RADIO TEST REPORT

Product	:	802.11ac/a/b/g/n 2T2R Wi-Fi + Bluetooth 5.0 Half Mini PCIe Module
Model Name	:	WPET-239ACN(BT)
FCC ID	:	RYK-WPET239ACNBT
Test Regulation	:	FCC 47 CFR Part 15 Subpart E (Section 15.407)
Received Date	:	2021/8/5
Test Date	:	2021/8/9 ~ 2021/10/22
Issued Date	:	2021/11/18
Applicant	:	SparkLAN Communications, Inc. 8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan (R.O.C.)
Issued By	:	Underwriters Laboratories Taiwan Co., Ltd. Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Testing Laboratory
3398

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REVISION HISTORY

Original Test Report No.: 4790038904-US-R1-V0

Rev.	Test report No.	Date	Page revised	Contents
Original	4790038904-US-R1-V0	2021/11/18	-	Initial issue

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1. Attestation of Test Results

APPLICANT:	SparkLAN Communications, Inc. 8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan (R.O.C.)
MANUFACTURER:	SparkLAN Communications, Inc. 8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan (R.O.C.)
EUT DESCRIPTION:	802.11ac/a/b/g/n 2T2R Wi-Fi + Bluetooth 5.0 Half Mini PCIe Module
BRAND:	SparkLAN
MODEL:	WPET-239ACN(BT)
SAMPLE STAGE:	Engineering Verification Test sample
DATE of TESTED:	2021/8/9 ~ 2021/10/22

APPLICABLE STANDARDS	
STANDARD	**Test Results**
FCC 47 CFR PART 15 Subpart E (Section 15.407)	PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

Sally Lu Date : 2021/11/18
Project Handler

Approved and Authorized By:

Waternil Guan Date : 2021/11/18
Engineer

2. Summary of Test Results

Summary of Test Results		
FCC Clause	**Test Items**	**Result**
15.407(e)	6dB Bandwidth	PASS
15.403(i)	26dB Bandwidth	PASS
2.1049	Occupied Bandwidth	See Note1
15.407(a)(1/2/3)	Conducted Output Power	PASS
15.407(a)(1/2/3)	Power Spectral Density	PASS
15.407(g)	Frequency Stability	PASS
15.407(b) (1/2/3/4(i/ii)/9)	Radiated Emissions and Band Edge Measurement	PASS
15.407(b)(9)	AC Power Conducted Emission	PASS
15.203	Antenna Requirement	PASS
15.407(h)	Dynamic Frequency Selection	See Note2

Note:
1. The Occupied Bandwidth was reference only.
2. The "Dynamic Frequency Selection measurement" was recorded in Report No.: 4790038904-US-R2-V0.

3. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with 47 CFR FCC Part 2, KDB 789033 D02 General UNII Test Procedure New Rules v02r01, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013 and KDB 662911 D01 Multiple Transmitter Output v02r01.

4. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398.

5. Measurement Uncertainty

For statement of conformity, accuracy method (Section 8.2.4 and 8.2.5 of ISO Guide 98-4) was applied as decision rule for measurement in this test report.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor k=2.

Measurement	Frequency	Uncertainty
Conducted disturbance at mains terminals ports	150kHz ~ 30MHz	±3.1 dB
RF Conducted	9 kHz - 40GHz	±1.9 dB
Radiated disturbance below 30MHz	9 kHz - 30 MHz	±1.9 dB
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	±5.4 dB
Radiated disturbance above 1 GHz	1GHz ~ 40GHz	±4.7 dB

6. Equipment under Test

6.1. Description of EUT

Product	802.11ac/a/b/g/n 2T2R Wi-Fi + Bluetooth 5.0 Half Mini PCIe Module	
Brand Name	SparkLAN	
Model Name	WPET-239ACN(BT)	
Operating Frequency	5180 ~ 5240 MHz, 5260 ~ 5320 MHz, 5500 ~ 5720 MHz, 5745 ~ 5825 MHz	
Modulation	256QAM, 64QAM, 16QAM, QPSK, BPSK	
Transfer Rate	802.11a: up to 54 Mbps 802.11n: up to MCS15 802.11ac: up to MCS9	
Number of Channel	5180 ~ 5240 MHz	4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20)
		2 for 802.11n (HT40), 802.11ac (VHT40)
		1 for 802.11ac (VHT80)
	5260 ~ 5320 MHz	4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20)
		2 for 802.11n (HT40), 802.11ac (VHT40)
		1 for 802.11ac (VHT80)
	5500 ~ 5720 MHz	12 for 802.11a, 802.11n (HT20), 802.11ac (VHT20)
		6 for 802.11n (HT40), 802.11ac (VHT40)
		3 for 802.11ac (VHT80)
	5745 ~ 5825 MHz	5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20)
		2 for 802.11n (HT40), 802.11ac (VHT40)
		1 for 802.11ac (VHT80)
Maximum Output Power	5180 ~ 5240 MHz: 20.66 dBm 5260 ~ 5320 MHz: 20.70 dBm 5500 ~ 5720 MHz: 23.56 dBm 5745 ~ 5825 MHz: 26.97 dBm	
Normal Voltage	3.3Vdc	
Sample ID	4197850	

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	Tx,Rx Function
802.11a	2TX,2RX
802.11n (HT20)	2TX,2RX
802.11n (HT40)	2TX,2RX
802.11ac (VHT20)	2TX,2RX
802.11ac (VHT40)	2TX,2RX
802.11ac (VHT80)	2TX,2RX

* The modulation and bandwidth are similar for 802.11n mode for HT20 / HT40 and 802.11ac mode for VHT20 / VHT40 and tune up powers of 802.11n mode for HT20 / HT40 are same as 802.11ac mode for VHT20 / VHT40, therefore investigated worst case to representative mode in test report.

2. The EUT contains following accessory devices.

Product	Brand	Model	Description
Dipole Antenna 1	SparkLAN	AD-301N	-
Dipole Antenna 2	SparkLAN	AD-103AG	-
Dipole Antenna 3	SparkLAN	AD-305N	-
Dipole Antenna 4	SparkLAN	AD-303N	-
Dipole Antenna 5	SparkLAN	AD-302N	-
Dipole Antenna 6	SparkLAN	AD-315N	-

3. The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual.

6.2. Channel List

FOR 5180 ~ 5240MHz

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210MHz

FOR 5260 ~ 5320MHz

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
52	5260 MHz	60	5300 MHz
56	5280 MHz	64	5320 MHz

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
54	5270 MHz	62	5310 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
58	5290MHz

FOR 5500 ~ 5720MHz

12 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
100	5500 MHz	124	5620 MHz
104	5520 MHz	128	5640 MHz
108	5540 MHz	132	5660 MHz
112	5560 MHz	136	5680 MHz
116	5580 MHz	140	5700 MHz
120	5600 MHz	144	5720 MHz

6 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
102	5510 MHz	126	5630 MHz
110	5550 MHz	134	5670 MHz
118	5590 MHz	142	5710 MHz

3 channels are provided for 802.11ac (VHT80):

Channel	Frequency	Channel	Frequency
106	5530MHz	138	5690MHz
122	5610MHz	-	-

FOR 5745 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz	-	-

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

6.3. Test Condition

Test Item	Test Site No.	Environmental Condition	Input Power	Test Date	Tested by
Antenna Port Conducted Measurement	SR4	23~26°C/ 60~65%RH	3.3Vdc	2021/08/09~ 2021/10/22	Mike Cai
Radiated Spurious Emission	966-2	23~26°C/ 60~65%RH	3.3Vdc	2021/09/06~ 2021/10/22	Patrick Kuan/ Mike Cai
AC power Line Conducted Emission	SR1	23~26°C/ 60~65%RH	3.3Vdc	2021/10/07~ 2021/10/08	Mike Cai

FCC Test Firm Registration Number: 498077

6.4. Description of Available Antennas

Ant. No.	Transmitter Circuit	Brand Name	Model Name	Ant. Type	Maximum Gain (dBi)	Remark
1	Chain (0)+(1)	SparkLAN	AD-301N	Dipole	2.4GHz: 4.4 5GHz: 5.8	RP-SMA
2	Chain (0)+(1)	SparkLAN	AD-103AG	Dipole	2.4GHz: 2.02 5GHz: 2.03	RP-SMA
3	Chain (0)+(1)	SparkLAN	AD-305N	Dipole	2.4GHz: 5 5GHz: 5.53	RP-SMA
4	Chain (0)+(1)	SparkLAN	AD-303N	Dipole	2.4GHz: 3.14 5GHz: 3.45	RP-SMA
5	Chain (0)+(1)	SparkLAN	AD-302N	Dipole	2.4GHz: 3.14 5GHz: 2.87	RP-SMA
6	Chain (0)+(1)	SparkLAN	AD-315N	Dipole	2.4GHz: 3 5GHz: 5	MHF

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual.

6.5. Test Mode Applicability and Tested Channel Detail

- The fundamental of the dipole antenna was investigated in two orthogonal (lay and stand), it was determined that stand mode was worst-case. Therefore, all final radiated testing was performed with the dipole antenna in stand mode.
- For AC power line conducted emissions, the pre-scan has been determined by AC power 120Vac/60Hz (worst case).
- The antenna AD-301N has the highest gain, the following tests are all carried out using this antenna.
- For Antenna Port Conducted Measurement, this item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.
- For below 1 GHz radiated emission and AC power line conducted emission have performed all modes of operation were investigated and the worst-case emissions are reported.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Test Item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated Emissions (Above 1GHz)	802.11a	5180-5240	OFDM	36 to 48	36, 44, 48	6Mbps
	802.11ac20			36 to 48	36, 44, 48	MCS0
	802.11ac40			38 to 46	38, 46	MCS0
	802.11ac80			42	42	MCS0
	802.11a	5260-5320		52 to 64	52, 60, 64	6Mbps
	802.11ac20			52 to 64	52, 60, 64	MCS0
	802.11ac40			54 to 62	54, 62	MCS0
	802.11ac80			58	58	MCS0
	802.11a	5500-5720		100 to 144	100, 116, 140, 144	6Mbps
	802.11ac20			100 to 144	100, 116, 140, 144	MCS0
	802.11ac40			102 to 142	102, 110, 134,142	MCS0
	802.11ac80			106, 122,138	106, 122, 138	MCS0
	802.11a	5745-5825		149 to 165	149, 157, 165	6Mbps
	802.11ac20			149 to 165	149, 157, 165	MCS0
	802.11ac40			151 to 159	151, 159	MCS0
	802.11ac80			155	155	MCS0

Test Item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated Emissions (Below 1GHz)	802.11ac20	5745-5825	OFDM	149 to 165	149	MCS0
AC Power Line Conducted Emission	802.11ac20	5745-5825	OFDM	149 to 165	149	MCS0
Antenna Port Conducted Measurement	802.11a	5180-5240	OFDM	36 to 48	36, 44, 48	6Mbps
	802.11ac20			36 to 48	36, 44, 48	MCS0
	802.11ac40			38 to 46	38, 46	MCS0
	802.11ac80			42	42	MCS0
	802.11a	5260-5320		52 to 64	52, 60, 64	6Mbps
	802.11ac20			52 to 64	52, 60, 64	MCS0
	802.11ac40			54 to 62	54, 62	MCS0
	802.11ac80			58	58	MCS0
	802.11a	5500-5720		100 to 144	100, 116, 140, 144	6Mbps
	802.11ac20			100 to 144	100, 116, 140, 144	MCS0
	802.11ac40			102 to 142	102, 110, 134,142	MCS0
	802.11ac80			106, 122,138	106, 122, 138	MCS0
	802.11a	5745-5825		149 to 165	149, 157, 165	6Mbps
	802.11ac20			149 to 165	149, 157, 165	MCS0
	802.11ac40			151 to 159	151, 159	MCS0
	802.11ac80			155	155	MCS0

Simultaneously transmission condition:

Condition	Technology	
1	WLAN (2.4GHz), Chain0	Bluetooth, Chain1
2	WLAN (5GHz) , Chain0	Bluetooth Chain1
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.		

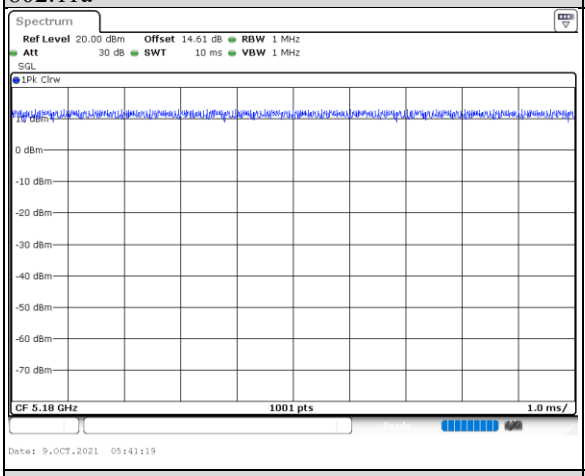
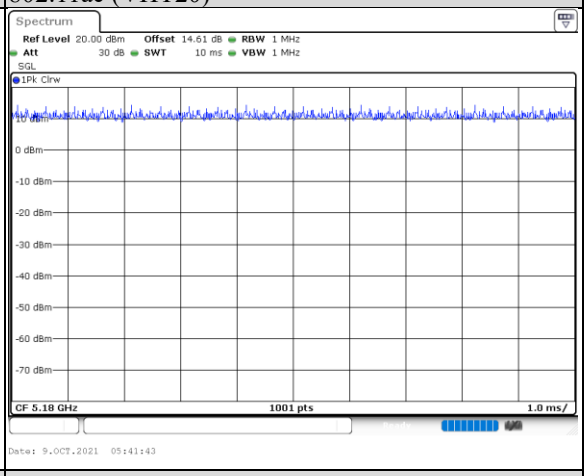
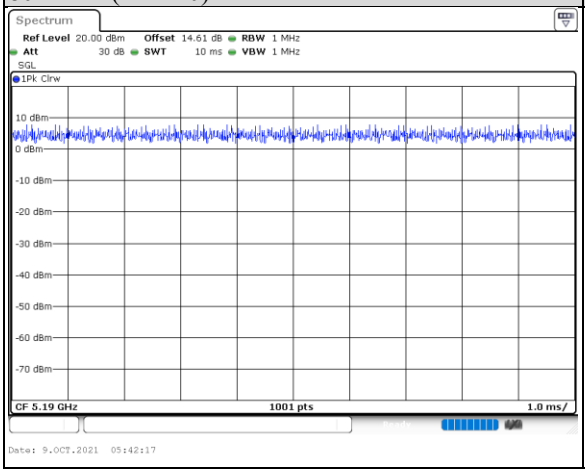
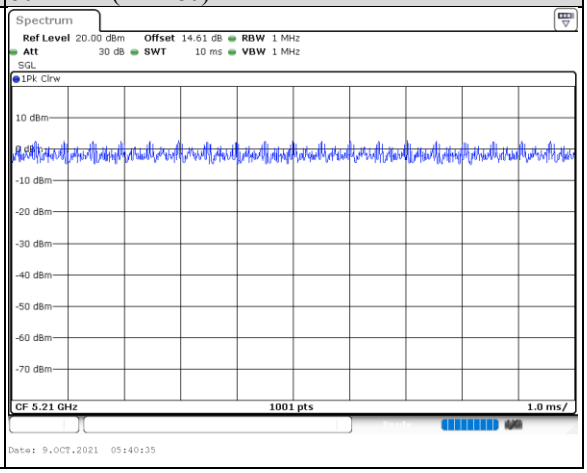
6.6. Duty cycle

802.11a: Duty cycle = 1/1 = 100%, duty cycle of test signal is ≥ 98 %, duty factor is not required.

802.11ac (VHT20): Duty cycle = 1/1 = 100%, duty cycle of test signal is ≥ 98 %, duty factor is not required.

802.11ac (VHT40): Duty cycle = 1/1 = 100%, duty cycle of test signal is ≥ 98 %, duty factor is not required.

802.11ac (VHT80): Duty cycle = 1/1 = 100%, duty cycle of test signal is ≥ 98 %, duty factor is not required.

802.11a	802.11ac (VHT20)
	
802.11ac (VHT40)	802.11ac (VHT80)
	

7. Test Equipment

Test Equipment List					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Expired date**
Radiated Spurious Emission					
Spectrum Analyzer	Keysight	N9010A	MY56070827	2020/11/11	2021/11/10
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	2020/12/11	2021/12/10
Loop Antenna	ETS lindgren	6502	00213440	2020/12/25	2021/12/24
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT-N0538	2021/1/13	2022/1/12
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	2020/12/30	2021/12/29
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	2020/12/30	2021/12/29
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	2021/6/8	2022/6/7
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	2021/2/3	2022/2/2
Preamplifier (18-40GHz)	EMCI	EMC184040SEE	980426	2021/5/19	2022/5/18
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-4 & 170425-2	2021/1/22	2022/1/21
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-1 & 170214-2	2021/1/22	2022/1/21

Test Equipment List					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Expired date**
Antenna Port Conducted Measurement					
Spectrum Analyzer	Keysight	N9010A	MY56070834	2020/11/6	2021/11/5
Pulse Power Sensor	Anritsu	MA2411B	1531202	2020/12/21	2021/12/20
Power Meter	Anritsu	ML2495A	1645002	2020/12/21	2021/12/20
Temperature &Humidity Test Chamber	GIANT FORCE	GTH-150-40-CP-AR	MAA1701-010	2021/3/22	2022/3/21
AC power Line Conducted Emission					
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	2020/11/17	2021/11/16
Two-Line V-Network	Rohde & Schwarz	ENV216	102136	2021/8/30	2022/8/29
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2021/8/26	2022/8/25
Cables	TITAN	CFD200	T0732ACFD20 020A300-1	2021/3/2	2022/3/1

UL Software		
Description	**Name**	**Version**
Radiated measurement	e3	6.191211 (V6)
Conducted measurement	RF Conducted Test Tools	ver 2.4.0.620b
AC power Line Conducted Emission	EZ_EMC	UL-3A1.2

8. Description of Test Setup

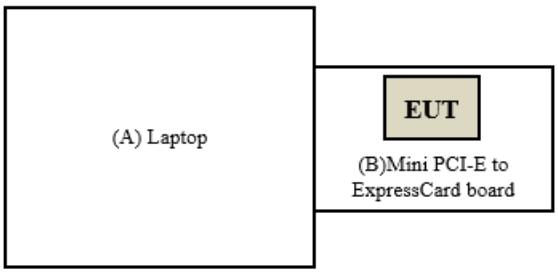
Support Equipment

ID	Equipment	Brand Name	Model Name	S/N	Remark
A	Laptop	Lenovo	T460	PC0FWU5Y	Provide by lab
B	Mini PCI-E to ExpressCard board	N/A	N/A	N/A	Provide by lab

Test Setup

Controlled using a bespoke application (RTL8822CU MP Diagnostic Program 0.0001.1020.2018) on a test Notebook. The application was used to enable a continuous transmission mode and to select the test channels, data rates, modulation schemes and power setting as required.

Setup Diagram for Test



Under Table

Remote Site

9. Test Results

9.1. 6dB Bandwidth

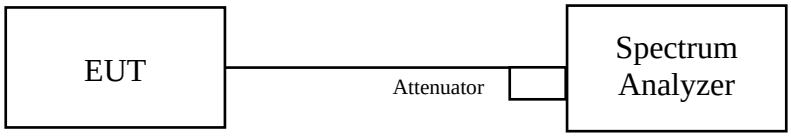
Requirements

The minimum 6 dB bandwidth shall be at least 500 kHz.

Test procedure

a. Set resolution bandwidth (RBW) = 100kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

Test Data

802.11a

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
144 (U-NII-3 Band)	5720	3.11	3.11	0.5	PASS
149	5745	17.14	16.90	0.5	PASS
157	5785	17.14	16.90	0.5	PASS
165	5825	17.14	16.54	0.5	PASS

802.11ac (VHT20)

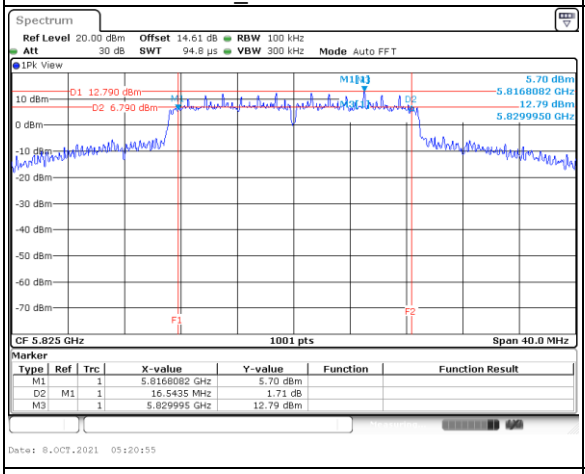
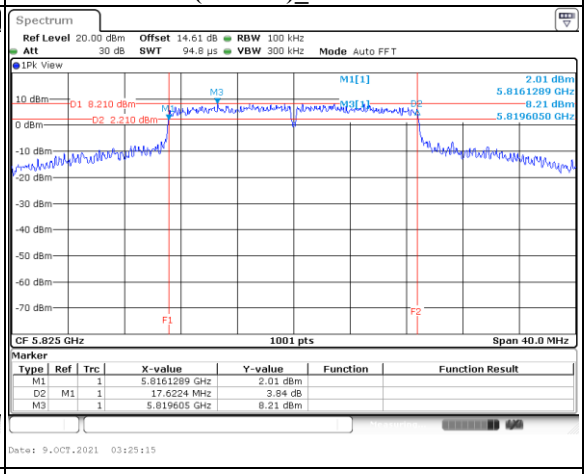
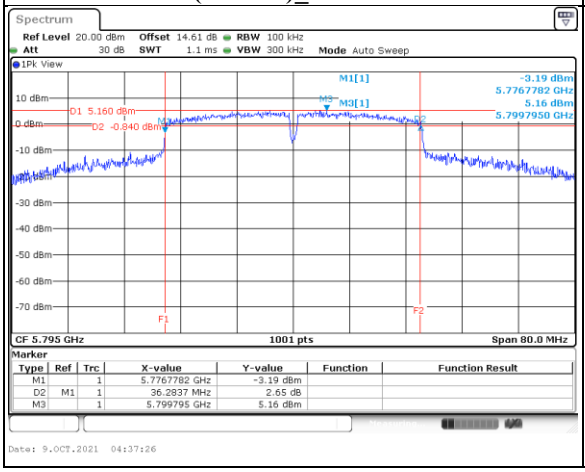
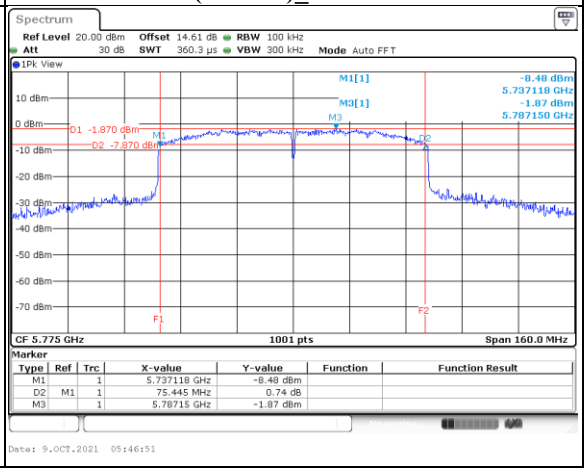
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
144 (U-NII-3 Band)	5720	3.71	3.71	0.5	PASS
149	5745	17.62	17.66	0.5	PASS
157	5785	17.62	17.66	0.5	PASS
165	5825	17.62	17.66	0.5	PASS

802.11ac (VHT40)

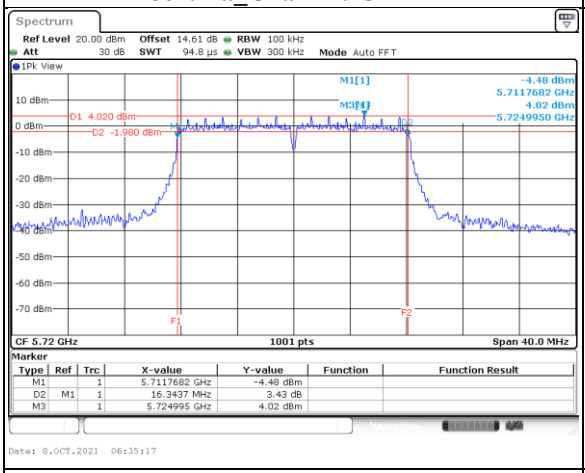
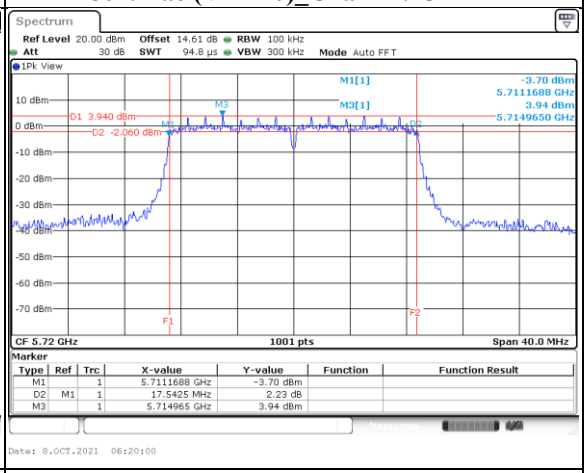
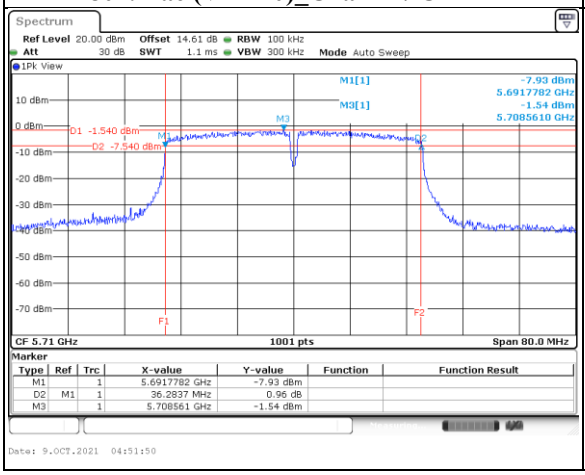
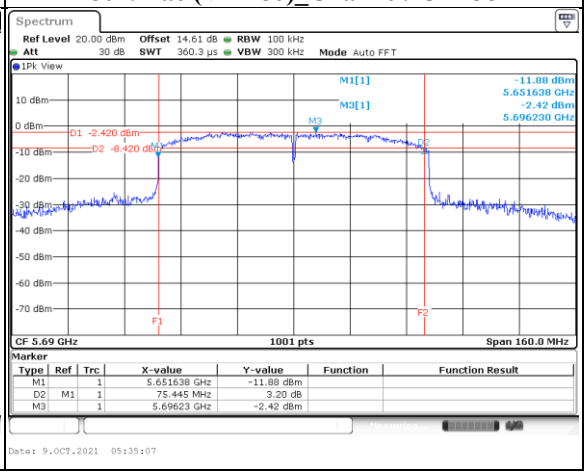
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
142 (U-NII-3 Band)	5710	3.06	3.06	0.5	PASS
151	5755	36.28	36.28	0.5	PASS
159	5795	36.28	36.28	0.5	PASS

802.11ac (VHT80)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
138 (U-NII-3 Band)	5690	2.08	2.40	0.5	PASS
155	5775	75.45	75.45	0.5	PASS

Spectrum Plot of Worst Value	
802.11a_Chain 1 / CH165	**802.11ac (VHT20)_Chain 0 / CH165**
	
802.11ac (VHT40)_Chain 1 / CH159	**802.11ac (VHT80)_Chain 1 / CH155**
	

Channel Straddling

Worst Spectrum Plot of Straddle Channel	
802.11a_Chain 1 / CH144	**802.11ac (VHT20)_Chain 1 / CH144**
	
802.11ac (VHT40)_Chain 1 / CH142	**802.11ac (VHT80)_Chain 0 / CH138**
	

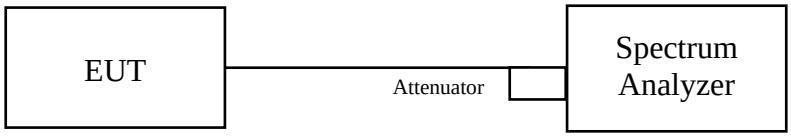
Note: The 6dB bandwidth above 5725MHz = Marker 1 + Delta 2 – 5725MHz

9.2. 26dB Bandwidth

Test procedure

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%.

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

Test Data

802.11a

Channel	Channel Frequency (MHz)	26 dB Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	19.02	18.42
44	5220	18.70	18.42
48	5240	18.66	18.62
52	5260	18.50	18.58
60	5300	18.74	18.58
64	5320	18.66	18.74
100	5500	18.58	18.58
116	5580	18.58	18.58
140	5700	18.74	18.58
144	5720	18.66	18.62
144 (U-NII-2c Band)	5720	14.35	14.39

802.11ac (VHT20)

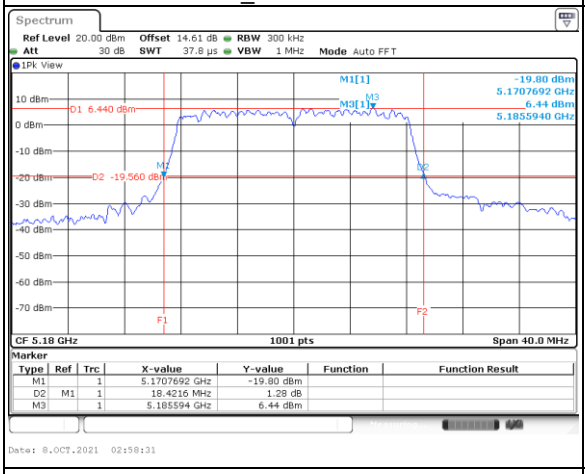
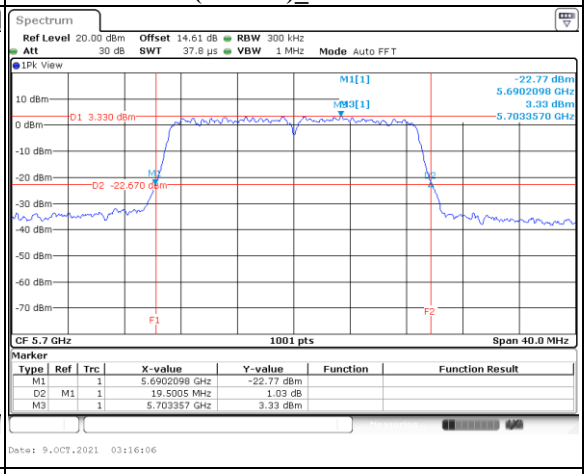
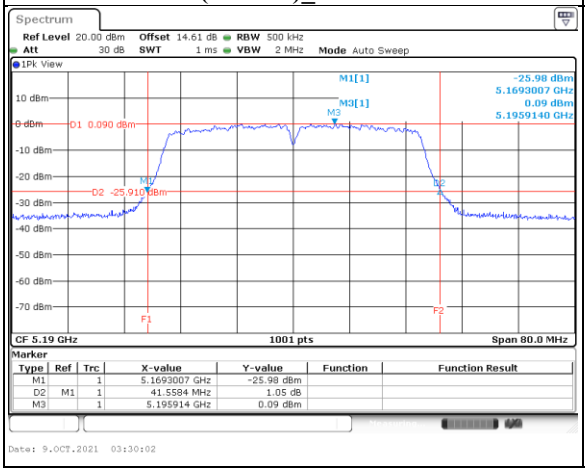
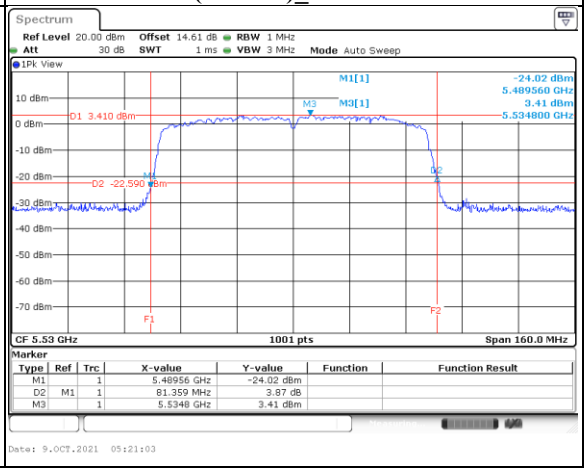
Channel	Channel Frequency (MHz)	26 dB Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	19.58	19.74
44	5220	19.58	19.58
48	5240	19.58	19.58
52	5260	19.62	19.62
60	5300	19.58	19.54
64	5320	19.58	19.62
100	5500	19.62	19.58
116	5580	19.70	19.58
140	5700	19.78	19.50
144	5720	19.66	19.62
144 (U-NII-2c Band)	5720	14.95	14.87

802.11ac (VHT40)

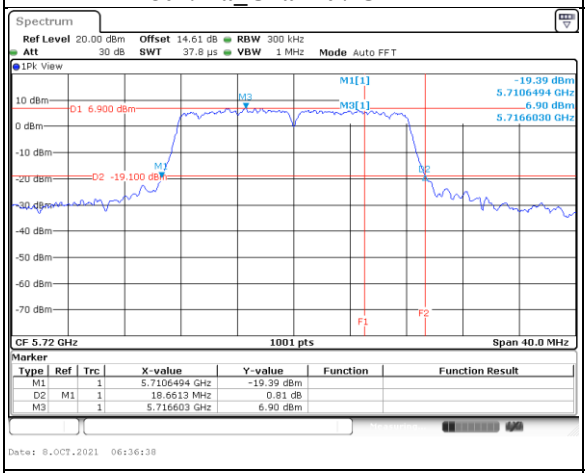
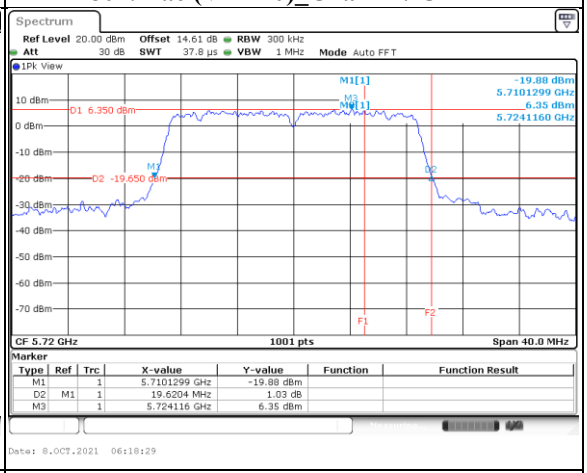
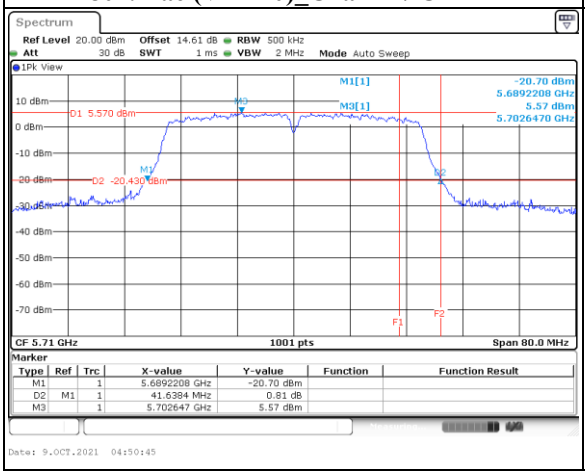
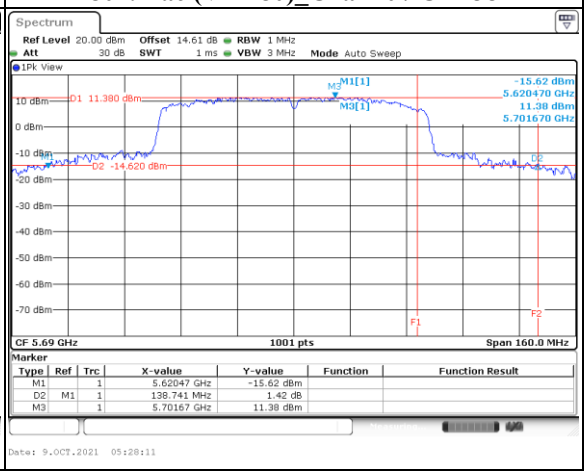
Channel	Channel Frequency (MHz)	26 dB Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	42.12	41.56
46	5230	41.88	43.40
54	5270	41.80	43.32
62	5310	42.36	41.88
102	5510	41.80	41.88
110	5550	51.47	58.42
134	5670	41.96	41.64
142	5710	41.96	41.64
142 (U-NII-2c Band)	5710	36.10	35.78

802.11ac (VHT80)

Channel	Channel Frequency (MHz)	26 dB Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	82.32	81.36
58	5290	82.00	81.52
106	5530	81.36	81.36
122	5610	113.01	124.36
138	5690	138.74	153.29
138 (U-NII-2c Band)	5690	104.53	110.76

Spectrum Plot of Worst Value	
802.11a_Chain 1 / CH36	**802.11ac (VHT20)_Chain 1 / CH140**
	
802.11ac (VHT40)_Chain 1 / CH38	**802.11ac (VHT80)_Chain 1 / CH106**
	

Channel Straddling

Worse Spectrum Plot of Straddle Channel	
802.11a_Chain 0 / CH144	**802.11ac (VHT20)_Chain 1 / CH144**
	
802.11ac (VHT40)_Chain 1 / CH142	**802.11ac (VHT80)_Chain 0 / CH138**
	

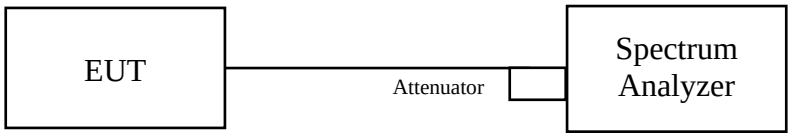
Note: The bandwidth below 5725MHz = Delta 2 – (Marker 1 + Delta 2 – 5725MHz)

9.3. Occupied Bandwidth

Test procedure

a. Set center frequency to the nominal EUT channel center frequency.
b. Set span = 1.5 times to 5.0 times the OBW.
c. Set RBW = 1% to 5% of the OBW
d. Set VBW ≥ 3 x RBW
e. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
f. Use the 99% power bandwidth function of the instrument (if available).
g. If the instrument does not have a 99% power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

Test Data

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	16.38	16.38
44	5220	16.38	16.38
48	5240	16.38	16.42
52	5260	16.38	16.42
60	5300	16.42	16.42
64	5320	16.38	16.42
100	5500	16.38	16.42
116	5580	16.38	16.42
140	5700	16.42	16.38
144	5720	16.38	16.38
149	5745	26.93	27.33
157	5785	27.29	27.25
165	5825	26.73	27.49

802.11ac (VHT20)

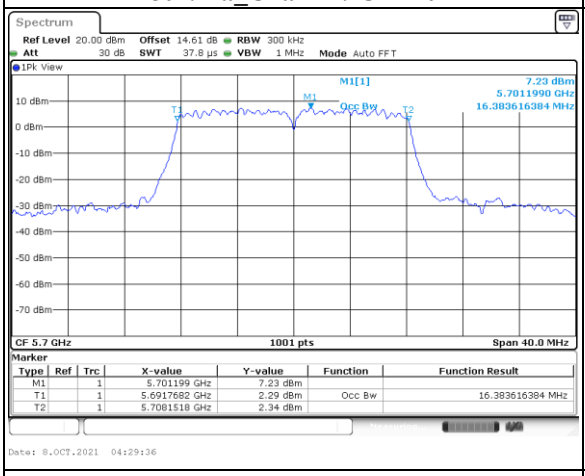
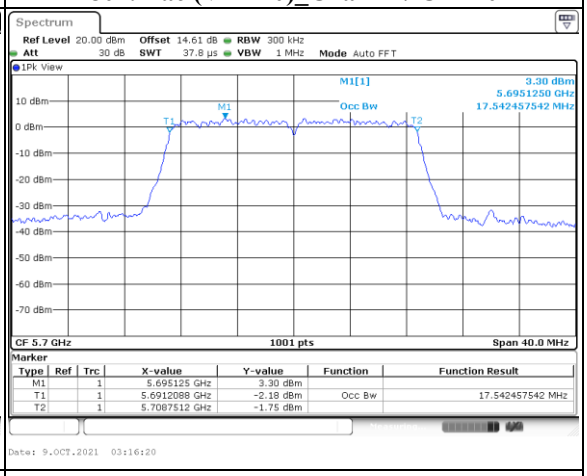
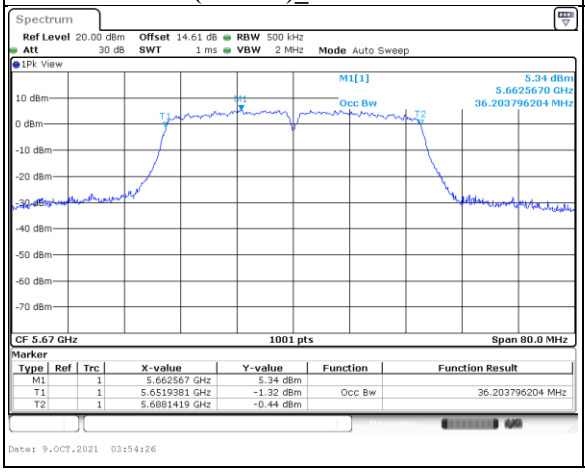
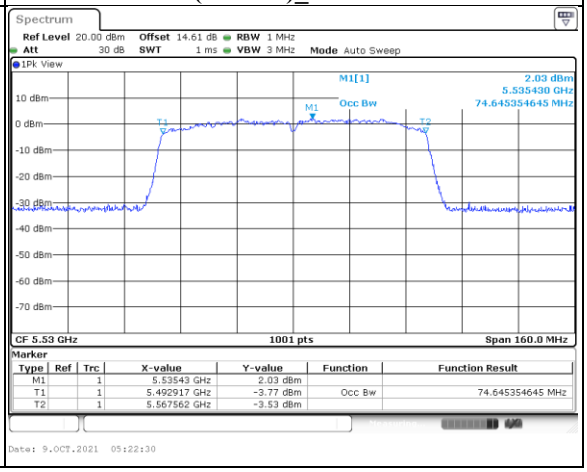
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	17.58	17.58
44	5220	17.54	17.54
48	5240	17.54	17.54
52	5260	17.54	17.54
60	5300	17.54	17.54
64	5320	17.54	17.54
100	5500	17.58	17.54
116	5580	17.58	17.54
140	5700	17.54	17.54
144	5720	17.54	17.54
149	5745	25.41	25.61
157	5785	25.81	26.57
165	5825	24.86	25.33

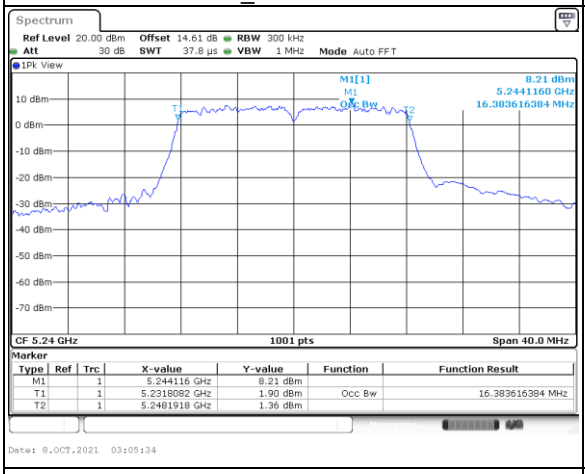
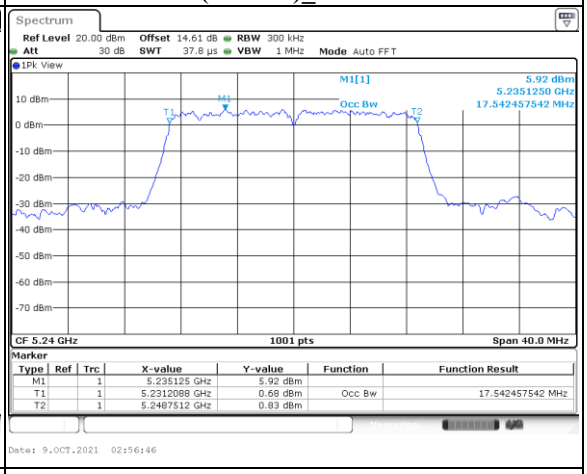
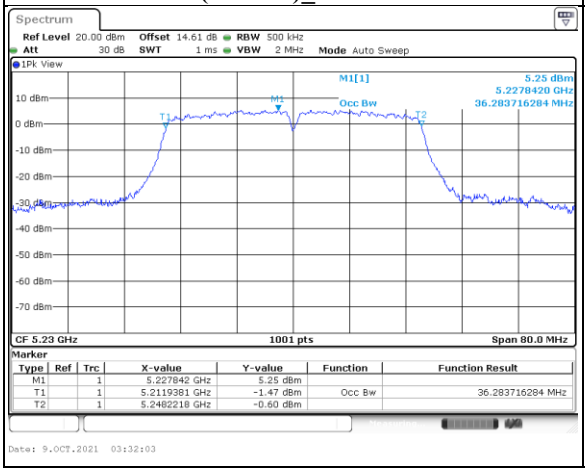
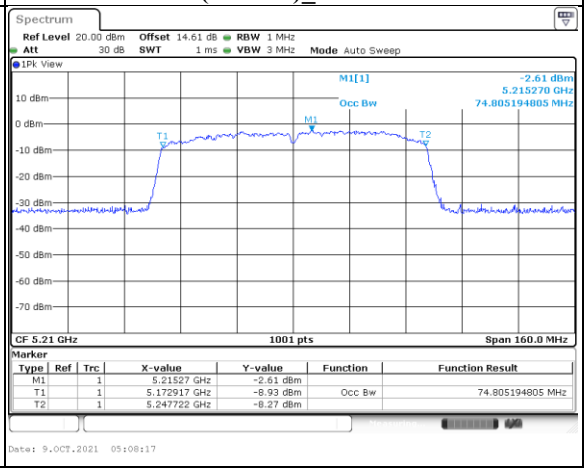
802.11ac (VHT40)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36.28	36.20
46	5230	36.28	36.28
54	5270	36.28	36.28
62	5310	36.28	36.20
102	5510	36.20	36.20
110	5550	36.36	36.44
134	5670	36.28	36.20
142	5710	36.28	36.20
151	5755	36.92	45.07
159	5795	49.87	49.15

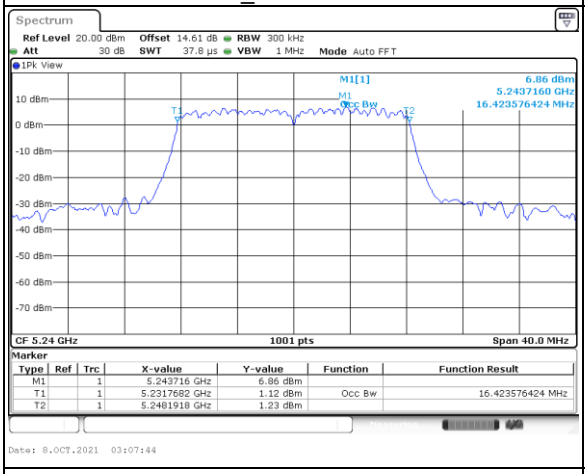
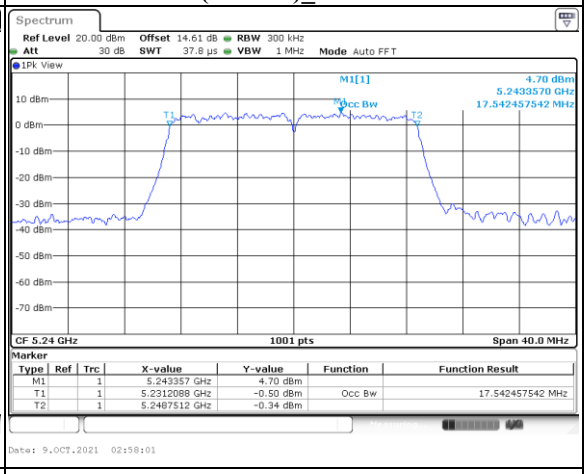
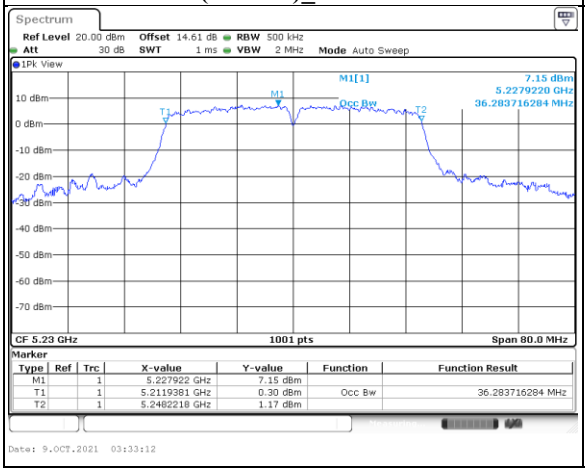
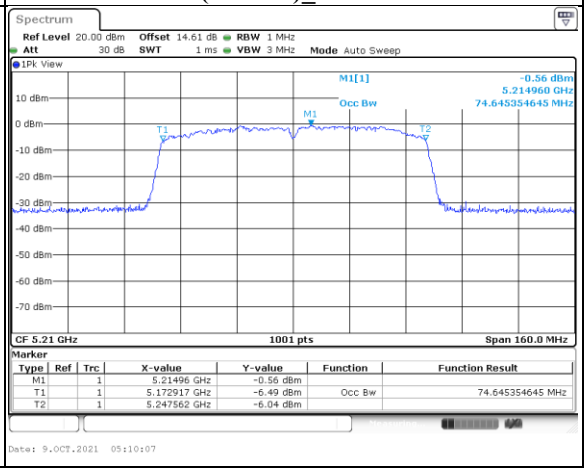
802.11ac (VHT80)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	74.81	74.65
58	5290	74.81	74.81
106	5530	74.65	74.81
122	5610	75.12	75.28
138	5690	75.92	76.88
155	5775	74.81	75.12

Spectrum Plot of Worst Value	
802.11a_Chain 1 / CH140	**802.11ac (VHT20)_Chain 1 / CH140**
	
802.11ac (VHT40)_Chain 1 / CH134	**802.11ac (VHT80)_Chain 0 / CH106**
	

Spectrum Plot for UNII-1 nearly DFS band Channels	
802.11a_Chain 0 / CH48	**802.11ac (VHT20)_Chain 0 / CH48**
	
802.11ac (VHT40)_Chain 0 / CH46	**802.11ac (VHT80)_Chain 0 / CH42**
	

Note: The observed T2 is all <5250 MHz, so UNII-1 band channels which in nearly DFS band no need for DFS function.

Spectrum Plot for UNII-1 nearly DFS band Channels	
802.11a_Chain 1 / CH48	**802.11ac (VHT20)_Chain 1 / CH48**
	
802.11ac (VHT40)_Chain 1 / CH46	**802.11ac (VHT80)_Chain 1 / CH42**
	

Note: The observed T2 is all <5250 MHz, so UNII-1 band channels which in nearly DFS band no need for DFS function.

9.4. Conducted output power

Requirements

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) Max. e.i.r.p ≦ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon If G_{TX} > 6 dBi, then P_{Out} = 30 – (G_{TX} – 6)
		Fixed point-to-point Access Point	1 Watt (30 dBm) If G_{TX} > 23 dBi, then P_{Out} = 30 – (G_{TX} – 23)
		Indoor Access Point	1 Watt (30 dBm) If G_{TX} > 6 dBi, then P_{Out} = 30 – (G_{TX} – 6)
	√	Client device	250mW (24 dBm) If G_{TX} > 6 dBi, then P_{Out} = 23.98 – (G_{TX} – 6)
U-NII-2A	√		250mW (24 dBm) or 11 dBm+10 log B* If G_{TX} > 6 dBi, then P_{Out} = 23.98 – (G_{TX} – 6)
U-NII-2C	√		250mW (24 dBm) or 11 dBm+10 log B* If G_{TX} > 6 dBi, then P_{Out} = 23.98 – (G_{TX} – 6)
U-NII-3	√		For Point-to-multipoint systems (P2M): 1 Watt (30 dBm). If G_{TX} > 6 dBi, then P_{Out} = 30 – (G_{TX} – 6) For Point-to-point systems (P2P): 1 Watt (30 dBm)

Note:
1. P_{Out} = maximum conducted output power in dBm,
2. G_{TX} = the maximum transmitting antenna directional gain in dBi.
3. B is the 26 dB emission bandwidth in megahertz
4. Directional Gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{Gn/20})^2$ / Nant] dBi.

   N*a*nt: Number of Transmit Antennas
   G1, G2,..., Gn: Gain of Individual Antennas

5. Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

   Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
   Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
   Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

Test Procedure

For Average Power Measurement

Test method PM-G

For 802.11a, 802.11ac (VHT20), 802.11ac (VHT40)

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 and set the detector to AVERAGE. Duty factor is not added to measured value.

Test method SA-1

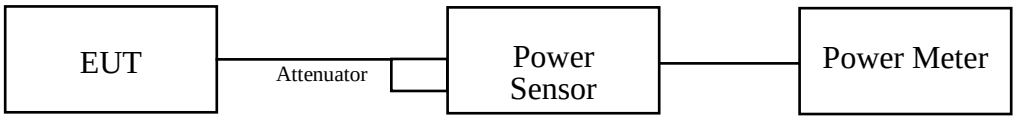
For 802.11ac (VHT80)

a. Set span to encompass the entire 26 dB EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
b. Set sweep trigger*.
c. Set RBW = 1 MHz.
d. Set VBW ≥ 3 MHz
e. Number of points in sweep ≥ 2 Span / RBW.
f. Sweep time ≤ (number of points in sweep) * T
g. Using emission bandwidth to determine the frequency span for integration the channel bandwidth.
h. Detector = RMS.
i. Trace mode = max hold.
j. Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.

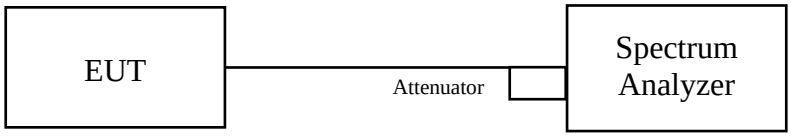
* If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run.”

Test Setup

For Average Power Measurement



The loss between RF output port of the EUT and the input port of the Power Meter has been taken into consideration.



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

Test Data

802.11a

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
36	5180	15.63	16.63	82.604	19.17	23.98	PASS
44	5220	17.63	16.54	103.039	20.13	23.98	PASS
48	5240	17.71	16.48	103.514	20.15	23.98	PASS
52	5260	17.23	16.01	92.683	19.67	23.67	PASS
60	5300	17.11	16.02	91.411	19.61	23.69	PASS
64	5320	15.45	17.13	86.696	19.38	23.7	PASS
100	5500	16.13	17.47	96.828	19.86	23.69	PASS
116	5580	17.06	16.71	97.724	19.90	23.69	PASS
140	5700	16.03	17.13	91.833	19.63	23.69	PASS
144 (U-NII-2c Band)	5720	16.16	15.32	75.336	18.77	22.56	PASS
144 (U-NII-3 Band)	5720	10.94	10.00	22.439	13.51	30	PASS
149	5745	23.46	23.43	442.588	26.46	30	PASS
157	5785	23.70	23.98	484.172	26.85	30	PASS
165	5825	23.07	23.18	411.15	26.14	30	PASS

Note: The directional gain = 5.8 dBi < 6 dBi, so the power limit shall not be reduced.

For Reference only – Straddle Channels Total Power

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
144	5720	17.30	16.44	97.724	19.90
Note: The total power was calculated through formula and record the value for reference only.					

802.11ac (VHT20)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
36	5180	16.54	15.66	81.846	19.13	23.98	PASS
44	5220	16.75	15.64	83.946	19.24	23.98	PASS
48	5240	17.73	16.42	103.039	20.13	23.98	PASS
52	5260	17.35	16.12	95.28	19.79	23.92	PASS
60	5300	17.42	16.09	95.94	19.82	23.9	PASS
64	5320	12.41	14.26	44.055	16.44	23.91	PASS
100	5500	15.60	16.81	84.333	19.26	23.91	PASS
116	5580	17.48	16.44	100	20.00	23.91	PASS
140	5700	14.19	15.21	59.429	17.74	23.9	PASS
144 (U-NII-2c Band)	5720	16.36	15.45	78.343	18.94	22.72	PASS
144 (U-NII-3 Band)	5720	11.34	10.49	24.831	13.95	30	PASS
149	5745	23.53	23.55	451.856	26.55	30	PASS
157	5785	23.70	24.03	487.528	26.88	30	PASS
165	5825	23.14	23.37	423.643	26.27	30	PASS

Note: The directional gain = 5.8 dBi < 6 dBi, so the power limit shall not be reduced.

For Reference only – Straddle Channels Total Power

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
144	5720	17.55	16.65	103.039	20.13
Note: The total power was calculated through formula and record the value for reference only.					

802.11ac (VHT40)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
38	5190	9.73	11.24	22.699	13.56	23.98	PASS
46	5230	16.62	18.48	116.413	20.66	23.98	PASS
54	5270	16.75	18.46	117.49	20.70	23.98	PASS
62	5310	9.59	11.06	21.878	13.40	23.98	PASS
102	5510	9.57	10.85	21.232	13.27	23.98	PASS
110	5550	19.55	20.26	196.336	22.93	23.98	PASS
134	5670	16.35	17.20	95.719	19.81	23.98	PASS
142 (U-NII-2c Band)	5710	17.52	16.44	100.462	20.02	23.98	PASS
142 (U-NII-3 Band)	5710	9.62	8.58	16.368	12.14	30	PASS
151	5755	20.76	22.56	299.226	24.76	30	PASS
159	5795	23.81	24.10	497.737	26.97	30	PASS

Note: The directional gain = 5.8 dBi < 6 dBi, so the power limit shall not be reduced.

For Reference only – Straddle Channels Total Power

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
142	5710	18.17	17.10	116.95	20.68
Note: The total power was calculated through formula and record the value for reference only.					

802.11ac (VHT80)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
42	5210	7.04	8.85	12.735	11.05	23.98	PASS
58	5290	6.90	8.67	12.246	10.88	23.98	PASS
106	5530	10.84	11.42	26.002	14.15	23.98	PASS
122	5610	18.99	19.47	167.88	22.25	23.98	PASS
138 (U-NII-2c Band)	5690	18.92	19.50	167.109	22.23	23.98	PASS
138 (U-NII-3 Band)	5690	14.07	15.34	59.704	17.76	30	PASS
155	5775	18.92	20.13	181.134	22.58	30	PASS

Note: The directional gain = 5.8 dBi < 6 dBi, so the power limit shall not be reduced.

For Reference only – Straddle Channels Total Power

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
138	5690	20.15	20.91	226.986	23.56
Note: The total power was calculated through formula and record the value for reference only.					

9.5. Power Spectral Density

Requirements

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	17dBm/ MHz If G_{TX} > 6 dBi, then PSD = 17 – (G_{TX} – 6)
		Fixed point-to-point Access Point	17dBm/ MHz If G_{TX} > 23 dBi, then PSD = 17 – (G_{TX} – 23)
		Indoor Access Point	17dBm/ MHz If G_{TX} > 6 dBi, then PSD = 17 – (G_{TX} – 6)
	√	Client device	11dBm/ MHz If G_{TX} > 6 dBi, then PSD = 11 – (G_{TX} – 6)
U-NII-2A	√		11dBm/ MHz If G_{TX} > 6 dBi, then PSD = 11 – (G_{TX} – 6)
U-NII-2C	√		11dBm/ MHz If G_{TX} > 6 dBi, then PSD = 11 – (G_{TX} – 6)
U-NII-3	√		For Point-to-multipoint systems (P2M): 30dBm/ 500kHz. If G_{TX} > 6 dBi, then PSD = 30 – (G_{TX} – 6) For Point-to-point systems (P2P): 30dBm/ 500kHz

Note:
1. PSD = power spectral density that he same method as used to determine the conducted output power shall be used to determine the power spectral density. And power spectral density in dBm/MHz
2. G_{TX} = the maximum transmitting antenna directional gain in dBi.
3. Directional Gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{Gn/20})^2$ / Nant] dBi.

   Nant: Number of Transmit Antennas
   G1, G2,..., Gn: Gain of Individual Antennas
4. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

Test procedure

For U-NII-1, U-NII-2A, U-NII-2C band:

Using method as below:

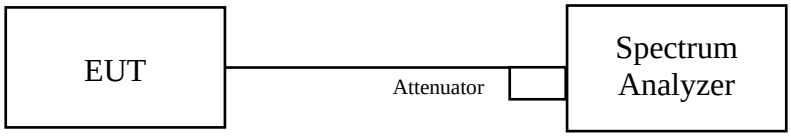
a. Set span to encompass the entire emission bandwidth (EBW) of the signal.
b. Set RBW = 1 MHz, Set VBW ≥ 3 RBW, Detector = RMS
c. Sweep time = auto, trigger set to "free run".
d. Trace average at least 100 traces in power averaging mode.
e. Record the max value. (if Duty cycle <98 %, add 10 log (1/duty cycle))

For U-NII-3 band:

Using method as below:

a. Set span to encompass the entire emission bandwidth (EBW) of the signal.
b. Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS
c. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
d. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10 log (500 kHz/300kHz)
e. Sweep time = auto, trigger set to "free run".
f. Trace average at least 100 traces in power averaging mode.
g. Record the max value. (if Duty cycle <98 %, add 10 log (1/duty cycle))

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

Test Data

For U-NII-1, U-NII-2A, U-NII-2C band

802.11a

Channel	Frequency (MHz)	PSD w/o duty factor (dBm/MHz)		Total PSD with duty factor (dBm/MHz)	PSD Maximum Limit (dBm/MHz)	Pass/Fail
		Chain 0	Chain 1			
36	5180	2.67	4.32	6.58	8.19	PASS
44	5220	4.75	4.69	7.73	8.19	PASS
48	5240	4.71	4.52	7.63	8.19	PASS
52	5260	4.56	4.15	7.37	8.19	PASS
60	5300	4.90	4.68	7.8	8.19	PASS
64	5320	1.88	3.67	5.88	8.19	PASS
100	5500	2.83	3.71	6.3	8.19	PASS
116	5580	4.39	4.08	7.25	8.19	PASS
140	5700	2.53	3.80	6.22	8.19	PASS
144 (U-NII-2c Band)	5720	4.20	4.27	7.25	8.19	PASS

Note:

1. Directional gain = 8.81 dBi > 6 dBi , so the limit shall be reduced.
2. Refer to section 6.6 for duty cycle spectrum plot.

802.11ac (VHT20)

Channel	Frequency (MHz)	PSD w/o duty factor (dBm/MHz)		Total PSD with duty factor (dBm/MHz)	PSD Maximum Limit (dBm/MHz)	Pass/Fail
		Chain 0	Chain 1			
36	5180	3.91	4.56	7.26	8.19	PASS
44	5220	4.63	4.19	7.43	8.19	PASS
48	5240	4.75	4.42	7.6	8.19	PASS
52	5260	4.82	4.72	7.78	8.19	PASS
60	5300	4.82	4.46	7.65	8.19	PASS
64	5320	-0.50	1.13	3.4	8.19	PASS
100	5500	2.24	2.24	5.25	8.19	PASS
116	5580	4.78	3.70	7.28	8.19	PASS
140	5700	0.40	1.44	3.96	8.19	PASS
144 (U-NII-2c Band)	5720	4.41	3.94	7.19	8.19	PASS

Note:

1. Directional gain = 8.81 dBi > 6 dBi , so the limit shall be reduced.
2. Refer to section 6.6 for duty cycle spectrum plot.

802.11ac (VHT40)

Channel	Frequency (MHz)	PSD w/o duty factor (dBm/MHz)		Total PSD with duty factor (dBm/MHz)	PSD Maximum Limit (dBm/MHz)	Pass/Fail
		Chain 0	Chain 1			
38	5190	-6.11	-4.19	-2.03	8.19	PASS
46	5230	1.41	3.06	5.32	8.19	PASS
54	5270	1.40	2.97	5.27	8.19	PASS
62	5310	-5.86	-4.13	-1.9	8.19	PASS
102	5510	-6.31	-4.94	-2.56	8.19	PASS
110	5550	1.48	2.47	5.01	8.19	PASS
134	5670	0.17	1.17	3.71	8.19	PASS
142 (U-NII-2c Band)	5710	2.84	1.75	5.34	8.19	PASS

Note:

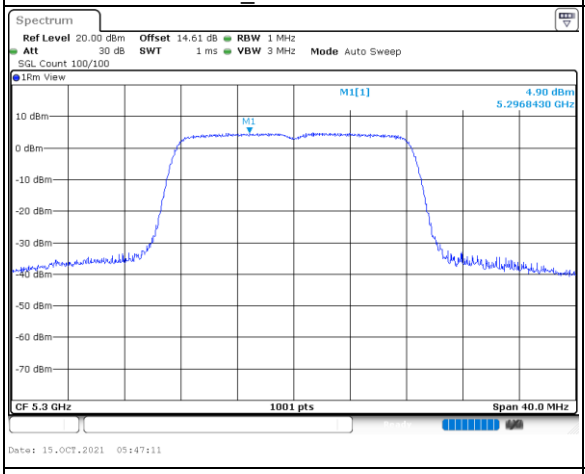
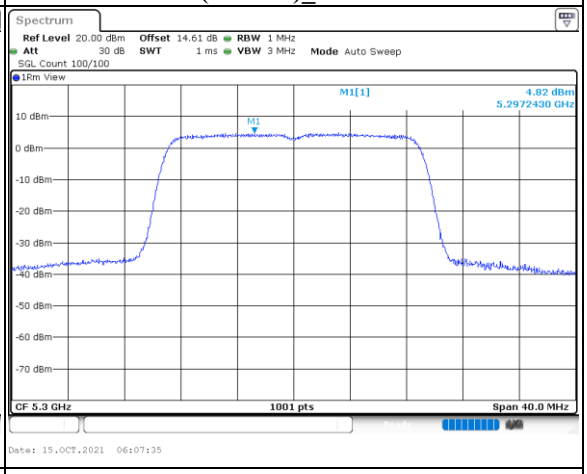
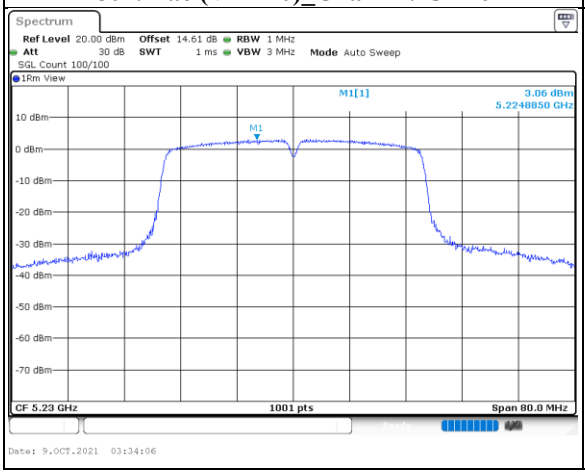
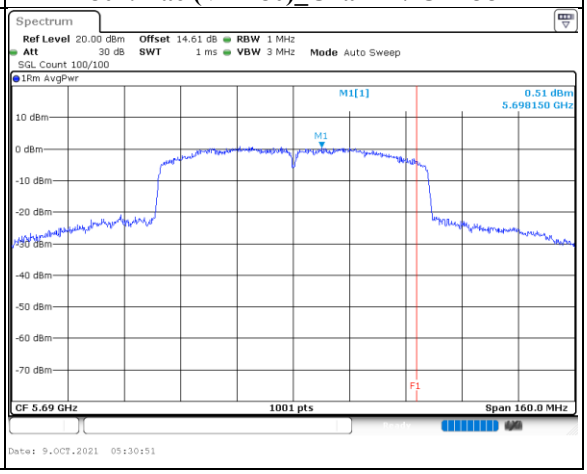
1. Directional gain = 8.81 dBi > 6 dBi , so the limit shall be reduced.
2. Refer to section 6.6 for duty cycle spectrum plot.

802.11ac (VHT80)

Channel	Frequency (MHz)	PSD w/o duty factor (dBm/MHz)		Total PSD with duty factor (dBm/MHz)	PSD Maximum Limit (dBm/MHz)	Pass/Fail
		Chain 0	Chain 1			
42	5210	-13.80	-12.19	-9.91	8.19	PASS
58	5290	-13.58	-12.25	-9.85	8.19	PASS
106	5530	-9.96	-8.68	-6.26	8.19	PASS
122	5610	-0.91	-0.82	2.15	8.19	PASS
138 (U-NII-2c Band)	5690	0.22	0.51	3.38	8.19	PASS

Note:

1. Directional gain = 8.81 dBi > 6 dBi , so the limit shall be reduced.
2. Refer to section 6.6 for duty cycle spectrum plot.

Spectrum Plot of Worst Value	
802.11a_Chain 0 / CH60	**802.11ac (VHT20)_Chain 0 / CH60**
	
802.11ac (VHT40)_Chain 1 / CH46	**802.11ac (VHT80)_Chain 1 / CH138**
	

For U-NII-3 Band

802.11a

Channel	Frequency (MHz)	PSD w/o duty factor (dBm/300 kHz)		Total PSD w/o BWCF (dBm/300 kHz)	Total PSD with BWCF (dBm/500 kHz)	Total PSD with duty factor (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
		Chain 0	Chain 1					
144 (U-NII-3 Band)	5720	-1.43	-1.36	1.62	3.84	3.84	27.19	PASS
149	5745	4.80	5.37	8.1	10.32	10.32	27.19	PASS
157	5785	5.45	4.90	8.19	10.41	10.41	27.19	PASS
165	5825	4.48	4.86	7.68	9.90	9.9	27.19	PASS

Note:

1. Directional gain = 8.81 dBi > 6 dBi , so the limit shall be reduced.
2. Refer to section 6.6 for duty cycle spectrum plot.
3. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz/300kHz).

802.11ac (VHT20)

Channel	Frequency (MHz)	PSD w/o duty factor (dBm/300 kHz)		Total PSD w/o BWCF (dBm/300 kHz)	Total PSD with BWCF (dBm/500 kHz)	Total PSD with duty factor (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
		Chain 0	Chain 1					
144 (U-NII-3 Band)	5720	-2.05	-1.78	1.1	3.32	3.32	27.19	PASS
149	5745	5.25	5.57	8.42	10.64	10.64	27.19	PASS
157	5785	5.49	6.17	8.85	11.07	11.07	27.19	PASS
165	5825	5.01	5.59	8.32	10.54	10.54	27.19	PASS

Note:

1. Directional gain = 8.81 dBi > 6 dBi , so the limit shall be reduced.
2. Refer to section 6.6 for duty cycle spectrum plot.
3. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz/300kHz).

802.11ac (VHT40)

Channel	Frequency (MHz)	PSD w/o duty factor (dBm/300 kHz)		Total PSD w/o BWCF (dBm/300 kHz)	Total PSD with BWCF (dBm/500 kHz)	Total PSD with duty factor (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
		Chain 0	Chain 1					
142 (U-NII-3 Band)	5710	-4.91	-5.20	-2.04	0.18	0.18	27.19	PASS
151	5755	0.54	2.44	4.6	6.82	6.82	27.19	PASS
159	5795	2.68	2.74	5.72	7.94	7.94	27.19	PASS

Note:

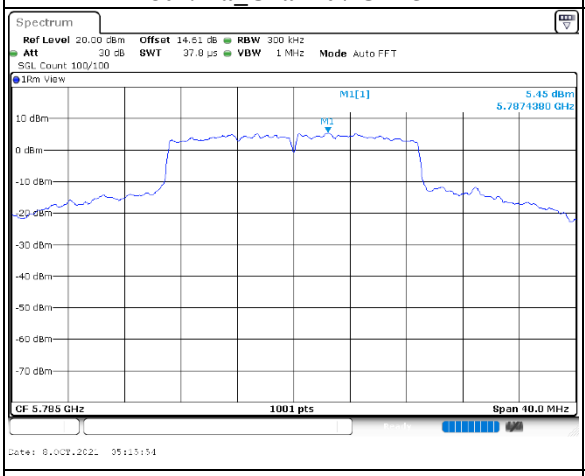
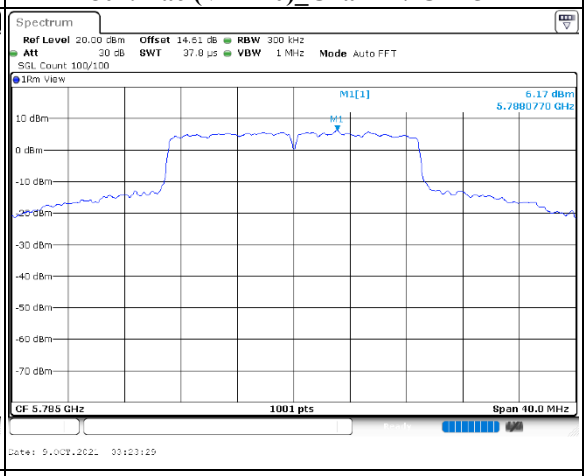
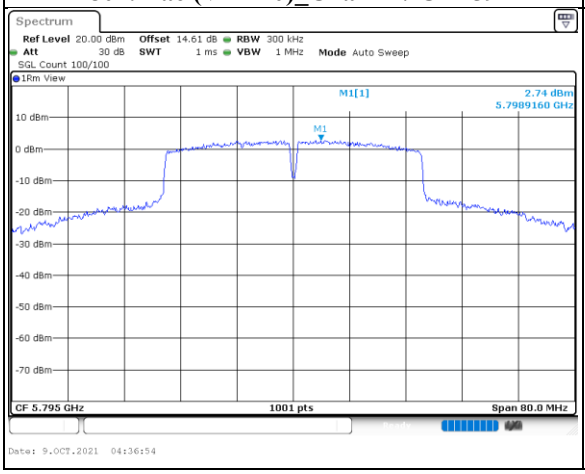
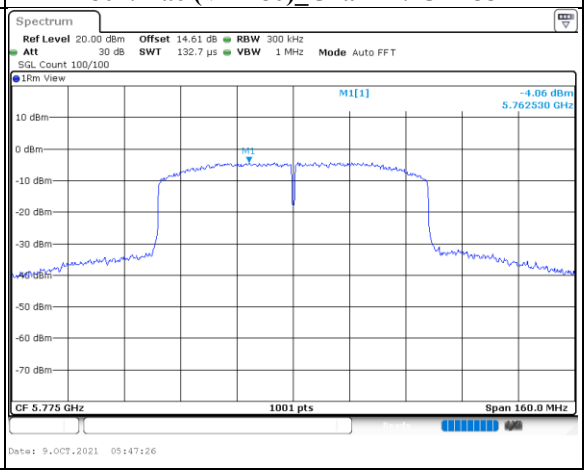
1. Directional gain = 8.81 dBi > 6 dBi , so the limit shall be reduced.
2. Refer to section 6.6 for duty cycle spectrum plot.
3. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz/300kHz).

802.11ac (VHT80)

Channel	Frequency (MHz)	PSD w/o duty factor (dBm/300 kHz)		Total PSD w/o BWCF (dBm/300 kHz)	Total PSD with BWCF (dBm/500 kHz)	Total PSD with duty factor (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
		Chain 0	Chain 1					
138 (U-NII-3 Band)	5690	-8.40	-7.45	-4.89	-2.67	-2.67	27.19	PASS
155	5775	-5.81	-4.06	-1.84	0.38	0.38	27.19	PASS

Note:

1. Directional gain = 8.81 dBi > 6 dBi , so the limit shall be reduced.
2. Refer to section 6.6 for duty cycle spectrum plot.
3. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz/300kHz).

Spectrum Plot of Worst Value	
802.11a_Chain 0 / CH157	**802.11ac (VHT20)_Chain 1 / CH157**
	
802.11ac (VHT40)_Chain 1 / CH159	**802.11ac (VHT80)_Chain 1 / CH155**
	

9.6. Frequency Stability

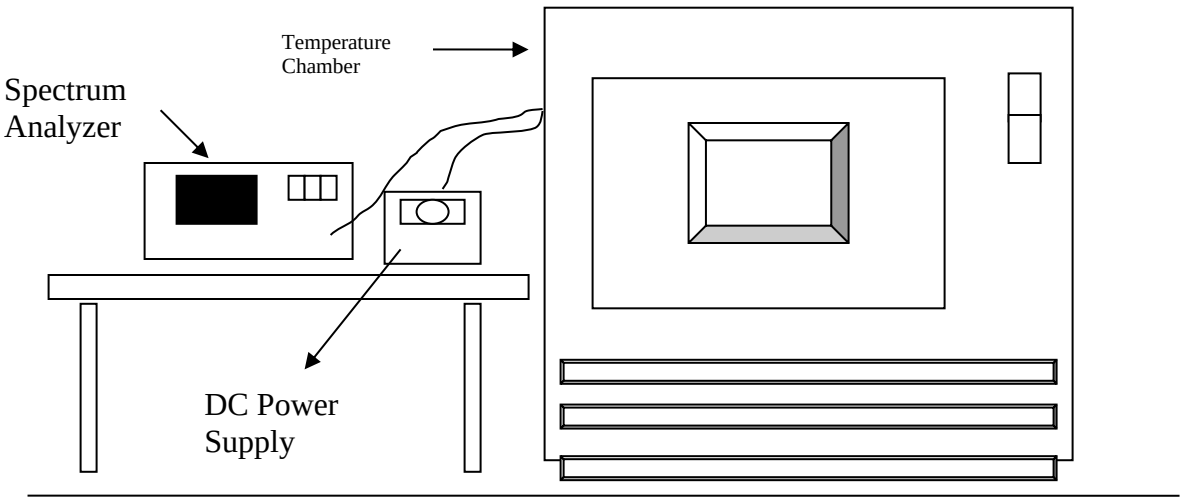
Requirements

The frequency of the carrier signal shall be maintained within band of operation.

Test procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
b. Turn the EUT on and couple its output to a spectrum analyzer.
c. Turn the EUT off and set the chamber to the highest temperature specified.
d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.
e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

Test Setup



Test Data

Frequency Stability Versus Temp.									
Operating Frequency: 5180 MHz									
TEMP. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)
50	3.3	5180.0054	1.04	5180.0035	0.68	5180.004	0.77	5180.0063	1.22
40	3.3	5179.9877	-2.37	5179.9867	-2.57	5179.9893	-2.07	5179.9877	-2.37
30	3.3	5179.9811	-3.65	5179.9808	-3.71	5179.9785	-4.15	5179.9803	-3.80
20	3.3	5179.9783	-4.19	5179.9785	-4.15	5179.9783	-4.19	5179.9803	-3.80
10	3.3	5179.9933	-1.29	5179.9929	-1.37	5179.9918	-1.58	5179.9904	-1.85
0	3.3	5179.9971	-0.56	5179.9982	-0.35	5179.9964	-0.69	5179.9965	-0.68
-10	3.3	5180.0123	2.37	5180.0149	2.88	5180.0163	3.15	5180.016	3.09
-20	3.3	5179.9802	-3.82	5179.9798	-3.90	5179.9798	-3.90	5179.981	-3.67
-30	3.3	5180.005	0.97	5180.0044	0.85	5180.0037	0.71	5180.007	1.35
TEMP. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)
20	3.795	5179.9775	-4.34	5179.9795	-3.96	5179.9784	-4.17	5179.9813	-3.61
20	3.3	5179.9783	-4.19	5179.9785	-4.15	5179.9783	-4.19	5179.9803	-3.80
20	2.805	5179.9774	-4.36	5179.9783	-4.19	5179.9779	-4.27	5179.9807	-3.73

9.7. Radiated Spurious Emission

Requirements

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequency(MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:
1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, 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 20dB under any condition of modulation.

Limits of unwanted emission out of the restricted bands

Applicable To		Limit	
789033 D02 General UNII Test Procedure New Rules v02r01		Field Strength at 3m	
		PK:74 (dBµV/m)	AV:54 (dBµV/m)
Frequency Band	**Applicable To**	**EIRP Limit**	**Equivalent Field Strength at 3m**
5150~5250 MHz	15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBµV/m)
5250~5350 MHz	15.407(b)(2)		
5470~5725 MHz	15.407(b)(3)		
5725~5850 MHz	15.407(b)(4)(i)	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2(dBµV/m) *1 PK:105.2 (dBµV/m) *2 PK: 110.8(dBµV/m) *3 PK:122.2 (dBµV/m) *4
*1 beyond 75 MHz or more above of the band edge. *2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above. *3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above. *4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.			

Note:
The following formula is used to convert the effective isotropic radiated power (eirp) to field strength:

$E = \frac{1000000\sqrt{30P}}{3}$ µV/m, where P is the eirp (Watts).

Test Procedures

[For 9 kHz ~ 30 MHz]

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. For measurement below 30MHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

NOTE:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

[For above 30 MHz]

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. 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 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.
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. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
f. The test-receiver system was set to peak and average detects 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.

Note:

a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
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 1GHz.
c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.

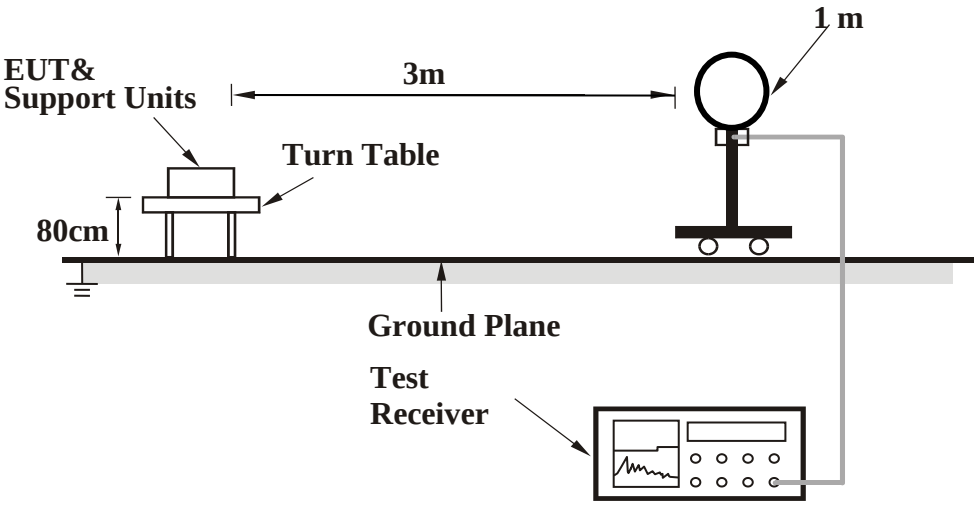
Configuration	Average	
	RBW	VBW
802.11a	1MHz	10Hz
802.11ac (VHT20)		10Hz
802.11ac (VHT40)		10Hz
802.11ac (VHT80)		10Hz

Note: Refer to section 6.6 for duty cycle.

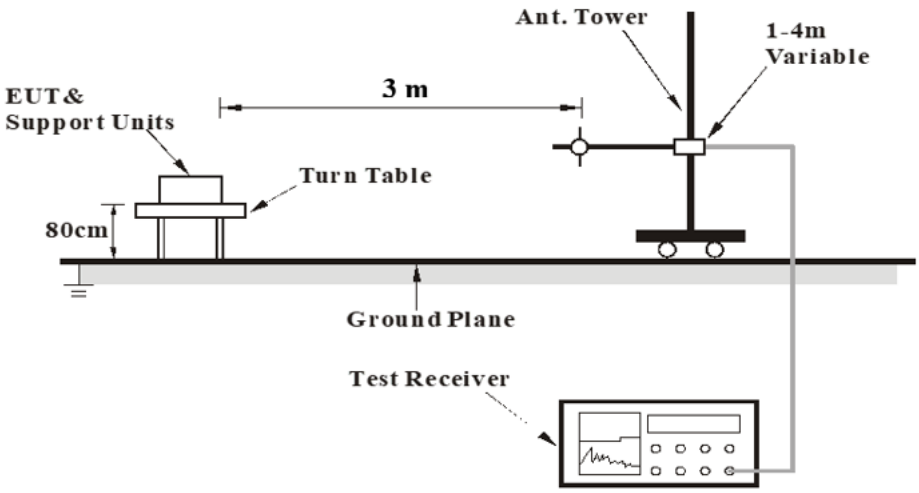
d. All modes of operation were investigated (includes all external accessories) and the worst-case emissions are reported.
e. Test data of Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
f. Test data of Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
g. Test data of Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
h. Test data of Notation "@" = Fundamental Frequency
i. Test data of Notation " * " = Only required peak limit or the peak result under 20 dB above and complies with AVG limit, AVG result is deemed to comply with AVG limit.

Test Setup

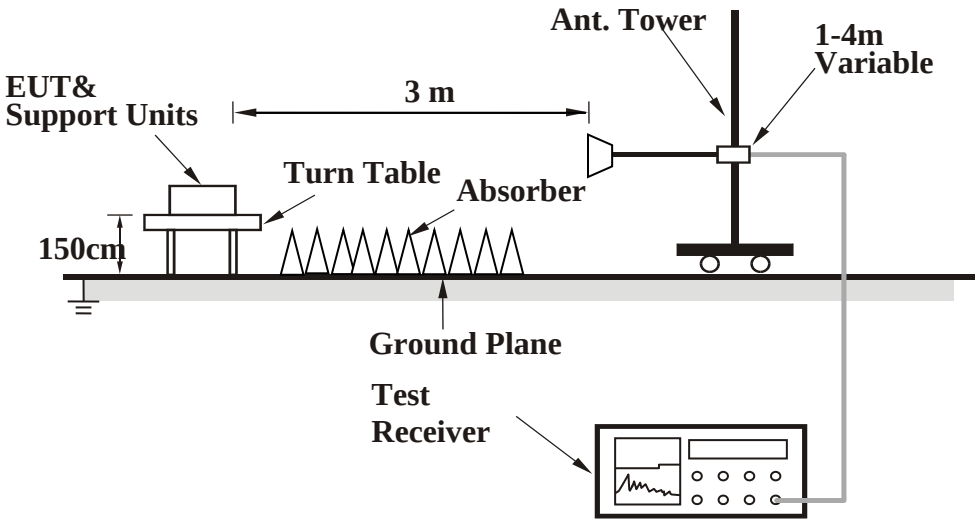
<Frequency Range 9 kHz ~ 30 MHz>



<Frequency Range 30 MHz ~ 1 GHz >



<Frequency Range above 1 GHz>



For the actual test configuration, please refer to the Setup Configurations.

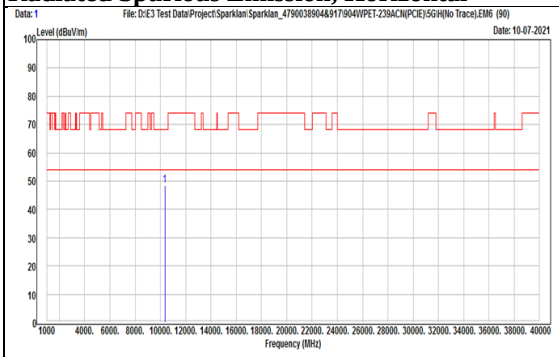
Test Data

Above 1G

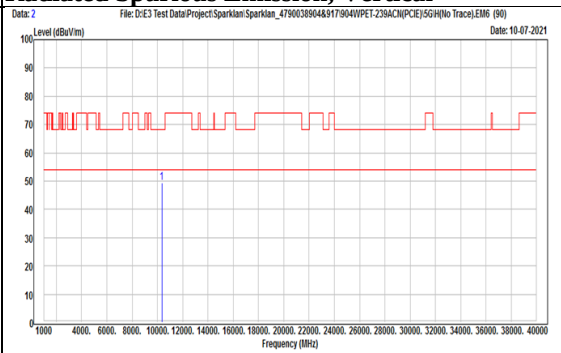
Mode	802.11a	Channel	36

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5097.3	30.9	13.45	44.35	54	-9.65	AVG
		5126.7	41.39	13.44	54.83	74	-19.17	PK
	@	5180	86.75	13.4	100.15	N/A	N/A	PK
	@	5180	74.38	13.4	87.78	N/A	N/A	AVG
	*	10360	31.19	17.39	48.58	68.2	-19.62	PK
Vertical		5148.75	39.38	13.42	52.8	54	-1.2	AVG
		5149.1	46.88	13.43	60.31	74	-13.69	PK
	@	5180	95.45	13.4	108.85	N/A	N/A	PK
	@	5180	89.55	13.4	102.95	N/A	N/A	AVG
	*	10360	31.99	17.39	49.38	68.2	-18.82	PK

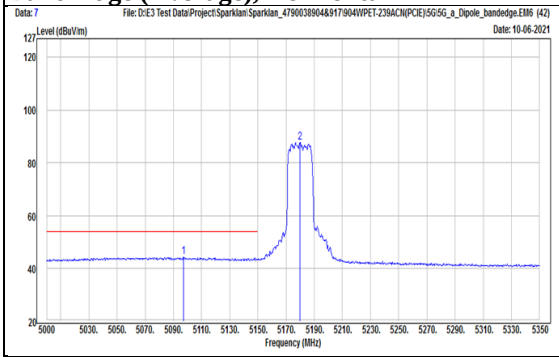
TX, 802.11a (Ch 36)
Radiated Spurious Emission, Horizontal



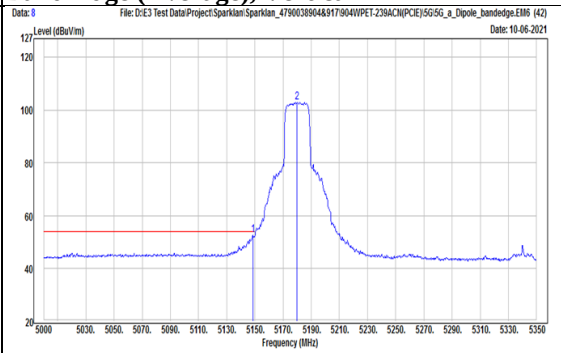
TX, 802.11a (Ch 36)
Radiated Spurious Emission, Vertical



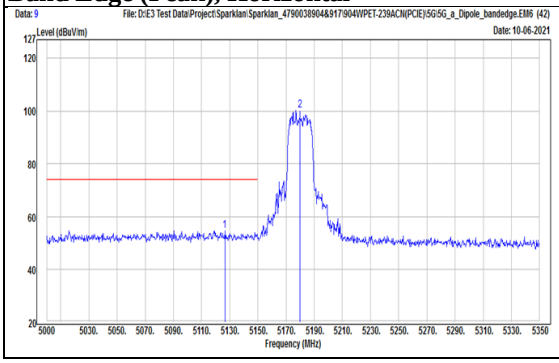
TX, 802.11a (Ch 36)
Band Edge (Average), Horizontal



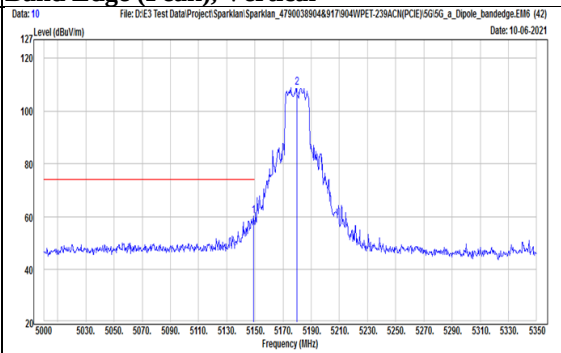
TX, 802.11a (Ch 36)
Band Edge (Average), Vertical



TX, 802.11a (Ch 36)
Band Edge (Peak), Horizontal



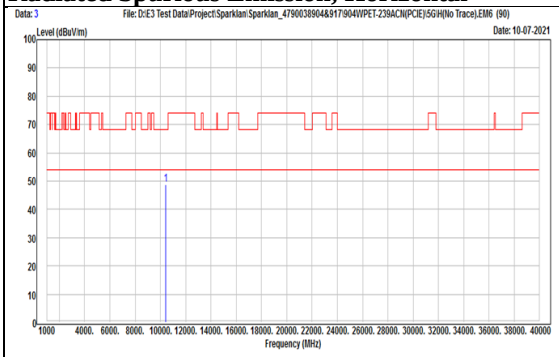
TX, 802.11a (Ch 36)
Band Edge (Peak), Vertical



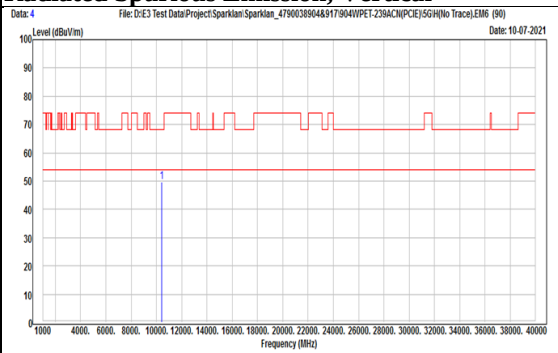
Mode	802.11a	Channel	44

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5083.3	41.69	13.42	55.11	74	-18.89	PK
		5091.7	31.01	13.43	44.44	54	-9.56	AVG
	@	5220	91.4	13.33	104.73	N/A	N/A	PK
	@	5220	79.95	13.33	93.28	N/A	N/A	AVG
	*	10440	31.24	17.63	48.87	68.2	-19.33	PK
Vertical		5146.3	32.54	13.43	45.97	54	-8.03	AVG
		5147	38.87	13.43	52.3	74	-21.7	PK
	@	5220	99.29	13.33	112.62	N/A	N/A	PK
	@	5220	92.33	13.33	105.66	N/A	N/A	AVG
	*	10440	31.98	17.63	49.61	68.2	-18.59	PK

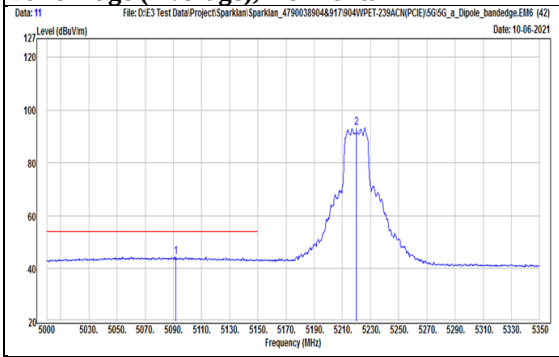
TX, 802.11a (Ch 44)
Radiated Spurious Emission, Horizontal



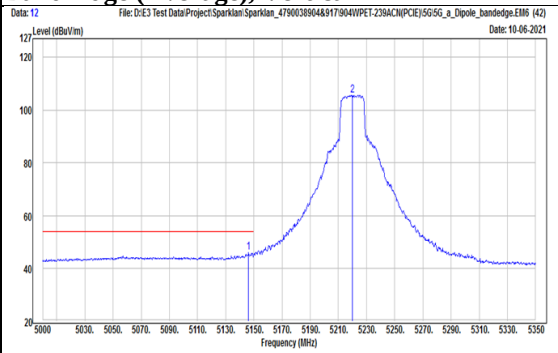
TX, 802.11a (Ch 44)
Radiated Spurious Emission, Vertical



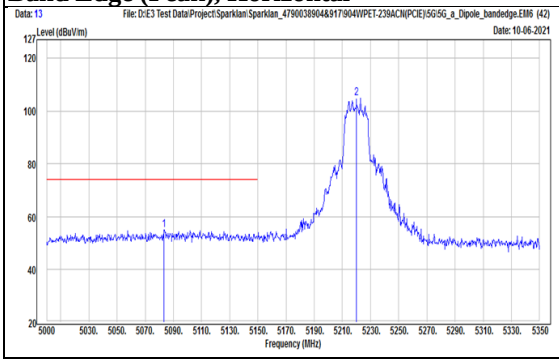
TX, 802.11a (Ch 44)
Band Edge (Average), Horizontal



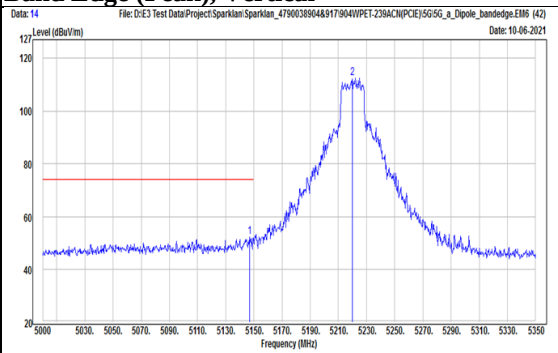
TX, 802.11a (Ch 44)
Band Edge (Average), Vertical



TX, 802.11a (Ch 44)
Band Edge (Peak), Horizontal



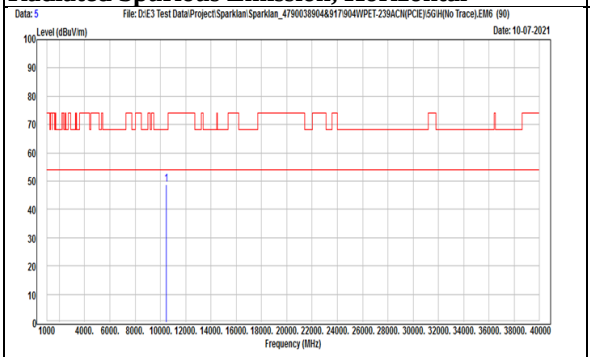
TX, 802.11a (Ch 44)
Band Edge (Peak), Vertical



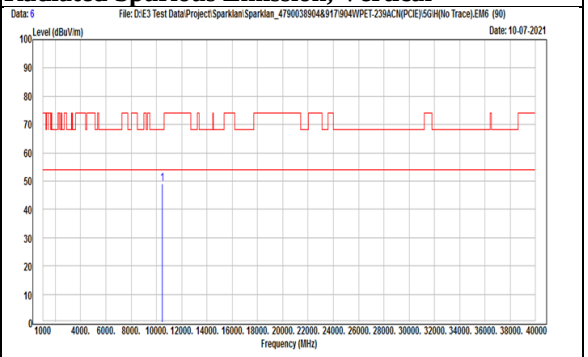
Mode	802.11a	Channel	48

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5088.55	30.86	13.43	44.29	54	-9.71	AVG
		5110.6	42.03	13.46	55.49	74	-18.51	PK
	@	5240	90.37	13.27	103.64	N/A	N/A	PK
	@	5240	79.62	13.27	92.89	N/A	N/A	AVG
	*	10480	31.03	17.69	48.72	68.2	-19.48	PK
Vertical		5072.8	31.81	13.38	45.19	54	-8.81	AVG
		5132.3	37.9	13.44	51.34	74	-22.66	PK
	@	5240	98.32	13.27	111.59	N/A	N/A	PK
	@	5240	93.06	13.27	106.33	N/A	N/A	AVG
	*	10480	31.3	17.69	48.99	68.2	-19.21	PK

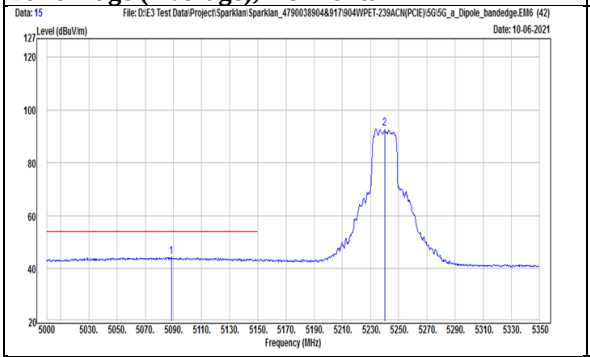
TX, 802.11a (Ch 48)
Radiated Spurious Emission, Horizontal



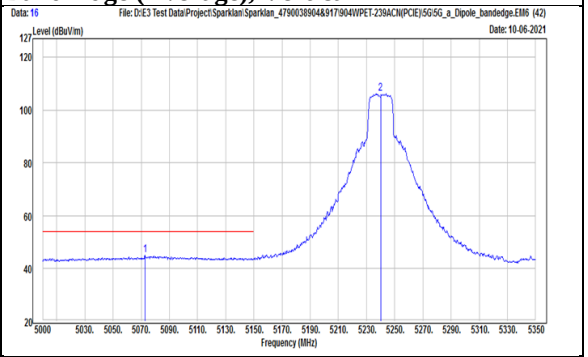
TX, 802.11a (Ch 48)
Radiated Spurious Emission, Vertical



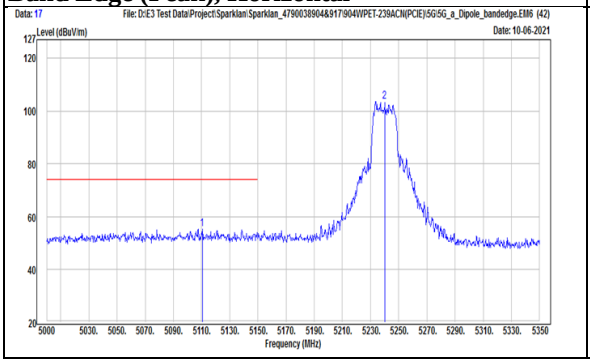
TX, 802.11a (Ch 48)
Band Edge (Average), Horizontal



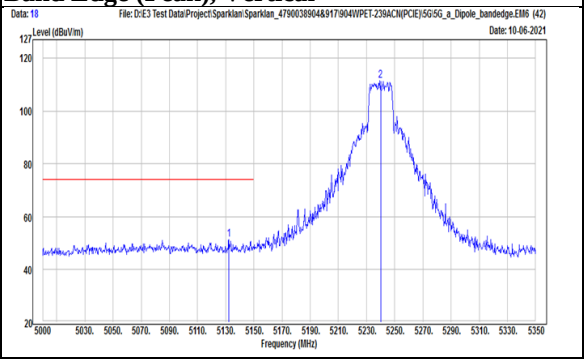
TX, 802.11a (Ch 48)
Band Edge (Average), Vertical



TX, 802.11a (Ch 48)
Band Edge (Peak), Horizontal



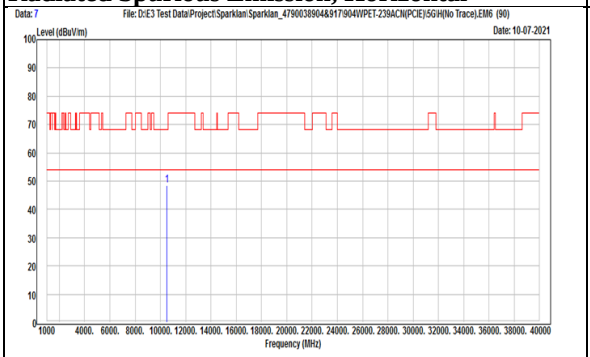
TX, 802.11a (Ch 48)
Band Edge (Peak), Vertical



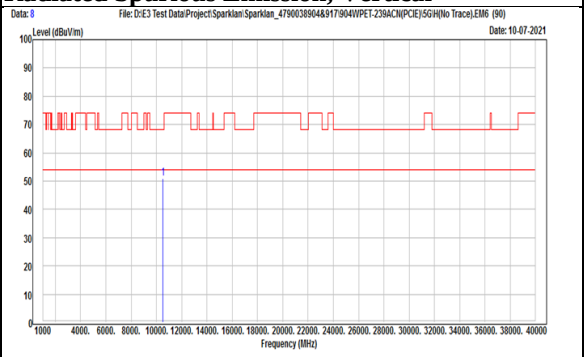
Mode	802.11a	Channel	52

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	5260	89.88	13.24	103.12	N/A	N/A	PK
	@	5260	80.23	13.24	93.47	N/A	N/A	AVG
		5411.4	39.88	13.48	53.36	74	-20.64	PK
		5453.4	28.65	13.68	42.33	54	-11.67	AVG
	*	10520	30.86	17.73	48.59	68.2	-19.61	PK
Vertical	@	5260	103.28	13.24	116.52	N/A	N/A	PK
	@	5260	93.67	13.24	106.91	N/A	N/A	AVG
		5366.4	31.28	13.31	44.59	54	-9.41	AVG
		5373.6	41.89	13.34	55.23	74	-18.77	PK
	*	10520	33.24	17.73	50.97	68.2	-17.23	PK

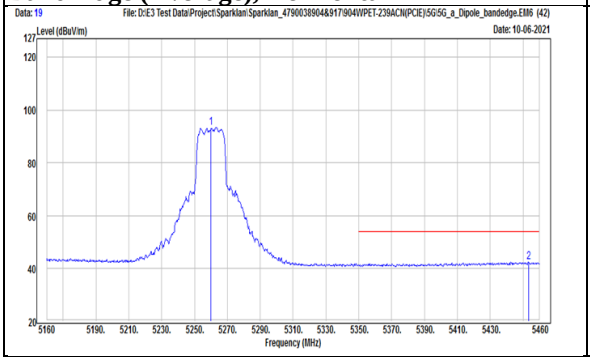
TX, 802.11a (Ch 52)
Radiated Spurious Emission, Horizontal



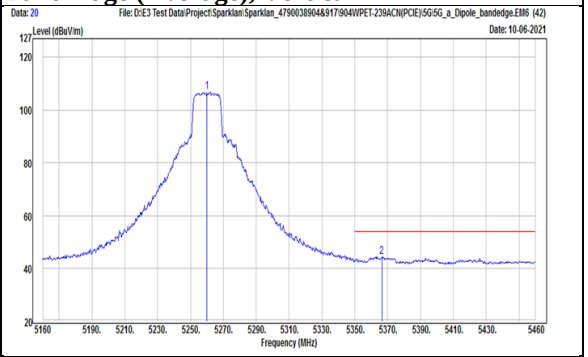
TX, 802.11a (Ch 52)
Radiated Spurious Emission, Vertical



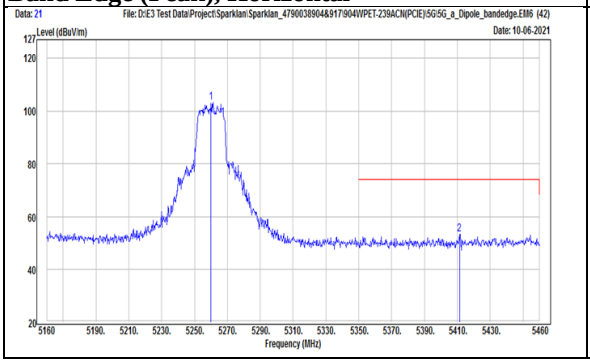
TX, 802.11a (Ch 52)
Band Edge (Average), Horizontal



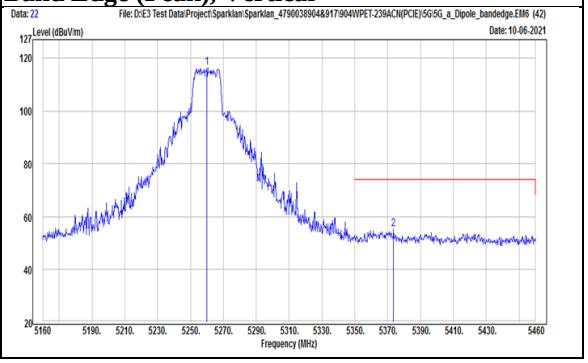
TX, 802.11a (Ch 52)
Band Edge (Average), Vertical



TX, 802.11a (Ch 52)
Band Edge (Peak), Horizontal



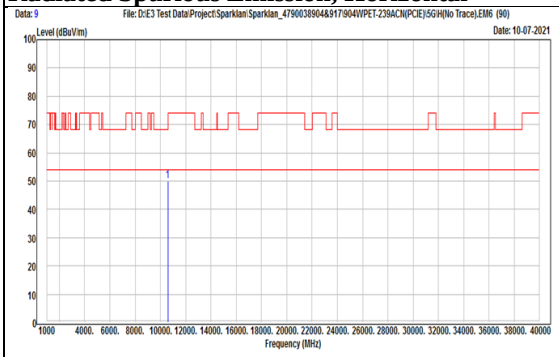
TX, 802.11a (Ch 52)
Band Edge (Peak), Vertical



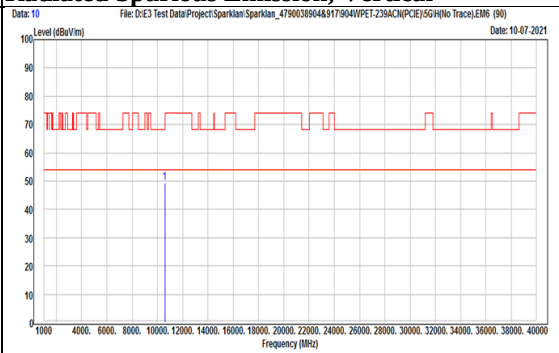
Mode	802.11a	Channel	60

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	5300	90.08	13.21	103.29	N/A	N/A	PK
	@	5300	78.95	13.21	92.16	N/A	N/A	AVG
		5453.4	40.3	13.68	53.98	74	-20.02	PK
		5456.7	28.95	13.69	42.64	54	-11.36	AVG
	*	10600	32.16	17.73	49.89	68.2	-18.31	PK
Vertical	@	5300	103.59	13.21	116.8	N/A	N/A	PK
	@	5300	94.48	13.21	107.69	N/A	N/A	AVG
		5350.2	39.18	13.26	52.44	54	-1.56	AVG
		5352.9	51.64	13.27	64.91	74	-9.09	PK
	*	10600	31.63	17.73	49.36	68.2	-18.84	PK

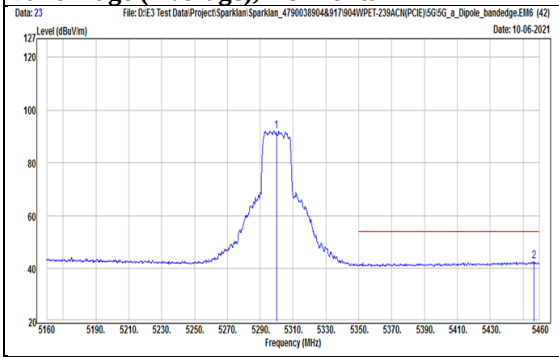
TX, 802.11a (Ch 60)
Radiated Spurious Emission, Horizontal



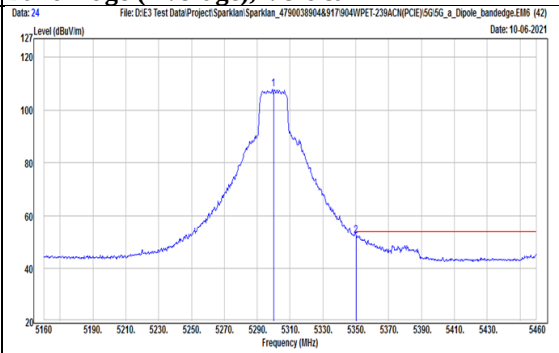
TX, 802.11a (Ch 60)
Radiated Spurious Emission, Vertical



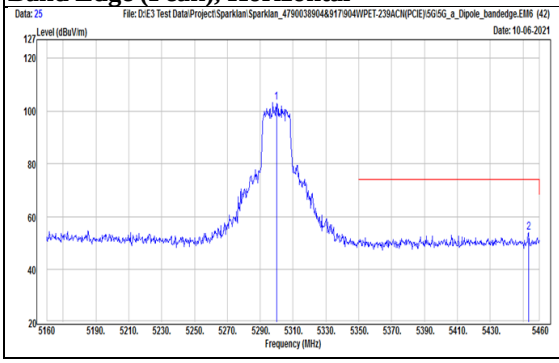
TX, 802.11a (Ch 60)
Band Edge (Average), Horizontal



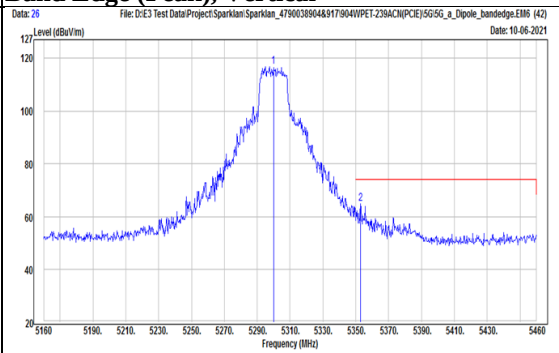
TX, 802.11a (Ch 60)
Band Edge (Average), Vertical



TX, 802.11a (Ch 60)
Band Edge (Peak), Horizontal

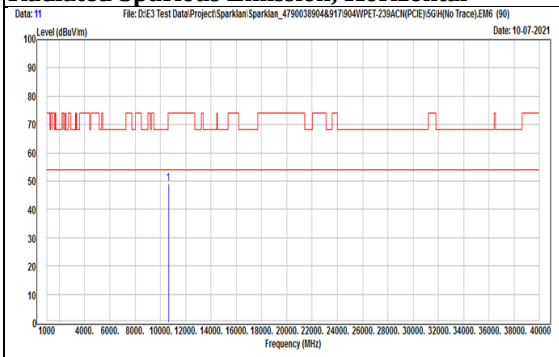
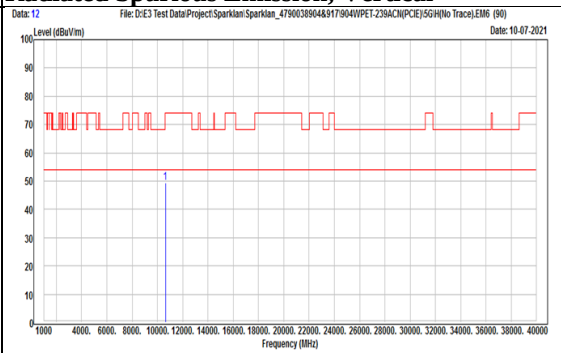
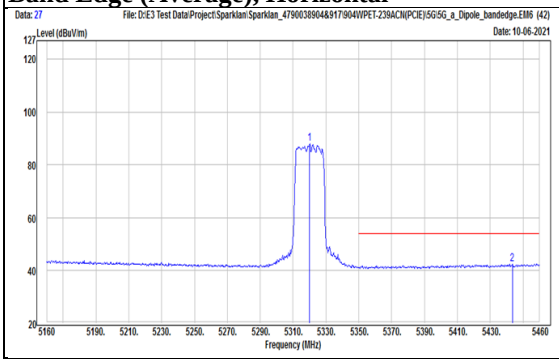
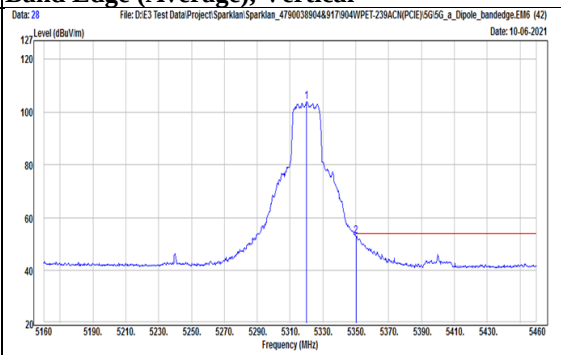
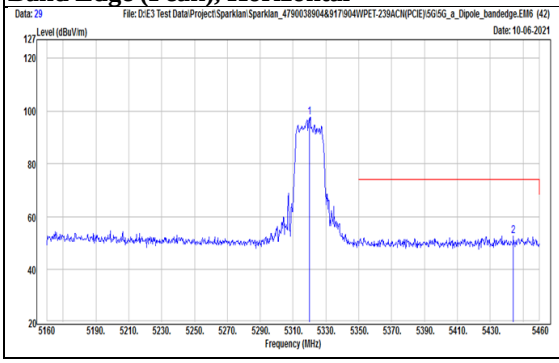
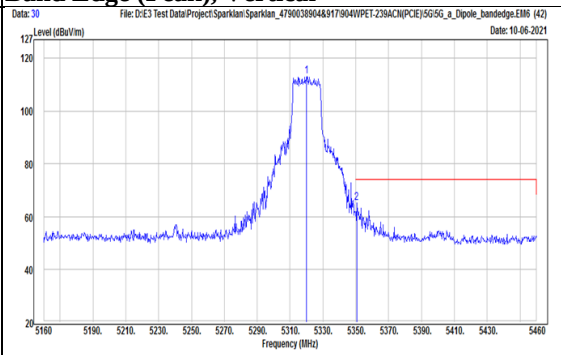


TX, 802.11a (Ch 60)
Band Edge (Peak), Vertical



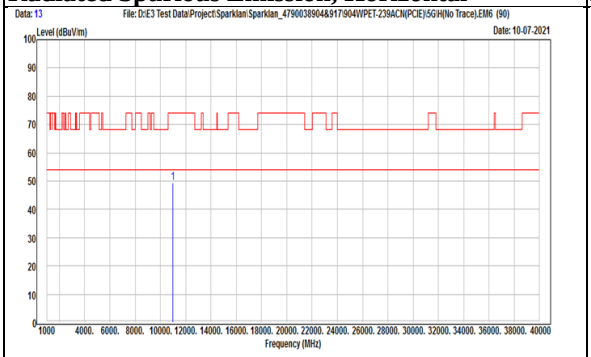
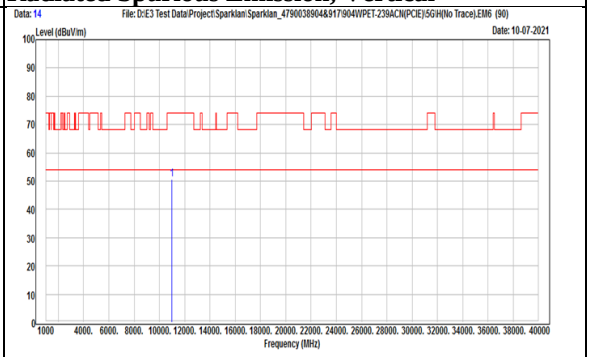
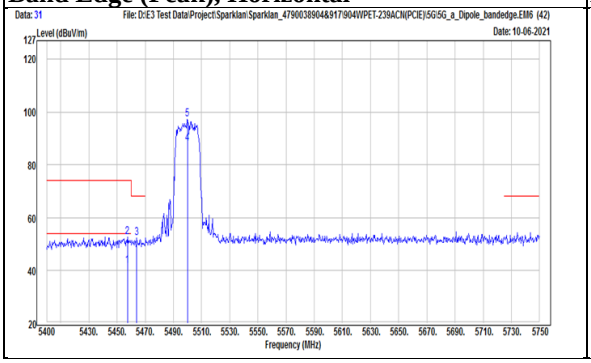
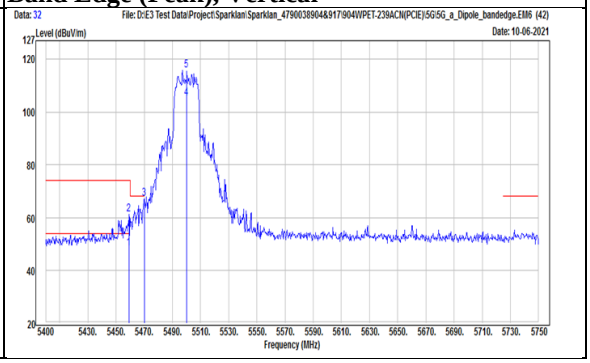
Mode	802.11a	Channel	64

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	5320	84.4	13.23	97.63	N/A	N/A	PK
	@	5320	74.64	13.23	87.87	N/A	N/A	AVG
		5443.5	28.92	13.64	42.56	54	-11.44	AVG
		5444.1	39.13	13.65	52.78	74	-21.22	PK
	*	10640	31.2	17.82	49.02	74	-24.98	PK
Vertical	@	5320	99.96	13.23	113.19	N/A	N/A	PK
	@	5320	90.73	13.23	103.96	N/A	N/A	AVG
		5350.2	39.79	13.26	53.05	54	-0.95	AVG
		5350.5	52.03	13.26	65.29	74	-8.71	PK
	*	10640	31.63	17.82	49.45	74	-24.55	PK

TX, 802.11a (Ch 64) **Radiated Spurious Emission, Horizontal**	**TX, 802.11a (Ch 64)** **Radiated Spurious Emission, Vertical**
	
TX, 802.11a (Ch 64) **Band Edge (Average), Horizontal**	**TX, 802.11a (Ch 64)** **Band Edge (Average), Vertical**
	
TX, 802.11a (Ch 64) **Band Edge (Peak), Horizontal**	**TX, 802.11a (Ch 64)** **Band Edge (Peak), Vertical**
	

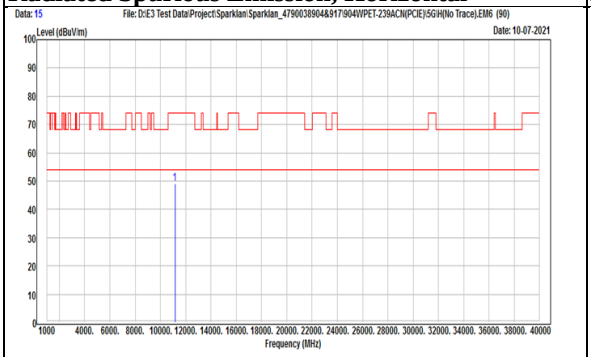
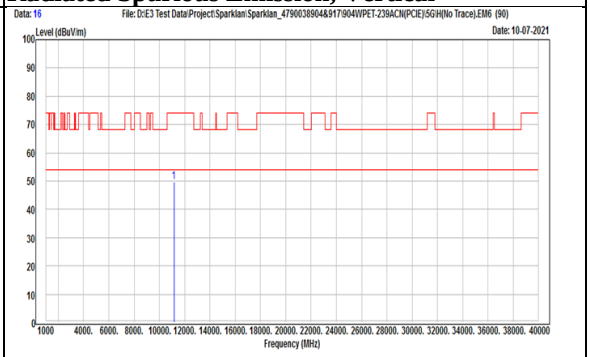
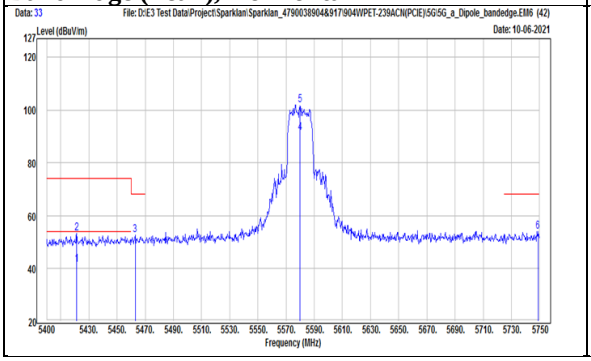
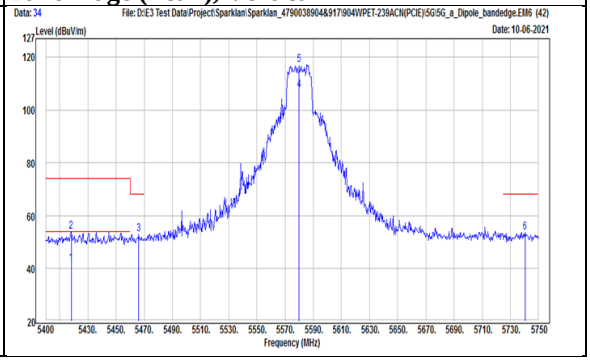
Mode	802.11a	Channel	100

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5457.4	38.9	13.69	52.59	74	-21.41	PK
		5457.4	28.21	13.69	41.9	54	-12.1	AVG
		5464.05	38.51	13.72	52.23	68.2	-15.97	PK
	@	5500	83.32	13.83	97.15	N/A	N/A	PK
	@	5500	74.1	13.83	87.93	N/A	N/A	AVG
	*	11000	31.11	18.28	49.39	74	-24.61	PK
Vertical		5459.15	47.73	13.7	61.43	74	-12.57	PK
		5459.15	34.8	13.7	48.5	54	-5.5	AVG
		5470	53.35	13.74	67.09	68.2	-1.11	PK
	@	5500	101.82	13.83	115.65	N/A	N/A	PK
	@	5500	91.3	13.83	105.13	N/A	N/A	AVG
	*	11000	32.27	18.28	50.55	74	-23.45	PK

TX, 802.11a (Ch 100) Radiated Spurious Emission, Horizontal	TX, 802.11a (Ch 100) Radiated Spurious Emission, Vertical
	
TX, 802.11a (Ch 100) Band Edge (Peak), Horizontal	**TX, 802.11a (Ch 100) Band Edge (Peak), Vertical**
	

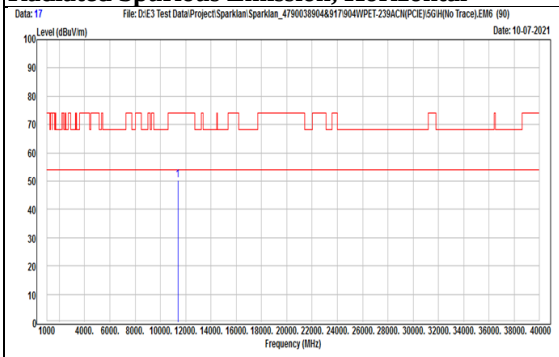
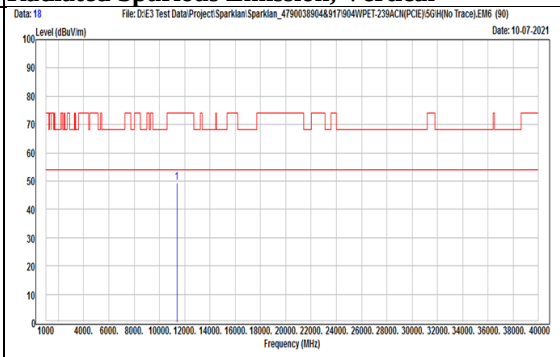
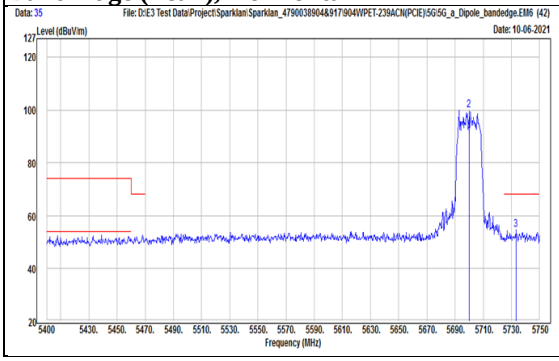
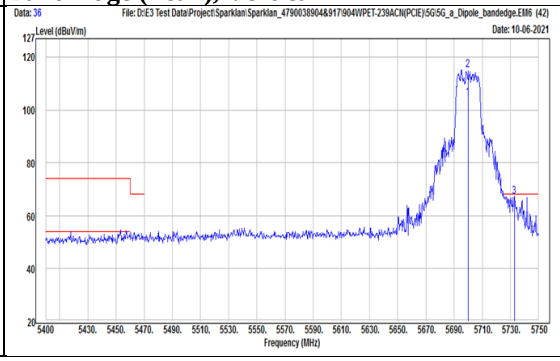
Mode	802.11a	Channel	116

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5421.35	39.7	13.53	53.23	74	-20.77	PK
		5421.35	27.9	13.53	41.43	54	-12.57	AVG
		5463	38.96	13.72	52.68	68.2	-15.52	PK
	@	5580	87.99	13.98	101.97	N/A	N/A	PK
	@	5580	77.3	13.98	91.28	N/A	N/A	AVG
		5748.95	39.78	14.31	54.09	68.2	-14.11	PK
	*	11160	30.66	18.32	48.98	74	-25.02	PK
Vertical		5418.2	40.5	13.51	54.01	74	-19.99	PK
		5418.2	28.2	13.51	41.71	54	-12.29	AVG
		5466.15	39.43	13.72	53.15	68.2	-15.05	PK
	@	5580	103.06	13.98	117.04	N/A	N/A	PK
	@	5580	93.4	13.98	107.38	N/A	N/A	AVG
		5740.55	39.58	14.26	53.84	68.2	-14.36	PK
	*	11160	31.4	18.32	49.72	74	-24.28	PK

TX, 802.11a (Ch 116) Radiated Spurious Emission, Horizontal	TX, 802.11a (Ch 116) Radiated Spurious Emission, Vertical
	
TX, 802.11a (Ch 116) Band Edge (Peak), Horizontal	**TX, 802.11a (Ch 116) Band Edge (Peak), Vertical**
	

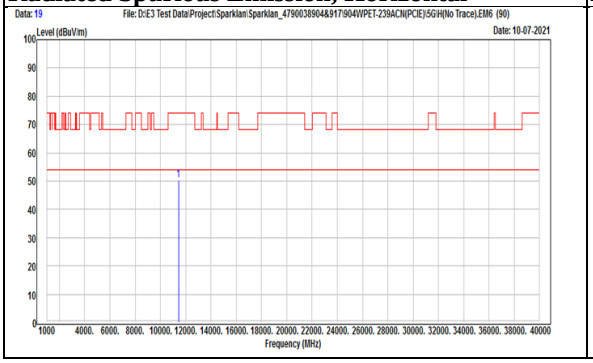
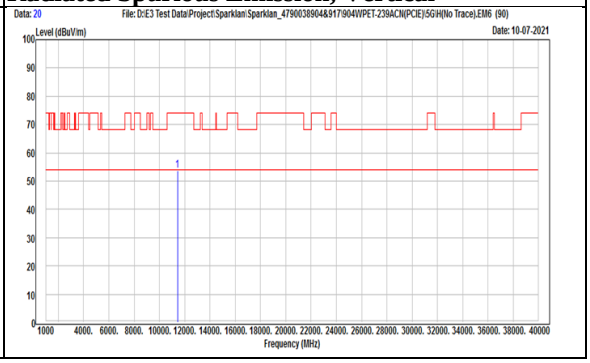
Mode	802.11a	Channel	140

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	5700	86	14.05	100.05	N/A	N/A	PK
	@	5700	75.8	14.05	89.85	N/A	N/A	AVG
		5733.2	40.57	14.22	54.79	68.2	-13.41	PK
	*	11400	31.55	18.74	50.29	74	-23.71	PK
Vertical	@	5700	101	14.05	115.05	N/A	N/A	PK
	@	5700	90.4	14.05	104.45	N/A	N/A	AVG
		5732.85	53.01	14.22	67.23	68.2	-0.97	PK
	*	11400	30.62	18.74	49.36	74	-24.64	PK

TX, 802.11a (Ch 140) Radiated Spurious Emission, Horizontal	TX, 802.11a (Ch 140) Radiated Spurious Emission, Vertical
	
TX, 802.11a (Ch 140) Band Edge (Peak), Horizontal	**TX, 802.11a (Ch 140) Band Edge (Peak), Vertical**
	

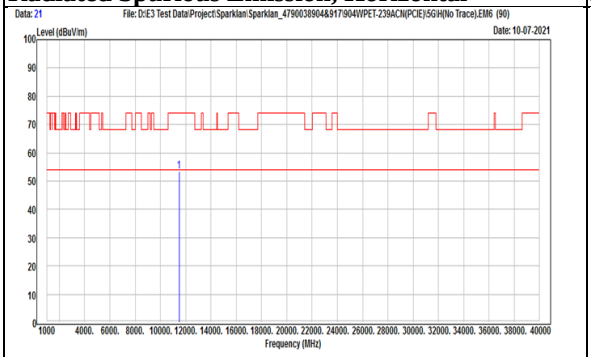
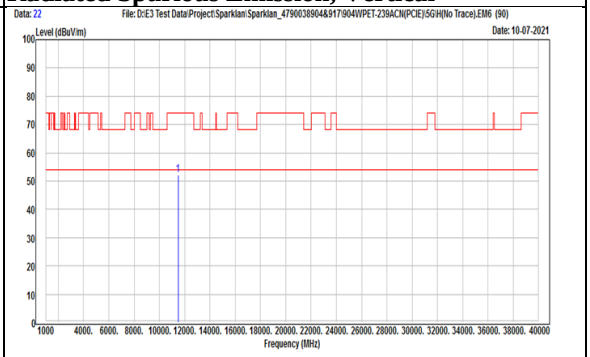
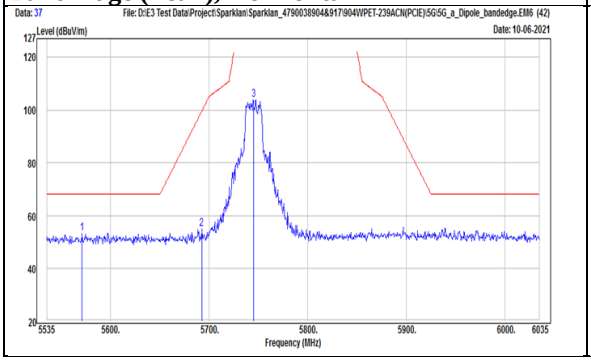
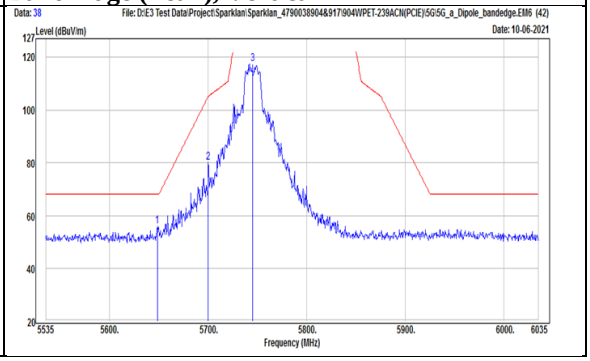
Mode	802.11a	Channel	144

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	*	11440	31.39	18.86	50.25	74	-23.75	PK
Vertical	*	11440	34.81	18.86	53.67	74	-20.33	PK

TX, 802.11a (Ch 144) Radiated Spurious Emission, Horizontal	TX, 802.11a (Ch 144) Radiated Spurious Emission, Vertical
	

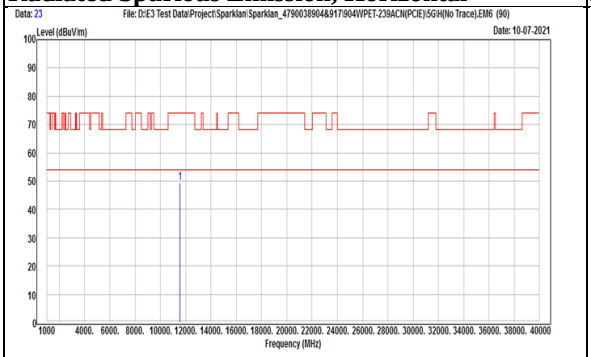
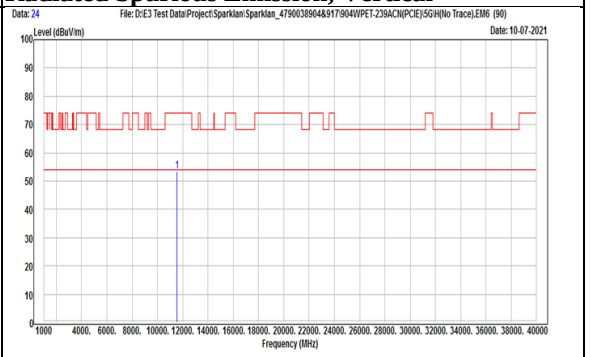
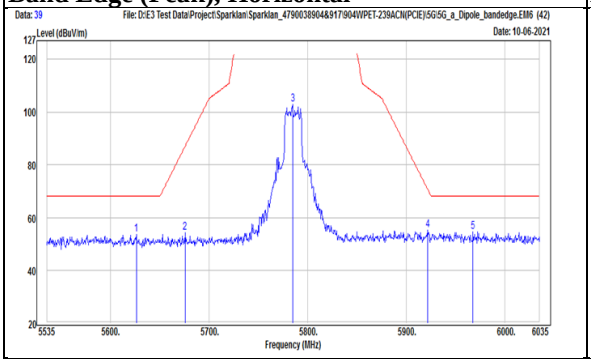
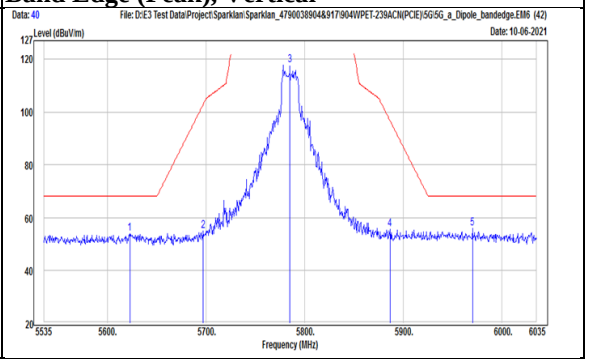
Mode	802.11a	Channel	149

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5571	39.5	13.95	53.45	68.2	-14.75	PK
		5692.5	41.07	14.05	55.12	99.67	-44.55	PK
	@	5745	89.51	14.28	103.79	N/A	N/A	PK
	*	11490	34.34	19.02	53.36	74	-20.64	PK
Vertical		5648.5	42	14	56	68.2	-12.2	PK
		5700	65.92	14.05	79.97	105.2	-25.23	PK
	@	5745	103.2	14.28	117.48	N/A	N/A	PK
	*	11490	33.02	19.02	52.04	74	-21.96	PK

TX, 802.11a (Ch 149) Radiated Spurious Emission, Horizontal	TX, 802.11a (Ch 149) Radiated Spurious Emission, Vertical
	
TX, 802.11a (Ch 149) Band Edge (Peak), Horizontal	**TX, 802.11a (Ch 149) Band Edge (Peak), Vertical**
	

Mode	802.11a	Channel	157

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5626	39.63	14.02	53.65	68.2	-14.55	PK
		5675.5	40.46	14.02	54.48	87.11	-32.63	PK
	@	5785	88.25	14.48	102.73	N/A	N/A	PK
		5921.5	40.26	14.99	55.25	70.78	-15.53	PK
		5967.5	39.5	15.08	54.58	68.2	-13.62	PK
	*	11570	30.38	18.88	49.26	74	-24.74	PK
Vertical		5622.5	40.07	14.03	54.1	68.2	-14.1	PK
		5697	41.03	14.05	55.08	102.99	-47.91	PK
	@	5785	103.21	14.48	117.69	N/A	N/A	PK
		5886.5	40.65	14.92	55.57	96.66	-41.09	PK
		5970	40.83	15.07	55.9	68.2	-12.3	PK
	*	11570	34.65	18.88	53.53	74	-20.47	PK

TX, 802.11a (Ch 157) **Radiated Spurious Emission, Horizontal**	**TX, 802.11a (Ch 157)** **Radiated Spurious Emission, Vertical**
	
TX, 802.11a (Ch 157) **Band Edge (Peak), Horizontal**	**TX, 802.11a (Ch 157)** **Band Edge (Peak), Vertical**
	

Mode	802.11a	Channel	165

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	5825	86.3	14.69	100.99	N/A	N/A	PK
		5923.5	39.03	14.99	54.02	69.31	-15.29	PK
		5974.5	39.71	15.09	54.8	68.2	-13.4	PK
	*	11650	31.14	18.63	49.77	74	-24.23	PK
Vertical	@	5825	100.63	14.69	115.32	N/A	N/A	PK
		5876	49.03	14.89	63.92	104.46	-40.54	PK
		5983.5	40.45	15.12	55.57	68.2	-12.63	PK
	*	11650	31.95	18.63	50.58	74	-23.42	PK