TEST REPORT

Product Name:	Vitals360 Multi-vitals Mobile Monitor
Trade Mark:	Vitals360
Model No. / HVIN:	VC-001
Add. Model No. / HVIN:	N/A
Report Number:	190518003RFC-4
Test Standards:	FCC 47 CFR Part 15 Subpart E
FCC ID:	2AUBA-VC19VTLS09081
Test Result:	PASS
Date of Issue:	August 28, 2019

Prepared for:

VoCare Inc
4950 Turkey Foot Road, Zionsville Indiana 46077, USA

Prepared by:

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Date: August 28, 2019

Version

Version No.	Date	Description
V1.0	August 28, 2019	Original

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	VoCare Inc
Address of Applicant:	4950 Turkey Foot Road, Zionsville Indiana 46077, USA
Manufacturer:	Linktop Technology Co.Ltd
Address of Manufacturer:	North 5F, Huoju Plaza, No.56-58, Huoju Road, Huli district, Xiamen city, Fujian province, China

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Vitals360 Multi-vitals Mobile Monitor		
Model No. / HVIN:	VC-001		
Add. Model No. / HVIN:	N/A		
Trade Mark:	Vitals360		
DUT Stage:	Identical Prototype		
	UTRA Bands:	Band II/ Band IV/ Band V	
	E-UTRA Bands:	FDD Band 2/ Band 4/ Band 5/ Band 12/ Band 13/ Band 17	
	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
		Bluetooth V4.0	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n
		5 250 MHz to 5 350 MHz	IEEE 802.11a/n
		5 725 MHz to 5 850 MHz	IEEE 802.11a/n
	RNSS Bands:	1559 MHz to 1610 MHz	GPS/GLONASS/ Beidou
Sample Received Date:	July 23, 2019		
Sample Tested Date:	July 25, 2019 to August 6, 2019		

1.2.2 Description of Accessories

Adapter	
Model No.:	LXCP12-005200XFG
Input:	100-240 V~50/60 Hz 0.5 A Max
Output:	5.0 V ⎓ 2 A
AC Cable:	N/A
DC Cable:	N/A

Battery (1)	
Model No.:	E103737
Battery Type:	Lithium-ion Rechargeable Battery
Rated Voltage:	3.7 Vdc
Rated Capacity:	1500 mAh

Cable (1)	
Description:	USB Changing Cable
Cable Type:	Shielded without ferrite
Length:	1.0 Meter

Cable (2)	
Description:	USB Changing Cable
Cable Type:	Shielded without ferrite
Length:	0.8 Meter

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Frequency Bands:	5150 MHz to 5250 MHz (U-NII-1)				
	5250 MHz to 5350 MHz (U-NII-2A)				
	5 725 MHz to 5 850 MHz (U-NII-3)				
Frequency Ranges:	5180 MHz to 5240 MHz				
	5260 MHz to 5320 MHz				
	5 745 MHz to 5 825 MHz				
Support Standards:	IEEE 802.11a/n				
TPC Function:	Not Support				
DFS Operational mode:	Slave without radar Interference detection function				
Type of Modulation:	IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)				
	IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)				
Channel Spacing:	IEEE 802.11a/n-HT20: 20 MHz				
Data Rate:	IEEE 802.11a: Up to 54 Mbps				
	IEEE 802.11n-HT20: Up to MCS7				
Number of Channels:	5150 MHz to 5250 MHz: 4 for IEEE 802.11a/n-HT20				
	5250 MHz to 5350 MHz: 4 for IEEE 802.11a/n-HT20				
	5725 MHz to 5850 MHz: 5 for IEEE 802.11a/n-HT20				
Antenna Type:	Integral Antenna				
Antenna Gain:	5150 MHz to 5250 MHz: 0.8 dBi				
	5250 MHz to 5350 MHz: 0.9 dBi				
	5725 MHz to 5850 MHz: 2.7 dBi				
Maximum conducted output power (dBm):		**U-NII-1**	**U-NII-2A**	**U-NII-2C**	**U-NII-3**
	IEEE 802.11a:	14.23	12.94	/	14.23
	IEEE 802.11n-HT20:	14.16	12.96	/	14.19
Normal Test Voltage:	3.7 V Battery				

1.4 OTHER INFORMATION

Operation Frequency Each of Channel				
	U-NII-1	**U-NII-2A**	**U-NII-2C**	**U-NII-3**
IEEE 802.11a, IEEE 802.11n-HT20,	**f = 5000 + 5k, k = 32 + 4n**			**f = 5000 + 5k, k = 145 + 4n**
	n = 1,…, 4	**n = 5,…, 8**	**n = 17,…, 27**	**n = 1,…, 5**
Note: **f** is the operating frequency (MHz); **k** is the operating channel.				

1.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	FCC ID	Supplied by
Notebook	Lenovo	E450	SL10G10780	N/A	UnionTrust

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.3 Meter	Applicant

1.6 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

1.7 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069
The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01
Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories
CAB identifier: CN0032

FCC Accredited Lab.
Designation Number: CN1194
Test Firm Registration Number: 259480

1.8 DEVIATION FROM STANDARDS

None.

1.9 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.11 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-150KHz	±3.8 dB
2	Conducted emission 150KHz-30MHz	±3.4 dB
3	Radiated emission 9KHz-30MHz	±4.9 dB
4	Radiated emission 30MHz-1GHz	±4.7 dB
5	Radiated emission 1GHz-18GHz	±5.1 dB
6	Radiated emission 18GHz-26GHz	±5.2 dB
7	Radiated emission 26GHz-40GHz	±5.2 dB

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart E Test Cases			
Test Item	**Test Requirement**	**Test Method**	**Result**
Antenna Requirement	FCC 47 CFR Part 15 Subpart C Section 15.203 FCC 47 CFR Part 15 Subpart E Section 15.407(a)(1) (2)	N/A	PASS
26 dB emission bandwidth	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(2)(5)	KDB 789033 D02 v02r01 Section C.1	PASS
6 dB bandwidth	FCC 47 CFR Part 15 Subpart E Section 15.407 (e)	KDB 789033 D02 v02r01 Section C.2	PASS
Maximum conducted output power	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)	KDB 789033 D02 v02r01 Section E.3.a (Method PM)	PASS
Peak Power Spectral Density	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)	KDB 789033 D02 v02r01 Section F	PASS
Radiated Emissions and Band Edge Measurement	FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(1)(2)(3)(4)(5) FCC 47 CFR Part 15 Subpart C Section 15.209/205	KDB 789033 D02 v02r01 Section G.3, G.4, G.5, and G.6	PASS
Dynamic Frequency Selection	FCC 47 CFR Part 15 Subpart E Section 15.407 (h)	KDB 905462 D03 Client Without DFS New Rules v01r02	PASS
AC Power Line Conducted Emission	FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(6) FCC 47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013, Section 6.2.	PASS
Note: 1) N/A: In this whole report not applicable.			

For Dynamic Frequency Selection

Test Case	Result
Channel Availability Check Time	N/A[1]
U-NII Detection Bandwidth	N/A[1]
Channel Closing Transmission Time	PASS
Channel Move Time	PASS
DFS Detection Threshold	N/A[1]
Non- Occupancy Period	N/A[1]
Note: 1) The EUT is slave, NA In this whole report not applicable.	

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☒	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 03, 2018	Dec. 03, 2021
☒	Receiver	R&S	ESIB26	100114	Nov. 24, 2018	Nov. 24, 2019
☒	Loop Antenna	ETS-LINDGREN	6502	00202525	Dec. 03, 2018	Dec. 03, 2019
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Dec. 08, 2018	Dec. 08, 2019
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	Dec. 08, 2018	Dec. 08, 2019
☒	Preamplifier	HP	8447F	2805A02960	Nov. 24, 2018	Nov. 24, 2019
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May 18, 2019	May 18, 2020
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Jan. 05, 2019	Jan. 05, 2020
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160333		

Conducted Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☒	Receiver	R&S	ESR7	1316.3003K07 -101181-K3	Nov. 24, 2018	Nov. 24, 2019
☒	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 24, 2018	Nov. 24, 2019
☒	LISN	R&S	ESH2-Z5	860014/024	Nov. 24, 2018	Nov. 24, 2019
☒	Test Software	Audix	e3	Software Version: 9.160323		

Conducted RF test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☒	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Nov. 24, 2018	Nov. 24, 2019
☒	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	Nov. 24, 2018	Nov. 24, 2019

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage	Relative Humidity (%)
NT/NV	+15 to +35	3.7 V Battery	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (kPa)	Tested by
26 dB emission bandwidth	25.1	49	100.1	Hank Wu
6 dB bandwidth				
Occupied Bandwidth				
Maximum conducted output power				
Peak Power Spectral Density				
Radiated Emissions and Band Edge Measurement	22.4	52	100.52	Fire Huo
Dynamic Frequency Selection	25.1	49	100.1	Hank Wu
AC Power Line Conducted Emission	25.0	50	100.1	Bert Xiong

4.2 TEST CHANNELS

Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
IEEE 802.11a IEEE 802.11n-HT20	5150 MHz to 5250 MHz	Channel 36	Channel 44	Channel 48
		5180 MHz	5220 MHz	5240 MHz
	5250 MHz to 5350 MHz	Channel 52	Channel 60	Channel 64
		5260 MHz	5300 MHz	5320 MHz
	5725 MHz to 5850 MHz	Channel 149	Channel 157	Channel 165
		5745 MHz	5785 MHz	5825 MHz

4.3 EUT TEST STATUS

Mode	Tx/Rx Function	Description
IEEE 802.11a/n	1Tx/1Rx	1. Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.

Power Setting				
	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
IEEE 802.11a	23	23	/	23
IEEE 802.11n-HT20	23	23	/	23

Test Software
Test software name: QRCT ;

4.4 PRE-SCAN

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Following data rate was (were) selected for the final test as listed below

Mode	Worst-case data rates
IEEE 802.11a	54 Mbps
IEEE 802.11n-HT20	MCS7

4.5 TEST SETUP

4.5.1 For Radiated Emissions test setup

Figure 1. Below 30MHz

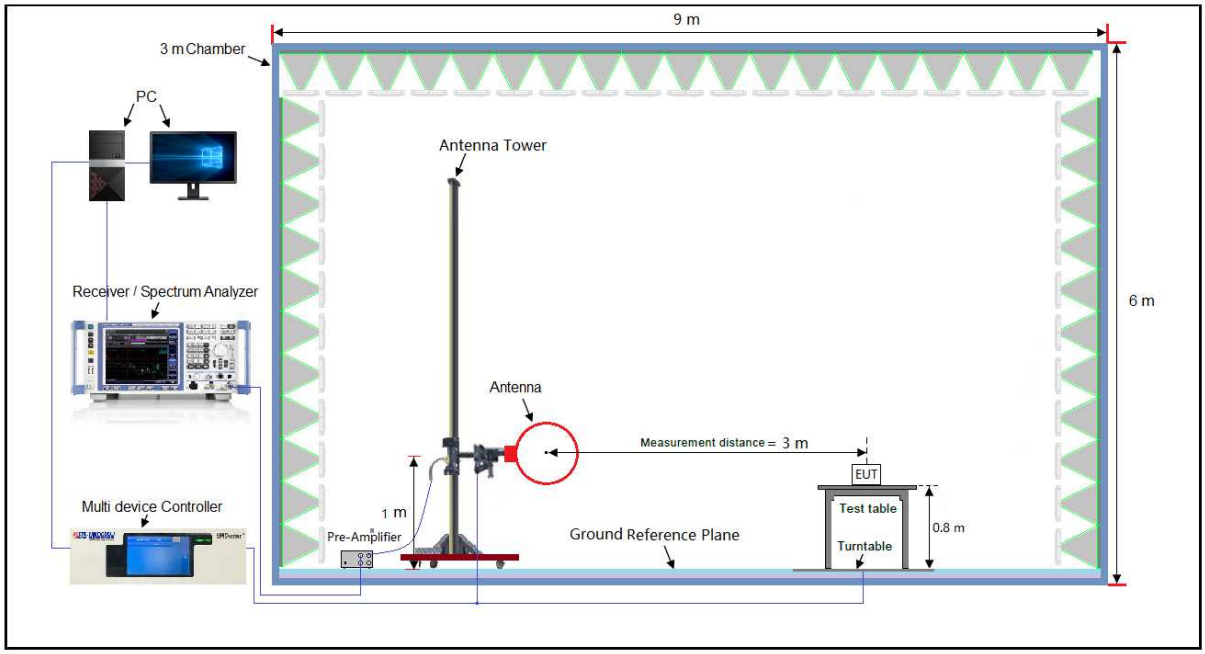


Figure 2. 30MHz to 1GHz

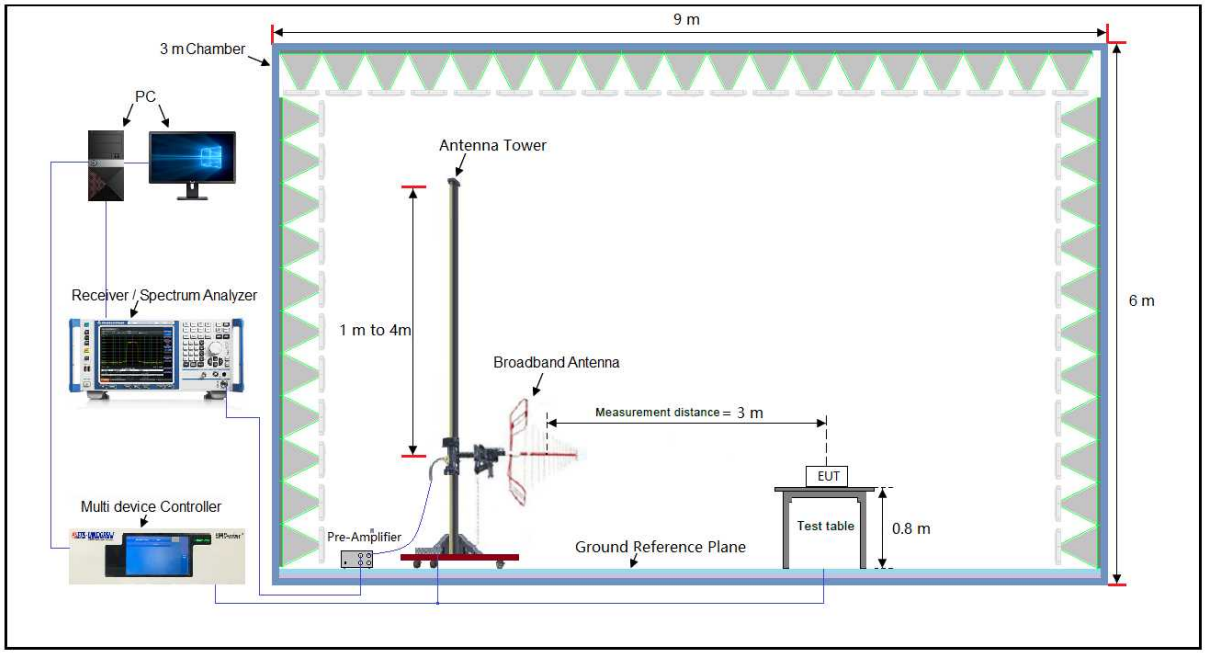
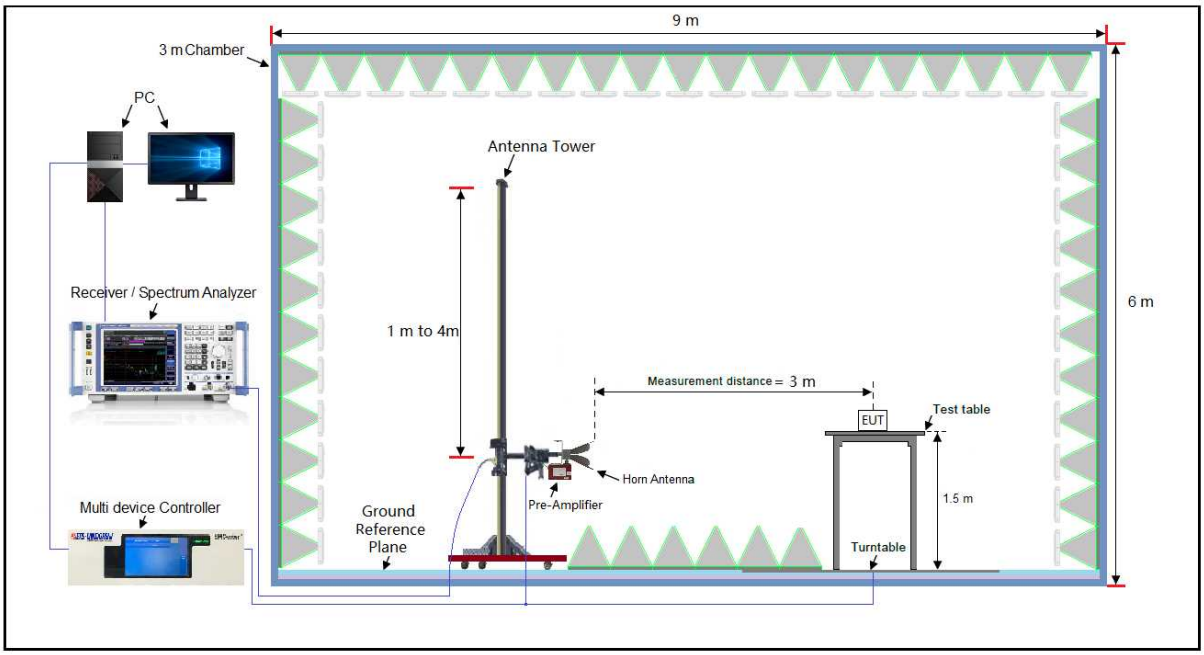
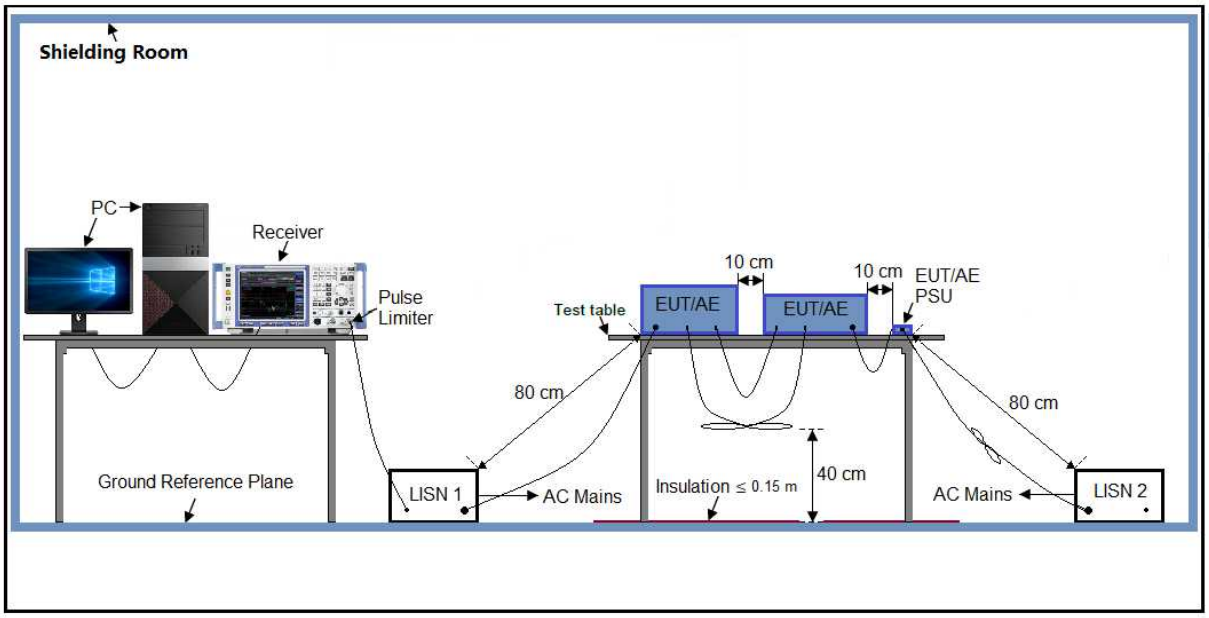


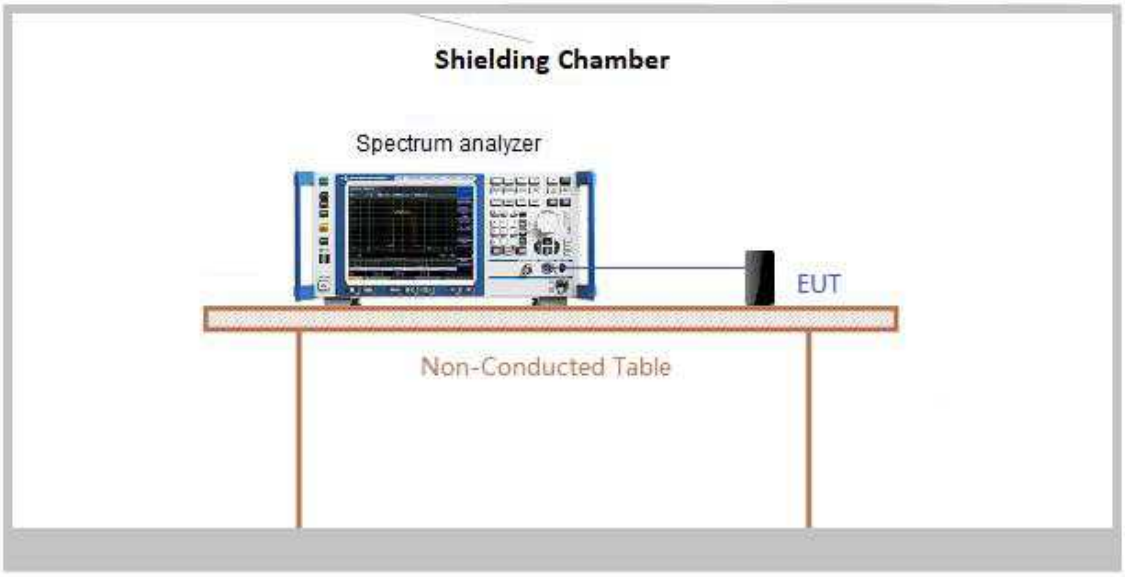
Figure 3. Above 1GHz



4.5.2 For Conducted Emissions test setup



4.5.3 For Conducted RF test setup



Normal Environment

4.6 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by 3.7 V Battery. Only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4.7 DUTY CYCLE

Test Procedure: ANSI C63.10-2013 Clause 12.2.

Test Results

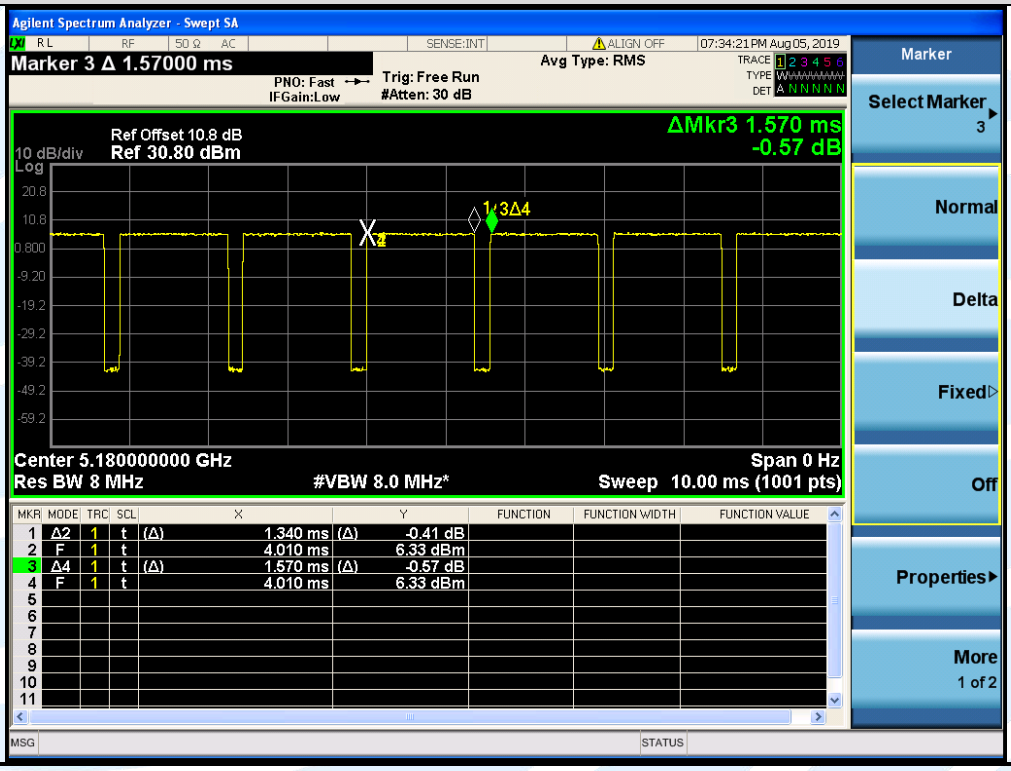
Mode	Data rates (Mbps)	On Time (msec)	Period (msec)	Duty Cycle (linear)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)	Average Factor (dB)
IEEE 802.11a	54	1.340	1.570	0.85	85.35	0.69	0.75	-1.38
IEEE 802.11n-HT20	MCS7	1.260	1.470	0.86	85.71	0.67	0.79	-1.34

Remark:

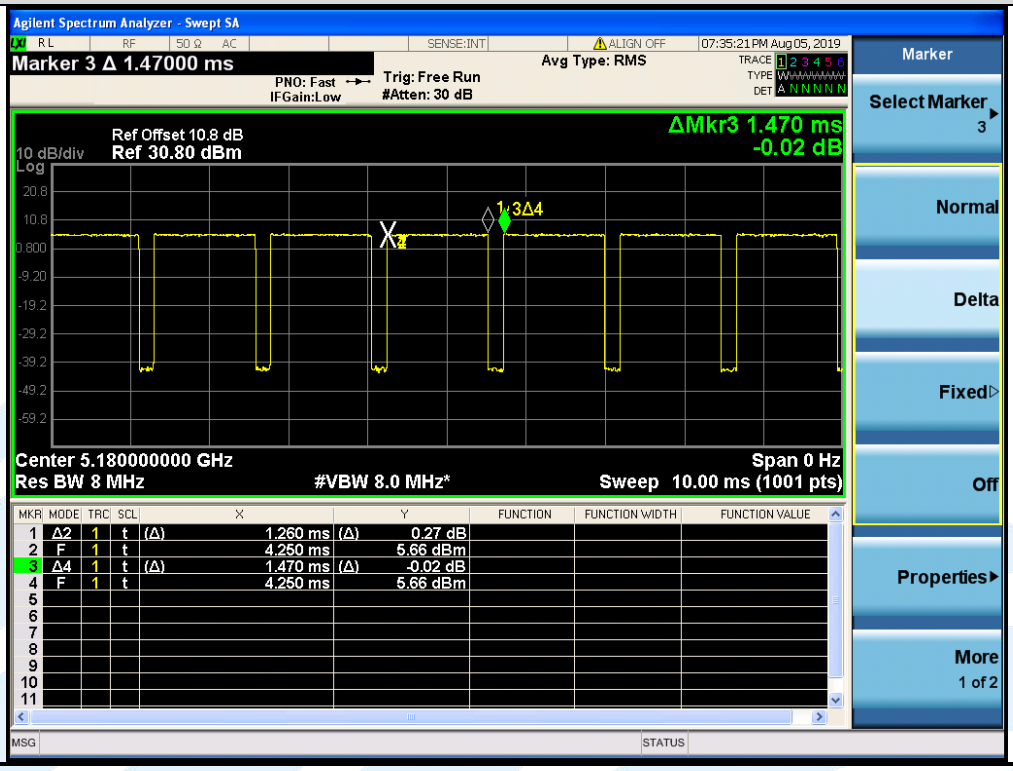
1) Duty cycle= On Time/ Period;
2) Duty Cycle factor = 10 * log(1/ Duty cycle);
3) Average factor = 20 $\log_{10}$ Duty Cycle.

The test plots as follows

IEEE 802.11a



IEEE 802.11n-HT20



5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicesed Wireless Devices
4	KDB 789033 D02 General UNII Test Procedures New Rules v02r01	Guidelines for compliance testing of unlicensed national information infrastructure (U-NII) device part 15, subpart E
5	KDB 905462 D06 802.11 Channel Plans New Rules v02	Operation in U-NII bands -802.11 channel PLAN(§15.407)
6	KDB 905462 D03 Client Without DFS New Rules v01r02	U-NII client devices without radar detection capability

5.2 ANTENNA REQUIREMENT

Standard Requirement
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. **15.407(a)(1) (2) requirement:** The conducted output power limit specified in paragraph (a) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (a) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power and the peak power spectral density shall be reduced by the by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
EUT Antenna:
Antenna in the interior of the equipment and no consideration of replacement. The gain of the antenna is 2.7 dBi

5.3 26 DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(2)(5)
Test Method: KDB 789033 D02 v02r01 Section C.1
Limit: None; for reporting purposes only.
Test Procedure:

The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum analyzer.

Spectrum analyzer according to the following Settings:
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 peak 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 %.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.
Test Setup: Refer to section 4.5.3 for details.
Instruments Used: Refer to section 3 for details
Test Results: Pass

Mode	Channel	26 dB Bandwidth (MHz)
IEEE 802.11a	36 (5180)	33.00
	44 (5220)	32.84
	48 (5240)	33.23
	52 (5260)	33.05
	60 (5300)	31.01
	64 (5320)	32.42
IEEE 802.11n-HT20	36 (5180)	33.86
	44 (5220)	34.00
	48 (5240)	33.58
	52 (5260)	32.13
	60 (5300)	33.59
	64 (5320)	33.43

The test plots as follows:

IEEE 802.11a

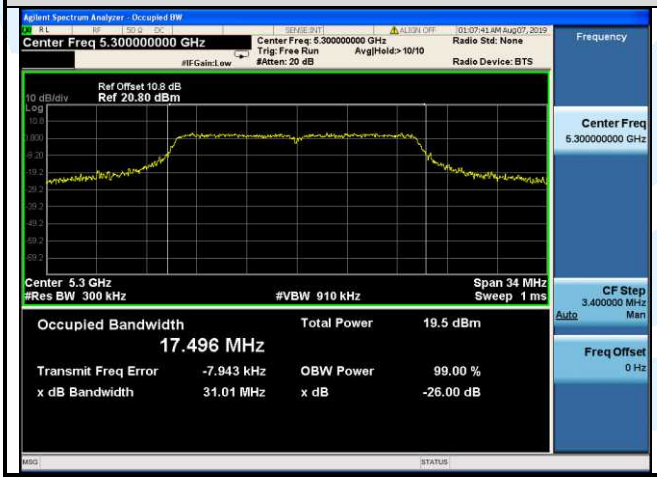
Channel 36

Channel 44

Channel 48

Channel 52

Channel 60



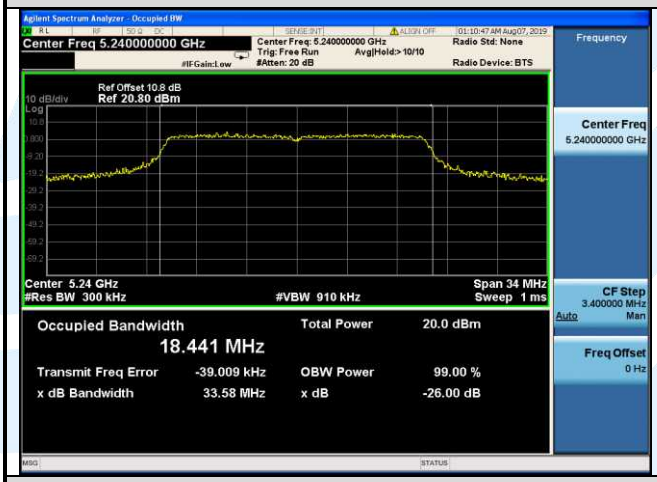
Channel 64

IEEE 802.11n-HT20

Channel 36

Channel 44

Channel 48



Channel 52

Channel 60

Channel 64

5.46 DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 15 Subpart E Section 15.407 (e)

Test Method: KDB 789033 D02 v02r01 Section C.2

Limit: Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Procedure:

The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum Analyzer.

Spectrum analyzer according to the following Settings:
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 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.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

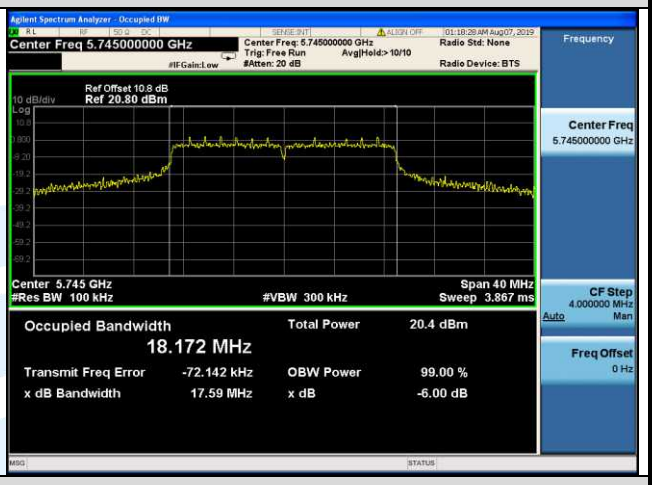
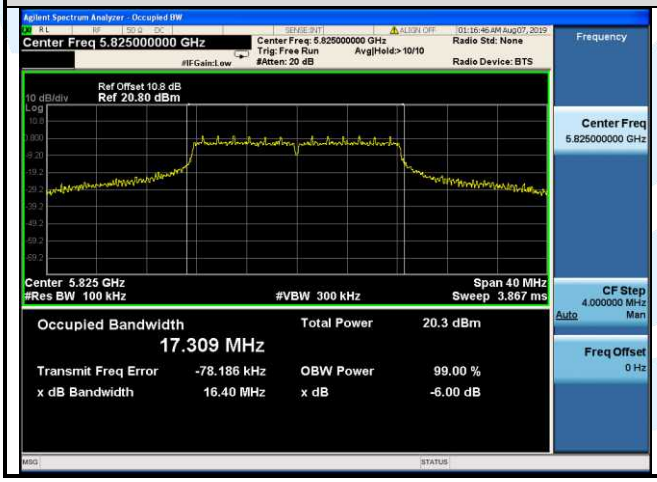
Test Mode: Transmitter mode

Test Results: Pass

Test Data:

Mode	Channel/ Frequency (MHz)	6 dB Bandwidth (MHz)	6 dB Bandwidth Limit	Pass / Fail
IEEE 802.11a	149 (5745)	16.38	> 500 kHz	Pass
	157 (5785)	16.40	> 500 kHz	Pass
	165 (5825)	16.40	> 500 kHz	Pass
IEEE 802.11n-HT20	149 (5745)	17.59	> 500 kHz	Pass
	157 (5785)	17.60	> 500 kHz	Pass
	165 (5825)	17.56	> 500 kHz	Pass

The test plots as follows:

IEEE 802.11a	IEEE 802.11n-HT20
Channel 149	
	
Channel 157	
Channel 165	
	

5.5 MAXIMUM CONDUCTED OUTPUT POWER OR E.I.R.P

Test Requirement: FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(3)

Test Method: KDB 789033 D02 v02r01 Section E.3.a(Method PM)

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. 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. 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. 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.

   (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. In addition, 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 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.

2. 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.

Test Procedure:

1. Connected the EUT's antenna port to measure device by 10dB attenuator.
2. Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of Tx on burst.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Transmitter mode
Test Results: Pass
Test Data:

Directional gain and the maximum output power limit.

FCC 47 CFR Part 15 Subpart E

Frequency Band	Antenna Gain (dBi))	Power Limits (dBm)
U-NII-1	0.80	24.00
U-NII-2A	0.90	24.00
U-NII-3	2.70	30.00

For U-NII-1 Band:

Mode	Channel/ Frequency (MHz)	Maximum conducted output power (dBm)		Limit (dBm)	Pass / Fail
		Meas Power	Corr'd Power		
IEEE 802.11a	36 (5180)	13.54	14.23	24	Pass
	44 (5220)	12.90	13.59	24	Pass
	48 (5240)	12.43	13.12	24	Pass
IEEE 802.11n-HT20	36 (5180)	13.49	14.16	24	Pass
	44 (5220)	12.64	13.31	24	Pass
	48 (5240)	12.40	13.07	24	Pass

Remark:

1. Corr'd Power = Meas Power + Duty Cycle Factor

For U-NII-2A Band:

Mode	Channel/ Frequency (MHz)	Maximum conducted output power (dBm)		Limit (dBm)	Pass / Fail
		Meas Power	Corr'd Power		
IEEE 802.11a	52 (5260)	12.24	12.93	24	Pass
	60 (5300)	12.18	12.87	24	Pass
	64 (5320)	12.25	12.94	24	Pass
IEEE 802.11n-HT20	52 (5260)	12.19	12.86	24	Pass
	60 (5300)	12.16	12.83	24	Pass
	64 (5320)	12.29	12.96	24	Pass

Remark:

2. Corr'd Power = Meas Power + Duty Cycle Factor

For U-NII-3 Band:

Mode	Channel/ Frequency (MHz)	Maximum conducted output power (dBm)		Limit (dBm)	Pass / Fail
		Meas Power	Corr'd Power		
IEEE 802.11a	149 (5745)	12.62	13.31	30	Pass
	157 (5785)	13.34	14.03	30	Pass
	165 (5825)	13.54	14.23	30	Pass
IEEE 802.11n-HT20	149 (5745)	12.61	13.28	30	Pass
	157 (5785)	13.30	13.97	30	Pass
	165 (5825)	13.52	14.19	30	Pass

Remark:

1. Corr'd Power = Meas Power + Duty Cycle Factor

5.6 PEAK POWER SPECTRAL DENSITY

Test Requirement: FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)

Test Method: KDB 789033 D02 v02r01 Section F

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. 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. 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. 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.

   (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. In addition, 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 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.

2. 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.

Directional gain and the maximum output power limit.

Frequency Band	Antenna Gain (dBi))	Power Limits (dBm)
U-NII-1	0.80	24.00
U-NII-2A	0.90	24.00
U-NII-3	2.70	30.00

For U-NII-1 Band:

Mode	Channel/ Frequency (MHz)	Power spectral density (dBm/MHz)		Limit (dBm/MHz)	Pass / Fail
		Meas PSD	Corr'd PSD		
IEEE 802.11a	36 (5180)	-0.476	0.21	11	Pass
	44 (5220)	-2.019	-1.33	11	Pass
	48 (5240)	-2.271	-1.58	11	Pass
IEEE 802.11n-HT20	36 (5180)	-0.496	0.17	11	Pass
	44 (5220)	-1.633	-0.96	11	Pass
	48 (5240)	-2.439	-1.77	11	Pass

Remark:

1. Corr'd PSD = Meas PSD + Duty Cycle Factor

For U-NII-2A Band:

Mode	Channel/ Frequency (MHz)	Power spectral density (dBm/MHz)		Limit (dBm/MHz)	Pass / Fail
		Meas PSD	Corr'd PSD		
IEEE 802.11a	52 (5260)	-2.480	-1.79	11	Pass
	60 (5300)	-1.595	-0.91	11	Pass
	64 (5320)	-0.629	0.06	11	Pass
IEEE 802.11n-HT20	52 (5260)	-3.129	-2.46	11	Pass
	60 (5300)	-1.906	-1.24	11	Pass
	64 (5320)	-1.191	-0.52	11	Pass

Remark:

2. Corr'd PSD = Meas PSD + Duty Cycle Factor

For U-NII-3 Band:

Mode	Channel/ Frequency (MHz)	Power spectral density (dBm/500KHz)		Limit (dBm/500KHz)	Pass / Fail
		Meas PSD	Corr'd PSD		
IEEE 802.11a	149 (5745)	8.138	8.83	30	Pass
	157 (5785)	8.307	8.99	30	Pass
	165 (5825)	6.918	7.61	30	Pass
IEEE 802.11n-HT20	149 (5745)	7.385	8.05	30	Pass
	157 (5785)	7.373	8.04	30	Pass
	165 (5825)	7.174	7.84	30	Pass

Remark:

1. Corr'd PSD = Meas PSD + Duty Cycle Factor

The test plots as follows:

IEEE 802.11a	IEEE 802.11n-HT20
Channel 36	
Channel 44	
Channel 48	

IEEE 802.11a	IEEE 802.11n-HT20
Channel 52	
Channel 60	
Channel 64	

IEEE 802.11a	IEEE 802.11n-HT20
Channel 149	
Channel 157	
Channel 165	

5.7 RADIATED EMISSIONS AND BAND EDGE MEASUREMENT

Test Requirement: FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(1)(2)(3)(4)(6)
FCC 47 CFR Part 15 Subpart C Section 15.209/205

Test Method: KDB 789033 D02 v02r01 Section G.3, G.4, G.5, and G.6

Receiver Setup:

Frequency	RBW
0.009 MHz-0.150 MHz	200/300 kHz
0.150 MHz -30 MHz	9/10 kHz
30 MHz-1 GHz	100/120 kHz
Above 1 GHz	1 MHz

Limits:

1. Limits of Radiated Emission and Band edge Measurement

Radiated emissions that fall in the restricted bands must comply with the general emissions limits in 15.209(a) as below table. Other emissions shall be at least 20 dB below the highest level of the desired power.

Frequency	Field strength (microvolt/meter)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009 MHz-0.490 MHz	2400/F(kHz)	--	--	300
0.490 MHz-1.705 MHz	24000/F(kHz)	--	--	30
1.705 MHz-30 MHz	30	--	--	30
30 MHz-88 MHz	100	40.0	Quasi-peak	3
88 MHz-216 MHz	150	43.5	Quasi-peak	3
216 MHz-960 MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1 GHz	500	54.0	Average	3

Remark:

a. The lower limit shall apply at the transition frequencies.
b. Emission level (dBuV/m) = 20 log Emission level (uV/m).
c. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

2. Limits of Unwanted Emission Out of the Restricted Bands

Applicable To	Limit	
789033 D02 General U-NII Test Procedures New Rules v01r04	**Field Strength at 3 m**	
	PK: 74 (dBμV/m)	**AV: 54 (dBμV/m)**
Applicable To	EIRP Limit	Equivalent Field Strength at 3 m
FCC Part 15.407 (b)(1)	PK: -27 (dBm/MHz)	PK: 74 (dBμV/m)
FCC Part 15.407 (b)(2)	PK: -27 (dBm/MHz)	PK: 74 (dBμV/m)
FCC Part 15.407 (b)(3)	PK: -27 (dBm/MHz)	PK: 68.2 (dBμV/m)
FCC Part 15.407 (b)(4)	27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edges;	PK: 68.2 (dBμV/m)
	15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;	
	10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges;	
	-27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.	

Test Setup: Refer to section 4.5.1 for details.

Test Procedures:

1. The EUT was placed on the top of a rotating table 0.8 meters (for below 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
6. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Remark:

a) The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
b) The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
c) The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for RMS Average (Duty cycle < 98 %) for Average detection (AV) at frequency above 1 GHz, then the measurement results was added to a correction factor (10 log(1/duty cycle)).
d) The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz (Duty cycle ≥ 98 %) or ≥ 1/T(duty cycle is < 98%) for Average detection (AV) at frequency above 1 GHz.
e) All modes of operation were investigated and the worst-case emissions are reported.

Equipment Used: Refer to section 3 for details.

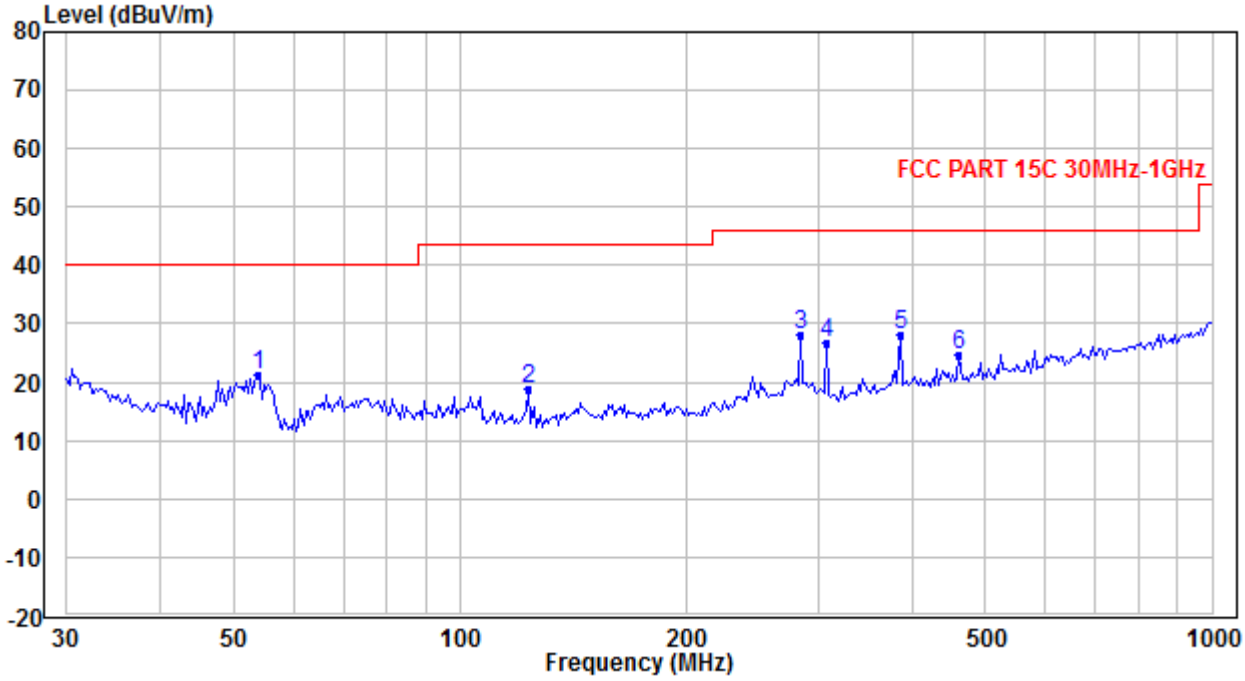
Test Result: Pass

The measurement data as follows:

Radiated Emission Test Data (9 KHz ~ 30 MHz):
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

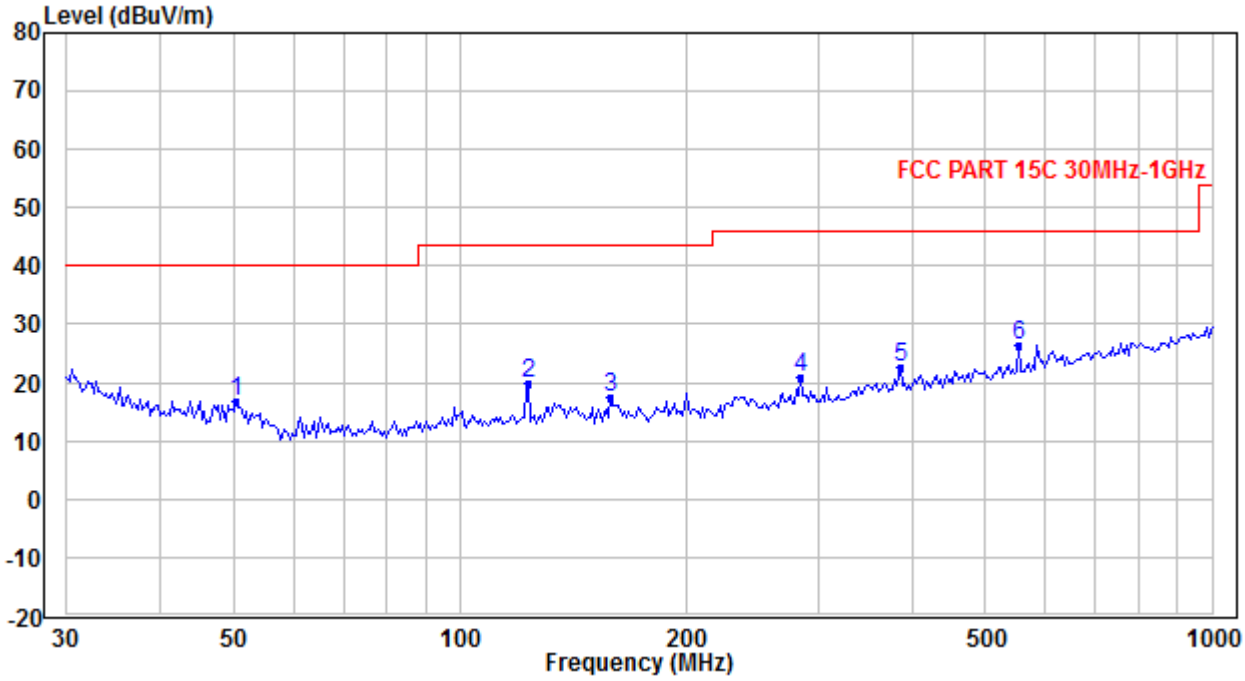
Radiated Emission Test Data (30 MHz ~ 1 GHz Worst Case):
Worst-Case Configuration

Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	53.756	34.89	-13.73	21.16	40.00	-18.84	QP
2	123.181	30.46	-11.60	18.86	43.50	-24.64	QP
3	284.261	35.36	-7.31	28.05	46.00	-17.95	QP
4	307.105	33.99	-7.24	26.75	46.00	-19.25	QP
5	384.545	33.52	-5.44	28.08	46.00	-17.92	QP
6	461.631	29.01	-4.23	24.78	46.00	-21.22	QP

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	50.461	30.07	-13.41	16.66	40.00	-23.34	QP
2	123.181	31.43	-11.60	19.83	43.50	-23.67	QP
3	158.640	28.01	-10.53	17.48	43.50	-26.02	QP
4	284.261	28.25	-7.31	20.94	46.00	-25.06	QP
5	384.545	28.13	-5.44	22.69	46.00	-23.31	QP
6	554.171	29.40	-2.86	26.54	46.00	-19.46	QP

Radiated Emission Test Data (Above 1GHz):

IEEE 802.11a_Channel 36

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10360.00	39.89	11.11	51.00	74.00	-23.00	Peak	Horizontal
2	10360.00	28.19	11.11	39.30	54.00	-14.70	Average	Horizontal
3	15540.00	38.99	10.76	49.75	74.00	-24.25	Peak	Horizontal
4	15540.00	27.07	10.76	37.83	54.00	-16.17	Average	Horizontal
5	10360.00	42.12	9.39	51.51	74.00	-22.49	Peak	Vertical
6	10360.00	28.42	9.39	37.81	54.00	-16.19	Average	Vertical
7	15540.00	39.52	11.59	51.11	74.00	-22.89	Peak	Vertical
8	15540.00	27.41	11.59	39.00	54.00	-15.00	Average	Vertical

IEEE 802.11a_Channel 44

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10440.00	41.14	11.31	52.45	74.00	-21.55	Peak	Horizontal
2	10440.00	28.63	11.31	39.94	54.00	-14.06	Average	Horizontal
3	15660.00	39.86	11.00	50.86	74.00	-23.14	Peak	Horizontal
4	15660.00	27.51	11.00	38.51	54.00	-15.49	Average	Horizontal
5	10440.00	43.00	9.43	52.43	74.00	-21.57	Peak	Vertical
6	10440.00	29.04	9.43	38.47	54.00	-15.53	Average	Vertical
7	15660.00	39.42	11.93	51.35	74.00	-22.65	Peak	Vertical
8	15660.00	27.11	11.93	39.04	54.00	-14.96	Average	Vertical

IEEE 802.11a_Channel 48

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10480.00	40.73	11.41	52.14	74.00	-21.86	Peak	Horizontal
2	10480.00	28.11	11.41	39.52	54.00	-14.48	Average	Horizontal
3	15720.00	39.37	11.08	50.45	74.00	-23.55	Peak	Horizontal
4	15720.00	27.34	11.08	38.42	54.00	-15.58	Average	Horizontal
5	10480.00	42.11	9.45	51.56	74.00	-22.44	Peak	Vertical
6	10480.00	28.07	9.45	37.52	54.00	-16.48	Average	Vertical
7	15720.00	38.92	12.05	50.97	74.00	-23.03	Peak	Vertical
8	15720.00	26.59	12.05	38.64	54.00	-15.36	Average	Vertical

IEEE 802.11a_Channel 52

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10520.00	40.71	11.42	52.13	74.00	-21.87	Peak	Horizontal
2	10520.00	28.27	11.42	39.69	54.00	-14.31	Average	Horizontal
3	15780.00	39.49	11.16	50.65	74.00	-23.35	Peak	Horizontal
4	15780.00	27.20	11.16	38.36	54.00	-15.64	Average	Horizontal
5	10520.00	42.70	9.43	52.13	74.00	-21.87	Peak	Vertical
6	10520.00	28.37	9.43	37.80	54.00	-16.20	Average	Vertical
7	15780.00	38.78	12.19	50.97	74.00	-23.03	Peak	Vertical
8	15780.00	26.52	12.19	38.71	54.00	-15.29	Average	Vertical

IEEE 802.11a_Channel 60

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10600.00	40.21	11.33	51.54	74.00	-22.46	Peak	Horizontal
2	10600.00	28.21	11.33	39.54	54.00	-14.46	Average	Horizontal
3	15900.00	39.73	11.33	51.06	74.00	-22.94	Peak	Horizontal
4	15900.00	27.27	11.33	38.60	54.00	-15.40	Average	Horizontal
5	10600.00	42.91	9.37	52.28	74.00	-21.72	Peak	Vertical
6	10600.00	28.33	9.37	37.70	54.00	-16.30	Average	Vertical
7	15900.00	38.94	12.45	51.39	74.00	-22.61	Peak	Vertical
8	15900.00	26.22	12.45	38.67	54.00	-15.33	Average	Vertical

IEEE 802.11a_Channel 64

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10640.00	40.28	11.29	51.57	74.00	-22.43	Peak	Horizontal
2	10640.00	28.36	11.29	39.65	54.00	-14.35	Average	Horizontal
3	15960.00	39.91	11.49	51.40	74.00	-22.60	Peak	Horizontal
4	15960.00	27.05	11.49	38.54	54.00	-15.46	Average	Horizontal
5	10640.00	41.47	9.34	50.81	74.00	-23.19	Peak	Vertical
6	10640.00	28.36	9.34	37.70	54.00	-16.30	Average	Vertical
7	15960.00	38.40	12.66	51.06	74.00	-22.94	Peak	Vertical
8	15960.00	26.50	12.66	39.16	54.00	-14.84	Average	Vertical

IEEE 802.11a_Channel 149

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	11490.00	41.45	9.78	51.23	74.00	-22.77	Peak	Horizontal
2	11490.00	29.11	9.78	38.89	54.00	-15.11	Average	Horizontal
3	17235.00	38.87	13.98	52.85	74.00	-21.15	Peak	Horizontal
4	17235.00	27.19	13.98	41.17	54.00	-12.83	Average	Horizontal
5	11490.00	41.64	8.27	49.91	74.00	-24.09	Peak	Vertical
6	11490.00	29.11	8.27	37.38	54.00	-16.62	Average	Vertical
7	17235.00	38.58	13.24	51.82	74.00	-22.18	Peak	Vertical
8	17235.00	26.49	13.24	39.73	54.00	-14.27	Average	Vertical

IEEE 802.11a_Channel 157

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	11570.00	40.36	9.86	50.22	74.00	-23.78	Peak	Horizontal
2	11570.00	28.64	9.86	38.50	54.00	-15.50	Average	Horizontal
3	17355.00	40.25	14.49	54.74	74.00	-19.26	Peak	Horizontal
4	17355.00	28.14	14.49	42.63	54.00	-11.37	Average	Horizontal
5	11570.00	41.40	8.47	49.87	74.00	-24.13	Peak	Vertical
6	11570.00	28.46	8.47	36.93	54.00	-17.07	Average	Vertical
7	17355.00	39.76	13.68	53.44	74.00	-20.56	Peak	Vertical
8	17355.00	27.65	13.68	41.33	54.00	-12.67	Average	Vertical

IEEE 802.11a_Channel 165

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	11570.00	40.36	9.86	50.22	74.00	-23.78	Peak	Horizontal
2	11570.00	28.64	9.86	38.50	54.00	-15.50	Average	Horizontal
3	17355.00	40.25	14.49	54.74	74.00	-19.26	Peak	Horizontal
4	17355.00	28.14	14.49	42.63	54.00	-11.37	Average	Horizontal
5	11570.00	41.40	8.47	49.87	74.00	-24.13	Peak	Vertical
6	11570.00	28.46	8.47	36.93	54.00	-17.07	Average	Vertical
7	17355.00	39.76	13.68	53.44	74.00	-20.56	Peak	Vertical
8	17355.00	27.65	13.68	41.33	54.00	-12.67	Average	Vertical

IEEE 802.11n-HT20_Channel 36

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10360.00	40.48	11.11	51.59	74.00	-22.41	Peak	Horizontal
2	10360.00	29.00	11.11	40.11	54.00	-13.89	Average	Horizontal
3	15540.00	40.82	10.76	51.58	74.00	-22.42	Peak	Horizontal
4	15540.00	27.69	10.76	38.45	54.00	-15.55	Average	Horizontal
5	10360.00	42.69	9.39	52.08	74.00	-21.92	Peak	Vertical
6	10360.00	28.85	9.39	38.24	54.00	-15.76	Average	Vertical
7	15540.00	38.86	11.59	50.45	74.00	-23.55	Peak	Vertical
8	15540.00	26.90	11.59	38.49	54.00	-15.51	Average	Vertical

IEEE 802.11n-HT20_Channel 44

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10440.00	41.16	11.31	52.47	74.00	-21.53	Peak	Horizontal
2	10440.00	29.10	11.31	40.41	54.00	-13.59	Average	Horizontal
3	15660.00	39.43	11.00	50.43	74.00	-23.57	Peak	Horizontal
4	15660.00	27.54	11.00	38.54	54.00	-15.46	Average	Horizontal
5	10440.00	43.46	9.43	52.89	74.00	-21.11	Peak	Vertical
6	10440.00	29.39	9.43	38.82	54.00	-15.18	Average	Vertical
7	15660.00	39.32	11.93	51.25	74.00	-22.75	Peak	Vertical
8	15660.00	26.51	11.93	38.44	54.00	-15.56	Average	Vertical

IEEE 802.11n-HT20_Channel 48

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10480.00	40.46	11.41	51.87	74.00	-22.13	Peak	Horizontal
2	10480.00	28.72	11.41	40.13	54.00	-13.87	Average	Horizontal
3	15720.00	39.24	11.08	50.32	74.00	-23.68	Peak	Horizontal
4	15720.00	27.34	11.08	38.42	54.00	-15.58	Average	Horizontal
5	10480.00	43.21	9.45	52.66	74.00	-21.34	Peak	Vertical
6	10480.00	28.78	9.45	38.23	54.00	-15.77	Average	Vertical
7	15720.00	38.87	12.05	50.92	74.00	-23.08	Peak	Vertical
8	15720.00	26.34	12.05	38.39	54.00	-15.61	Average	Vertical

IEEE 802.11n-HT20_Channel 52

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10520.00	40.77	11.42	52.19	74.00	-21.81	Peak	Horizontal
2	10520.00	28.97	11.42	40.39	54.00	-13.61	Average	Horizontal
3	15780.00	39.57	11.16	50.73	74.00	-23.27	Peak	Horizontal
4	15780.00	27.20	11.16	38.36	54.00	-15.64	Average	Horizontal
5	10520.00	42.74	9.43	52.17	74.00	-21.83	Peak	Vertical
6	10520.00	28.91	9.43	38.34	54.00	-15.66	Average	Vertical
7	15780.00	38.27	12.19	50.46	74.00	-23.54	Peak	Vertical
8	15780.00	26.03	12.19	38.22	54.00	-15.78	Average	Vertical

IEEE 802.11n-HT20_Channel 60

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10600.00	41.13	11.33	52.46	74.00	-21.54	Peak	Horizontal
2	10600.00	28.65	11.33	39.98	54.00	-14.02	Average	Horizontal
3	15900.00	38.77	11.33	50.10	74.00	-23.90	Peak	Horizontal
4	15900.00	27.21	11.33	38.54	54.00	-15.46	Average	Horizontal
5	10600.00	42.92	9.37	52.29	74.00	-21.71	Peak	Vertical
6	10600.00	28.87	9.37	38.24	54.00	-15.76	Average	Vertical
7	15900.00	38.26	12.45	50.71	74.00	-23.29	Peak	Vertical
8	15900.00	26.43	12.45	38.88	54.00	-15.12	Average	Vertical

IEEE 802.11n-HT20_Channel 64

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4924.00	40.99	11.29	52.28	74.00	-21.72	Peak	Horizontal
2	4924.00	28.80	11.29	40.09	54.00	-13.91	Average	Horizontal
3	7386.00	38.68	11.49	50.17	74.00	-23.83	Peak	Horizontal
4	7386.00	27.05	11.49	38.54	54.00	-15.46	Average	Horizontal
5	4924.00	42.74	9.34	52.08	74.00	-21.92	Peak	Vertical
6	4924.00	28.74	9.34	38.08	54.00	-15.92	Average	Vertical
7	7386.00	37.91	12.66	50.57	74.00	-23.43	Peak	Vertical
8	7386.00	26.01	12.66	38.67	54.00	-15.33	Average	Vertical

IEEE 802.11n-HT20_Channel 149

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	11490.00	41.52	9.78	51.30	74.00	-22.70	Peak	Horizontal
2	11490.00	29.41	9.78	39.19	54.00	-14.81	Average	Horizontal
3	17235.00	39.22	13.98	53.20	74.00	-20.80	Peak	Horizontal
4	17235.00	27.19	13.98	41.17	54.00	-12.83	Average	Horizontal
5	11490.00	40.81	8.27	49.08	74.00	-24.92	Peak	Vertical
6	11490.00	29.36	8.27	37.63	54.00	-16.37	Average	Vertical
7	17235.00	38.32	13.24	51.56	74.00	-22.44	Peak	Vertical
8	17235.00	26.63	13.24	39.87	54.00	-14.13	Average	Vertical

IEEE 802.11n-HT20_Channel 157

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	11570.00	40.43	9.86	50.29	74.00	-23.71	Peak	Horizontal
2	11570.00	28.91	9.86	38.77	54.00	-15.23	Average	Horizontal
3	17355.00	40.13	14.49	54.62	74.00	-19.38	Peak	Horizontal
4	17355.00	28.20	14.49	42.69	54.00	-11.31	Average	Horizontal
5	11570.00	41.25	8.47	49.72	74.00	-24.28	Peak	Vertical
6	11570.00	28.89	8.47	37.36	54.00	-16.64	Average	Vertical
7	17355.00	39.30	13.68	52.98	74.00	-21.02	Peak	Vertical
8	17355.00	27.71	13.68	41.39	54.00	-12.61	Average	Vertical

IEEE 802.11n-HT20_Channel 165

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	11650.00	41.12	9.95	51.07	74.00	-22.93	Peak	Horizontal
2	11650.00	29.06	9.95	39.01	54.00	-14.99	Average	Horizontal
3	17475.00	40.31	14.89	55.20	74.00	-18.80	Peak	Horizontal
4	17475.00	27.92	14.89	42.81	54.00	-11.19	Average	Horizontal
5	11650.00	41.01	8.69	49.70	74.00	-24.30	Peak	Vertical
6	11650.00	28.91	8.69	37.60	54.00	-16.40	Average	Vertical
7	17475.00	39.07	14.00	53.07	74.00	-20.93	Peak	Vertical
8	17475.00	26.94	14.00	40.94	54.00	-13.06	Average	Vertical

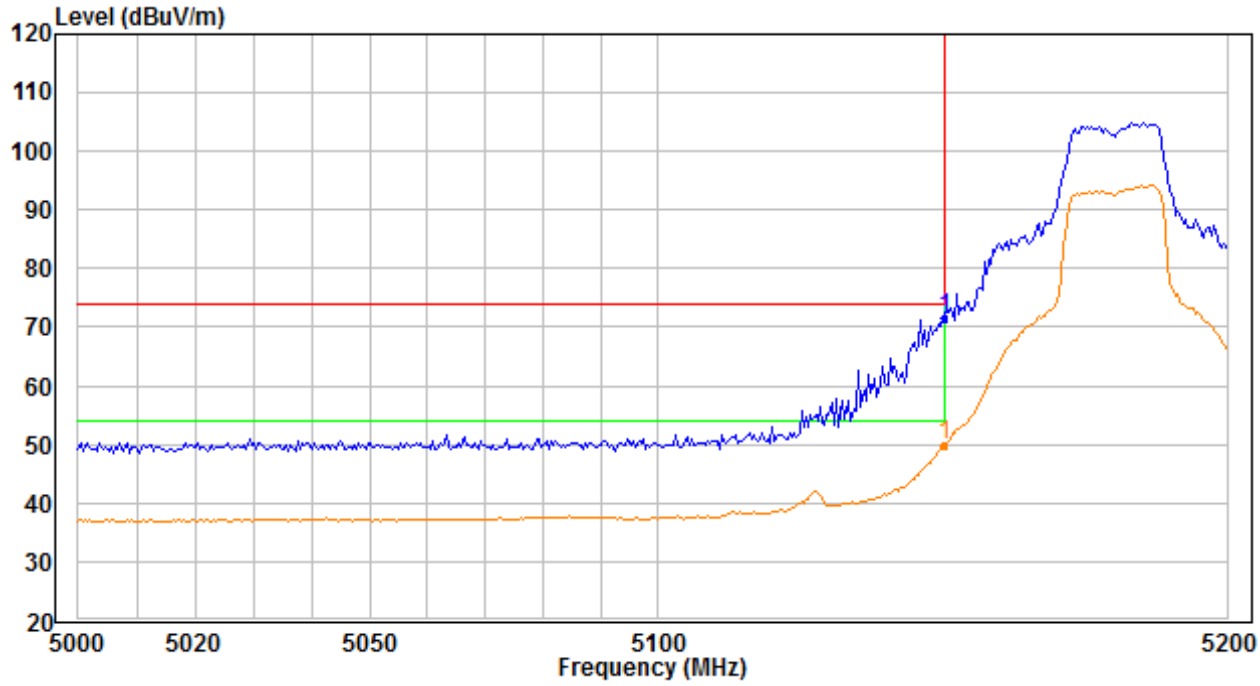
Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit

Band Edge Measurements (Radiated)

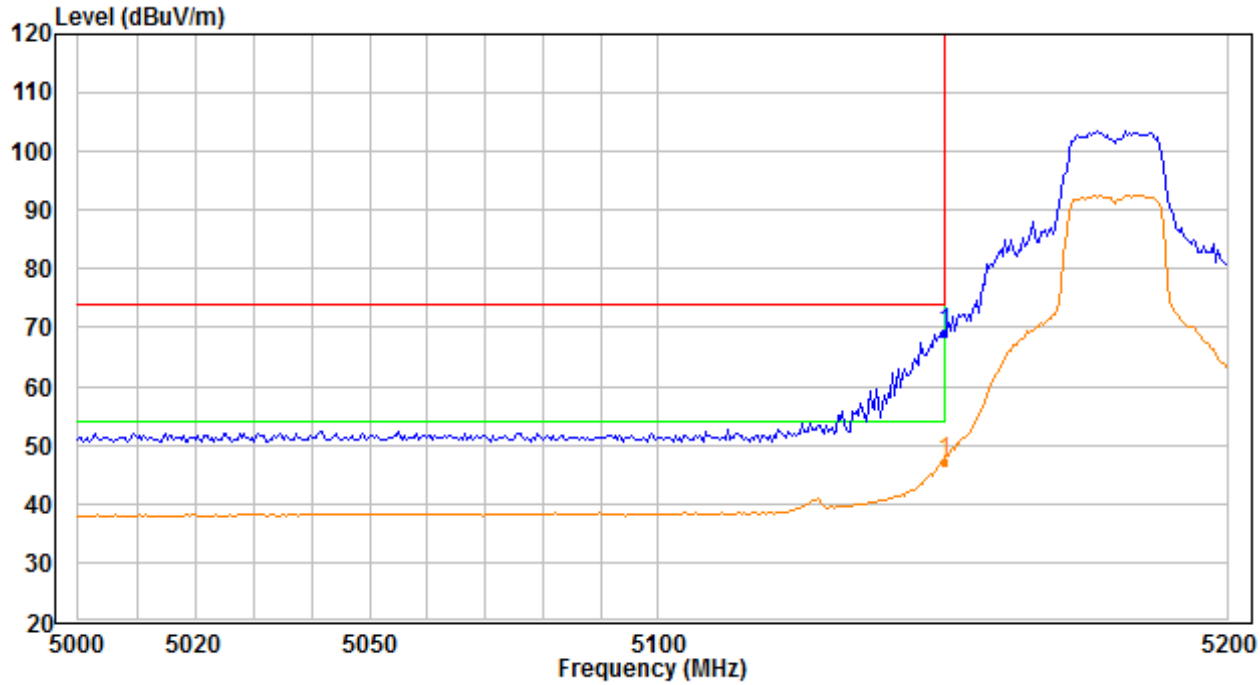
IEEE 802.11a

Test Channel:	Channel 36	Ant. Polar. :	Horizontal



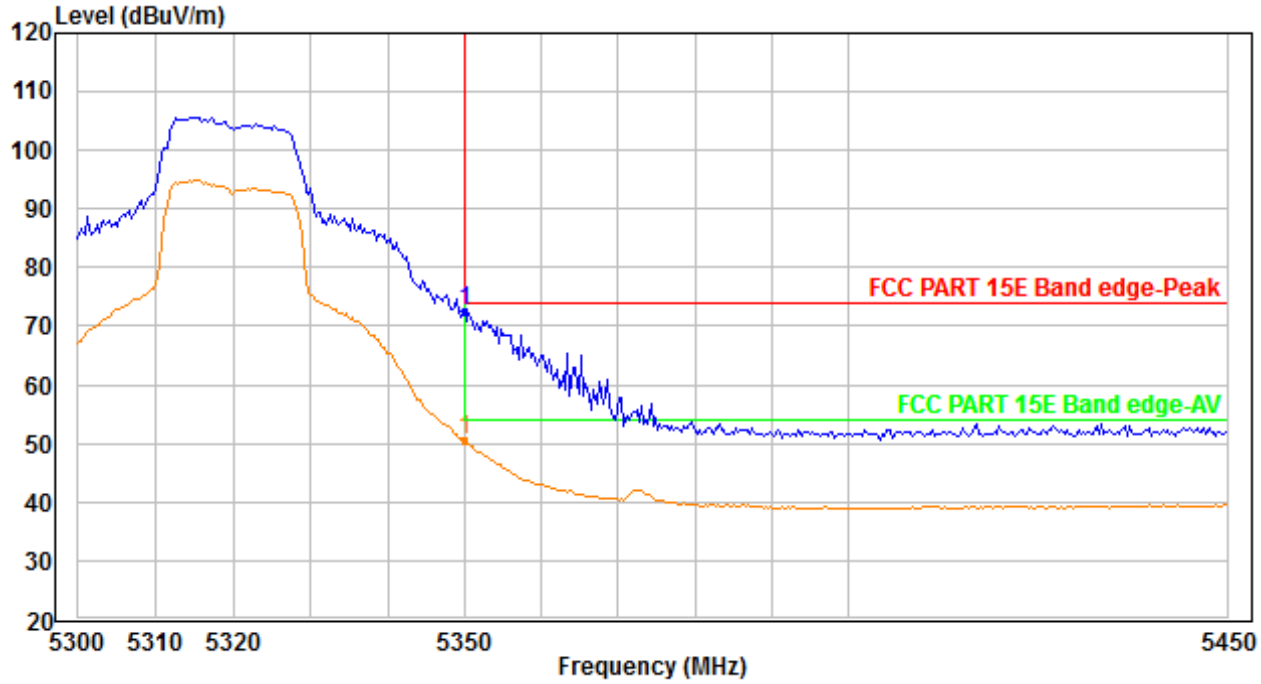
Frequency (MHz)	Peak level (dBuv/m)	Peak Limit (dBuv/m)	AV level (dBuv/m)	AV Limit (dBuv/m)	Conclusion
5150.0000	71.66	74.00	49.93	54.00	Pass

Test Channel:	Channel 36	Ant. Polar. :	Vertical



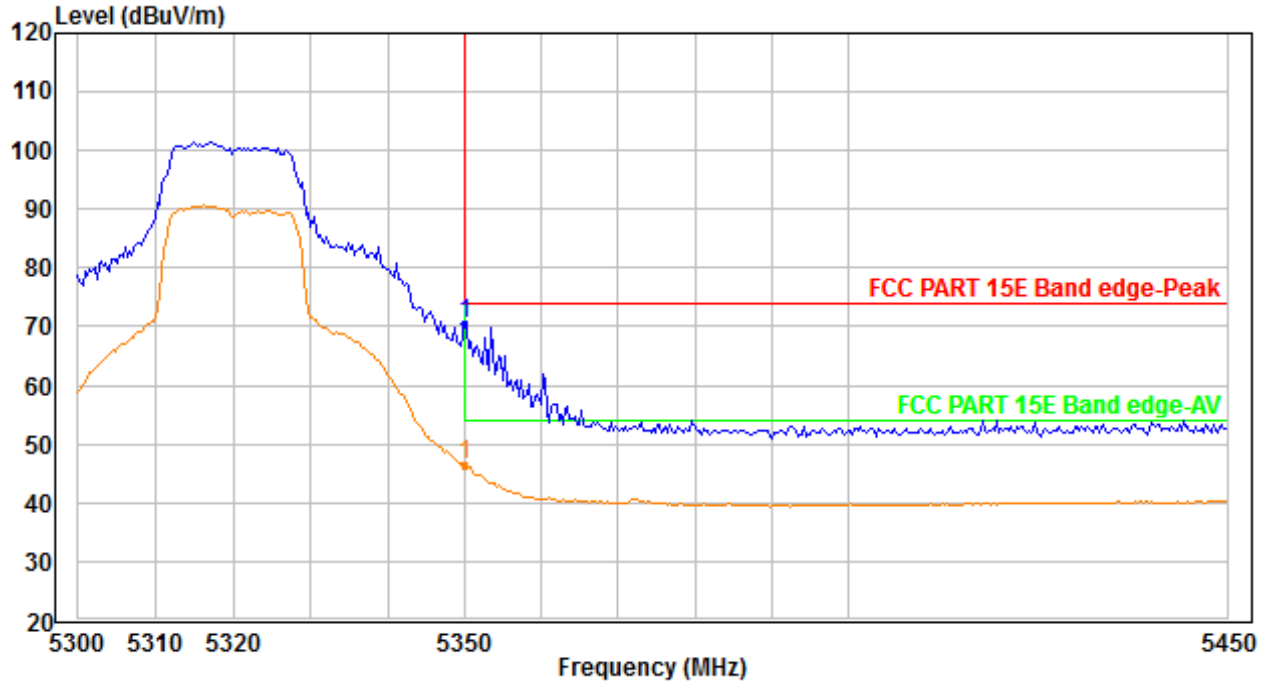
Frequency (MHz)	Peak level (dBuv/m)	Peak Limit (dBuv/m)	AV level (dBuv/m)	AV Limit (dBuv/m)	Conclusion
5150.0000	69.09	74.00	47.25	54.00	Pass

Test Channel:	Channel 64	Ant. Polar. :	Horizontal



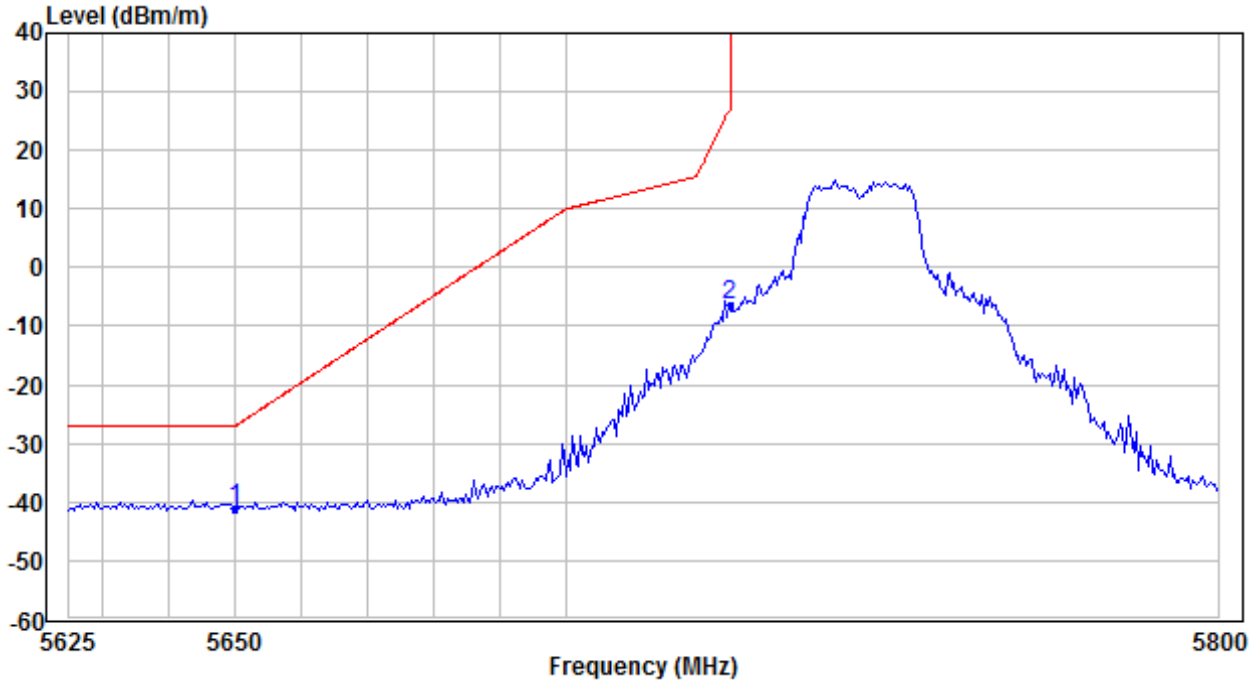
Frequency (MHz)	Peak level (dBuv/m)	Peak Limit (dBuv/m)	AV level (dBuv/m)	AV Limit (dBuv/m)	Conclusion
5350.0000	72.64	74.00	50.46	54.00	Pass

Test Channel:	Channel 64	Ant. Polar. :	Vertical



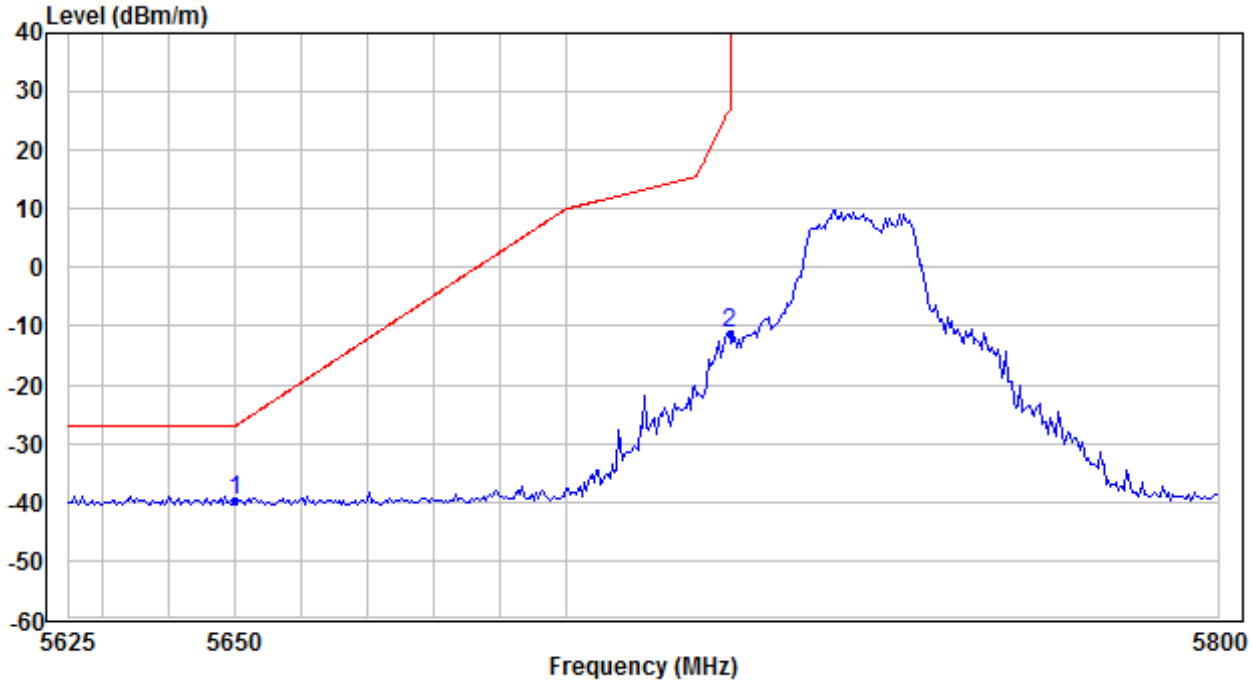
Frequency (MHz)	Peak level (dBuv/m)	Peak Limit (dBuv/m)	AV level (dBuv/m)	AV Limit (dBuv/m)	Conclusion
5350.0000	70.37	74.00	46.57	54.00	Pass

Test Channel:	Channel 149	Ant. Polar. :	Horizontal



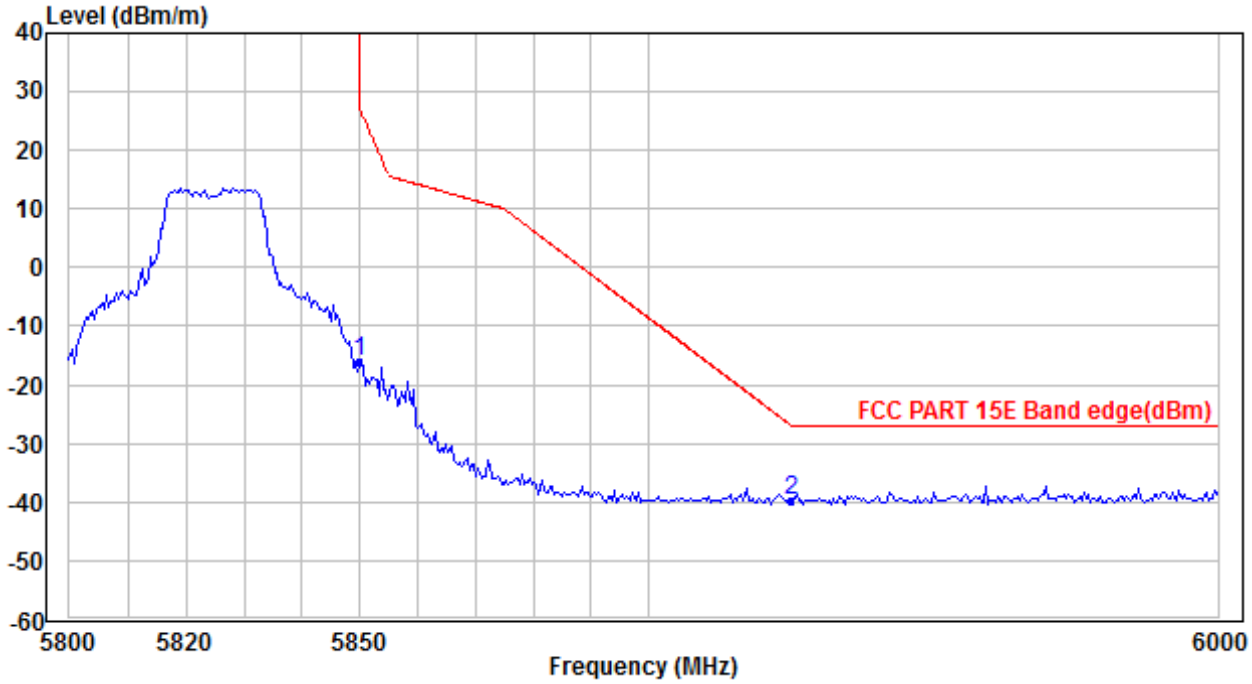
Frequency (MHz)	Peak level (dBm)	Peak Limit (dBm)	Conclusion
5650.0000	-41.06	-27.00	Pass
5725.0000	-6.36	26.97	Pass

Test Channel:	Channel 149	Ant. Polar. :	Vertical



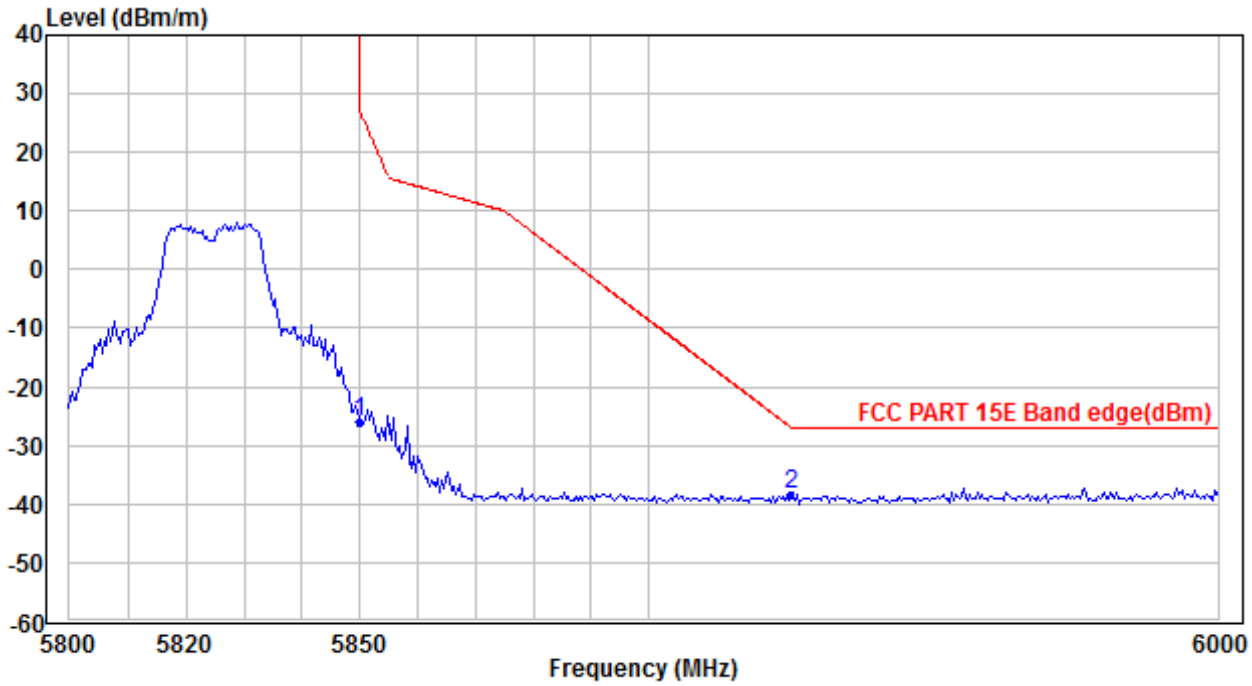
Frequency (MHz)	Peak level (dBm)	Peak Limit (dBm)	Conclusion
5650.0000	-39.69	-27.00	Pass
5725.0000	-11.16	26.97	Pass

Test Channel:	Channel 165	Ant. Polar. :	Horizontal



Frequency (MHz)	Peak level (dBm)	Peak Limit (dBm)	Conclusion
5850.0000	-15.98	26.94	Pass
5925.0000	-39.58	-27.00	Pass

Test Channel:	Channel 165	Ant. Polar. :	Vertical



Frequency (MHz)	Peak level (dBm)	Peak Limit (dBm)	Conclusion
5850.0000	-26.13	26.94	Pass
5925.0000	-38.21	-27.00	Pass

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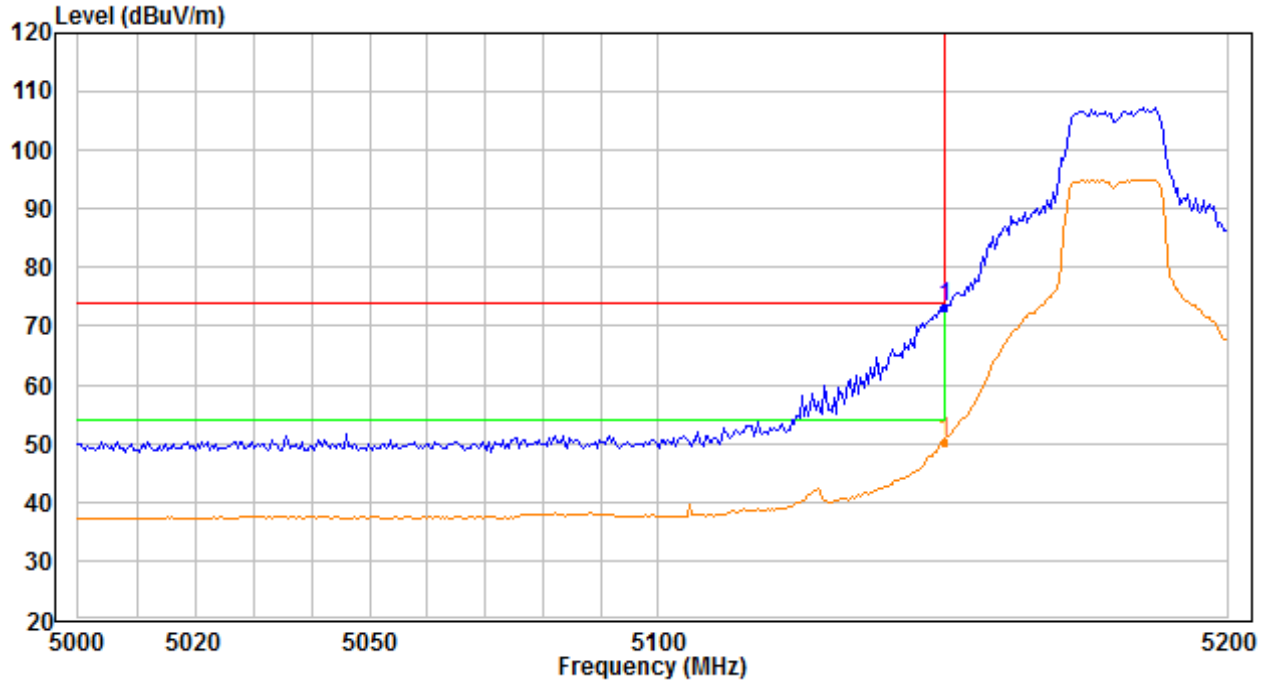
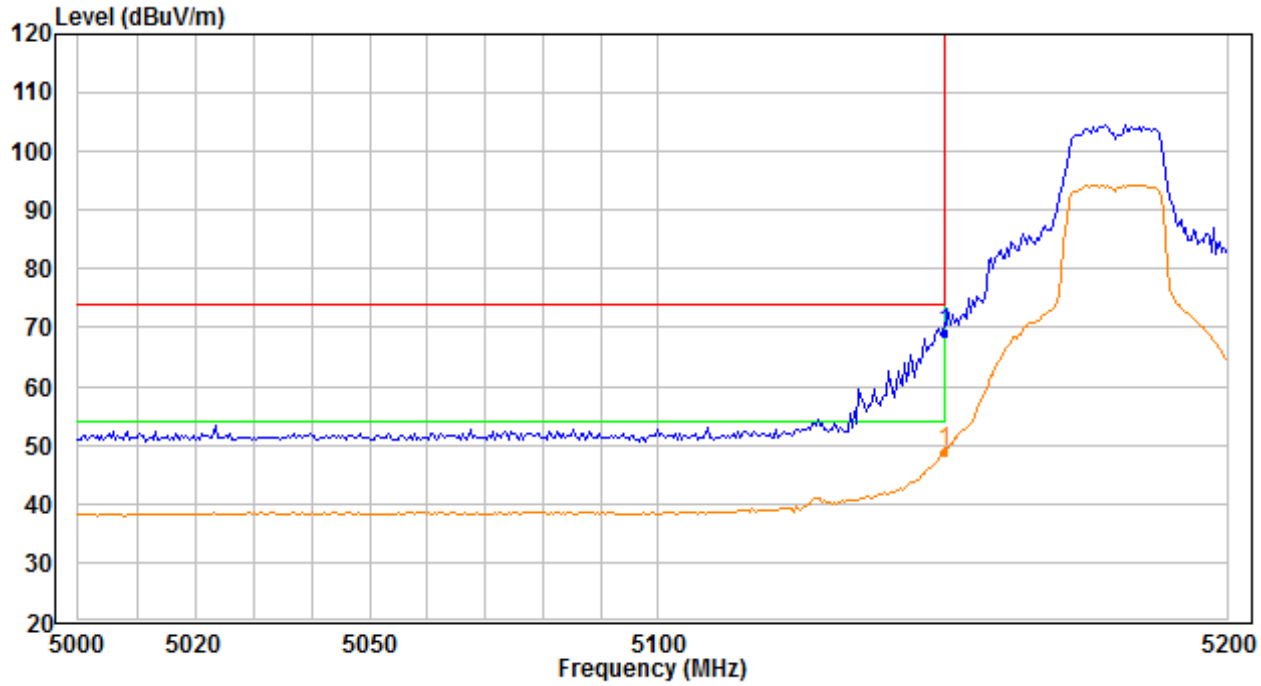
Test Channel:	Channel 36	Ant. Polar. :	Horizontal



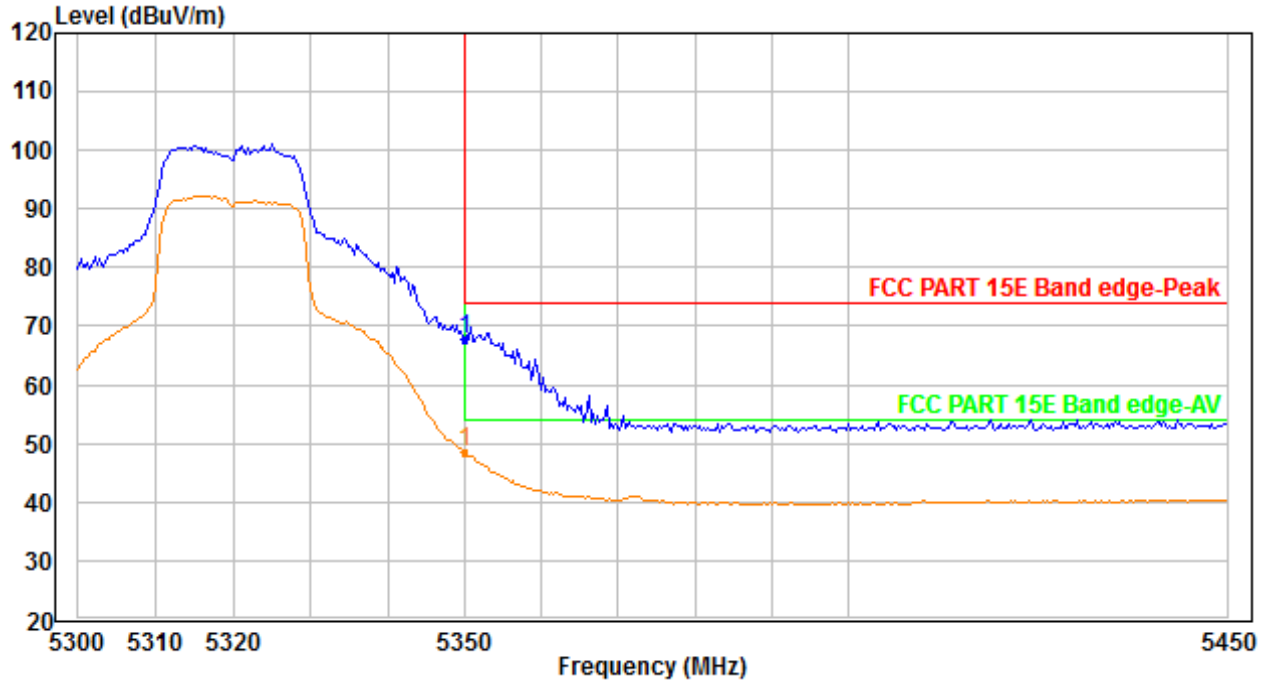
Frequency (MHz)	Peak level (dBuv/m)	Peak Limit (dBuv/m)	AV level (dBuv/m)	AV Limit (dBuv/m)	Conclusion
5150.0000	73.21	74.00	50.40	54.00	Pass

Test Channel:	Channel 36	Ant. Polar. :	Vertical



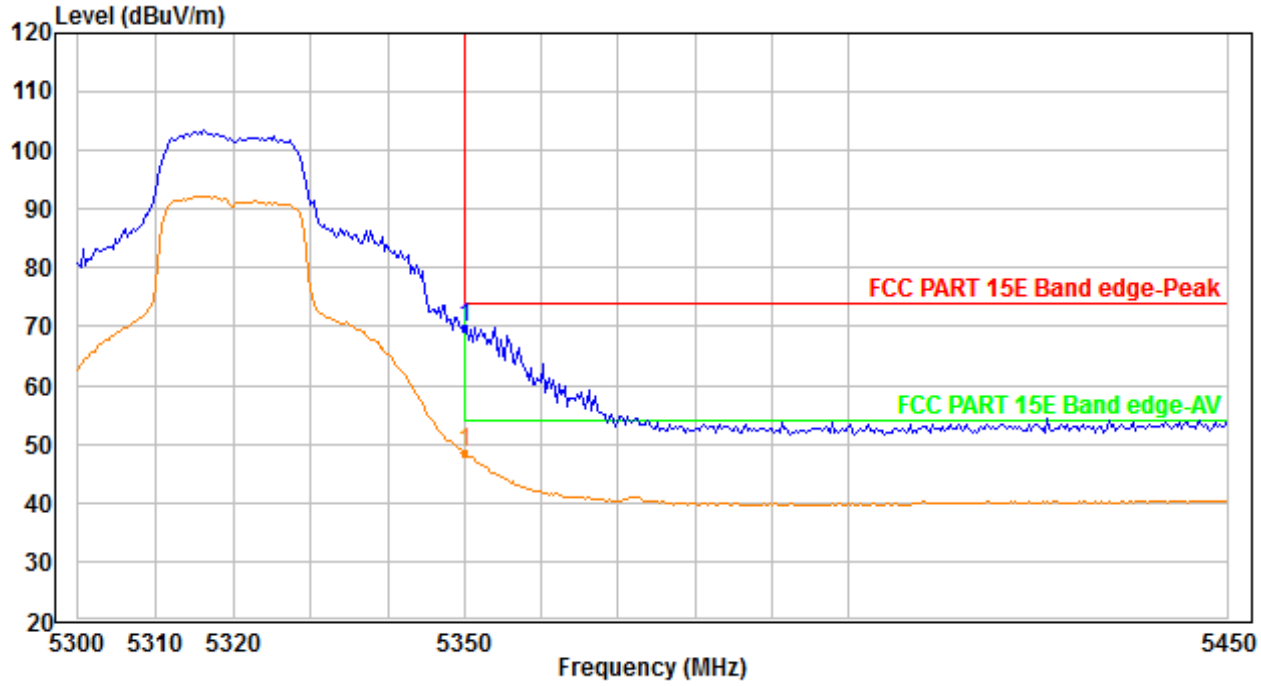
Frequency (MHz)	Peak level (dBuv/m)	Peak Limit (dBuv/m)	AV level (dBuv/m)	AV Limit (dBuv/m)	Conclusion
5150.0000	69.02	74.00	48.86	54.00	Pass

Test Channel:	Channel 64	Ant. Polar. :	Horizontal



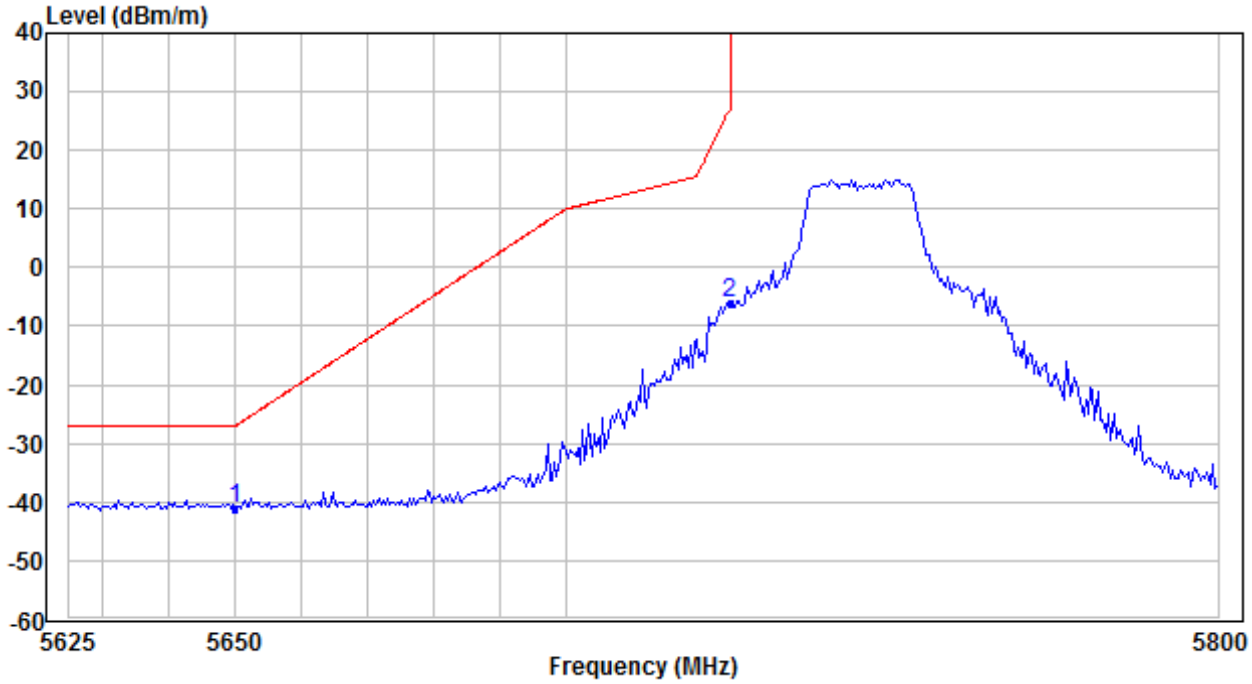
Frequency (MHz)	Peak level (dBuv/m)	Peak Limit (dBuv/m)	AV level (dBuv/m)	AV Limit (dBuv/m)	Conclusion
5350.0000	67.84	74.00	51.46	54.00	Pass

Test Channel:	Channel 64	Ant. Polar. :	Vertical



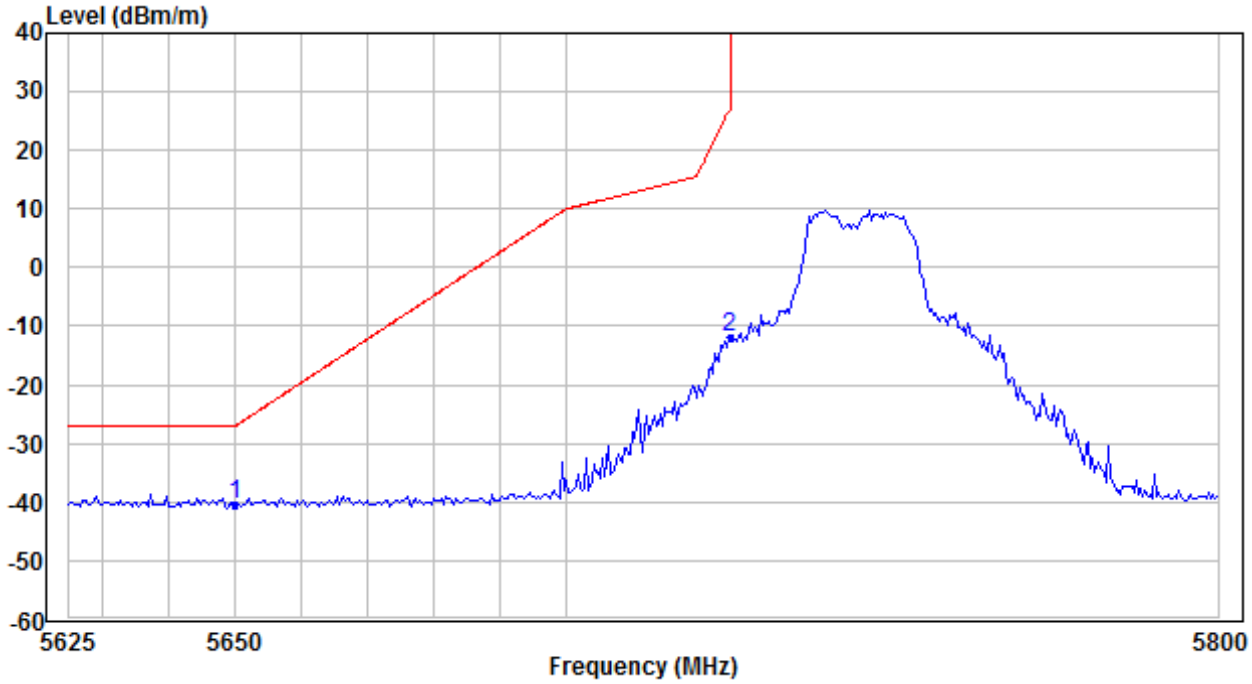
Frequency (MHz)	Peak level (dBuv/m)	Peak Limit (dBuv/m)	AV level (dBuv/m)	AV Limit (dBuv/m)	Conclusion
5350.0000	69.87	74.00	48.69	54.00	Pass

Test Channel:	Channel 149	Ant. Polar. :	Horizontal



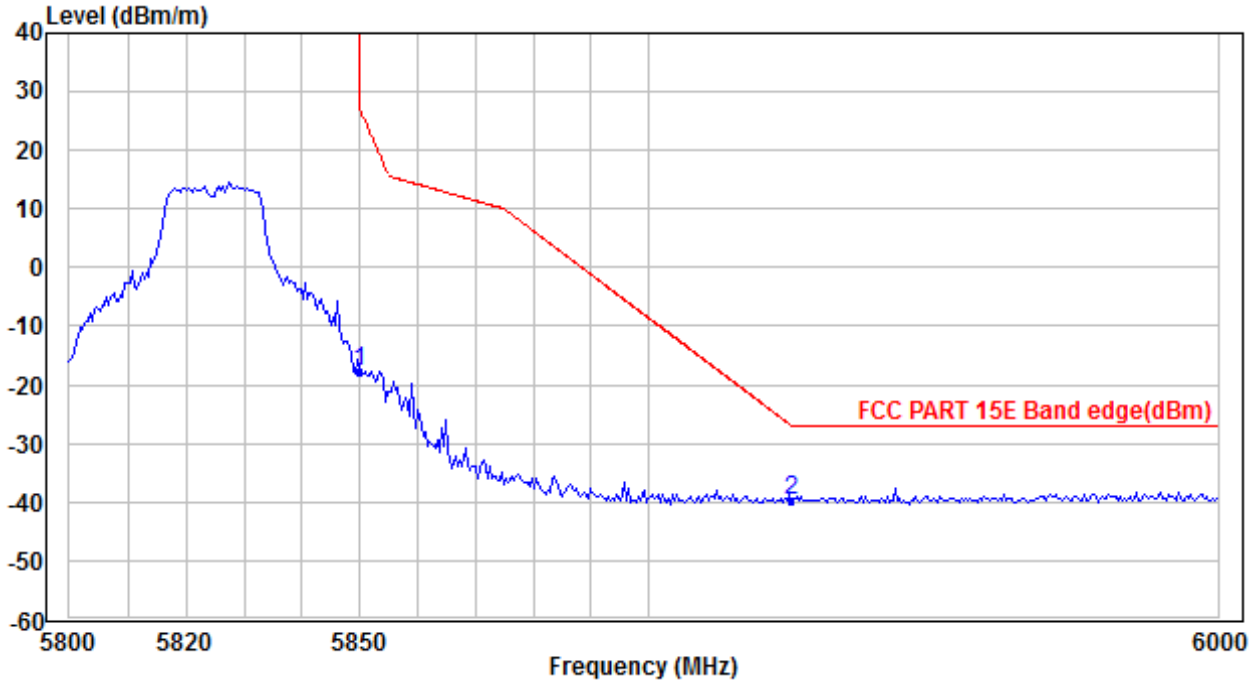
Frequency (MHz)	Peak level (dBm)	Peak Limit (dBm)	Conclusion
5650.0000	-41.12	-27.00	Pass
5725.0000	-6.16	26.97	Pass

Test Channel:	Channel 149	Ant. Polar. :	Vertical



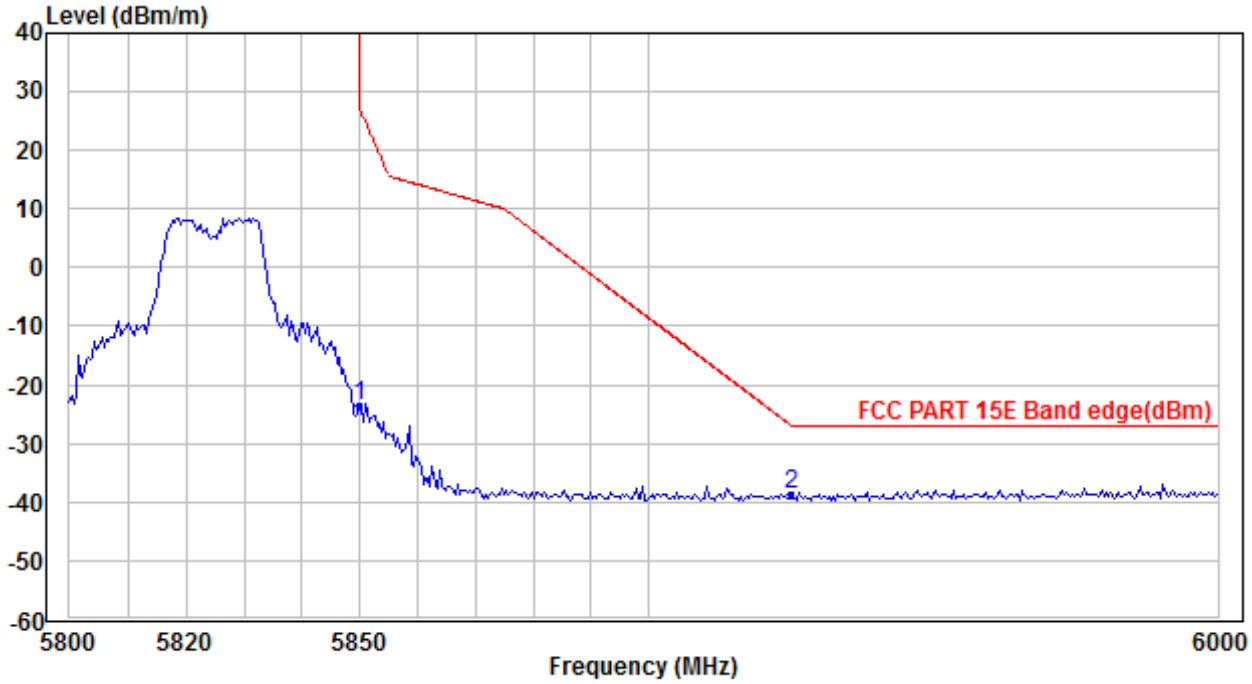
Frequency (MHz)	Peak level (dBm)	Peak Limit (dBm)	Conclusion
5650.0000	-40.41	-27.00	Pass
5725.0000	-12.05	26.97	Pass

Test Channel:	Channel 165	Ant. Polar. :	Horizontal



Frequency (MHz)	Peak level (dBm)	Peak Limit (dBm)	Conclusion
5850.0000	-17.67	26.94	Pass
5925.0000	-39.72	-27.00	Pass

Test Channel:	Channel 165	Ant. Polar. :	Vertical



Frequency (MHz)	Peak level (dBm)	Peak Limit (dBm)	Conclusion
5850.0000	-23.70	26.94	Pass
5925.0000	-38.57	-27.00	Pass

5.8 DYNAMIC FREQUENCY SELECTION

Test Requirement: FCC 47 CFR Part 15 Subpart E Section 15.407 (h)

Test Method: KDB 905462 D03 Client Without DFS New Rules v01r02

EUT Operating Mode:

DFS Operational mode	Operating Frequency Range	
	5250 MHz to 5350 MHz	5470 MHz to 5725 MHz
Slave without radar Interference detection function	✓	✓

Applicability:

The following table from KDB905462 and the lists of the applicable requirements for the DFS testing.

Applicability of DFS Requirements Prior to Use of a Channel:

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
Non-Occupancy Period	✓	Not required	Yes
DFS Detection Threshold	✓	Not required	Yes
Channel Availability Check Time	✓	Not required	Not required
U-NII Detection Bandwidth	✓	Not required	Yes

Applicability of DFS requirements during normal operation:

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
DFS Detection Threshold	Yes	Not required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required
Additional requirements for devices with multiple bandwidth modes	**Master Device or Client with Radar Detection**	**Client Without Radar Detection**
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required
Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.		

DFS Detection Thresholds for Master Devices and Client Devices with Radar Detection:

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP ≥ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.
Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.
Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

DFS Radar Signal Parameter Values:

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds (See Note 1.)
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. (See Notes 1 and 2.)
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. (See Note 3.)

Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.
Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.
Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

DFS Radar Signal Parameter:

Radar Type 0 was used in the evaluation of the Client device for the purpose of measuring the Channel Move Time and the Channel Closing Transmission Time

Table 1-Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Trials
0	1	1428	18	See Note 1.	See Note 1.
1	1	Test A Test B	$\text{Roundup}\left\{\begin{matrix}\left(\frac{1}{360}\right)\\ \left(\frac{19\cdot 10^6}{\text{PRI}_{\mu sec}}\right)\end{matrix}\right\}$	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.

Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a
Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A
A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms.
If more than 30 waveforms are used for Short Pulse Radar Type 1, then each additional waveform is generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B.

The aggregate is the average of the percentage of successful detections of short pulse radar types 1-4

Table 2-Long Pulse Radar Test Waveform

Radar Type	Pulse Width (μsec)	Chirp Width (MHz)	PRI (μsec)	Number of Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

Table 3-Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (μsec)	PRI (μsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	9	0.333	300	70%	30

In-Service Monitoring: Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period

Limit of In-Service Monitoring:

Reference to DFS Radar Signal Parameter Values.

Test Procedures:

a) One frequency will be chosen from the Operating Channels of the EUT within the 5250-5350 MHz or 5470-5725 MHz bands. For 802.11 devices, the test frequency must contain control signals. This can be verified by disabling channel loading and monitoring the spectrum analyzer. If no control signals are detected, another frequency must be selected within the emission bandwidth where control signals are detected.

b) In case the EUT is a Master Device, a U-NII device operating as a Client Device will be used and it is assumed that the Client will associate with the EUT (Master). For radiated tests, the emissions of the Radar Waveform generator will be directed towards the Master Device. If the Master Device has antenna gain, the main beam of the antenna will be directed toward the radar emitter. Vertical polarization is used for testing.

c) The TCP protocol unicast data stream was generated by the iperf software command line with at least 17% activity ratio over any 100ms period.

d) Timing plots are reported with calculations demonstrating a minimum channel loading of approximately 17% or greater. For example, channel loading can be estimated by setting the spectrum analyzer for zero span and approximate the Time On/ (Time On + Off Time).

e) At time T0 the Radar Waveform generator sends a Burst of pulses for one of the Short Pulse Radar Types 1-4 at DFS Detection Threshold levels on the Operating Channel. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.

f) Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the EUT during the observation time (Channel Move Time). Measure and record the Channel Move Time and Channel Closing Transmission Time if radar detection occurs.

g) When operating as a Master Device, monitor the EUT for more than 30 minutes following instant T2 to verify that the EUT does not resume any transmissions on this Channel. Perform this test once and record the measurement result.

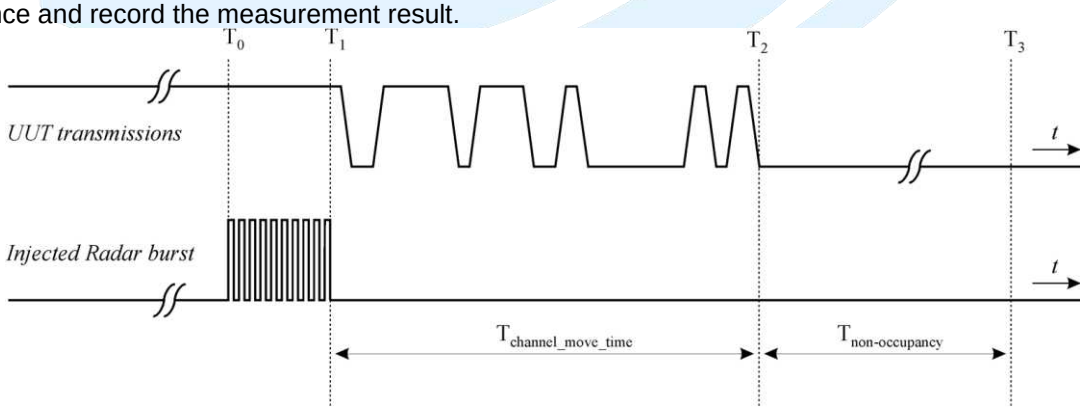
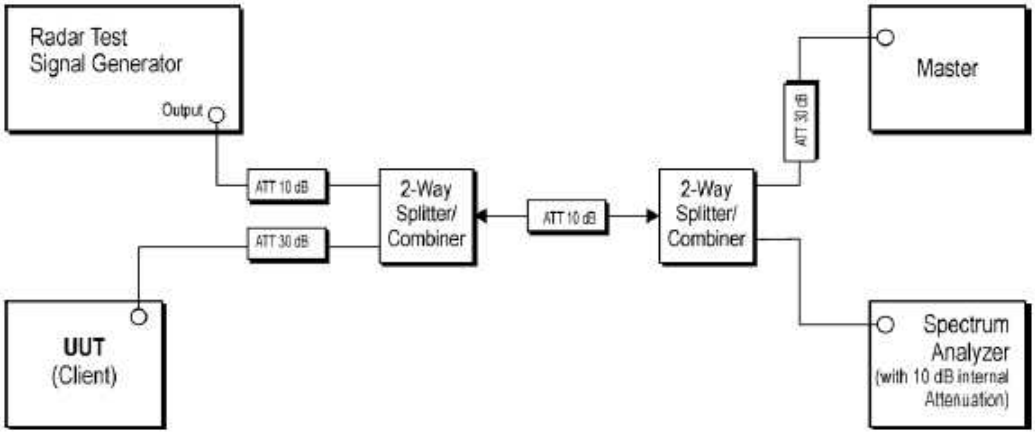


Figure 17: Channel Closing Transmission Time, Channel Move Time and Non-Occupancy Period

Conducted test setup



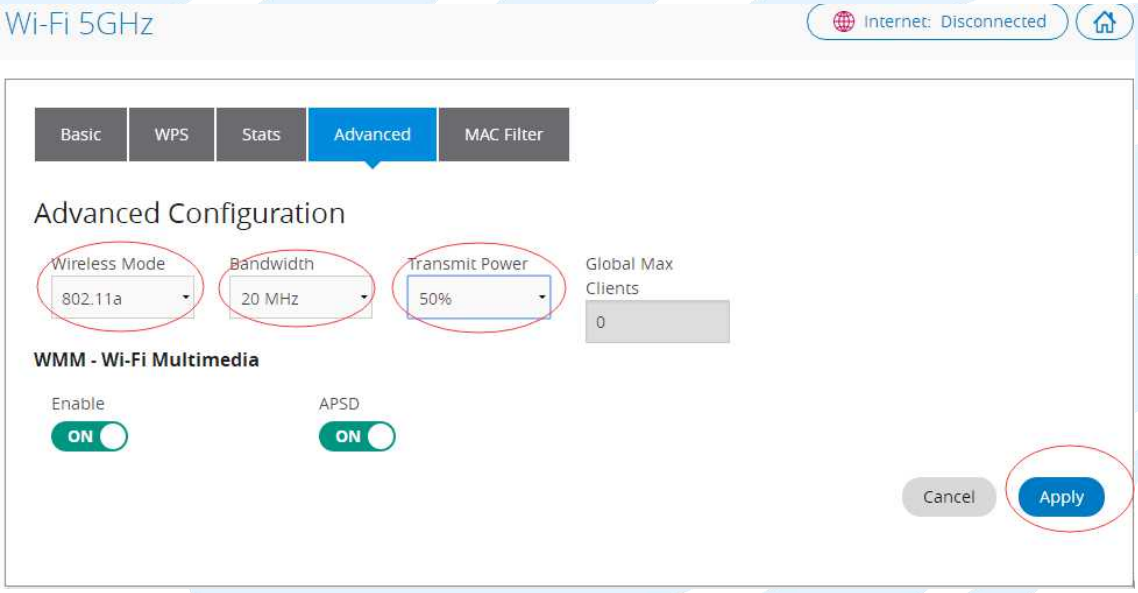
Setup for Client with injection at the Master

Equipment Used: Refer to section 3 for details.

Test Result: Result of Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period for Client Beacon Tes

Channel loading mode:

a) The router can only be powered by 120V/60Hz.
b) Wait for 2 minutes to start up.
c) Open the browser and enter https://192.168.1.1
d) Login account and password: admin
e) Click Wi-Fi 5GHz to enter the 5G settings, and set the wireless mode, bandwidth, and power level under "Advanced".

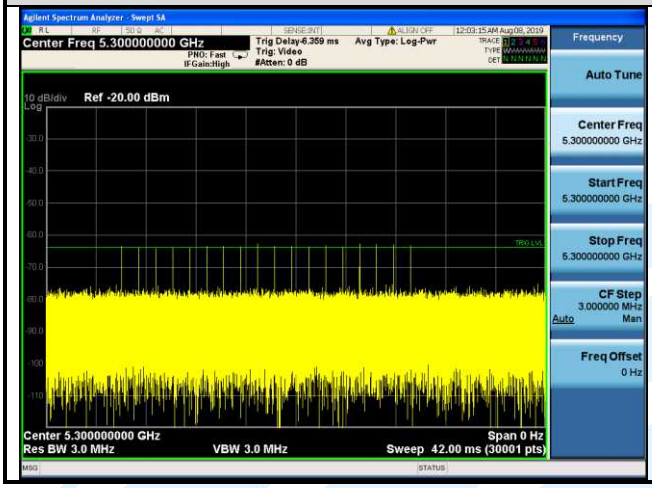
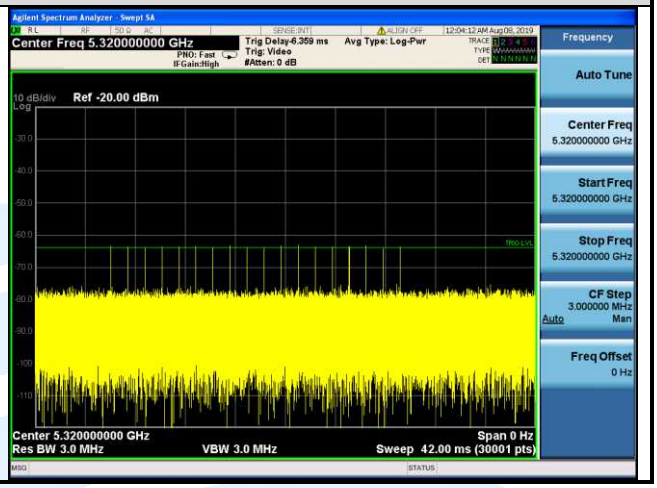


f) Use EUT to search for 5G hotspot signal.

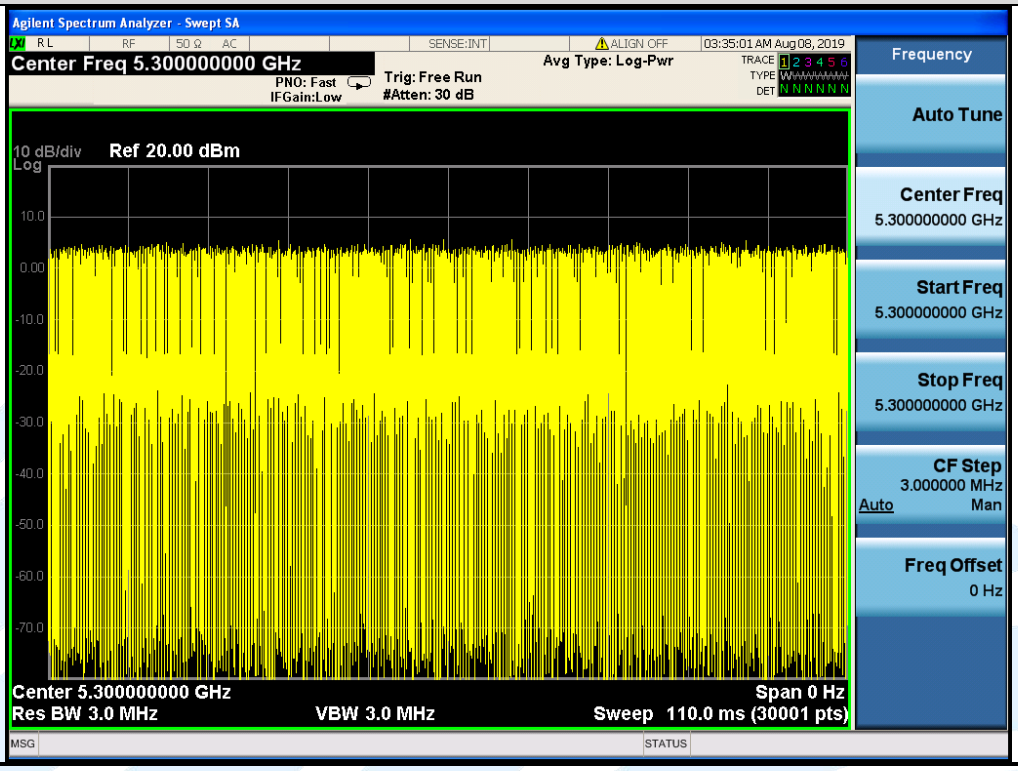
The measurement data as follows:

BW / Channel	Test Item	Test Result	Limit	Pass/Fail
20 MHz / 5300 MHz	Channel Move Time	0.593 s	< 10s	Pass
	Channel Closing Transmission Time	2.8 ms	< 200+60ms	Pass
	Non-Occupancy Period	No transmission	30 minutes	Pass
20 MHz / 5500 MHz	Channel Move Time	0.724 s	< 10s	Pass
	Channel Closing Transmission Time	3.6 ms	< 200+60ms	Pass
	Non-Occupancy Period	No transmission	30 minutes	Pass

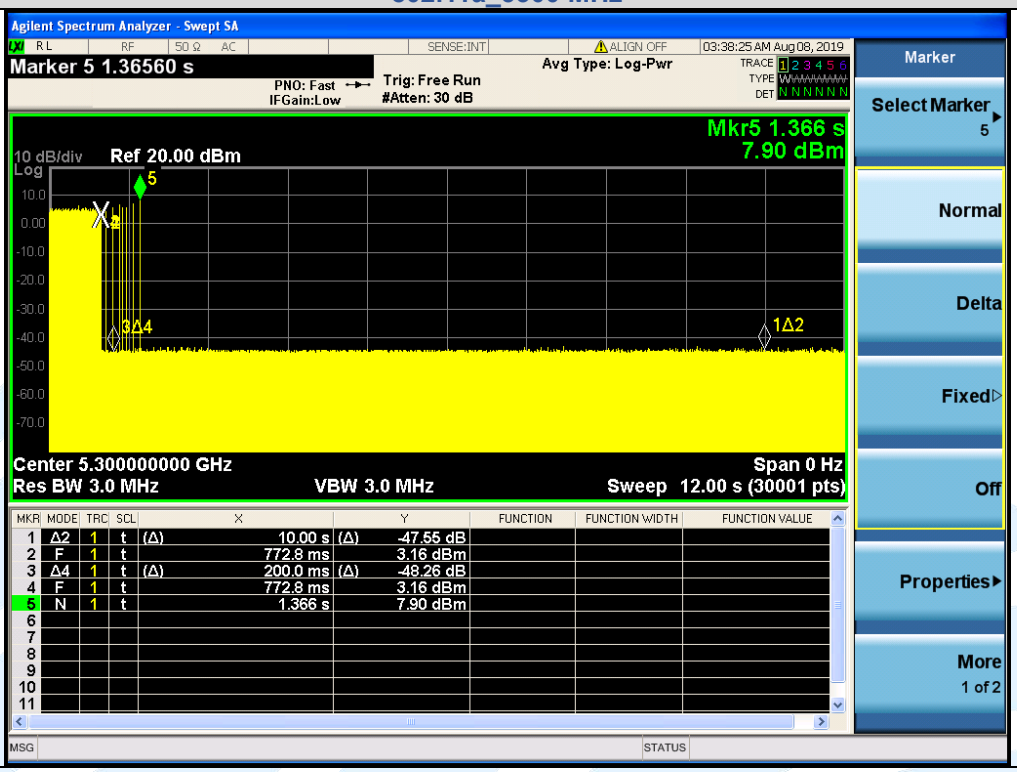
Radar Waveform calibration Plot

Reference DFS test signal	
5300 MHz	5320 MHz
	

Data Traffic Plot



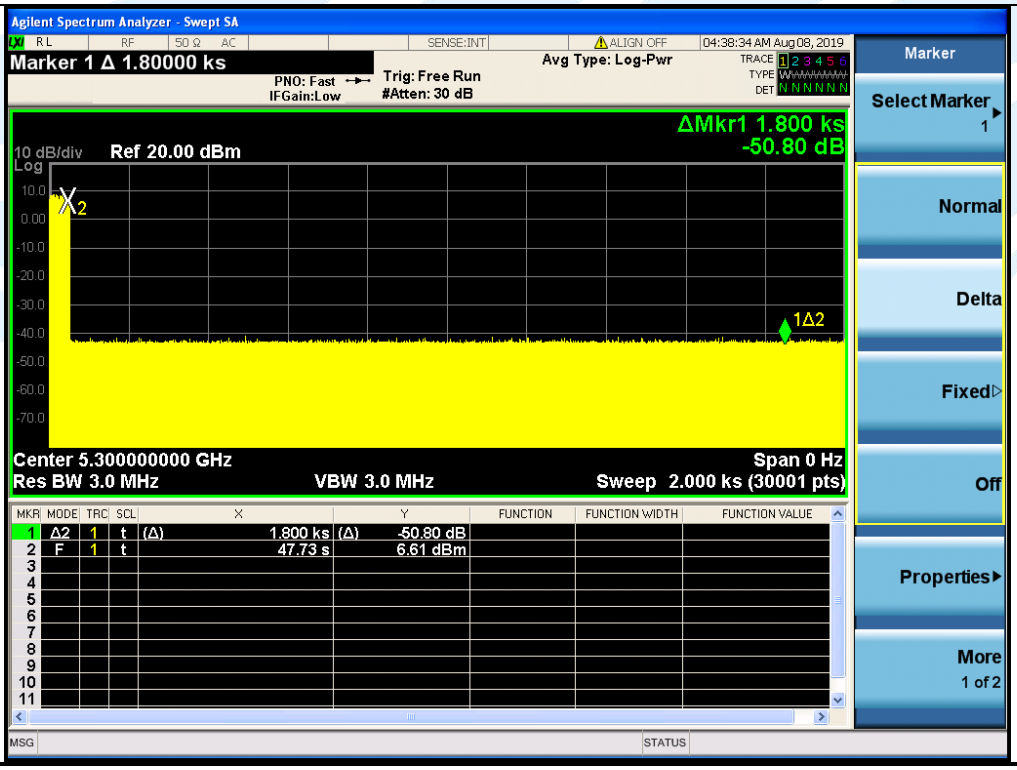
Channel Move Time & Channel Closing Transmission Time
802.11a_5300 MHz



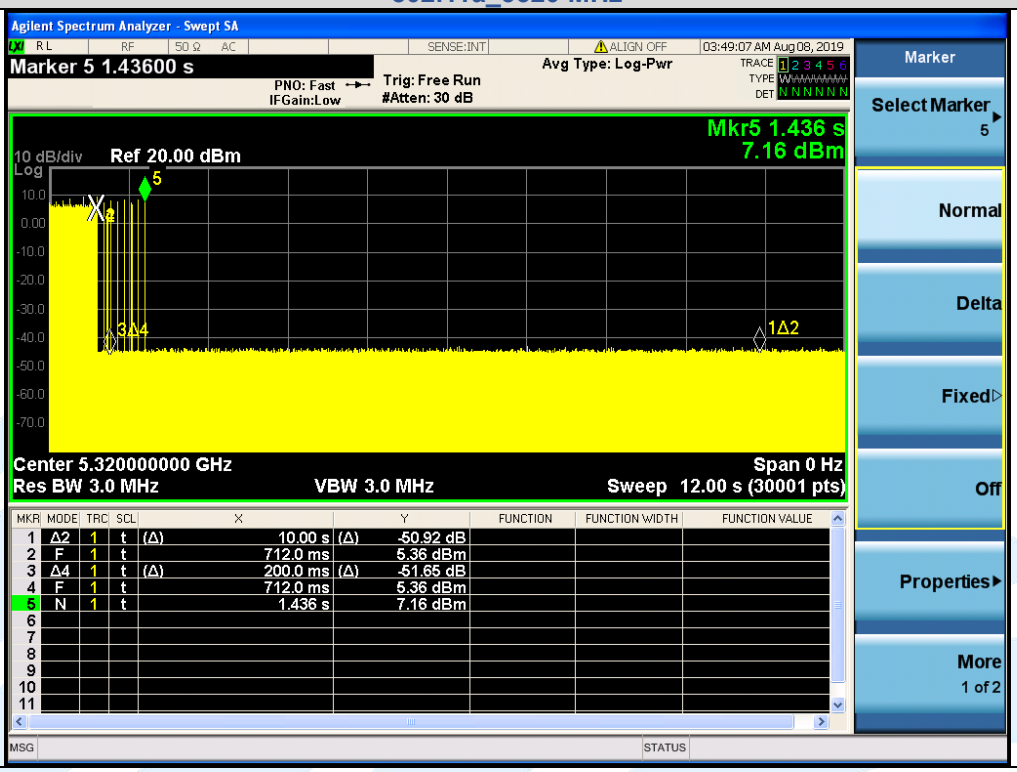
Note:

1) Mark1 Time: 772.8 ms, Mark2 Time: 1366 ms, Ontime Points: 7
2) Dwell = S/B = 12000ms/30000 = 0.4 ms, C = N x Dwell = 7 x 0.4 = 2.8ms
3) CMT = 1.366 s – 0.773 s = 0.593s

Non-Occupancy Period_802.11a_CH60_5300 MHz



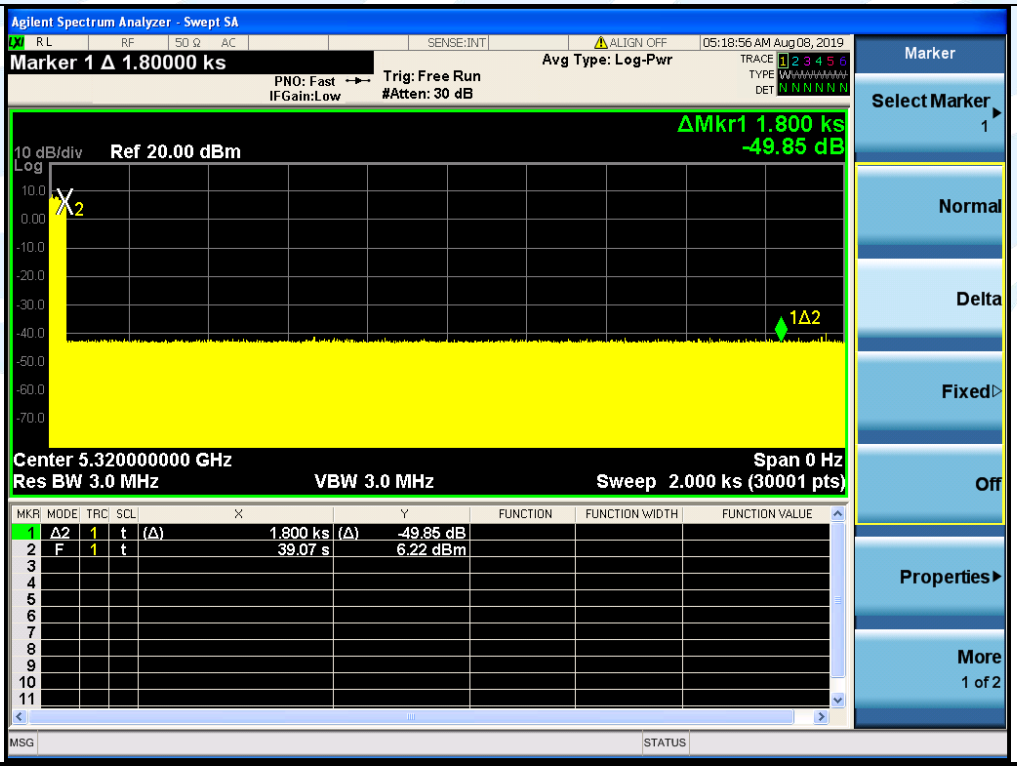
Channel Move Time & Channel Closing Transmission Time
802.11a_5320 MHz



Note:

4) Mark1 Time: 712 ms, Mark2 Time: 1436 ms, Ontime Points: 9
5) Dwell = S/B = 12000ms/30000 = 0.4 ms, C = N x Dwell = 9 x 0.4 = 3.6ms
6) CMT = 1.436 s – 0.712 s = 0.724s

Non-Occupancy Period_802.11a_CH64_5320 MHz



5.9 AC POWER LINE CONDUCTED EMISSION

Test Requirement: FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(6)
FCC 47 CFR Part 15 Subpart C Section 15.207

Test Method: ANSI C63.10-2013, Section 6.2.

Limits:

Frequency range (MHz)	Limits (dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

Remark:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

Test Setup: Refer to section 4.5.2 for details.

Test Procedures:

Test frequency range :150KHz-30MHz

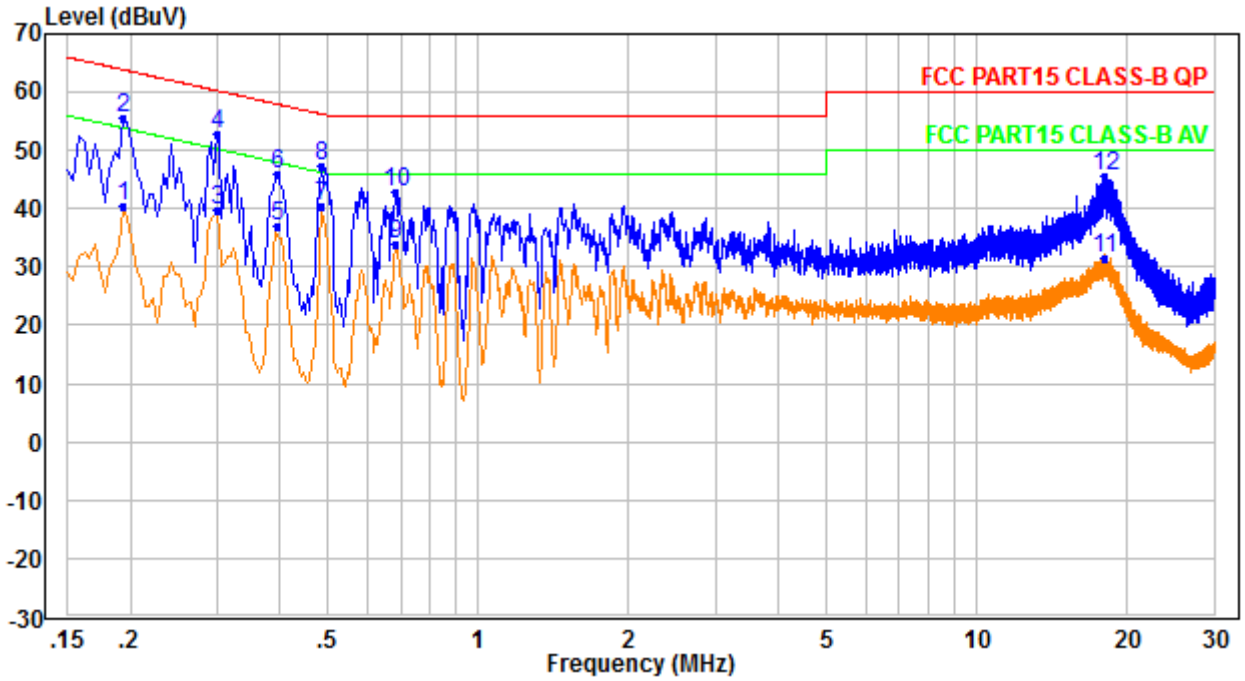
1) The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Equipment Used: Refer to section 3 for details.

Test Result: Pass

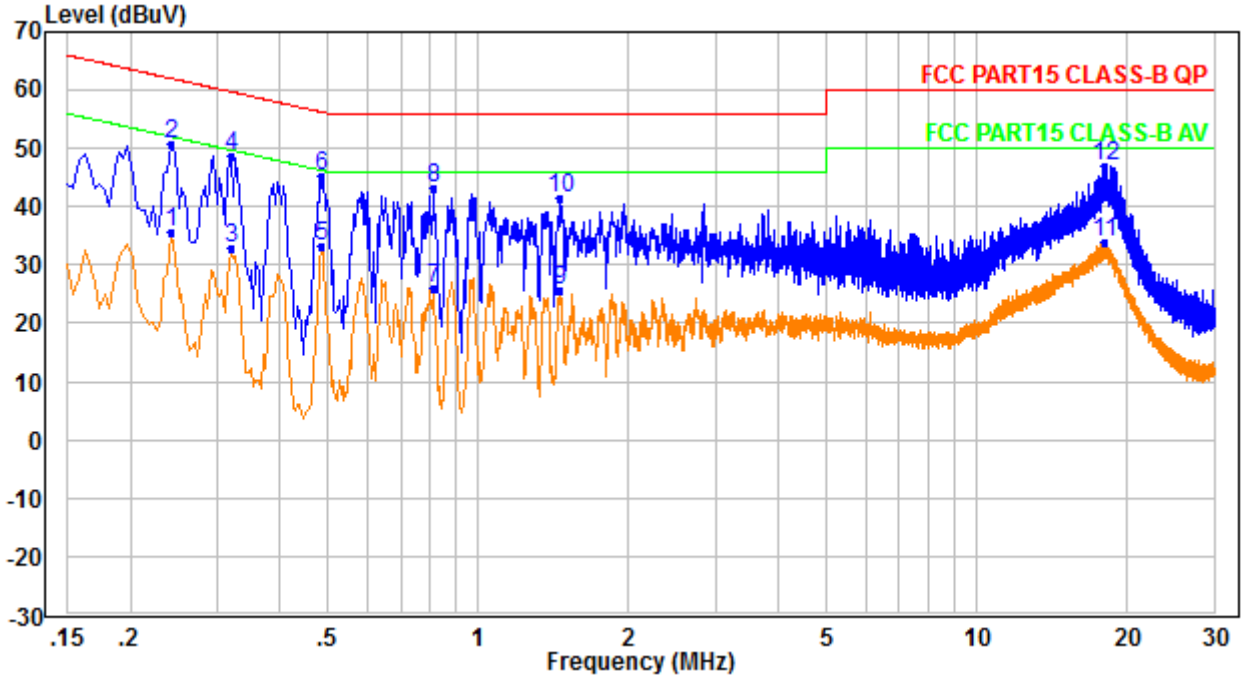
The measurement data as follows:
Quasi Peak and Average:
Mode: WIFI Link

Live Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.194	30.36	10.01	40.37	53.86	-13.49	Average
2	0.194	45.49	10.01	55.50	63.86	-8.36	QP
3	0.298	29.77	9.98	39.75	50.30	-10.55	Average
4	0.298	42.84	9.98	52.82	60.30	-7.48	QP
5	0.394	27.02	9.99	37.01	47.98	-10.97	Average
6	0.394	36.06	9.99	46.05	57.98	-11.93	QP
7	0.486	30.36	9.99	40.35	46.24	-5.89	Average
8	0.486	37.49	9.99	47.48	56.24	-8.76	QP
9	0.682	23.77	10.02	33.79	46.00	-12.21	Average
10	0.682	32.84	10.02	42.86	56.00	-13.14	QP
11	18.033	19.07	12.59	31.66	50.00	-18.34	Average
12	18.033	33.12	12.59	45.71	60.00	-14.29	QP

Neutral Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.242	25.56	9.98	35.54	52.03	-16.49	Average
2	0.242	40.69	9.98	50.67	62.03	-11.36	QP
3	0.318	22.79	9.96	32.75	49.76	-17.01	Average
4	0.318	38.90	9.96	48.86	59.76	-10.90	QP
5	0.486	23.34	9.97	33.31	46.24	-12.93	Average
6	0.486	35.41	9.97	45.38	56.24	-10.86	QP
7	0.814	16.06	10.03	26.09	46.00	-19.91	Average
8	0.814	33.14	10.03	43.17	56.00	-12.83	QP
9	1.462	15.36	10.15	25.51	46.00	-20.49	Average
10	1.462	31.41	10.15	41.56	56.00	-14.44	QP
11	18.057	21.46	12.44	33.90	50.00	-16.10	Average
12	18.057	34.53	12.44	46.97	60.00	-13.03	QP

Remark:

1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result - Limit
4. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***

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