FCC TEST REPORT

Application No.:	ZR/2020/C0043
Applicant:	Sony Mobile Communications, Inc.
Address of Applicant	4-12-3 Higashi-shinagawa, Shinagawa-ku, Tokyo, 140-0002, Japan
Manufacturer:	Sony Mobile Communications, Inc.
Address of Manufacturer	4-12-3 Higashi-shinagawa, Shinagawa-ku, Tokyo, 140-0002, Japan
EUT Description:	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, GPS and NFC
Trade Mark:	Sony
FCC ID:	PY7-76625R
Standards:	47 CFR FCC Part 2, Subpart J 47 CFR FCC Part 15, Subpart E
Test Method:	KDB 789033 D02 General UNII Test Procedures New Rules v02 KDB 662911 D01 Multiple Transmitter Output v02r01 KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02 KDB 905462 D03 Client Without DFS New Rules v01r02 ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices
Date of Receipt:	2021/1/10
Date of Test:	2021/1/10 to 2021/3/15
Date of Issue:	2021/4/21
Test Result :	**PASS ***

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:

Derek Yang
Wireless Laboratory Manager

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1 Version

Revision Record				
Version	***Chapter***	***Date***	***Modifier***	***Remark***
01		2021-03-18		Original
02		2021-04-21	Eason Wang	Update equipment list

Authorized for issue by:		
Prepared By		Eason Wang **(Eason Wang) /Engineer**
Checked By		David Chen **(David Chen) /Reviewer**

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2 Test Summary

Test Item	Band	FCC rules	Test Requirements	Result	Remark	Test Lab*
26dB Emission Bandwidth	5150-5250	15.403(i) 15.407(a)(1)	No limit.	-	See Note	A
	5250-5350	15.403(i) 15.407(a)(2)				
	5470-5725	15.403(i) 15.407(a)(2)				
6dB Emission Bandwidth	5725-5850	15.403(i) 15.407(e)	≥ 500 kHz.	-	See Note	
99% Occupied Bandwidth	5150-5250	KDB 789033 D02§ D	No limit.	-	See Note	
	5250-5350					
	5470-5725					
	5725-5850					
Duty Cycle	5150-5850	--	No limit.	PASS	-	
Maximum Conducted Output Power	5150-5250	15.407(a)(1) 15.407(a)(4)	FCC < 250mW (avg during transmission)	PASS	-	
	5250-5350	15.407(a)(2) 15.407(a)(4)	<MIN{250mW,11dBm+10*lg(EBW)} (avg during transmission)			
	5470-5725	15.407(a)(2) 15.407(a)(4)	<MIN{250mW,11dBm+10*lg(EBW)} (avg during transmission)			
	5725-5850	15.407(a)(3)	< 1W (avg during transmission)			
Maximum Power Spectral Density	5150-5250	15.407(a)(1) 15.407(a)(4)	<11dBm/MHz (avg during transmission)	-	See Note	
	5250-5350	15.407(a)(2) 15.407(a)(4)	<11dBm/MHz (avg during transmission)			
	5470-5725	15.407(a)(2) 15.407(a)(4)	<11dBm/MHz (avg during transmission)			
	5725-5850	15.407(a)(3) 15.407(a)(4)	<30dBm/500KHz (avg during transmission)			
Unwanted Emissions that fall Out of the Restricted Bands (Radiated)	5150-5250	15.407(b)(1) 15.407(b)(6) 15.407(b)(7) 15.209	F<1GHz: §15.209/§7.2.5 limit (QP). F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.15-5.35 GHz). F≥1GHz & in-restricted: §15.209/§7.2.5 limit (AV&PK).	PASS	-	B
	5250-5350	15.407(b)(2) 15.407(b)(6) 15.407(b)(7) 15.209	F<1GHz: §15.209/§7.2.5 limit (QP).	PASS		

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			F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.25-5.35 GHz). F≥1GHz & in-restricted: §15.209/§7.2.5 limit (AV&PK).			
	5470-5750	15.407(b)(3) 15.407(b)(6) 15.407(b)(7) 15.209	F<1GHz: §15.209/§7.2.5 limit (QP). F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.47-5.725 GHz). F≥1GHz & in-restricted: §15.209/§7.2.5 limit (AV&PK).	PASS		
	5725-5850	15.407(b)(4) 15.407(b)(6) 15.407(b)(7) 15.209	F<1GHz: §15.209/§7.2.5 limit (QP) F≥1GHz &out-restricted:(QP) a) 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; b) 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; c) 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; and d) -27 dBm/MHz at frequencies more than 75 MHz above or below the band edges. F≥1GHz & in-restricted: §15.209/§7.2.5 limit (AV&PK).	PASS		
Unwanted Emissions in the Restricted Bands (Radiated)	5150-5250 5250-5350 5470-5725 5725-5850	15.209	---	PASS	-	B
AC Power Line Conducted Emissions	5150-5250 5250-5350 5470-5725 5725-5850	15.207	---	-	See Note	-

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Frequency Stability	5150-5250 5250-5350 5470-5725 5725-5850	15.209	---	-	See Note	-
Dynamic Frequency Selection	5250-5350 5470-5725	47 CFR Part 15, Subpart E 15.407	Channel Move Time:10 Seconds	PASS	-	B

Note:The RF circuit, output power level and antenna performance is the same in WLAN function across all two FCC ID PY7-54955X and PY7-76625R, since the change, only verify RF output power and radiated spurious emission test data the worst mode was reported in this report. Dynamic Frequency Selection was retested.

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3 General Information

3.1 Details of Client

Applicant:	Sony Mobile Communications, Inc.
Address of Applicant	4-12-3 Higashi-shinagawa, Shinagawa-ku, Tokyo, 140-0002, Japan
Manufacturer:	Sony Mobile Communications, Inc.
Address of Manufacturer	4-12-3 Higashi-shinagawa, Shinagawa-ku, Tokyo, 140-0002, Japan

3.2 Test Location

Lab A:

Company:	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Address:	No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
Post code:	518057
Test Engineer:	Dee Zheng, Mike Hu

Lab B:

Company:	SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD.
Address:	1/F, Unit D, Building 1, Kanghong Orange Technology Park, No.137, Keyuan 3rd Road, Fengdong New City, Xi'an, Shaanxi China
Post code:	710086
Test Engineer:	Ben Huang

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3.3 Test Facility

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

Lab A:

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• FCC –Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

Lab B:

• A2LA (Certificate No. 4854.01)

SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4854.01.

• FCC –Designation Number: CN1271

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3.4 General Description of EUT

EUT Description:	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, GPS and NFC	
Trade Mark:	Sony	
S/N:	005059ADNVM2	
IEEE 802.11 WLAN Mode Supported:	☒ 802.11a (20 MHz channel bandwidth) ; ☒ 802.11n (20 MHz channel bandwidth); ☒ 802.11n (40 MHz channel bandwidth); ☒ 802.11ac (20 MHz channel bandwidth); ☒ 802.11ac (40 MHz channel bandwidth); ☒ 802.11ac (80 MHz channel bandwidth),	
Operation Frequency:	All	fc = 5000 MHz + N * 5 MHz, where: -fc = “Operating Frequency” in MHz, -N = “Channel Number”.
	5150-5250 MHz (U-NII)	N = 36 to 48 with step of 4 for the 20 MHz channel bandwidth. N = 38 to 46 with step of 8 for the 40 MHz channel bandwidth. N = 42 for the 80 MHz channel bandwidth.
	5250-5350 MHz (U-NII)	N = 52 to 64 with step of 4 for the 20 MHz channel bandwidth. N = 54 to 62 with step of 8 for the 40 MHz channel bandwidth. N = 58 for the 80 MHz channel bandwidth.
	5470-5650 MHz (U-NII) (for FCC)	N = 100 to 128 with step of 4 for the 20 MHz channel bandwidth. N = 102 to 126 with step of 8 for the 40 MHz channel bandwidth. N = 106 to 122 with step of 16 for the 80 MHz channel bandwidth.
	5650-5725 MHz (U-NII)	N = 132 to 144 with step of 4 for the 20 MHz channel bandwidth. N = 134 to 142 with step of 8 for the 40 MHz channel bandwidth. N = 138 for the 80 MHz channel bandwidth.
	5725-5850MHz(U-NII)	N = 149 to 165 with step of 4 for the 20 MHz channel bandwidth. N = 151 to 159 with step of 8 for the 40 MHz channel bandwidth. N = 155 for the 80 MHz channel bandwidth.
Type of Modulation:	OFDM	
DFS mode:	☐Master ☐ Slave with radar detection ☒Slave without radar detection	
Sample Type:	☒ Portable Device, ☐Module	
Antenna Type:	☐ External, ☒ Integrated	
Antenna Ports	☒ Ant 1, ☒ Ant 2, ☐ Ant 3	
Smart System:	☒ SISO (for 802.11a/n/ac), ☒ MIMO (for 802.11a/n/ac), ☐ Diversity (for 802.11a) : Tx & Rx	
Antenna Gain:	0.9dBi(ANT1); -1.3dBi(ANT2);	

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Remark:

In FCC 15.31, for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table, and the selected channel to perform the test as below:

Frequency Range of Operation Operating Frequency Range (in each Band)	Number of Measurement Frequencies Required	Location of Measurement Frequency in Band of Operation
1 MHz or less	1	centre
1 MHz to 10 MHz	2	1 near high end, 1 near low end
Greater than 10 MHz	3	1 near high end, 1 near centre

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For UNII Band I:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac 20MHz	The Lowest channel	5180
	The Middle channel	5200
	The Highest channel	5240
IEEE 802.11n/ac 40MHz	The Lowest channel	5190
	The Highest channel	5230
IEEE 802.11ac 80MHz	The Middle channel	5210

For UNII Band II-A:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac 20MHz	The Lowest channel	5260
	The Middle channel	5280
	The Highest channel	5320
IEEE 802.11n/ac 40MHz	The Lowest channel	5270
	The Highest channel	5310
IEEE 802.11ac 80MHz	The Middle channel	5290

For UNII Band II-C:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac 20MHz	The Lowest channel	5500
	The Middle channel	5580
	The Highest channel	5720
IEEE 802.11n/ac 40MHz	The Lowest channel	5510
	The Middle channel	5550
	The Highest channel	5710
IEEE 802.11ac 80MHz	The Lowest channel	5530
	The Highest channel	5690

For UNII Band III:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac 20MHz	The Lowest channel	5745
	The Middle channel	5785
	The Highest channel	5825
IEEE 802.11n/ac 40MHz	The Lowest channel	5755
	The Highest channel	5795
IEEE 802.11ac 80MHz	The Middle channel	5775

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3.5 Test Environment and Mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	55 % RH
Atmospheric Pressure:	101.32 KPa
Test mode:	
Modulation	Data Rate
802.11a	6Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20	MCS0
802.11ac VHT40	MCS0
802.11ac VHT80	MCS0

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4 Test results and Measurement Data

4.1 Antenna Requirement

Standard requirement:	47 CFR Part 15 Section 15.203
The antenna is integrated antenna and no consideration of replacement. The best case gain of the antenna is 0.9dBi.	

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4.2 Duty cycle

4.2.1 Test Result

TestMode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Limit	Verdict
11A	Ant1	5240	2.03	2.07	98.07	---	PASS
11N40SISO	Ant1	5510	0.93	0.97	95.88	---	PASS
11AC80SISO	Ant1	5210	0.46	0.49	93.88	---	PASS

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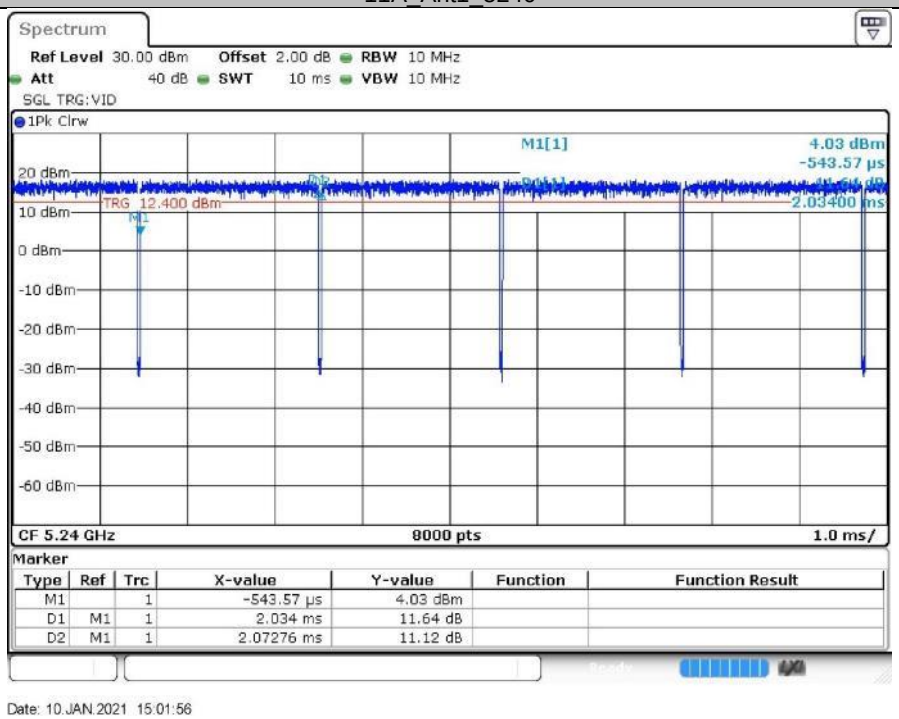
4.2.2 Test Plots

11A_Ant1_5240



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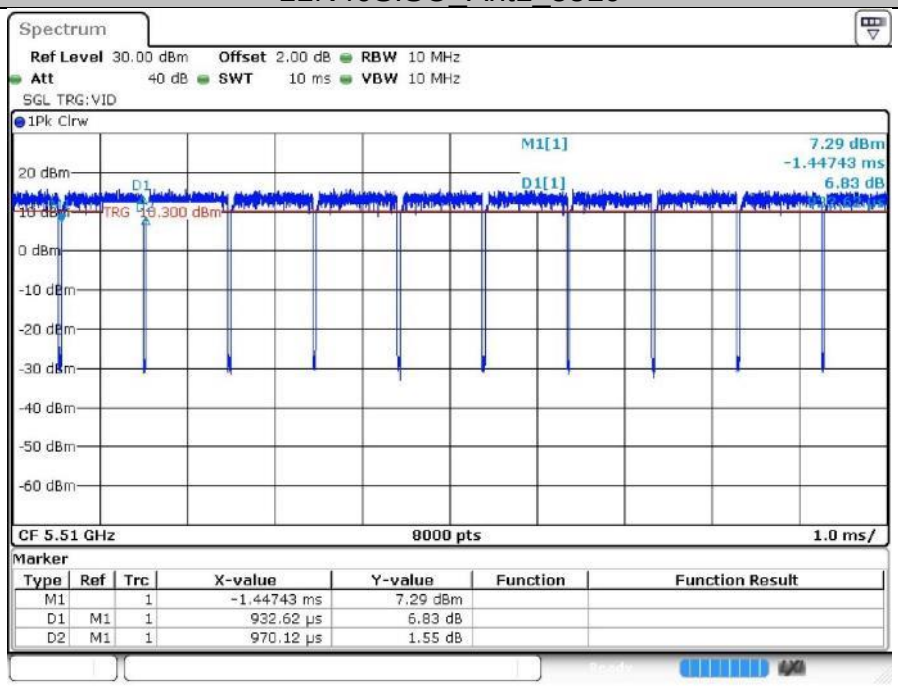
11N40SISO_Ant1_5510



Date: 10.JAN.2021 18:34:36

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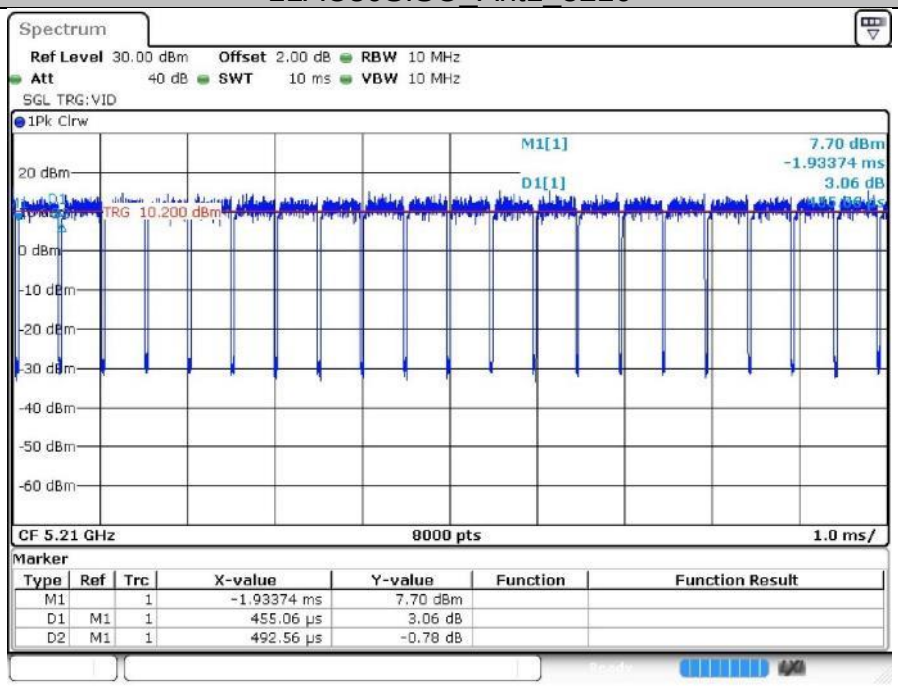

Date: 10.JAN.2021 20:05:43

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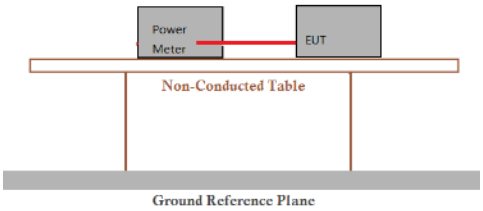
4.3 Conducted Output Power

Test Requirement:	47 CFR Part 15 Section 15.407(a)	
Test Method:	ANSI C63.10 :2013	
Test Setup:		
Test Instruments:	Refer to section 6 for details	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates	
Final Test Mode:	Through Pre-scan, find the 6Mbps of rate is the worst case of 802.11a; MCS0 of rate is the worst case of 802.11n(HT20) ; MCS0 of rate is the worst case of 802.11n(HT40); MCS0 of rate is the worst case of 802.11ac(VHT20). MCS0 of rate is the worst case of 802.11ac(VHT40). MCS0 of rate is the worst case of 802.11ac(VHT80). Only the worst case is recorded in the report.	
Limit:	Frequency Band	Limit
	5150-5250MHz	Not exceed 250mW(24dBm)
	5250-5350MHz	The lesser of 250mW(24dBm) or 11+ 10logB
	5470-5725MHz	The lesser of 250mW(24dBm) or 11+ 10logB
	5725-5850MHz	Not exceed 1W(30dBm)
	*Where B is the 26dB emission bandwidth in MHz	
Test Results:	Pass	

The detailed test data see: **Appendix**

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4.4 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15 Section 15.407(b)
Test Method:	ANSI C63.10: 2013
Test Site:	Measurement Distance: 3m or 10m (Semi-Anechoic Chamber)
Test Setup:	

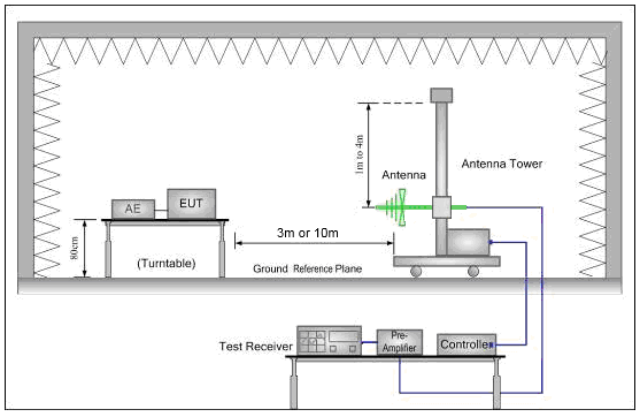

Figure 1. 30MHz to 1GHz

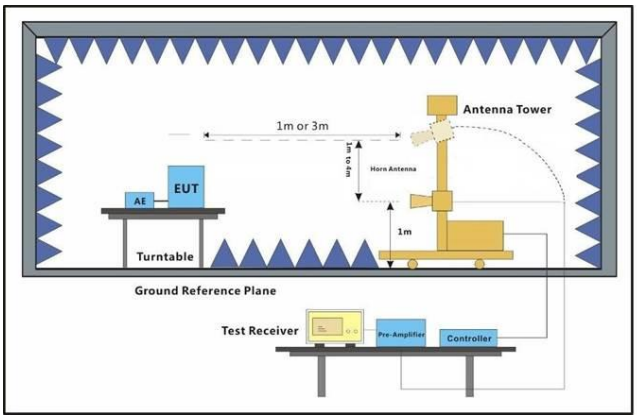

Figure 2. Above 1 GHz

Test Procedure:	a. For below 1GHz test, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. For above 1GHz test, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. d. The antenna height 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. e. 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. f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. g. Test the EUT in the outermost channels. h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case. i. Repeat above procedures until all frequencies measured was complete.
Test Configuration:	Measurements Below 1000MHz • RBW = 120 kHz • VBW = 300 kHz • Detector = Peak

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	• Trace mode = max hold Peak Measurements Above 1000 MHz • RBW = 1 MHz • VBW ⩾ 3 MHz • Detector = Peak • Sweep time = auto • Trace mode = max hold Average Measurements Above 1000MHz • RBW = 1 MHz • VBW = 10 Hz, when duty cycle is no less than 98 percent. • VBW ⩾ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates.
Final Test Mode:	Through Pre-scan, find the 6Mbps of rate is the worst case of 802.11a; MCS0 of rate is the worst case of 802.11n(HT20) ; MCS0 of rate is the worst case of 802.11n(HT40); MCS0 of rate is the worst case of 802.11ac(VHT20). MCS0 of rate is the worst case of 802.11ac(VHT40). MCS0 of rate is the worst case of 802.11ac(VHT80). For below 1GHz, through Pre-scan, find the 1Mbps of rate of 802.11a at lowest channel is the worst case. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 6 for details
Test Results:	Pass
Remark:	The Emission Test is performed by the Lab B

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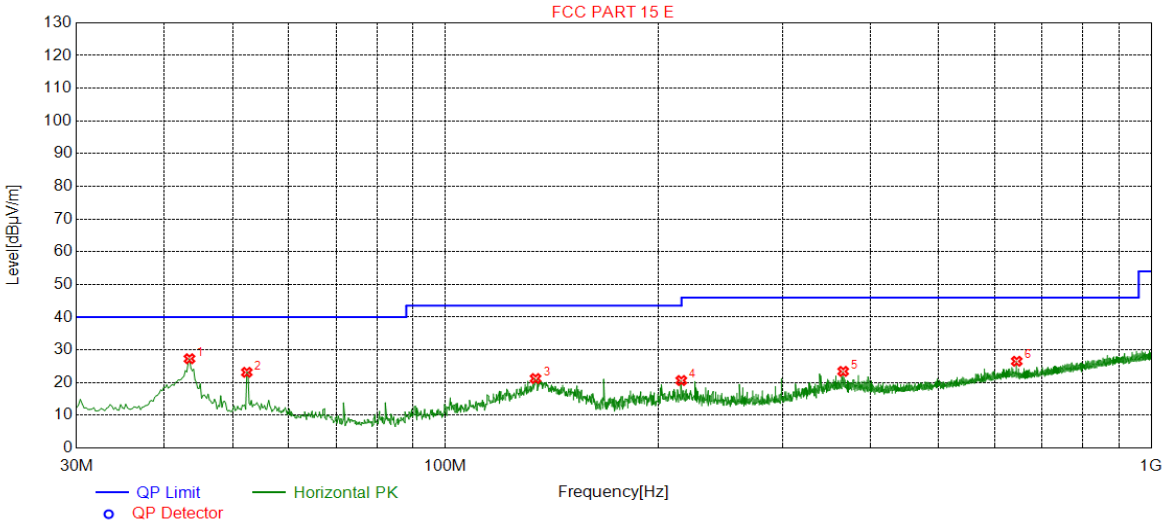
4.4.2 Radiated emission below 1GHz

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	43.3887	27.30	-29.76	40.00	12.70	202	329	Horizontal
2	52.3145	23.15	-30.71	40.00	16.85	156	102	Horizontal
3	134.1988	21.25	-35.27	43.50	22.25	176	221	Horizontal
4	215.8892	20.65	-30.82	43.50	22.85	201	218	Horizontal
5	366.0752	23.43	-26.44	46.00	22.57	354	204	Horizontal
6	644.9090	26.53	-20.09	46.00	19.47	215	207	Horizontal

Final Data List

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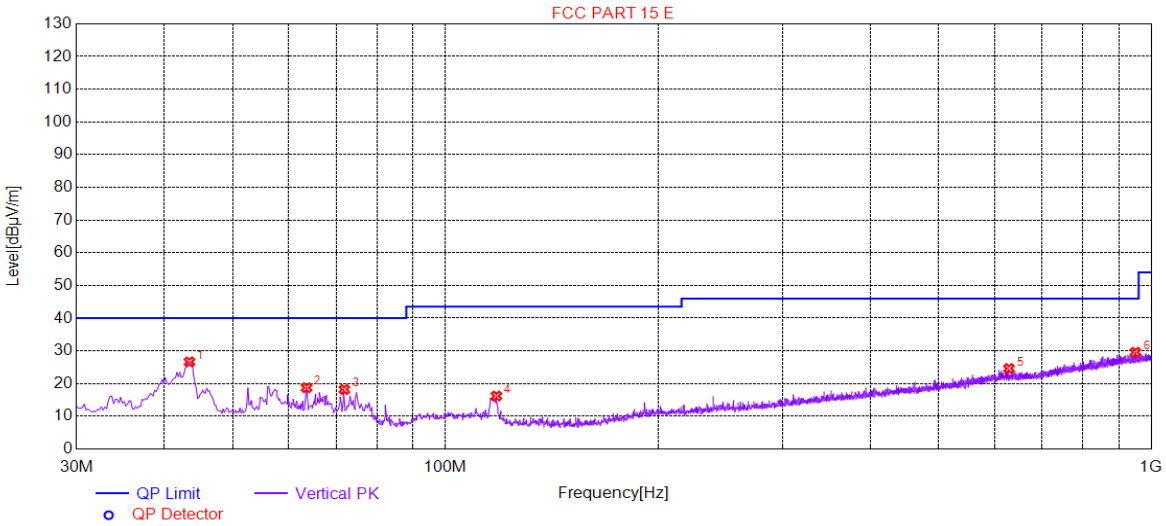
Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	43.3887	26.65	-29.76	40.00	13.35	145	25	Vertical
2	63.5687	18.75	-32.78	40.00	21.25	246	36	Vertical
3	71.9124	18.20	-34.73	40.00	21.80	324	148	Vertical
4	118.0936	16.21	-33.27	43.50	27.29	189	36	Vertical
5	628.8038	24.63	-20.28	46.00	21.37	247	2	Vertical
6	949.7439	29.59	-15.48	46.00	16.41	269	231	Vertical

Final Data List

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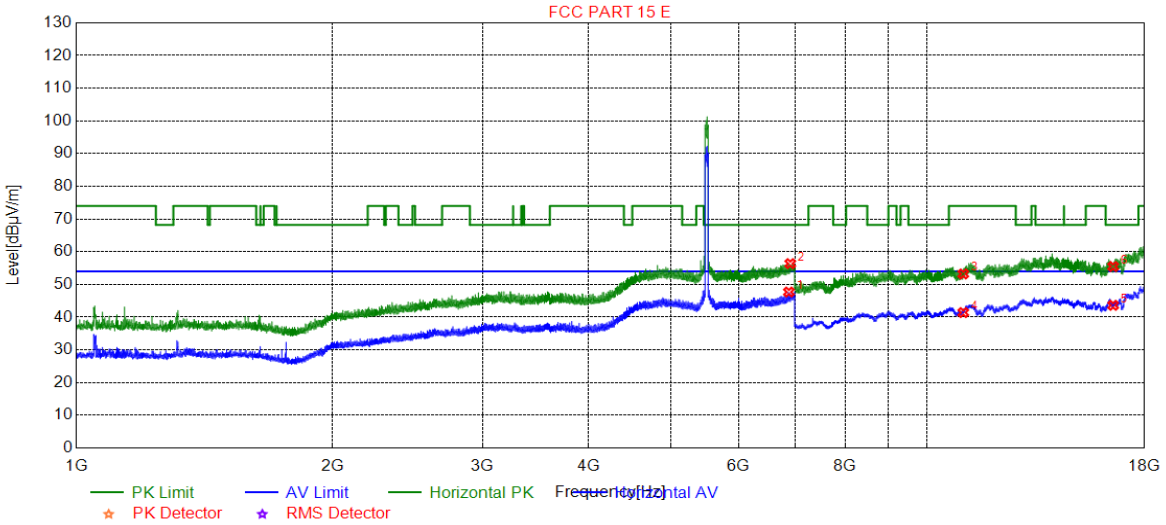
4.4.3 Transmitter Emission above 1GHz

4.4.3.1 802.11N40_Channel 102

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	6875.193	47.70	21.40	54.00	6.30	156	304	Horizontal
2	6900.995	56.38	21.35	68.20	11.82	208	184	Horizontal
3	11020.00	53.23	-1.61	74.00	20.77	176	200	Horizontal
4	11020.00	41.42	-1.61	54.00	12.58	147	14	Horizontal
5	16530.00	43.63	0.09	54.00	10.37	176	285	Horizontal
6	16530.00	55.49	0.09	68.20	12.71	156	116	Horizontal

Final Data List

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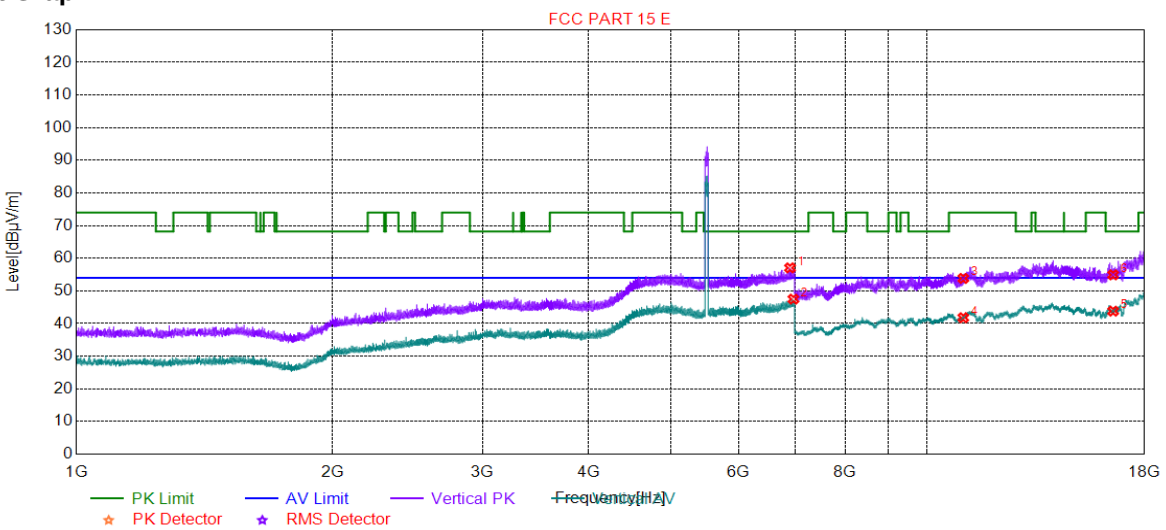
4.4.3.2 802.11N40_Channel 102

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	6895.294	57.07	21.36	68.20	11.13	243	73	Vertical
2	6959.498	47.50	21.75	54.00	6.50	279	176	Vertical
3	11020.00	53.84	-1.61	74.00	20.16	316	108	Vertical
4	11020.00	41.81	-1.61	54.00	12.19	249	40	Vertical
5	16530.00	43.82	0.09	54.00	10.18	263	177	Vertical
6	16530.00	54.94	0.09	68.20	13.26	256	194	Vertical

Final Data List

Remark:
1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
2) Scan from 9kHz to 40GHz,The disturbance between 9KHz to 30MHz and 18GHz to 40GHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported .
3) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. 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. So, only the peak measurements were shown in the report.

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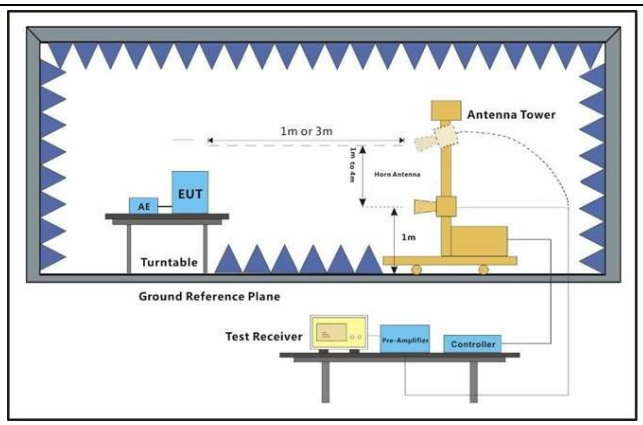
4.5 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15 Section 15.407(b)		
Test Method:	ANSI C63.10: 2013		
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)		
Limit:	Frequency	Limit (dBuV/m)	Remark
	30MHz-88MHz	40.0	Quasi-peak
	88MHz-216MHz	43.5	Quasi-peak
	216MHz-960MHz	46.0	Quasi-peak
	960MHz-1GHz	54.0	Quasi-peak
	Above 1GHz	54.0	Average Value
		74.0	Peak Value
Test Setup:			



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Test Procedure:	a. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height 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. d. 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. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel g. Test the EUT in the outermost channels. h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode,And found the X axis positioning which it is worse case. i. Repeat above procedures until all frequencies measured was complete.
Test Configuration:	Measurements Below 1000MHz • RBW = 120 kHz • VBW = 300 kHz • Detector = Peak • Trace mode = max hold Peak Measurements Above 1000 MHz • RBW = 1 MHz • VBW ⩾ 3 MHz • Detector = Peak • Sweep time = auto • Trace mode = max hold Average Measurements Above 1000MHz • RBW = 1 MHz • VBW = 10 Hz, when duty cycle is no less than 98 percent. • VBW ⩾ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates.
Final Test Mode:	Through Pre-scan, find the 6Mbps of rate is the worst case of 802.11a; MCS0 of rate is the worst case of 802.11n(HT20) ;

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	MCS0 of rate is the worst case of 802.11n(HT40); MCS0 of rate is the worst case of 802.11ac(VHT20). MCS0 of rate is the worst case of 802.11ac(VHT40). MCS0 of rate is the worst case of 802.11ac(VHT80). Only the worst case is recorded in the report.
Instruments Used:	Refer to section 6 for details
Test Results:	Pass
Remark:	The Emission Test is performed by the Lab B

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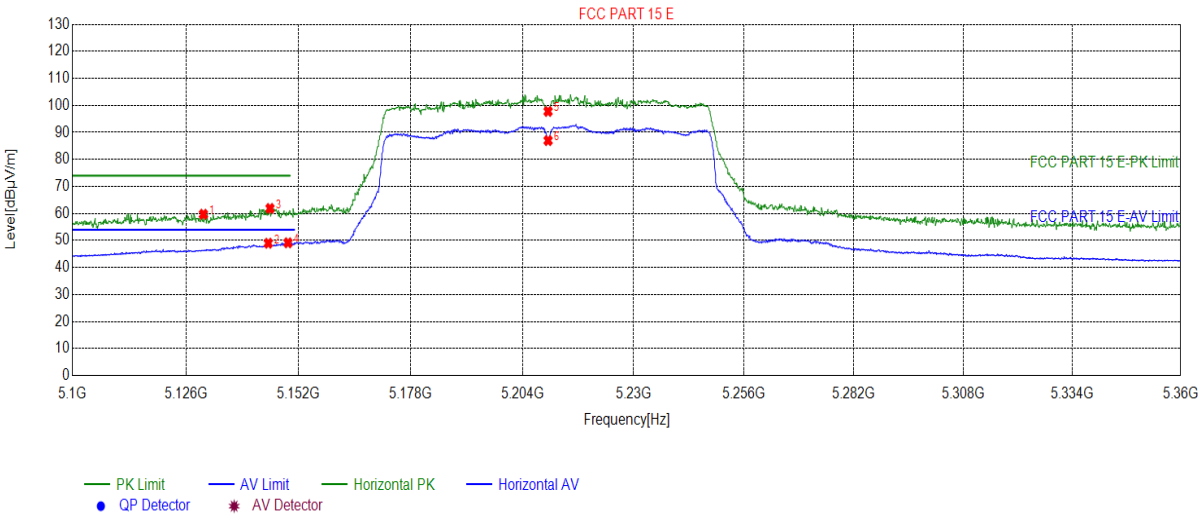
4.5.1 Test Plots

4.5.1.1 802.11AC80_Channel 42 MIMO

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5130.045	59.71	19.34	74.00	14.29	165	72	Horizontal
2	5145.002	48.98	19.32	54.00	5.02	158	81	Horizontal
3	5145.392	61.86	19.32	74.00	12.14	153	13	Horizontal
4	5149.554	49.14	19.33	54.00	4.86	145	18	Horizontal
5	5210.000	97.77	18.93	0.00	-97.77	256	236	Horizontal
6	5210.000	86.98	18.93	0.00	-86.98	182	215	Horizontal

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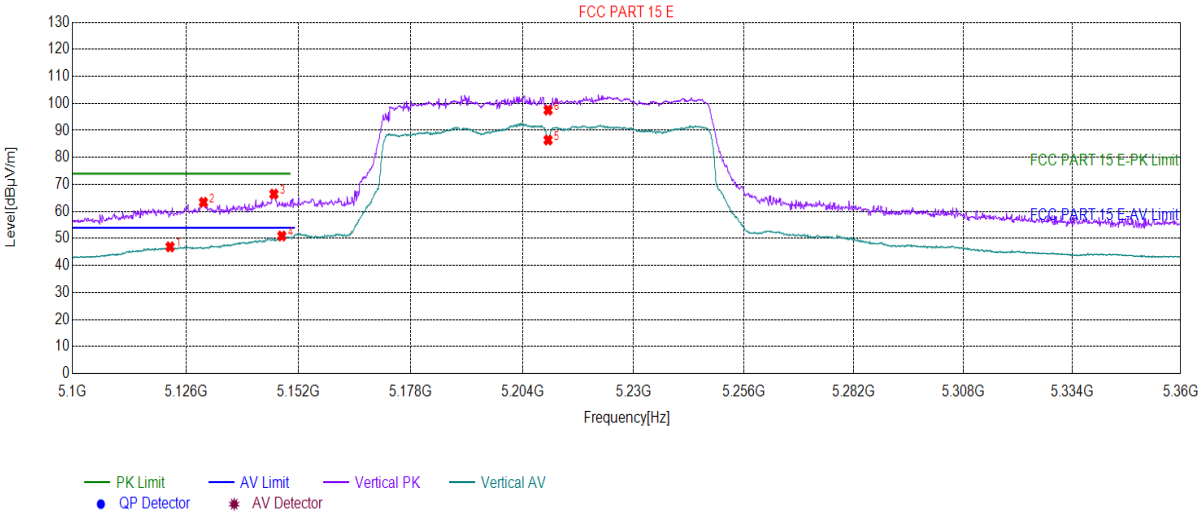
4.5.1.2 802.11AC80_Channel 42 MIMO

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5122.371	46.89	19.33	54.00	7.11	300	0	Vertical
2	5130.045	63.38	19.34	74.00	10.62	189	14	Vertical
3	5146.303	66.43	19.32	74.00	7.57	163	4	Vertical
4	5148.124	50.93	19.33	54.00	3.07	300	346	Vertical
5	5210.000	86.43	18.93	0.00	-86.43	163	346	Vertical
6	5210.000	97.53	18.93	0.00	-97.53	189	2	Vertical

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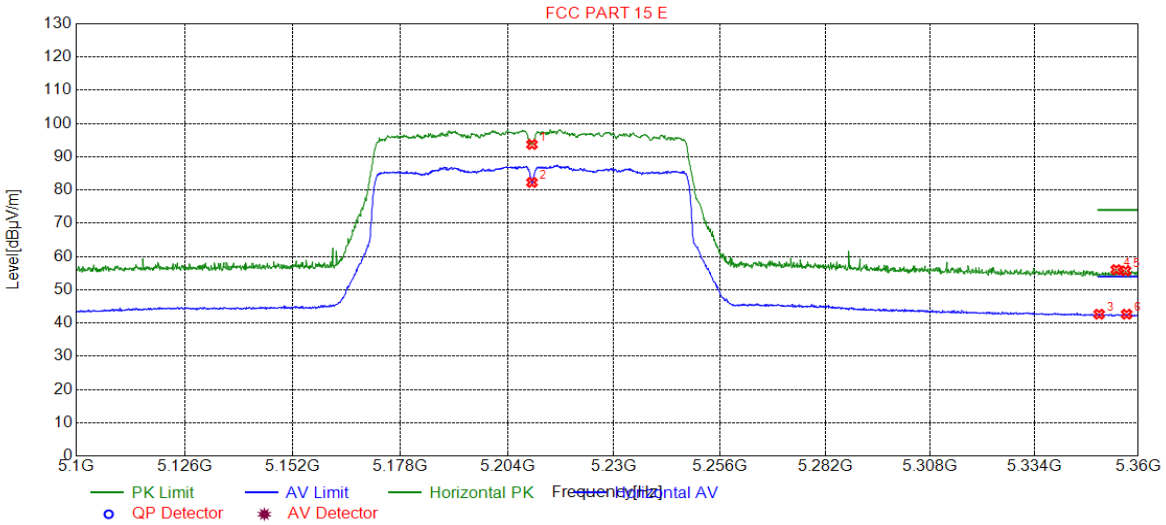
4.5.1.3 802.11AC80_Channel 42

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5210.000	93.71	18.93	0.00	-93.71	147	44	Horizontal
2	5210.000	82.29	18.93	0.00	-82.29	156	44	Horizontal
3	5350.245	42.67	18.54	54.00	11.33	178	82	Horizontal
4	5354.537	56.07	18.55	74.00	17.93	207	87	Horizontal
5	5356.878	55.72	18.57	74.00	18.28	149	235	Horizontal
6	5357.138	42.67	18.57	54.00	11.33	157	92	Horizontal

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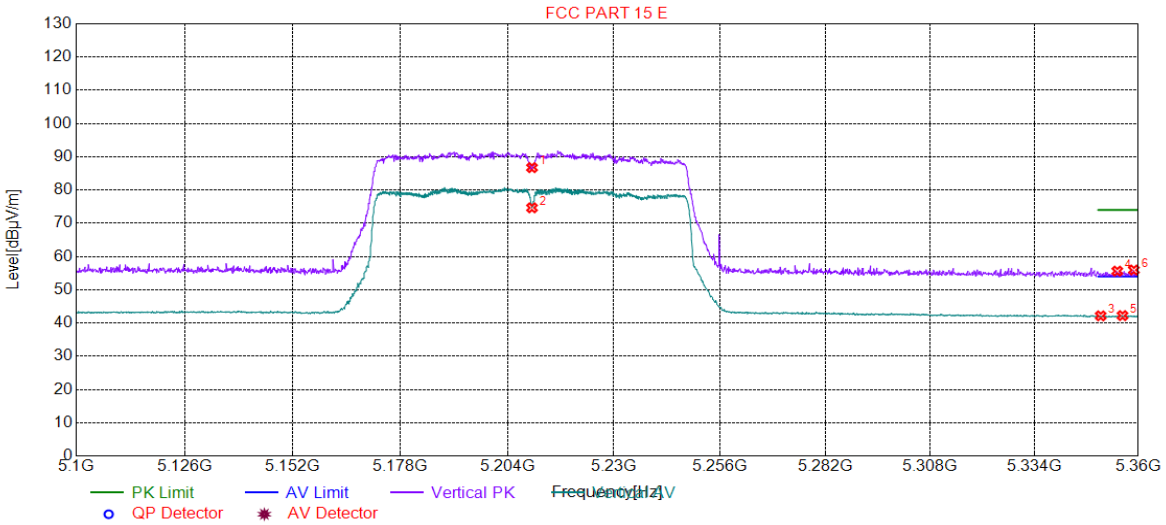
4.5.1.4 802.11AC80_Channel 42

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5210.000	86.75	18.93	0.00	-86.75	246	222	Vertical
2	5210.000	74.66	18.93	0.00	-74.66	302	236	Vertical
3	5350.635	42.17	18.54	54.00	11.83	275	330	Vertical
4	5354.797	55.63	18.55	74.00	18.37	263	69	Vertical
5	5356.098	42.25	18.56	54.00	11.75	249	40	Vertical
6	5358.959	55.96	18.59	74.00	18.04	286	312	Vertical

Final Data List

Remark:
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
All modes have been tested, but only the worst case data displayed in this report.

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4.6 Dynamic Frequency Selection

4.6.1 DFS Overview

Table 1: 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	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 2: 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.		

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4.6.2 DFS Detection Thresholds

Table 3: 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	-64 dBm
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.	

4.6.3 Response Requirements

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Table 4: DFS Response Requirement 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.

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4.6.4 Test plots

4.6.4.1 DFS Detection Thresholds

4.6.4.1.1 Test Result

TestMode	Channel	Radar Type	Result	Limit[dbm]	Verdict
11AC20SISO	5320	Type0	-63.21	-62.00	PASS
	5500	Type0	-62.56	-62.00	PASS
11AC80SISO	5290	Type0	-62.61	-62.00	PASS
	5530	Type0	-62.43	-62.00	PASS

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4.6.4.1.2 Test Graphs

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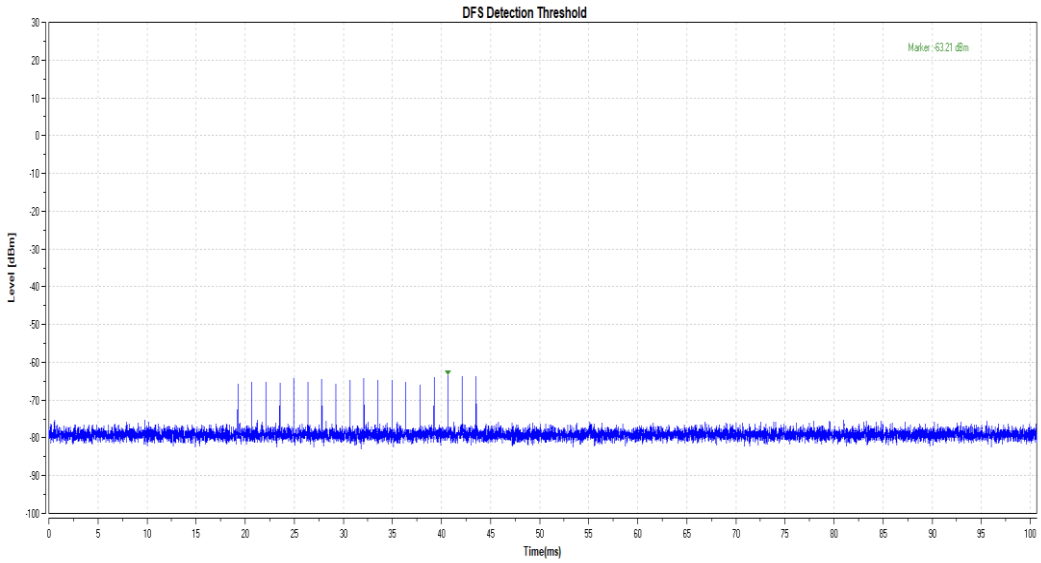

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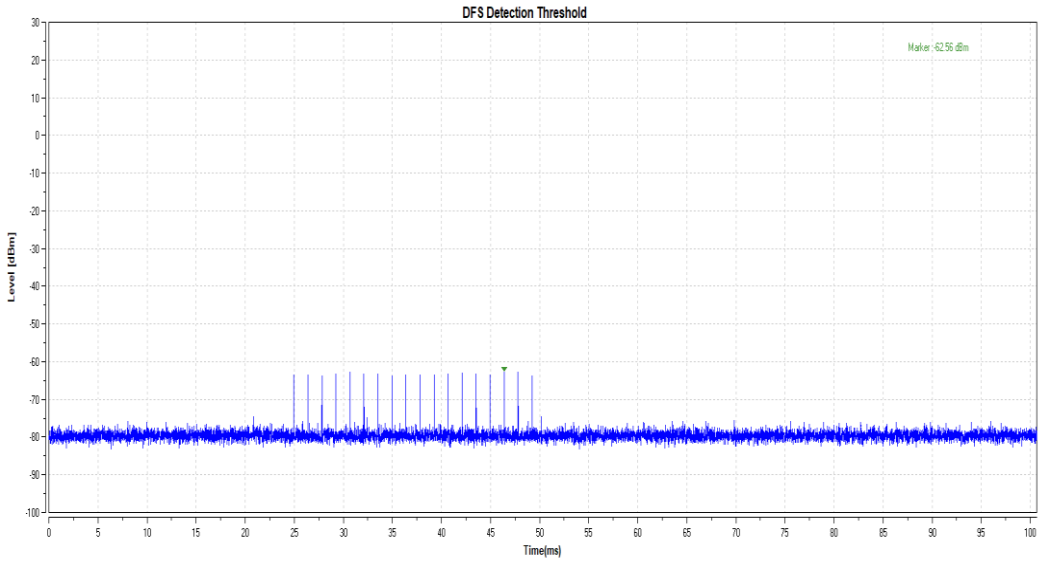

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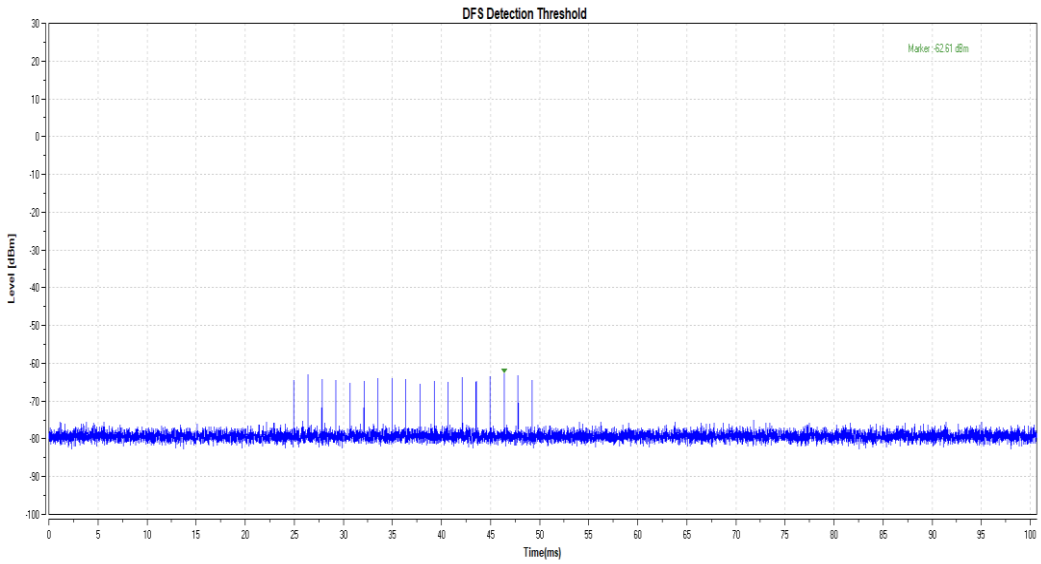

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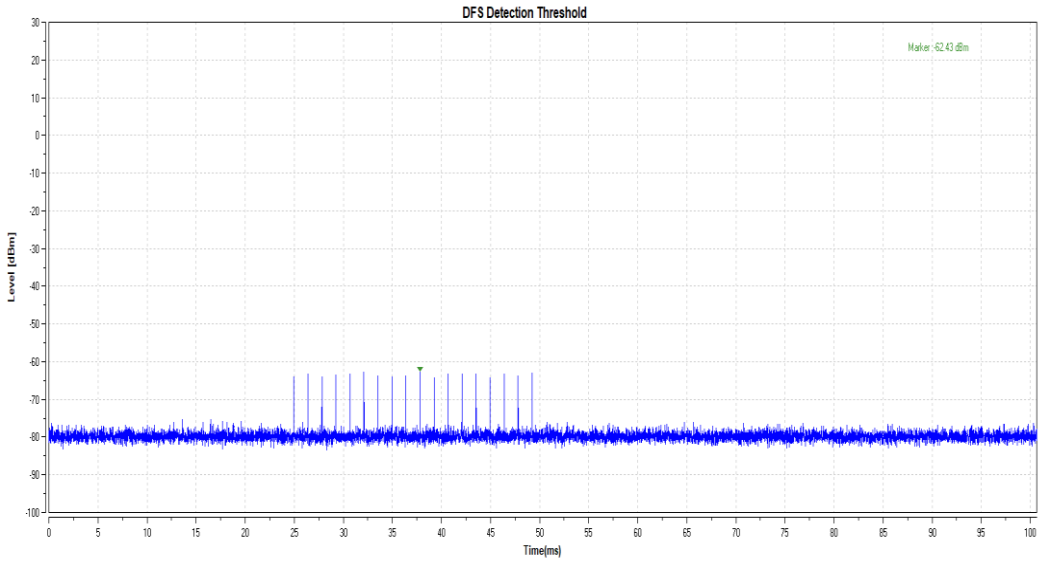

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4.6.4.2 Channel Move Time and Channel Closing Transmission Time

4.6.4.2.1 Test Result

TestMode	Channel	CCT[ms]	Limit[ms]	CMT[ms]	Limit[ms]	Verdict
11AC20SISO	5320	45.7	60	314.6	10000	PASS
	5500	0	60	225.2	10000	PASS
11AC80SISO	5290	0	60	206.7	10000	PASS
	5530	59.5	60	362.7	10000	PASS

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4.6.4.2.2 Test Graphs

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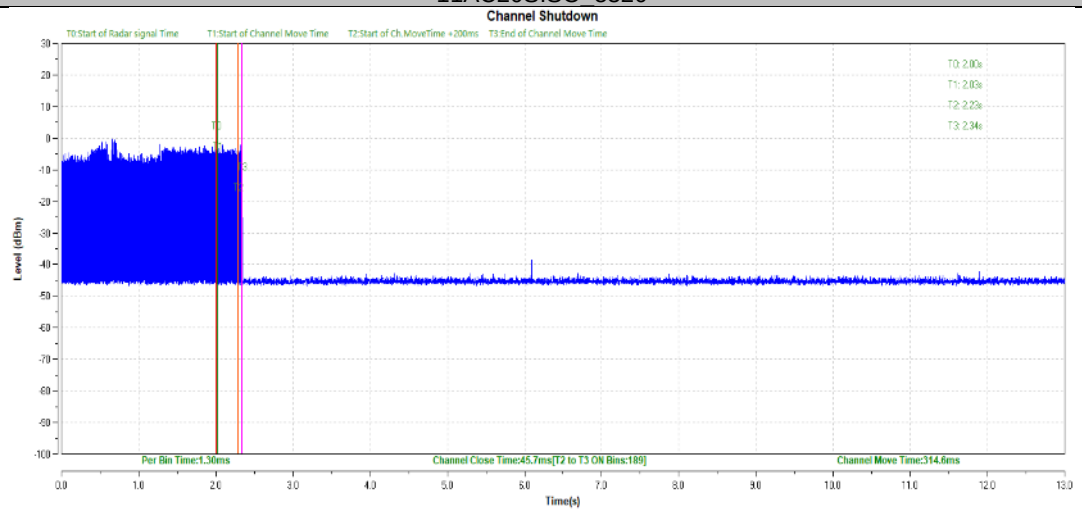

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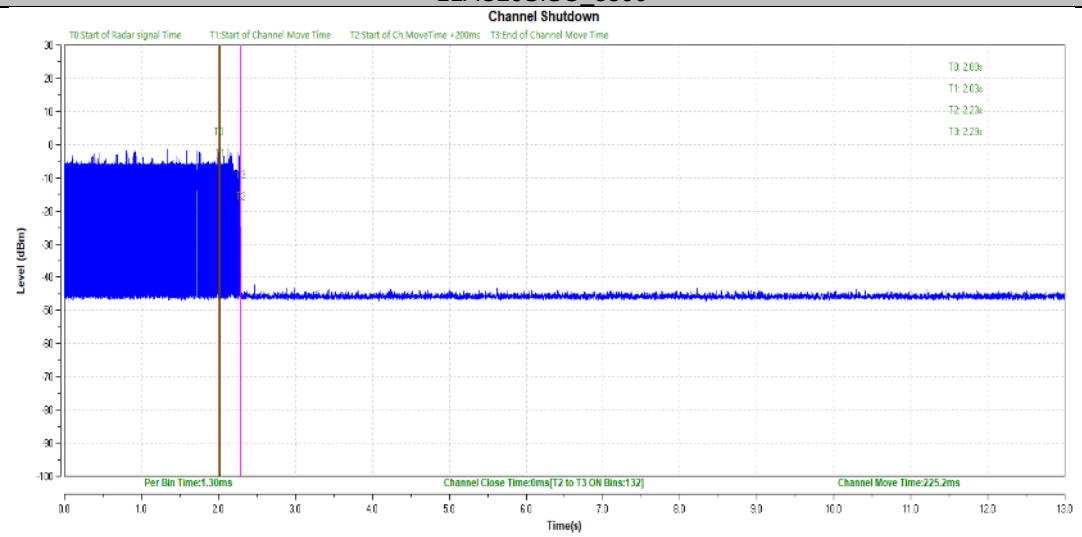

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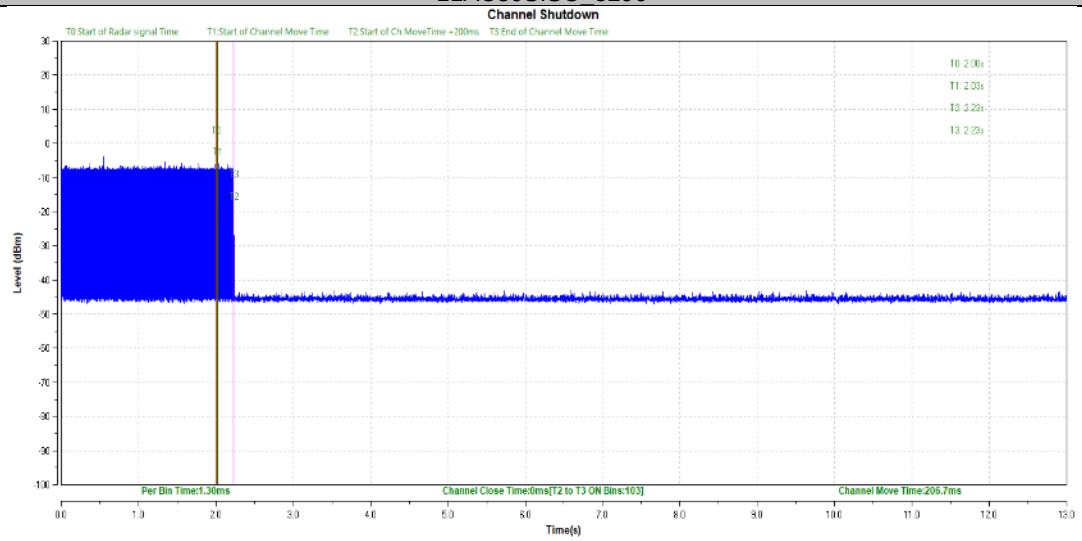

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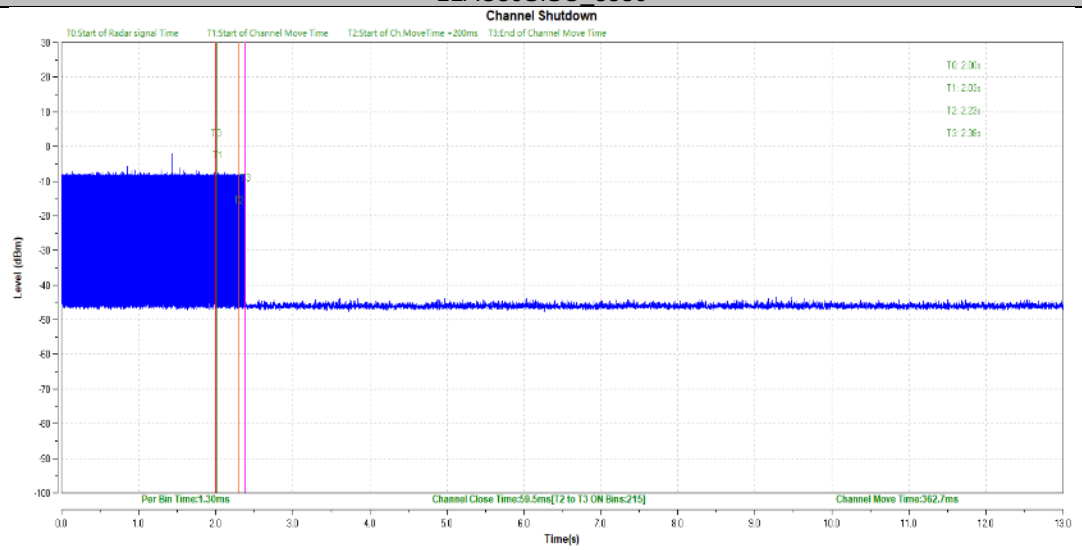

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4.6.4.3 Non-Occupancy Period

4.6.4.3.1 Test Result

TestMode	Channel	Result	Limit[s]	Verdict
11AC20SISO	5320	see test graph	>=1800	PASS
	5500	see test graph	>=1800	PASS
11AC80SISO	5290	see test graph	>=1800	PASS
	5530	see test graph	>=1800	PASS

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4.6.4.3.2 Test Graphs

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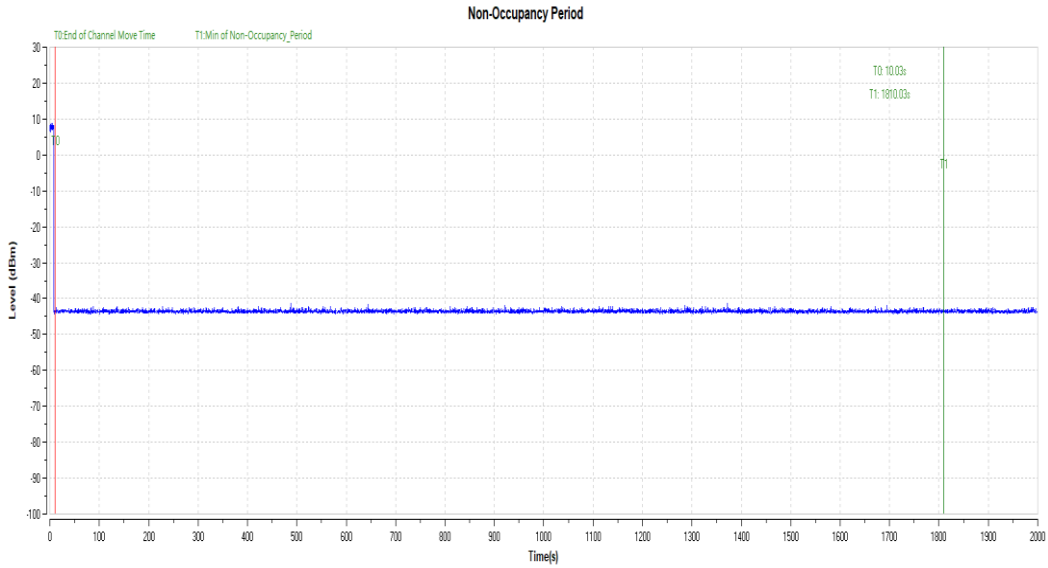

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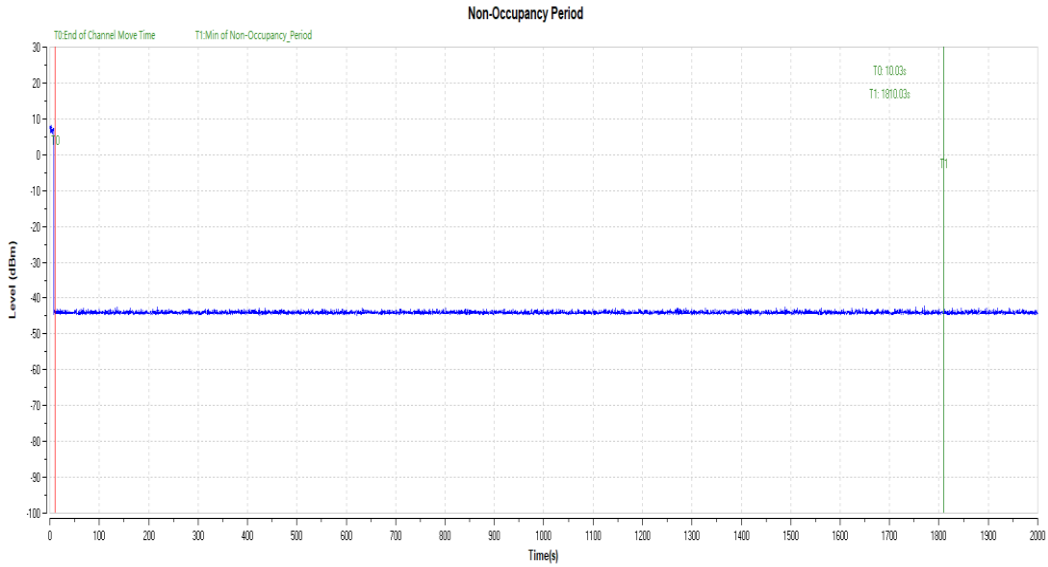

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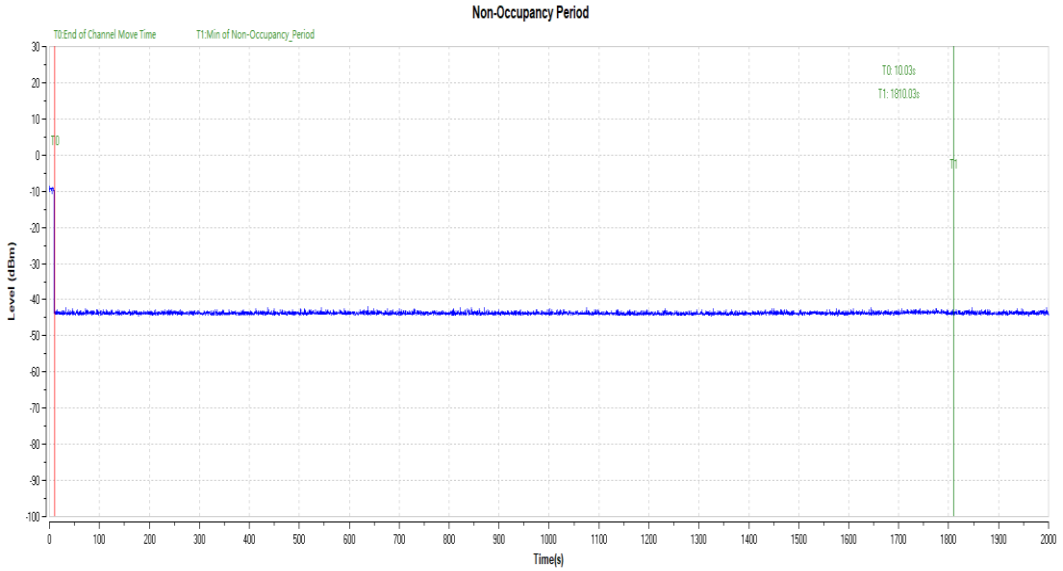
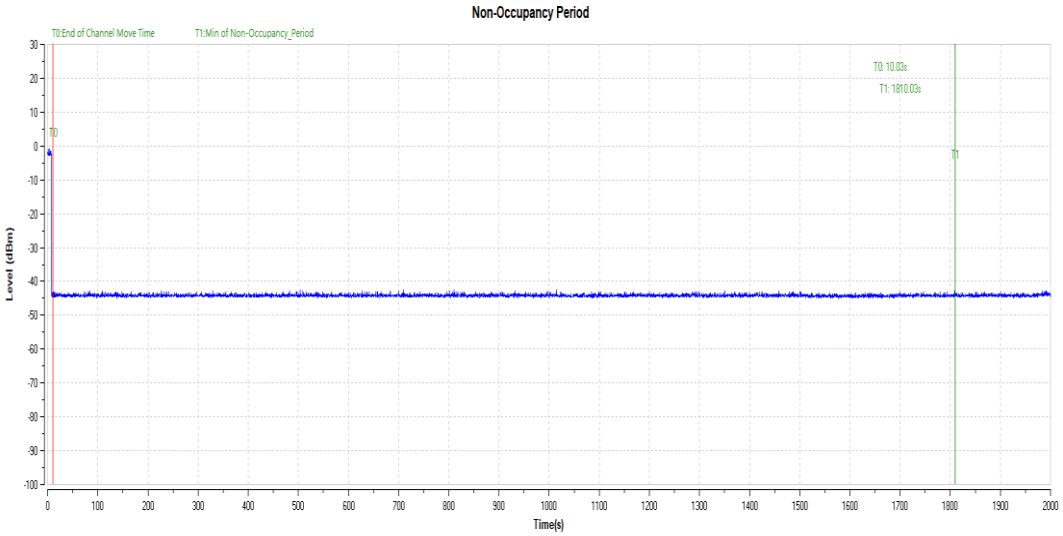
11AC80SISO_5290



11AC80SISO_5530



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5 Measurement Uncertainty (95% confidence levels, k=2)

Lab A:

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	±0.41dB

Lab B:

No.	Item	Measurement Uncertainty
1	Conduction Emission	± 3.0dB (150kHz to 30MHz)
2	Radiated Emission	± 4.8dB (Below 1GHz)
		± 4.8dB (1GHz to 6GHz)
		± 4.5dB (6GHz to 18GHz)
		± 5.02dB (Above 18GHz)

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6 Equipment List

RF conducted					
Test Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date (yyyy-mm-dd)**	**Cal. Due date (yyyy-mm-dd)**
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2020/4/16	2021/4/15
DC Power Supply	Rohde & Schwarz	HMP2020	W009-08	2020/7/15	2021/7/15
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2020/7/14	2021/7/13
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	HTC-1	W006-17	2020/4/21	2021/4/20
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2020/11/20	2021/11/19

DFS					
Test Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date (yyyy-mm-dd)**	**Cal. Due date (yyyy-mm-dd)**
Master Device	Linksys pte.Ltd	WRT32X	FCC ID:Q87-WRT3200ACM IC ID:3839A-WRT3200ACM	N/A	N/A
MXA signal analyzer	Angilent	N9020A	XAW01-06-07	2020/4/16	2021/4/15
MXG vector signal Generator	Angilent	N5182B	XAW01-07-16	2020/4/16	2021/4/15
MXG vector signal Generator	Angilent	N5182A	XAW01-07-17	2020/4/16	2021/4/15

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RSE Test System					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Semi-Anechoic Chamber	Brilliant-emc	N/A	XAW03-35-01	2019-09-11	2022-09-10
MXA signal analyzer	Keysight	N9020A	XAW01-06-01	2020-04-02	2021-04-01
Spectrum Analyzer	Keysight	N9020B	XAW01-11-03	2020-04-15	2021-04-14
Test receiver	ROHDE&SCHWARZ	ESR	XAW01-08-01	2020-09-11	2021-09-10
Receiving antenna (30MHz-3GHz)	Schwarzbeck	VULB 9163	XAW01-09-01	2019-10-13	2021-10-12
Receiving antenna (1GHz~18GHz)	Schwarzbeck	BBHA 9120D	XAW01-09-02	2019-10-13	2021-10-12
Receiving antenna (15GHz~40GHz)	Schwarzbeck	BBHA 9170	XAW01-09-03	2019-10-13	2021-10-12
Directional antenna rack controller	Max-Full	MF-7802BS	XAW03-03-01	NCR	NCR
High-speed antenna rack controller	Max-Full	MF-7802	XAW03-04-01	NCR	NCR
Filter bank	Tonscend	JS0806-F	XAW03-05-01	NCR	NCR
Filter bank	Tonscend	JS0806s	XAW03-05-02	NCR	NCR
Amplifier	Tonscend	TAP00903040	XAW01-41-01	2020-10-26	2021-10-25
Amplifier	Tonscend	TAP01018048	XAW01-41-02	2020-10-26	2021-10-25
Amplifier	Tonscend	TAP18040048	XAW01-41-03	2020-10-27	2021-10-26
Amplifier	Shanghai Steed	YX28980930	XAW01-41-06	2020-10-26	2021-10-25
Temperature and humidity meter	MingGao	TH101B	XAW01-01-01	2020-11-06	2021-11-05
Measurement Software	Tonscend	TS+ RSE V3.0.0.2	XAW02-05-01	NCR	NCR

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7 Photographs - EUT Constructional Details

Refer to Appendix A PCE&NII&DTS&DSS Setup Photos.

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Appendix

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Maximum conducted output power

Test Result

TestMode	Antenna	Channel	Result[dBm]	Verdict
11A	Ant1	5240	13.63	PASS

The End

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