Test Report C9124AXI-B

Cisco Catalyst C9124AX Series 802.11ax Access Point 5GHz Auxiliary Radio

FCC ID: LDK-HTIAK2282

5150-5250 MHz

Against the following Specifications:

CFR47 Part 15.407



Cisco Systems 170 West Tasman Drive San Jose, CA 95134

J.J.L	Shut
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	Revision: 2

This report replaces any previously entered test report under EDCS – 21541303. This test report has been electronically authorized and archived using the CISCO Engineering Document Control system. Test Report Template EDCS# 11644122.

This test report ha	s been electronically authorized and archived using the CISCO Engineering Document Co	nuoi syster
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Section 1: Overview

The samples were assessed against the tests detailed in section 3 under the requirements of the following specifications:

Specifications:

CFR47 Part 15.407

Section 2: Assessment Information

2.1 General

This report contains an assessment of an apparatus against Electromagnetic Compatibility Standards based upon tests carried out on the samples submitted. The testing was performed by and for the use of Cisco systems Inc:

With regard to this assessment, the following points should be noted:

- a) The results contained in this report relate only to the items tested and were obtained in the period between the date of the initial assessment and the date of issue of the report. Manufactured products will not necessarily give identical results due to production and measurement tolerances.
- b) The apparatus was set up and exercised using the configuration and modes of operation defined in this report only.
- c) Where relevant, the apparatus was only assessed using the susceptibility criteria defined in this report and the Test Assessment Plan (TAP).
- d) All testing was performed under the following environmental conditions:

Temperature	15°C to 35°C (54°F to 95°F)
Atmospheric Pressure	860mbar to 1060mbar (25.4" to 31.3")
Humidity	10% to 75*%

 All AC testing was performed at one or more of the following supply voltages: 110V 60 Hz (+/-20%)

Units of Measurement

The units of measurements defined in the appendices are reported in specific terms, which are test dependent. Where radiated measurements are concerned these are defined at a particular distance. Basic voltage measurements are defined in units of [dBuV]

As an example, the basic calculation for all measurements is as follows:

Emission level [dBuV] = Indicated voltage level [dBuV] + Cable Loss [dB] + Other correction factors [dB] The combinations of correction factors are dependent upon the exact test configurations [see test equipment lists for further details] and may include:-

Antenna Factors, Pre Amplifier Gain, LISN Loss, Pulse Limiter Loss and Filter Insertion Loss..

Note: to convert the results from dBuV/m to uV/m use the following formula:-

Level in uV/m = Common Antilogarithm [(X dBuV/m)/20] = Y uV/m

Measurement Uncertainty Values

voltage and power measurements	± 2 dB
conducted EIRP measurements	± 1.4 dB
radiated measurements	± 3.2 dB
frequency measurements	± 2.4 10-7
temperature measurements	± 0.54°
humidity measurements	± 2.3%
DC and low frequency measurements	± 2.5%

Where relevant measurement uncertainty levels have been estimated for tests performed on the apparatus. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Radiated emissions (expanded uncertainty, confidence interval 95%)

30 MHz - 300 MHz	+/- 3.8 dB
300 MHz - 1000 MHz	+/- 4.3 dB
1 GHz - 10 GHz	+/- 4.0 dB
10 GHz - 18GHz	+/- 8.2 dB
18GHz - 26.5GHz	+/- 4.1 dB
26.5GHz - 40GHz	+/- 3.9 dB

Conducted emissions (expanded uncertainty, confidence interval 95%)

30 MHz – 40GHz	+/- 0.38 dB
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A product is considered to comply with a requirement if the nominal measured value is below the limit line. The product is considered to not be in compliance in case the nominal measured value is above the limit line.

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2.2 Date of testing

24-FEB-2021 through 10-MAR-2021

2.3 Report Issue Date

12-APR-2021

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2.4 Testing facilities

This assessment was performed by:

Testing Laboratory

Cisco Systems, Inc. 125 West Tasman Drive (Building P) San Jose, CA 95134 USA

Headquarters

Cisco Systems, Inc., 170 West Tasman Drive San Jose, CA 95134, USA

Registration Numbers for Industry Canada

Cisco System Site	Address	Site Identifier
Building P, 10m Chamber	125 West Tasman Dr	Company #: 2461N-2
	San Jose, CA 95134	
Building P, 5m Chamber	125 West Tasman Dr	Company #: 2461N-1
	San Jose, CA 95134	
Building 7, 5m Chamber	425 E. Tasman Drive	Company #: 2461N-3
	San Jose, California 95134	

Test Engineers

Said Abdelwafi, Julian Land

2.5 Equipment Assessed (EUT)

C9124AXI

2.6 EUT Description

The Cisco Catalyst 9124AX Series outdoor access points are next-generation Wi-Fi 6 access points encased in a rugged and robust design that service providers and enterprises can easily deploy.

The radio supports the following modes of operation. The modes are further defined in the radio Theory of Operation. The modes included in this report represent the worst-case data for all modes.

802.11a - Non HT20, One Antenna, 6 to 54 Mbps, 1ss

The following antennas are supported by this product series. Please note, the antenna information has been provided by the customer (the Cisco business unit). The data included in this report represent the worst-case data for all antennas.

Frequency	Antenna Name		Antenna	a Gain
2.4GHz & 5GHz (Wi-Fi)	Antenna 1	TX/RX: internal	7dBi@2.4GHz	7dBi@5GHz
2.4GHz & 5GHz (Wi-Fi)	Antenna 2	TX/RX: internal	7dBi@2.4GHz	7dBi@5GHz
2.4GHz & 5GHz (Wi-Fi)	Antenna 3	TX/RX: internal	7dBi@2.4GHz	7dBi@5GHz
2.4GHz & 5GHz (Wi-Fi)	Antenna 4	TX/RX: internal	7dBi@2.4GHz	7dBi@5GHz
BLE	Antenna T	TX/RX: internal	5d1	Bi
2.4GHz & 5GHz (Aux)	Antenna A	TX/RX: internal	6dBi@2.4GHz	7dBi@5GHz
2.4GHz & 5GHz (Aux)	Antenna B	RX: internal	6dBi@2.4GHz	7dBi@5GHz

Ithaca (Internal Antenna) Model C9124AXI-x

Section 3: Result Summary

3.1 Results Summary Table

Conducted emissions

Basic Standard	Technical Requirements / Details	Result
FCC 15.407	99% & 26 dB Bandwidth : The 99% 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. There is no limit for 99% OBW.	Pass
	The 26 dB emission is the 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 26 dB relative to the maximum level measured in the fundamental emission.	

FCC 15.407	Output Power: (1) For the band 5.15-5.25 GHz.	
	(i) 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 dBiIf transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output powershall be reduced by the amount in dB that the directional gain of the antenna exceeds 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).	Pass
	(ii) 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 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.	
	(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 WFixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. 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.	
	(iv) For mobile and portable 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.	

FCC 15.407	Power Spectral Density	Pass
	(i) For an outdoor access point operating in the band 5.15-5.25 GHzthe 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. 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).	
	(ii) For an indoor 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. 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.	
	(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHzthe maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. 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.	
	(iv) For mobile and portable client devices in the 5.15-5.25 GHz bandthe 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 the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	
FCC 15.407	Conducted Spurious Emissions / Band-Edge: 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 EIRP of - 27dBm/MHz.	Pass
FCC 15.407 FCC 15.209 FCC 15.205	Restricted band : Unwanted emissions falling within the restricted bands, as defined in FCC 15.205 (a) must also comply with the radiated emission limits specified in FCC 15.209 (a)	Pass

Basic Standard	Technical Requirements / Details	Result
FCC 15.209 FCC 15.205	TX Spurious Emissions: Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the field strength limits table in this section.	Not covered by the scope of this report
FCC 15.207	AC Conducted Emissions: Except when the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply, either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the table in these sections. The more stringent limit applies at the frequency range boundaries.	Not covered by the scope of this report

Section 4: Sample Details

Note: Each sample was evaluated to ensure that its condition was suitable to be used as a test sample prior to the commencement of testing.

4.1 Sample Details

	Sample No.	Equipment Details	Manufacturer	Hardware Rev.	Serial Number
95	S01	C9124AXI-B (used in Rack 9)	Foxconn (for Cisco)	074-125082-01	FOC243919ZU
S	S02	C9124AXI-B (used in Rack 4)	Foxconn (for Cisco)	074-125082-01	FOC243919PK

4.2 System Details

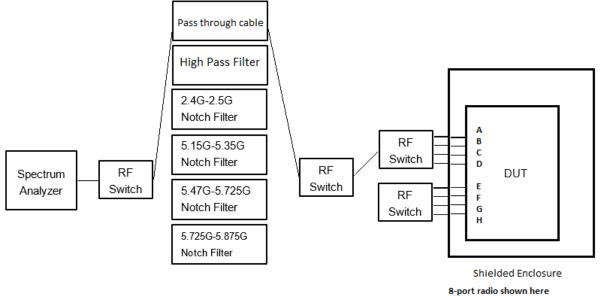
System #	Description	Samples
1	EUT (used in Rack 9)	S01
2	EUT (used in Rack 4)	S02

4.3 Mode of Operation Details

Mode#	Description	Comments
1	Continuous Transmit	AP Running Image: 8.8.1.10
	Testing using Rack 9	Cisco AP Software, (ap1g6a), [sjc-ads-
		9175:/nobackup/rahulsi6/ithaca/c175_throttle/router]
		Compiled Wed Feb 17 19:47:58 PST 2021
2	Continuous Transmit	AP Running Image: 8.8.1.10
	Testing using Rack 4	Cisco AP Software, (ap1g6a), [cheetah-
		build9:/san1/BUILD/workspace/c175_throttle_mfg/label/mfg-ap1g6a]
		Compiled Sun Mar 7 19:58:16 GMT 2021

Appendix A: Emission Test Results

Conducted Test Setup Diagram



8-port radio shown here Some radios will fewer transmit paths

A.1 Duty Cycle

Duty Cycle Test Requirement

From KDB 789033 D02 General UNII Test Procedures New Rules v02r01

B. Duty Cycle (x), Transmission Duration (T), and Maximum Power Control Level

1. All measurements are to be performed with the EUT transmitting at 100 percent duty cycle at its maximum power control level; however, if 100 percent duty cycle cannot be achieved, measurements of duty cycle, x, and maximum-power transmission duration, *T*, are required for each tested mode of operation.

Duty Cycle Test Method

From KDB 789033 D02 General UNII Test Procedures New Rules v02r01:

B. Duty Cycle (x), Transmission Duration (T), and Maximum Power Control Level

The zero-span mode on a spectrum analyzer or EMI receiver, if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW \geq EBW if possible; otherwise, set RBW to the largest available value. Set VBW \geq RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T, where T is defined in section II.B.1.a), and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T \leq 16.7 microseconds.)

Duty Cycle Test Information

Tested By :	Date of testing:
Said Abdelwafi, Julian Land	24-FEB-2021 through 10-MAR-2021
Test Result : PASS	

Test Equipment

See Appendix C for list of test equipment

Duty Cycle Data Table

Duty Cycle table and screen captures are shown below for power/psd modes.

Frequency (MHz)	Mode	Data Rate (Mbps)	Duty Cycle Correction Factor (dB)
5180	Non HT20, 6 to 54 Mbps	6.0	0.11619
5220	Non HT20, 6 to 54 Mbps	6.0	0.11619
5240	Non HT20, 6 to 54 Mbps	6.0	0.11619

Data Screenshots

5180 MHz: Non HT20, 6 to 54 Mbps

Spect Swep	rum Ana t SA	lyzer 1	•	+						₽	Frequency	- 7 蒜
RL	SIGH1 -►-	Dinput: F Couplir Align: (ng: DC	Input Ζ: 50 Ω Corrections: On Freq Ref: Int (S) NFE: Full	#Atten: 34 dB µW Path: Standar	PNO: Fas d Gate: Off IF Gain: L Sig Track	Avg Ho .ow Trig: Fi	pe: Log-Powe old: 1/1 ree Run	er 123456 A WWWWW P N N N N N	5.18000	requency 0000 GHz	Settings
1 Spe	ctrum		V					Mk	r4 200.0 µs	Span 0.00000	000 Hz	
Scale Log 5,00	/Div 10		~~~1/	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Ref Level 15.00 c		Cynamic a marchillaga		26.414 dBm		ept Span Span	
-5.00 -15.0				4	2						ıll Span	
-25.0 -35.0 -45.0					¥.					Start Fre 5.18000	9 0000 GHz	
-43.0 -55.0 -65.0										Stop Fre 5.18000	q 0000 GHz	
-75.0 Cente	er 5.1800	000000	GHz						Span 0 Hz		TO TUNE	
Res E	3W 3.0 N	IHz						Sweep 1.0	00 ms (1001 pts)	· ·		
5 Mar	ker Table		▼							3.00000		
1	Mode N	Trace 1	Scale t	Χ 495.0 μs		Function	Function V	Vidth Fu	unction Value	Freq Offs		
2	N N	1	t t	503.0 μs 192.0 μs	-13.90 dBm -18.63 dBm					0 Hz		
5 4 5 6	N	1		200.0 µs	-26.41 dBm					X Axis So Log Lin	cale	
	ょ	6		? Mar 11, 2021 4:34:34 AM			97.36, 0.12			Signal Tr (Span Zoo		

Antenna A

5220 MHz: Non HT20, 6 to 54 Mbps

Swept			•	+	11011 0.4 IB		A			Frequenc	y T
RL	SIGH1	Couplir Align: (ng: DC	Input Ζ: 50 Ω Corrections: On Freq Ref: Int (S) NFE: Full	#Atten: 34 dB μW Path: Standar	PNO: Fast d Gate: Off IF Gain: Low Sig Track: Of	Avg Type: Lo Avg Hold: 1/1 Trig: Free Ru f	Ĭ	1 2 3 4 5 6 A WW WW W P N N N N N	Center Frequency 5.180000000 GHz Span	Settings
1 Spe	ctrum		•						200.0 µs	0.00000000 Hz	
Log	/Div 10		~~~1/	www.whiteware.www	Ref Level 15.00 c		and a stand and a stand	-26	.414 dBm	Swept Span Zero Span	
5.00 -5.00 -15.0				3	2					Full Span	
-25.0 -35.0			[4						Start Freq 5.180000000 GHz	
-45.0 -55.0 -65.0			ł							Stop Freq 5.180000000 GHz	
-75.0 Cente	er 5.1800	00000 0	GHz						Span 0 Hz	AUTO TUNE	
	3W 3.0 M						Swe	ep 1.00 i	ms (1001 pts)	CF Step	
5 Mar	ker Table		▼							3.000000 MHz	
	Mode	Trace	Scale	Х	Y	Function	Function Width	Func	tion Value	Man	
1 2	N N	1	t t	495.0 µs 503.0 µs					_	Freq Offset	1
2	N	1	t	192.0 μs						0 Hz	
4	N	1	t	200.0 µs						X Auto October	
5 6										X Axis Scale Log Lin	
	ょ	6		Mar 11, 2021 4:34:34 AM		97.	36, 0.12			Signal Track (Span Zoom)	

Antenna A

5240 MHz: Non HT20, 6 to 54 Mbps

Spect Swep	rum Anal t SA	yzer 1	•	+							Frequency	· · ※
RL	SIGH1	Input: F Couplir Align: C	ng: DC	Input Ζ: 50 Ω Corrections: On Freq Ref: Int (S) NFE: Full	#Atten: 34 dB µW Path: Standa	PNO: Fas rd Gate: Off IF Gain: L Sig Track:	Avg Hold: ow Trig: Free	1/1	1 2 3 4 5 6 A WW WW W P N N N N N		r Frequency 000000 GHz	Settings
1 Spe	ctrum		V					Mkr4	200.0 µs		00000 Hz	
Scale Log 5,00	/Div 10		~~~1	and the second sec	Ref Level 15.00			- 26	.414 dBm		wept Span ero Span	
-5.00 -15.0				4	2						Full Span	
-25.0 -35.0										Start F 5.180	Freq 0000000 GHz	
-45.0 -55.0 -65.0			4							Stop F 5.180	req 0000000 GHz	
-75.0 Cent e	er 5.1800	00000 0	GHz						Span 0 Hz			
Res E	W 3.0 M		•				S	weep 1.00	ms (1001 pts)	CF Ste	ep 1000 MHz	
Jiviai											uto	
1	Mode N	Trace	Scale	Х 495.0 µs	Y -27.30 dBm	Function	Function Widt	h Fund	tion Value	M	lan	
2	N	1	t	503.0 µs						Freq C	Offset	
3	N	1	t	192.0 µs	-18.63 dBm					0 Hz		
4 5 6	N	1	t	200.0 µs	-26.41 dBm						Scale og in	
	5	6		Mar 11, 2021 4:34:34 AM			97.36, 0.12			Signal (Span)	Track Zoom)	

Antenna A

A.2 99% and 26dB Bandwidth

99% and 26dB Bandwidth Test Requirement

For the FCC:

There is no requirement for the value of bandwidth. Power measurements are made using the 99% Bandwidth as the integration bandwidth.

99% and 26dB Bandwidth Test Procedure

The 99-percent 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. Measurement of the 99-percent occupied bandwidth is required only as a condition for using the optional band-edge measurement techniques described in section II.G.3.d). Measurements of 99-percent occupied bandwidth may also optionally be used in lieu of the EBW to define the minimum frequency range over which the spectrum is integrated when measuring maximum conducted output power as described in section II.E. However, the EBW must be measured to determine bandwidth dependent limits on maximum conducted output power in accordance with 15.407(a).

Ref. KDB 789033 Section D. 99 Percent Occupied Bandwidth

99% BW

Test Parameters

1. Set center frequency to the nominal EUT channel center frequency.

2. Set span = 1.5 times to 5.0 times the OBW.

3. Set RBW = 1% to 5% of the OBW

4. Set VBW \geq 3 \cdot RBW

5. 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.

6. Use the 99 % power bandwidth function of the instrument (if available).

Ref KDB 789033 in Section C. Measurement Bandwidth, Section 1

Test parameters

X dB BW = -26dB (using the OBW function of the spectrum analyzer)

Emission Bandwidth (EBW)

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%.

Tested By :	Date of testing:
Said Abdelwafi, Julian Land	24-FEB-2021 through 10-MAR-2021
Test Result : PASS	

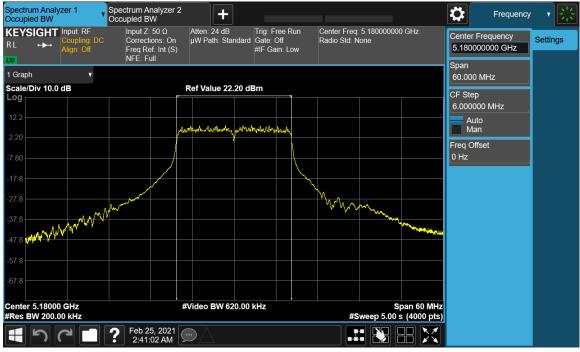
Test Equipment

See Appendix C for list of test equipment

Frequency (MHz)	Mode	Data Rate (Mbps)	26dB BW	99% BW (MHz)
			(MHz)	
5180	Non HT20, 6 to 54 Mbps	6.0	21.2	16.478
5220	Non HT20, 6 to 54 Mbps	6.0	33.6	17.544
5240	Non HT20, 6 to 54 Mbps	6.0	33.9	18.214

Data Screenshots

5180 MHz: Non HT20, 6 to 54 Mbps



Antenna A

5220 MHz: Non HT20, 6 to 54 Mbps

Spectrum Occupied	BW GHT	•	HINPUT Z: 50 Ω Corrections: C		: 28 dB Path: Standard	Trig: Free R	un	Center Freq Radio Std: N	5.220000000) GHz	Center Fre	Frequency	Settings
R L		Align: Off	Freq Ref: Int (NFE: Full			#IF Gain: Lo	W	Raulo Stu. N	lone		5.220000 Span	000 GHz	Jettings
1 Graph		•									60.000 M	Hz	
Scale/Di	iv 10.0 c	β		Ref Va	alue 27.20 d	Bm					CF Step		
Log 17.2 7.20 -2.80				man	want	mmm					6.000000	MHz	
-12.8 -22.8	~~~~^~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Name and the second sec	m m m m m m m m m m m m m m m m m m m					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	www.www	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Man Freq Offse	et	
-32.8 -42.8 -52.8											0 Hz		
-62.8													
Center 5 #Res BV				#Video	BW 620.00	kHz		#S	Sp weep 5.00 s	oan 60 MHz 5 (4000 pts)			
2 Metrics		▼							·				
	Occupi	ed Bandwidth	ו 544 MHz			7.1.1.0			00.4				
	Troport	nit Freg Error	30.81	7 647		Total Pow % of OBW			30.1 dE 99.00				
		andwidth		MHz		x dB	Powe		-26.00				
	า (? Mar 11, 202 5:16:10 AM										

Antenna A

5240 MHz: Non HT20, 6 to 54 Mbps

Spectrur Occupie	n Analyzer 1 d BW	• +									₽	Frequency	· • 😤
KEYSI RL	IGHT Input: RI ↔ Coupling Align: O	J: DC Corre	ctions: On Ref: Int (S)	Atten: 28 dB µW Path: Standa				Center Freq Radio Std: N	5.24000000 lone	0 GHz	Center Fre 5.240000 Span		Settings
1 Graph		•									60.000 M	Hz	
	iv 10.0 dB		F	Ref Value 27.20	dBm						CF Step		
Log 17.2 7.20 -2.80				haventeration	nan de cleve	Annatha					6.000000 Auto Man	MHz	
-32.0	man	······································						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	and the second	www.www	Freq Offse 0 Hz	et	
-42.8 -52.8 -62.8													
	5.24000 GHz N 200.00 kHz		#\	/ideo BW 620.	00 kHz			#5		pan 60 MHz s (4000 pts)			
2 Metrics	;	•											
	Occupied Ban	dwidth 18.214 MHz			Total	Power			30.1 d	Bm			
	Transmit Freq x dB Bandwid		53.976 kHz 33.94 MHz		% of x dB	OBW F	Power		99.00 -26.00				
	50	1 ? Mar 5:3:	11, 2021 2:10 AM										

Antenna A

A.3 Maximum Conducted Output Power

Maximum Conducted Output Power Test Requirement

15.407 General technical requirements, (a) Power limits: (1) For the band 5.15-5.25 GHz.

(i) 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.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. 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).

(ii) 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. ... 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.

(iii) For fixed point-to-point access points 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. ...Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. 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.

(iv) 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.

Maximum Conducted Output Power Test Procedure

Ref. KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Maximum Conducted Output Power

Test Procedure

1. Set the radio in the continuous transmitting mode at full power

2. Compute power by integrating the spectrum across the EBW (or alternatively entire 99% OBW) of the signal using the instrument's band power measurement function. The integration shall be performed using the spectrum analyzer band-power measurement function with band limits set equal to the EBW or the OBW band edges.

3. Capture graphs and record pertinent measurement data.

Ref. KDB 789033 D02 General UNII Test Procedures New Rules v02r01 2. Measurement using a Spectrum Analyzer or EMI Receiver (SA), (d) Method SA-2

Maximum Conducted Output Power

Test parameters

Method SA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

(i) Measure the duty cycle, x, of the transmitter output signal as described in section II.B.

(ii) Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(iii) Set RBW = 1 MHz.

(iv) Set VBW \geq 3 MHz.

(v) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is \leq RBW/2, so that narrowband signals are not lost between frequency bins.)

(vi) Sweep time = auto.

(vii) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

(viii) Do not use sweep triggering. Allow the sweep to "free run".

(ix) Trace average at least 100 traces in power averaging (i.e., RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter.

(x) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth)

The "measure-and-sum technique" is used for measuring in-band transmit power of a device. In the measure-andsum approach, the conducted emission level is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in linear power units. ANSI C63.10 section 14.3.2.2

Tested By :	Date of testing:
Said Abdelwafi, Julian Land	24-FEB-2021 through 10-MAR-2021
Test Result : PASS	

Test Equipment

See Appendix C for list of test equipment

Maximum Output Power

Frequency 5180 MHz

	Paths	related Antenna Gain ()	Max Power m)	y Cycle	Total Tx Channel Power (dBm)	it m)	gin
Mode	Tx Paths	Correlated (dBi)	Tx 1 May (dBm)	Duty Cyc (dB)	Total Tx ((dBm)	Limit (dBm)	Margin (dB)
Non HT20, 6 to 54 Mbps	1	7	19.1	0.12	19.2	29	9.79

Frequency 5220 MHz

	1	1					
		Correlated Antenna Gain (dBi)	Max Power 1)	2	Total Tx Channel Power (dBm)		
Mode	Tx Paths	Correlated (dBi)	Tx 1 Max] (dBm)	Duty Cycle (dB)	Total Tx Cl (dBm)	Limit (dBm)	Margin (dB)
Non HT20, 6 to 54 Mbps	1	7	24.1	0.12	24.2	29	4.82

Frequency 5240 MHz

	x Paths	Correlated Antenna Gain (dBi)	Tx 1 Max Power (dBm)	Duty Cycle (dB)	Total Tx Channel Power (dBm)	Limit (dBm)	Margin (dB)
Mode Non HT20, 6 to 54 Mbps	<u>×</u> <u></u> 1	<u>ඊ ප</u> 7	24.0	<u><u><u>a</u></u><u></u> 0.12</u>	<u> </u>	29 29	<u> </u>

Maximum Transmit Power greater than 30 degrees

Frequency 5180 MHz

Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Max Power (dBm)	Duty Cycle (dB)	Total Radiated Channel Power (dBm)	Limit (dBm)	Margin (dB)
Non HT20, 6 to 54 Mbps	1	-5	19.1	0.1	14.2	21.0	6.79

Frequency 5220 MHz

	Paths	Correlated Antenna Gain (dBi)	1 Max Power m)	y Cycle)	Total Radiated Channel Power (dBm)	nit m)	Margin (dB)
Mode	Tx	Corre (dBi)	Tx 1 N (dBm)	Duty (dB)	Total H (dBm)	Limit (dBm)	Mar (dB)
Non HT20, 6 to 54 Mbps	1	-5	24.1	0.1	19.2	21.0	1.82

Frequency 5240 MHz

		a Gain			annel Power		
Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Max Power (dBm)	Duty Cycle (dB)	Total Radiated Channel Power (dBm)	Limit (dBm)	Margin (dB)
Non HT20, 6 to 54 Mbps	1	-5	24.0	0.1	19.1	21.0	1.92

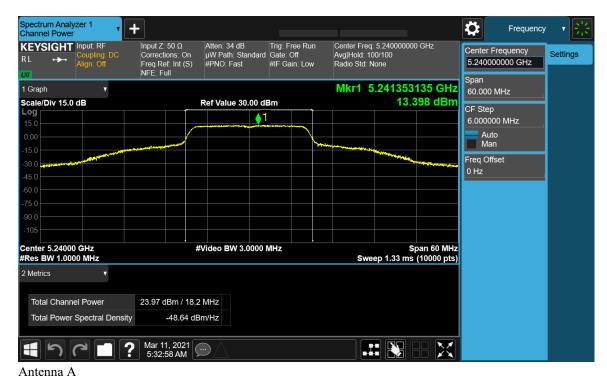
Data Screenshots

5220 MHz: Non HT20, 6 to 54 Mbps

Spectrum Analy Channel Power	yzer 1	+							₽	Frequency	· · · · · · · · · · · · · · · · · · ·
KEYSIGHT RL ↔	Input: RF Coupling: DC Align: Off	Input Ζ: 50 Ω Corrections: On Freq Ref: Int (S) NFE: Full	Atten: 34 dB µW Path: Sta #PNO: Fast	andard Gate	: Free Run ∋: Off Gain: Low	Center Fr Avg Hold: Radio Std		0 GHz	Center Free 5.2200000 Span		Settings
1 Graph	•					Mkr1	5.222667		60.000 MH	łz ,	
Scale/Div 15.0	dB		Ref Value 30	0.00 dBm			13.	504 dBm	CF Step		
Log				<u> </u>					6.000000	MHz	
0.00					\square				Auto Man		
-15.0						and the second distribution of the second distribution of the second distribution of the second distribution of	Non and a Constant of the State		Freq Offset		
-30.0								and the state of the	0 Hz		
-45.0											
-75.0											
-90.0											
-105											
Center 5.2200 #Res BW 1.00			#Video BW 3	.0000 MHz		Sv	S veep 1.33 ms	pan 60 MHz (10000 pts)			
2 Metrics	•										
Total Chann	el Power	24.06 dBm / 17	.5 MHz								
	Spectral Density										
- Total F Ower	opeotral Delisity										
1		Mar 11, 2021 5:16:58 AM	$\bigcirc \triangle$								

Antenna A

5240 MHz: Non HT20, 6 to 54 Mbps



5180 MHz: Non HT20, 6 to 54 Mbps



Antenna A

A.4 Power Spectral Density

Power Spectral Density Test Requirement

15.407 General technical requirements, (a) Power limits: (1) For the band 5.15-5.25 GHz.

(i) 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. 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.

(ii) For an indoor 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. 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.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz...the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. 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.

(iv) For client devices in the 5.15-5.25 GHz band, 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.

Power Spectral Density Test Procedure

Ref. KDB 789033 D02 General UNII Test Procedures New Rules v02r01 F. Maximum Power Spectral Density (PSD)

Power Spectral Density

Test Procedure

The rules requires "maximum power spectral density" measurements where the intent is to measure the maximum value of the time average of the power spectral density measured during a period of continuous transmission. 1. Create an average power spectrum for the EUT operating mode being tested by following the instructions in section II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power…". (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)

2. Use the peak search function on the instrument to find the peak of the spectrum and record its value.

3. Make the following adjustments to the peak value of the spectrum, if applicable: a) If Method SA-2 or SA-2 Alternative was used, add $10 \log(1/x)$, where x is the duty cycle, to the peak of the spectrum.

b) If Method SA-3 Alternative was used and the linear mode was used in step II.E.2.g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.

4. The result is the Maximum PSD over 1 MHz reference bandwidth.

Ref. KDB 789033 D02 General UNII Test Procedures New Rules v02r01 2. Measurement using a Spectrum Analyzer or EMI Receiver (SA), (d) Method SA-2

Power Spectral Density

Test parameters

Method SA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

(i) Measure the duty cycle, x, of the transmitter output signal as described in section II.B.

(ii) Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(iii) Set RBW = 1 MHz.

(iv) Set VBW \geq 3 MHz.

(v) Number of points in sweep \geq 2 Span / RBW. (This ensures that bin-to-bin spacing is \leq RBW/2, so that narrowband signals are not lost between frequency bins.)

(vi) Sweep time = auto.

(vii) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

(viii) Do not use sweep triggering. Allow the sweep to "free run".

(ix) Trace average at least 100 traces in power averaging (i.e., RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter.

(x) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth)

F. Maximum Power Spectral Density (PSD)

2. Use the peak search function on the instrument to find the peak of the spectrum and record its value.

3. Make the following adjustments to the peak value of the spectrum, if applicable: a) If Method SA-2 or SA-2 Alternative was used, add $10 \log(1/x)$, where x is the duty cycle, to the peak of the spectrum.

The "measure-and-sum technique" is used for measuring in-band transmit power of a device. In the measure-andsum approach, the conducted emission level is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in linear power units. ANSI C63.10 section 14.3.2.2

Tested By :	Date of testing:
Said Abdelwafi, Julian Land	24-FEB-2021 through 10-MAR-2021
Test Result : PASS	

Test Equipment

See Appendix C for list of test equipment

Power Spectral Density

Frequency 5180 MHz

		l Antenna Gain	(2	2	(z	(z	
Mode	Tx Paths	Correlated (dBi)	Tx 1 PSD (dBm/MHz)	Duty Cycle (dB)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)
Non HT20, 6 to 54 Mbps	1	7	8.9	0.12	9.0	16	6.99

Frequency 5220 MHz

	aths	Correlated Antenna Gain (dBi)	PSD //MHz)	Cycle	(PSD) PMHz)	t //MHz)	gin
Mode	Tx Paths	Correlated / (dBi)	Tx 1 PSD (dBm/MHz)	Duty Cycle (dB)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)
Non HT20, 6 to 54 Mbps	1	7	13.5	0.12	13.6	16	2.38

Frequency 5240 MHz

	Paths	Correlated Antenna Gain (dBi)	Tx 1 PSD (dBm/MHz)	Duty Cycle (dB)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)
Mode Non HT20, 6 to 54 Mbps	х <u>т</u> 1	<u>රී ප</u> 7	13.4	<u>0.12</u>	<u>не</u> 13.5	<u>16</u>	(dB) 7.49

Data Screenshots

5220 MHz: Non HT20, 6 to 54 Mbps

Spectrum An Channel Pow		+							Frequency	- * 😤
KEYSIGH RL +>-	Coupling: DC	Input Z: 50 Ω Corrections: On Freq Ref: Int (S) NFE: Full	µW Path: Standard	Trig: Free Run Gate: Off #IF Gain: Low	Center Fre Avg Hold: Radio Std:		0 GHz		Frequency 00000 GHz	Settings
1 Graph	\checkmark				Mkr1	5.222667		60.000	MHz	
Scale/Div 15	5.0 dB		Ref Value 30.00 dE	3m		13.	504 dBm	CF Step		
15.0				1				6.00000		
0.00				-				Aut		
-15.0		and the second s				No. of Concession, Name		Mar		
-30.0	and the second s					Contraction of the local data	and addition of the state of the	Freq Off 0 Hz	set	
-45.0										
-60.0										
-75.0										
-90.0										
Center 5.220 #Res BW 1.0			#Video BW 3.0000 N	ИНz	Su	S veep 1.33 ms	pan 60 MHz			
2 Metrics					34	veep 1.55 ms	(10000 pts)			
ZIMENICS	·									
Total Cha	nnel Power	24.06 dBm / 17.	5 MHz							
Total Pow	er Spectral Densi	-48.38 dl								
1 5		Mar 11, 2021 5:16:58 AM								

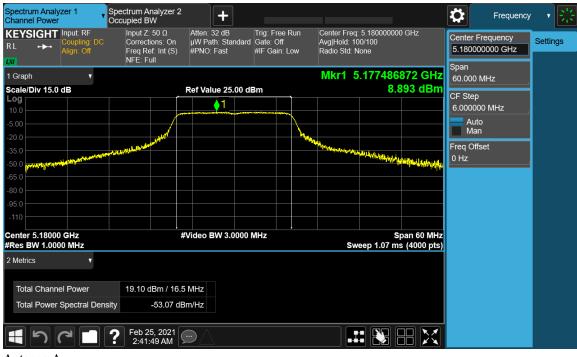
Antenna A

5240 MHz: Non HT20, 6 to 54 Mbps

Spectrum Analy Channel Power	yzer 1	+								\$	Frequency	· · · · · · · · · · · · · · · · · · ·
KEYSIGHT RL ↔	Input: RF Coupling: DC Align: Off	Input Z: 50 Ω Corrections: O Freq Ref: Int (NFE: Full		th: Standard	Trig: Free Gate: Off #IF Gain: L		Center Fre Avg Hold: Radio Std		0 GHz	Center Fre 5.240000 Span		Settings
1 Graph	•						Mkr1	5.241353		60.000 M	Hz	
Scale/Div 15.0	dB		Ref Val	ue 30.00 d	Bm	_		13.3	398 dBm	CF Step		
Log				(6.000000	MHz	
0.00			\square			\backslash				Auto		
-15.0						and the second s	Married Street of the			Man		
-30.0	and the state of t							and the second s		Freq Offse	et	
-45.0										0 Hz		
-60.0												
-75.0												
-90.0												
-105												
Center 5.2400 #Res BW 1.00			#Video E	3W 3.0000	MHz		51	S veep 1.33 ms	pan 60 MHz (10000 pts)			
2 Metrics	v							reep 1.00 ms	(10000 pts)	1		
Total Chann	el Power	23.97 dBm /	18.2 MHz									
Total Power	Spectral Density	-48.64	dBm/Hz									
		Mar 11, 202 5:32:58 AM		2								

Antenna A

5180 MHz: Non HT20, 6 to 54 Mbps



Antenna A

A.5 Conducted Spurious Emissions

Conducted Spurious Emissions Test Requirement

15.407(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) 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.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.
 (7) The provisions of §15.205 apply to intentional radiators operating under this section.

(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

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

Use formula below to substitute conducted measurements in place of radiated measurements

E[dBµV/m] = EIRP[dBm] - 20 log(d[meters]) + 104.77, where E = field strength and d = 3 meter

1) Average Plot, Limit= -41.25 dBm eirp

2) Peak plot, Limit = -21.25 dBm eirp

KDB 789033 D02 General UNII Test Procedures New Rules v02r01

2. Unwanted Emissions that fall Outside of the Restricted Bands

a) For all measurements, follow the requirements in II.G.3. "General Requirements for Unwanted Emissions Measurements."

b) At frequencies below 1000 MHz, use the procedure described in II.G.4. "Procedure for Unwanted Emissions Measurements Below 1000 MHz."

c) At frequencies above 1000 MHz, use the procedure for maximum emissions described in II.G.5., *"Procedure for Unwanted Emissions Measurements Above 1000 MHz."*

(i) 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.³

Conducted Spurious Emissions Test Procedure

KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Ref. ANSI C63.10: 2013

Conducted Spurious Emissions

Test Procedure

1. Connect the antenna port(s) to the spectrum analyzer input.

2. Place the radio in continuous transmit mode

3. Configure Spectrum analyzer as per test parameters below (be sure to enter all losses between the transmitter output and the spectrum analyzer).

4. Use the peak marker function to determine the maximum spurs amplitude level.

5. The "measure-and-sum technique" is used for measuring in-band transmit power of a device. In the measure-and-sum approach, the conducted emission level is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total

emission level from the device. Summing is performed in linear power units. The worst case output is recorded. (see ANSI C63.10:2013 section 14.3.2.2) 6. Capture graphs and record pertinent measurement data.

Ref. ANSI C63.10: 2013 section 12.7.6 (Peak) and 12.7.7.2 (Average)

KDB 789033 D02 General UNII Test Procedures New Rules v02r01, Sec. 5 (Peak), Sec. 6 (Average Method AD)

Conducted Spurious Emissions Test parameters	
Peak	Average
RBW = 1 MHz	RBW = 1 MHz
$VBW \ge 3 MHz$	$VBW \ge 3 MHz$
Sweep = Auto	Sweep = Auto
Detector = Peak	Detector = RMS
Trace = Max Hold.	Power Averaging

Add the max antenna gain + ground reflection factor (4.7 dB for frequencies between 30 MHz and 1000 MHz, and 0 dB for frequencies > 1000 MHz).

Tested By :	Date of testing:
Said Abdelwafi, Julian Land	24-FEB-2021 through 10-MAR-2021
Test Result : PASS	

Test Equipment

See Appendix C for list of test equipment

Conducted Spurs Average Upper

Spect Swep	rum Anal t SA	lyzer 1	•	+								Frequency	- * 器
KEY RL	SIGH1	Input: F Couplir Align: (ng: DC	Input Ζ: 50 Ω Corrections: On Freq Ref: Int (S) NFE: Full	#Atten: 0 dB µW Path: Standar	PNO: Fa d Gate: Off IF Gain: Sig Track	f A High T	Avg Type: F vg Hold: 12 rig: Free Ru	5/125	123456 A \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		Frequency 0000000 GHz	Settings
1 Spe	ctrum		•					N		.748 GHz		00000 GHz	
	/Div 10	dB			Ref Level -10.00	dBm			-68.	247 dBm		wept Span	
Log -20.0					Ť						Z	ero Span	
-30.0 -40.0												Full Span	
-50.0											Start F	req	
-60.0											12.00	0000000 GHz	
-70.0 -80.0	2				HALLAND R. MARA	munder	-	montantani	mannih	- www.wayado	Stop F		
-90.0	tune	mann	المسم مسمع مسم	malessanthing	****						40.00	0000000 GHz	
-100											A	UTO TUNE	
	12.00 GI BW 1.0				#Video BW 3.0 N	lHz*		Swe		op 40.00 GHz is (1001 pts)	CF Ste	20	
	ker Table		•									000000 GHz	
	Mode	Trace	Scale	×	Y	Function	-		-			uto an	
1	N	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	f	× X 12.000 GHz		Function	i Funci	tion Width	Funct	ion Value			
2	N	1	f	12.000 GHz	-89.49 dBm						Freq C 0 Hz	offset	
3	N	1	f	39.748 GHz	-68.25 dBm								
5 6											X Axis L	Scale og	
	ょ	6		? Mar 11, 2021 4:41:46 AM							Signal (Span 2		

Conducted Spurs Peak Upper

Spec Swep	trum Ana ot SA	yzer 1	•	+								Frequency	- *
KE) RL	′SIGH1 ⊶	Dinput: F Couplir Align: C	ng: DC	Input Ζ: 50 Ω Corrections: On Freq Ref: Int (S) NFE: Full	#Atten: 0 dB μW Path: Standarc	PNO: F I Gate: O IF Gain Sig Trac	ff High	#Avg Type: F Avg Hold: 12 Trig: Free Ru	5/125	123456 MWWWW PNNNNN		Frequency 0000000 GHz	Settings
1 Spe	ectrum		•					Μ	lkr4 39	.244 GHz		00000 GHz	
	e/Div 10	dB		i i i i i i i i i i i i i i i i i i i	Ref Level -10.00 c	lBm			-4	6.50 dBm		wept Span	
Log -20.0					ļĬ						Ze	ero Span	
-30.0 -40.0										4		Full Span	
-50.0 -60.0	2						a talaat bistan	- helpolyman	jh./hor-t-manner/	where where we was	Start F	req 0000000 GHz	
-70.0		wirmer .	where the	www.walistanaramaticalist	Contraction of the factor of t	1° 144-14444 (144-	му на наци.						
-80.0											Stop F	req 0000000 GHz	
-90.0 -100											40.00		
	12.00 GI				#Video BW 3.0 N				64	op 40.00 GHz	A	JTO TUNE	
	BW 1.0				#VIGEO BVV 3.0 IV	INZ		Swee		ns (1001 pts)	CF Ste	p	
5 Ma	rker Table		•								2.800	000000 GHz	
	Mode	Trace	Scale	X	Y	Functio	- 5	nction Width	E	ion Value		uto an	
1	N	1	f	∧ 5.180 GHz	T dBm	Functio	n Ful		Funci	lon value			
2	N	1	f	10.360 GHz	dBm						Freq C	ffset	
3		4		39.244 GHz	-46.50 dBm						0 Hz		
4				<u>39.244 G⊓2</u>	-40.50 GBIII						X Axis		
6													
	5	2		? Mar 11, 2021 4:43:36 AM	\mathbf{D}						Signal (Span Z		

Conducted Spurs Average

Frequency 5180 MHz

	sh	ated Antenna Gain	Spur Power)	Cycle	Total Conducted Spur (dBm)		-
Mode	Tx Paths	Correlated (dBi)	Tx 1 S (dBm)	Duty ((dB)	Total ((dBm)	Limit (dB)	Margin (dB)
Non HT20, 6 to 54 Mbps	1	7	-52.5	0.12	-45.4	-41	4.11

Frequency 5220 MHz

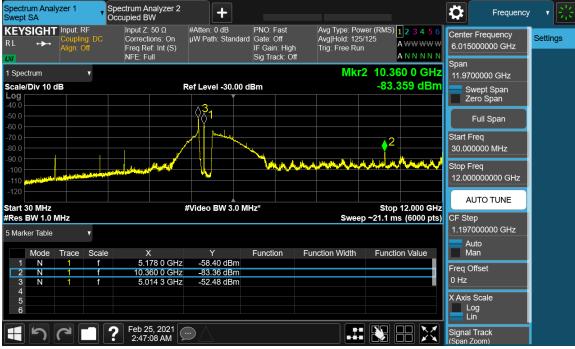
	k Paths	Correlated Antenna Gain (dBi)	Tx 1 Spur Power (dBm)	Duty Cycle (dB)	Total Conducted Spur (dBm)	Limit (dB)	Margin (dB)
Mode	Tx						
Non HT20, 6 to 54 Mbps	1	7	-61.5	0.12	-54.4	-41	13.13

Frequency 5240 MHz

	Paths	Correlated Antenna Gain (dBi)	Tx 1 Spur Power (dBm)	Duty Cycle (dB)	Total Conducted Spur (dBm)	Limit (dB)	Margin (dB)
Mode Non HT20, 6 to 54 Mbps	Ľ L	<u>ਹੋਏ</u> 7	1 x1 -61.4	(fp) 0.12	<u> </u>	imil (dB) -41	(dB) 13.03

Data Screenshots

5180 MHz: Non HT20, 6 to 54 Mbps



Antenna A

5240 MHz: Non HT20, 6 to 54 Mbps

Spectru Swept S	SA		•	+					Frequence	y v 👯
KEYS RL	ight •►•	Input: F Couplir Align: (ng: DC	Input Z: 50 Ω Corrections: On Freq Ref: Int (S) NFE: Full	#Atten: 0 dB µW Path: Standa	PNO: Fast rd Gate: Off IF Gain: Hig Sig Track: C	Avg Hold: 125 h Trig: Free Run		Center Frequency 6.015000000 GHz	Settings
1 Spect	rum		•				N	lkr3 5.560 GHz	Span 11.9700000 GHz	
Scale/I	Div 10 (:B			Ref Level -7.00	dBm		-61.371 dBm		
-27.0 -37.0									Full Span	
-47.0 -57.0					3			^2	Start Freq 30.000000 MHz	
-67.0 -77.0 -87.0						have been a second seco		w.	Stop Freq 12.000000000 GHz	
-97.0 Start 30	0 MHz	ang and a second second	and search	and an	≠Video BW 3.0 M	ľ		Stop 12.000 GHz	AUTO TUNE	
#Res B	W 1.0 I	MHz					Sweep	~21.2 ms (1001 pts)		
5 Marke			•						1.197000000 GHz	
1	Mode N	Trace	Scale	X 5.249 GHz	Y -73.61 dBm	Function	Function Width	Function Value	Man	
2	N	1	f	10.480 GHz	-73.73 dBm				Freq Offset	
3	N	1	f	5.560 GHz	-61.37 dBm				0 Hz	
4 5 6									X Axis Scale Log Lin	
	ょ	2		? Mar 11, 2021 5:33:42 AM					Signal Track (Span Zoom)	1

Antenna A

5220 MHz: Non HT20, 6 to 54 Mbps



Conducted Spurs Peak

Frequency 5180 MHz

Mode	Tx Paths	Correlated Antenna (dBi)	Tx 1 Spur Power (dBm)	Duty Cycle (dB)	Total Conducted Spur (dBm)	Limit (dB)	Margin (dB)
Non HT20, 6 to 54 Mbps	1	7	-44.2	0.12	-37.1	-27	10.08

Frequency 5220 MHz

	ths	Correlated Antenna Gain (dBi)	Spur Power)	Cycle	Total Conducted Spur (dBm)		ï
Mode	Tx Paths	Correlated Ar (dBi)	Tx 1 Spur Po (dBm)	Duty Cycle (dB)	Total Conduci (dBm)	Limit (dB)	Margin (dB)
Non HT20, 6 to 54 Mbps	1	7	-52.5	0.12	-45.4	-27	18.38

Frequency 5240 MHz

	x Paths	Correlated Antenna Gain (dBi)	Tx 1 Spur Power (dBm)	Duty Cycle (dB)	Total Conducted Spur (dBm)	Limit (dB)	Margin (dB)
Mode	Tx						
Non HT20, 6 to 54 Mbps	1	7	-51.6	0.12	-44.5	-27	17.48

Data Screenshots

5180 MHz: Non HT20, 6 to 54 Mbps



Antenna A

5240 MHz: Non HT20, 6 to 54 Mbps

Swep			•	+							Frequency	- *
KEY RL	′SIGH1 • → ••	Input: F Couplir Align: (ng: DC	Input Ζ: 50 Ω Corrections: On Freq Ref: Int (S) NFE: Full	#Atten: 0 dB μW Path: Standar	PNO: F rd Gate: C IF Gain Sig Tra	off : High	#Avg Type: P Avg Hold: 125 Trig: Free Ru		6.0150	Frequency 000000 GHz	Settings
1 Spe	ctrum		v					Ν	Akr4 5.560 GHz		00000 GHz	
Scale Log	e/Div 10	dB			Ref Level -7.00 d	dBm			-51.52 dBm	31	vept Span ero Span	
-17.0 -27.0 -37.0											Full Span	
-47.0 -57.0 -67.0			1			***			<mark>2</mark>	Start Fi 30.000	req 0000 MHz	
-87.0 -87.0	artally and an orthogona	wow		When Hard Batter and Manger and Martin			epertup framework of	nevenuelloonduelu	wyaliWeekary whay the providence		^{req} 0000000 GHz	
	30 MHz				#Video BW 3.0 I	MHz			Stop 12.000 GH		JTO TUNE	
#Res	BW 1.0	MHz						Swee	p ~21.2 ms (1001 pts			
5 Mai	ker Table		▼							1.1970 AL	000000 GHz	
	Mode	Trace	Scale	X	Y	Functio	n Fu	Inction Width	Function Value	AL Ma		
1	N	1	f	5.249 GHz	-61.25 dBm					Freq O	ffset	
2	N	1	f	10.480 GHz	-62.02 dBm					0 Hz		
3	N	1	f	4.926 GHz 5.560 GHz	-51.61 dBm -51.52 dBm							
5 6				5.500 GHZ	-51.52 (15)					X Axis Lo	og	
	5	C		? Mar 11, 2021 5:34:30 AM						Signal (Span Z	Track oom)	

Antenna A

5220 MHz: Non HT20, 6 to 54 Mbps



A.6 Conducted Band Edge

Conducted Band Edge Test Requirement

15.407(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) 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.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.(7) The provisions of §15.205 apply to intentional radiators operating under this section.

(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

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

Use formula below to substitute conducted measurements in place of radiated measurements

E[dBµV/m] = EIRP[dBm] - 20 log(d[meters]) + 104.77, where E = field strength and d = 3 meter

1) Average Plot, Limit= -41.25 dBm eirp

2) Peak plot, Limit = -21.25 dBm eirp

KDB 789033 D02 General UNII Test Procedures New Rules v02r01

2. Unwanted Emissions that fall Outside of the Restricted Bands

a) For all measurements, follow the requirements in II.G.3. "General Requirements for Unwanted Emissions Measurements."

b) At frequencies below 1000 MHz, use the procedure described in II.G.4. "Procedure for Unwanted Emissions Measurements Below 1000 MHz."

c) At frequencies above 1000 MHz, use the procedure for maximum emissions described in II.G.5., *"Procedure for Unwanted Emissions Measurements Above 1000 MHz."*

(i) 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.³

Conducted Band Edge Test Procedure

KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Ref. ANSI C63.10: 2013

Conducted Spurious Emissions

Test Procedure

1. Connect the antenna port(s) to the spectrum analyzer input.

2. Place the radio in continuous transmit mode

3. Configure Spectrum analyzer as per test parameters below (be sure to enter all losses between the transmitter output and the spectrum analyzer).

4. Use the peak marker function to determine the maximum spurs amplitude level.

5. The "measure-and-sum technique" is used for measuring in-band transmit power of a device. In the measure-and-sum approach, the conducted emission level is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total

emission level from the device. Summing is performed in linear power units. The worst case output is recorded. (see ANSI C63.10:2013 section 14.3.2.2) 6. Capture graphs and record pertinent measurement data.

Ref. ANSI C63.10: 2013 section 12.7.6 (Peak) and 12.7.7.2 (Average)

KDB 789033 D02 General UNII Test Procedures New Rules v02r01, Sec. 5 (Peak), Sec. 6 (Average Method AD)

Conducted Spurious Emissions Test parameters								
Peak	Average							
RBW = 1 MHz	RBW = 1 MHz							
$VBW \ge 3 MHz$	$VBW \ge 3 MHz$							
Sweep = Auto	Sweep = Auto							
Detector = Peak	Detector = RMS							
Trace = Max Hold.	Power Averaging							

Tested By :	Date of testing:
Said Abdelwafi, Julian Land	24-FEB-2021 through 10-MAR-2021
Test Result : PASS	

Test Equipment

See Appendix C for list of test equipment

Conducted Bandedge Average

Frequency 5180 MHz

	k Paths	Correlated Antenna Gain (dBi)	k 1 Bandedge Level Bm)	uty Cycle B)	Total Tx Bandedge Level (dBm)	mit B)	argin B)
Mode	Tx Pa	Corre (dBi)	–	Duty (dB)	Total 7 (dBm)	Limit (dB)	Margin (dB)
Non HT20, 6 to 54 Mbps	1	7	-52.2	0.12	-45.1	-41	3.83

Data Screenshots

5180 MHz: Non HT20, 6 to 54 Mbps

Spect Swep	rum Anal t SA	yzer 1	•	Spectrum Analyzer 2 Occupied BW	+						Frequency	- • 🛞
RL	SIGHT • • • PASS	Input: Coupli Align:	ng: DC	Input Ζ: 50 Ω Corrections: On Freq Ref: Int (S) NFE: Full	#Atten: 28 dB µW Path: Stand	PNO: Fa dard Gate: Off IF Gain: Sig Tracł	Avg Hold: 1 Low Trig: Free F	25/125	6 123456 AWWWWW ANNNNN		Frequency 000000 GHz	Settings
1 Spe	ctrum		•				N	lkr2 5.0	22 5 GHz		00000 MHz	
	/Div 10 (B			Ref Level 23.0	0 dBm		-52	.218 dBm		wept Span	
Log 13.0	Trace	> 1 Pa	ass-		Ĭ					Z	ero Span	
3.00 -7.00											Full Span	
-17.0 -27.0										Start F	req 000000 GHz	
-37.0												
-47.0 -57.0										Stop F 5.180	req 000000 GHz	
-67.0			ֆուներթար	_վ իշալիկու _{նա} կերեկլիսերով			աղարություն էրերությունը։ Դե	WHILIW HANN			UTO TUNE	
	4.5000 G BW 1.0 I				#Video BW 3.0) MHz*	s		p 5.1800 GHz ms (601 pts)		ep	
5 Mar	ker Table		•								0000 MHz	
	Mode	Trace	Scal		Y	Function	Function Width	n Func	tion Value		uto an	
1	N N	1	∣ f ∣ f	5.150 0 GHz 5.022 5 GHz						Freq (Offset	
3					OL.LL GDI					0 Hz		
4 5										X Axis		
6											og in	
	ょ	2		? Feb 25, 2021 2:46:27 AM						Signal (Span	Track Zoom)	

Conducted Bandedge Peak

Frequ	encv	5180	MHz

	x Paths	Correlated Antenna Gain (dBi)	Tx 1 Bandedge Level (dBm)	Total Tx Bandedge Level (dBm)	imit IB)	Margin (dB)
Mode	Tx P	Corr (dBi)	Tx 1 (dBn	Tota] (dBn	Limit (dB)	Marg (dB)
Non HT20, 6 to 54 Mbps	1	7	-37.7	-30.6	-27	3.58

Data Screenshots

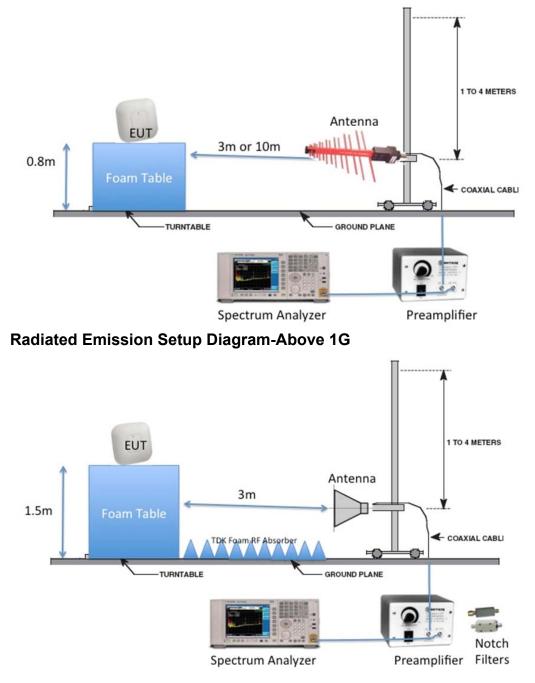
5180 MHz: Non HT20, 6 to 54 Mbps

Spect Swep	rum Anal t SA	yzer 1	•	Spectrum Analyzer 2 Occupied BW	+							Frequency	- v
RL	SIGHT	Input: F Couplir Align: 0	ng: DC	Input Ζ: 50 Ω Corrections: On Freq Ref: Int (S) NFE: Off	#Atten: 30 dB µW Path: Standa	PNO: Fas ard Gate: Off IF Gain: I Sig Track	Low	#Avg Type: Log Avg Hold: 100/ Trig: Free Run	100	123456 MWWWW PNNNNN		Frequency 00000 GHz	Settings
1 Spe	ctrum		v					Mk	r2 5.	023 6 GHz		0000 MHz	
Log	/Div 10 (Ref Level 23.00	dBm			-4	0.59 dBm	Sw	ept Span o Span	
13.0 3.00 -7.00	Trace	} 1 ⊢a										ull Span	
-17.0 -27.0								2			Start Fre 4.5000	eq 00000 GHz	
-37.0 -47.0 -57.0	๛๛๚๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛	มาการให้มีหรือเรื่องเป็น	┉୷୶	ay how the share start	b-Martallanov-p-1-mpaped	Lilan (Mariana)	ւրառվա _{Մի} քեսի	⊢──────────	ԱզոՂոյիսպիս	Juni Viscon Ma	Stop Fre 5.1800	eq 00000 GHz	
-67.0 Start	4.5000 G	Hz			#Video BW 3.0	MHz			Sto	op 5.1800 GHz	AU	TO TUNE	
	BW 1.0 ker Table	MHz	v					Swe	ep 1.16	5 ms (601 pts)		000 MHz	
1 2 3	Mode N N	Trace 1 1	Scal f	e X 5.150 0 GHz 5.023 6 GHz	Y -37.74 dBm -40.59 dBm	Function	Fun	ction Width	Fund	ction Value	Aut Ma Freq Off 0 Hz	n	
6 4 5 6											X Axis S Log Lin	3	
	ょ	6		? Feb 25, 2021 2:42:59 AM							Signal T (Span Zo	irack om)	

Appendix B: Emission Test Results

Testing Laboratory: Cisco Systems, Inc., 125 West Tasman Drive, San Jose, CA 95134, USA

Radiated Emission Setup Diagram-Below 1G



B.1 Radiated Spurious Emissions

FCC 15.205 / 15.407 Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Not covered by the scope of this test report.

B.2 Radiated Emissions 30MHz to 1GHz

FCC 15.209 / 15.205 / 15.407 Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Ref. ANSI C63.10: 2013 section 6.5

Not covered by the scope of this test report.

B.3 AC Conducted Emissions

FCC 15.207 Except when the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply, either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the table in these sections. The more stringent limit applies at the frequency range boundaries.

Measurement Procedure Accordance with ANSI C63.10:2013 section 6.2

Not covered by the scope of this test report.

Equipment #	Manufacturer/ Model	Description	Last Cal	Next Due	Test Item			
	Test Equipment used for conducted tests – Rack 9							
58719	Cisco/Automation Test Insertion Loss	Rack 9	Verify Before Use	Verify Before Use	A.1-A.6			
57562	Keysight (Agilent/HP)/ N9030B-550 OPT LNP EP0	PXA Signal Analyzer, 2Hz-50GHz with Options LNP and EP0	23-Jul-20	23-Jul-21	A.1-A.6			
58231	NATIONAL INSTRUMENTS / PXIe- 1062Q	CHASSIS	Cal Not Required	Cal Not Required	A.1-A.6			
58232	NATIONAL INSTRUMENTS / PXIe- 8840	Up to 2.6 GHz Quad-Core PXI Express Controller	Cal Not Required	Cal Not Required	A.1-A.6			
58234	NATIONAL INSTRUMENTS / PXI- 2796	40 GHz Dual 6x1 Multiplexer (SP6T)	Verify Before Use	Verify Before Use	A.1-A.6			
58236	NATIONAL INSTRUMENTS / PXI- 2796	40 GHz Dual 6x1 Multiplexer (SP6T)	Verify Before Use	Verify Before Use	A.1-A.6			
58237	NATIONAL INSTRUMENTS / PXI- 2799	Switch 1x1	Verify Before Use	Verify Before Use	A.1-A.6			
56327	PASTERNACK/ PE5019-1	Torque Wrench	14-May-20	14-May-21	A.1-A.6			
58256	COMET/ T7611-4	WEB SENSOR FOR REMOTE THERMOMETER HYGROMETER	3-Feb-21	3-Feb-22	A.1-A.6			

Appendix C: List of Test Equipment Used to perform the test

Equip#	Manufacturer/ Model	Description Last Cal		Next Due	Test Item				
	Test Equipment used for conducted tests								
57478	Cisco/Automation Test Insertion Loss	Rack 4	Verify Before Use	Verify Before Use	A.1-A.6				
58702	Keysight (Agilent/HP)/ N9030B-550	PXA Signal Analyzer, 2Hz-50GHz	15-Oct-20	15-Oct-21	A.1-A.6				
55096	National Instruments/ PXI-1042	CHASSIS, PXI	Cal Not Required	Cal Not Required	A.1-A.6				

57239	National Instruments/ PXI-8115	Embedded Controller	Cal Not Required	Cal Not Required	A.1-A.6
57250	National Instruments/ PXI-2796	40 GHz Dual 6x1 Multiplexer (SP6T)	Verify Before Use	Verify Before Use	A.1-A.6
57251	National Instruments/ PXI-2799	Switch 1x1	Verify Before Use	Verify Before Use	A.1-A.6
56093	National Instruments/ PXI-2796	40 GHz Dual 6x1 Multiplexer (SP6T)	Verify Before Use	Verify Before Use	A.1-A.6
56327	PASTERNACK/ PE5019-1	Torque Wrench	14-May-20	14-May-21	A.1-A.6
58256	COMET/ T7611-4	WEB SENSOR FOR REMOTE THERMOMETER HYGROMETER	3-Feb-21	3-Feb-22	A.1-A.6

Appendix D: Abbreviation Key and Definitions

Abbreviation	Description	Abbreviation	Description
EMC	Electro Magnetic Compatibility	°F	Degrees Fahrenheit
EMI	Electro Magnetic Interference	°C	Degrees Celsius
EUT	Equipment Under Test	Temp	Temperature
ITE	Information Technology Equipment	S/N	Serial Number
TAP	Test Assessment Schedule	Qty	Quantity
ESD	Electro Static Discharge	emf	Electromotive force
EFT	Electric Fast Transient	RMS	Root mean square
EDCS	Engineering Document Control System	Qp	Quasi Peak
Config	Configuration	Av	Average
CIS#	Cisco Number (unique identification number for Cisco test equipment)	Pk	Peak
Cal	Calibration	kHz	Kilohertz (1x10 ³)
EN	European Norm	MHz	MegaHertz (1x10 ⁶)
IEC	International Electro technical Commission	GHz	Gigahertz (1x10 ⁹)
CISPR	International Special Committee on Radio Interference	Н	Horizontal
CDN	Coupling/Decoupling Network	V	Vertical
LISN	Line Impedance Stabilization Network	dB	decibel
PE	Protective Earth	V	Volt
GND	Ground	kV	Kilovolt (1x10 ³)
L1	Line 1	μV	Microvolt (1x10 ⁻⁶)
L2	Line2	А	Amp
L3	Line 3	μA	Micro Amp (1x10 ⁻⁶)
DC	Direct Current	mS	Milli Second (1x10 ⁻³)
RAW	Uncorrected measurement value, as indicated by the measuring device	μS	Micro Second (1x10 ⁻⁶)
RF	Radio Frequency	μS	Micro Second (1x10 ⁻⁶)
SLCE	Signal Line Conducted Emissions	m	Meter
Meas dist	Measurement distance	Spec dist	Specification distance
N/A or NA	Not Applicable	SL	Signal Line (or Telecom Line)
Р	Power Line	L	Live Line
Ν	Neutral Line	R	Return
S	Supply	AC	Alternating Current

The following table defines abbreviations used within this test report.

Appendix E: Photographs of Test Setups

EUT Photos have been omitted from this test report. Photos can be found in the supplementary exhibit included in the submission and EDCS# 21541319.

Appendix F: Software Used to Perform Testing

Cisco Internal LabView Radio Test Automation Software:

- RF Automation Main versions: 208, 218
- RF Domain Report Generation version 3

Appendix G:Test Procedures

Measurements were made in accordance with

- KDB Publication No. 789033 D02 General UNII Test Procedures New Rules v02r01
- KDB Publication No. 662911 MIMO
- ANSI C63.4 2014 Unintentional Radiators
- ANSI C63.10 2013 Intentional Radiators

Test procedures are summarized below:

FCC 5GHz Test Procedures	EDCS # 1445048		
FCC 5GHz RSE Test Procedures	EDCS # 1511600		

Appendix H: Scope of Accreditation (A2LA certificate number 1178-01)

The scope of accreditation of Cisco Systems, Inc. can be found on the A2LA web page at:

http://www.a2la.org/scopepdf/1178-01.pdf

Appendix I: Test Assessment Plan

Compliance Test Plan (Excel) EDCS# 21468205 Target Power Tables EDCS# 19766956

Appendix J: Worst Case Justification

N/A

End