















Page Number: 37 of 69



802.11ax-HE160 99% Bandwidth - Ant 0 / Ant 0 + 1 + 2 + 3						
Channel 50 (5250MHz)	Channel 114 (5570MHz)					
Specifican Arayyor 1 Propuesty Propuesty	Sportum Analyzer 1 Propuency Propuency					



7.3. 6dB Bandwidth Measurement

7.3.1.Test Limit

The minimum 6dBbandwidth shall be at least 500 kHz.

7.3.2.Test Procedure used

ANSI C63-2013 - Section 12.4.2

7.3.3.Test Setting

- 1. Set center frequency to the nominal EUT channel center frequency.
- 2. RBW = 100 kHz.
- 3. VBW≧ 3 x RBW.
- 4. Detector = Peak.
- 5. Trace mode = max hold.
- 6. Sweep = auto couple.
- 7. Allow the trace to stabilize.
- 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.

7.3.4.Test Setup





7.3.5.Test Result

Product	ACCESS POINT	Temperature	24°C
Test Engineer	Kevin Ker	Relative Humidity	59%
Test Site	SR2	Test Date	2020/01/10
Model Name	APEX0574		

Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result		
Ant 0 / Ant 0 + 1 + 2 + 3								
802.11a	6Mbps	149	5745	16.35	≥0.5	Pass		
802.11a	6Mbps	157	5785	16.37	≥0.5	Pass		
802.11a	6Mbps	165	5825	16.38	≥0.5	Pass		
802.11ac-VHT20	MCS0	149	5745	17.59	≥0.5	Pass		
802.11ac-VHT20	MCS0	157	5785	17.59	≥0.5	Pass		
802.11ac-VHT20	MCS0	165	5825	17.57	≥0.5	Pass		
802.11ac-VHT40	MCS0	151	5755	36.31	≥0.5	Pass		
802.11ac-VHT40	MCS0	159	5795	36.33	≥0.5	Pass		
802.11ac-VHT80	MCS0	155	5775	75.26	≥0.5	Pass		
802.11ax-HE20	MCS0	149	5745	18.67	≥0.5	Pass		
802.11ax-HE20	MCS0	157	5785	18.95	≥0.5	Pass		
802.11ax-HE20	MCS0	165	5825	18.91	≥0.5	Pass		
802.11ax-HE40	MCS0	151	5755	37.30	≥0.5	Pass		
802.11ax-HE40	MCS0	159	5795	37.30	≥0.5	Pass		
802.11ax-HE80	MCS0	155	5775	76.17	≥0.5	Pass		















802.11ax-HE80 (dB Bandwi
Channel 155 (5775MHz)	
Spectrum Analyzer 1 Coccepted bit KEVSIGHT Insut RF Display Action Cell EVENSIGHT Insut RF Company Action Cell Company Action Cell Company Action Cell Cell Cell Cell Cell Cell Cell Cell Cell	Frequency Center Frequency Settings
Conget Ref Lvi Offset 17, 20 dB Scaledry 10.0 dB Ref Value 25.00 dBm 500 ()) () () () () () () () () () () () ()	Span 160.00 MHz CF Step 16.00000 MHz 400000 MHz
6.00 5.00	Man Freq Offset 0 Hz
Confer 5,775 CHz #Video BW 300.00 KHz Span 160 MHz Reve BW 100.00 KHz Sweep 15.3 ms (2001 pts) 2 Metrics 1	
Occupied Bandwidth Total Power 29.4 dBm Transmit Freq Error -43.497 kHz % of CBW Power 99.00 %	
x dB Bandwidh 76.17 MHz x dB 40.00 dB	



7.4. Output Power Measurement

7.4.1.Test Limit

For an outdoor 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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm).

If transmitting antennas of directional gain greater than 6dBi are used, the maximumconducted output power shall be reduced by the amount in dB that the directional gain of theantenna exceeds 6dBi.

7.4.2.Test Procedure Used

ANSI C63-2013 - Section 12.3

7.4.3.Test Setting

Average power measurements were perform only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.



7.4.4.Test Setup





7.4.5.Test Result

For APEX0574, please refer to Annex D clause 1.

For APEX0575, please refer to Annex E clause 1.

For APEX0577, please refer to Annex F clause 1.



7.5. Transmit Power Control

7.5.1.Test Limit

The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm.

7.5.2.Test Procedure Used

ANSI C63-2013 - Section 12.3

7.5.3.Test Setting

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

7.5.4.Test Setup



7.5.5.Test Result

It gets addressed in the operational description.



7.6. Power Spectral Density Measurement

7.6.1.Test Limit

For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

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

7.6.2.Test Procedure Used

ANSI C63-2013 - Section 12.6

7.6.3.Test Setting

- 1. Analyzer was set to the center frequency of the UNII channel under investigation
- 2. Span was set to encompass the entire 26dB EBW of the signal.
- 3. RBW = 1MHz, if measurement bandwidth of Maximum PSD is specified in 500 kHz,

RBW = 100 kHz

- 4. VBW = 3MHz
- 5. Number of sweep points \geq 2 × (span / RBW)
- 6. Detector = power averaging (Average)
- 7. Sweep time = auto
- 8. Trigger = free run
- 9. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
- 10. Add 10*log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add 10*log(1/0.25) = 6 dB if the duty cycle is 25 percent.
- 11. When the measurement bandwidth of Maximum PSD is specified in 500 kHz, add a constant factor 10*log(500kHz/100kHz) = 6.99 dB to the measured result.



7.6.4.Test Setup





7.6.5.Test Result

For APEX0574, please refer to Annex D clause 2.

For APEX0575, please refer to Annex E clause 2.

For APEX0577, please refer to Annex F clause 2.

7.7. Frequency Stability Measurement

7.7.1.Test Limit

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5GHz band (IEEE 802.11 specification).

7.7.2.Test Procedure Used

While maintaining a constant temperature inside the environmental chamber, turn the EUT on and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.

Frequency Stability Under Temperature Variations:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C decreased per stage until the lowest temperature reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.



7.7.3.Test Setup





7.7.4.Test Result

Test Engineer	Kevin Ker	Temperature	-30 ~ 50°C
Test Time	2020/01/15	Relative Humidity	48 ~ 55%RH
Test Mode	5180MHz (Carrier Mode)	Test Site	SR2

Voltage	Power	Temp	Frequency Tolerance (ppm)				
(%)	(VAC)	(°C)	0 minutes	2 minutes	5 minutes	10 minutes	
		- 30	-3.52	-3.83	-3.71	-3.45	
		- 20	-3.85	-3.51	-3.23	-3.86	
		- 10	-3.65	-3.64	-3.38	-3.75	
		0	-4.25	-4.83	-5.51	-4.74	
100%	120	+ 10	-4.12	-4.40	-5.68	-4.84	
		+ 20 (Ref)	-5.38	-5.09	-5.12	-5.15	
		+ 30	-6.23	-5.89	-5.82	-5.94	
		+ 40	-7.01	-7.19	-5.46	-5.62	
		+ 50	-6.75	-6.87	-6.89	-6.52	
115%	138	+ 20	-5.27	-5.57	-5.64	-5.71	
85%	102	+ 20	-6.73	-6.74	-6.13	-6.35	

Note: Frequency Tolerance (ppm) = {[Measured Frequency (Hz) - Declared Frequency (Hz)] / Declared Frequency (Hz)} $*10^{6}$.



7.8. Radiated Spurious Emission Measurement

7.8.1.Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title

47CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209								
Frequency Field Strength Measured Distance								
[MHz]	[uV/m]	[Meters]						
0.009 - 0.490	2400/F (kHz)	300						
0.490 - 1.705	24000/F (kHz)	30						
1.705 - 30	30	30						
30 - 88	100	3						
88 - 216	150	3						
216 - 960	200	3						
Above 960	500	3						

7.8.2.Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

ANSI C63.10 Section 6.4 (Standard test method below 30MHz)

ANSI C63.10 Section 6.5 (Standard test method above 30MHz to 1GHz)

ANSI C63.10 Section 6.6 (Standard test method above 1GHz)

7.8.3.Test Setting

Table 1 - RBW as a function of frequency

Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz



Quasi-Peak Measurements below 1GHz

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. Span was set greater than 1MHz
- 3. RBW = as specified in Table 1
- 4. Detector = CISPR quasi-peak
- 5. Sweep time = auto couple
- 6. Trace was allowed to stabilize

Peak Measurements above 1GHz

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz
- 3. VBW = 3MHz
- 4. Detector = peak
- 5. Sweep time = auto couple
- 6. Trace mode = max hold
- 7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method VB)

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz
- 3. VBW; If the EUT is configured to transmit with duty cycle \ge 98%, set VBW = 10 Hz.
- If the EUT duty cycle is < 98%, set VBW \geq 1/T. T is the minimum transmission duration.
- 4. Detector = Peak
- 5. Sweep time = auto
- 6. Trace mode = max hold
- 7. Trace was allowed to stabilize



7.8.4.Test Setup

Below 1GHz Test Setup:





7.8.5.Test Result

For APEX0574, please refer to Annex D clause 6.

For APEX0575, please refer to Annex E clause 6.

For APEX0577, please refer to Annex F clause 6.



7.9. Radiated Restricted Band Edge Measurement

7.9.1.Test Limit

For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)	
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15	
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46	
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75	
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.25 - 8.5	
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2	
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5	
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7	
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4	
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5	
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2	
8.362 - 8.366	156.52475 - 156.525	2483.5 - 2500	17.7 - 21.4	
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12	
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0	
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8	
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5	
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(2)	
13.36 - 13.41				

For 15.407(b) requirement:

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.



Refer to KDB 789033 D02v02r01 G)2)c), as specified in § 15.407(b), emissions above 1000 MHz.

1) Sections 15.407(b)(1-3) specifies the unwanted emissions limit for the U-NII-1 and U-NII-2

bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz.

 Section 15.407(b)(4) specifies the unwanted emissions limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are based on the use of a peak detector.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209								
Frequency Field Strength Measured Distance								
[MHz]	[uV/m]	[Meters]						
0.009 - 0.490	2400/F (kHz)	300						
0.490 - 1.705	24000/F (kHz)	30						
1.705 - 30	30	30						
30 - 88	100	3						
88 - 216	150	3						
216 - 960	200	3						
Above 960	500	3						

7.9.2.Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

ANSI C63.10 Section 6.6 (Standard test method above 1GHz)

7.9.3.Test Setting

Peak Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

- 2. RBW = 1MHz
- 3. VBW = 3MHz
- 4. Detector = peak
- 5. Sweep time = auto couple
- 6. Trace mode = max hold
- 7. Trace was allowed to stabilize



Average Field Strength Measurements

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz
- 3. VBW ≥ 1/T
- 4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to "Voltage" regardless of the display mode
- 5. Detector = Peak
- 6. Sweep time = auto
- 7. Trace mode = max hold
- 8. Allow max hold to run for at least 50 times (1/duty cycle) traces

7.9.4.Test Setup





7.9.5.Test Result

For APEX0574, please refer to Annex D clause 6.

For APEX0575, please refer to Annex E clause 6.

For APEX0577, please refer to Annex F clause 6.



7.10. AC Conducted Emissions Measurement

7.10.1. Test Limit

FCC Part 15.207 Limits					
Frequency (MHz)	QP (dBµV)	AV (dBµV)			
0.15 - 0.50	66 - 56	56 - 46			
0.50 - 5.0	56	46			
5.0 - 30	60	50			

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

7.10.2. Test Procedure

The EUT was setup according to ANSI C63.4, 2009 and tested according to KDB 789033 for compliance to FCC 47CFR 15.247 requirements. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.



7.10.3. Test Setup



Vertical ground reference plane



7.10.4.Test Result

4

5

6

7

8

9

10

11

12

Site: SR2			Time: 2020/03/21 - 18:13						
Limi	Limit: FCC_Part15.207_CE_AC Power					Engineer: Kev	vin Ker		
Prob	be: EN	V216_1	01683_Filter	On		Polarity: Neut	ral		
EUT	: ACCE	ESS PC	NT			Power: AC 12	0V/60Hz		
Test	Mode	1 (APE	X0574)						
	1 (SERMODE T (APEXOS)4)								
No	Flag	Mark	Frequency	Measure	Reading	Margin	Limit	Factor	Туре
			(MHz)	Level	Level	(dB)	(dBuV)	(dB)	
				(dBuV)	(dBuV)				
1			0.158	45.254	34.964	-20.315	65.568	10.290	QP
2		*	0.158	36.525	26.235	-19.044	55.568	10.290	AV
3			0.234	36.197	26.209	-26.109	62.307	9.989	QP

Note: Measure Level (dB μ V) = Reading Level (dB μ V) + Factor (dB)

32.010

31.305

26.676

25.692

24.427

23.584

12.475

17.913

7.376

22.022

21.260

16.631

15.527

14.263

13.403

2.294

7.639

-2.898

-20.296

-28.666

-23.294

-30.822

-22.086

-36.416

-37.525

-42.087

-42.624

52.307

59.970

49.970

56.514

46.514

60.000

50.000

60.000

50.000

9.989

10.045

10.045

10.164

10.164

10.181

10.181

10.274

10.274

AV QP

AV

QP

AV

QP

AV

QP

AV

Factor (dB) = Cable Loss (dB) + LISN Factor (dB).

0.234

0.310

0.310

0.470

0.470

8.302

8.302

23.902

23.902



Site: SR2	Time: 2020/03/21 - 18:17
Limit: FCC_Part15.207_CE_AC Power	Engineer: Kevin Ker
Probe: ENV216_101683_Filter On	Polarity: Line
EUT: ACCESS POINT	Power: AC 120V/60Hz

Test Mode 1 (APEX0574)



No	Flag	Mark	Frequency	Measure	Reading	Margin	Limit	Factor	Туре
			(MHz)	Level	Level	(dB)	(dBuV)	(dB)	
				(dBuV)	(dBuV)				
1			0.158	45.698	35.387	-19.870	65.568	10.311	QP
2			0.158	37.460	27.149	-18.109	55.568	10.311	AV
3			0.238	37.079	27.125	-25.087	62.166	9.954	QP
4			0.238	31.164	21.209	-21.002	52.166	9.954	AV
5			0.314	36.608	26.593	-23.256	59.864	10.015	QP
6		*	0.314	34.868	24.853	-14.996	49.864	10.015	AV
7			0.550	24.071	13.930	-31.929	56.000	10.141	QP
8			0.550	9.853	-0.288	-36.147	46.000	10.141	AV
9			8.534	23.347	13.163	-36.653	60.000	10.184	QP
10			8.534	11.650	1.466	-38.350	50.000	10.184	AV
11			23.842	18.897	8.699	-41.103	60.000	10.198	QP
12			23.842	8.376	-1.822	-41.624	50.000	10.198	AV

Note: Measure Level (dB μ V) = Reading Level (dB μ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB).



8. CONCLUSION

The data collected relate only the item(s) tested and show that the unit is in compliance with Part

15E of the FCC Rules.

The End



Appendix A - Test Setup Photograph

Refer to "2003TW0002-UT" file.



Appendix B - EUT Photograph

Refer to "2003TW0002-UE" file.