10 RSS-247 §6.2.1.2 – 26dB Attenuated Below The Channel Power

10.1 Applicable Standard

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 including implementing dynamic frequency selection (DFS) and TPC, on the portion of the emission that resides in the 5250-5350 MHz band.

10.2 Test Procedure

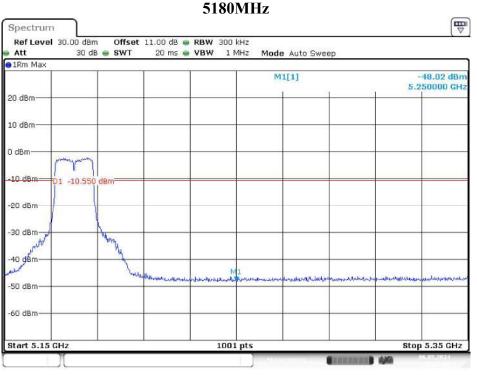
- 1. Set $RBW = 1\% \sim 5\%$ of the emission bandwidth.
- 2. Set the VBW > RBW.
- 3. Detector = RMS.
- 4. Trace mode = max hold
- 5. Measure the emission attenuated below the channel power

10.3 Test Results

The requirement is for 5150-5250 MHz band. The channel power please refer to the power test result in section 12.3.

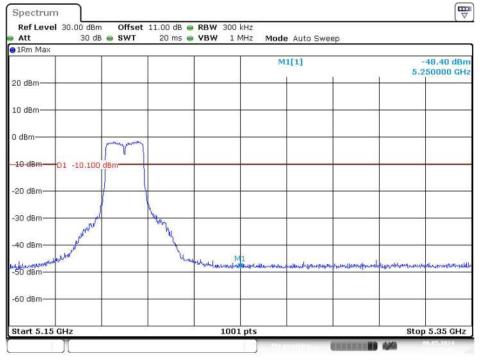
Transmitting Mode:

IEEE 802.11a Mode / 5150 ~ 5250MHz



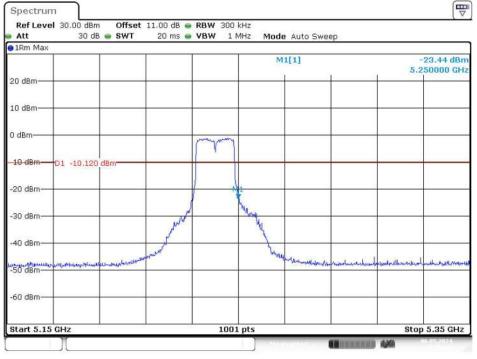
Date: 6.MAY.2024 15:54:03

5200MHz



Date: 6.MAY.2024 15:55:17

5240MHz



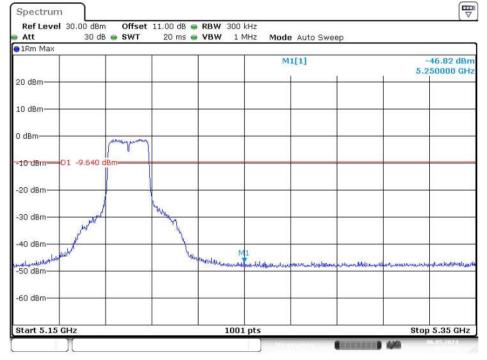
Date: 6.MAY.2024 15:56:09

IEEE 802.11ac VHT20 Mode / 5150 ~ 5250MHz



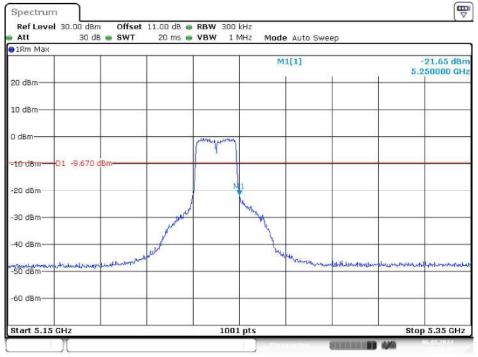
Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) Page 68 of 110

5200MHz



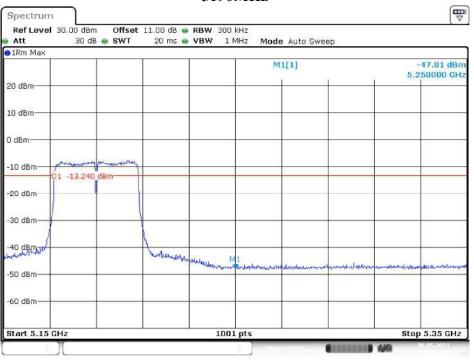
Date: 6.MAY.2024 15:58:27

5240MHz



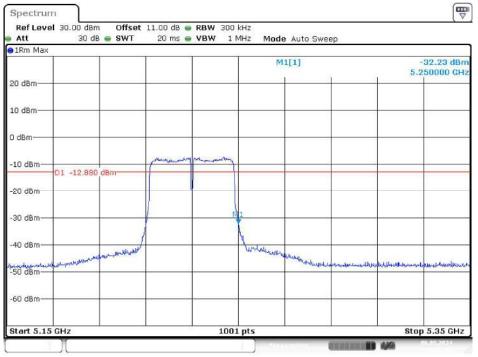
Date: 6.MAY.2024 15:59:32

IEEE 802.11ac VHT40 Mode / 5150 ~ 5250MHz



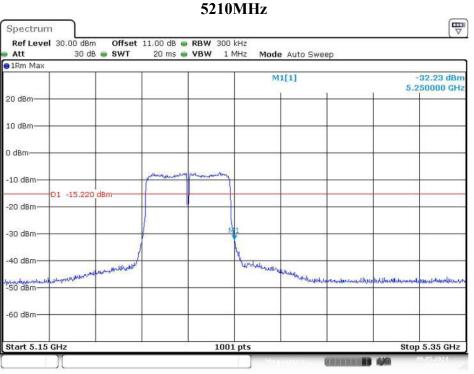
Date: 6.MAY.2024 16:01:18

5230MHz



Date: 6.MAY.2024 16:02:07

IEEE 802.11ac VHT80 Mode / 5150 ~ 5250MHz



Date: 6.MAY.2024 16:02:07

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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 6.2.4.2

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) \ge 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	Channel	Frequency (MHz)	26dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)
		36	5180	34.48	16.94
	802.11a	40	5200	34.80	17.06
		48	5240	35.60	17.42
	802.11ac 20	36	5180	38.82	18.10
UNII-1		40	5200	38.98	18.26
		48	5240	41.54	18.98
	802.11ac 40	38	5190	44.16	36.68
	802.11ac 40	46	5230	49.28	36.76
	802.11ac 80	42	5210	83.68	75.92

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

5725-5850MHz

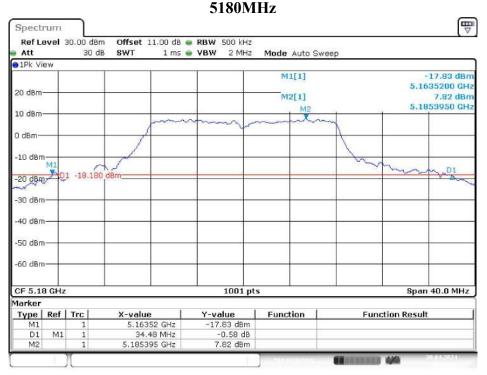
UNII Band	Mode	Channel	Frequency (MHz)	6dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)	Limit (kHz)	Result
		149	5745	16.52	28.69	≥500	PASS
	802.11a	157	5785	16.52	26.77	≥500	PASS
		165	5825	16.52	24.65	≥500	PASS
	802.11ac 20	149	5745	17.80	29.85	≥500	PASS
UNII-3		157	5785	17.76	28.29	≥500	PASS
		165	5825	17.80	26.61	≥500	PASS
	802 11 40	151	5755	36.48	45.00	≥500	PASS
	802.11ac 40	159	5795	36.40	39.80	≥500	PASS
	802.11ac 80	155	5775	76.32	76.88	≥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



Date: 30.APR.2024 10:00:32

₽ Spectrum Ref Level 30.00 dBm Offset 11.00 dB 👄 RBW 500 kHz Att 30 dB SWT 1 ms 🖷 VBW 2 MHz Mode Auto Sweep ∋1Pk View M1[1] 17.74 dBn 5.1834400 GHz 20 dBm M2[1] 8.16 dBn 5.2053950 GHz MS 10 dBm 0 dBm -10 dBm 41 VR1 -17.840 -20 dBm -30 dBm 40 dBm -50 dBm -60 dBm Span 40.0 MHz 1001 pts CF 5.2 GHz Marker X-value 5.18344 GHz 34.8 MHz Type Ref Trc Y-value Function **Function Result** -17.74 dBm M1 1 D1 M1 -0.47 dB 1 M2 5.205395 GHz 8.16 dBm

5200MHz

Date: 30.APR.2024 09:58:34

₩ V Spectrum Ref Level 30.00 dBm Offset 11.00 dB 👄 RBW 500 kHz Att 30 dB SWT 1 ms 👄 VBW 2 MHz Mode Auto Sweep ●1Pk View M1[1] -17.46 dBn 5.2233600 GH 20 dBm M2[1] 8.45 dBn 5.2453950 GHz M2 10 dBm \mathbf{x} 0 dBm -10 dBm D1 -17.550 dBm-~_ D1 -20 d8m -30 dBm 40 dBm -50 dBm -60 dBm Span 40.0 MHz 1001 pts CF 5.24 GHz Marker Y-value -17.46 dBm Type Ref Trc X-value Function **Function Result** 5.22336 GHz 35.6 MHz M1 D1 -0.47 dB M1 1 M2 5.245395 GHz 8.45 dBm

5240MHz

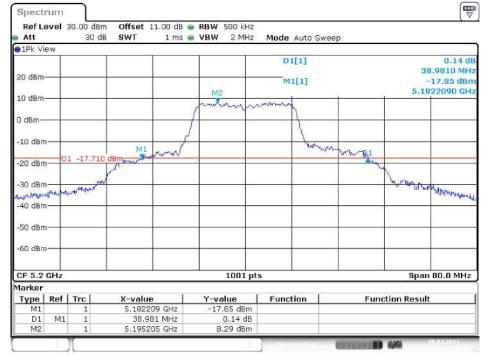
Date: 30.APR.2024 09:57:07

IEEE 802.11ac VHT20 Mode / 5150 ~ 5250MHz

5180MHz Spectrum Ref Level 30.00 dBm Offset 11.00 dB 👜 RBW 500 kHz 30 dB Att SWT 1 ms 🖷 VBW 2 MHz Mode Auto Sweep 91Pk View D1[1] 0.38 dB 38.8210 MHz 20 dBm M1[1] -18.26 dBm 5.1623690 GHz Ma 10 dBm tro amor 0 dBm -10 dBm min M1 wayny1 -20 dBm -30 dBm total and the production of and the with -40 dBm--50 dBm -60 dBm CF 5.18 GHz 1001 pts Span 80.0 MHz Marker Type | Ref | Trc Y-value Function **Function Result** X-value 5.162369 GHz -18.26 dBm M1 D1 M1 38.821 MHz 5.175125 GHz -0.38 dB 8.05 dBm M2 -

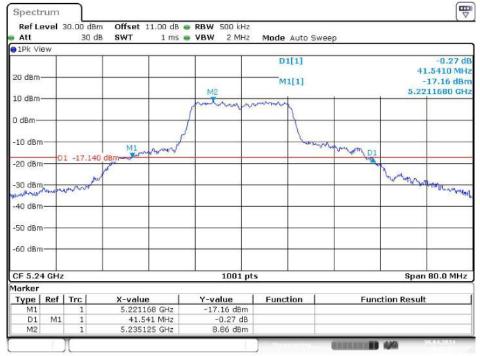
Date: 30.APR 2024 10:26:15

5200MHz



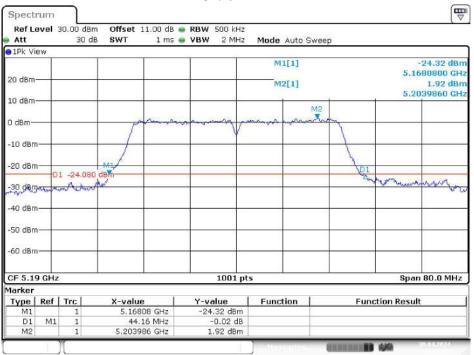
Date: 30.APR 2024 10:32:35

5240MHz



Date: 30.APR.2024 10:35:57

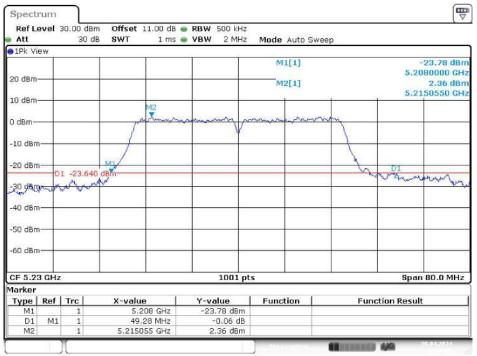
IEEE 802.11ac VHT40 Mode / 5150 ~ 5250MHz



5190MHz

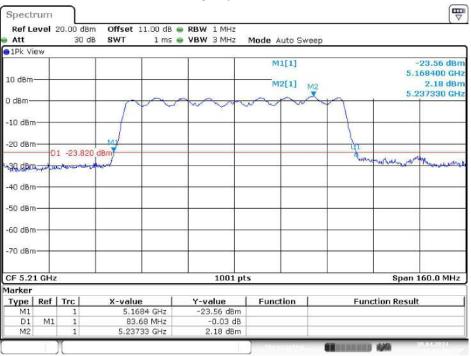
Date: 30.APR 2024 11:23:05

5230MHz



Date: 30.APR.2024 11:24:28

IEEE 802.11ac VHT80 Mode / 5150 ~ 5250MHz

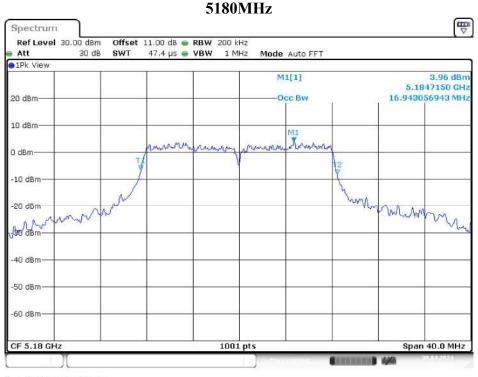


5210MHz

Date: 30.APR.2024 11:42:10

UNII-1 Band I / OBW 99%

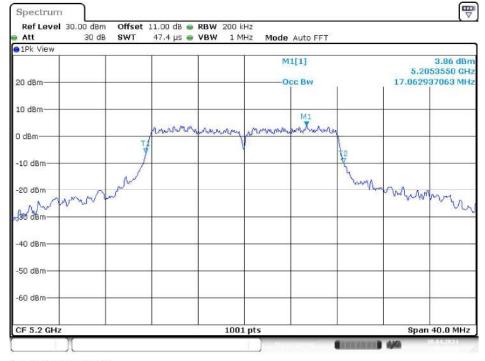
IEEE 802.11a Mode / 5150 ~ 5250MHz



Date: 30.APR.2024 09:45:47

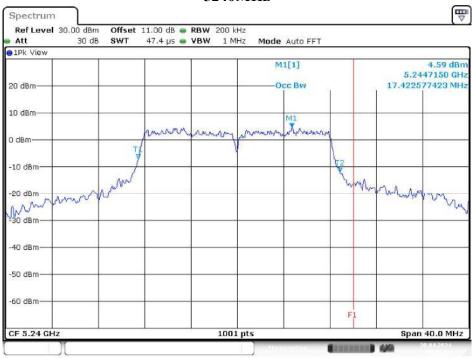
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5200MHz



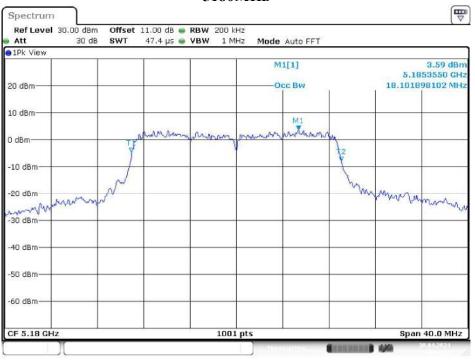
Date: 30.APR.2024 09:47:46

5240MHz



Date: 30.APR.2024 09:51:44

IEEE 802.11ac VHT20 Mode / 5150 ~ 5250MHz

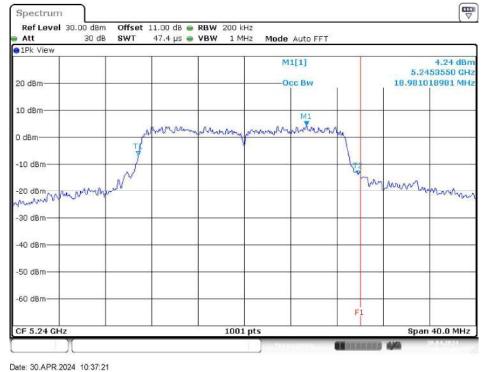


Date: 30.APR.2024 10:23:29

5200MHz -Spectrum Ref Level 30.00 dBm Offset 11.00 dB 🖷 RBW 200 kHz Att 30 dB 47.4 µs 🖷 VBW SWT 1 MHz Mode Auto FFT 1Pk View M1[1] 3.82 dBm 5.2053550 GHz Occ Bw 18.261738262 MHz 20 dBm 10 dBm M3 T. man st. 0 dBm--10 dBm Mon J. same -20 dBm Mondria Marken mon -30 dBm 40 dBm -50 dBm -60 dBm Span 40.0 MHz 1001 pts CF 5.2 GHz 10

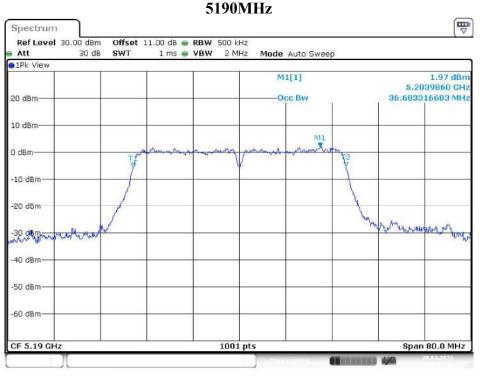
Date: 30.APR.2024 10:29:27

5240MHz



Date: 0014111.2024 10.01.21

IEEE 802.11ac VHT40 Mode / 5150 ~ 5250MHz

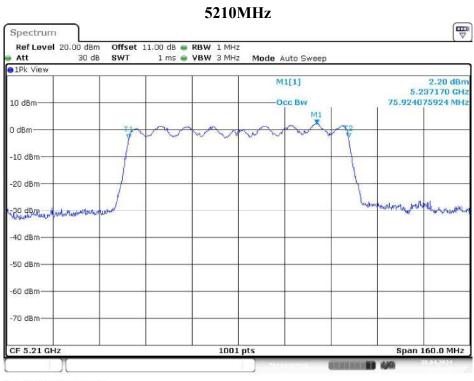


Date: 30.APR.2024 11:22:27



5230MHz

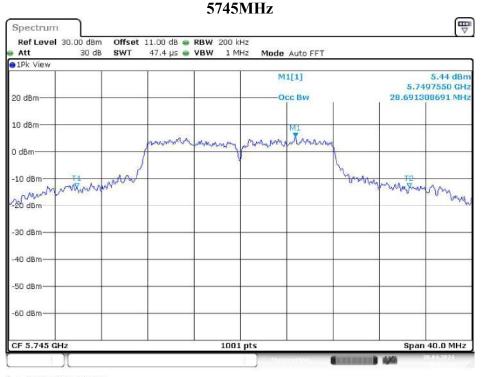
IEEE 802.11ac VHT80 Mode / 5150 ~ 5250MHz



Date: 30.APR.2024 11:41:35

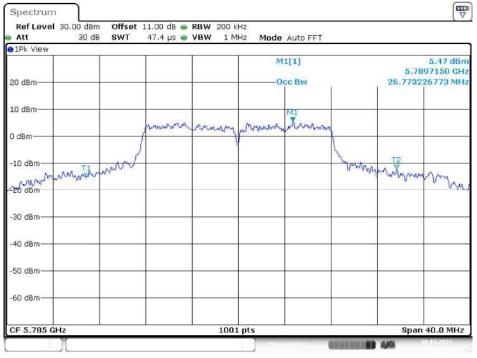
UNII-3 Band IV / OBW 99%

IEEE 802.11a Mode / 5725 ~ 5850MHz



Date: 30.APR.2024 10:02:48

5785MHz

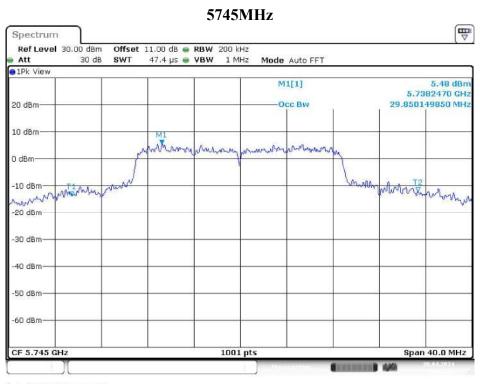


Date: 30.APR.2024 10:12:47

₩ Spectrum Ref Level 30.00 dBm Offset 11.00 dB 👄 RBW 200 kHz Att 30 dB SWT 47.4 µs 🖷 VBW 1 MHz Mode Auto FFT ●1Pk View 5.22 dBm M1[1] 5.8297150 GHz 20 dBm OCC BW 24.655344655 MHz 10 dBm James manne nonno 0 dBm month the month of the -10 dBm montan -20 86 -30 dBm 40 dBm -50 dBm -60 dBm CF 5.825 GHz 1001 pts Span 40.0 MHz

Date: 30.APR 2024 10:17:59

IEEE 802.11ac VHT20 Mode / 5725 ~ 5850MHz

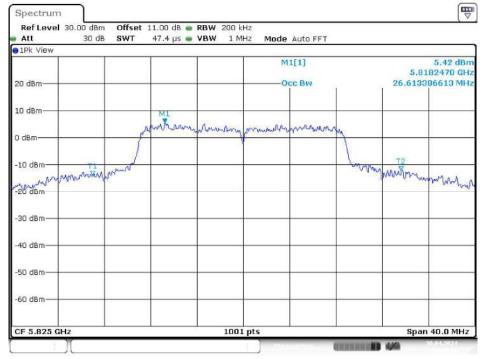


Date: 30.APR.2024 11:11:58

Spectrum Ref Level 30.00 dBm Offset 11.00 dB 👄 RBW 200 kHz Att 30 dB SWT 47.4 µs 👄 VBW 1 MHz Mode Auto FFT ⊙1Pk View 5.44 dBm M1[1] 5.7778470 GHz 20 dBm Occ Bw 28.291708292 MHz 10 dBm Marian a Brand Brand wards Marin 0 dBm and marken the marken have -10 dBm our hundren mil -20 dBm -30 dBm 40 dBm -50 dBm -60 dBm CF 5.785 GHz 1001 pts Span 40.0 MHz

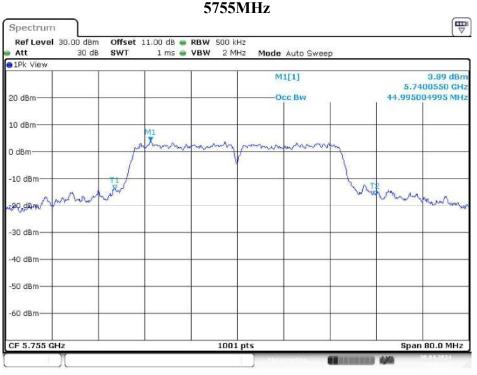
Date: 30.APR.2024 11:13:35

5825MHz

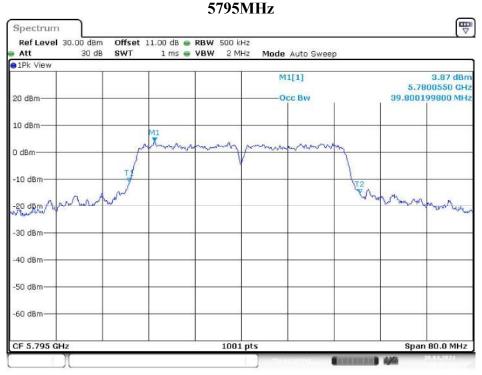


Date: 30.APR.2024 11:21:13

IEEE 802.11ac VHT40 Mode / 5725 ~ 5850MHz



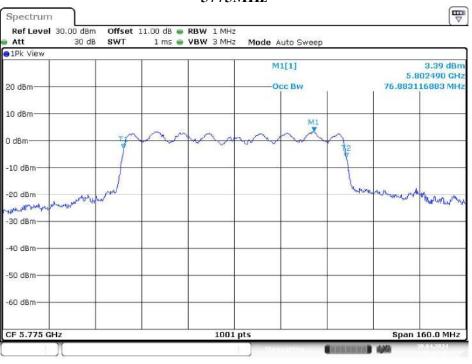
Date: 30.APR.2024 11:27:30



Date: 30.APR 2024 11:34:46

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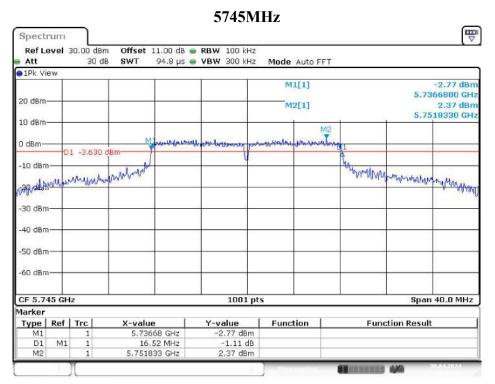
IEEE 802.11ac VHT80 Mode / 5725 ~ 5850MHz



Date: 30.APR.2024 11:44:40

UNII-3 Band IV / BW 6dBc

IEEE 802.11a Mode / 5725 ~ 5850MHz



Date: 30.APR.2024 10:01:45

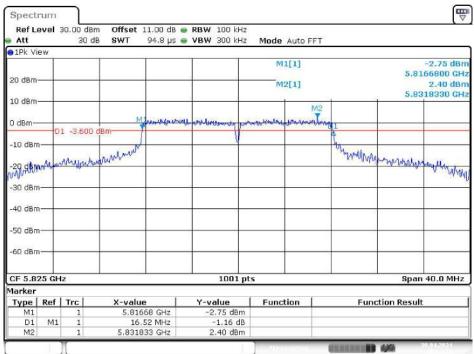
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5785MHz

Spect	rum											
Ref L Att	evel	30.00 de 30 (RBW 100 kH		Mode	Auto FF	т			
●1Pk V	iew			pr -		14.	nouc	Hato II	,			-
20 dBm							15	1[1] 2[1]			5.776680	dBm
10 dBm	+		4 0		0 0	_	1	M	2		3.791033	U GHA
0 dBm-	D	1 -3.510	MJ	anthactual	Land Germany	ar.	antralac					_
-10 dBr	100		a particular a second		V	31			- Charley	I.Makan		_
~39, db	pa/Umar	anapan	wanterwat				_			and how work	nahammyua	MMM
-30 dBr	n		-									
-40 dBr	n		-		0 0							
-50 dBr	n —											
-60 dBr	n											
CF 5.7	85 GH	z			1001	pts					Span 40.0	MHz
Marker												
Туре	Ref	Trc	X-value		Y-value		Func	tion	H	unction R	esult	
M1		1		58 GHz	-2.73 dB							
D1	M1	1		2 MHz	-1.00 d							
M2		1	5.79183	33 GHz	2.49 dB	m						
		Yr						1-11/10-00	C. B. B. B. B. B. B.	118 444	30.04.20	24

Date: 30.APR.2024 10:11:43

5825MHz



Date: 30.APR.2024 10:17:23

IEEE 802.11ac VHT20 Mode / 5725 ~ 5850MHz

Att		30	dB SWT	94.8 µs 🕯	VBW 300 kHz	Mode Auto FF	T	
∎1Pk Vi	BW		1		1 1	M1[1]		-2.18 dBr
						MITTAL		5.7360400 GH
20 dBm-						M2[1]		2.81 dBr
10 dBm-					a= a=			5.7384470 GH
			100	M2		·		
0 dBm—			M	And my marked	In producer of par	worknosely and Mars	-shipes	
	77	1 -3.19	JUBII		V		t	
-10 dBm		Carlor And	. DAANO				Monally	Million Contraction
MALAN	man	mann	umantung					hlammunum
-20-061								
-30 dBm								
-40 dBm				3	-0		52 S	
-50 dBm					2			
-60 dBm								
00 001								
CF 5.74	15 GH	z			1001 pt	s		Span 40.0 MHz
Marker		() () () () () () () () () () () () () (in the second			
Type	Ref		X-valı		Y-value	Function	Fun	ction Result
M1		1		604 GHz	-2.18 dBm			
D1 M2	M1	1		17.8 MHz	-1.39 dB 2.81 dBm			

5745MHz

Date: 30.APR.2024 11:11:21

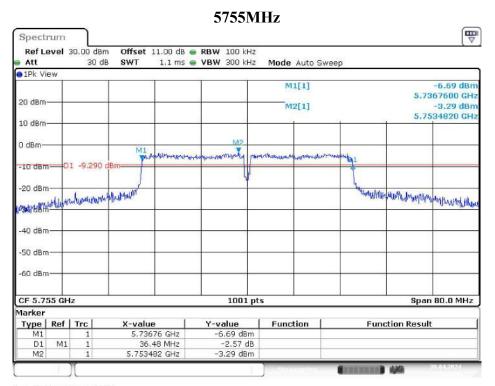
5785MHz Spectrum Ref Level 30.00 dBm Offset 11.00 dB 👄 RBW 100 kHz Att 30 dB SWT 94.8 µs 💩 VBW 300 kHz Mode Auto FFT 🔵 1 Pk View M1[1] -2.29 dBm 5.7760400 GHz 20 dBm M2[1] 2.80 dBn 5.7795650 GHz 10 dBm M2 0 dBm 1n D1 -3.200 dBm month in many man -zangets (Manunumunumunum -10 dBm -30 dBm 40 dBm -50 dBm -60 dBm Span 40.0 MHz CF 5.785 GHz 1001 pts Marker Type Ref Trc X-value Y-value Function Function Result 5.77604 GHz 17.76 MHz 5.779565 GHz -2.28 dBm -0.81 dB M1 D1 M1 1 M2 2.80 dBm 11.11.11 AV4

Date: 30.APR.2024 11:12:59

Spectrum Ref Level 30.00 dBm Offset 11.00 dB 👄 RBW 100 kHz Att 30 dB SWT 94.8 µs 👄 **VBW** 300 kHz Mode Auto FFT ●1Pk View M1[1] 2.35 dBn 5.8160400 GHz 20 dBm M2[1] 2.68 dBn 5.8184470 GHz 10 dBm M2 M2 0 dBm-Maria STALL! D1 -3.320 dBm -10 dBm and many Minustry Mary M mmy pour and man pour and -30 dBm 40 dBm -50 dBm -60 dBm Span 40.0 MHz 1001 pts CF 5.825 GHz Marker Y-value -2.35 dBm -1.36 dB Type Ref Trc X-value Function **Function Result** 5.81604 GHz M1 D1 17.8 MHz M1 M2 5.818447 GHz 2.68 dBm

Date: 30.APR.2024 11:20:37

IEEE 802.11ac VHT40 Mode / 5725 ~ 5850MHz



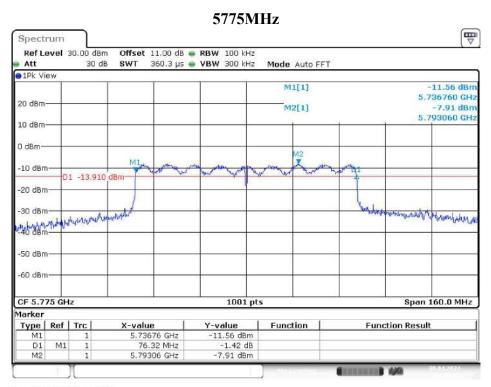
Date: 30.APR 2024 11:26:26

₩ V Spectrum Ref Level 30.00 dBm Offset 11.00 dB 👄 RBW 100 kHz Att 30 dB SWT 1.1 ms 👄 VBW 300 kHz Mode Auto Sweep ●1Pk View M1[1] 7.51 dBn 5.7767600 GHz 20 dBm M2[1] -3.40 dBn 5.7934820 GHz 10 dBm 0 dBmand the second MI dellerowercover andurany D. 01 -9.400 dBr 10 dBm -20 dBm analytic and the second second and a second second and water and the second ISQ CHANNEL 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** 5.77676 GHz 36.4 MHz -7.51 dBm -0.21 dB M1 D1 M1 1 M2 5.793482 GHz -3.40 dBm

5795MHz

Date: 30.APR.2024 11:33:42

IEEE 802.11ac VHT80 Mode / 5725 ~ 5850MHz



Date: 30.APR.2024 11:43:36

12 FCC §15.407(a) & RSS-247 §6.2 – Maximum Output Power

12.1 Applicable Standard

According to FCC §15.407(a):

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 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 client devices in the 5.15-5.25 GHz band, 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 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. 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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

According to RSS-247 §6.2:

For the 5.15-5.25 GHz band

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or 1.76 + 10 log10B, dBm, whichever is less. Devices shall implement transmitter power control (TPC) in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.

For other devices, the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log 10B$, 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.

For the 5.725-5.85 GHz bands

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

Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) Page 93 of 110 that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint Footnote3 systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

12.2 Test Procedure

According to ANSI C63.10-2013 Section 12.3.3.1

The use Power Meter

1. Place the EUT on a bench and set it in transmitting mode.

2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to a Power sensor.

12.3 Test Results

Test Mode: Transmitting

Conducted Average Output Power

Pre-scan Mode 1 and Mode 2, Worst case is the Mode 1

5150-5250 MHz

Mode 1

Test Modes	Channel	Frequency (MHz)	Maximum Conducted Average Output Power (dBm)	FCC Master Limit (dBm)	FCC Client Limit (dBm)	EIRP Power (dBm)	RSS-247 EIRP Limit (dBm)
	36	5180	15.45	30	24	18.87	22.29
802.11a	40	5200	15.90	30	24	19.32	22.32
	48	5240	15.88	30	24	19.30	22.41
	36	5180	15.73	30	24	19.15	22.58
802.11ac VHT20	40	5200	16.36	30	24	19.78	22.62
	48	5240	16.33	30	24	19.75	22.78
802.11ac VHT40	38	5190	12.76	30	24	16.18	23
	46	5230	13.12	30	24	16.54	23
802.11ac VHT80	42	5210	10.78	30	24	14.20	23

Note: The device supports softAP mode and client mode.

The maximum antenna gain is 3.42 dBi.

Mode 2 (spot check the worst case channel) :

Test Modes	Channel	Frequency (MHz)	Maximum Conducted Average Output Power (dBm)	FCC Master Limit (dBm)	FCC Client Limit (dBm)	EIRP Power (dBm)	RSS-247 EIRP Limit (dBm)
802.11ac VHT20	40	5200	16.34	30	24	19.76	22.62

Result: The test data results of Mode 1 and Mode 2 are close.

Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

5725-5850 MHz

Mode 1

Test Modes	Channel	Frequency (MHz)	Maximum Conducted Average Output Power (dBm)	FCC / RSS-247 Limit (dBm)
	149	5745	16.85	30
802.11a	157	5785	16.91	30
	165	5825	16.87	30
	149	5745	17.33	30
802.11ac VHT20	157	5785	17.37	30
	165	5825	17.27	30
202 11 VIIT40	151	5755	14.33	30
802.11ac VHT40	159	5795	14.32	30
802.11ac VHT80	155	5775	12.27	30

Mode 2 (spot check the worst case channel) :

Test Modes	Channel	Frequency (MHz)	Maximum Conducted Average Output Power (dBm)	FCC / RSS-247 Limit (dBm)
802.11ac VHT20	157	5785	17.34	30

Result: The test data results of Mode 1 and Mode 2 are close.

13 FCC §15.407(a) & RSS-247 §6.2 – Power Spectral Density

13.1 Applicable Standard

According to FCC §15.407(a):

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 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 client devices in the 5.15-5.25 GHz band, 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 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 30dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6dBi 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 6dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

According to RSS-247 §6.2:

For the 5.15-5.25 GHz band

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or 1.76 + 10 log10B, dBm, whichever is less. Devices shall implement transmitter power control (TPC) in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.

For other devices, the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log 10B$, 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.

For the 5.725-5.85 GHz bands

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. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint Footnote3 systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

13.2 Test Procedure

The measurements are base on FCC KDB 789033 D02 General UNII Test Procedyres New Rules v02r01: Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices section F: Maximum power spectral density. Duty cycle > 98%, Method SA-1 was used.

13.3 Test Results

Test Mode: Transmitting

5150-5250 MHz

UNII Band	Mode	Channel	Frequency (MHz)	Power Spectral Density (dBm/MHz)	FCC Master Limit (dBm/MHz)	FCC Client Limit (dBm/MHz)	Power S Den	RP Spectral
				· · · ·			Result	Limit
		36	5180	3.64	17	11	7.06	10
	802.11a	40	5200	4.06	17	11	7.48	10
		48	5240	4.25	17	11	7.67	10
		36	5180	3.59	17	11	7.01	10
UNII-1	802.11ac 20	40	5200	3.91	17	11	7.33	10
		48	5240	4.26	17	11	7.68	10
	802.11ac 40	38	5190	-2.37	17	11	1.05	10
	002.11ac 40	46	5230	-2.16	17	11	1.26	10
	802.11ac 80	42	5210	-5.83	17	11	-2.41	10

Note: The device supports softAP mode and client mode.

The maximum antenna gain is 3.42 dBi.

Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

No.: RXZ240408022RF02

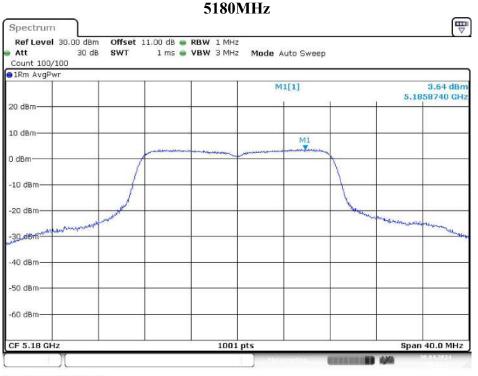
5725-5850 MHz

UNII Band	Mode	Channel	Frequency (MHz)	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)
		149	5745	1.97	30
	802.11a	157	5785	2.04	30
		165	5825	2.14	30
	802.11ac 20	149	5745	2.10	30
UNII-3		157	5785	2.18	30
		165	5825	2.14	30
	<u>802 11aa 40</u>	151	5755	-3.74	30
	802.11ac 40	159	5795	-3.98	30
	802.11ac 80	155	5775	-7.55	30

Please refer to the following plots

UNII-1 Band I / PSD

IEEE 802.11a Mode / 5150 ~ 5250MHz



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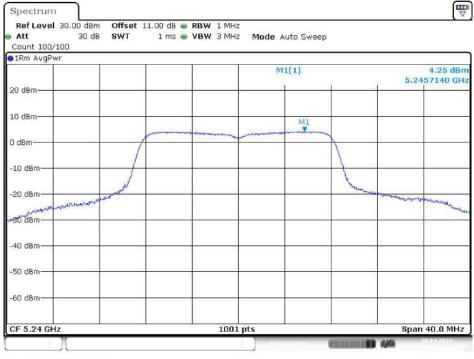
5200MHz



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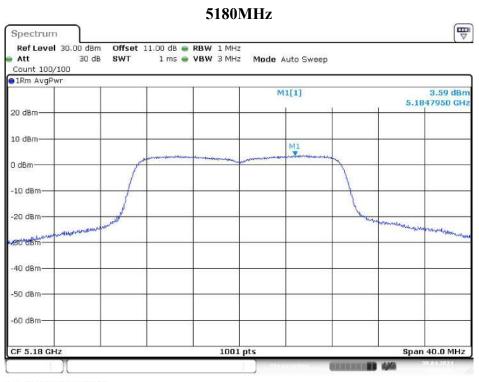
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5240MHz



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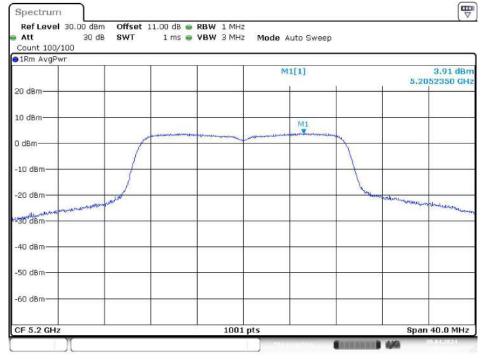
IEEE 802.11ac VHT20 Mode / 5150 ~ 5250MHz



Date: 30.APR.2024 10:23:02

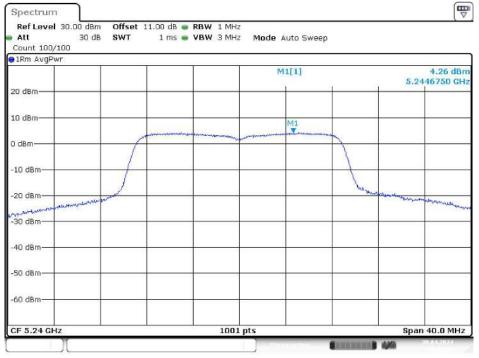
Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

5200MHz



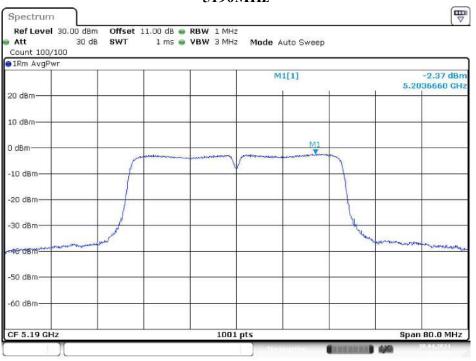
Date: 30.APR 2024 10:28:59

5240MHz

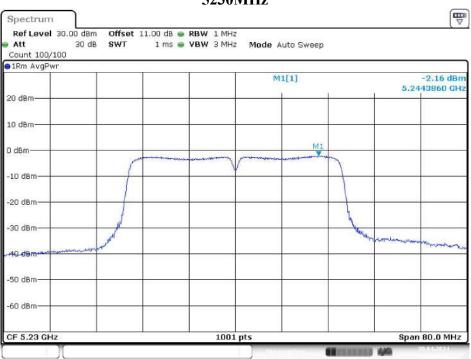


Date: 30.APR 2024 10:36:53

IEEE 802.11ac VHT40 Mode / 5150 ~ 5250MHz



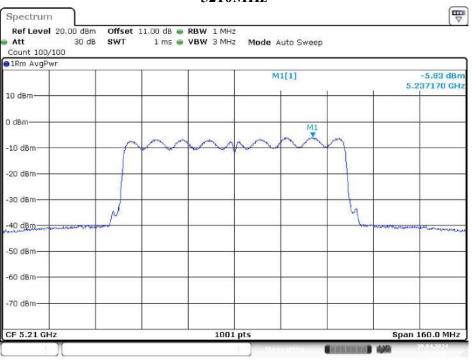
Date: 30.APR.2024 11:21:59



5230MHz

Date: 30.APR.2024 11:24:37

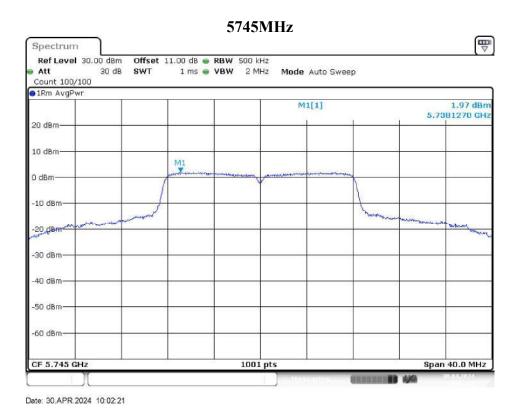
IEEE 802.11ac VHT80 Mode / 5150 ~ 5250MHz



Date: 30.APR.2024 11:41:07

UNII-3 Band IV / PSD

IEEE 802.11a Mode / 5725 ~ 5850MHz



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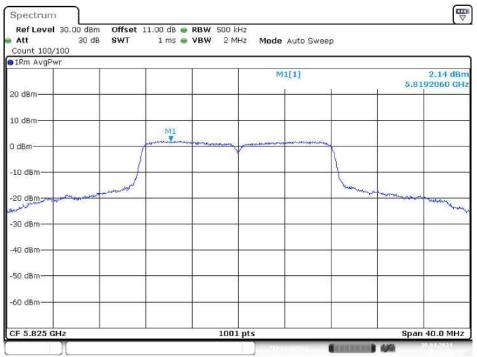
Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

5785MHz



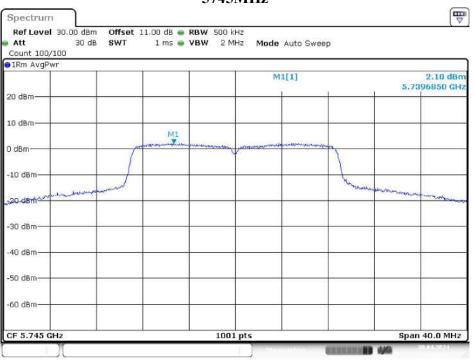
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5825MHz



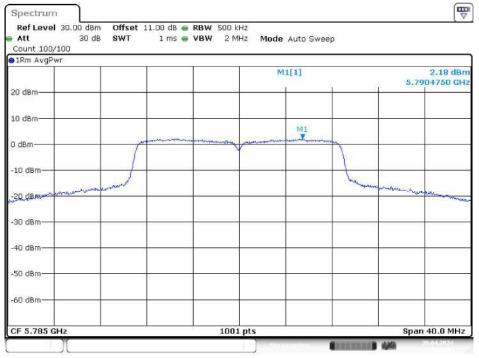
Date: 30.APR.2024 10:17:32

IEEE 802.11ac VHT20 Mode / 5725 ~ 5850MHz



Date: 30.APR.2024 11:11:30

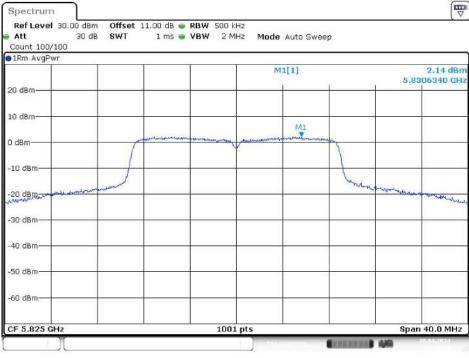
5785MHz



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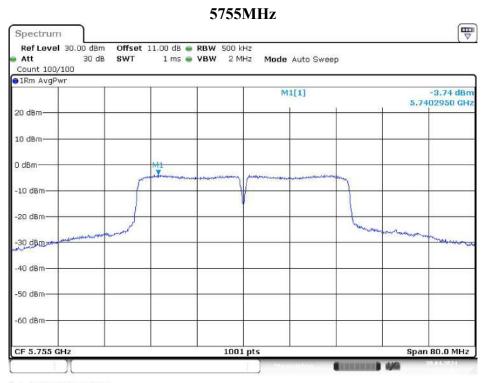
Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

No.: RXZ240408022RF02



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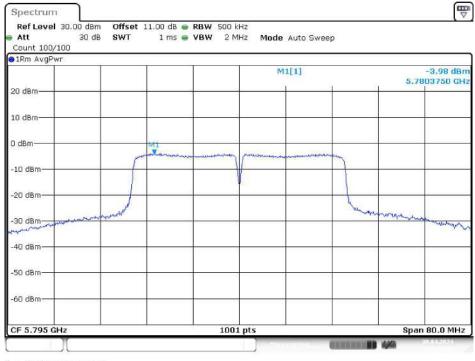
IEEE 802.11ac VHT40 Mode / 5725 ~ 5850MHz



Date: 30.APR.2024 11:27:03

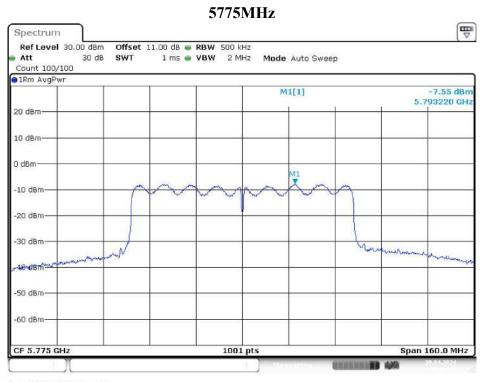
Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

No.: RXZ240408022RF02



Date: 30.APR.2024 11:34:18

IEEE 802.11ac VHT80 Mode / 5725 ~ 5850MHz



Date: 30.APR.2024 11:44:12

14 RSS-247 §6.4 – Additional requirements

14.1 Applicable Standard

According to RSS-247 Clause 6.4 Additional requirement

The following requirements shall apply:

- a. The device shall automatically discontinue transmission in cases of absence of information to transmit, or operational failure. A description on how this is done shall accompany the application for equipment certification. Note that this is not intended to prohibit transmission of control or signalling information or the use of repetitive codes where required by the technology.
- b. All LE-LAN devices must contain security features to protect against modification of software by unauthorized parties.

Manufacturers must implement security features in any digitally modulated devices capable of operating in any of the frequency ranges within the 5 GHz band, so that third parties are not able to reprogram the device to operate outside the parameters for which the device was certified. The software must prevent the user from operating the transmitter with operating frequencies, output power, modulation types or other radio frequency parameters outside those that were approved for the device. Manufacturers may use various means, including the use of a private network that allows only authenticated users to download software, electronic signatures in software or coding in hardware that is decoded by software to verify that new software can be legally loaded into a device to meet these requirements and must describe the methods in their application for equipment certification.

Manufacturers must take steps to ensure that DFS functionality cannot be disabled by the operator of the LE-LAN device.

- c. The user manual for LE-LAN devices shall contain instructions related to the restrictions mentioned in the above sections, namely that:
 - i. the device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;Footnote4
 - for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit;
 - iii. for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits as appropriate; and
 - iv. where applicable, antenna type(s), antenna models(s), and worst-case tilt angle(s) necessary to remain compliant with the e.i.r.p. elevation mask requirement set forth in section 6.2.2.3 shall be clearly indicated.

14.2 Judgment

RSS-247 Clause 6.4 a):

The device shall automatically discontinue transmission in cases of absence of information to transmit, or operational failure.Please refer to the declaration

RSS-247 Clause 6.4 b):

The devices must contain security features to protect against modification of software by unauthorized parties. Please refer to the declaration

RSS-247 Clause 6.4 c):

i). The device operates on 5150-5250MHz is only for indoor use.

ii). The device operates on 5150-5250MHz/5725-5850MHz.

iii). The device operates on 5725-5850MHz, the detachable antenna meets EIRP limits.

iv). Not Applicable.

***** END OF REPORT *****