dB & 99% BANDWIDTH

LIMITS

FCC §15.407

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

TEST PROCEDURE

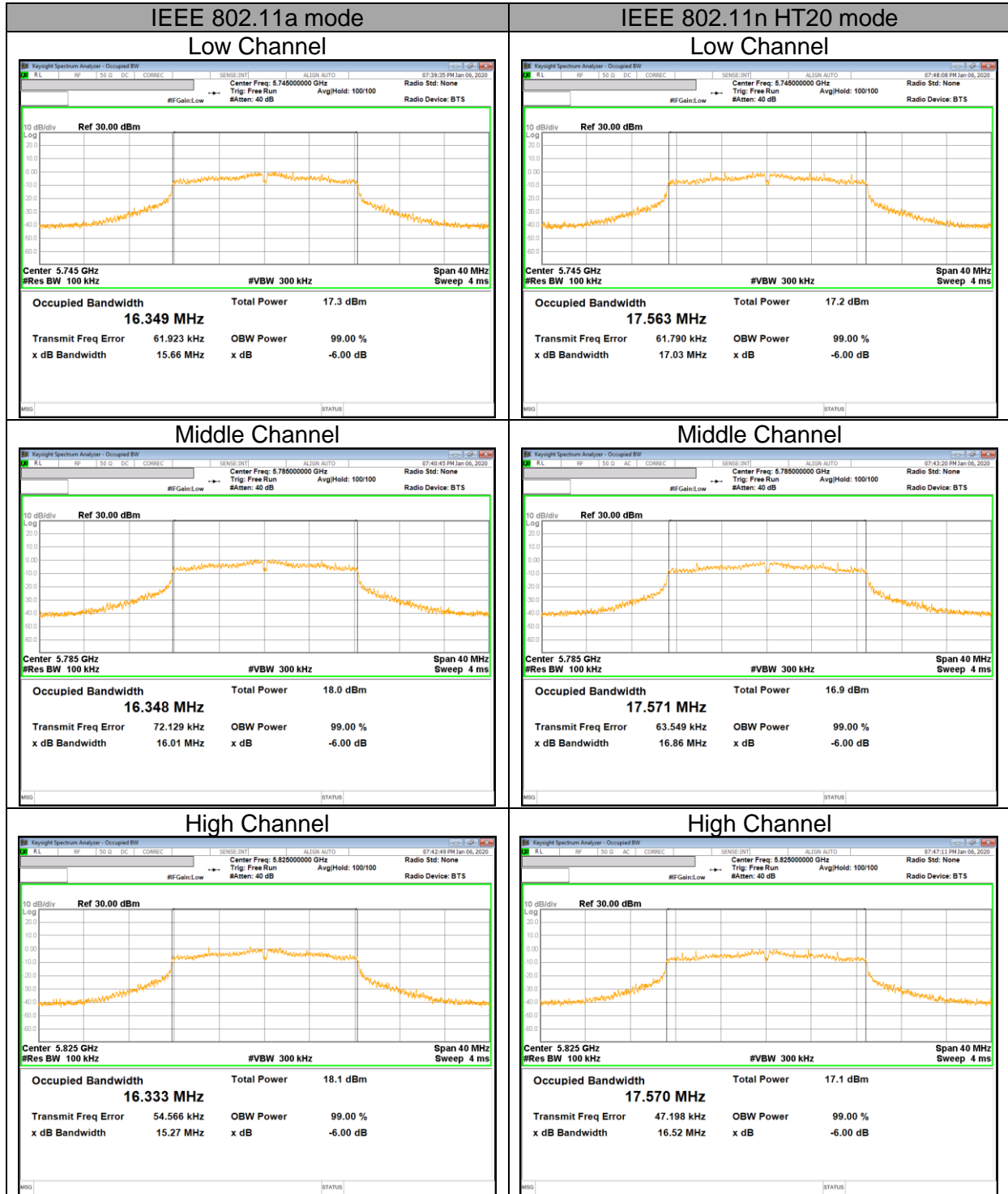
Reference to 789033 D02 General UNII Test Procedures New Rules v02r01: The transmitter output is connected to a spectrum analyzer with the RBW set to 100 kHz, the VBW $\geq 3 \times$ RBW, peak detector and max hold.

RESULTS

10.1.1. 6 dB & 99% BANDWIDTH TEST RESULTS

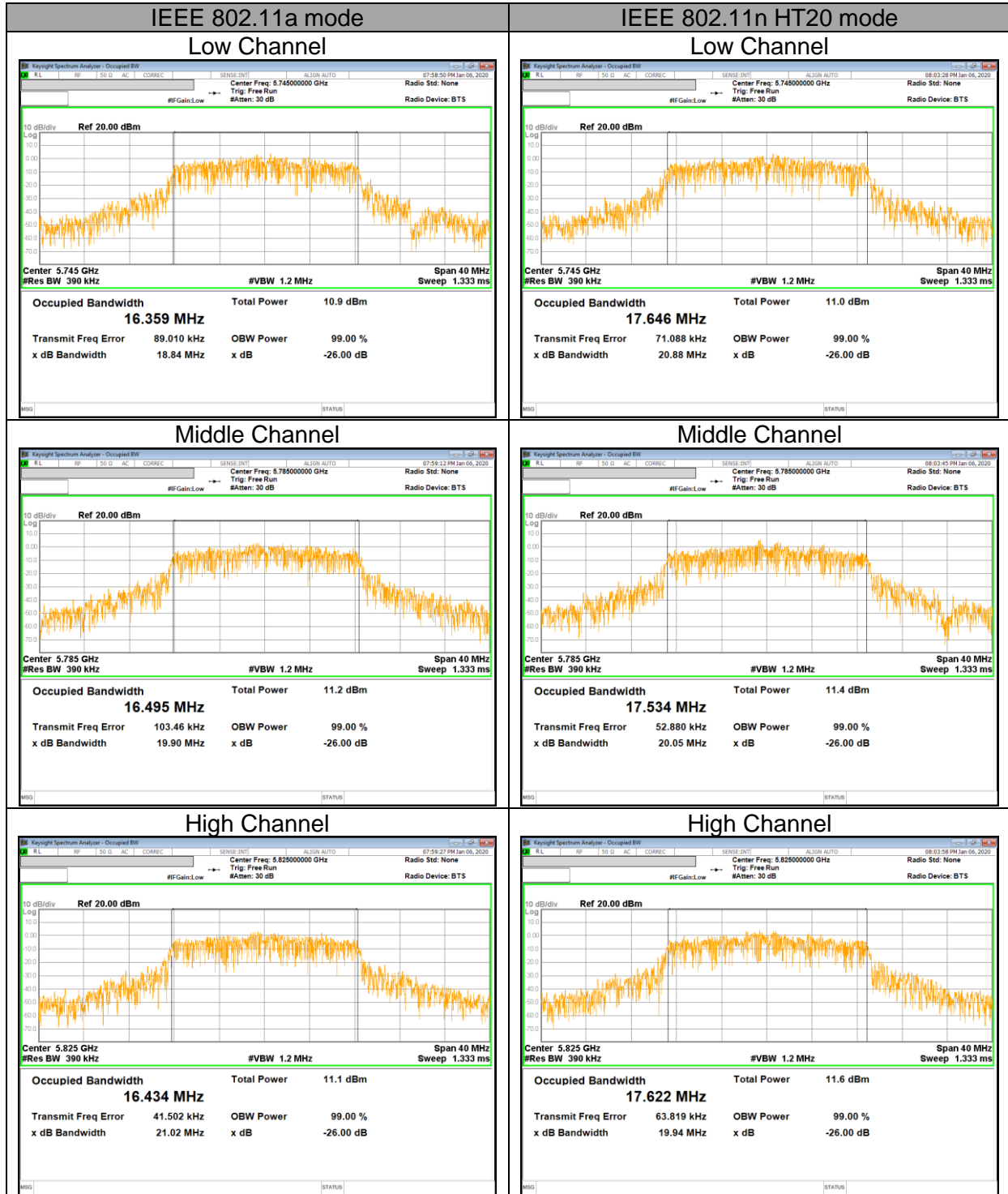
Band	Mode	Channel	Center Freq. [MHz]	6 dB BW [MHz]	99% BW [MHz]	Worst	Minimum Limit [MHz]
UNII-3	802.11a	Low	5745	15.66	16.359	15.27	0.5
		Mid	5785	16.01	16.495		
		High	5825	15.27	16.434		
	802.11n HT20	Low	5745	17.03	17.646	16.52	
		Mid	5785	16.86	17.534		
		High	5825	16.52	17.622		
	802.11n HT40	Low	5755	35.12	36.054	35.05	
		High	5795	35.05	35.989		
	802.11ac VHT80	Middle	5775	71.30	75.404	71.30	

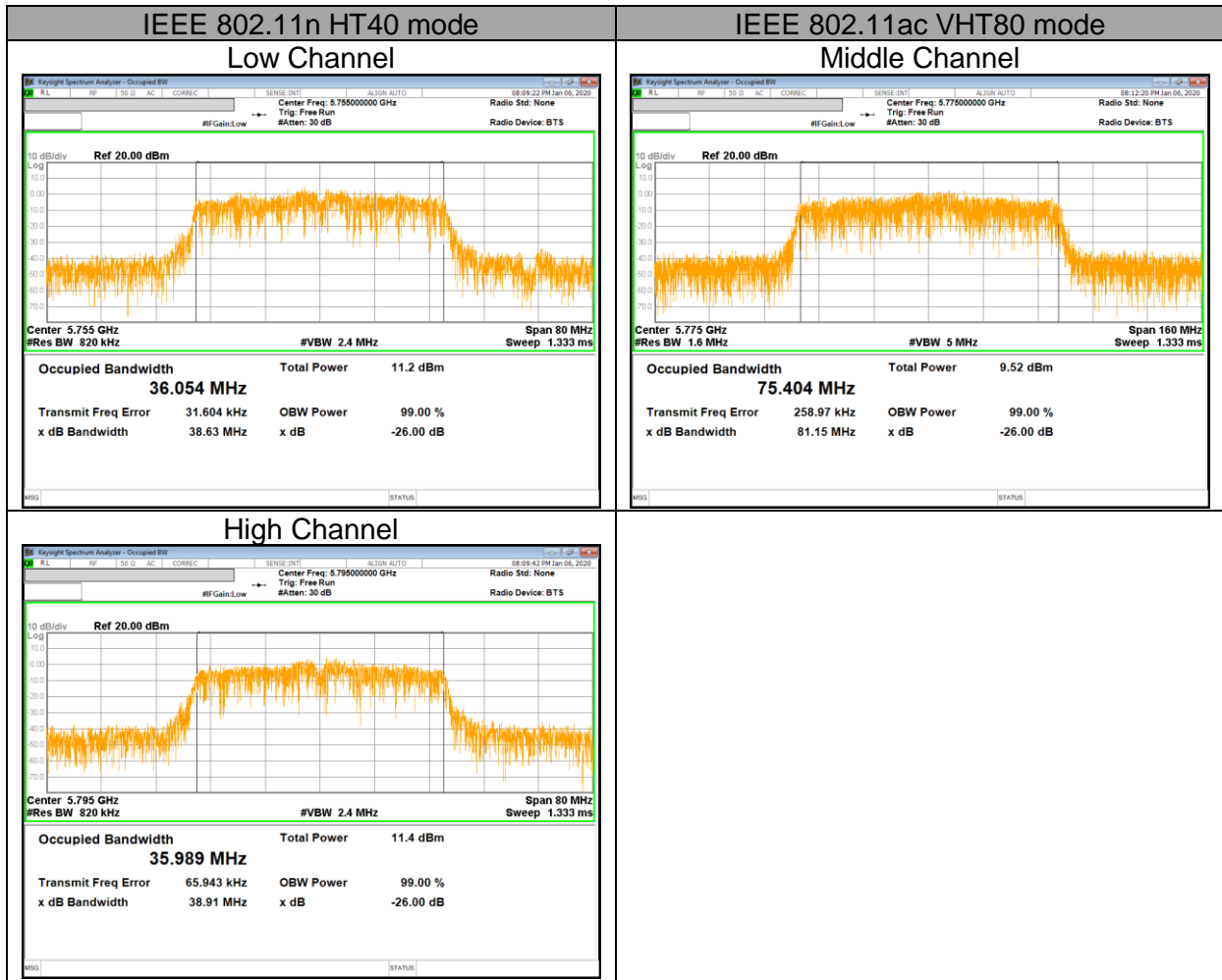
10.1.2. 6 dB BANDWIDTH TEST PLOTS





10.1.3. 99% BANDWIDTH TEST PLOTS





10.2. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1) (2) (3)

FCC

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak 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 $11 \text{ dBm} + 10 \log B$, 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.

RSS-247 §6.2.1.1, §6.2.2.1, §6.2.3.1, §6.2.4.1

6.2.1.1 - For other devices, the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log_{10} B$, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

6.2.2.1 - The maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band; The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10} B$, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

6.2.3.1 - The maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10} B$, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

6.2.4.1 - The maximum conducted output power shall not exceed 1 W. The output power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the output power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

KDB 789033 Method PM is used for output power.

KDB 789033 Method SA-2 is used for only power of straddle Ch. and PPSD. RBW set to 1MHz(500kHz for the band 5.725-5.85 GHz, the VBW >= 3 x RBW, RMS detector and trace averaging). Band power function used for power and peak marker value of the spectrum is used for PSD.

DIRECTIONAL ANTENNA GAIN

For OUTPUT POWER and PSD: The TX chains are correlated and the antenna gains are unequal among the chains. The directional gain is:

Frequency Band [MHz]	ANT Gain [dBi]
UNII 1 5150 - 5250	-2.60
UNII 2A 5250 - 5350	-2.80
UNII 2C 5470 - 5725	-2.00
UNII 3 5725 - 5850	-2.10

RESULTS

10.2.1. 1Tx MODE IN THE 5.2 GHz BAND

Bandwidth and Antenna Gain, Limits

Band	Mode	Channel	Center Freq. [MHz]	Bandwidth [MHz]		Directional Gain [dBi]	Power Limit [dBm]		PPSD Limit [dBm/MHz]	
				26 dB	99%		FCC	IC	FCC	IC
UNII-1	802.11a	Low	5180	19.45	16.450	-2.60	23.89	23.00	11.00	12.60
		Mid	5200	19.34	16.477		23.86	23.00		
		High	5240	20.33	16.471		24.00	23.00		
	802.11n HT20	Low	5180	19.83	17.662		23.97	23.00		
		Mid	5200	20.25	17.607		24.00	23.00		
		High	5240	21.85	17.687		24.00	23.00		
	802.11n HT40	Low	5190	39.95	36.116		24.00	23.00		
		High	5230	39.92	36.066		24.00	23.00		
	802.11ac VHT80	Mid	5210	81.60	75.505		24.00	23.00		
	Included in Calculations of Corr'd Power & PPSD									
Duty Cycle CF [dB]		802.11a					0.00	dB		
		802.11n20					0.00	dB		
		802.11n40					0.00	dB		
		802.11ac VHT80					0.00	dB		

Output Power Results

Band	Mode	Channel	Center Freq. [MHz]	Meas Power [dBm]	Corr'd Power [dBm]	Power Limit [dBm]	
						FCC	IC
UNII-1	802.11a	Low	5180	12.82	12.82	23.89	23.00
		Mid	5200	12.69	12.69	23.86	23.00
		High	5240	12.52	12.52	24.00	23.00
	802.11n HT20	Low	5180	12.81	12.81	23.97	23.00
		Mid	5200	12.51	12.51	24.00	23.00
		High	5240	12.54	12.54	24.00	23.00
	802.11n HT40	Low	5190	12.45	12.45	24.00	23.00
		High	5230	12.42	12.42	24.00	23.00
	802.11ac VHT80	Mid	5210	10.65	10.65	24.00	23.00

* Calculation of Output Power : Corr'd Power = Meas Power + Duty CF [dB]

PPSD Results

Band	Mode	Channel	Center Freq. [MHz]	Meas PPSS [dBm/MHz]	Corr'd PPSS [dBm/MHz]	PPSS Limit [dBm/MHz]	
						FCC	IC
UNII-1	802.11a	Low	5180	2.703	2.703	11.00	12.60
		Mid	5200	2.563	2.563		
		High	5240	2.937	2.937		
	802.11n HT20	Low	5180	2.639	2.639		
		Mid	5200	2.027	2.027		
		High	5240	2.227	2.227		
	802.11n HT40	Low	5190	-0.736	-0.736		
		High	5230	-0.441	-0.441		
	802.11ac VHT80	Mid	5210	-5.554	-5.554		

* Calculation of PPSS result : Corr'd PPSS = Meas PPSS + Duty CF + Corr'd factor [dB]

10.2.2. 1Tx MODE IN THE 5.3 GHz BAND

Bandwidth and Antenna Gain, Limits

Band	Mode	Channel	Center Freq. [MHz]	Bandwidth [MHz]		Directional Gain [dBi]	Power Limit [dBm]		PPSS Limit [dBm/MHz]	
				26 dB	99%		FCC	IC	FCC	IC
UNII-2A	802.11a	Low	5260	20.15	16.455	-2.80	24.00	23.16	11.00	11.00
		Mid	5300	19.03	16.400		23.79	23.15		
		High	5320	19.64	16.294		23.93	23.12		
	802.11n HT20	Low	5260	20.22	17.542		24.00	23.44		
		Mid	5300	20.79	17.603		24.00	23.46		
		High	5320	21.78	17.709		24.00	23.48		
	802.11n HT40	Low	5270	39.87	36.114		24.00	24.00		
		High	5310	39.86	36.040		24.00	24.00		
	802.11ac VHT80	Mid	5290	80.77	75.229		24.00	24.00		
	Included in Calculations of Corr'd Power & PPSS									
Duty Cycle CF [dB]				802.11a			0.00	dB		
				802.11n20			0.00	dB		
				802.11n40			0.00	dB		
				802.11ac VHT80			0.00	dB		

Output Power Results

Band	Mode	Channel	Center Freq. [MHz]	Meas Power [dBm]	Corr'd Power [dBm]	Power Limit [dBm]	
						FCC	IC
UNII-2A	802.11a	Low	5260	12.68	12.68	24.00	23.16
		Mid	5300	12.92	12.92	23.79	23.15
		High	5320	12.90	12.90	23.93	23.12
	802.11n HT20	Low	5260	12.36	12.36	24.00	23.44
		Mid	5300	12.79	12.79	24.00	23.46
		High	5320	12.90	12.90	24.00	23.48
	802.11n HT40	Low	5270	12.50	12.50	24.00	24.00
		High	5310	12.52	12.52	24.00	24.00
	802.11ac VHT80	Mid	5290	10.41	10.41	24.00	24.00

* Calculation of Output Power : Corr'd Power = Meas Power + Duty CF [dB]

PPSD Results

Band	Mode	Channel	Center Freq. [MHz]	Meas PPSD [dBm/MHz]	Corr'd PPSD [dBm/MHz]	PPSD Limit [dBm/1MHz]	
						FCC	IC
UNII-2A	802.11a	Low	5260	2.590	2.590	11.00	11.00
		Mid	5300	3.059	3.059		
		High	5320	3.266	3.266		
	802.11n HT20	Low	5260	2.278	2.278		
		Mid	5300	2.717	2.717		
		High	5320	2.962	2.962		
	802.11n HT40	Low	5270	-0.400	-0.400		
		High	5310	-0.447	-0.447		
	802.11ac VHT80	Mid	5290	-5.493	-5.493		

* Calculation of PPSD result : Corr'd PPSD = Meas PPSD + Duty CF + Corr'd factor [dB]

10.2.3. 1Tx MODE IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain, Limits

Band	Mode	Channel	Center Freq. [MHz]	Bandwidth [MHz]		Directional Gain [dBi]	Power Limit [dBm]		PPSD Limit [dBm/MHz]	
				26 dB	99%		FCC	IC	FCC	IC
UNII-2C	802.11a	Low	5500	20.03	16.409	-2.00	24.00	23.15	11.00	11.00
		Mid	5580	19.66	16.431		23.94	23.16		
		High	5700	19.78	16.443		23.96	23.16		
	802.11n HT20	Low	5500	21.58	17.621		24.00	23.46		
		Mid	5580	20.95	17.541		24.00	23.44		
		High	5700	21.42	17.540		24.00	23.44		
	802.11n HT40	Low	5510	39.69	36.003		24.00	24.00		
		Mid	5550	39.73	36.020		24.00	24.00		
		High	5670	39.81	36.089		24.00	24.00		
	802.11ac VHT80	Low	5530	81.56	75.399		24.00	24.00		
		High	5610	81.44	75.155		24.00	24.00		
	Included in Calculations of Corr'd Power & PPSD									
Duty Cycle CF [dB]			802.11a				0.00		dB	
			802.11n20				0.00		dB	
			802.11n40				0.00		dB	
			802.11ac VHT80				0.00		dB	

Output Power Results

Band	Mode	Channel	Center Freq. [MHz]	Meas Power [dBm]	Corr'd Power [dBm]	Power Limit [dBm]	
						FCC	IC
UNII-2C	802.11a	Low	5500	12.31	12.31	24.00	23.15
		Mid	5580	12.22	12.22	23.94	23.16
		High	5700	12.63	12.63	23.96	23.16
	802.11n HT20	Low	5500	12.11	12.11	24.00	23.46
		Mid	5580	12.46	12.46	24.00	23.44
		High	5700	12.48	12.48	24.00	23.44
	802.11n HT40	Low	5510	12.38	12.38	24.00	24.00
		Mid	5550	12.37	12.37	24.00	24.00
		High	5670	12.36	12.36	24.00	24.00
	802.11ac VHT80	Low	5530	10.42	10.42	24.00	24.00
		High	5610	10.56	10.56	24.00	24.00

* Calculation of Output Power : Corr'd Power = Meas Power + Duty CF [dB]

PPSD Results

Band	Mode	Channel	Center Freq. [MHz]	Meas PPSP [dBm/MHz]	Corr'd PPSP [dBm/MHz]	PPSD Limit [dBm/1MHz]	
						FCC	IC
UNII-2C	802.11a	Low	5500	2.490	2.490	11.00	11.00
		Mid	5580	2.664	2.664		
		High	5700	2.766	2.766		
	802.11n HT20	Low	5500	2.244	2.244		
		Mid	5580	2.530	2.530		
		High	5700	2.495	2.495		
	802.11n HT40	Low	5510	-0.556	-0.556		
		Mid	5550	-0.550	-0.550		
		High	5670	-0.705	-0.705		
	802.11ac VHT80	Low	5530	-5.784	-5.784		
High		5610	-5.912	-5.912			

* Calculation of PPSP result : Corr'd PPSP = Meas PPSP + Duty CF + Corr'd factor [dB]

10.2.4. 1Tx Mode Straddle channel IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain, Limits

Band	Mode	Channel	Center Freq. [MHz]	Bandwidth [MHz]		Directional Gain [dBi]	Power Limit [dBm]		PPSD Limit [dBm/MHz]		
				26 dB	99%		FCC	IC	FCC	IC	
UNII-2C	802.11a	Straddle	5720	15.948	13.068	-2.00	23.03	22.16	11.00	11.00	
	802.11n HT20	Straddle	5720	15.098	13.700		22.79	22.37			
	802.11n HT40	Straddle	5710	34.916	32.947		24.00	24.00			
	802.11ac VHT80	Straddle	5690	75.776	72.326		24.00	24.00			
Included in Calculations of Corr'd Power & PPSP											
Duty Cycle CF [dB]				802.11a			0.00	dB			
				802.11n20			0.00	dB			
				802.11n40			0.00	dB			
				802.11ac VHT80			0.00	dB			

Output Power Results

Band	Mode	Channel	Center Freq. [MHz]	Meas Power [dBm]	Corr'd Power [dBm]	Power Limit [dBm]	
						FCC	IC
UNII-2C	802.11a	Straddle	5720	10.728	10.728	23.03	22.16
	802.11n HT20	Straddle	5720	10.416	10.416	22.79	22.37
	802.11n HT40	Straddle	5710	11.270	11.270	24.00	24.00
	802.11ac VHT80	Straddle	5690	8.985	8.985	24.00	24.00

* Calculation of Output Power : Corr'd Power = Meas Power + Duty CF [dB]

PPSD Results

Band	Mode	Channel	Center Freq. [MHz]	Meas PPSP [dBm/MHz]	Corr'd PPSP [dBm/MHz]	PPSP Limit [dBm/1MHz]	
						FCC	IC
UNII-2C	802.11a	Straddle	5720	2.489	2.489	11.00	11.00
	802.11n HT20	Straddle	5720	2.211	2.211		
	802.11n HT40	Straddle	5710	-0.832	-0.832		
	802.11ac VHT80	Straddle	5690	-5.509	-5.509		

* Calculation of PPSP result : Corr'd PPSP = Meas PPSP + Duty CF + Corr'd factor [dB]

10.2.5. 1Tx Mode Straddle channel IN THE 5.8 GHz BAND

Bandwidth and Antenna Gain, Limits

Band	Mode	Channel	Center Freq. [MHz]	Bandwidth [MHz]		Directional Gain [dBi]	Power Limit [dBm]	PPSP Limit [dBm/500kHz]
				26 dB	99%			
UNII-3	802.11a	Straddle	5720	4.928	4.117	-2.10	30.00	30.00
	802.11n HT20	Straddle	5720	5.326	4.362			
	802.11n HT40	Straddle	5710	5.372	4.046			
	802.11ac VHT80	Straddle	5690	5.824	4.719			
Included in Calculations of Corr'd Power & PPSP								
Duty Cycle CF [dB]				802.11a		0.00	dB	
				802.11n20		0.00	dB	
				802.11n40		0.00	dB	
				802.11ac VHT80		0.00	dB	

Output Power Results

Band	Mode	Channel	Center Freq. [MHz]	Meas Power [dBm]	Corr'd Power [dBm]	Power Limit [dBm]
UNII-3	802.11a	Straddle	5720	2.672	2.672	30.00
	802.11n HT20	Straddle	5720	2.930	2.930	
	802.11n HT40	Straddle	5710	-1.215	-1.215	
	802.11ac VHT80	Straddle	5690	-6.795	-6.795	

* Calculation of Output Power : Corr'd Power = Meas Power + Duty CF [dB]

PPSD Results

Band	Mode	Channel	Center Freq [MHz]	Meas PPSD [dBm/MHz]	Corr'd PPSD [dBm/MHz]	PPSD Limit [dBm/500kHz]
UNII-3	802.11a	Straddle	5720	-4.326	-4.326	30.00
	802.11n HT20	Straddle	5720	-4.571	-4.571	
	802.11n HT40	Straddle	5710	-9.784	-9.784	
	802.11ac VHT80	Straddle	5690	-14.557	-14.557	

* Calculation of PPSD result : Corr'd PPSD = Meas PPSD + Duty CF + Corr'd factor [dB]

10.2.6. 1Tx MODE IN THE 5.8 GHZ BAND

Bandwidth and Antenna Gain, Limits

Included in Calculations of Corr'd Power & PPSD			
Duty Cycle CF [dB]	802.11a	0.00	dB
	802.11n20	0.00	dB
	802.11n40	0.00	dB
	802.11ac VHT80	0.00	dB

Output Power Results

Band	Mode	Channel	Center Freq. [MHz]	Meas Power [dBm]	Corr'd Power [dBm]	Power Limit [dBm]
UNII-3	802.11a	Mid	5745	12.59	12.59	30.00
		High	5785	12.79	12.79	
		High	5825	12.87	12.87	
	802.11n HT20	Low	5745	12.34	12.34	
		Mid	5785	12.53	12.53	
		High	5825	12.69	12.69	
	802.11n HT40	Low	5755	12.44	12.44	
		High	5795	12.80	12.80	
	802.11ac VHT80	Middle	5775	10.87	10.87	

* Calculation of Output Power : Corr'd Power = Meas Power + Duty CF [dB]

PPSD Results

Band	Mode	Channel	Center Freq. [MHz]	Meas PPSD [dBm/MHz]	Corr'd PPSD [dBm/MHz]	PPSD Limit [dBm/500kHz]
UNII-3	802.11a	Low	5745	-0.058	-0.058	30.00
		Mid	5785	0.150	0.150	
		High	5825	0.219	0.219	
	802.11n HT20	Low	5745	-0.351	-0.351	
		Mid	5785	-0.377	-0.377	
		High	5825	-0.224	-0.224	
	802.11n HT40	Low	5755	-3.450	-3.450	
		High	5795	-3.067	-3.067	
	802.11ac VHT80	Middle	5775	-8.125	-8.125	

* Calculation of PPSD result : Corr'd PPSD = Meas PPSD + Duty CF + Corr'd factor [dB]

10.2.7. OUTPUT POWER AND PPSD PLOTS

