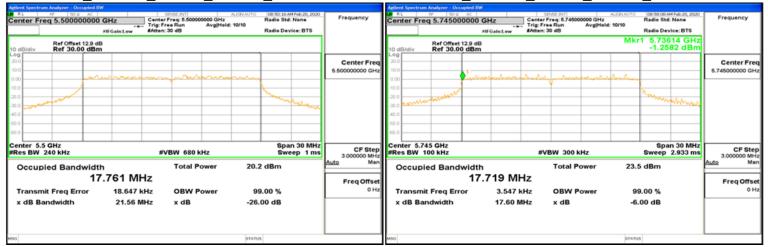


Page: 39 of 350

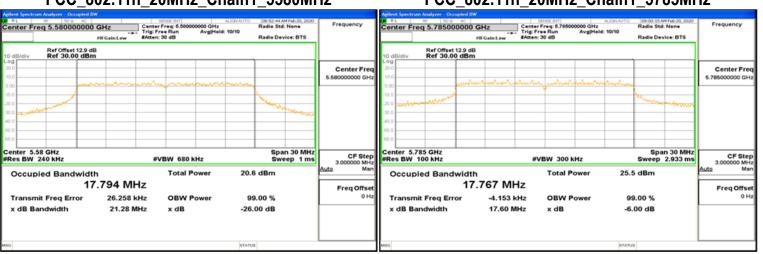
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FCC_802.11n_20MHz_Chain1_5745MHz



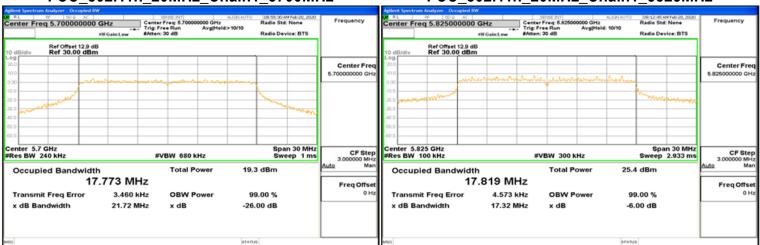
FCC 802.11n 20MHz Chain1 5580MHz

FCC 802.11n 20MHz Chain1 5785MHz



FCC 802.11n 20MHz Chain1 5700MHz

FCC 802.11n 20MHz Chain1 5825MHz



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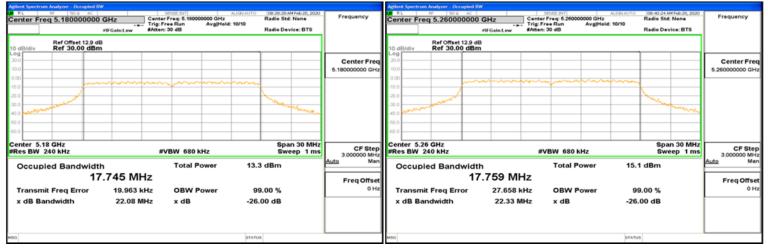
f (886-2) 2298-0488



Page: 40 of 350

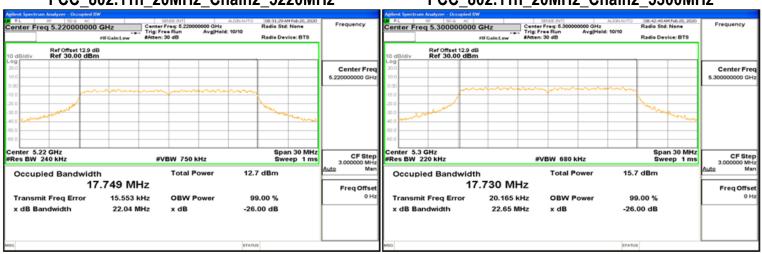
FCC_802.11n_20MHz_Chain2_5180MHz

FCC_802.11n_20MHz_Chain2_5260MHz



FCC 802.11n 20MHz Chain2 5220MHz

FCC 802.11n 20MHz Chain2 5300MHz



FCC 802.11n 20MHz Chain2 5240MHz

FCC 802.11n 20MHz Chain2 5320MHz



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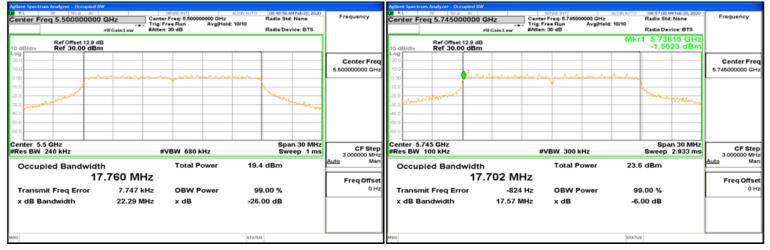
f (886-2) 2298-0488



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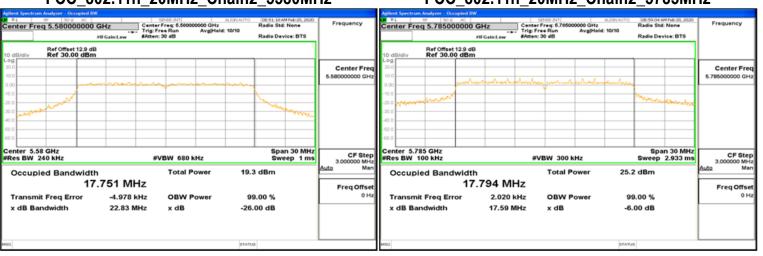
FCC_802.11n_20MHz_Chain2_5500MHz

FCC_802.11n_20MHz_Chain2_5745MHz



FCC 802.11n 20MHz Chain2 5580MHz

FCC 802.11n 20MHz Chain2 5785MHz



FCC 802.11n 20MHz Chain2 5700MHz

FCC 802.11n 20MHz Chain2 5825MHz



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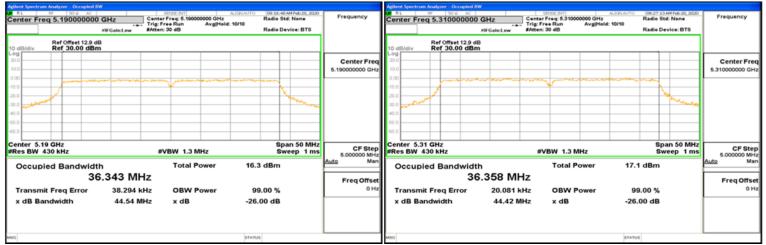
f (886-2) 2298-0488



Page: 42 of 350

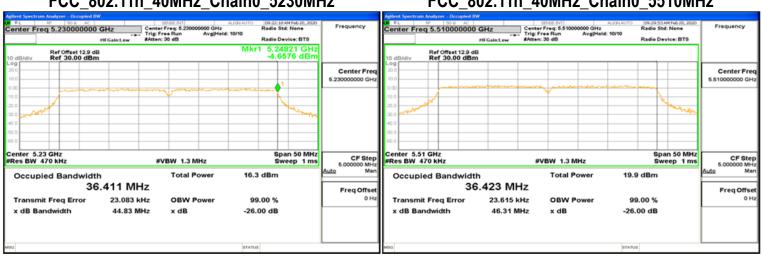
FCC_802.11n_40MHz_Chain0_5190MHz

FCC_802.11n_40MHz_Chain0_5310MHz



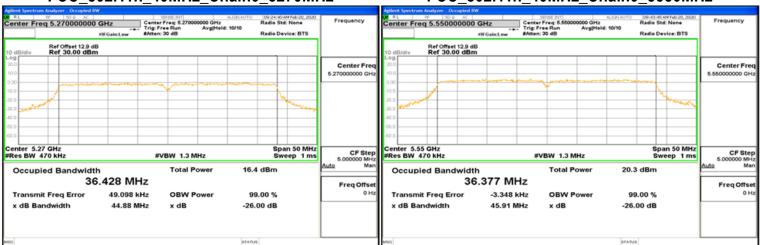
FCC 802.11n 40MHz Chain0 5230MHz

FCC 802.11n 40MHz Chain0 5510MHz



FCC 802.11n 40MHz Chain0 5270MHz

FCC 802.11n 40MHz Chain0 5550MHz



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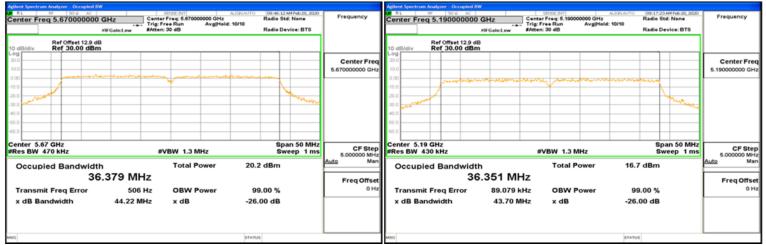
f (886-2) 2298-0488



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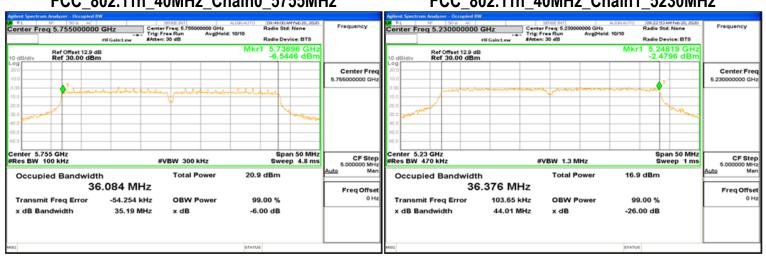
FCC_802.11n_40MHz_Chain0_5670MHz

FCC_802.11n_40MHz_Chain1_5190MHz



FCC 802.11n 40MHz Chain0 5755MHz

FCC 802.11n 40MHz Chain1 5230MHz



FCC 802.11n 40MHz Chain0 5795MHz

FCC 802.11n 40MHz Chain1 5270MHz



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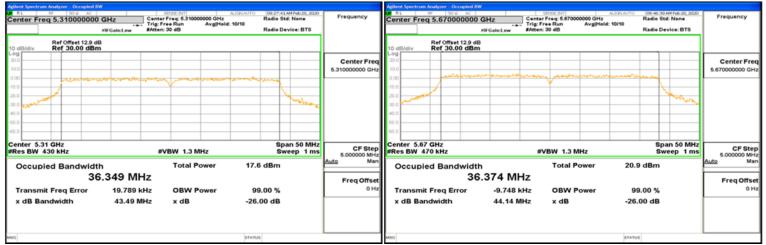
f (886-2) 2298-0488



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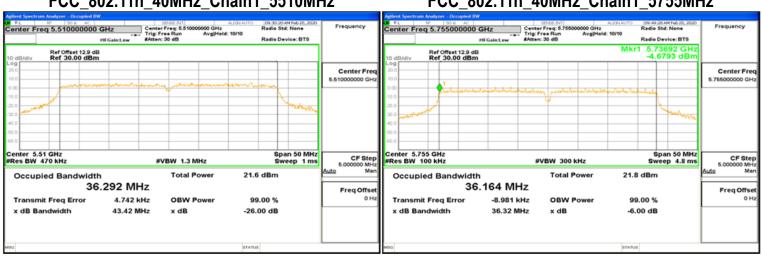
FCC_802.11n_40MHz_Chain1_5310MHz

FCC_802.11n_40MHz_Chain1_5670MHz



FCC 802.11n 40MHz Chain1 5510MHz

FCC 802.11n 40MHz Chain1 5755MHz



FCC 802.11n 40MHz Chain1 5550MHz

FCC 802.11n 40MHz Chain1 5795MHz



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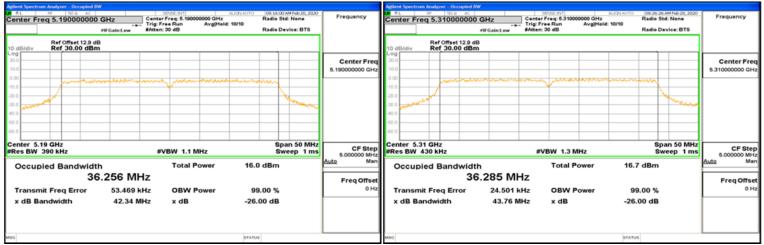
f (886-2) 2298-0488



Page: 45 of 350

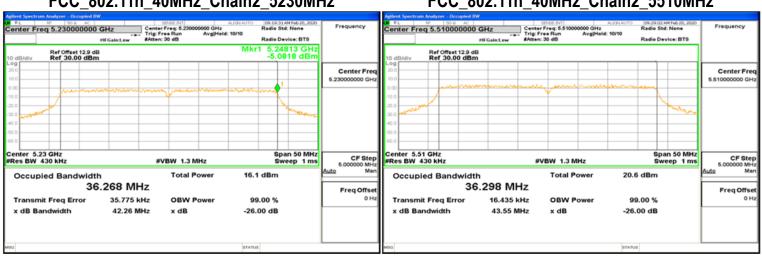
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FCC_802.11n_40MHz_Chain2_5310MHz



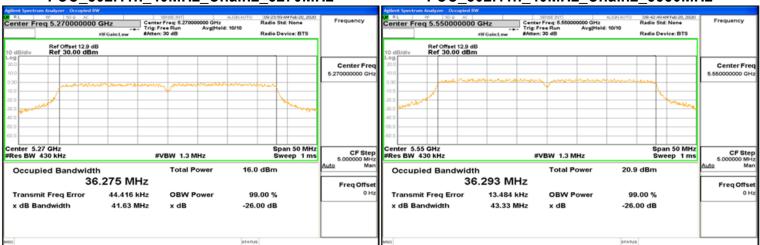
FCC 802.11n 40MHz Chain2 5230MHz

FCC 802.11n 40MHz Chain2 5510MHz



FCC 802.11n 40MHz Chain2 5270MHz

FCC 802.11n 40MHz Chain2 5550MHz



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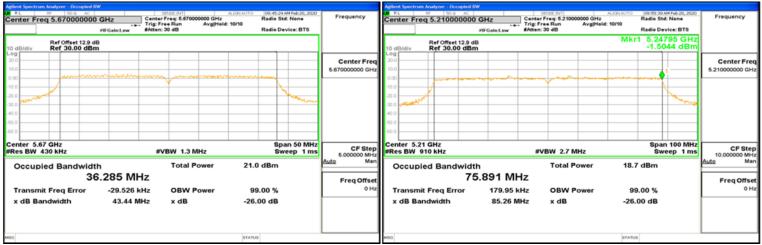
f (886-2) 2298-0488



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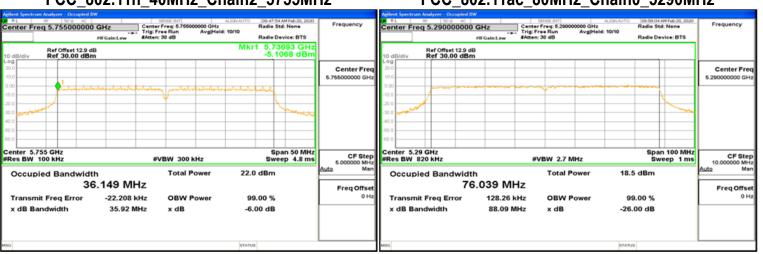
FCC_802.11n_40MHz_Chain2_5670MHz

FCC_802.11ac_80MHz_Chain0_5210MHz



FCC 802.11n 40MHz Chain2 5755MHz

FCC 802.11ac 80MHz Chain0 5290MHz



FCC 802.11n 40MHz Chain2 5795MHz

FCC 802.11ac 80MHz Chain0 5530MHz



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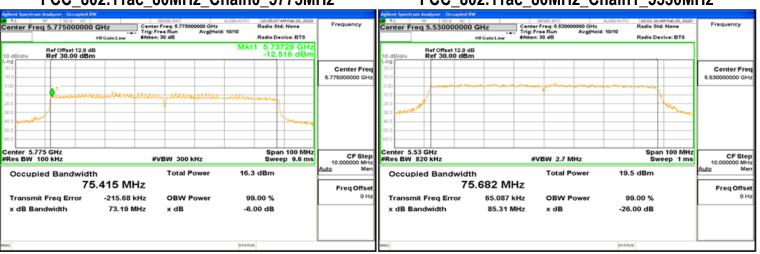
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FCC_802.11ac_80MHz_Chain1_5290MHz



FCC 802.11ac 80MHz Chain0 5775MHz

FCC 802.11ac 80MHz Chain1 5530MHz



FCC 802.11ac 80MHz Chain1 5210MHz

FCC 802.11ac 80MHz Chain1 5610MHz



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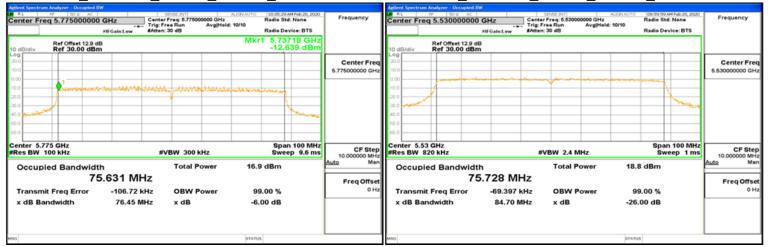
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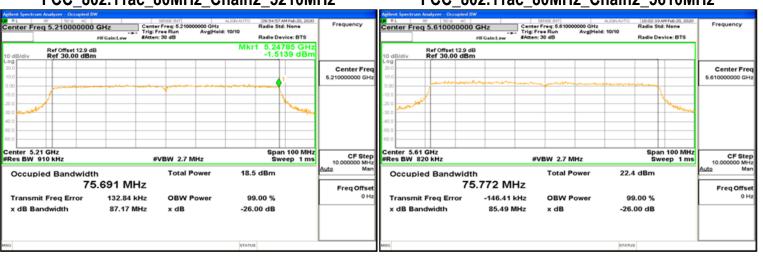
FCC_802.11ac_80MHz_Chain1_5775MHz

FCC_802.11ac_80MHz_Chain2_5530MHz



FCC 802.11ac 80MHz Chain2 5210MHz

FCC 802.11ac 80MHz Chain2 5610MHz



FCC 802.11ac 80MHz Chain2 5290MHz

FCC 802.11ac 80MHz Chain2 5775MHz



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8.5.3 99% BW Verification for DFS Function

202 11a Ch0

802 11a Ch1

802 11a Ch2

002.118	I_CIIU		002.116	1_0111		602.11a_C112			
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	
5240	5248.39	< 5250	5240	5248.25	< 5250	5240	5248.29	< 5250	
5745	5736.76	> 5725	5745	5736.75	> 5725	5745	5736.75	> 5725	
•				•				•	

802.11n HT20 Ch0

802.11n HT20 Ch1

802.11n HT20 Ch2

002.111			002.11.		•	002.1111120_0112				
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)		
5240	5248.89	< 5250	5240	5248.88	< 5250	5240	5248.89	< 5250		
5745	5736.17	> 5725	5745	5736.14	> 5725	5745	5736.15	> 5725		

802.11n HT40 Ch0

802.11n HT40 Ch1

802.11n HT40 Ch2

		-								
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)		
5230	5248.21	< 5250	5230	5248.19	< 5250	5230	5248.13	< 5250		
5755	5736.96	> 5725	5755	5736.92	> 5725	5755	5736.93	> 5725		

802.11ac _VHT80_Ch0

802.11ac _VHT80_Ch1

802.11ac _VHT80_Ch2

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.95	< 5250	5210	5247.87	< 5250	5210	5247.85	< 5250
5775	5737.29	> 5725	5775	5737.18	> 5725	5775	5737.25	> 5725

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MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

Standard Applicable

FCC

OPERZTION Band		EUT CATEGORY	LIMIT
		Access Point (Master device)	1 Watt(30dBm)
U-NII-1		Fixed point-to-point Access Ponit	1 Watt(30dBm)
	V	Mobile and portable client device	250mW(23.98dBm)
U-NII-2A			250mW(23.98dBm) or 11dBm+10 log B
U-NII-2C	V		250mW(23.98dBm) or 11dBm+10 log B
U-NII-3	V		1 Watt(30dBm)

If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum transmit power shall be reduced by the amount in dB that the direction-al gain of the antenna exceeds 6 dBi.

Note:

As per FCC KDB 662911 D01

Unequal antenna gains, with equal transmit powers. For antenna gains given by G1, G2, ..., GN dBi.

(i) If transmit signals are correlated, then Directional gain

= $10 \log[(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/N_{ANT}] dBi$

[Note the "20"s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

The antenna gain is grater than 6 dBi in MIMO mode, therefore the limit needs to be reduced as below:

	Effective Legacy Gain (dBi)	Conducted Power Limit (dBm)
UNII-1	9.77	26.23
UNII-2A	9.77	20.21
U-NII-2C	9.77	20.21
U-NII-3	9.77	26.23

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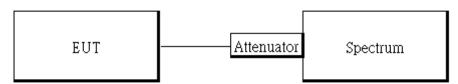
9.2 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
- 4. Power Meter is used as the auxiliary test equipment to conduct the output power measurement.
- Record the max. reading and add 10 log(1/duty cycle).
- 6. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.

9.3 Measurement Equipment Used

Measurement Lq	Measurement Equipment Osed											
Conducted Emission Test Site												
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.							
TYPE		NUMBER	NUMBER	CAL.								
Power Meter	Anritsu	ML2496A	1242004	11/05/2019	11/04/2020							
Power Sensor	Anritsu	MA2411B	1207365	11/05/2019	11/04/2020							
Power Sensor	Anritsu	MA2411B	1207368	11/05/2019	11/04/2020							
DC Power Supply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020							
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021							

9.4 Test Set-up



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9.5 **Measurement Result**

9.5.1 Conducted output power (FCC)

802.11a 3TX

011	Frequency	Data	Avg. F	OWER	(dBm)	TOTAL	TOTAL		REQUIRED	•	DE0111 T
СН	(MHz)	Rate	CH 0	CH 1	CH 2	POWER (dBm)	POWER (mW)		LIMIT (dBm)		RESULT
36	5180	6	6.92	6.77	7.2	11.87	15.371		26.22878745		PASS
44	5220	6	6.98	6.82	7.1	11.87	15.388		26.22878745		PASS
48	5240	6	6.87	6.72	7	11.77	15.026		26.22878745		PASS
52	5260	6	14.3	14.2	15	19.25	84.223	20.21	or 11+10log(B) =	24.32	PASS
60	5300	6	13.8	13.9	15	19.12	81.716	20.21	or 11+10log(B) =	23.95	PASS
64	5320	6	14.3	14.3	15	19.28	84.773	20.21	or 11+10log(B) =	23.92	PASS
100	5500	6	14.2	13.7	14	18.84	76.615	20.21	or 11+10log(B) =	24.68	PASS
116	5580	6	13.8	13.5	14	18.63	72.875	20.21	or 11+10log(B) =	24.11	PASS
140	5700	6	13.7	13.7	13	18.52	71.166	20.21	or 11+10log(B) =	24.14	PASS
149	5745	6	16.7	16.9	17	21.63	145.448		26.22878745		PASS
157	5785	6	18.2	18.5	18	23.18	207.916		26.22878745		PASS
165	5825	6	18.5	18.1	18	23.25	211.366		26.22878745		PASS

802.11n HT20 MIMO

	Frequency	Data	Avg. F	OWER	(dBm)	TOTAL	TOTAL		REQUIRED		
СН	(MHz)	Rate	CH 0	CH 1	CH 2	POWER (dBm)	POWER (mW)		LIMIT (dBm)		RESULT
36	5180	MCS16	6.84	7.44	7.5	12.50	17.786		26.22878745		PASS
44	5220	MCS16	7.08	7.39	7.5	12.53	17.919		26.22878745		PASS
48	5240	MCS16	7.34	7.42	7.5	12.65	18.411		26.22878745		PASS
52	5260	MCS16	9.29	9.25	9.8	14.67	29.288	20.21	or 11+10log(B) =	24.23	PASS
60	5300	MCS16	9.14	9.26	10	14.79	30.114	20.21	or 11+10log(B) =	24.16	PASS
64	5320	MCS16	9.22	9.13	10	14.84	30.473	20.21	or 11+10log(B) =	24.28	PASS
100	5500	MCS16	13.2	13.7	13	18.46	70.172	20.21	or 11+10log(B) =	24.29	PASS
116	5580	MCS16	13.3	13.7	13	18.52	71.099	20.21	or 11+10log(B) =	24.28	PASS
140	5700	MCS16	13	13.5	13	18.31	67.841	20.21	or 11+10log(B) =	24.35	PASS
149	5745	MCS16	16.3	16.9	16	21.77	150.227		26.22878745		PASS
157	5785	MCS16	18.1	18.2	18	23.22	209.912		26.22878745		PASS
165	5825	MCS16	18.3	18	18	23.29	213.108		26.22878745		PASS

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802.11n_HT40_MIMO

СН	Frequency	Data	Avg. F	POWER	(dBm)	TOTAL	TOTAL		REQUIRED LIMIT		RESULT
СП	(MHz)	Rate	CH 0	CH 1	CH 2	POWER (dBm)	POWER (mW)		(dBm)		RESULI
38	5190	MCS16	7.31	7.73	7.9	13.20	20.878		26.22878745		PASS
46	5230	MCS16	7.42	7.51	7.8	13.12	20.509		26.22878745		PASS
54	5270	MCS16	9.27	9.35	9.9	15.03	31.870	20.21	or 11+10log(B) =	27.17	PASS
62	5310	MCS16	9.15	9.18	10	14.99	31.551	20.21	or 11+10log(B) =	27.38	PASS
102	5510	MCS16	13.3	13.9	13	19.00	79.427	20.21	or 11+10log(B) =	27.38	PASS
110	5550	MCS16	13.2	14	13	19.02	79.798	20.21	or 11+10log(B) =	27.36	PASS
134	5670	MCS16	13.7	13.8	13	19.03	79.977	20.21	or 11+10log(B) =	27.38	PASS
151	5755	MCS16	14.3	14.3	14	19.69	93.147		26.22878745		PASS
159	5795	MCS16	17.1	17	16	22.41	174.295		26.22878745	•	PASS

802.11ac VHT80 MIMO

OCENTIAL TOTAL											
СН	Frequency	Data	Avg. F	OWER	(dBm)	TOTAL POWER	TOTAL POWER		REQUIRED LIMIT		RESULT
СП	(MHz)	Rate	CH 0	CH 1	CH 2		(mW)		(dBm)		RESULI
42	5210	MCS0	6.52	7.02	7.2	13.02	20.044		26.22878745		PASS
58	5290	MCS0	9.48	9.31	10	15.70	37.123	20.21	or 11+10log(B) =	30.35	PASS
106	5530	MCS0	9.47	9.98	9.6	15.79	37.898	20.21	or 11+10log(B) =	30.28	PASS
122	5610	MCS0	14.2	14.1	13	20.03	100.779	20.21	or 11+10log(B) =	30.32	PASS
155	5775	MCS0	8.95	8.84	8.5	14.87	30.700		26.22878745		PASS

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10 MAXIMUM POWER SPECTRAL DENSITY

10.1 Standard Applicable

FCC

OPERZTION Band		EUT CATEGORY	LIMIT
		Access Point (Master device)	17dBm/ MHz
U-NII-1		Fixed point-to-point Access Ponit	17 dBitti/ Wil IZ
	√	Mobile and portable client device	11dBm/ MHz
U-NII-2A	√		11dBm/ MHz
U-NII-2C	√		11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note:

As per FCC KDB 662911 D01

Unequal antenna gains, with equal transmit powers. For antenna gains given by G1, G2, ..., GN dBi.

(i) If transmit signals are correlated, then Directional gain

= $10 \log[(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/N_{ANT}] dBi$

[Note the "20"s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

The antenna gain is grater than 6 dBi in MIMO mode, therefore the limit needs to be reduced as below:

	Effective Legacy Gain (dBi)	PSD Limit	
UNII-1	9.77	13.23	dBm/MHz
UNII-2A	9.77	7.23	dBm/MHz
U-NII-2C	9.77	7.23	dBm/MHz
U-NII-3	9.77	26.23	dBm/500 kHz

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10.2 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.

4. For U-NII1, U-NII-2A, U-NII-2C Band:

Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

For U-NII-3 Band:

Set RBW=500 kHz, VBW≥ 3RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

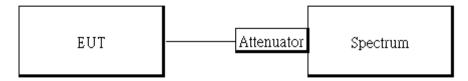
- 5. User the cursor on spectrum to peak search the highest level of trace
- 6. Record the max. reading and add 10 log(1/duty cycle).
- 7. Repeat above procedures until all default test channel (low, middle, and high) was complete.
- 8. 802.11n/ac MIMO mode: offset is set following "measure and add 10 Log (N)" on spectrum to measure the PSD for MIMO mode. Offset = cable loss + 10 log (N), where N is number of transmitting antenna. N=3 for this given application.

Note: For the test of PSD at MIMO mode, the highest emission of worst case employing Measure and add 10 log (N) technical is reported on this report after the comparison between Main Antenna at single transmitting mode and Aux that yields the higher value. The MIMO transmitting mode produces higher value of outcome.

10.3 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	05/02/2019	05/01/2020
DC Power Supply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021

10.4 Test Set-up



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10.5 **Measurement Result**

10.5.1 Power spectral density

	POWER DENS	SITY 802.1		3ТХ	
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5180.00	-0.22	0.15	-0.07	13.23	-13.30
5220.00	-0.23	0.15	-0.08	13.23	-13.31
5240.00	-0.12	0.15	0.03	13.23	-13.20
5260.00	6.72	0.15	6.87	7.23	-0.36
5300.00	6.94	0.15	7.09	7.23	-0.14
5320.00	7.01	0.15	7.16	7.23	-0.07
5500.00	6.85	0.15	7.00	7.23	-0.23
5580.00	6.90	0.15	7.05	7.23	-0.18
5700.00	7.03	0.15	7.18	7.23	-0.05
5745.00	7.41	0.15	7.56	26.23	-18.67
5785.00	9.02	0.15	9.17	26.23	-17.06
5825.00	9.24	0.15	9.39	26.23	-16.84
PC	WER DENSITY	802.11n F	T20 MODI	E MIMO	•
Frequency (MHz)	PSD W/O Duty Factor	Duty Factor	PSD With Duty Factor	Limit (dBm)	Margin (dB)
	(dBm)		(dBm)		
5180	-0.49	0.45	-0.04	13.23	-13.27
5220	-0.65	0.45	-0.20	13.23	-13.43
5240	-0.51	0.45	-0.06	13.23	-13.29
5260	1.43	0.45	1.88	7.23	-5.35
5300	1.98	0.45	2.43	7.23	-4.80
5320	2.18	0.45	2.63	7.23	-4.60
5500	5.81	0.45	6.26	7.23	-0.97
5580	5.72	0.45	6.17	7.23	-1.06
5700	5.92	0.45	6.37	7.23	-0.86
3700				l 	
5745	6.29	0.45	6.74	26.23	-19.49
	6.29 8.43	0.45 0.45	6.74 8.88	26.23 26.23	-19.49 -17.35

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РО	POWER DENSITY 802.11n HT40 MODE_MIMO					
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)	
5190	-1.67	0.76	-0.91	13.23	-14.13	
5230	-1.56	0.76	-0.80	13.23	-14.02	
5270	-1.22	0.76	-0.46	7.23	-7.68	
5310	-0.94	0.76	-0.18	7.23	-7.40	
5510	3.31	0.76	4.07	7.23	-3.15	
5550	3.74	0.76	4.50	7.23	-2.72	
5670	2.83	0.76	3.59	7.23	-3.63	
5755	1.12	0.76	1.88	26.23	-24.34	
5795	4.40	0.76	5.16	26.23	-21.06	
POV	POWER DENSITY 802.11ac VHT80 MODE_MIMO					
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)	
5210	-5.32	1.33	-3.99	13.23	-17.22	
5290	-3.95	1.33	-2.62	7.23	-9.85	
5530	-2.99	1.33	-1.66	7.23	-8.89	
5610	1.24	1.33	2.57	7.23	-4.66	
5775	-7.11	1.33	-5.78	26.23	-32.01	

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802.11a 20MHz 5180MHz

802.11a 20MHz 5260MHz





802.11a 20MHz 5220MHz

802.11a 20MHz 5300MHz





802.11a 20MHz 5240MHz

802.11a 20MHz 5320MHz





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