TEST REPORT

Product Name:	Notebook
FCC ID:	2AT2F-PN1404P
Trademark:	Adreamer
Model Number:	PN1404P
Prepared For:	ShenzhenAdreamerEliteCo.,Ltd
Address:	Floor4th, Fuanna industrial park, No.1qingning road, qinghu, longhua Dist, Shenzhen. China.
Manufacturer:	ShenzhenAdreamerEliteCo.,Ltd
Address:	Floor4th, Fuanna industrial park, No.1qingning road, qinghu, longhua Dist, Shenzhen. China.
Prepared By:	Shenzhen CTB Testing Technology Co., Ltd.
Address:	Floor 1&2, Building A, No. 26 of Xinhe Road, Xinqiao Street, Baoan District, Shenzhen, China
Sample Received Date:	Jun. 30, 2021
Sample tested Date:	Jun. 30, 2021 to Jul. 11, 2021
Issue Date:	Jul. 21, 2021
Report No.:	CTB210708011RF
Test Standards	47 CFR Part 15 Subpart E
Test Results	PASS
Remark:	This is WIFI-5GHz band radio test report.

Compiled by:	Reviewed by:	Approved by:
Arron Liu	Bin Mei	Rita Xiao / Director

The test report is effective only with both signature and specialized stamp.This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen CTB Testing Technology Co., Ltd. this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client.

TABLE OF CONTENT

(Note: N/A means not applicable)

1. VERSION

Report No.	Issue Date	Description	Approved
CTB210708011RF	Jul. 21, 2021	Original	Valid

2. TEST SUMMARY

The Product has been tested according to the following specifications:

Test Item	Test Requirement	Test method	Result
AC Power Line Conducted Emission	47 CFR Part 15 Subpart E Section 15.407 (b)(6)	ANSI C63.10-2013	PASS
Radiated Spurious emissions	47 CFR Part 15 Subpart E Section 15.205/15.407(b)	KDB789033	PASS
Band edge	47 CFR Part 15 Subpart E Section 15.205/15.407(b)	KDB789033	PASS
Conducted Peak Output Power	47 CFR Part 15 Subpart E Section 15.407 (a)	KDB789033	PASS
Emission Bandwidth & Occupied Bandwidth	47 CFR Part 15 Subpart E Section 15.407 (a)(e)	KDB789033	PASS
Power Spectral Density	47 CFR Part 15 Subpart E Section 15.407 (a)	KDB789033	PASS
Frequency stability	47 CFR Part 15 Subpart E Section 15.407 (g)	KDB789033	PASS
Operation in the absence of information to the transmit	47 CFR Part 15 Subpart E Section 15.407 (c)	47 CFR Part 15 Subpart E	PASS
Antenna Requirement	47 CFR Part 15 Subpart E Section 15.203	ANSI C63.10-2013	PASS

Remark:
Test according to ANSI C63.4-2014 & ANSI C63.10-2013.

3. MEASUREMENT UNCERTAINTY

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

No.	Item	Uncertainty
1	Occupancy bandwidth	U=±54.3Hz
2	Adjacent channel power	U=±1.3dB
3	Conducted Adjacent channel power	U=±1.38dB
4	Conducted output power Above 1G	U=±1.0dB
5	Conducted output power below 1G	U=±0.9dB
6	Power Spectral Density , Conduction	U=±1.0dB
7	Conduction spurious emissions	U=±2.8dB
8	Out of band emission	U=±54Hz
9	3m camber Radiated spurious emission(30MHz-1GHz)	U=±4.3dB
10	3m chamber Radiated spurious emission(1GHz-18GHz)	U=±4.5dB
11	humidity uncertainty	U=±5.3%
12	Temperature uncertainty	U=±0.59℃
13	Supply volyages	U=±3%
14	Time	U=±5%

4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Model(s):	PN1404P
Model Description:	N/A
Wi-Fi Specification:	IEEE 802.11a/b/g/n/ac
Hardware Version:	XA133PR200-PE60A
Software Version:	Windows 10 Pro 20H2 19042.804
Operation Frequency:	IEEE 802.11a/n/ac(20M): 5150MHz ~5250MHz/ 4 channel IEEE 802.11n/ac(40M): 5150MHz ~5250MHz/ 2 channel IEEE 802.11ac(80M): 5150MHz ~5250MHz/ 1 channel IEEE 802.11a/n/ac(20M): 5725MHz ~5850MHz/ 5 channel IEEE 802.11n/ac(40M): 5725MHz ~5850MHz/ 2 channel IEEE 802.11ac(80M): 5725MHz ~5850MHz/ 1 channel
Max. RF output power:	WiFi (5G): 23.514dBm
Type of Modulation:	WiFi: DSSS, OFDM
Antenna installation:	Internal antenna
Antenna Gain:	1dBi
Ratings:	INPUT:AC 100~240V. 50-60HZ 1.5A OUTPUT:19V, 2100mA

4.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

4.3 Support Equipment

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
1	AC adapter	吉宏达	JHD-AP045E-190 210-AF	N/A	N/A
2	Notebook	Adreamer	PN1404P	N/A	EUT
3	battery	优特力	XU140S-PC U552688PV-3S2P	N/A	N/A

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.4 Channel List

For 802.11a/n/ac(20M) Operation in the 5150MHz ~5250 MHz band			
Channel	Frequency	Channel	Frequency
36	5180MHz	44	5220MHz
40	5200MHz	48	5240MHz
For 802.11a/n/ac(20M) Operation in the 5725MHz ~5850 MHz band			
Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz	NA	NA

For 802.11n/ac(40M) Operation in the 5150MHz ~5250 MHz band			
Channel	Frequency	Channel	Frequency
38	5190MHz	46	5230MHz
For 802.11n/ac(40M) Operation in the 5725MHz ~5850 MHz band			
Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

For 802.11ac(80M) Operation in the 5150MHz ~5250 MHz band			
Channel	Frequency	Channel	Frequency
42	5210MHz	NA	NA
For 802.11ac(80M) Operation in the 5725MHz ~5850 MHz band			
Channel	Frequency	NA	NA
155	5775MHz	NA	NA

Table for Internal antenna

Ant.	Brand	Model Name	Antenna Type	Gain (dBi)	NOTE
A	N/A	PN1404P	Internal antenna	1	
B	N/A	PN1404P	Internal antenna	1	

EUT has two Internal antennas with Max gain GANT 1dBi on every antenna, CDD device with two spatial streams, also can operat with one spatial streams according to KDB662911 D01 v02r01,

Directional gain= GANT + Array Gain, where Array Gain is as follows.

1) For power spectral density(PSD) measurements,

Array Gain=10log(NANT/NSS)dB=10log(2/1)=3.01dB,

So the directional gain for PSD is 4.01dBi

4.5 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test Mode	Tx/Rx	RF Channel		
		Low(L)	Middle(M)	High(H)
802.11a/n/ac(20M)	5150MHz ~5250 MHz	Channel 36	Channel 40	Channel 48
		5180MHz	5200MHz	5240MHz
802.11n/ac(40M)	5150MHz ~5250 MHz	Channel 38	N/A	Channel 46
		5190MHz	N/A	5230MHz
802.11ac(80M)	5150MHz ~5250 MHz	N/A	Channel 42	N/A
		N/A	5210MHz	N/A
802.11a/n/ac(20M)	5725MHz ~5850 MHz	Channel 149	Channel 157	Channel 165
		5745MHz	5785MHz	5825MHz
802.11n/ac(40M)	5725MHz ~5850 MHz	Channel 151	N/A	Channel 159
		5755MHz	N/A	5795MHz
802.11ac(80M)	5725MHz ~5850 MHz	N/A	Channel 155	N/A
		N/A	5775MHz	N/A

4.6 Test Environment

Humidity(%):	55
Atmospheric Pressure(kPa):	101.1
Normal Voltage(AC):NV	120
Normal Temperature(℃):NT	25
Low Temperature(℃):LT	0
High Temperature(℃):HT	40

5. TEST FACILITY AND TEST INSTRUMENT USED

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at Floor 1&2, Building A, No. 26 of Xinhe Road, Xinqiao Street, Baoan District, Shenzhen China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

5.2 Test Instrument Used

No.	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY52090073	2021.09.27
2	Power Sensor	Agilent	U2021XA	MY56120032	2021.09.27
3	Power Sensor	Agilent	U2021XA	MY56120034	2021.09.27
4	Communication test set	R&S	CMW500	108058	2021.09.27
5	Spectrum Analyzer	R&S	FSP40	100550	2021.09.27
6	Signal Generator	Agilent	N5181A	MY49060920	2021.09.27
7	Signal Generator	Agilent	N5182A	MY47420195	2021.09.27
8	Communication test set	Agilent	E5515C	MY50102567	2021.09.27
9	band rejection filter	Shenxiang	MSF2400-2483.5MS-1154	2018101500 1	2021.09.27
10	band rejection filter	Shenxiang	MSF5150-5850 MS-1155	2018101500 1	2021.09.27
11	band rejection filter	Xingbo	XBLBQ-DZA120	190821-1-1	2021.09.27
12	BT&WI-FI Automatic test software	Micowave	MTS8310	Ver. 2.0.0.0	2021.09.27
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	2021.09.27
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	2021.09.27
15	234G Automatic test software	Micowave	MTS8200	Ver. 2.0.0.0	2021.09.27
16	966 chamber	C.R.T.	966 Room	966	2021.09.27
17	Receiver	R&S	ESPI	100362	2021.09.27
18	Amplifier	HP	8447E	2945A02747	2021.09.27
19	Amplifier	Agilent	8449B	3008A01838	2021.09.27
20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	869	2021.09.27

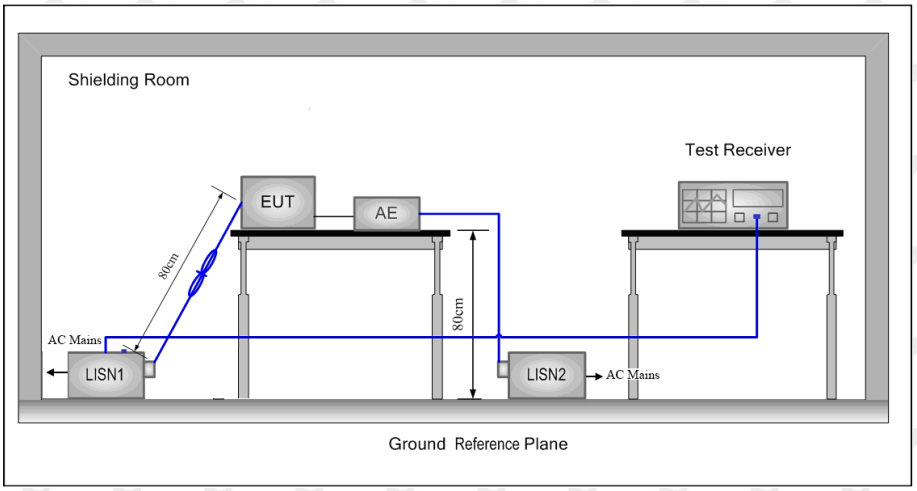
21	Horn Antenna	Schwarzbeck	BBHA9120D	1911	2021.09.27
22	Software	Fala	EZ-EMC	FA-03A2 RE	2021.09.27
23	3-Loop Antenna	Daze	ZN30401	17014	2021.09.27
24	loop antenna	ZHINAN	ZN30900A	/	2021.09.27
25	Horn antenna	A/H/System	SAS-574	588	2021.09.27
26	Amplifier	AEROFLEX	/	S/N/ 097	2021.09.27

Continuous disturbance					
No.	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	AMN	ROHDE&SCHWARZ	ESH3-Z5	831551852	2021.09.27
2	Pulse limiter	ROHDE&SCHWARZ	ESH3Z2	357881052	2021.09.27
3	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCS30	834115/006	2021.09.27
4	Coaxial cable	ZDECL	Z302S	18091904	2021.09.27
5	AAN	Schwarzbeck	NTFM8158	183	2021.09.27
6	Communication test set	Agilent	E5515C	MY50102567	2021.09.27
7	Communication test set	R&S	CMW500	108058	2021.09.27
8	EZ-EMC	Frad	EMC-con3A1.1	/	/

Radiated emission					
No.	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA 9120D	1911	2021.11.01
2	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	869	2021.11.01
3	Amplifier	Agilent	8449B	3008A01838	2021.09.27
4	Amplifier	HP	8447E	2945A02747	2021.09.27
5	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESPI7	100362	2021.09.27
6	Coaxial cable	ETS	RFC-SNS-100-NMS-80 NI	/	2021.09.27
7	Coaxial cable	ETS	RFC-SNS-100-NMS-20 NI	/	2021.09.27
8	Coaxial cable	ETS	RFC-SNS-100-SMS-20 NI	/	2021.09.27
9	Coaxial cable	ETS	RFC-NNS-100-NMS-300 NI	/	2021.09.27
10	Communication test set	Agilent	E5515C	MY50102567	2021.09.27
11	Communication test set	R&S	CMW500	108058	2021.09.27
12	EZ-EMC	Frad	EMC-con3A1.1	/	/

6. AC POWER LINE CONDUCTED EMISSION

6.1 Block Diagram Of Test Setup



6.2 Limit

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

6.3 Test procedure

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

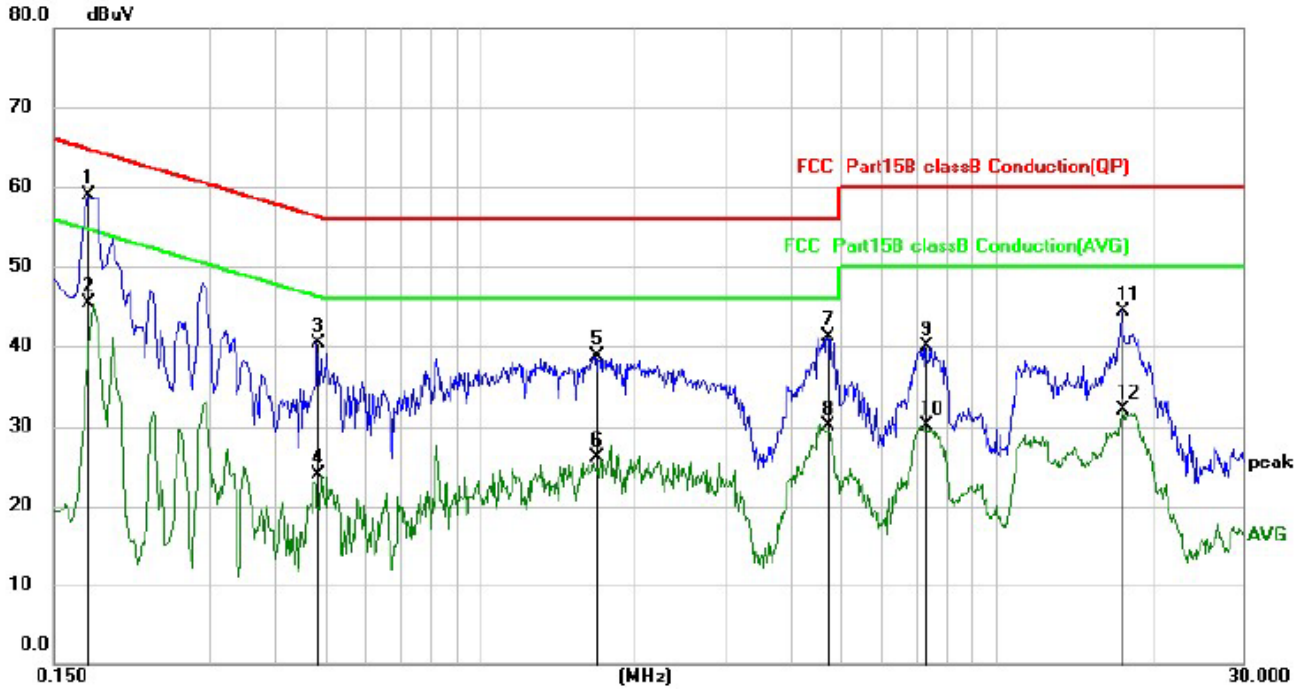
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0,4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was

between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0,8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

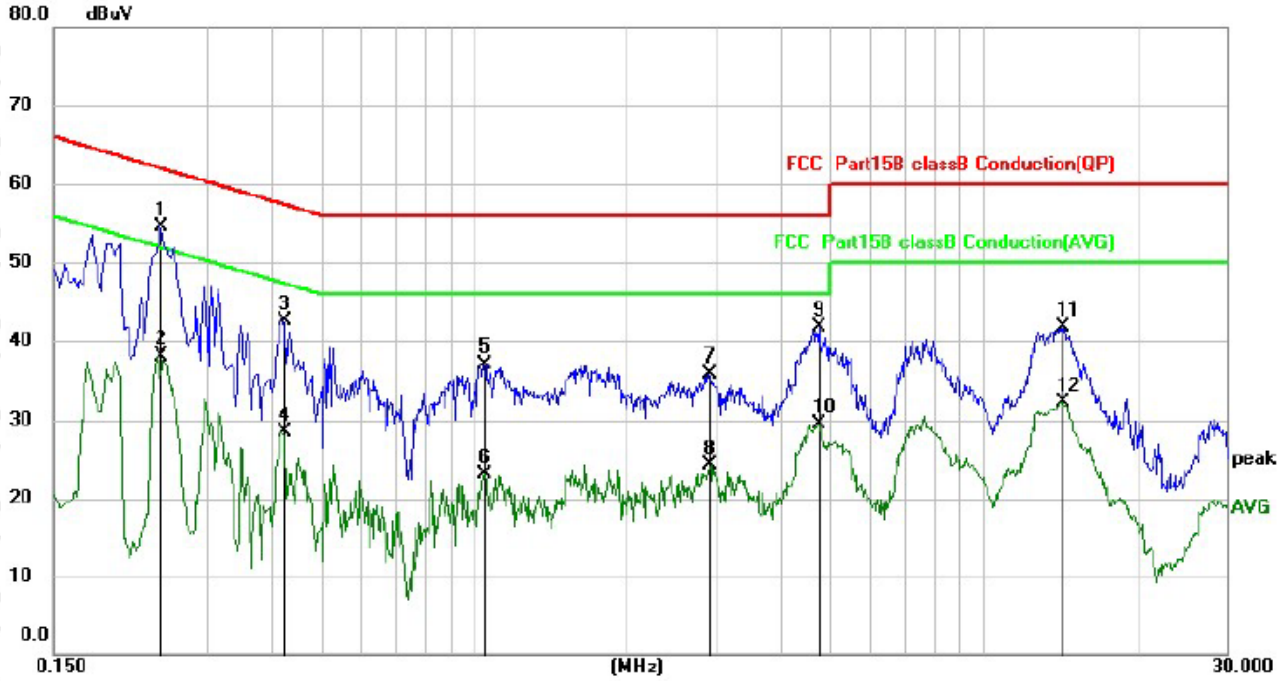
6.4 Test Result

Test Specification: Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	*	0.1737	48.93	9.96	58.89	64.78	-5.89	QP
2		0.1737	35.39	9.96	45.35	54.78	-9.43	AVG
3		0.4858	30.33	9.96	40.29	56.24	-15.95	QP
4		0.4858	13.97	9.96	23.93	46.24	-22.31	AVG
5		1.6737	28.62	10.00	38.62	56.00	-17.38	QP
6		1.6737	16.17	10.00	26.17	46.00	-19.83	AVG
7		4.7057	30.92	10.15	41.07	56.00	-14.93	QP
8		4.7057	19.97	10.15	30.12	46.00	-15.88	AVG
9		7.3258	29.40	10.46	39.86	60.00	-20.14	QP
10		7.3258	19.65	10.46	30.11	50.00	-19.89	AVG
11		17.5100	33.15	11.06	44.21	60.00	-15.79	QP
12		17.5100	21.06	11.06	32.12	50.00	-17.88	AVG

Test Specification: Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	*	0.2419	44.64	9.96	54.60	62.03	-7.43	QP
2		0.2419	28.16	9.96	38.12	52.03	-13.91	AVG
3		0.4218	32.64	9.96	42.60	57.41	-14.81	QP
4		0.4218	18.52	9.96	28.48	47.41	-18.93	AVG
5		1.0460	27.19	9.96	37.15	56.00	-18.85	QP
6		1.0460	13.16	9.96	23.12	46.00	-22.88	AVG
7		2.8900	25.77	10.06	35.83	56.00	-20.17	QP
8		2.8900	14.17	10.06	24.23	46.00	-21.77	AVG
9		4.7659	31.49	10.16	41.65	56.00	-14.35	QP
10		4.7659	19.43	10.16	29.59	46.00	-16.41	AVG
11		14.2819	30.70	10.95	41.65	60.00	-18.35	QP
12		14.2819	21.44	10.95	32.39	50.00	-17.61	AVG

Remark:

1. Factor = Cable loss + LISN factor, Margin = Limit – Level
2. All modes were tested at AC 120V and 240V, only the worst result of AC 120V 60Hz was reported.
3. All the test modes completed for test. Only the worst result of was reported.

7. RADIATED SPURIOUS EMISSIONS

7.1 Block Diagram Of Test Setup

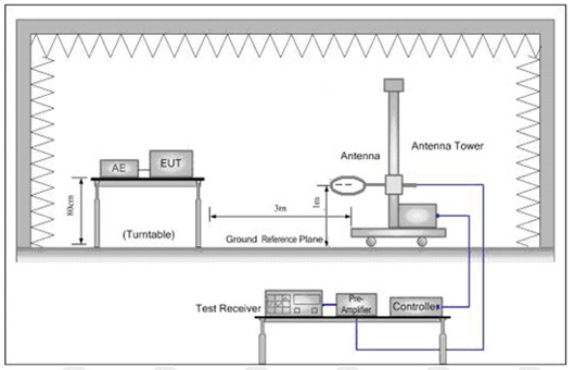


Figure 1. Below 30MHz

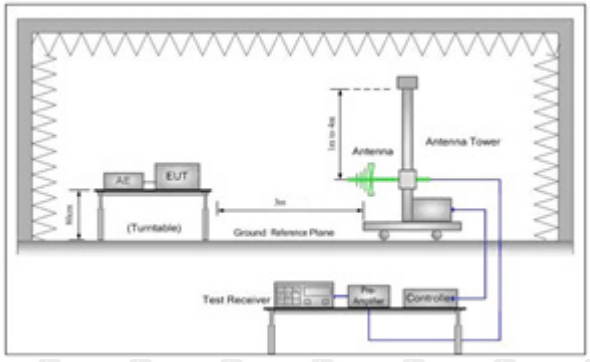


Figure 2. 30MHz to 1GHz

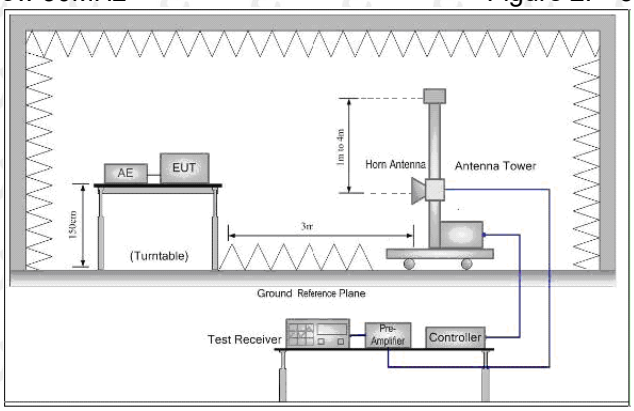


Figure 3. Above 1GHz

7.2 Limit

Spurious Emissions:

Frequency	Field strength (dBμV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	20log 2400/F (kHz) + 80	Quasi-peak	3
0.490MHz-1.705MHz	20log 24000/F (kHz) + 40	Quasi-peak	3
1.705MHz-30MHz	20log 30 + 40	Quasi-peak	3
30MHz-88MHz	40.0	Quasi-peak	3
88MHz-216MHz	43.5	Quasi-peak	3
216MHz-960MHz	46.0	Quasi-peak	3
960MHz-1GHz	54.0	Quasi-peak	3
Above 1GHz	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

If radiated measurements are performed, field strength is then converted to EIRP as follows:
(i) EIRP = ((E*d)^2) / 30
where:
• E is the field strength in V/m;
• d is the measurement distance in meters;
• EIRP is the equivalent isotropically radiated power in watts.
(ii) Working in dB units, the above equation is equivalent to:
EIRP[dBm] = E[dBμV/m] + 20 log(d[meters]) - 104.77
(iii) Or, if d is 3 meters:
EIRP[dBm] = E[dBμV/m] - 95.2

7.3 Test procedure

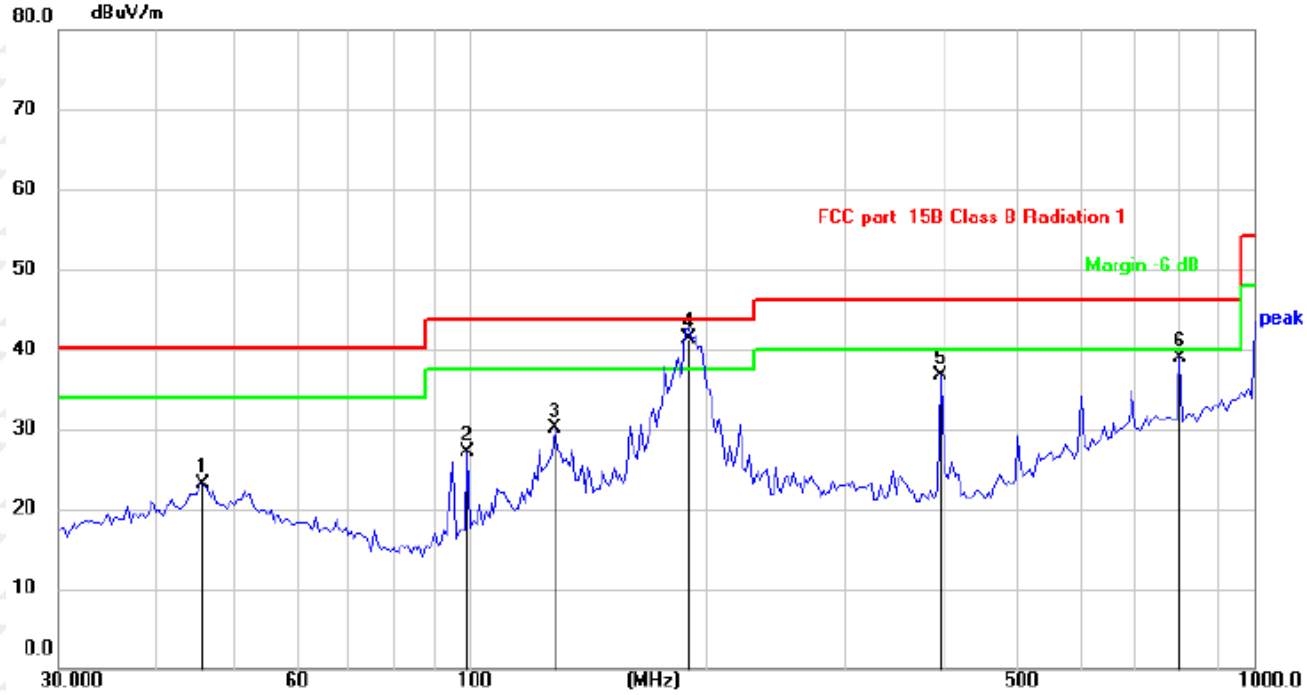
Below 1GHz test procedure as below:
a.The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b.The EUT was set 3 meters away from the interference-receiving 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table 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.If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Above 1GHz test procedure as below:
g.Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).
h.Test the EUT in the lowest channel ,the middle channel ,the Highest channel
j.Repeat above procedures until all frequencies measured was complete.

Receiver set:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30KHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30KHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30KHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30KHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30KHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120 kHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

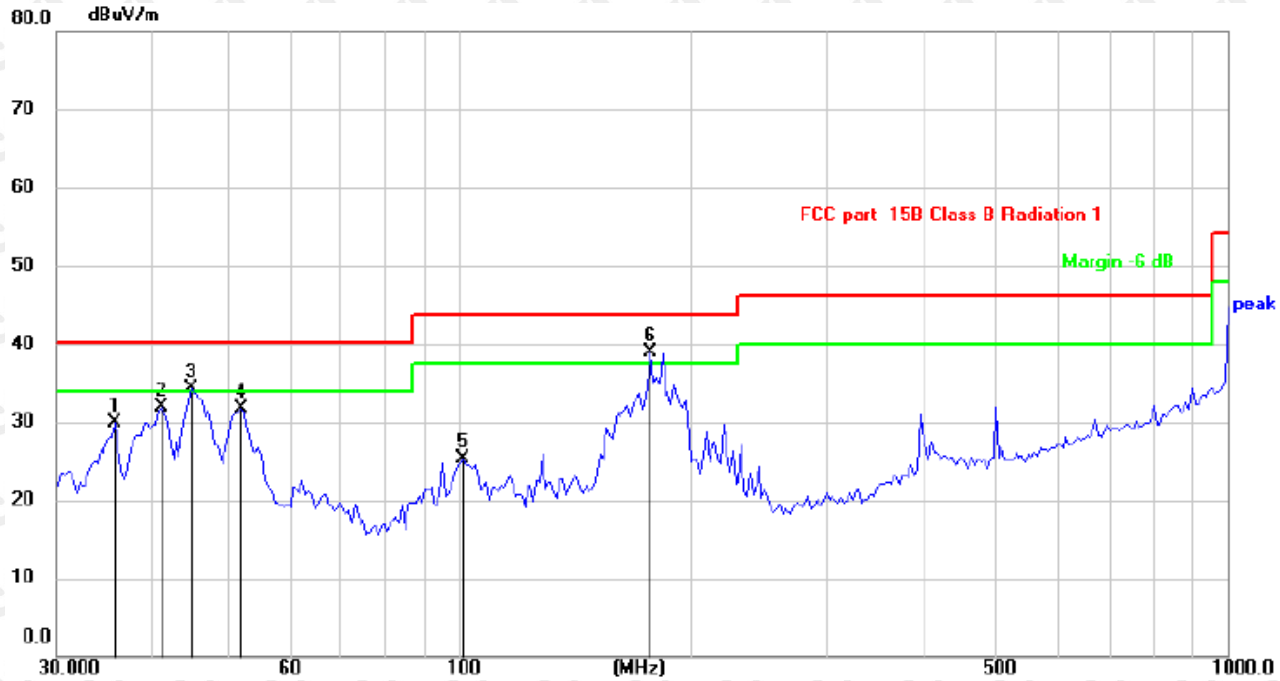
7.4 Test Result

30MHz-1GHzTest Results:
Modulation : 802.11a (the worst data)
Test Channel : 5780MHz
Antenna polarity: H



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		45.6946	30.04	-6.95	23.09	40.00	-16.91	QP
2		99.7026	37.59	-10.41	27.18	43.50	-16.32	QP
3		128.5629	38.23	-8.20	30.03	43.50	-13.47	QP
4	*	190.7390	51.02	-9.71	41.31	43.50	-2.19	QP
5		398.3312	41.35	-4.70	36.65	46.00	-9.35	QP
6		803.1933	34.91	4.08	38.99	46.00	-7.01	QP

Antenna polarity: V



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		35.7490	37.13	-7.21	29.92	40.00	-10.08	QP
2		41.1320	38.67	-6.81	31.86	40.00	-8.14	QP
3	!	44.9006	41.17	-6.92	34.25	40.00	-5.75	QP
4		52.1164	38.94	-7.26	31.68	40.00	-8.32	QP
5		101.4662	35.51	-10.24	25.27	43.50	-18.23	QP
6	*	177.8206	47.24	-8.39	38.85	43.50	-4.65	QP

Remark: Factor = Cable lose + Antenna factor - Pre-amplifier; Margin = Measurement – Limit

Radiated Spurious Emission (Above 1GHz):

ANT 1

Modulation : 802.11(a) (the worst data)

Freq (MHz)	Rd_level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	detector	Height	Degree	Antenna polarization
Channel:5180MHz									
10360	42.11	16.34	58.45	74	-15.55	PK	1.4	355	H
10360	25.79	16.34	42.13	54	-11.87	AV	1.2	100	H
10360	40.85	16.34	57.19	74	-16.81	PK	1.8	272	V
10360	26.62	16.34	42.96	54	-11.04	AV	1.2	257	V
Channel:5240MHz									
10480	39.75	16.15	55.90	74	-18.10	PK	1.0	6	H
10480	26.30	16.15	42.45	54	-11.55	AV	1.8	163	H
10480	42.48	16.15	58.63	74	-15.37	PK	1.4	149	V
10480	28.54	16.15	44.69	54	-9.31	AV	1.8	290	V
Channel:5745MHz									
11490	43.62	17.49	61.11	74	-12.89	PK	1.3	63	H
11490	27.42	17.49	44.91	54	-9.09	AV	1.2	277	H
11490	43.05	17.49	60.54	74	-13.46	PK	1.2	186	V
11490	26.79	17.49	44.28	54	-9.72	AV	1.9	28	V
Channel:5825MHz									
11650	40.34	17.52	57.86	74	-16.14	PK	1.4	109	H
11650	27.22	17.52	44.74	54	-9.26	AV	1.4	61	H
11650	42.39	17.52	59.91	74	-14.09	PK	1.3	358	V
11650	28.54	17.52	46.06	54	-7.94	AV	1.8	138	V

Modulation : 802.11(n40) (the worst data)

Freq (MHz)	Rd_level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	detector	Height	Degree	Antenna polarization
Channel:5190MHz									
10380	40.76	17.52	58.28	74	-15.72	PK	308	1.4	H
10380	26.86	17.52	44.38	54	-9.62	AV	121	1.7	H
10380	41.51	17.52	59.03	74	-14.97	PK	205	1.5	V
10380	24.19	17.52	41.71	54	-12.29	AV	235	1.4	V
Channel:5230MHz									
10460	40.19	16.25	56.44	74	-17.56	PK	6	1.4	H
10460	26.89	16.25	43.14	54	-10.86	AV	245	1.5	H
10460	42.49	16.25	58.74	74	-15.26	PK	251	1.7	V
10460	28.60	16.25	44.85	54	-9.15	AV	39	1.3	V
Channel:5755MHz									
11510	39.03	17.5	56.53	74	-17.47	PK	308	1.4	H
11510	28.53	17.5	46.03	54	-7.97	AV	121	1.7	H
11510	43.30	17.5	60.80	74	-13.20	PK	205	1.5	V
11510	28.79	17.5	46.29	54	-7.71	AV	235	1.4	V
Channel:5795MHz									
11590	40.58	17.5	58.08	74	-15.92	PK	308	1.4	H
11590	26.48	17.5	43.98	54	-10.02	AV	121	1.7	H
11590	41.91	17.5	59.41	74	-14.59	PK	205	1.5	V
11590	26.70	17.5	44.20	54	-9.80	AV	235	1.4	V

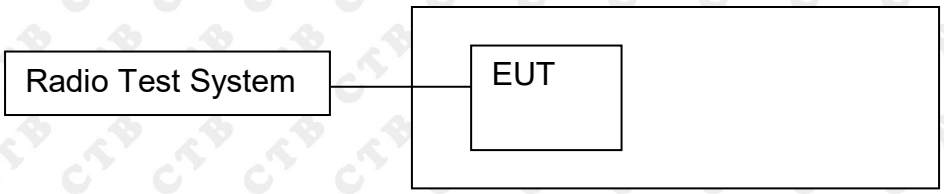
Modulation : 802.11(VH80) (the worst data)

Freq (MHz)	Rd_level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	detector	Height	Degree	Antenna polarization
Channel:5210MHz									
10420	54.35	8.53	62.88	74	-11.12	PK	1.6	360	H
10420	37.53	12.59	50.12	54	-3.88	AV	1.7	256	H
10420	54.43	8.53	62.96	74	-11.04	PK	1.7	100	V
10420	37.86	12.59	50.45	54	-3.55	AV	1.7	293	V
Channel:5775MHz									
11550	41.72	16.25	57.97	74	-16.03	PK	1.4	136	H
11550	25.33	16.25	41.58	54	-12.42	AV	1.8	216	H
11550	40.59	16.25	56.84	74	-17.16	PK	1.9	194	V
11550	26.27	16.25	42.52	54	-11.48	AV	1.4	46	V

Remark:
1.Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits
2.The EUT was tested in the low, high channel and the worst case position data was reported.
3.Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

8. BAND EDGE

8.1 Block Diagram Of Test Setup



8.2 Limit

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/MHz.
(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

8.3 Test procedure

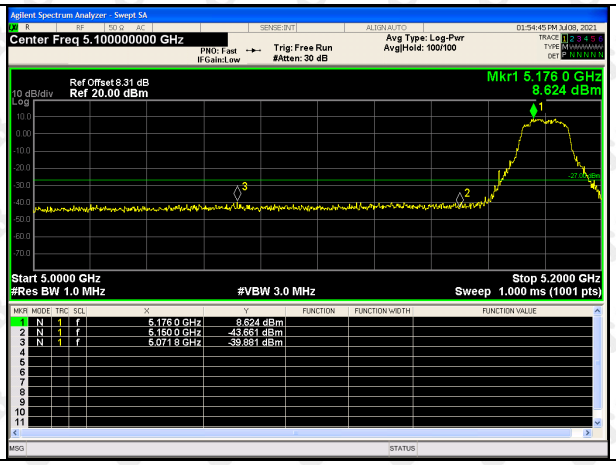
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

8.4 Test Result

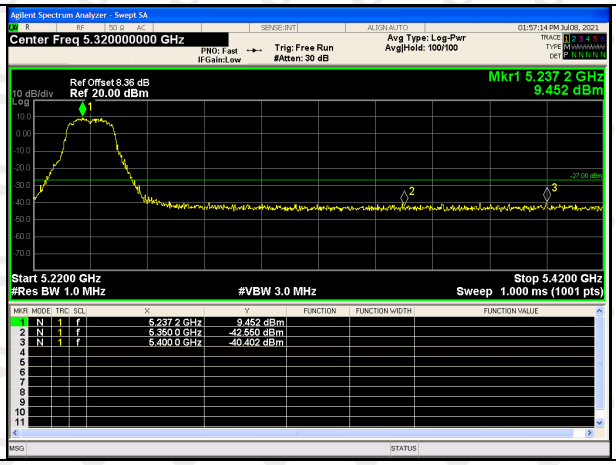
Test Graph

5180-5210MHz ANT 1

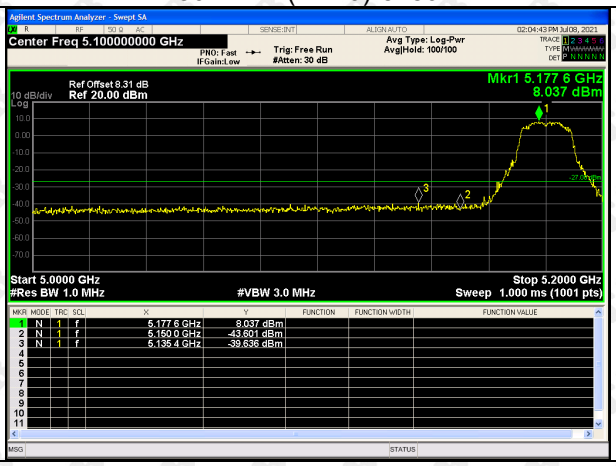
802.11a-5180



802.11a-5240



802.11ac(VH20)-5180



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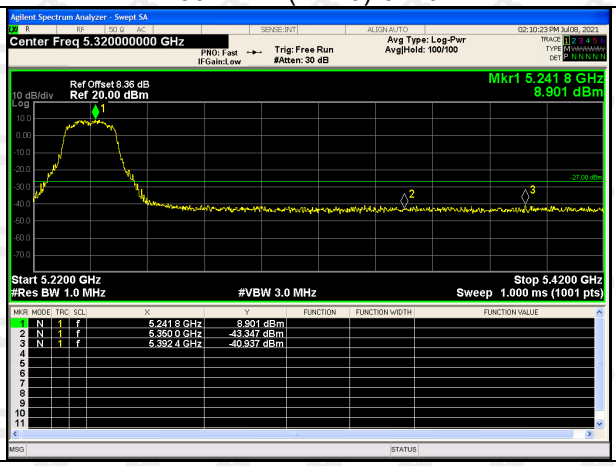
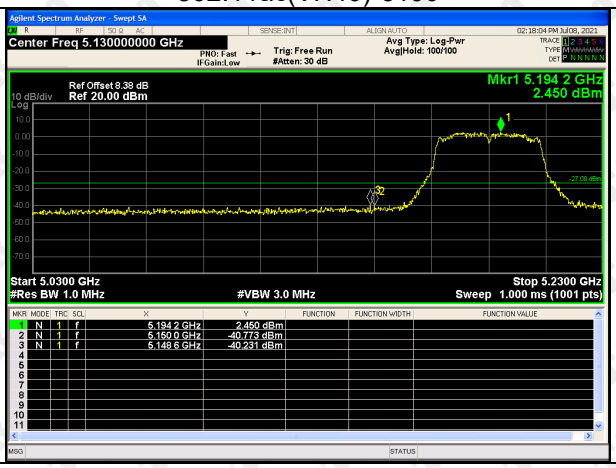
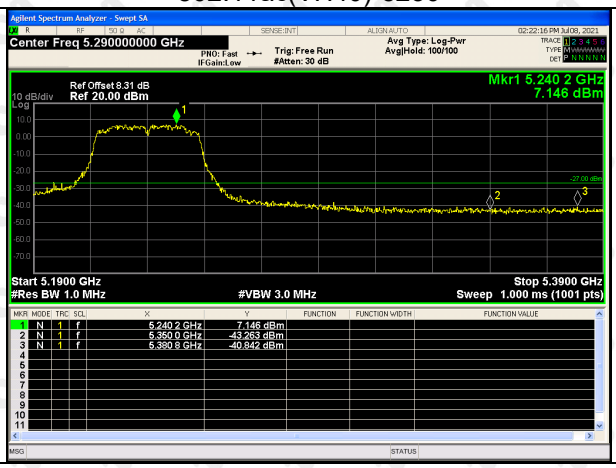


802.11ac(VH40)-5190

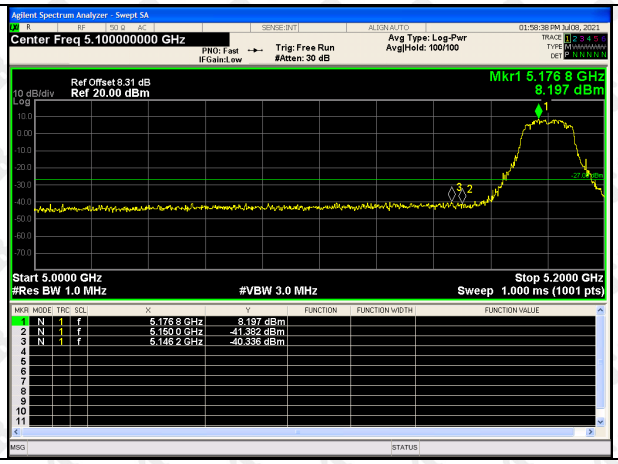


802.11ac(VH40)-5230



802.11n(HT20)-5180

802.11n(HT20)-5240



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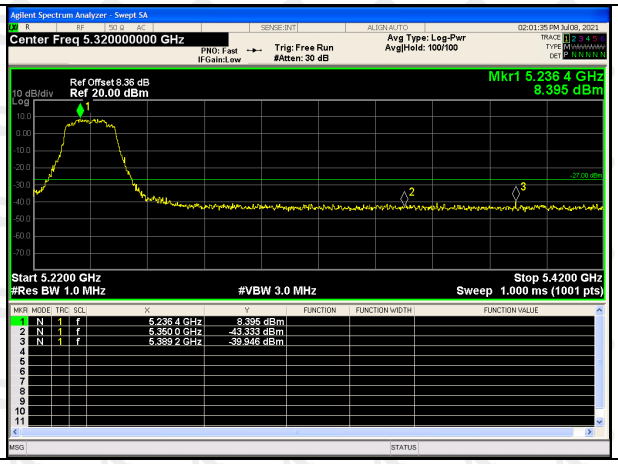

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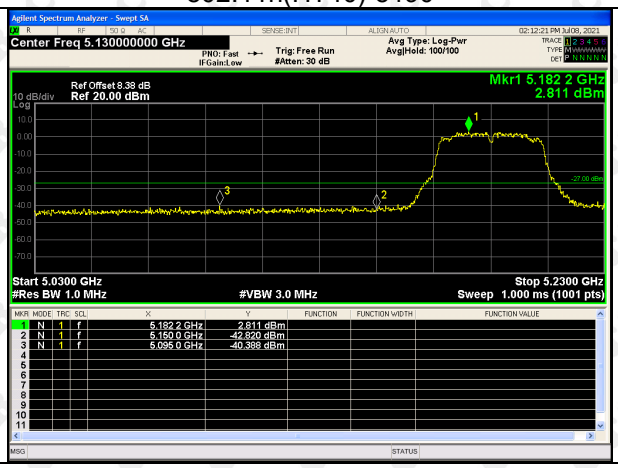

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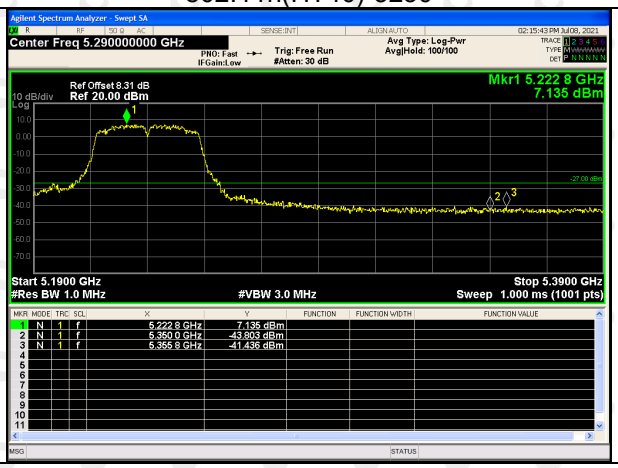
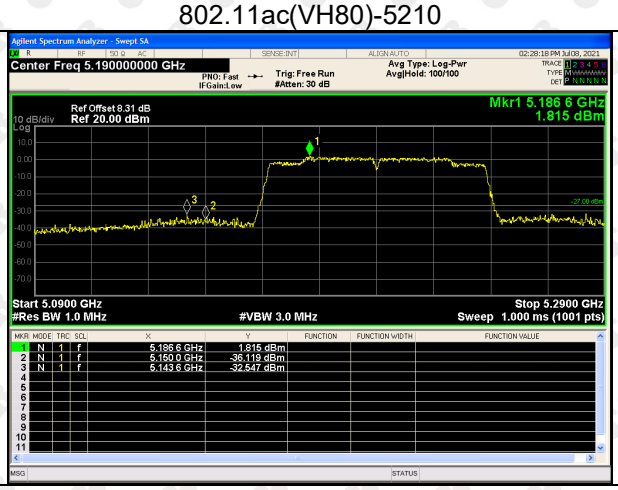
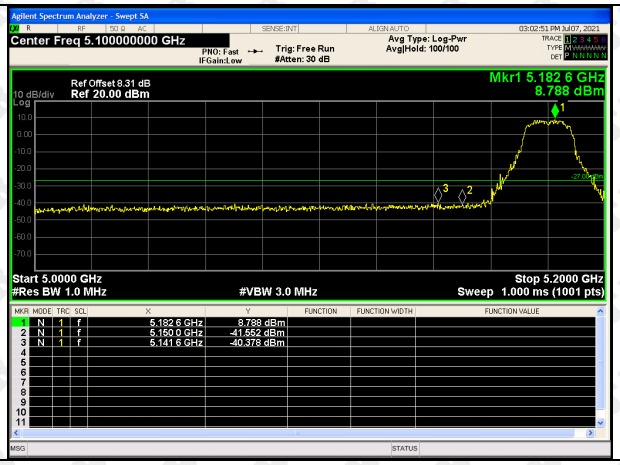
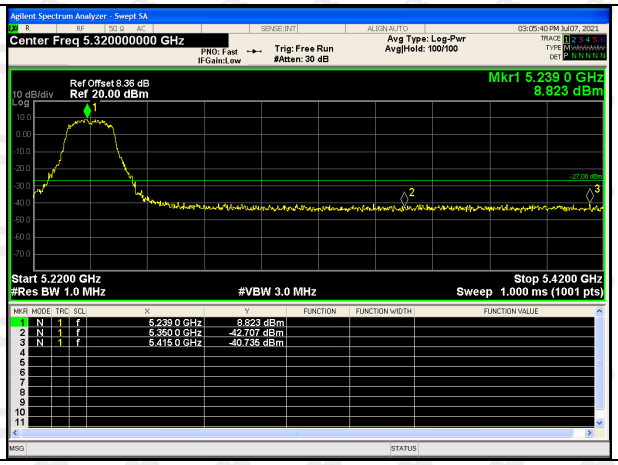
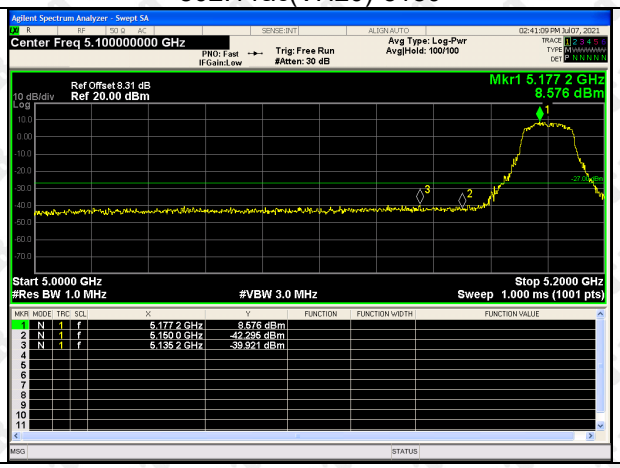
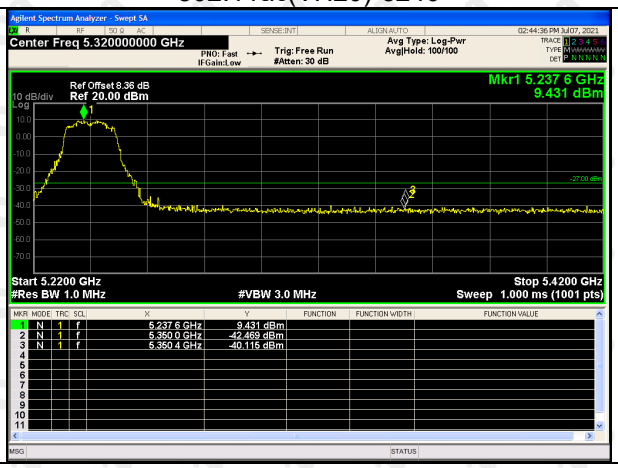




5180-5210MHz ANT 2

802.11a-5180	802.11a-5240
	
802.11ac(VH20)-5180	802.11ac(VH20)-5240
	
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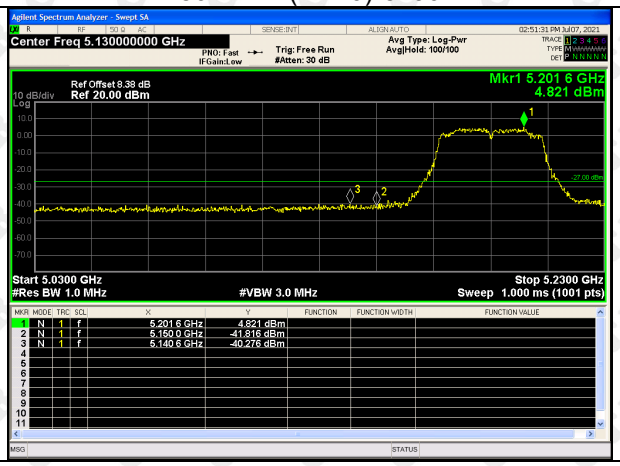
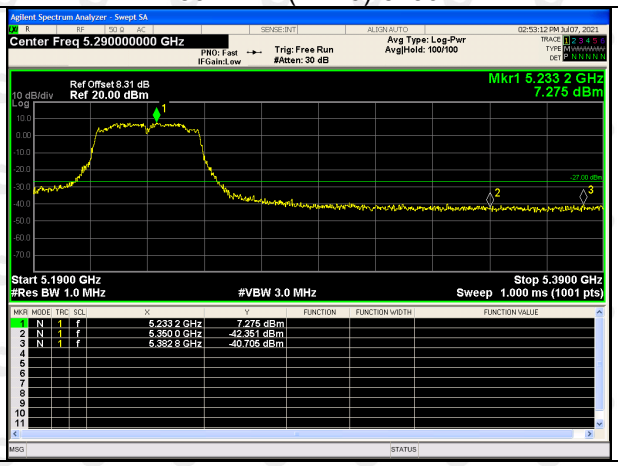
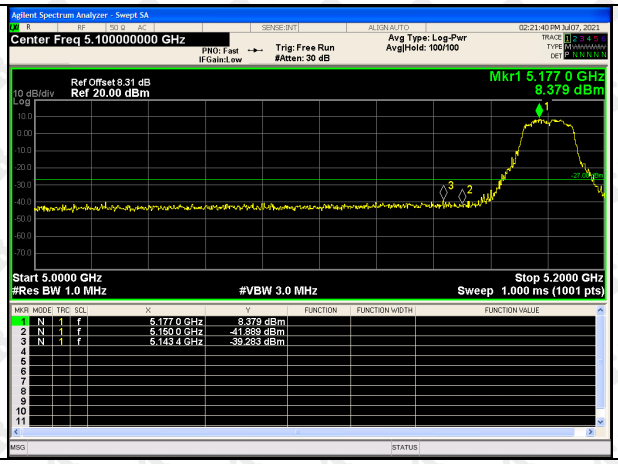
	
802.11n(HT20)-5180	802.11n(HT20)-5240



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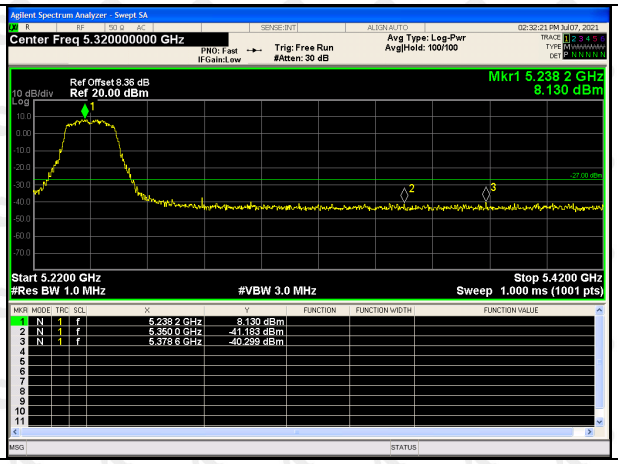

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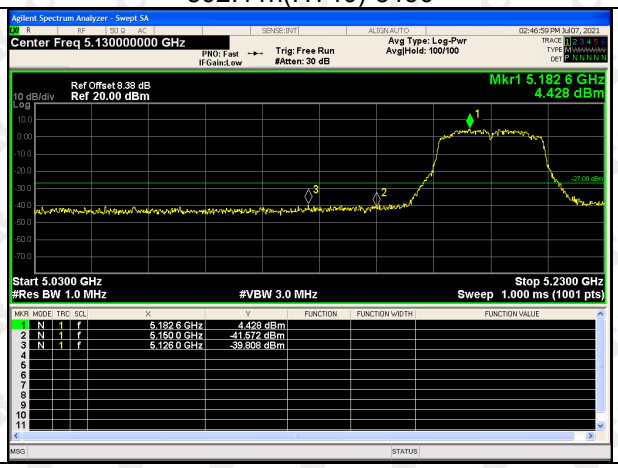

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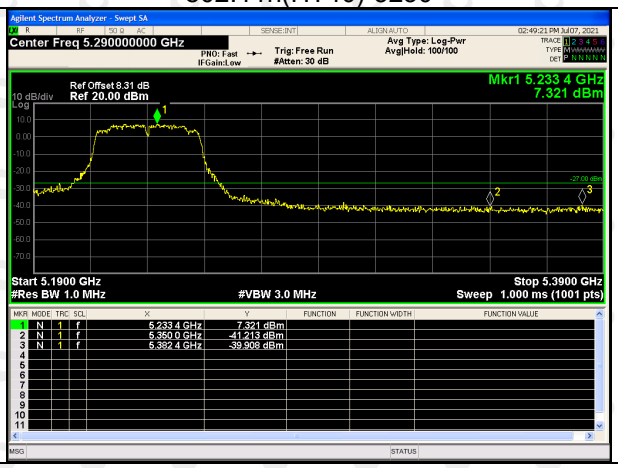
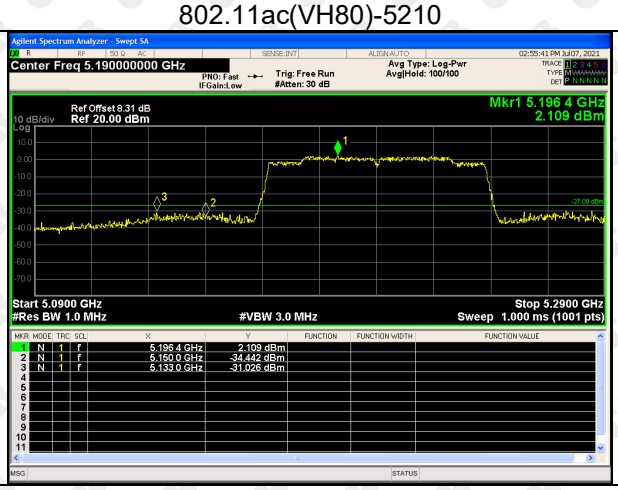
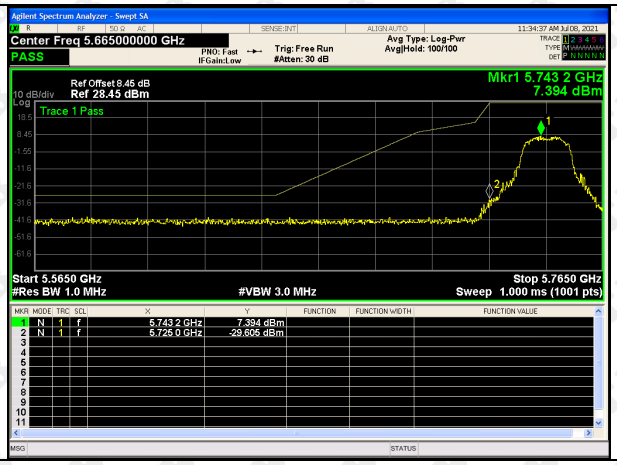


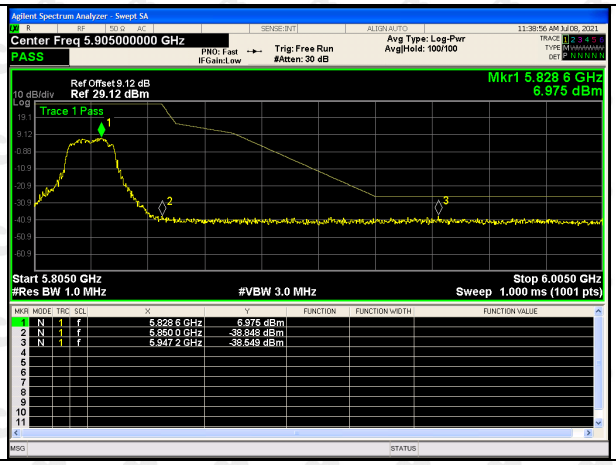


5745-5825MHz ANT 1

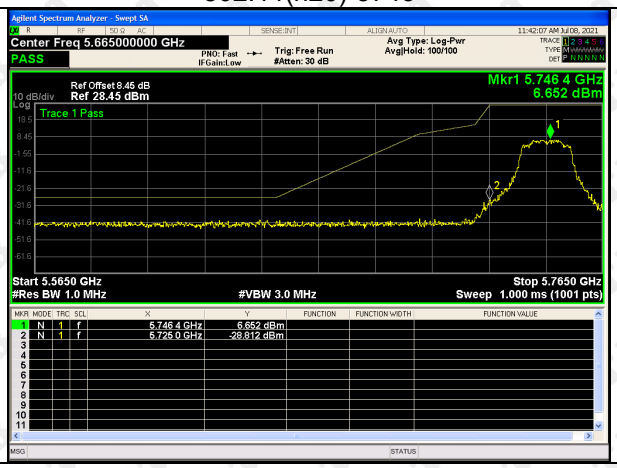
802.11a-5745



802.11a-5825



802.11(n20)-5745



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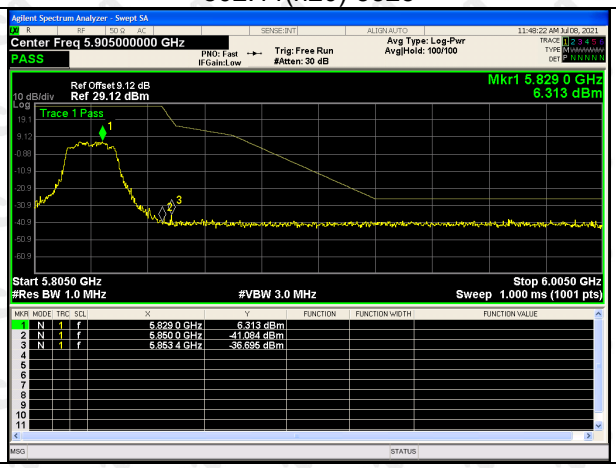

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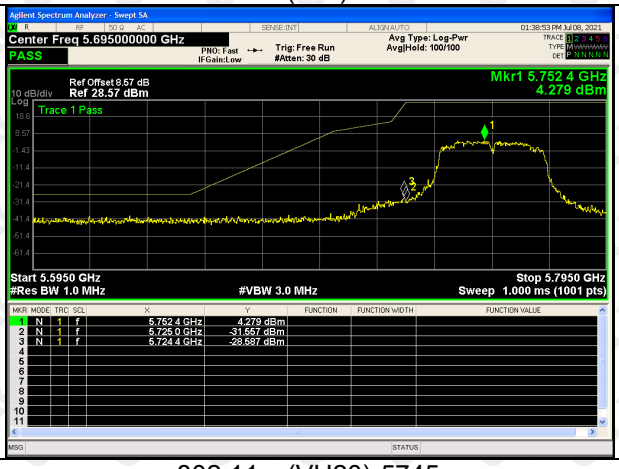

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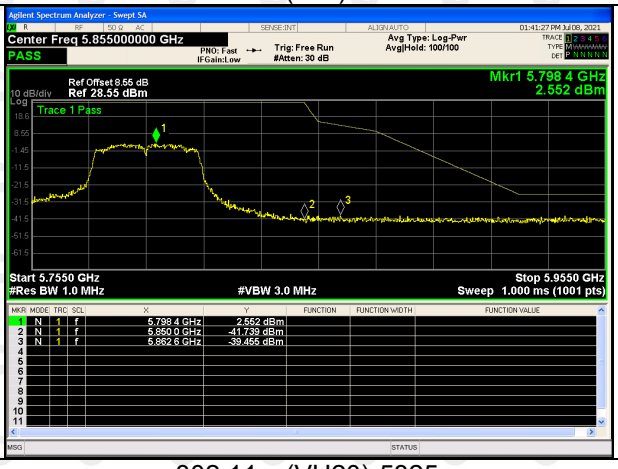
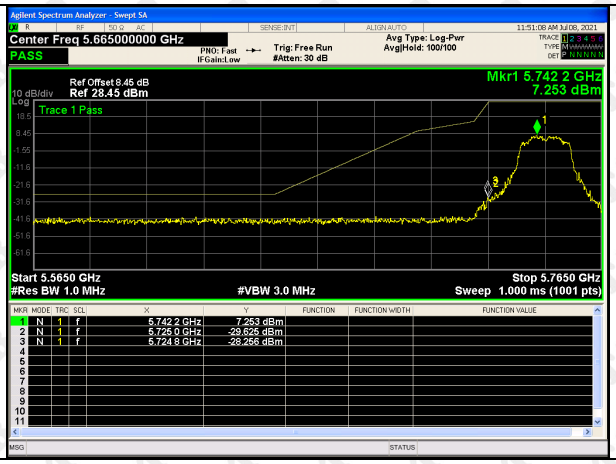


802.11ac(VH20)-5745

802.11ac(VH20)-5825



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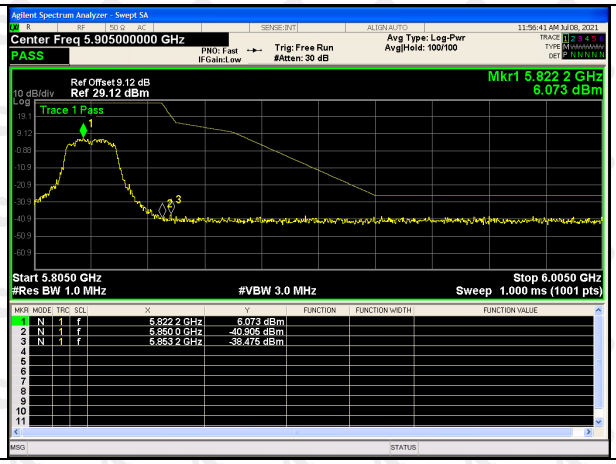

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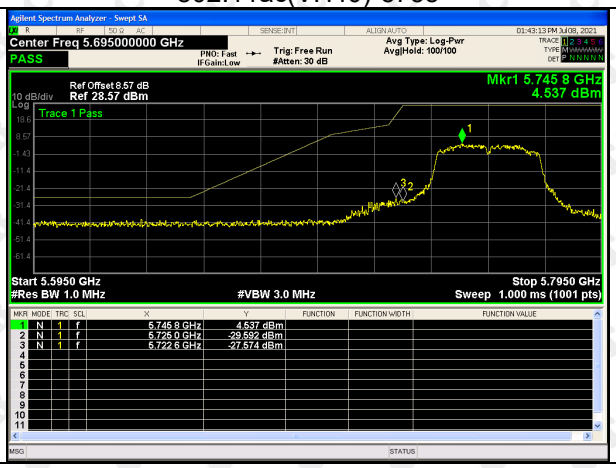

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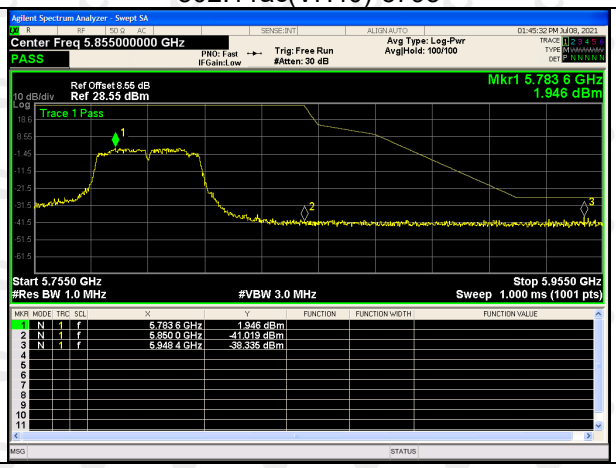
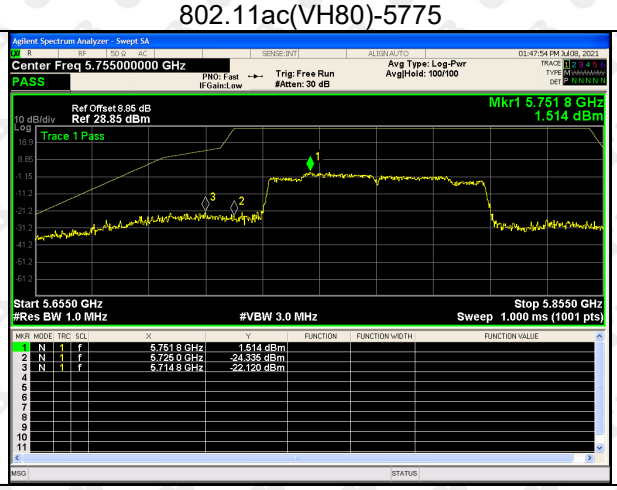
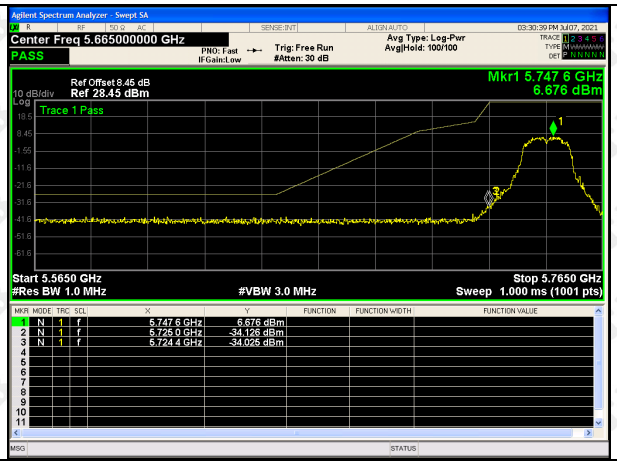
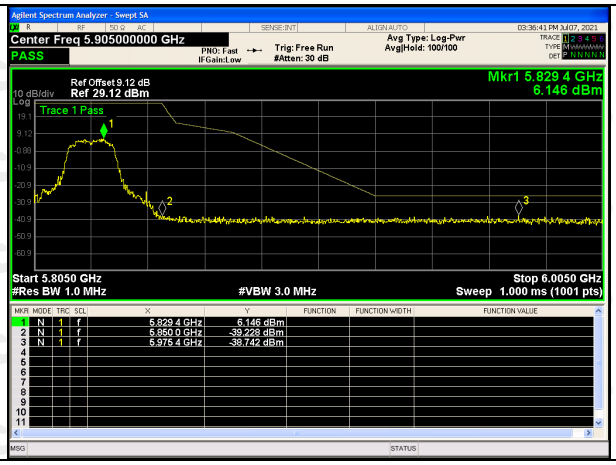




5745-5825MHz ANT 2

802.11a-5745	802.11a-5825
	
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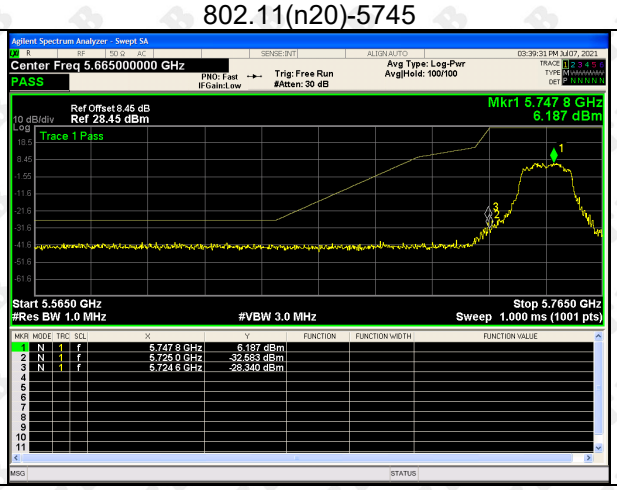	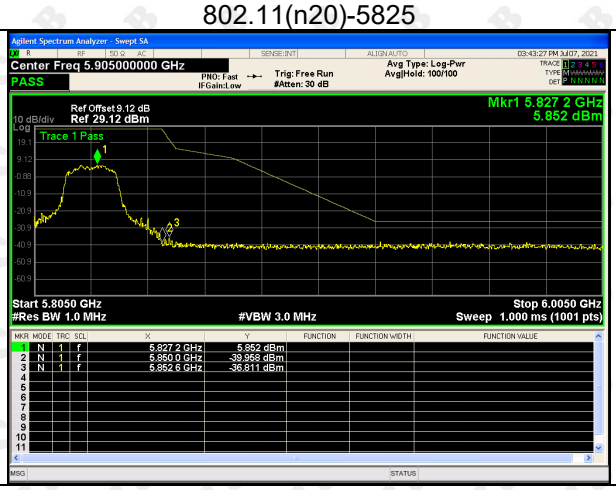
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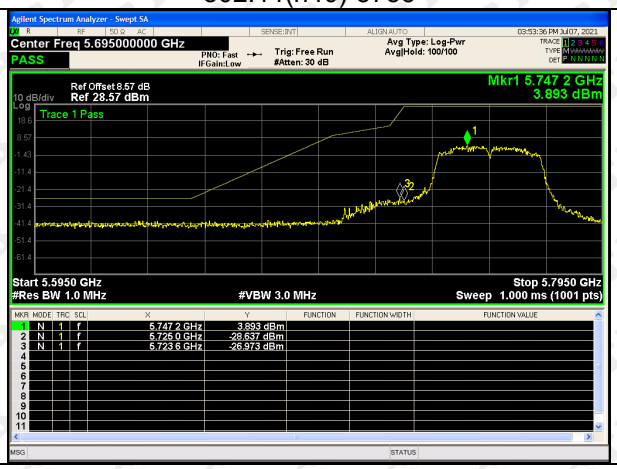	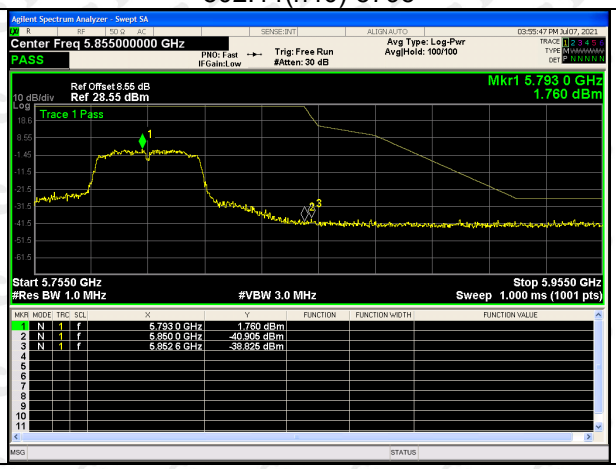
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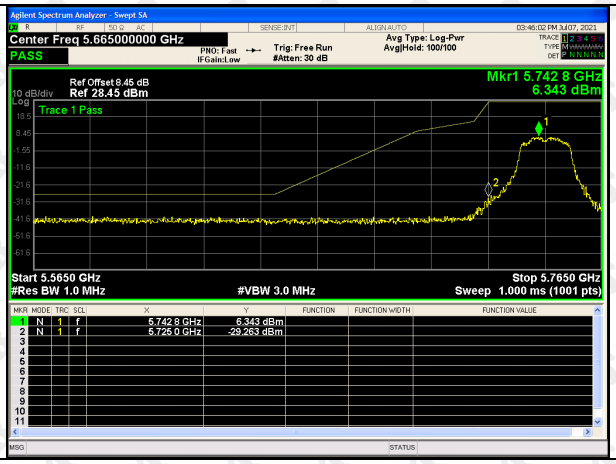

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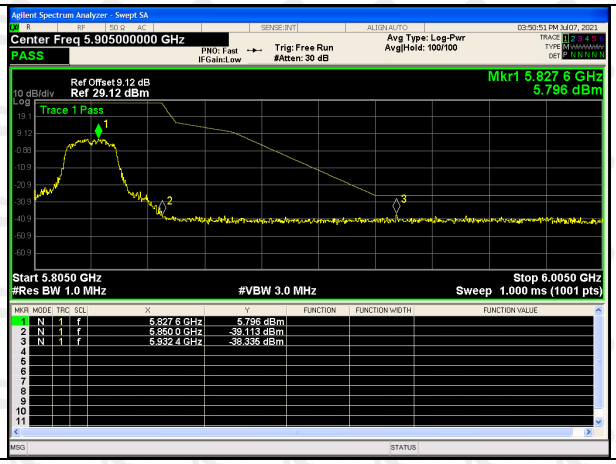

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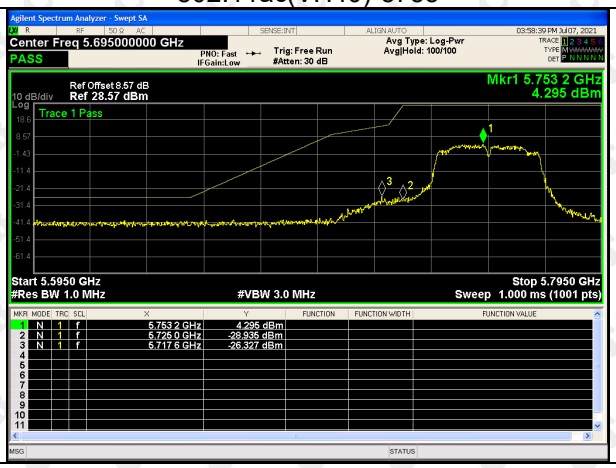

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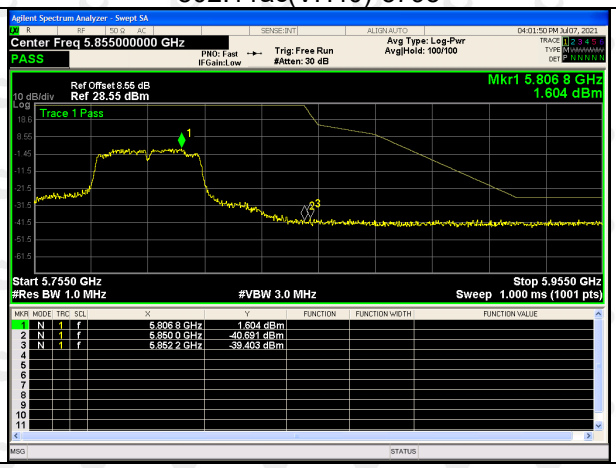
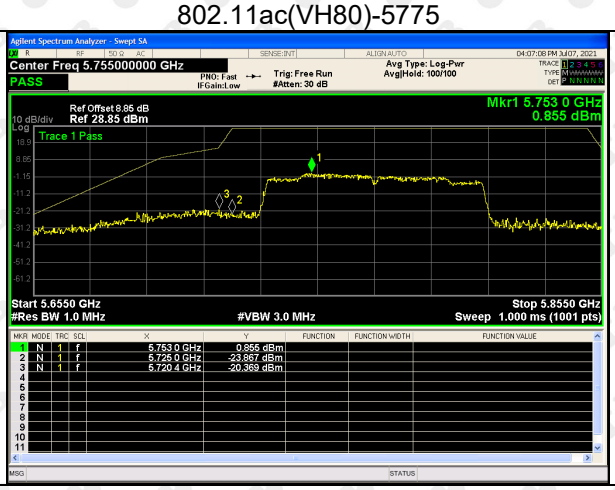
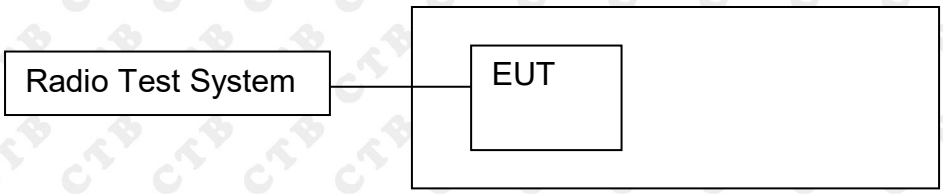




9. CONDUCTED PEAK OUTPUT POWER

9.1 Block Diagram Of Test Setup



9.2 Limit

(1) For the band 5.15-5.25 GHz.
(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p.
at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition,the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
(4) The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.
(5) The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less.

Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

(h) Transmit Power Control (TPC) and Dynamic Frequency Selection (DFS).
(1) Transmit power control (TPC). U-NII devices operating in the 5.25-5.35 GHz band and the 5.47-5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

9.3 Test procedure

According to KDB789033 D02v02r01 sectionE, the following is the measurement procedure.

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

(ii) Set RBW = 1 MHz.

(iii) Set VBW ≥ 3 MHz.

(iv) Number of points in sweep ≥ 2 × span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)

(v) Sweep time = auto.

(vi) Detector = power averaging (rms), if available. Otherwise, use sample detector mode.

(vii) 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.”

(viii) Trace average at least 100 traces in power averaging (rms) mode.

(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

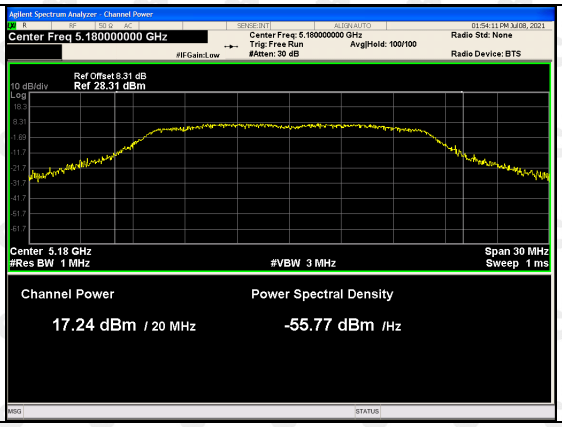
9.4 Test Result

Test mode	Test Channel (MHz)	Output Power dBm ANT 1	Output Power dBm ANT 2	Output Power dBm Total	Limit dBm
802.11a	5180	17.239	18.485	20.917	23.98
	5200	18.412	18.742	21.590	23.98
	5240	19.113	18.85	21.994	23.98
802.11ac20	5180	17.727	17.807	20.777	23.98
	5200	18.302	18.808	21.573	23.98
	5240	18.602	19.255	21.951	23.98
802.11ac40	5190	15.657	16.945	19.359	23.98
	5230	20.031	20.253	23.154	23.98
802.11ac80	5210	17.606	17.605	20.616	23.98
802.11n(HT20)	5180	18.167	18.223	21.205	23.98
	5200	18.758	18.855	21.817	23.98
	5240	18.596	18.959	21.792	23.98
802.11n(HT40)	5190	15.691	17.31	19.586	23.98
	5230	20.006	20.95	23.514	23.98

Test mode1	Test Channel (MHz)	Output Power dBm ANT1	Output Power dBm ANT2	Output Power dBm Total	Limit dBm
802.11a	5745	16.683	16.231	19.473	30
	5785	15.878	15.249	18.585	30
	5825	17.052	16.751	19.914	30
802.11ac20	5745	16.904	16.549	19.740	30
	5785	15.719	15.21	18.482	30
	5825	17.344	16.748	20.067	30
802.11ac40	5755	16.888	17.363	20.142	30
	5795	15.55	15.823	18.699	30
802.11ac80	5775	16.938	16.871	19.915	30
802.11n(HT20)	5745	16.951	16.581	19.780	30
	5785	15.726	15.211	18.486	30
	5825	16.964	16.715	19.852	30
802.11n(HT40)	5755	16.14	17.359	19.802	30
	5795	15.729	13.092	17.618	30

5180-5210MHz ANT1

802.11a-5180



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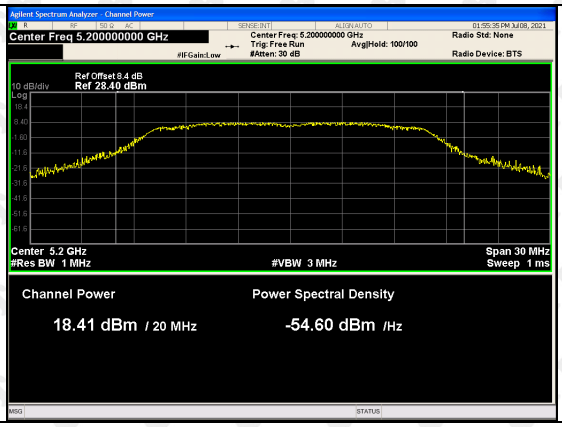

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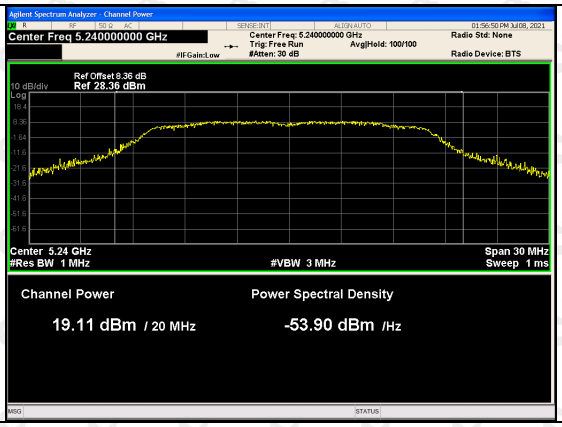

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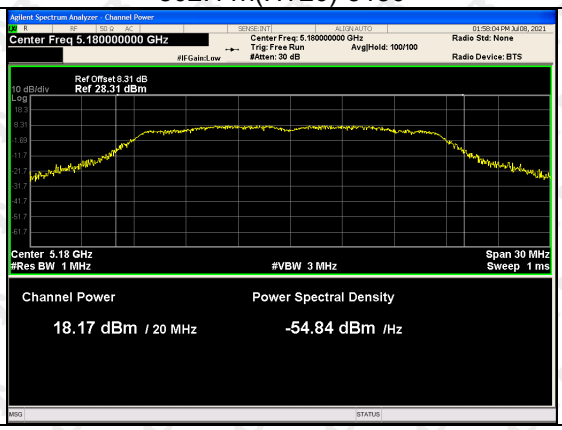

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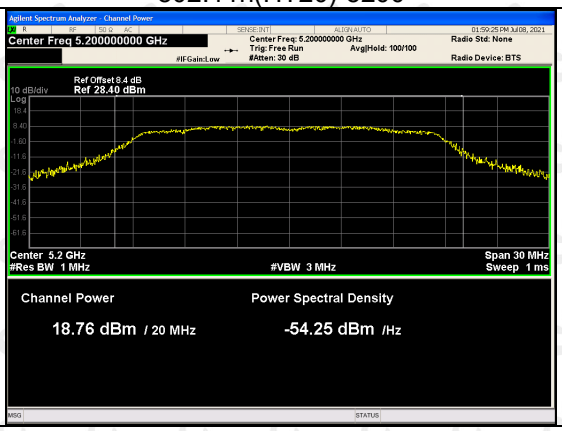

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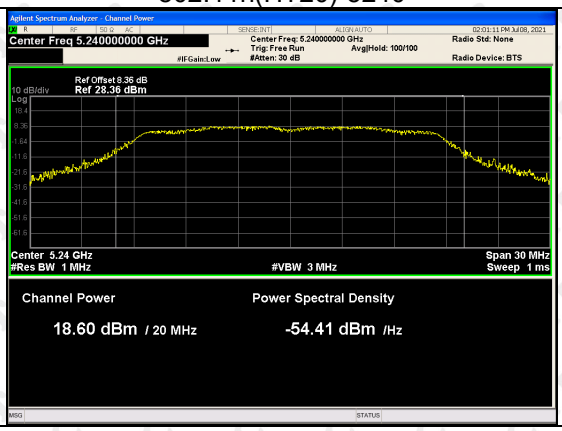

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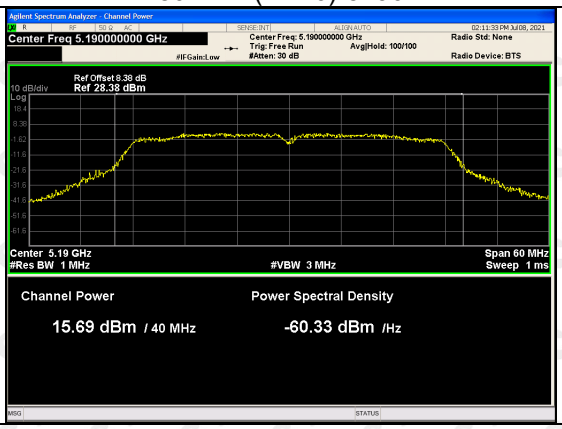

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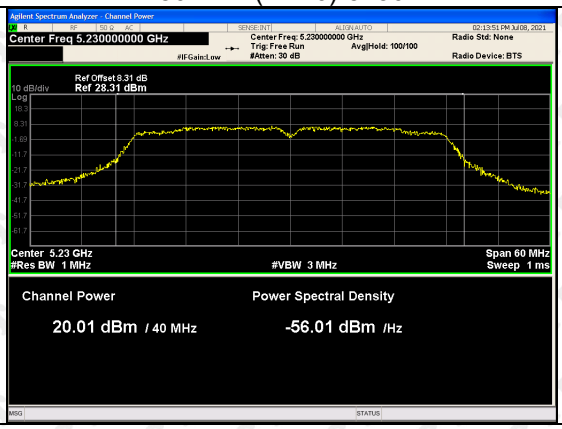

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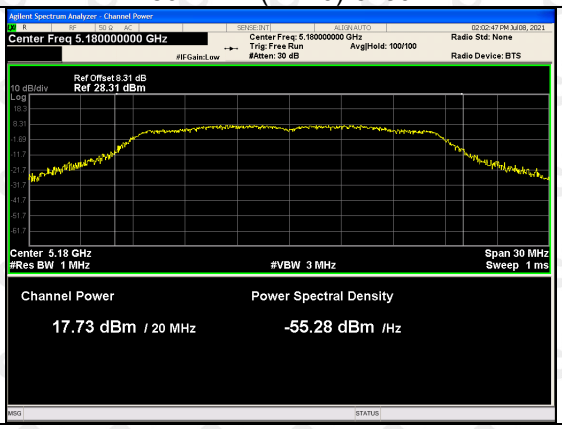

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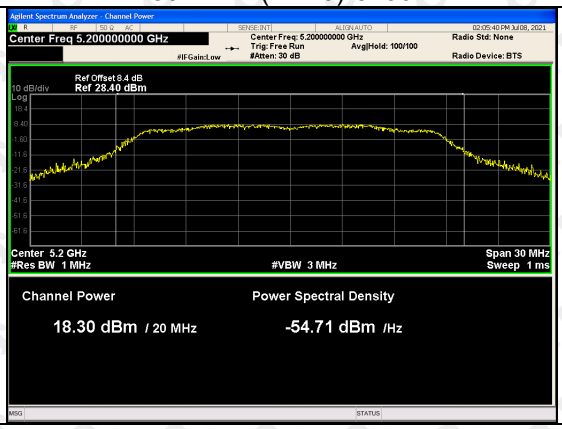

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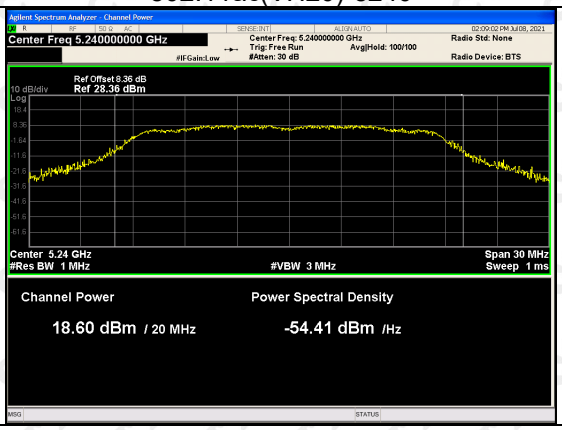

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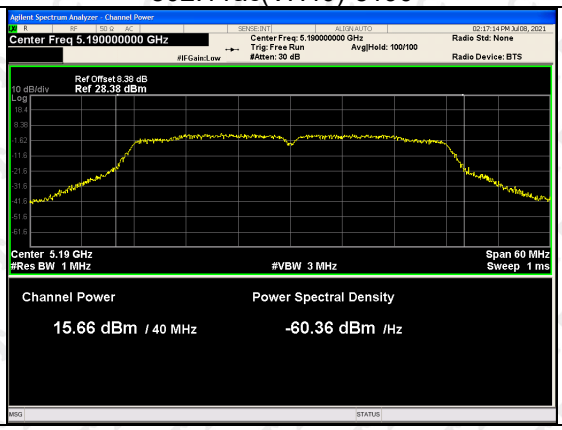

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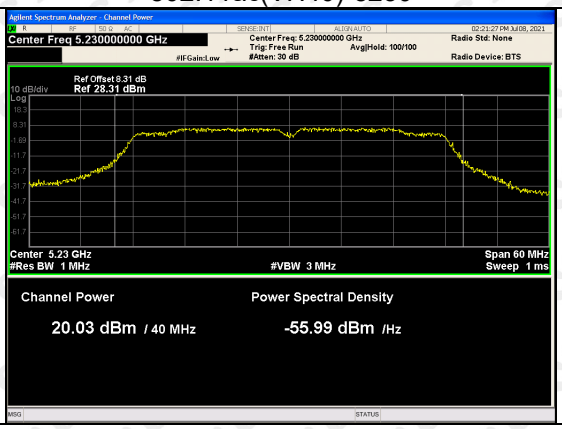

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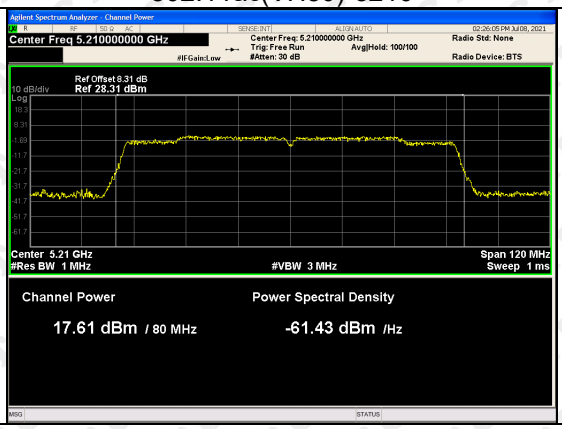
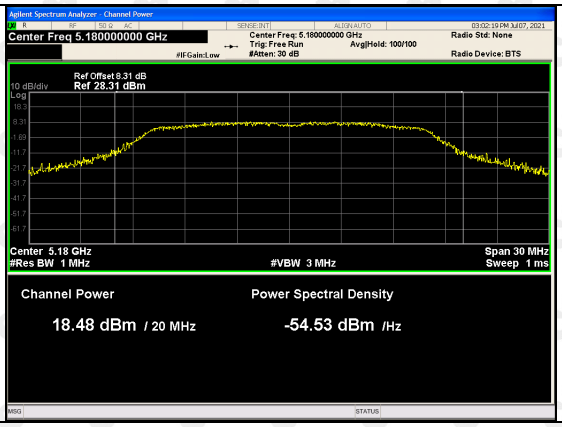


5180-5210MHz ANT2

802.11a-5180



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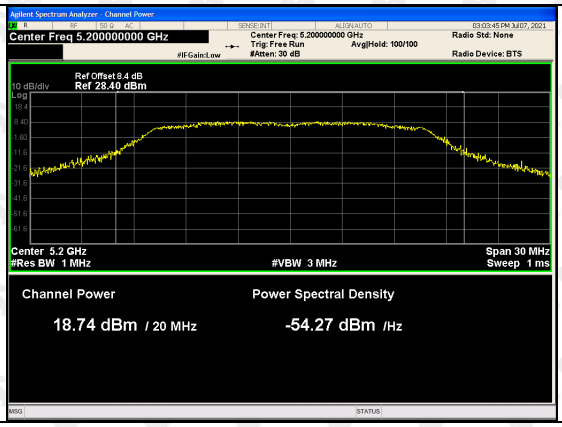

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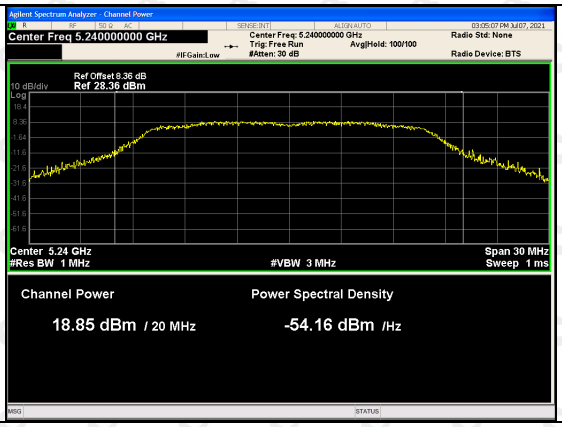

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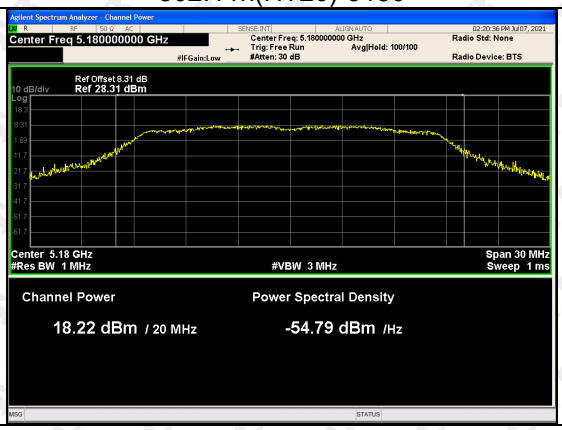

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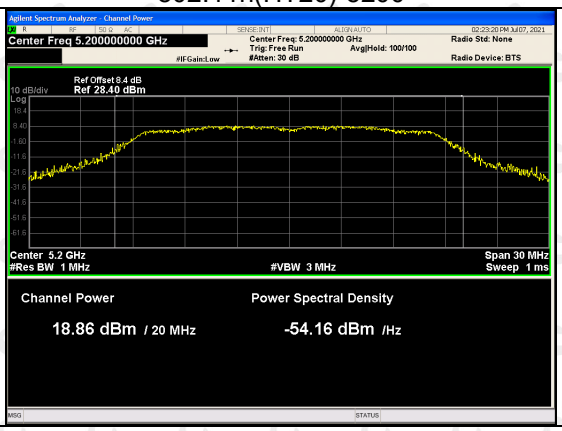

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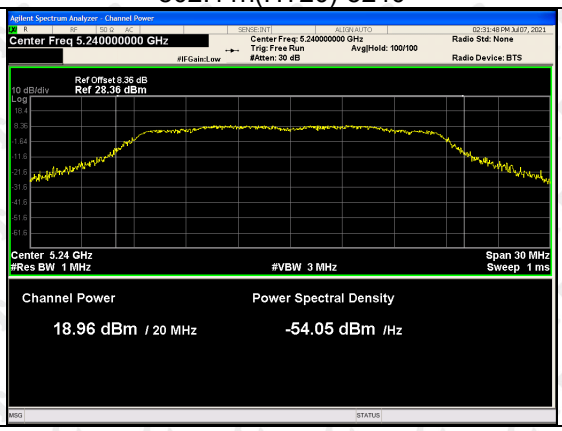

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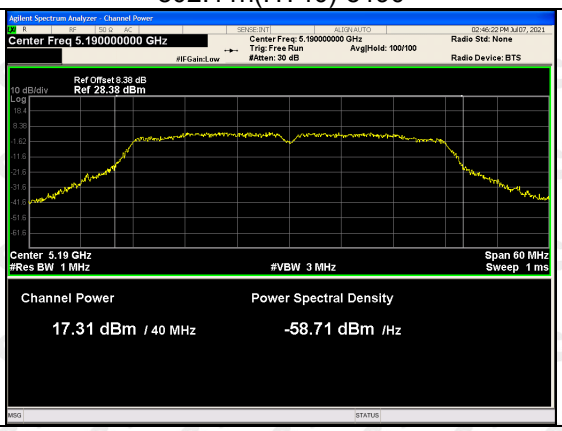

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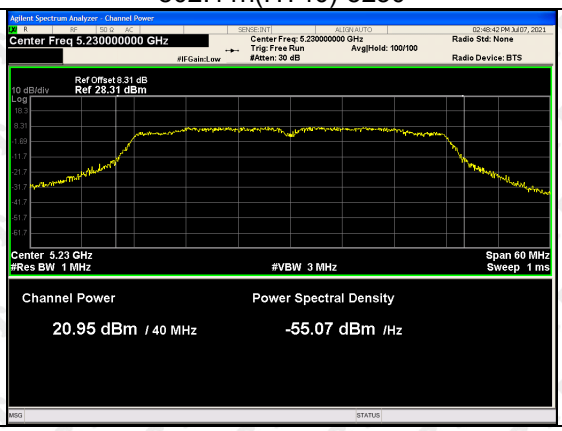

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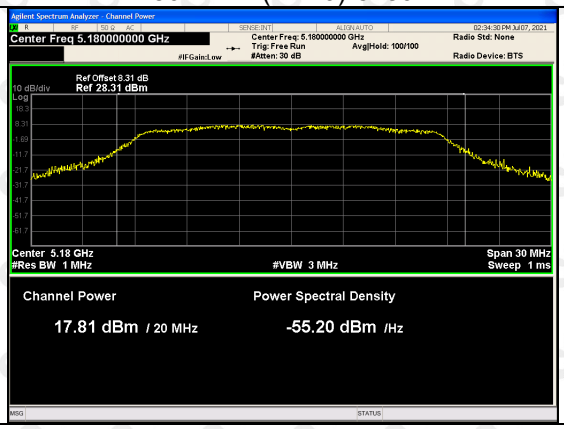

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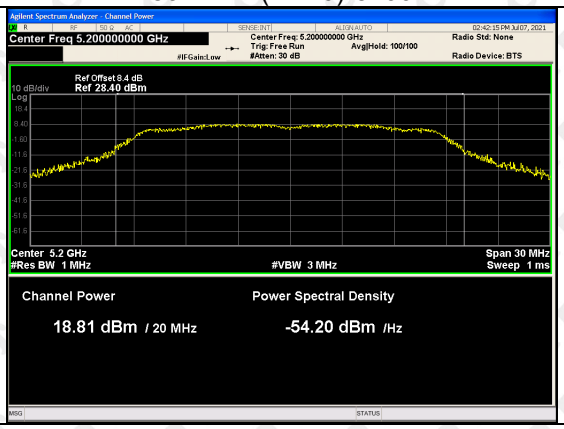

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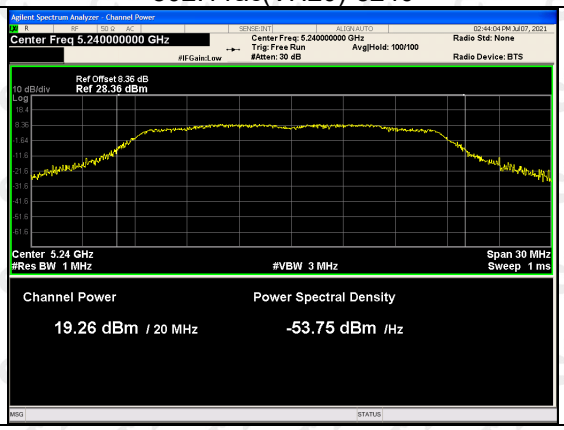

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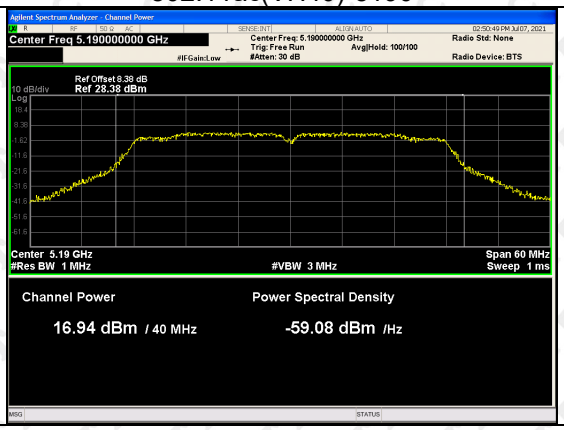

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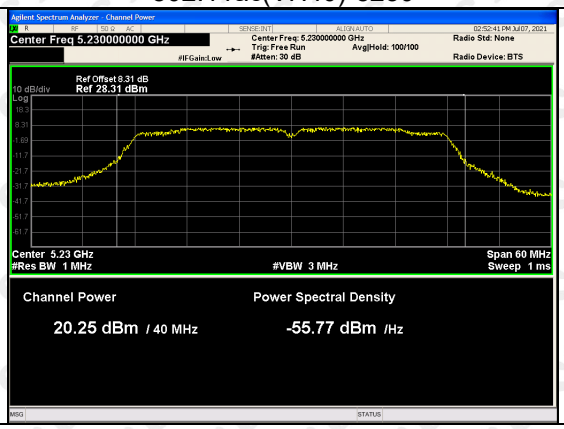

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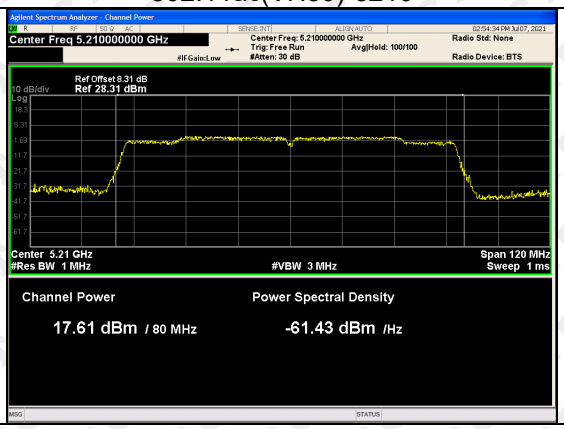
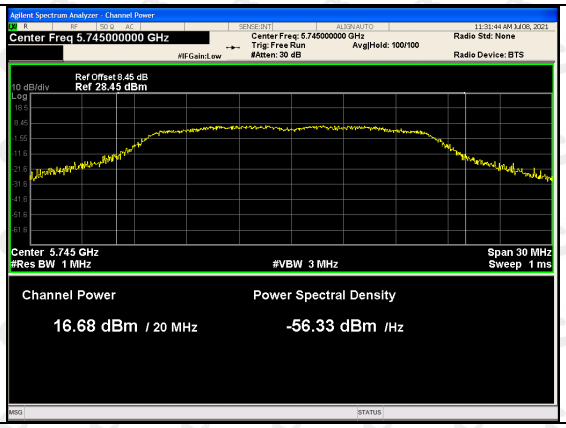


5745-5825MHz ANT 1

802.11a-5745



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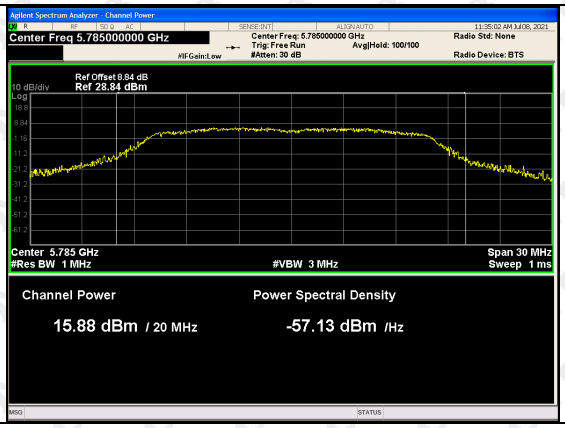

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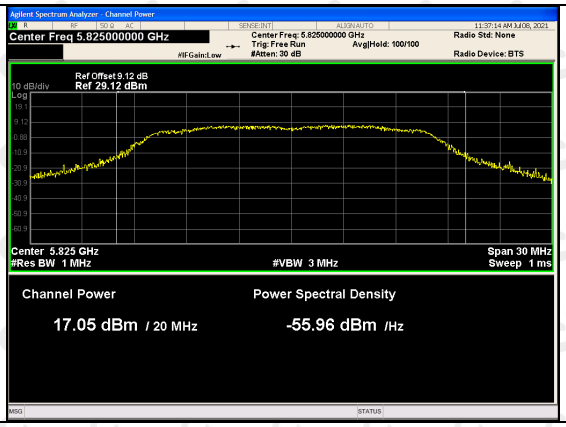

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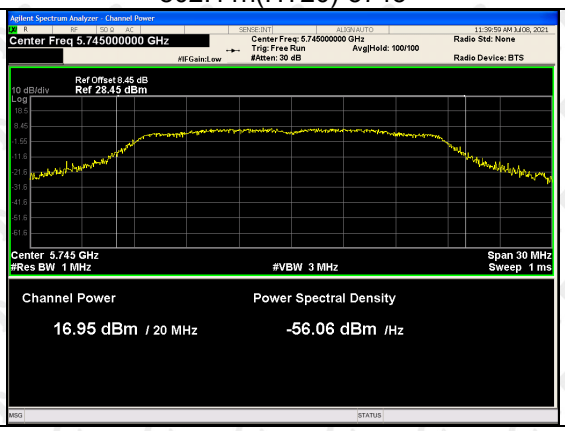

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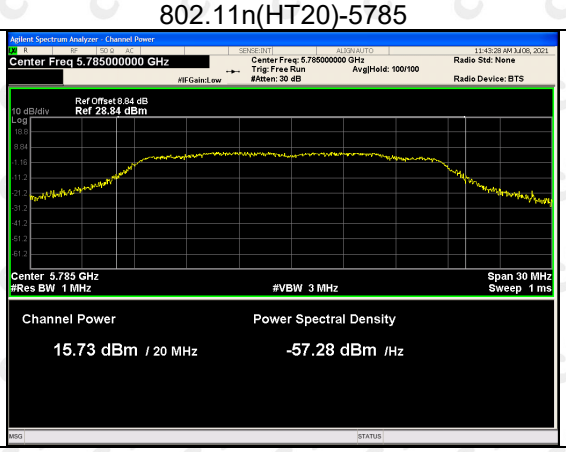

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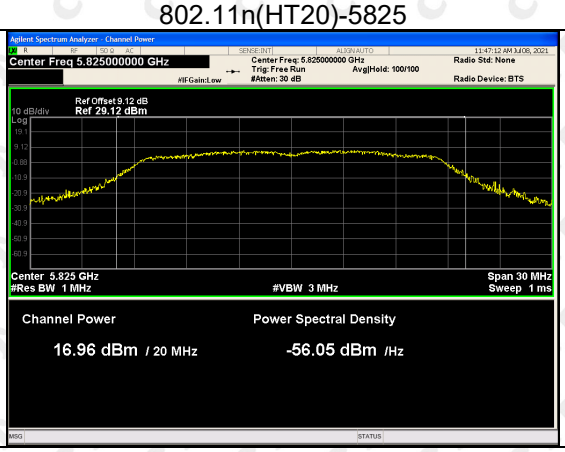

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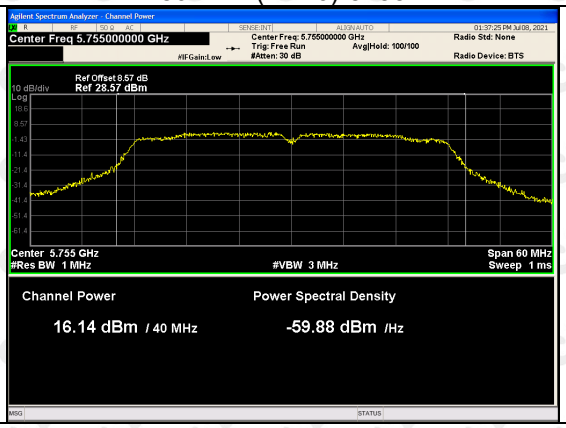

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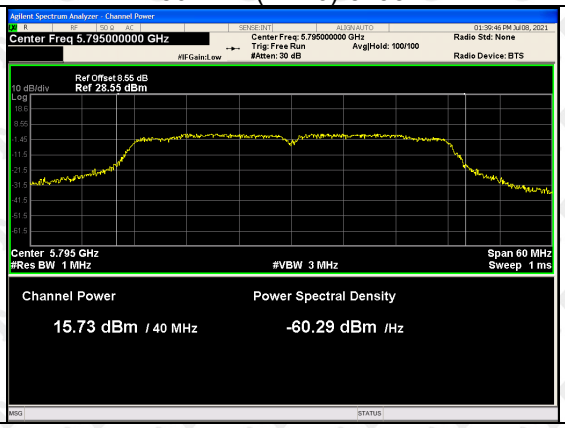

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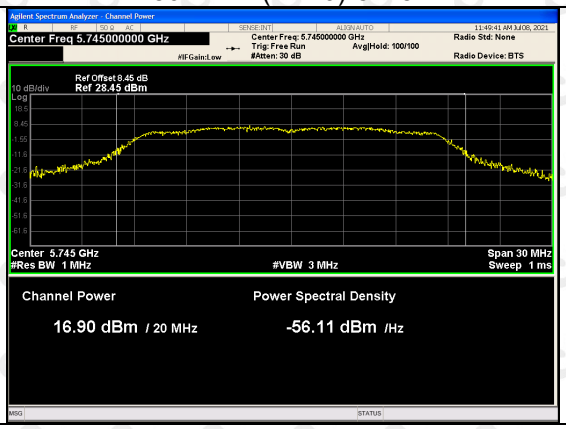

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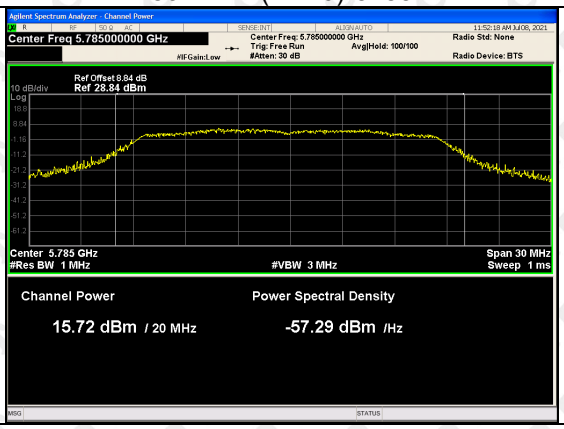

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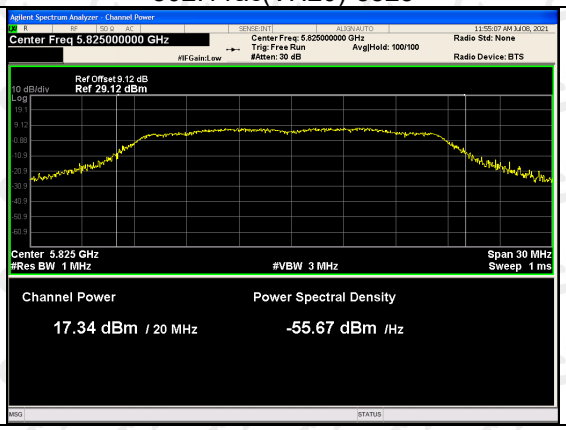

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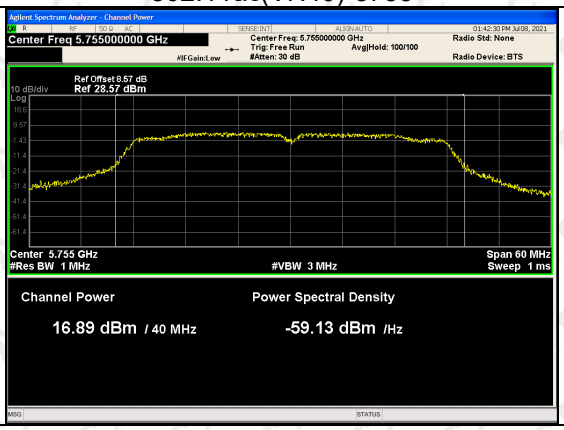

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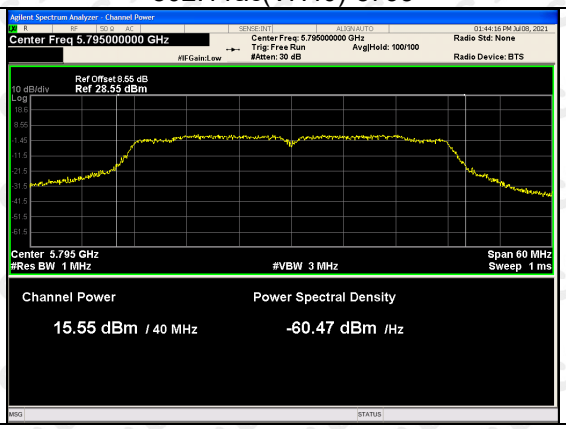

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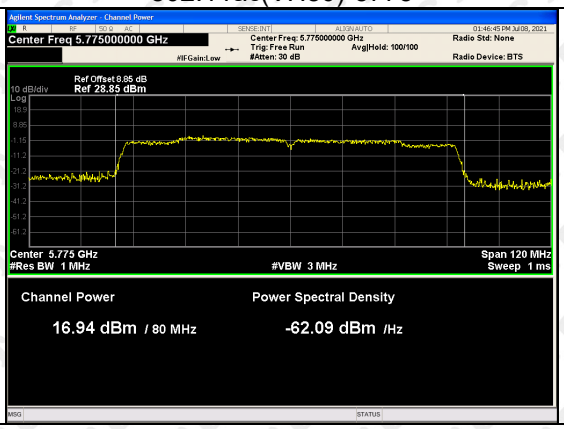
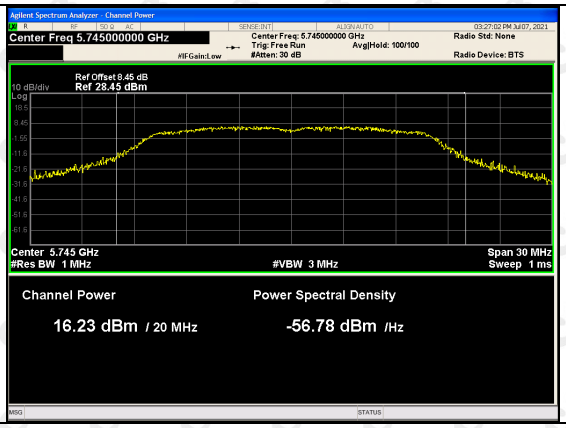


5745-5825MHz ANT 2

802.11a-5745



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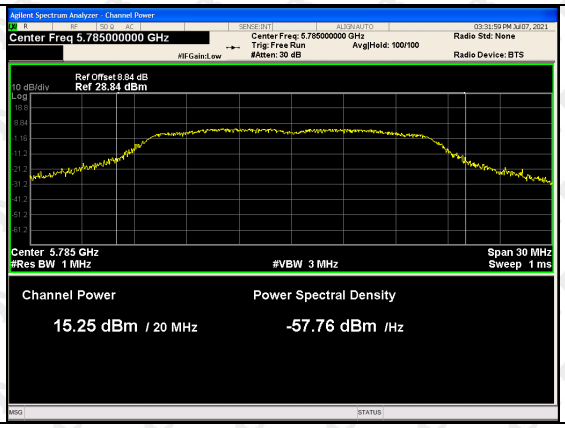

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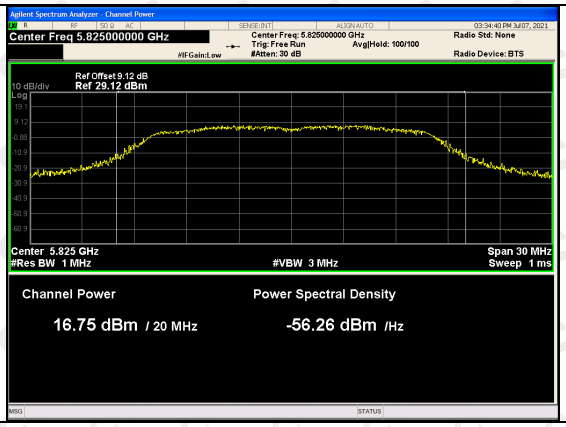

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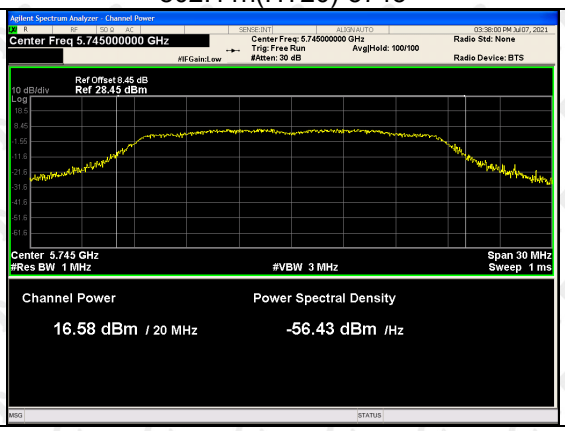

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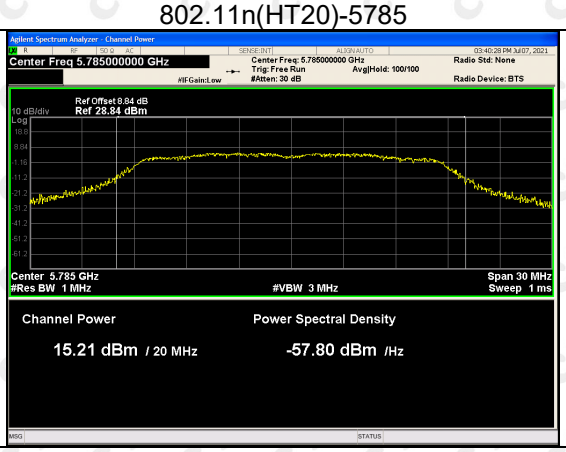

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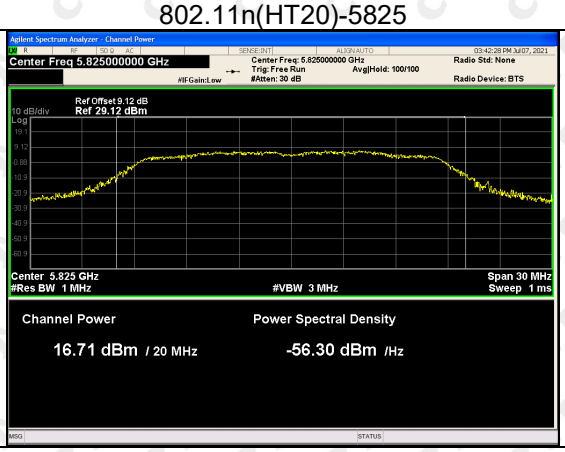

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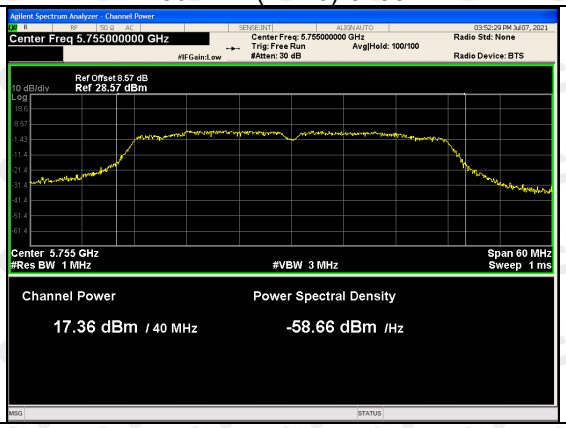

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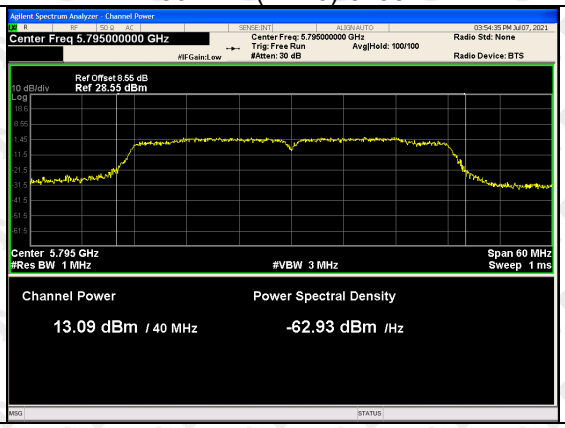

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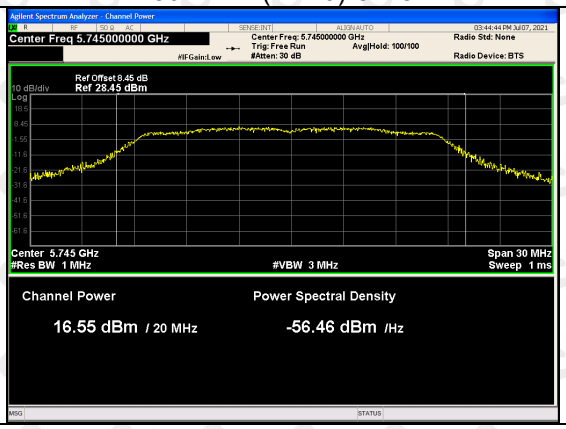

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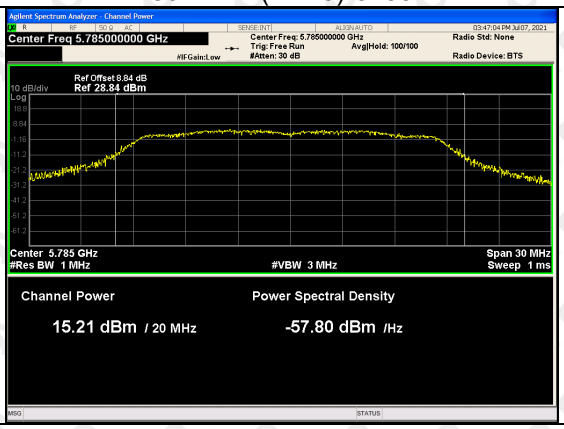

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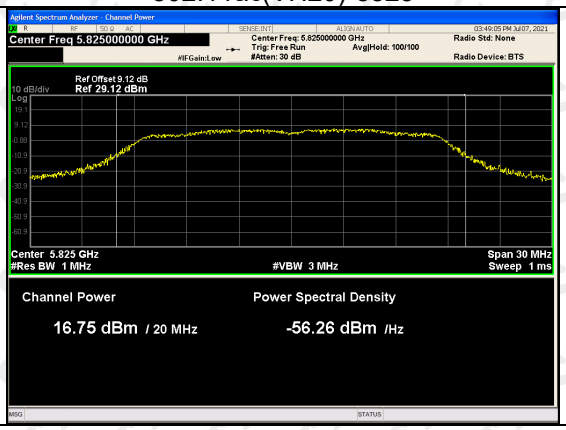

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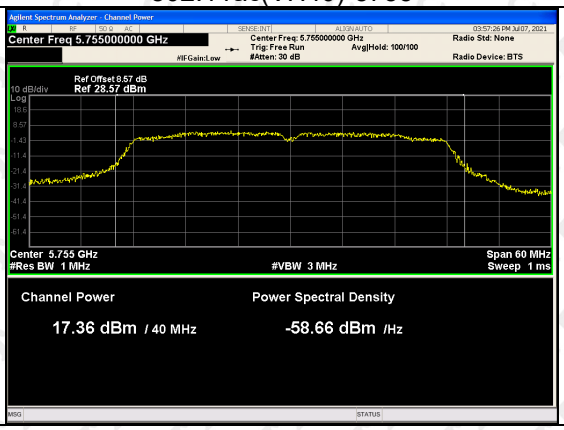

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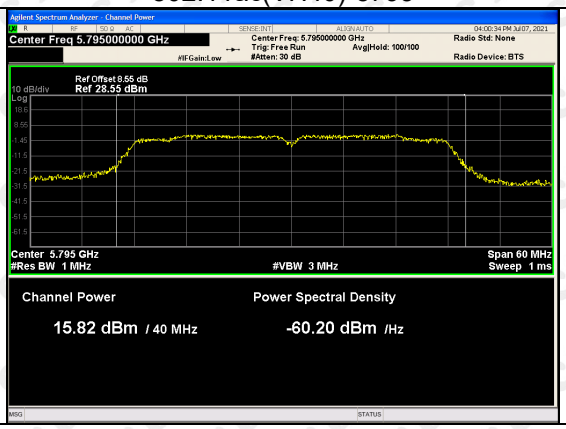

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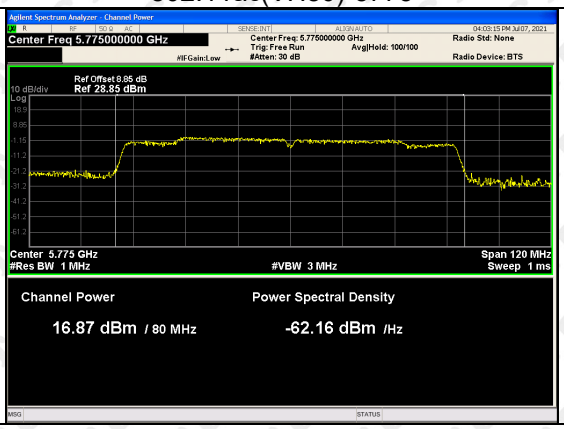
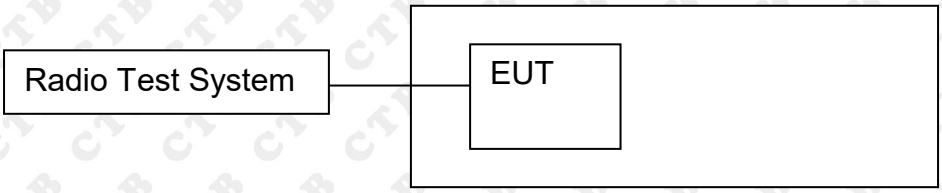


10. EMISSION BANDWIDTH& OCCUPIED BANDWIDTH

10.1 Block Diagram Of Test Setup



10.2 Limits

(1) For the band 5.15-5.25 GHz.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
(e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

10.3 Test Procedure

According to KDB789033 D02v02r01 sectionE, the following is the measurement procedure.

1. Emission Bandwidth (EBW)
a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
2. Minimum Emission Bandwidth for the band 5.725−5.85 GHz
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 kHz for the band 5.725−5.85 GHz. The following procedure shall be used for measuring this bandwidth:
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 * RBW.

c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described in this section. For devices that use channel aggregation refer to III.A and III.C for determining emission bandwidth.

D. 99% Occupied Bandwidth

The 99% occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. Measurement of the 99% occupied bandwidth is *required* only as a condition for using the optional band-edge measurement techniques described in II.G.3.d). Measurements of 99% occupied bandwidth may also optionally be used in lieu of the EBW to define the minimum frequency range over which the 789033 D02 General UNII Test Procedures New Rules v02r01 Page 4 spectrum is integrated when measuring maximum conducted output power as described in II.E. However, the EBW must be measured to determine bandwidth dependent limits on maximum conducted output power in accordance with Section 15.407(a).
The following procedure shall be used for measuring (99%) power bandwidth:
1. Set center frequency to the nominal EUT channel center frequency.

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

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

4. Set VBW ≥ 3 * RBW

5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

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

7. 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.