IEEE 802.11ac VHT40 Mode / 5150 ~ 5250MHz



Date: 22.DEC.2023 15:24:40

5230MHz



Date: 22.DEC.2023 15:22:59

IEEE 802.11ac VHT80 Mode / 5150 ~ 5250MHz



5210MHz

Date: 22.DEC.2023 15:09:57

11 FCC §15.407(a)(e) & RSS-247 §6.2, RSS-GEN §6.7 – Emission Bandwidth And Occupied Bandwidth

11.1 Applicable Standard

As per FCC §15.407(a): The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

As per FCC §15.407(e): for equipment operating in the band 5725 – 5850 MHz, the minimum 6 dB bandwidth of U-NII devices shall be 500 kHz.

RSS-247 Clause 6.2.1.2

For transmitters with operating frequencies in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. Any unwanted emissions that fall into the band 5250-5350 MHz shall be attenuated below the channel power by at least 26 dB, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth (i.e. 99% bandwidth), above 5250 MHz. The 26 dB bandwidth may fall into the 5250-5350 MHz band; however, if the occupied bandwidth also falls within the 5250-5350 MHz band, the transmission is considered as intentional and the devices shall comply with all requirements in the band 5250-5350 MHz band; bHz including implementing dynamic frequency selection (DFS) and TPC, on the portion of the emission that resides in the 5250-5350 MHz band.

RSS-247 Clause 6.2.4.1

For equipment operating in the band 5725-5850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

11.2 Test Procedure

26dB Emission Bandwidth (EBW)

According to ANSI C63.10-2013 Section 12.4.1

a) Set RBW = approximately 1% of the emission bandwidth.

b) Set the VBW > RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission.

Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Minimum Emission Bandwidth for the band 5.725-5.85 GHz

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

a) Set RBW = 100 kHz.

b) Set the video bandwidth (VBW) \geq 3 × RBW.

c) Detector = Peak.

d) Trace mode = max hold.

- e) Sweep = auto couple.
- f) Allow the trace to stabilize.

g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

99% Occupied Bandwidth:

According to ANSI C63.10-2013 Section 12.4.2&6.9.3

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

d) Step a) through step c) might require iteration to adjust within the specified range.

e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

11.3 Test Results

Test mode: Transmitting

5150-5250MHz

UNII Band	Mode	ModeChannelFrequency (MHz)26dB Emission Bandwidth (MHz)		99% Emission Bandwidth (MHz)	
		36	5180	21.40	16.66
	802.11a	40	5200	21.44	16.70
UNII-1		48	5240	21.48	16.70
	802.11ac 20	36	5180	22.44	17.94
		40	5200	21.88	17.82
		48	5240	23.76	17.86
	802.11ac 40	38	5190	45.60	36.36
		46	5230	47.28	36.60
	802.11ac 80	42	5210	82.08	75.44

The 99% Occupied Bandwidth have not fallen into the band 5250-5350MHz, please refer to the test plots of 99% Occupied Bandwidth.

5250-5350MHz

UNII Band Mode Channel Frequency (MHz)		26dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)		
		52	5260	21.44	16.70
UNII-2A	802.11a	60	5300	21.56	16.70
		64	5320	21.48	16.66
	802.11ac 20	52	5260	23.24	17.82
		60	5300	23.36	17.78
		64	5320	22.76	17.90
	802.11ac 40	54	5270	47.12	36.44
		62	5310	41.12	36.36
	802.11ac 80	58	5290	81.60	75.60

Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

No.: RXZ231115070RF03

5470-5725MHz

UNII Band Mode Channel Frequency (MHz)		26dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)		
		100	5500	21.40	16.66
	802.11a	116	5580	21.44	16.70
		140	5700	21.64	16.70
UNII-2C	802.11ac 20	100	5500	21.96	17.86
		116	5580	22.56	17.78
		140	5700	22.32	17.82
	802.11ac 40	102	5510	43.12	36.44
		110	5550	44.88	36.52
		134	5670	45.28	36.44
	802.11ac 80	106	5530	81.28	75.76
		122	5610	82.88	75.60

5725-5850MHz

UNII Band	Mode	Channel	Frequency (MHz)	6dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)	Limit (kHz)	Result
UNII-3	802.11a	149	5745	16.36	16.66	≥500	PASS
		157	5785	16.32	16.66	≥500	PASS
		165	5825	16.32	16.74	≥500	PASS
	802.11ac 20	149	5745	17.56	17.82	≥500	PASS
		157	5785	17.56	17.94	≥500	PASS
		165	5825	17.56	17.94	≥500	PASS
	802.11ac 40	151	5755	36.32	36.44	≥500	PASS
		159	5795	36.32	36.44	≥500	PASS
	802.11ac 80	155	5775	75.52	75.92	≥500	PASS

The 99% Occupied Bandwidth have not fallen into the band 5470-5725MHz, please refer to the test plots of 99% Occupied Bandwidth.

Please refer to the following plots

Transmitting Mode:

UNII-1 Band I / BW 26dBc IEEE 802.11a Mode / 5150 ~ 5250MHz

5180MHz Spectrum Ref Level 30.00 dBm Offset 11.30 dB @ RBW 300 kHz SWT 18.9 µs 👄 VBW Att 30 dB 1 MHz Mode Auto FFT 1Pk Max M1[1] -18.01 dBr 5.1692000 GH 20 dBm M2[1] 8.16 dBm 5.1783620 GHz M2 10 dBm 0 dBm--10 dBm M1, -20 dBm Sm -30 dBm -40 dBm -50 dBm -60 dBm CF 5.18 GHz 1001 pts Span 40.0 MHz Marker Type | Ref | Trc Function Result Function X-value Y-value М1 5.1692 GHz -18.01 dBm 1 D1 M1 1 21.4 MHz 0.05 dB 5.178362 GHz M2 8.16 dBm 1 144 n

Date: 21.Nov.2023 15:57:36



5200MHz

Date: 21.NOV.2023 16:12:50



Date: 21.NOV.2023 16:15:40

IEEE 802.11ac VHT20 Mode / 5150 ~ 5250MHz



Date: 4.DEC.2023 09:10:30

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Date: 4.DEC.2023 09:13:30

5240MHz



Date: 4.DEC.2023 09:16:35

IEEE 802.11ac VHT40 Mode / 5150 ~ 5250MHz



5190MHz

Date: 4.DEC.2023 09:52:59

5230MHz



Date: 4.DEC.2023 09:56:41

IEEE 802.11ac VHT80 Mode / 5150 ~ 5250MHz



5210MHz

Date: 4.DEC.2023 10:19:31

UNII-2A Band II / BW 26dBc IEEE 802.11a Mode / 5250 ~ 5350MHz

Spectr	um	L						
Ref Le	evel 3	30.00 d	Bm Offset	11.30 dB	RBW 300 kHz			
Att		30	dB SWT	18.9 µs	VBW 1 MHz	Mode Auto FF	Т	
1Pk Ma	ж							
						M1[1]		-18.13 dBn
20 dBm-	_							5.2492000 GH
Lo dom						M2[1]		8.09 dBn
10 dBm-	-			_	M2			5.2583220 GH
20 000					inter	mon		
0 dBm—				Junio	and a second second second second			
o abin				1				
-10 dBm	_		/					
10 000			MI				D 1	
-20 dBm	D	1 -17.9	10 dBm	_			A	
20 00.00	-	m	\sim				v	m
-30 dem	~ ~	~						~~~
0.51/50/71/51/00								
-40 dBm	\rightarrow			_			_	
-50 dBm	\rightarrow						_	
-60 dBm	+							
CF 5.26	i GHz				1001 p	ts		Span 40.0 MHz
larker								
Type	Ref	Trc	X-val	ue	Y-value	Eunction	Functi	on Result
M1		1	5.1	2492 GHz	-18.13 dBm	. unston	T unce	on noo an
D1	M1	1	2	1.44 MHz	0.13 dB			
M2		1	5.25	3322 GHz	8.09 dBm			

Date: 21.NOV.2023 16:19:39



Date: 21.NOV.2023 16:21:48

5320MHz



Date: 21.NOV.2023 16:23:22

IEEE 802.11ac VHT20 Mode / 5250 ~ 5350MHz



5260MHz

Date: 4.DEC.2023 09:18:59

5300MHz



Date: 4.DEC.2023 09:22:04



Date: 4.DEC.2023 09:28:33

IEEE 802.11ac VHT40 Mode / 5250 ~ 5350MHz



Date: 4.DEC.2023 09:58:55

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Date: 4.DEC.2023 10:01:13

IEEE 802.11ac VHT80 Mode / 5250 ~ 5350MHz

5290MHz Spectrum Ref Level 30.00 dBm Offset 11.30 dB 📾 RBW 1 MHz Att 30 dB SWT 22.9 µs 👄 VBW 3 MHz Mode Auto FFT IPk Max M1[1] -20.36 dBn 5.249360 GHz 20 dBm M2[1] 5.35 dBn 5.288240 GHz 10 dBm 0 dBm--10 dBm M 20 dBm 01 -20.650 iBm m ٨A 30 dBro AA -40 dBm -50 dBm -60 dBm CF 5.29 GHz 1001 pts Span 160.0 MHz Marker Type | Ref | Trc Function Result X-value Y-value Function 5.24936 GHz -20.36 dBm M1 1 D1 M1 81.6 MHz -0.42 dB 1 5.28824 GHz M2 1 5.35 dBm 14 STREET, STREET

Date: 4.DEC.2023 10:21:48

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UNII-2C Band III / BW 26dBc IEEE 802.11a Mode / 5470 ~ 5725MHz

5500MHz Spectrum Ref Level 30.00 dBm Offset 11.30 dB 🖷 RBW 300 kHz Att 30 dB SWT 18.9 µs 👄 VBW 1 MHz Mode Auto FFT 1Pk Max -18.01 dBm M1[1] 5.489200 GHz 20 dBm 8.25 dBm 5.498322 GHz M2[1] MO 10 dBm 0 dBm--10 dBm M1 -17.750 -20 dBm 30 dBm 40 dBm -50 dBm -60 dBm Span 40.0 MHz 1001 pts CF 5.5 GHz Marker Type | Ref | Trc | Y-value Function Function Result X-value 5.4892 GHz 21.4 MHz M1 -18.01 dBm D1 0.13 dB M1 1 M2 5.498322 GHz 8.25 dBm CONTRACTOR DE LA CALCONICIÓN DE LA CALCONICICAL DE LA CALCONICICA 440

Date: 4.DEC.2023 10:44:52



5580MHz

Date: 21.NOV.2023 16:27:30



Date: 21.NOV.2023 16:30:01

IEEE 802.11ac VHT20 Mode / 5470 ~ 5725MHz



Date: 4.DEC.2023 09:35:41

₽ Spectrum Ref Level 30.00 dBm Offset 11.30 dB 🖷 RBW 300 kHz Att 30 dB SWT 18.9 µs 👄 VBW 1 MHz Mode Auto FFT ●1Pk Max M1[1] -18.50 dBn 5.5689200 GHz 20 dBm 7.50 dBm 5.5808390 GHz M2[1] 10 dBm 0 dBm--10 dBm M: -20 dBm-D1 -18.500 nn -30 dBm -40 dBm -50 dBm -60 dBm Span 40.0 MHz 1001 pts CF 5.58 GHz Marker Y-value -18.50 dBm -0.25 dB Type | Ref | Trc X-value Function Function Result 5.56892 GHz 22.56 MHz M1 1 D1 M1 1 7.50 dBm M2 5.580839 GHz 1 ER I 4.46

Date: 4.DEC.2023 09:40:37

5700MHz



Date: 4.DEC.2023 09:42:19

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5580MHz

IEEE 802.11ac VHT40 Mode / 5470 ~ 5725MHz



5510MHz

Date: 4.DEC.2023 10:03:43

5550MHz Spectrum Ref Level 30.00 dBm Offset 11.30 dB 🖷 RBW 500 kHz Att 30 dB SWT 18.9 µs 👄 VBW 2 MHz Mode Auto FFT 1Pk View M1[1] -19.81 dBn 5.5299200 GHz 20 dBm M2[1] 6.35 dBn 5.5481620 GHz 10 dBm Y n 0 dBm--10 dBm м 01 -19.650 -20 dBm M ... m SO dBM -40 dBm -50 dBm -60 dBm CF 5.55 GHz 1001 pts Span 80.0 MHz Marker Type | Ref | Trc Function Result X-value Y-value Function 5.52992 GHz -19.81 dBm M1 1 D1 M1 44.88 MHz -0.07 dB 1 5.548162 GHz M2 1 6.35 dBm 10 **CONTRACTOR**

Date: 24.JAN.2024 10:20:00

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₽ Spectrum Ref Level 30.00 dBm Offset 11.30 dB 🖷 RBW 500 kHz Att 30 dB SWT 18.9 µs 🖷 VBW 2 MHz Mode Auto FFT ●1Pk Max M1[1] -19.23 dBn 5.6499200 GH 20 dBm M2[1] 6.82 dBn 5.6670430 GHz 10 dBm X 0 dBm--10 dBm M D1 -19.180 -20 dBmnt **สถ**ิ นอก -40 dBm -50 dBm -60 dBm 1001 pts Span 80.0 MHz CF 5.67 GHz Marker Y-value -19.23 dBm Type | Ref | Trc X-value Function Function Result 5.64992 GHz 45.28 MHz M1 1 D1 -0.10 dB M1 1 M2 5.667043 GHz 6.82 dBm 1 100 4.46

Date: 4.DEC.2023 10:06:12

IEEE 802.11ac VHT80 Mode / 5470 ~ 5725MHz



Date: 4.DEC.2023 10:24:02

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5670MHz



Date: 4.DEC.2023 10:26:15

UNII-3 Band IV / BW 6dBc IEEE 802.11a Mode / 5725 ~ 5850MHz



Date: 21.NOV.2023 16:32:33



Date: 21.NOV.2023 16:34:53

5825MHz



Date: 21.NOV.2023 16:36:58

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IEEE 802.11ac VHT20 Mode / 5725 ~ 5850MHz



5745MHz

Date: 4.DEC.2023 09:44:36

5785MHz



Date: 4.DEC.2023 09:46:41

₽ Spectrum Ref Level 30.00 dBm Offset 11.30 dB 🖷 RBW 100 kHz Att 30 dB SWT 56.9 µs 👄 **VBW** 300 kHz Mode Auto FFT ●1Pk Max M1[1] -1.77 dBn 5.8162000 GH: 20 dBm 4.04 dBm 5.8274780 GHz M2[1] 10 dBm 7 M1 Marsh 0 dBm-D1 -1.960 di -10 dBm -20 dBm m -30 dBm Wallhall handraken manutury -40 dBm -50 dBm -60 dBm Span 40.0 MHz CF 5.825 GHz 1001 pts Marker Type | Ref | Trc X-value Y-value Function **Function Result** 5.8162 GHz 17.56 MHz -1.77 dBm -0.16 dB M1 1 D1 M1 1 M2 5.827478 GHz 4.04 dBm 100 4.46

5825MHz

Date: 4.DEC.2023 09:48:57

IEEE 802.11ac VHT40 Mode / 5725 ~ 5850MHz



Date: 4.DEC.2023 10:12:39

₽ Spectrum Ref Level 30.00 dBm Offset 11.30 dB 🖷 RBW 100 kHz Att 30 dB SWT 94.8 µs 👄 **VBW** 300 kHz Mode Auto FFT • 1Pk Max M1[1] -4.75 dBn 5.7768400 GH 20 dBm M2[1] 1.34 dBn 5.7986760 GHz 10 dBm M2 tube to the 0 dBm 3. John Jahr Market d d d d d b D1 -4.660 -10 dBm -20 dBm and and a second and Well. widen by the property of the property of the -40 dBm -50 dBm -60 dBm Span 80.0 MHz CF 5.795 GHz 1001 pts Marker Type | Ref | Trc X-value Y-value Function **Function Result** 5.77684 GHz 36.32 MHz -4.75 dBm M1 1 D1 -0.07 dB M1 1 M2 5.798676 GHz 1.34 dBm 100 4.46

5795MHz

Date: 4.DEC.2023 10:15:02

IEEE 802.11ac VHT80 Mode / 5725 ~ 5850MHz

5775MHz Spectrum Ref Level 30.00 dBm Offset 11.30 dB 🖷 RBW 100 kHz SWT 189.6 µs 🖷 VBW 300 kHz Att 30 dB Mode Auto FFT 1Pk Max M1[1] -3.66 dBn 5.737400 GHz 20 dBm M2[1] -1.82 dBn 5.790020 GHz 10 dBm 0 dBm-1 Heldelichtelson mellollellell THULLUU. HILLINE -7.820 -10 dBm -20 dBm whether and whether the -40 dBm -50 dBm -60 dBm CF 5.775 GHz 1001 pts Span 160.0 MHz Marker Type | Ref | Trc **Function Result** X-value Y-value Function 5.7374 GHz 75.52 MHz 3.66 dBm M1 1 D1 M1 -4.34 dB 1 M2 1 5.79002 GHz -1.82 dBm 1111 B 440

Date: 4.DEC.2023 10:28:50

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UNII-1 Band I / OBW 99% IEEE 802.11a Mode / 5150 ~ 5250MHz

5180MHz ₽ Spectrum Ref Level 30.00 dBm Offset 11.30 dB 👄 RBW 200 kHz 28.4 µs 🖷 VBW 30 dB SWT 1 MHz Mode Auto FFT Att ●1Pk Max M1[1] 5.79 dBr 5.1804000 GHz 20 dBm 16.663336663 MH Occ Bw 10 dBm mm And 0 dBm -10 dBm -20 dBm m m -30 dBm Www -40 dBm -50 dBm -60 dBm CF 5.18 GHz Span 40.0 MHz 1001 pts Marker Function Type | Ref | Trc **Function Result** X-value Y-value 5.79 dBm -3.07 dBm 5.1804 GHz M1 1 5.1716484 GHz 5.1883117 GHz Τ1 Occ Bw 16.663336663 MHz -3.54 dBm T2 1 440 10

Date: 21.NOV.2023 15:58:18



5200MHz

Date: 21.NOV.2023 16:13:33

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₽ Spectrum Ref Level 30.00 dBm Offset 11.30 dB 🖷 RBW 200 kHz Att 30 dB SWT 28.4 µs 🖷 VBW 1 MHz Mode Auto FFT ●1Pk Max M1[1] 6.15 dBn 5.2383220 GH 20 dBm Occ Bw 16.703296703 MH 10 dBm 6.4. no make An 0 dBm -10 dBm -20 dBm mm 1 -30, dam -40 dBm -50 dBm -60 dBm F1 Span 40.0 MHz 1001 pts CF 5.24 GHz Marker Type | Ref | Trc X-value Y-value Function Function Result 6.15 dBm -3.56 dBm 5.238322 GHz M1 1 Τ1 5.2316084 GHz Occ Bw 16.703296703 MHz 1 Τ2 5.2483117 GHz -3.41 dBm 1 4.362

5240MHz

Date: 21.NOV.2023 16:16:22

IEEE 802.11ac VHT20 Mode / 5150 ~ 5250MHz



Date: 4.DEC.2023 09:11:13



Date: 4.DEC.2023 09:14:12

5240MHz



Date: 4.DEC.2023 09:17:17

IEEE 802.11ac VHT40 Mode / 5150 ~ 5250MHz



5190MHz

Date: 4.DEC.2023 09:53:41

5230MHz



Date: 4.DEC.2023 09:57:23

IEEE 802.11ac VHT80 Mode / 5150 ~ 5250MHz



5210MHz

Date: 4.DEC.2023 10:20:13

UNII-2A Band II / OBW 99% IEEE 802.11a Mode / 5250 ~ 5350MHz



Date: 21.NOV.2023 16:20:22

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