8.21.5. OUTPUT POWER AND PSD

<u>LIMITS</u>

FCC §15.407 (a) (2)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band 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 MHz. In addition, the maximum 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.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

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

Page 201 of 884

RESULTS

ID: 3055	4 Date:	12/15/16
----------	---------	----------

Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min	Min	Directional	Power	PSD
		26 dB	99%	Gain	Limit	Limit
		BW	BW			
	(MHz)	(MHz)	(MHz)	(dBi)	(dBm)	(dBm)
Mid	5290	82.72	75.71	2.24	24.00	11.00

Duty Cycle CF (dB) 0.21 Inclu	ided in Calculations of Corr'd PSD
-------------------------------	------------------------------------

Output Power Results

-					
Channel	Frequency	Ant A	Total	Power	Power
		Meas	Corr'd	Limit	Margin
		Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Mid	5290	12.88	12.88	24.00	-11.12

PPSD Results

Channel	Frequency	Ant A	Total	PSD	PSD
		Meas	Corr'd	Limit	Margin
		PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Mid	5290	-4.63	-4.42	11.00	-15.42

Page 202 of 884

<u>PSD</u>



Page 203 of 884

8.22. 802.11ac VHT80 ANTENNA B MODE IN THE 5.3 GHz BAND

8.22.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency	26 dB Bandwidth
	(MHz)	(MHz)
Mid	5290	82.880

26 dB BANDWIDTH



Page 204 of 884

8.22.2. 99% BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

RESULTS

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Mid	5290	75.5570

99% BANDWIDTH

BANDWIDTH, MID CH			
∰ Agilent 12:30:54 Sep 18, 2016 L	Measure		
Ch Freq 5.29 GHz Trig Free Occupied Bandwidth Averages: 20	Meas Off		
APv5.4(101216),43573, Temp B-1	Channel Power		
Ref 20 dBm #Atten 30 dB #Samp	Occupied BW		
dB/ Offst 11.5 Mutation and a set of the	ACP		
dB ref ref	Multi Carrier Power		
*Res BW 1.5 MHz *VBW 5 MHz Sweep 1.066 ms (1000 pts) Power Stat Occupied Bandwidth 0cc BW % Pwr 99.00 % CCDF 75 5570 MHz × dB -26.00 dB			
Transmit Freq Error -85.671 kHz x dB Bandwidth 79.281 MHz*	More 1 of 2		
Copyright 2000–2011 Agilent Technologies			

Page 205 of 884

8.22.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

RESULTS

ID: 30554 Date: 12/15/16	ID:	30554	Date:	12/15/16
--------------------------	-----	-------	-------	----------

Channel	Frequency	Power
	(MHz)	(dBm)
Mid	5290	12.84

Page 206 of 884

8.22.4. OUTPUT POWER AND PSD

<u>LIMITS</u>

FCC §15.407 (a) (2)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band 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 MHz. In addition, the maximum 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.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

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

Page 207 of 884

RESULTS

ID: 30554 Date: 12/15/16

Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min	Min	Directional	Power	PSD
		26 dB	99%	Gain	Limit	Limit
		BW	BW			
	(MHz)	(MHz)	(MHz)	(dBi)	(dBm)	(dBm)
Mid	5290	82.88	75.56	2.77	24.00	11.00

Duty Cycle CF (dB) 0.21 Ir	ncluded in Calculations of Corr'd PSD
----------------------------	---------------------------------------

Output Power Results

Channel	Frequency	Ant B	Total	Power	Power
		Meas	Corr'd	Limit	Margin
		Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Mid	5290	12.84	12.84	24.00	-11.16

PPSD Results

Channel	Frequency	Ant B	Total	PSD	PSD	
		Meas	Corr'd	Limit	Margin	
		PSD	PSD			
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)	
Mid	5290	-4.65	-4.44	11.00	-15.44	

<u>PSD</u>



Page 209 of 884

8.23. 802.11ac VHT80 2Tx (ANTENNA A + ANTENNA B) CDD MODE IN THE 5.3 GHz BAND

8.23.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency	26 dB BW	26 dB BW	
		Ant A	Ant B	
	(MHz)	(MHz)	(MHz)	
Mid	5290	82.880	82.880	

Page 210 of 884

26 DB BANDWIDTH, ANTENNA A



26 DB BANDWIDTH, ANTENNA B



Page 211 of 884

8.23.2. 99% BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

RESULTS

Channel	Frequency	99% BW	99% BW
		Ant A	Ant B
	(MHz)	(MHz)	(MHz)
Mid	5290	75.552	75.445

Page 212 of 884

99% BANDWIDTH, ANTENNA A



99% BANDWIDTH, ANTENNA B



Page 213 of 884

8.23.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

RESULTS

ID:	39316	Date:	12/15/16

Average Power Results

Channel	Frequency	Ant A	Ant B	Total
		Power Power		Power
	(MHz)	(dBm)	(dBm)	(dBm)
Mid	5290	11.93	11.98	14.97

Page 214 of 884

8.23.4. OUTPUT POWER AND PSD

<u>LIMITS</u>

FCC §15.407 (a) (2)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band 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 MHz. In addition, the maximum 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.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Ant A	Ant B	Uncorrelated Chains
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.24	2.77	2.51

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Ant A	Ant B	Correlated Chains
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.24	2.77	5.52

RESULTS

ID: 39316	Date:	12/15/16
------------------	-------	----------

Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min	Min	Directional	Directional	Power	PSD
		26 dB	99%	Gain	Gain	Limit	Limit
		BW	BW	for Power	for PSD		
	(MHz)	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(dBm)
Mid	5290	82.88	75.44	2.51	5.52	24	11.0

Duty Cycle CE (dB)	0.20	Included in Calculations of Corr'd PSD
Bully by bio bi (ub)	0.20	

Output Power Results

Channel	Frequency	Ant A	Ant B	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Mid	5290	11.93	11.98	14.97	24.00	-9.03

PSD Results

Channel	Frequency	Ant A	Ant B	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Mid	5290	-4.88	-4.83	-1.64	11.00	-12.64

Page 216 of 884

PSD, ANTENNA A



PSD, ANTENNA B



Page 217 of 884

8.24. 802.11ac VHT80 2Tx (ANTENNA A + ANTENNA B) STBC MODE IN THE 5.3 GHz BAND

Noted: Covered by 802.11ac VHT80 2Tx (ANTENNA A + ANTENNA B) CDD MODE IN THE 5.3 GHz BAND

Page 218 of 884

8.25. 802.11n HT20 ANTENNA A MODE IN THE 5.6 GHz BAND

8.25.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency	26 dB Bandwidth		
	(MHz)	(MHz)		
Low	5500	22.160		
Mid	5580	22.160		
High	5700	21.920		
144	5720	21.920		

Page 219 of 884

26 dB BANDWIDTH





Page 220 of 884





Page 221 of 884

8.25.2. 99% BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

RESULTS

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	5500	17.719
Mid	5580	17.702
High	5700	17.691
144	5720	17.496

Page 222 of 884

99% BANDWIDTH





Page 223 of 884





Page 224 of 884

8.25.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

RESULTS

ID: 30554	Date:	12/15/16
-----------	-------	----------

Channel	Frequency	Power
	(MHz)	(dBm)
Low	5500	15.44
Mid	5580	16.42
High	5700	15.43
144 5720		16.40

Page 225 of 884

8.25.4. OUTPUT POWER AND PSD

FCC §15.407 (a) (2)

For the band 5.47–5.725 GHz, the maximum conducted output power over the frequency band 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 MHz. In addition, the maximum 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.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Straddle channel power is measured using PXA spectrum analyzer, duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

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

Page 226 of 884

RESULTS

ID: 60554	Date:	12/15/16
-----------	-------	----------

Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min	Min	Directional	Power	PSD
		26 dB	99%	Gain	Limit	Limit
		BW	BW			
	(MHz)	(MHz)	(MHz)	(dBi)	(dBm)	(dBm)
Low	5500	22.16	17.72	3.39	23.48	11.00
Mid	5580	22.16	17.70	3.39	23.48	11.00
High	5700	21.92	17.69	3.39	23.48	11.00
Duty Cycle CF (dB) 0.00 Included in Calculations of Corr'd PSD)	

Output Power Results

Channel	Frequency	Ant A	Total	Power	Power
		Meas	Corr'd	Limit	Margin
		Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	15.44	15.44	23.48	-8.04
Mid	5580	16.42	16.42	23.48	-7.06
High	5700	15.43	15.43	23.48	-8.05

PSD Results

Channel	Frequency	Ant A	Total	PSD	PSD
		Meas	Corr'd	Limit	Margin
		PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	3.18	3.18	11.00	-7.83
Mid	5580	4.76	4.76	11.00	-6.24
High	5700	4.31	4.31	11.00	-6.69

<u>PSD</u>





Page 228 of 884



Page 229 of 884

8.26. 802.11ac VHT20 ANTENNA A STRADDLE CHANNEL 144 RESULTS

8.26.1. OUTPUT POWER AND PSD

UNII-2C BAND

Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min	Directional Directiona		Power	PSD
		26 dB	Gain	Gain	Limit	Limit
		BW	for Power	for PSD		
	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(dBm)
144	5720	15.96	3.39	3.39	23.03	11.00

Duty Cycle CF (dB) 0.00 Included in Calculations of Corr'd Power & PSD

Output Power Results

Channel	Frequency	Ant A	Total	Power	Power
		Meas	Corr'd	Limit	Margin
		Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
144	5720	14.86	14.86	23.03	-8.17

PSD Results

Channel	Frequency	Ant A	Total	PSD	PSD
		Meas	Corr'd	Limit	Margin
		PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
144	5720	4.91	4.91	11.00	-6.09

Page 230 of 884

enter Freq 5.	50 Ω DC 720000000 GHz PN0: Fast • IFGain:Low	→ Trig: Free Run Atten: 30 dB	#Avg Type: RMS Avg Hold: 100/100	09:09:47 AM Dec 15, 2016 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A N N N N N	Frequency
RefO)dB/div Ref (ffset 11.5 dB 30.00 dBm		Mkr Band Pow	1 5.717 02 GHz /er 14.859 dBm	Auto Tune
		0 ¹			Center Free 5.720000000 GH
0.0					Start Free 5.695000000 GH
0.0 0.0				ananan anan ana ana ana ana ana ana ana	Stop Fred 5.745000000 GH:
tart 5.69500 G Res BW 1.0 MI	Hz Hz #VB	W 3.0 MHz*	Sweep 1	Stop 5.74500 GHz .000 ms (1001 pts)	CF Step 5.000000 MH Auto Mar
In N 1 f 2 3 -	× 5.717 02 GHz	2.706 dBm Ba	runction Function wight and Power 15.96 MHz	PUNCITON VALUE A 14.859 dB	Freq Offse 0 H:



Page 231 of 884

UNII-3 BAND

Antenna Gain and Limit

Channel	Frequency	Min	Directional	Power	PSD
		26 dB	Gain	Limit	Limit
		BW			
	(MHz)	(MHz)	(dBi)	(dBm)	(dBm)
144	5720	5.96	3.39	30.00	30.00

Duty Cycle CF (dB) 0.00 Included in Calculations of Corr'd Power & PSD

Output Power Results

Channel	Frequency	Ant A	Total	Power	Power
		Meas	Corr'd	Limit	Margin
		Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
144	5720	10.226	10.226	30.00	-19.77

PSD Results

Channel	Frequency	Ant A	Total	PSD	PSD
		Meas	Corr'd	Limit	Margin
		PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
144	5720	2.061	2.061	30.00	-27.94

Page 232 of 884

enter Freq	5.720000000 GHz	→ Trig: Free Run	#Avg Type: RMS Avg Hold: 100/100	TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A N N N N N	Frequency
Re dB/div R e	f Offset 11.5 dB	Atten to de	Mkr1 Band Powe	5.727 98 GHz er 10.226 dBm	Auto Tune
og 20.0 10.0			0 1		Center Free 5.720000000 GH:
0.0					Start Free 5.695000000 GH
0.0 0.0 0.0	whenhausterne and a second and a			ang fantane terfore fan de state angelen e	Stop Free 5.745000000 GH
tart 5.69500 Res BW 1.0) GHz MHz #VB	W 3.0 MHz*	Sweep 1.0	Stop 5.74500 GHz)00 ms (1001 pts)	CF Step 5.000000 MH
XR MODE TRC S0 1 N 1 f 2 3 5 5 6 7 8 9 9 0 0 1	1 X 5.727 98 GHz	Y FI 4.617 dBm Bar	UNCTION WOTH Id Power 5.960 MHz	FUNCTION VALUE	Auto Mar Freq Offse 0 H:



Page 233 of 884

8.26.2. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

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

RESULTS

Channel	Frequency	6 dB Bandwidth
	(MHz)	(MHz)
144	5720	3.84

6 dB BANDWIDTH



Page 234 of 884

8.27. 802.11n HT20 ANTENNA B MODE IN THE 5.6 GHz BAND

8.27.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency	26 dB Bandwidth	
	(MHz)	(MHz)	
Low	5500	22.16	
Mid	5580	22.00	
High	5700	22.00	
144	5720	22.20	

Page 235 of 884

26 dB BANDWIDTH





Page 236 of 884




Page 237 of 884

8.27.2. 99% BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

RESULTS

Channel Frequency		99% Bandwidth
	(MHz)	(MHz)
Low	5500	17.693
Mid	5580	17.725
High	5700	17.690
144	5720	17.725

Page 238 of 884

99% BANDWIDTH





Page 239 of 884





Page 240 of 884

8.27.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

RESULTS

ID: 30554	Date:	12/15/16
-----------	-------	----------

Channel	Frequency	Power
	(MHz)	(dBm)
Low	5500	15.44
Mid	5580	16.98
High	5700	15.45
144	5720	16.88

Page 241 of 884

8.27.4. OUTPUT POWER AND PSD

<u>LIMITS</u>

FCC §15.407 (a) (2)

For the band 5.47–5.725 GHz, the maximum conducted output power over the frequency band 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 MHz. In addition, the maximum 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.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Straddle channel power is measured using PXA spectrum analyzer, duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

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

Page 242 of 884

RESULTS

ID:	30554	Date:	12/15/16
-----	-------	-------	----------

Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min	Min	Directional	Power	PSD
		26 dB	99%	Gain	Limit	Limit
		BW	BW			
	(MHz)	(MHz)	(MHz)	(dBi)	(dBm)	(dBm)
Low	5500	22.16	17.693	3.17	23.48	11.00
Mid	5580	22.00	17.725	3.17	23.49	11.00
High	5700	22.00	17.690	3.17	23.48	11.00
Duty C	ycle CF (dB)	F (dB) 0.00 Included in Calculations of Corr'd PSD)

Output Power Results

Channel	Frequency	Ant B	Total	Power	Power
		Meas	Corr'd	Limit	Margin
		Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	15.44	15.44	23.48	-8.04
Mid	5580	16.98	16.98	23.49	-6.51
High	5700	15.45	15.45	23.48	-8.03

PSD Results

Channel	Frequency	Ant B	Total	PSD	PSD
		Meas	Corr'd	Limit	Margin
		PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	3.315	3.32	11.00	-7.69
Mid	5580	6.413	6.41	11.00	-4.59
High	5700	3.984	3.98	11.00	-7.02

Page 243 of 884

PSD





Page 244 of 884



Page 245 of 884

8.28. 802.11ac VHT20 ANTENNA B STRADDLE CHANNEL 144 RESULTS

8.28.1. OUTPUT POWER AND PSD

UNII-2C BAND

Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min	Directional	Directional	Power	PSD
		26 dB	Gain	Gain	Limit	Limit
		BW	for Power	for PSD		
	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(dBm)
144	5720	16.10	3.17	3.17	23.07	11.00

Duty Cycle CF (dB) 0.00 Included in Calculations of Corr'd Power & PSD

Output Power Results

Channel	Frequency	Ant B	Total	Power	Power
		Meas	Corr'd	Limit	Margin
		Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
144	5720	16.11	16.11	23.07	-6.96

PSD Results

Channel	Frequency	Ant B	Total	PSD	PSD
		Meas	Corr'd	Limit	Margin
		PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
144	5720	6.63	6.63	11.00	-4.37

Page 246 of 884





Page 247 of 884

UNII-3 BAND

Antenna Gain and Limit

Channel	Frequency	Min	Directional	Power	PSD
		26 dB	Gain	Limit	Limit
		BW			
	(MHz)	(MHz)	(dBi)	(dBm)	(dBm)
144	5720	6.10	3.17	30.00	30.00

Duty Cycle CF (dB) 0.00 Included in Calculations of Corr'd Power & PSD

Output Power Results

Channel	Frequency	Ant B	Total	Power	Power
		Meas	Corr'd	Limit	Margin
		Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
144	5720	9.95	9.95	30.00	-20.05

PSD Results

Channel	Frequency	Ant B	Total	PSD	PSD
		Meas	Corr'd	Limit	Margin
		PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
144	5720	2.26	2.26	30.00	-27.74

Page 248 of 884

enter Fi	req 5.720000000	GHz	SENSE:II	n Avall	ALIGN AUTO Type: RMS fold: 100/100	09:35:02 AMNov 14, 2016 TRACE 1 2 3 4 5 6 TYPE A WWWWW	Frequency
		IFGain:Low	Atten: 30 dB		Mket		Auto Tune
0 dB/div	Ref Offset 11.5 dB Ref 30.00 dBm				Band Pov	ver 9.951 dBm	
20.0							Center Free
10.0				_	1		5.720000000 GH
.00							
0.0		1					Start Free
0.0		J. W.			X		5.695000000 GH
0.0		/			N.		
0.0	and the second sec				Stratteres .		Stop Free
0.0							5.745000000 GH
tart 5.69	500 GHz					stop 5.74500 GHz	CF Step
Res BW	1.0 MHz	#VB\	V 3.0 MHz*		Sweep 1.0	000 ms (1001 pts)	5.000000 MH
KR MODE TR	f 5.72	28 05 GHz	4.018 dBm	Band Power	6.100 MHz	EUNCTION VALUE 9.951 dB	
2 3							Freq Offse
4 5							0 H
6 7							
8							
9							



Page 249 of 884

8.28.2. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

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

RESULTS

Channel	Frequency	6 dB Bandwidth
	(MHz)	(MHz)
144	5720	4.00

6 dB BANDWIDTH



Page 250 of 884

8.29. 802.11n HT20 2Tx (ANTENNA A + ANTENNA B) CDD MODE IN THE 5.6 GHz BAND

8.29.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency	26 dB BW	26 dB BW
		Ant A	Ant B
	(MHz)	(MHz)	(MHz)
Low	5500	22.08	21.80
Mid	5580	22.12	21.60
High	5700	22.00	21.72
144	5720	22.16	21.76

Page 251 of 884

26 dB BANDWIDTH, ANTENNA A





Page 252 of 884





Page 253 of 884

26 dB BANDWIDTH, ANTENNA B





Page 254 of 884





Page 255 of 884

8.29.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency	99% BW	99% BW
		Ant A	Ant B
	(MHz)	(MHz)	(MHz)
Low	5500	17.679	17.553
Mid	5580	17.698	17.729
High	5700	17.750	17.627
144	5720	17.635	17.728

Page 256 of 884

99% BANDWIDTH, ANTENNA A





Page 257 of 884





Page 258 of 884

99% BANDWIDTH, ANTENNA B





Page 259 of 884





Page 260 of 884

8.29.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

RESULTS

ID:	39316	Date:	12/15/16

Average Power Results

Channel	Frequency	Ant A	Ant B	Total
		Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)
Low	5500	14.89	14.91	17.91
Mid	5580	15.45	15.40	18.44
High	5700	13.92	13.95	16.95
144	5720	15.48	15.23	18.37

UL VERIFICATION SERVICES INC. 47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888 This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Page 261 of 884

8.29.4. OUTPUT POWER AND PSD

<u>LIMITS</u>

FCC §15.407 (a) (2)

For the band 5.47–5.725 GHz, the maximum conducted output power over the frequency band 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 MHz. In addition, the maximum 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.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Straddle channel power is measured using PXA spectrum analyzer, duty cycle correction factor is required.

Page 262 of 884

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Ant A	Ant B	Uncorrelated Chains	
Antenna	Antenna	Directional	
Gain	Gain	Gain	
(dBi)	(dBi)	(dBi)	
3.39	3.17	3.28	

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Ant A	Ant B	Correlated Chains	
Antenna	Antenna	Directional	
Gain	Gain	Gain	
(dBi) (dBi)		(dBi)	
3.39	3.17	6.29	

Page 263 of 884

RESULTS

ID: 39316	Date:	12/15/16
-----------	-------	----------

0.00

Bandwidth, Antenna Gain and Limits

Channel	Frequency	Min	Min	Directional	Directional	Power	PSD
		26 dB	99%	Gain	Gain	Limit	Limit
		BW	BW	for Power	for PSD		
	(MHz)	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(dBm)
Low	5500	21.80	17.553	3.28	6.29	23.44	10.71
Mid	5580	21.60	17.698	3.28	6.29	23.48	10.71
High	5700	21.72	17.627	3.28	6.29	23.46	10.71

Duty Cycle CF (dB)

Included in Calculations of Corr'd PSD

Output Power Results

Channel	Frequency	Ant A	Ant B	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	14.89	14.91	17.91	23.44	-5.53
Mid	5580	15.45	15.40	18.44	23.48	-5.04
High	5700	13.92	13.95	16.95	23.46	-6.52

PSD Results

Channel	Frequency	Ant A	Ant B	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	4.612	4.451	7.54	10.71	-3.17
Mid	5580	5.084	5.594	8.36	10.71	-2.35
High	5700	2.71	3.756	6.27	10.71	-4.44

PSD, ANTENNA A





Page 265 of 884



PSD, ANTENNA B



Page 266 of 884





Page 267 of 884

8.30. 802.11ac VHT20 2Tx (ANTENNA A + ANTENNA B) CDD STRADDLE CHANNEL 144 RESULTS

8.30.1. OUTPUT POWER AND PSD

UNII-2C BAND

Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min	Directional	Directional	Power	PSD
		26 dB	Gain	Gain	Limit	Limit
		BW	for Power	for PSD		
	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(dBm)
144	5720	15.88	3.28	6.29	23.01	10.71

Duty Cycle CF (dB) 0.00	Included in Calculations of Corr'd Power & PSD
-------------------------	--

Output Power Results

Channel	Frequency	Ant A	Ant B	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
144	5720	14.05	13.95	17.01	23.01	-6.00

PSD Results

Channel	Frequency	Ant A	Ant B	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
144	5720	4.28	4.25	7.27	10.71	-3.44

OUTPUT POWER, ANTENNA A



OUTPUT POWER, ANTENNA B



Page 269 of 884

PSD, ANTENNA A



PSD, ANTENNA B



Page 270 of 884

UNII-3 BAND

Antenna Gain and Limit

Channel	Frequency	Min	Directional	Directional	Power	PSD
		26 dB	Gain	Gain	Limit	Limit
		BW	For Power	For PSD		
	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(dBm)
144	5720	5.88	3.28	6.29	30.00	29.71

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PSD

Output Power Results

Channel	Frequency	Ant A	Ant B	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
144	5720	9.45	9.50	12.49	30.00	-17.51

PSD Results

Channel	Frequency	Ant A	Ant B	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
144	5720	1.82	1.82	4.83	29.71	-24.88

Page 271 of 884

OUTPUT POWER, ANTENNA A



OUTPUT POWER, ANTENNA B



Page 272 of 884
PSD, ANTENNA A



PSD, ANTENNA B



Page 273 of 884

8.30.2. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

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

RESULTS

Channel	Frequency	6 dB BW	6 dB BW	
		Ant A	Ant B	
	(MHz)	(MHz)	(MHz)	
144	5720	3.920	3.880	

UL VERIFICATION SERVICES INC. 47173 BENICIA STREET, FREMONT, CA 94538, USA This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Page 274 of 884

ANTENNA A



ANTENNA B



Page 275 of 884

8.31. 802.11n HT20 2Tx (ANTENNA A + ANTENNA B) STBC MODE IN THE 5.6 GHz BAND

8.31.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency	26 dB BW	26 dB BW
		Ant A	Ant B
	(MHz)	(MHz)	(MHz)
Low	5500	22.200	21.880
Mid	5580	22.120	21.680
High	5700	22.160	21.640
144	5720	22.080	21.800

Page 276 of 884

26 dB BANDWIDTH, ANTENNA A





Page 277 of 884





Page 278 of 884

26 dB BANDWIDTH, ANTENNA B





Page 279 of 884





Page 280 of 884

8.31.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel Frequency		99% BW	99% BW
		Ant A	Ant B
	(MHz)	(MHz)	(MHz)
Low	5500	17.707	17.670
Mid	5580	17.725	17.747
High	5700	17.727	17.695
144	5720	17.733	17.693

Page 281 of 884

99% BANDWIDTH, ANTENNA A





Page 282 of 884





Page 283 of 884

99% BANDWIDTH, ANTENNA B





Page 284 of 884

Agilent 02:42:57 Sep 1	9,2016			Measure
Ch Freq 5.7 Occupied Bandwidth	GHz	Averages: 20	Trig Free	Meas Off
				Channel Power
APv5.4(101216),40802,				
Ref 20 dBm #Atten #Samp Log				Occupied BW
10 dB/ 0ffst 11.5				ACP
dB			Span 40 MHz	Multi Carrier Power
#Res BW 360 kHz	#VBW 1.1 MHz	Sweep 1.066 ms	s (1000 pts)	Douton Stat
Occupied Bandwidt	:h 51 MH ~	Occ BW % Pwr x dB	99.00 % -26.00 dB	CCDF
Transmit Freq Error	-9.314 kHz 20 660 MH7*			More 1 of 2



Page 285 of 884

8.31.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

RESULTS

ID:	39316	Date:	12/14/16

Average Power Results

Channel	Frequency	Ant A	Ant B	Total
		Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)
Low	5500	14.98	14.96	17.98
Mid	5580	16.44	16.86	19.67
High	5700	13.96	13.91	16.95
144	5720	16.48	16.87	19.69

UL VERIFICATION SERVICES INC. 47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888 This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Page 286 of 884

8.31.4. OUTPUT POWER AND PSD

<u>LIMITS</u>

FCC §15.407 (a) (2)

For the band 5.47–5.725 GHz, the maximum conducted output power over the frequency band 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 MHz. In addition, the maximum 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.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Straddle channel power is measured using PXA spectrum analyzer, duty cycle correction factor is required.

Page 287 of 884

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Ant A	Ant B	Uncorrelated Chains
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
3.39	3.17	3.28

UL VERIFICATION SERVICES INC. 47173 BENICIA STREET, FREMONT, CA 94538, USA This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Page 288 of 884

RESULTS

ID:	39316	Date:	12/14/16
-----	-------	-------	----------

0.00

Bandwidth, Antenna Gain and Limits

Channel	Frequency	Min	Min	Directional	Directional	Power	PSD
		26 dB	99%	Gain	Gain	Limit	Limit
		BW	BW	for Power	for PSD		
	(MHz)	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(dBm)
Low	5500	21.88	17.670	3.28	3.28	23.47	11.00
Mid	5580	21.68	17.725	3.28	3.28	23.49	11.00
High	5700	21.64	17.6951	3.28	3.28	23.48	11.00

Duty Cycle CF (dB)

Included in Calculations of Corr'd PSD

Output Power Results

Channel	Frequency	Ant A	Ant B	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	14.98	14.96	17.980	23.47	-5.49
Mid	5580	16.44	16.86	19.665	23.49	-3.82
High	5700	13.96	13.91	16.945	23.48	-6.53

PSD Results

Channel	Frequency	Ant A	Ant B	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	6.281	6.163	9.233	11.00	-1.77
Mid	5580	6.218	6.024	9.132	11.00	-1.87
High	5700	6.259	6.074	9.178	11.00	-1.82

Page 289 of 884

PSD, ANTENNA A





Page 290 of 884



PSD, ANTENNA B



Page 291 of 884





Page 292 of 884

8.32. 802.11ac VHT20 2Tx (ANTENNA A + ANTENNA B) STBC STRADDLE CHANNEL 144 RESULTS

8.32.1. OUTPUT POWER AND PSD

UNII-2C BAND

Bandwidth, Antenna Gain, and Limits

Channel	Frequency	Min	Directional	Directional	Power	PSD
		26 dB	Gain	Gain	Limit	Limit
		BW	for Power	for PSD		
	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(dBm)
144	5720	16.04	3.28	3.28	23.05	11.00

 Duty Cycle CF (dB)
 0.00
 Included in Calculations of Corr'd Power & PSD

Output Power Results

Channel	Frequency	Ant A	Ant B	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
144	5720	15.51	15.90	18.72	23.05	-4.33

PSD Results

Channel	Frequency	Ant A	Ant B	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
144	5720	5.861	6.191	9.04	11.00	-1.96

Page 293 of 884

OUTPUT POWER, ANTENNA A



OUTPUT POWER, ANTENNA B



Page 294 of 884

PSD, ANTENNA A



PSD, ANTENNA B



Page 295 of 884

UNII-3 BAND

Antenna Gain and Limit

Channel	Frequency	Min	Directional	Directional	Power	PSD
		26 dB	Gain	Gain	Limit	Limit
		BW	For Power	For PSD		
	(MHz)	(MHz)	(dBi)	(dBi)	(dBm)	(dBm)
144	5720	6.04	3.28	3.28	30.00	30.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PSD
	0.00	

Output Power Results

Channel	Frequency	Ant A	Ant B	Total	Power	Power
		Meas	Meas	Corr'd	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
144	5720	9.14	9.51	12.34	30.00	-17.66

PSD Results

Channel	Frequency	Ant A	Ant B	Total	PSD	PSD
		Meas	Meas	Corr'd	Limit	Margin
		PSD	PSD	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
144	5720	1.43	1.96	4.71	30.00	-25.29

Page 296 of 884

OUTPUT POWER, ANTENNA A



OUTPUT POWER, ANTENNA B



Page 297 of 884

PSD, ANTENNA A



PSD, ANTENNA B



Page 298 of 884

8.32.2. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

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

RESULTS

Channel	Channel Frequency		6 dB BW	
		Ant A	Ant B	
	(MHz)	(MHz)	(MHz)	
144	5720	3.880	3.840	

UL VERIFICATION SERVICES INC. 47173 BENICIA STREET, FREMONT, CA 94538, USA This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Page 299 of 884

ANTENNA A



ANTENNA B



Page 300 of 884