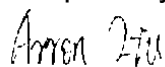


TEST REPORT

Product Name: Tablet PC(Notebook)
FCC ID: 2AWWW-MB01
Trademark: N/A
Model Number: MB01, the additional models refer to 4.1
Prepared For: Creature Information(Guangzhou)Technology Co., Limited
Address: Room B4A05, Block B, 203 Changfu Road, Tianhe district, Guangzhou, China
Manufacturer: Creature Information(Guangzhou)Technology Co., Limited
Address: Room B4A05, Block B, 203 Changfu Road, Tianhe district, Guangzhou, 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: Mar. 31, 2021
Sample tested Date: Mar. 31, 2021 to Apr. 8, 2021
Issue Date: Apr. 8, 2021
Report No.: CTB210331032RFX
Test Standards 47 CFR Part 15 Subpart E
Test Results PASS
Remark: This is WIFI-5GHz band radio test report.

Compiled by:

Arron Liu

Reviewed by:

Bin Mei

Approved by:

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.

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(Note: N/A means not applicable)

1. VERSION

Report No.	Issue Date	Description	Approved
CTB210331032RFX	Apr. 8, 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	$U = \pm 54.3\text{Hz}$
2	Adjacent channel power	$U = \pm 1.3\text{dB}$
3	Conducted Adjacent channel power	$U = \pm 1.38\text{dB}$
4	Conducted output power Above 1G	$U = \pm 1.0\text{dB}$
5	Conducted output power below 1G	$U = \pm 0.9\text{dB}$
6	Power Spectral Density , Conduction	$U = \pm 1.0\text{dB}$
7	Conduction spurious emissions	$U = \pm 2.8\text{dB}$
8	Out of band emission	$U = \pm 54\text{Hz}$
9	3m chamber Radiated spurious emission(30MHz-1GHz)	$U = \pm 4.3\text{dB}$
10	3m chamber Radiated spurious emission(1GHz-18GHz)	$U = \pm 4.5\text{dB}$
11	humidity uncertainty	$U = \pm 5.3\%$
12	Temperature uncertainty	$U = \pm 0.59^{\circ}\text{C}$
13	Supply volyages	$U = \pm 3\%$
14	Time	$U = \pm 5\%$

4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Model(s):	MB01, I8, I8 Plus, I8 Pro, I8 Power, I8 A, I8 A Plus, I8 A Pro, I8 A Power, I8 S, I8 S Plus, I8 S Pro, I8 S Power, I9, I9 Plus, I9 Pro, I9 Power, I9 A, I9 A Plus, I9 A Pro, I9 A Power, I9 S, I9 S Plus, I9 S Pro, I9 S Power, I10, I10 Plus, I10 Pro, I10 Power, I10 A, I10 A Plus, I10 A Pro, I10 A Power, I10 S, I10 S Plus, I10 S Pro, I10 S Power, I11, I11 Plus, I11 Pro, I11 Power, I11 A, I11 A Plus, I11 A Pro, I11 A Power, I11 S, I11 S Plus, I11 S Pro, I11 S Power, I12, I12 Plus, I12 Pro, I12 Power, I12 A, I12 A Plus, I12 A Pro, I12 A Power, I12 S, I12 S Plus, I12 S Pro, I12 S Power, I6, I7, I13, M11, M12, M13, M14, M15, M17, S1, S2, S3, S4, S5, S6, S7, S8, S9, Y11, Y13, Y14, Y15, X13, X14, X15, X17, S13, S14, S15, S17, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10
Model Description:	All model's the function, software and electric circuit are the same, only the model named different. Test sample model: MB01
Wi-Fi Specification:	IEEE 802.11a/b/g/n/ac
Hardware Version:	V2.0
Software Version:	V1.00_20210331
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): 7.946dBm
Type of Modulation:	WiFi: DSSS, OFDM
Antenna installation:	Internal antenna
Antenna Gain:	0.63dBi
Ratings:	DC5.0V charging from adapter Battery DC3.8V, 6000mAh

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

No.	Device Type	Brand	Model	Series No.	Data Cable	Power Cord
1.	---	---	---	---	---	---

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	Channel	Frequency
155	5775MHz	NA	NA

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(DC):NV	3.8
Normal Temperature(°C):NT	25
Low Temperature(°C):LT	0
High Temperature(°C):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

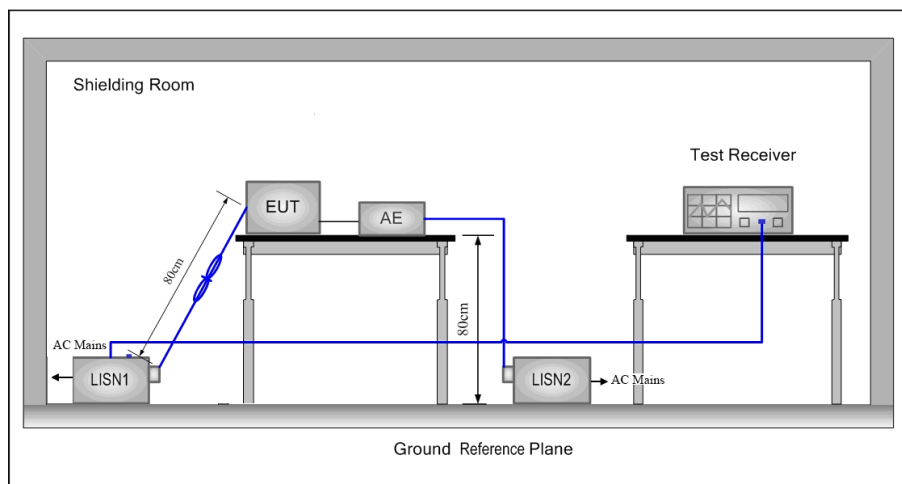
Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY52090073	Sep. 28, 2020	Sep. 28, 2021
2	Power Sensor	Agilent	U2021XA	MY56120032	Sep. 28, 2020	Sep. 28, 2021
3	Power Sensor	Agilent	U2021XA	MY56120034	Sep. 28, 2020	Sep. 28, 2021
4	Communication test set	R&S	CMW500	108058	Sep. 28, 2020	Sep. 28, 2021
5	Spectrum Analyzer	R&S	FSP40	100550	Sep. 28, 2020	Sep. 28, 2021
6	Signal Generator	Agilent	N5181A	MY49060920	Sep. 28, 2020	Sep. 28, 2021
7	Signal Generator	Agilent	N5182A	MY47420195	Sep. 28, 2020	Sep. 28, 2021
8	Communication test set	Agilent	E5515C	MY50102567	Oct. 10, 2020	Oct. 10, 2021
9	band rejection filter	Shenxiang	MSF2400-24 83.5MS-1154	20181015001	Sep. 28, 2020	Sep. 28, 2021
10	band rejection filter	Shenxiang	MSF5150-58 50MS-1155	20181015001	Sep. 28, 2020	Sep. 28, 2021
11	band rejection filter	Xingbo	XBLBQ-DZA 120	190821-1-1	Sep. 28, 2020	Sep. 28, 2021
12	BT&WI-FI Automatic test software	Microwave	MTS8310	Ver. 2.0.0.0	\	\
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	Sep. 28, 2020	Sep. 28, 2021
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	Sep. 28, 2020	Sep. 28, 2021
15	234G Automatic test software	Microwave	MTS8200	Ver. 2.0.0.0	\	\
16	966 chamber	C.R.T.	966 Room	966	Nov. 9, 2019	Nov. 08, 2022
17	Receiver	R&S	ESPI	100362	Sep. 28, 2020	Sep. 28, 2021

18	Amplifier	HP	8447E	2945A02747	Sep. 28, 2020	Sep. 28, 2021
19	Amplifier	Agilent	8449B	3008A01838	Sep. 28, 2020	Sep. 28, 2021
20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	Nov. 02, 2020	Nov. 01, 2021
21	Horn Antenna	Schwarzbeck	BBHA9120D	1911	Nov. 02, 2020	Nov. 01, 2021
22	Software	Fala	EZ-EMC	FA-03A2 RE	\	\
23	3-Loop Antenna	Daze	ZN30401	17014	Sep. 28, 2020	Sep. 28, 2021
24	loop antenna	ZHINAN	ZN30900A	/	Sep. 28, 2020	Sep. 28, 2021
25	Horn antenna	A/H/System	SAS-574	588	Sep. 28, 2020	Sep. 28, 2021
26	Amplifier	AEROFLEX	/	S/N/ 097	Sep. 28, 2020	Sep. 28, 2021

Conducted emissions Test					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
AMN	ROHDE&SCHWARZ	ESH3-Z5	100318	Sep. 28, 2020	Sep. 28, 2021
Pulse limiter	ROHDE&SCHWARZ	ESH3Z2	357881052	Sep. 28, 2020	Sep. 28, 2021
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCS30	834115/006	Sep. 28, 2020	Sep. 28, 2021
Coaxial cable	ZDECL	Z302S	18091804	Sep. 28, 2020	Sep. 28, 2021
ISN	TESEQ	NTFM8158	183	Sep. 28, 2020	Sep. 28, 2021
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100428/003	Sep. 28, 2020	Sep. 28, 2021
Software	Fala	EZ-EMC	EMC-CON 3A1.1	\	\

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

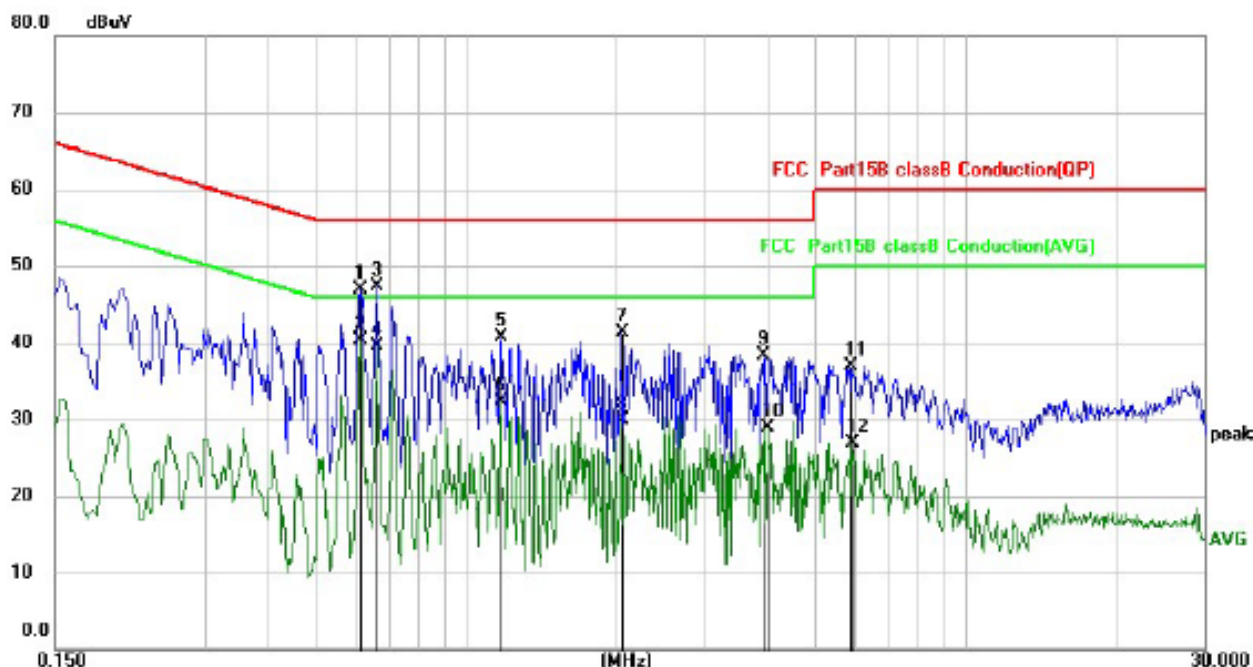
- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT 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.

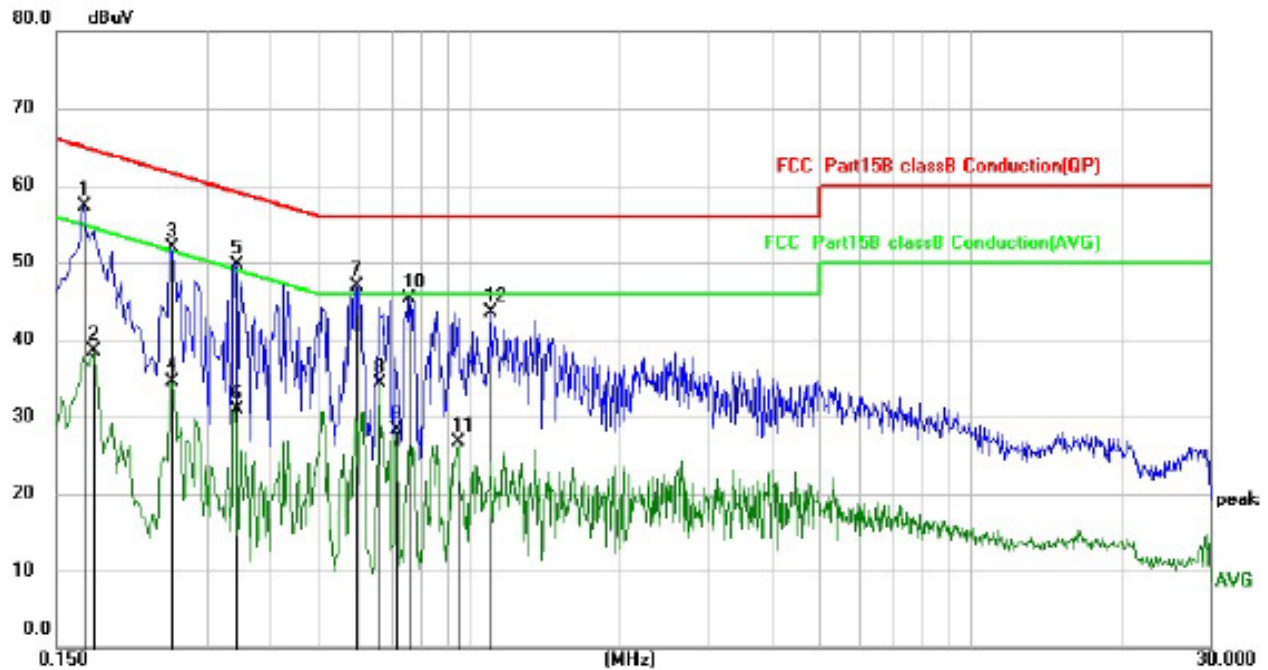
6.4 Test Result

Test Specification: Neutral



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	
		MHz	Level	Factor	ment			Detector
			dBuV	dB	dBuV	dBuV	dB	
1		0.6140	36.76	10.07	46.83	56.00	-9.17	QP
2	*	0.6140	30.19	10.07	40.26	46.00	-5.74	AVG
3		0.6620	37.18	10.08	47.26	56.00	-8.74	QP
4		0.6620	29.47	10.08	39.55	46.00	-6.45	AVG
5		1.1740	30.40	10.23	40.63	56.00	-15.37	QP
6		1.1740	22.16	10.23	32.39	46.00	-13.61	AVG
7		2.0460	31.07	10.23	41.30	56.00	-14.70	QP
8		2.0460	19.77	10.23	30.00	46.00	-16.00	AVG
9		3.9260	27.93	10.33	38.26	56.00	-17.74	QP
10		4.0260	18.51	10.33	28.84	46.00	-17.16	AVG
11		5.8620	26.57	10.42	36.99	60.00	-23.01	QP
12		5.9140	16.41	10.42	26.83	50.00	-23.17	AVG

Test Specification: Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	*	0.1700	47.13	10.10	57.23	64.96	-7.73	QP
2		0.1780	28.32	10.10	38.42	54.58	-16.16	AVG
3		0.2540	41.83	10.13	51.96	61.63	-9.67	QP
4		0.2540	24.32	10.13	34.45	51.63	-17.18	AVG
5		0.3420	39.58	10.17	49.75	59.15	-9.40	QP
6		0.3420	20.65	10.17	30.82	49.15	-18.33	AVG
7		0.5940	36.64	10.23	46.87	56.00	-9.13	QP
8		0.6620	24.06	10.24	34.30	46.00	-11.70	AVG
9		0.7140	18.02	10.23	28.25	46.00	-17.75	AVG
10		0.7580	35.10	10.22	45.32	56.00	-10.68	QP
11		0.9500	16.58	10.17	26.75	46.00	-19.25	AVG
12		1.1019	33.26	10.15	43.41	56.00	-12.59	QP

Remark:

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

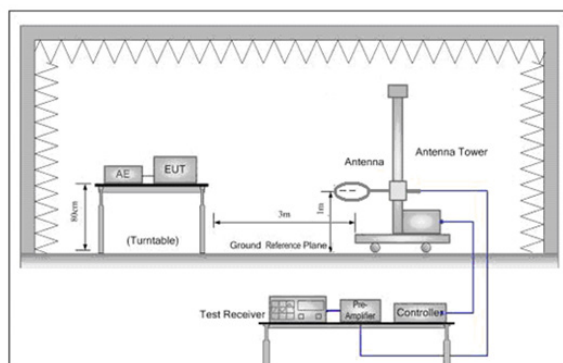


Figure 1. Below 30MHz

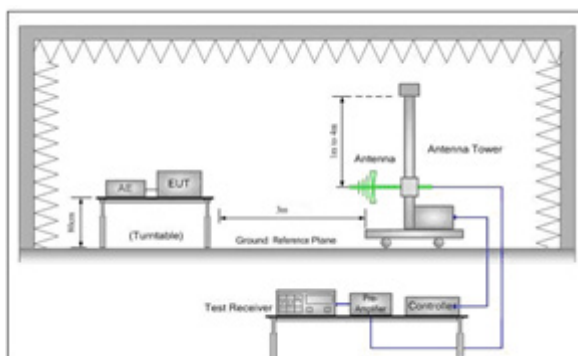


Figure 2. 30MHz to 1GHz

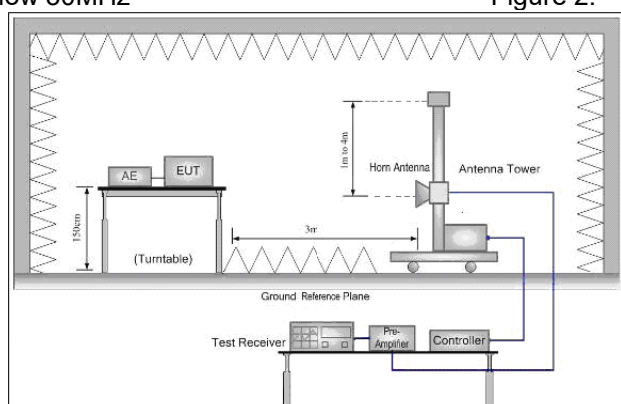


Figure 3. Above 1GHz

7.2 Limit

Spurious Emissions:

Frequency	Field strength (dBμV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	$20\log 2400/F \text{ (kHz)} + 80$	Quasi-peak	3
0.490MHz-1.705MHz	$20\log 24000/F \text{ (kHz)} + 40$	Quasi-peak	3
1.705MHz-30MHz	$20\log 30 + 40$	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) $EIRP = ((E \cdot d)^2) / 30$

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:
- $$EIRP[dBm] = E[dB\mu V/m] + 20 \log(d[meters]) - 104.77$$

(iii) Or, if d is 3 meters:

$$EIRP[dBm] = E[dB\mu V/m] - 95.2$$

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 chamber. 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

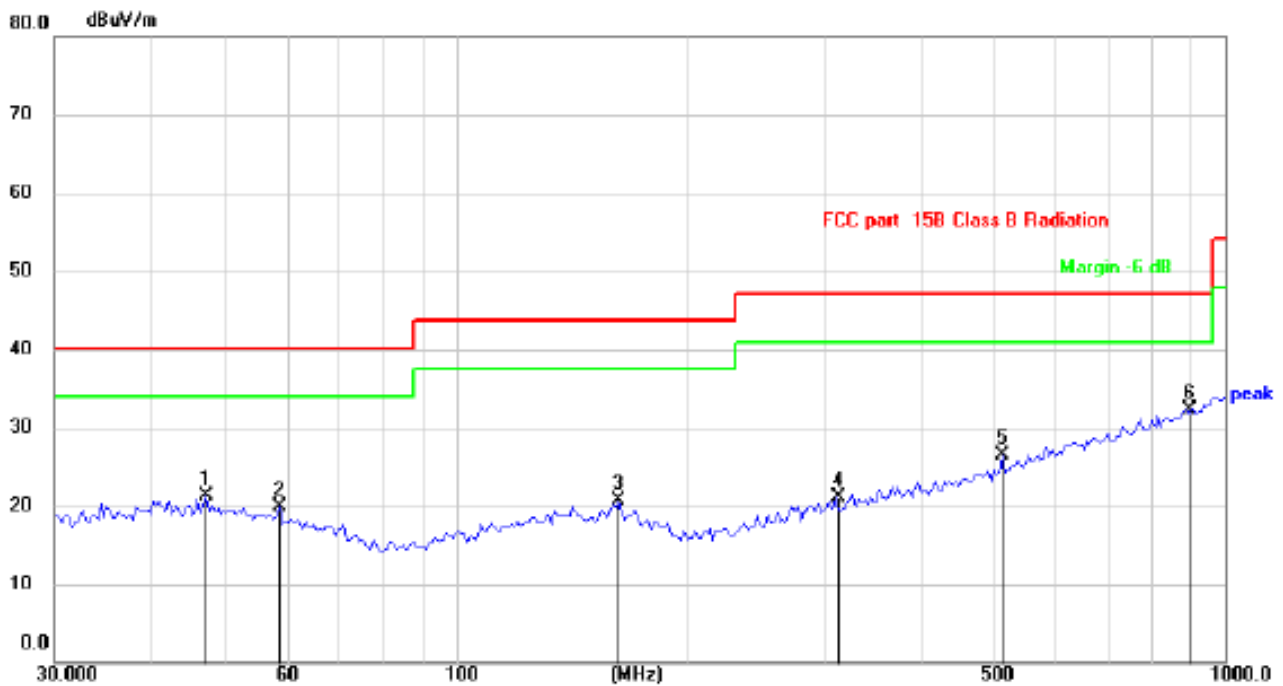
7.4 Test Result

30MHz-1GHz Test Results:

Modulation : 802.11a (the worst data)

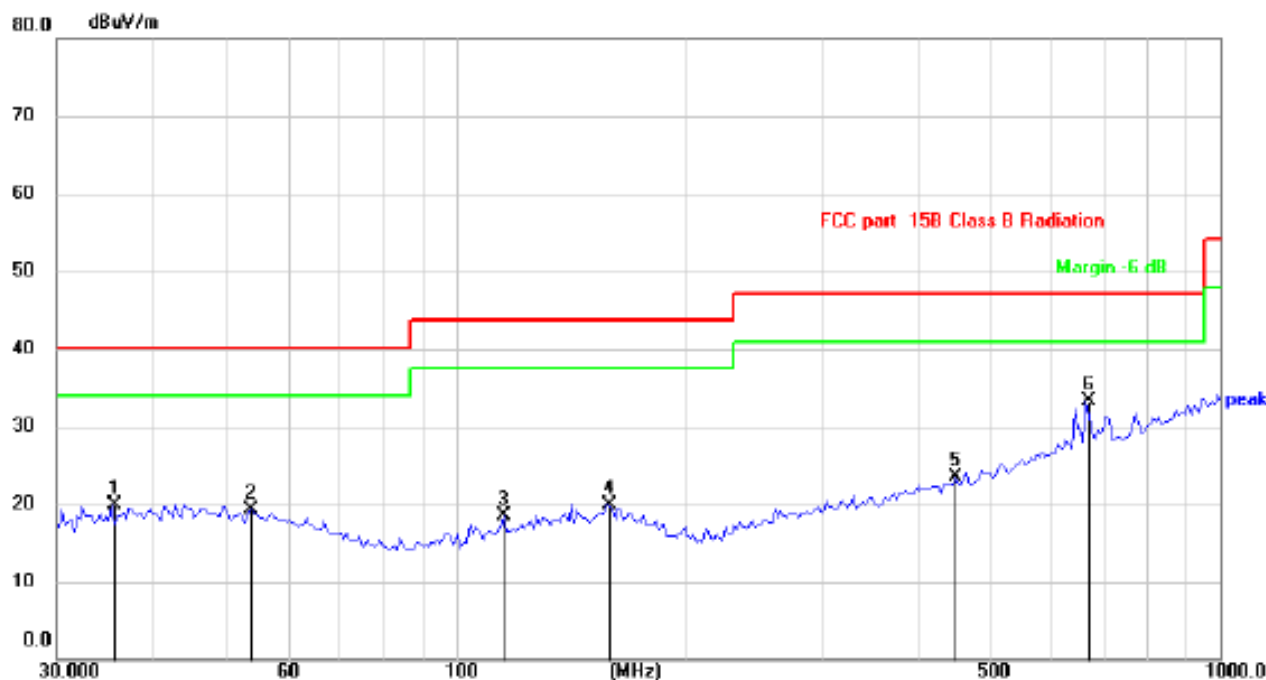
Test Channel : 5780MHz

Antenna polarity: H



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	Level	Factor	ment			Detector
			dBuV	dB	dBuV/m	dB/m	dB	
1		47.3255	28.33	-7.07	21.26	40.00	-18.74	QP
2		58.9217	27.78	-7.88	19.90	40.00	-20.10	QP
3		162.8959	27.67	-7.04	20.63	43.50	-22.87	QP
4		311.6326	27.66	-6.56	21.10	47.00	-25.90	QP
5		513.6331	28.49	-2.05	26.44	47.00	-20.56	QP
6	*	892.2909	26.75	5.46	32.21	47.00	-14.79	QP

Antenna polarity: V



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over
		MHz	dBuV	dB	dBuV/m	dB/m	dB
1		35.4371	27.11	-7.25	19.86	40.00	-20.14
2		53.9763	26.84	-7.50	19.34	40.00	-20.66
3		115.7256	27.42	-8.90	18.52	43.50	-24.98
4		157.2829	26.98	-7.04	19.94	43.50	-23.56
5		450.3447	27.06	-3.55	23.51	47.00	-23.49
6	*	668.1423	31.58	1.75	33.33	47.00	-13.67

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	41.62	16.34	57.96	74	-16.04	PK	6	1.4	H
10360	25.31	16.34	41.65	54	-12.35	AV	245	1.5	H
10360	40.50	16.34	56.84	74	-17.16	PK	251	1.7	V
10360	26.25	16.34	42.59	54	-11.41	AV	39	1.3	V
Channel:5240MHz									
10480	39.33	16.15	55.48	74	-18.52	PK	308	1.4	H
10480	25.81	16.15	41.96	54	-12.04	AV	121	1.7	H
10480	42.12	16.15	58.27	74	-15.73	PK	205	1.5	V
10480	28.26	16.15	44.41	54	-9.59	AV	235	1.4	V
Channel:5745MHz									
11490	43.49	17.49	60.98	74	-13.02	PK	308	1.4	H
11490	27.12	17.49	44.61	54	-9.39	AV	121	1.7	H
11490	42.79	17.49	60.28	74	-13.72	PK	205	1.5	V
11490	26.52	17.49	44.01	54	-9.99	AV	235	1.4	V
Channel:5825MHz									
11650	39.86	17.52	57.38	74	-16.62	PK	308	1.4	H
11650	26.96	17.52	44.48	54	-9.52	AV	121	1.7	H
11650	42.22	17.52	59.74	74	-14.26	PK	205	1.5	V
11650	28.19	17.52	45.71	54	-8.29	AV	235	1.4	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)

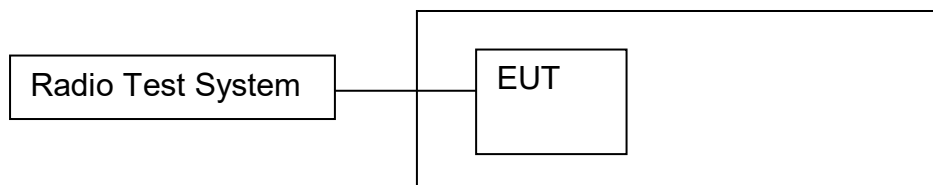
Freq (MHz)	Rd_level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	detector	Height	Degree	Antenna polarization
Channel:5210MHz									
10420	39.67	17.5	57.17	74	-16.83	PK	308	1.4	H
10420	26.82	17.5	44.32	54	-9.68	AV	121	1.7	H
10420	41.75	17.5	59.25	74	-14.75	PK	205	1.5	V
10420	25.38	17.5	42.88	54	-11.12	AV	235	1.4	V
Channel:5775MHz									
11550	42.15	16.25	58.40	74	-15.60	PK	6	1.4	H
11550	27.62	16.25	43.87	54	-10.13	AV	245	1.5	H
11550	41.46	16.25	57.71	74	-16.29	PK	251	1.7	V
11550	25.39	16.25	41.64	54	-12.36	AV	39	1.3	V

Remark:

- Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits
- The EUT was tested in the low, high channel and the worst case position data was reported.
- 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.

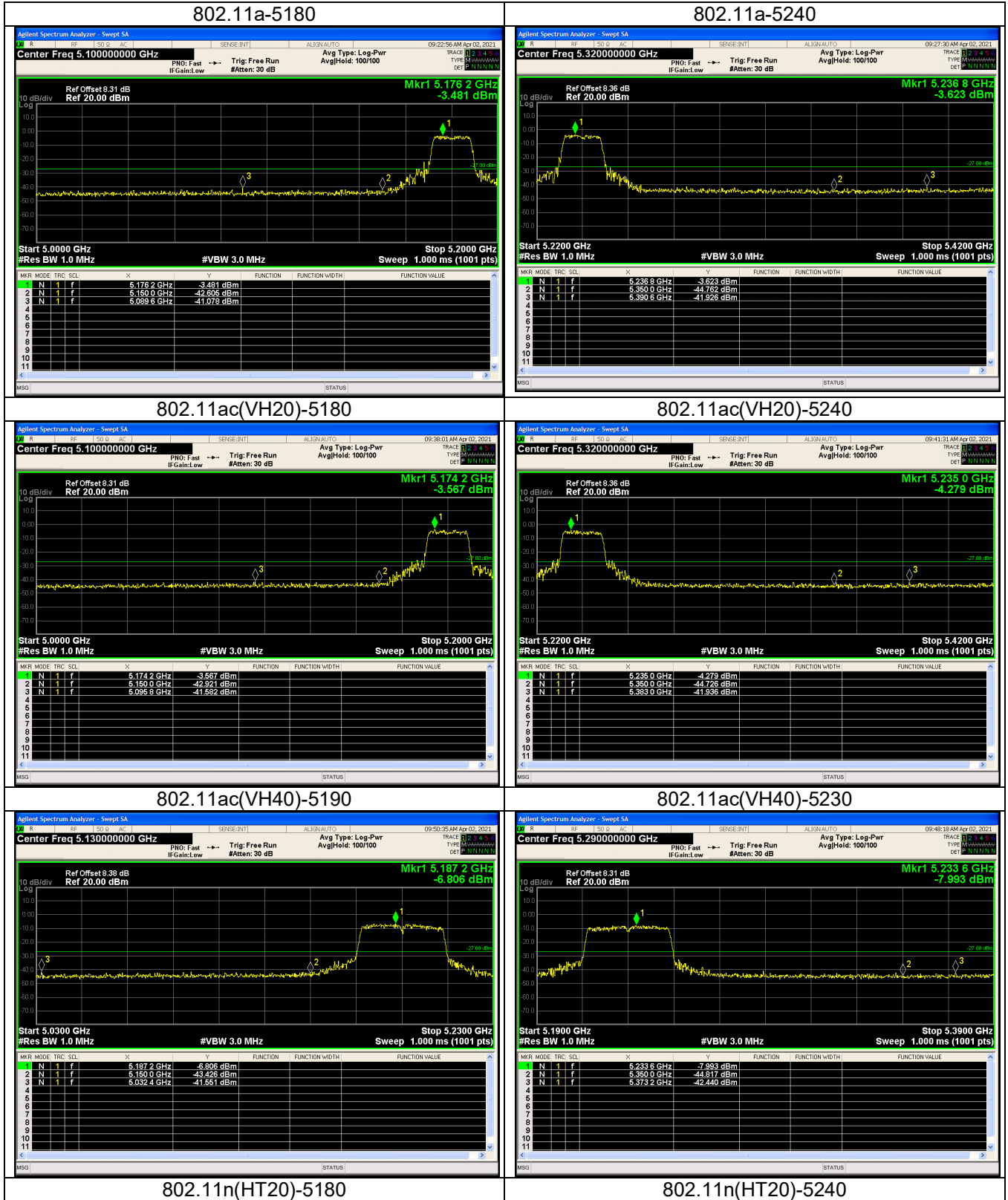
8.3 Test procedure

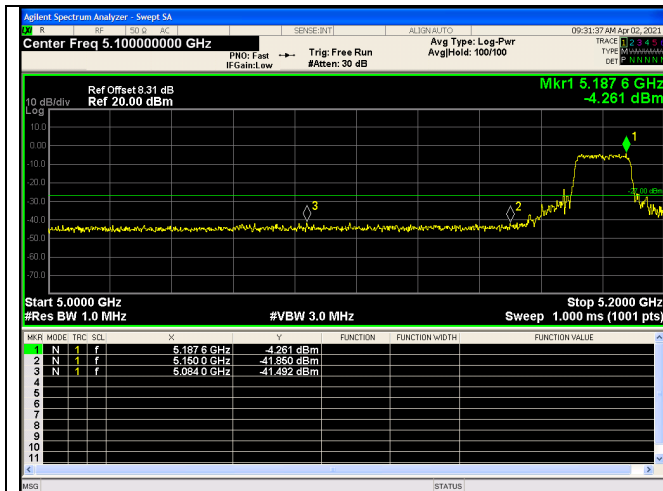
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then 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

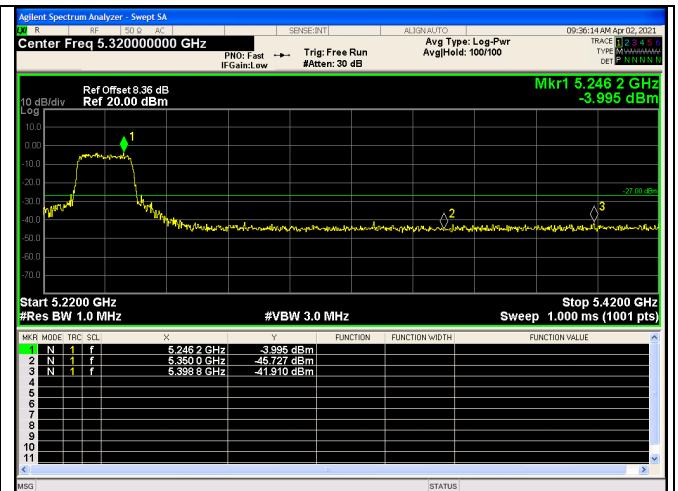
Test Graph

5180-5210MHz

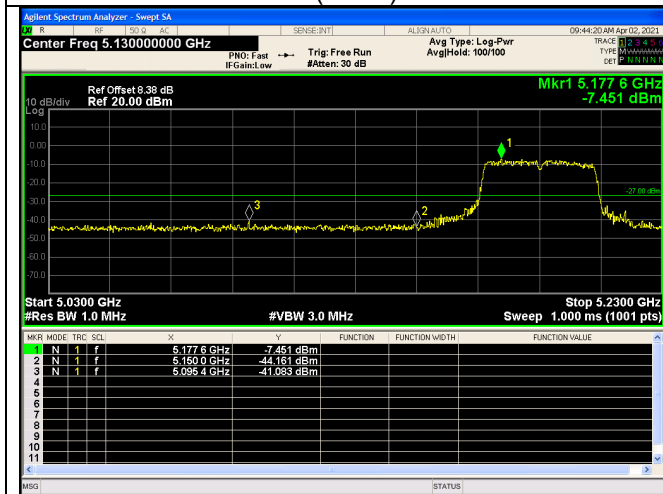




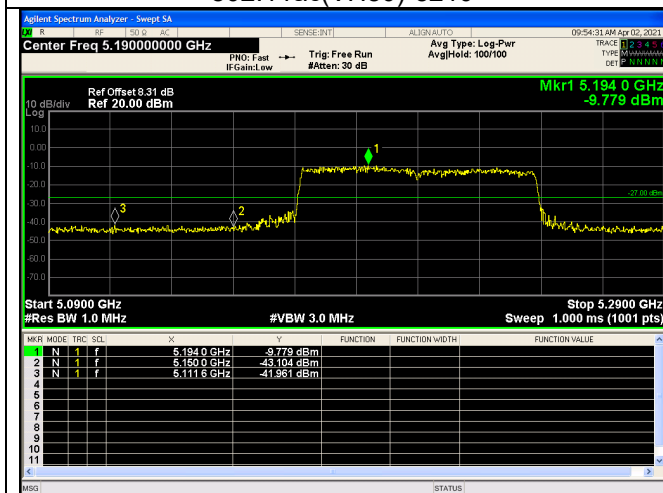
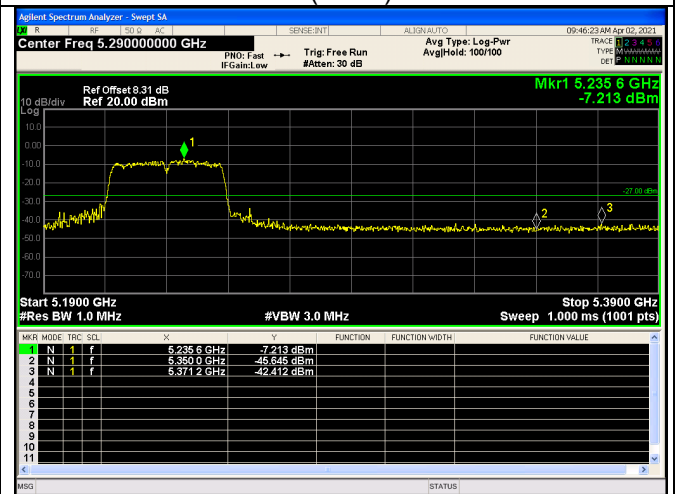
802.11n(HT40)-5190



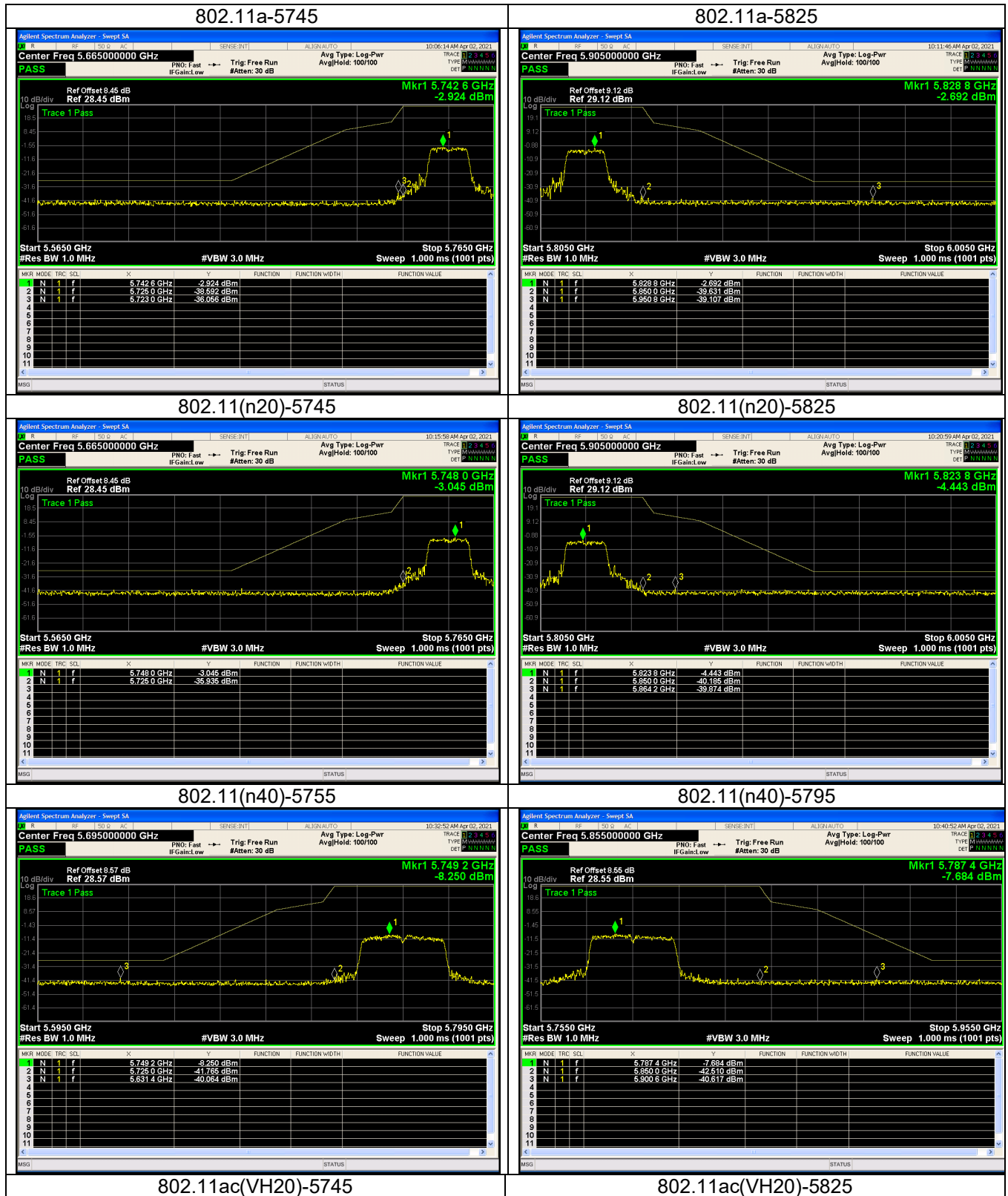
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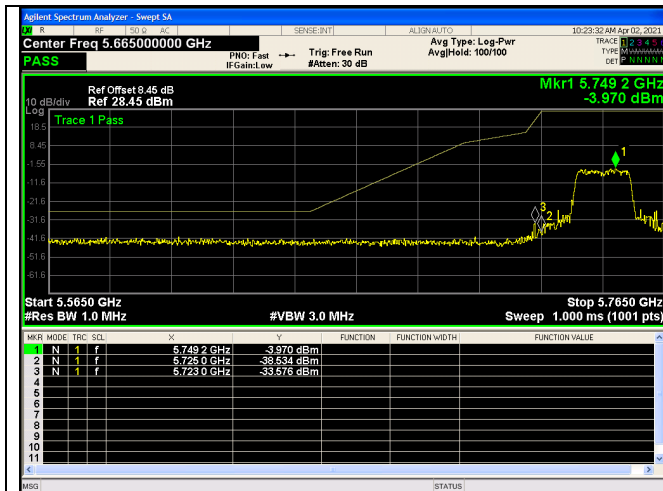


802.11ac(VH80)-5210



5745-5825MHz

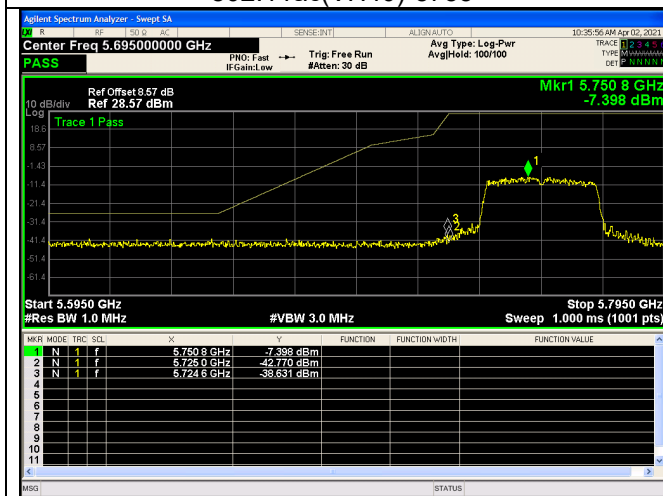




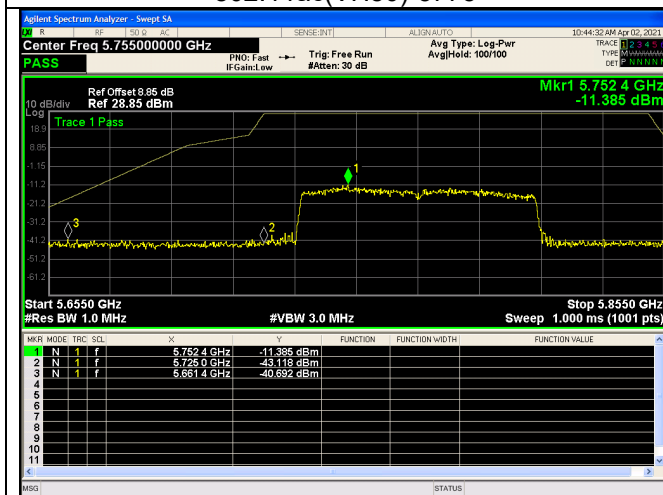
802.11ac(VH40)-5755



802.11ac(VH40)-5795

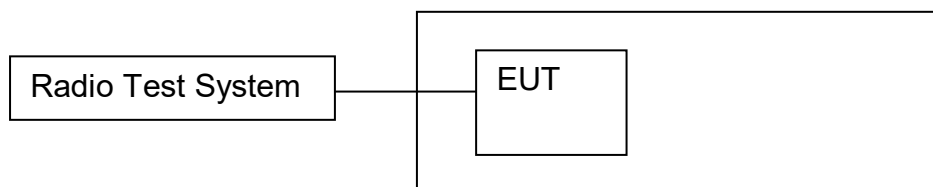


802.11ac(VH80)-5755



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 $11 \text{ dBm} + 10 \log B$, 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.

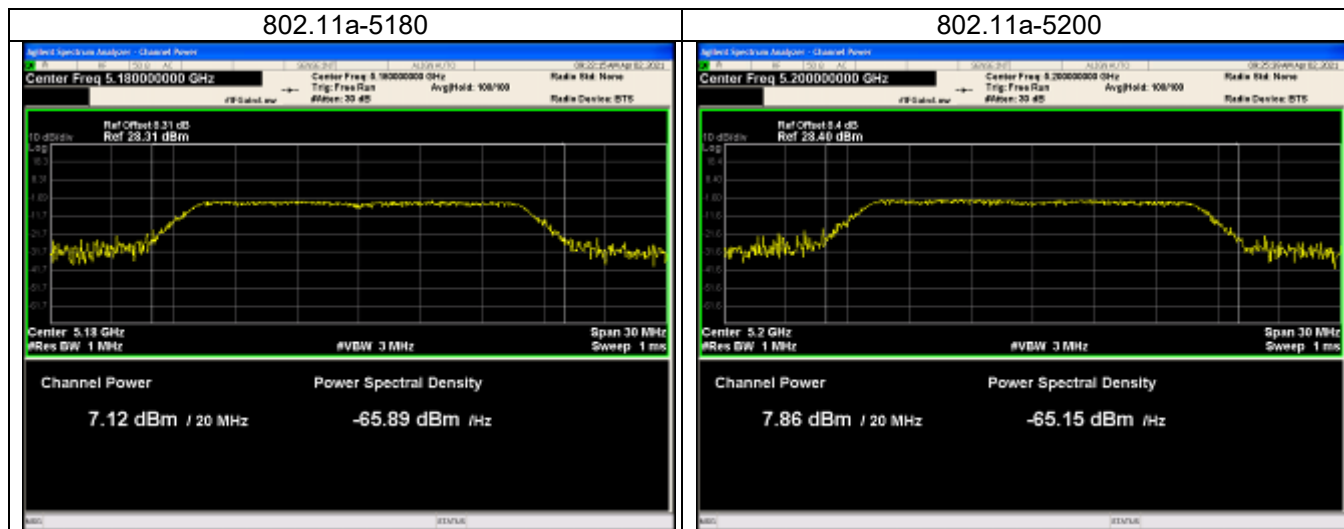
- (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- (ii) Set RBW = 1 MHz.
- (iii) Set VBW $\geq$ 3 MHz.
- (iv) Number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$. (This ensures that bin-to-bin spacing is $\leq \text{RBW}/2$, 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 $\geq 98\%$, 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

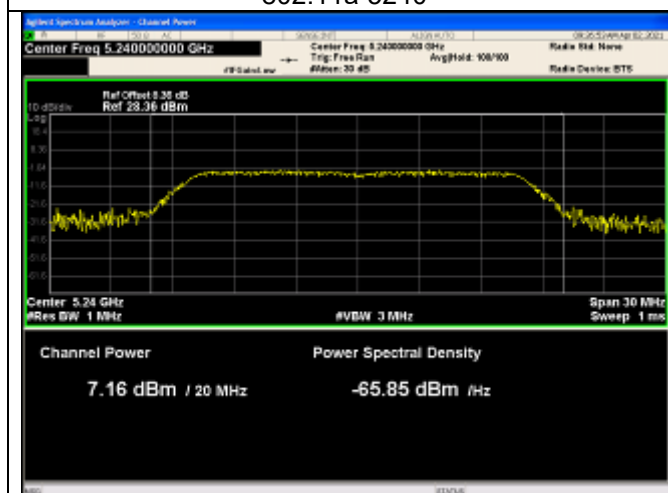
Test mode1	Test Channel (MHz)	Output Power dBm	Limit dBm
802.11a	5180	7.119	23.98
	5200	7.859	23.98
	5240	7.159	23.98
802.11ac20	5180	6.579	23.98
	5200	6.125	23.98
	5240	6.55	23.98
802.11ac40	5190	5.638	23.98
	5230	5.775	23.98
802.11ac80	5210	3.408	23.98
802.11n(HT20)	5180	6.016	23.98
	5200	6.014	23.98
	5240	6.45	23.98
802.11n(HT40)	5190	5.951	23.98
	5230	5.782	23.98

Test mode1	Test Channel (MHz)	Output Power dBm	Limit dBm
802.11a	5745	7.336	30
	5785	7.584	30
	5825	7.061	30
802.11ac20	5745	6.26	30
	5785	6.93	30
	5825	6.619	30
802.11ac40	5755	5.854	30
	5795	5.74	30
802.11ac80	5775	3.694	30
802.11n(HT20)	5745	6.951	30
	5785	6.657	30
	5825	6.508	30
802.11n(HT40)	5755	5.04	30
	5795	5.613	30

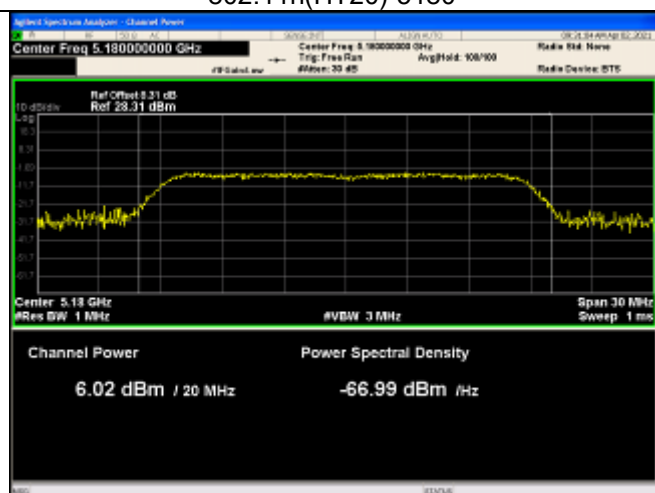
5180-5210MHz



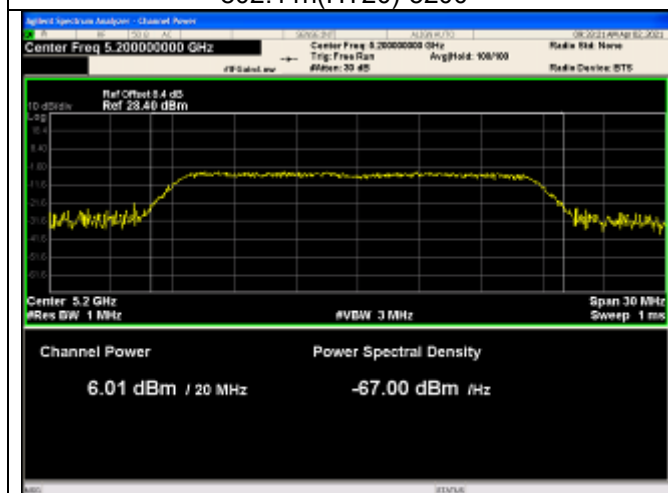
802.11a-5240



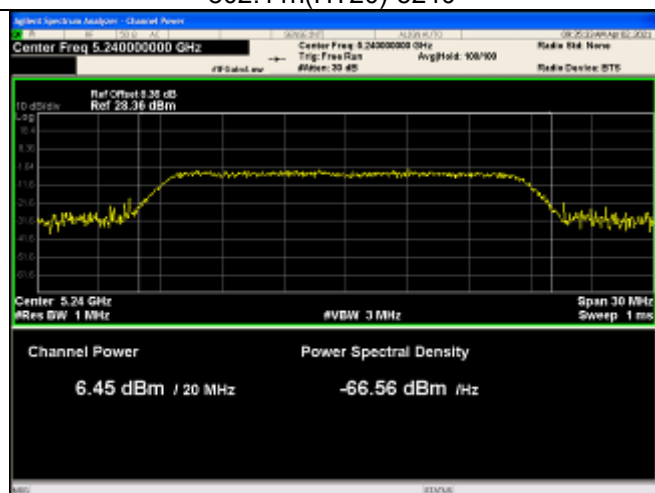
802.11n(HT20)-5180



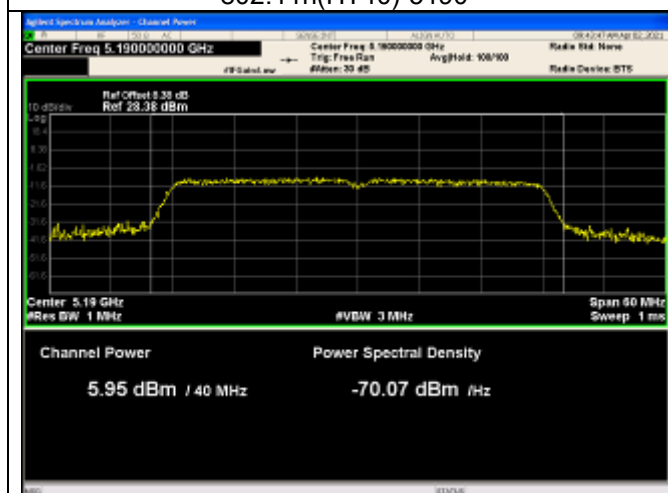
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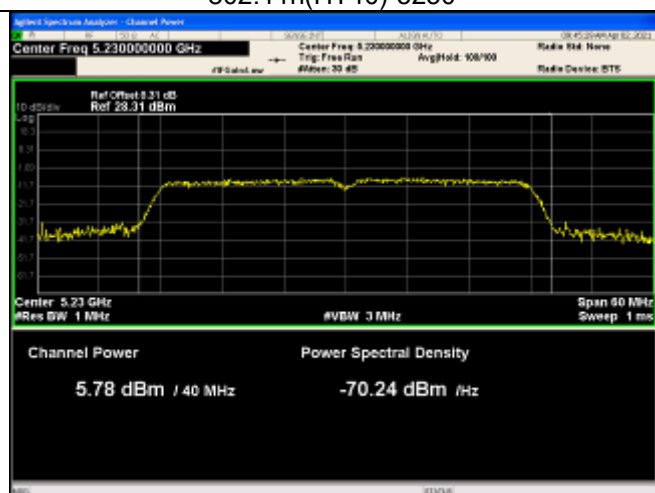
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802.11n(HT40)-5190

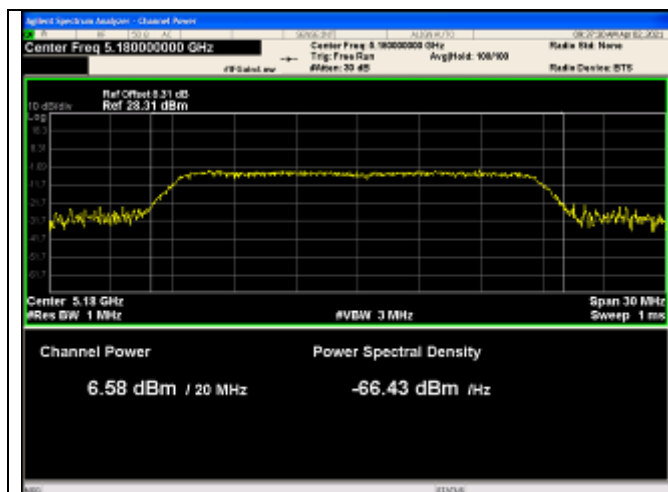


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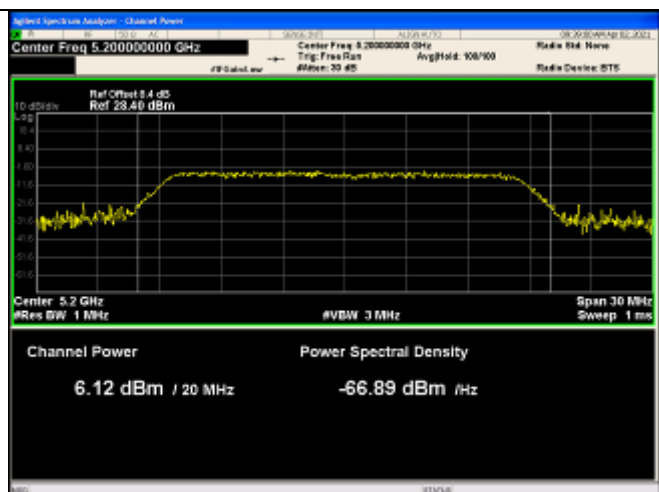


802.11ac(VH20)-5180

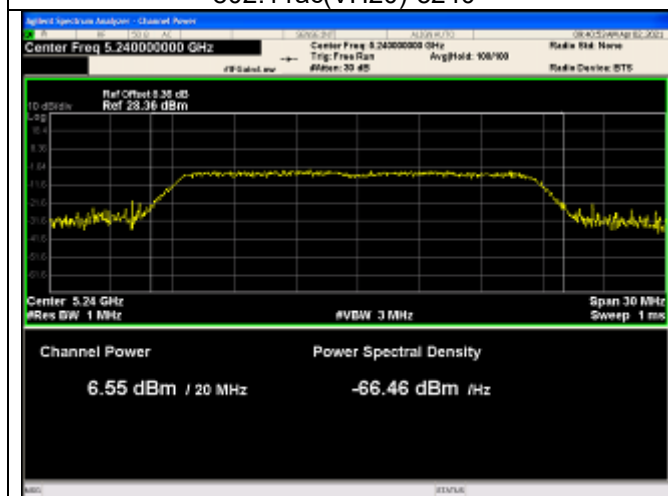
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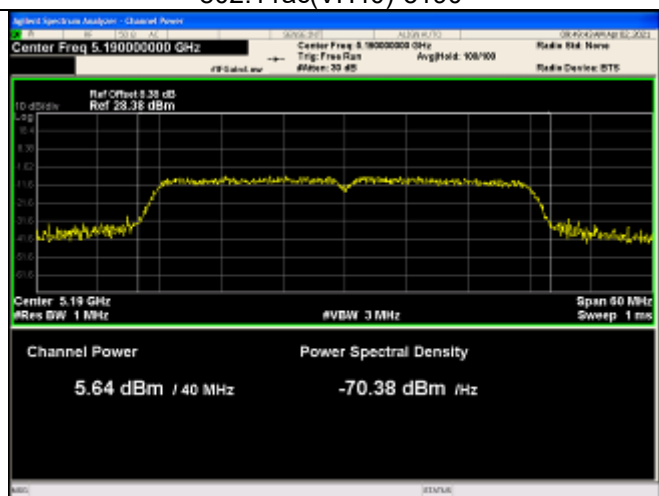
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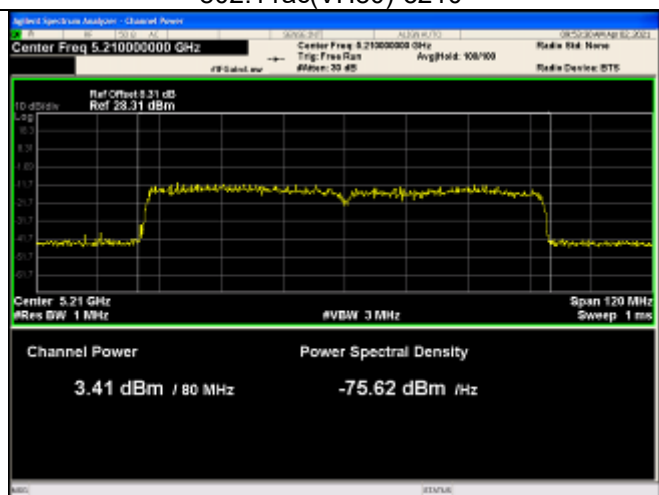
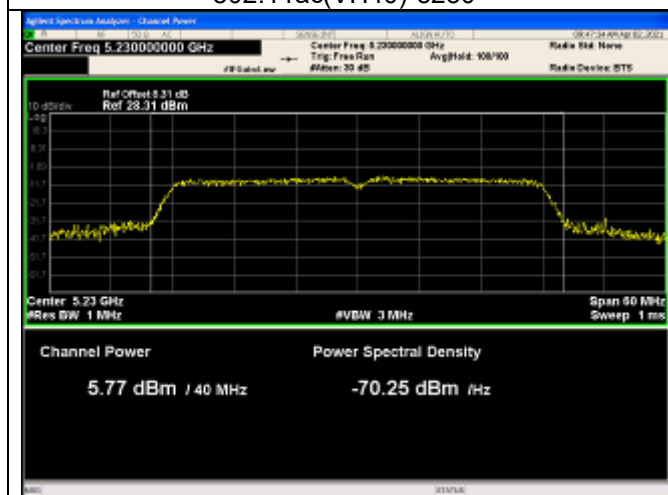
802.11ac(VH40)-5190



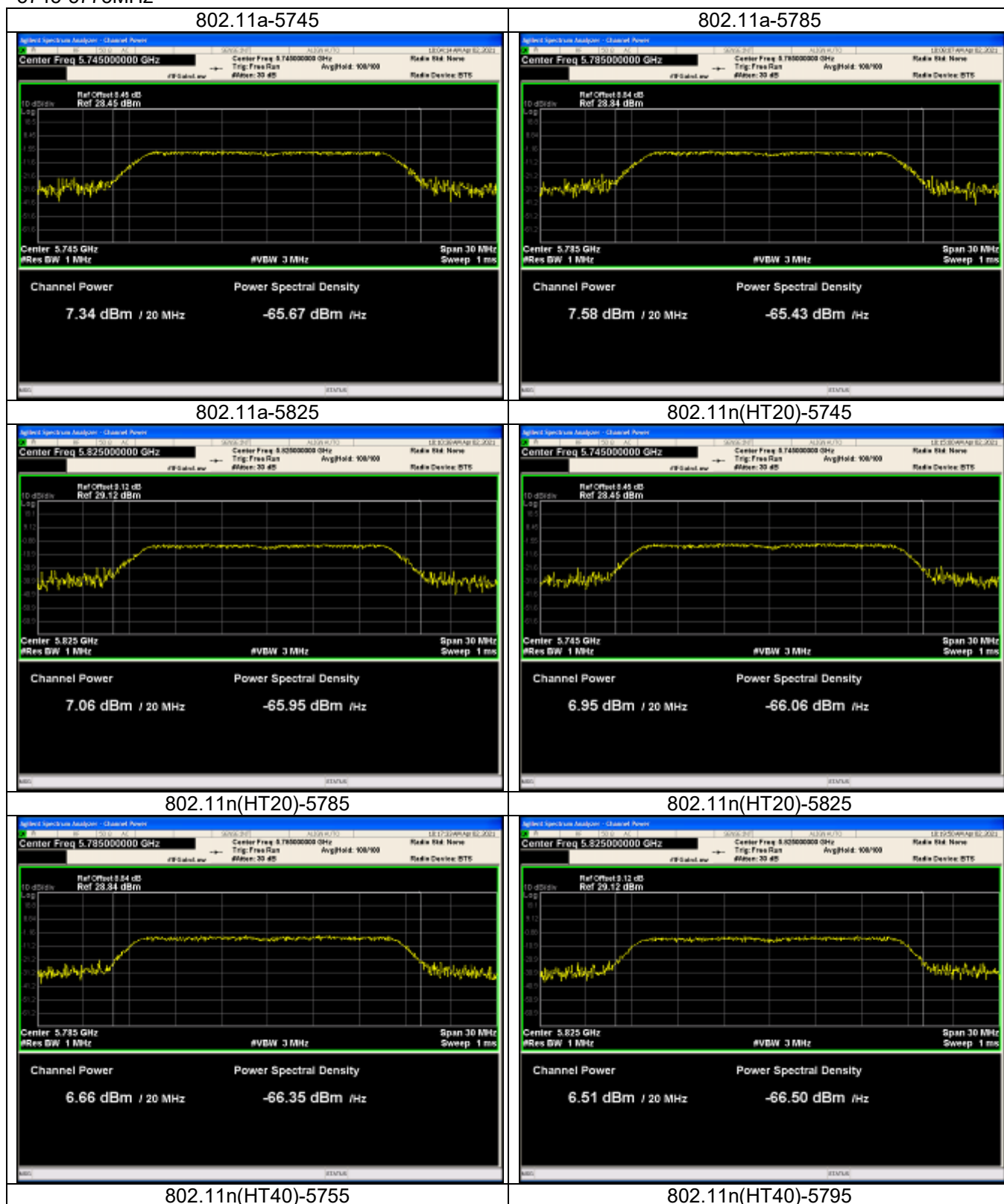
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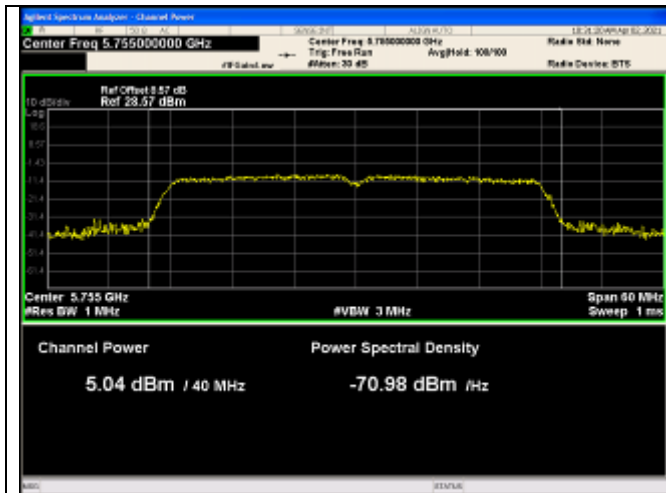


802.11ac(VH80)-5210

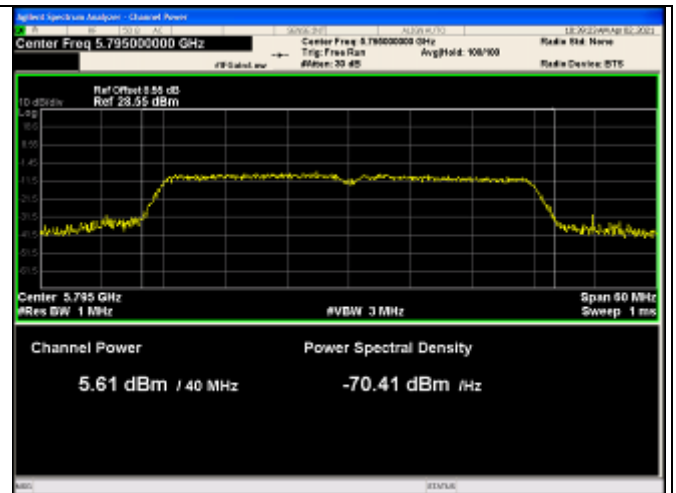


5745-5775MHz

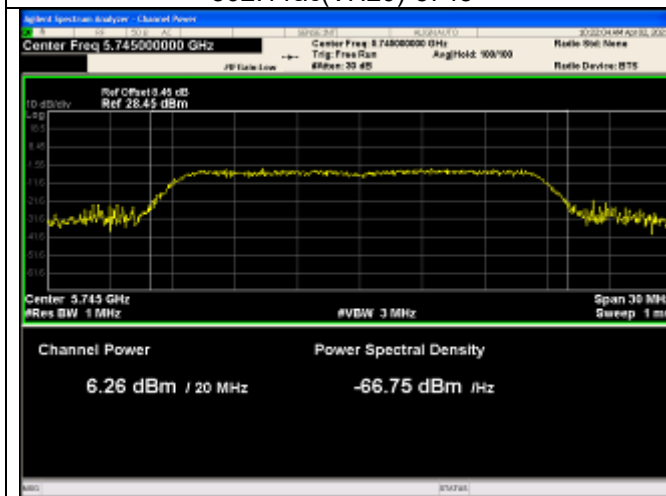




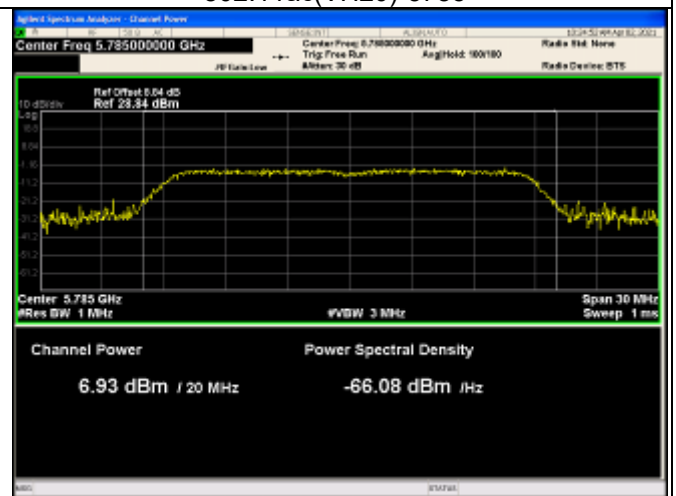
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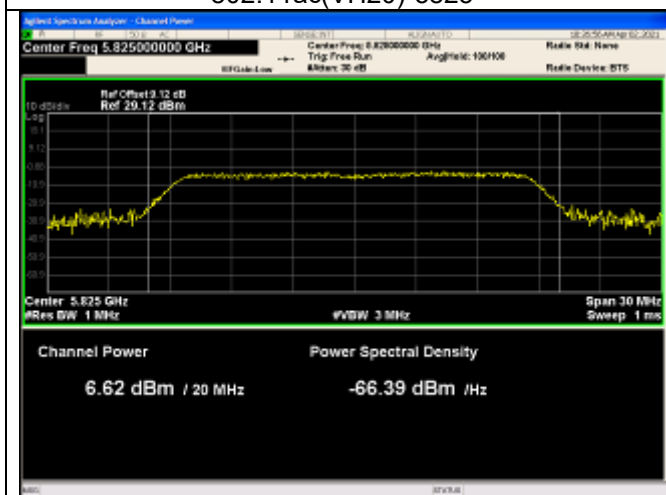
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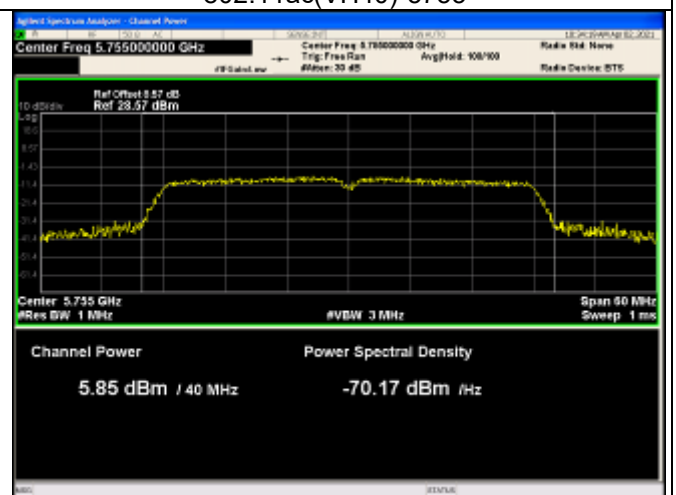
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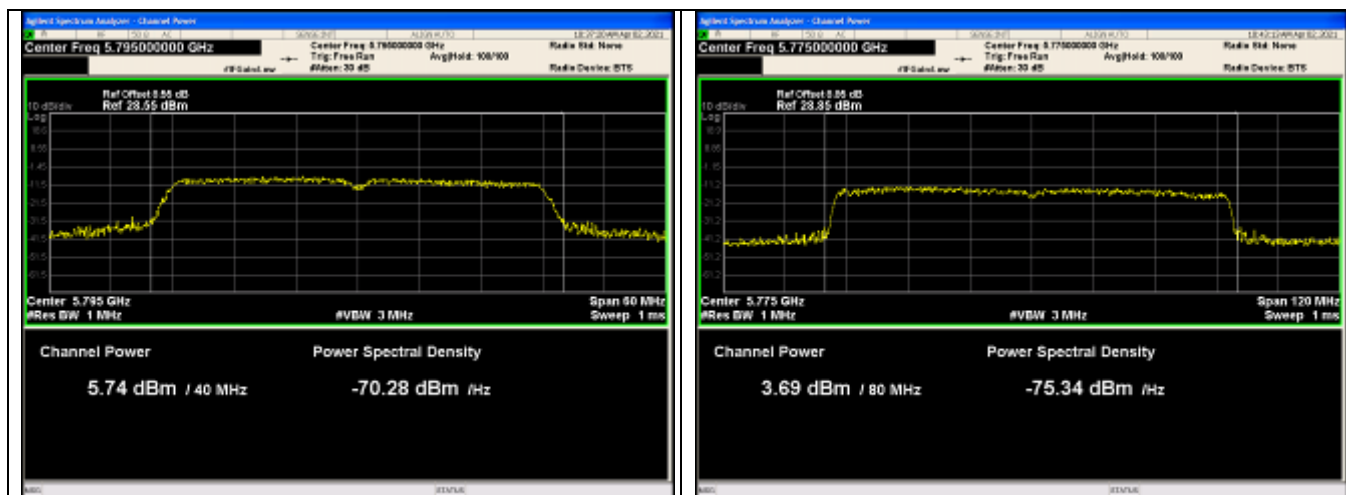
802.11ac(VH40)-5755



802.11ac(VH40)-5795

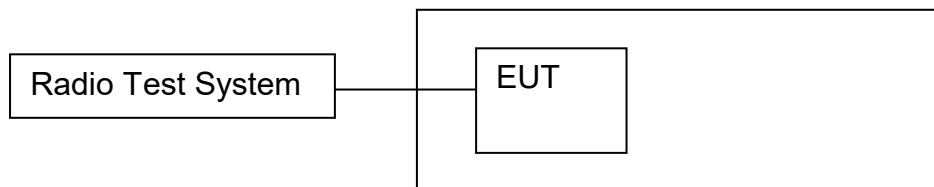


802.11ac(VH80)-5775



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 $11 \text{ dBm} + 10 \log B$, 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)

- Set RBW = approximately 1% of the emission bandwidth.
- Set the VBW > RBW.
- Detector = Peak.
- Trace mode = max hold.
- 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:

- Set RBW = 100 kHz.
- Set the video bandwidth (VBW) $\geq 3 * \text{RBW}$.

- 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:

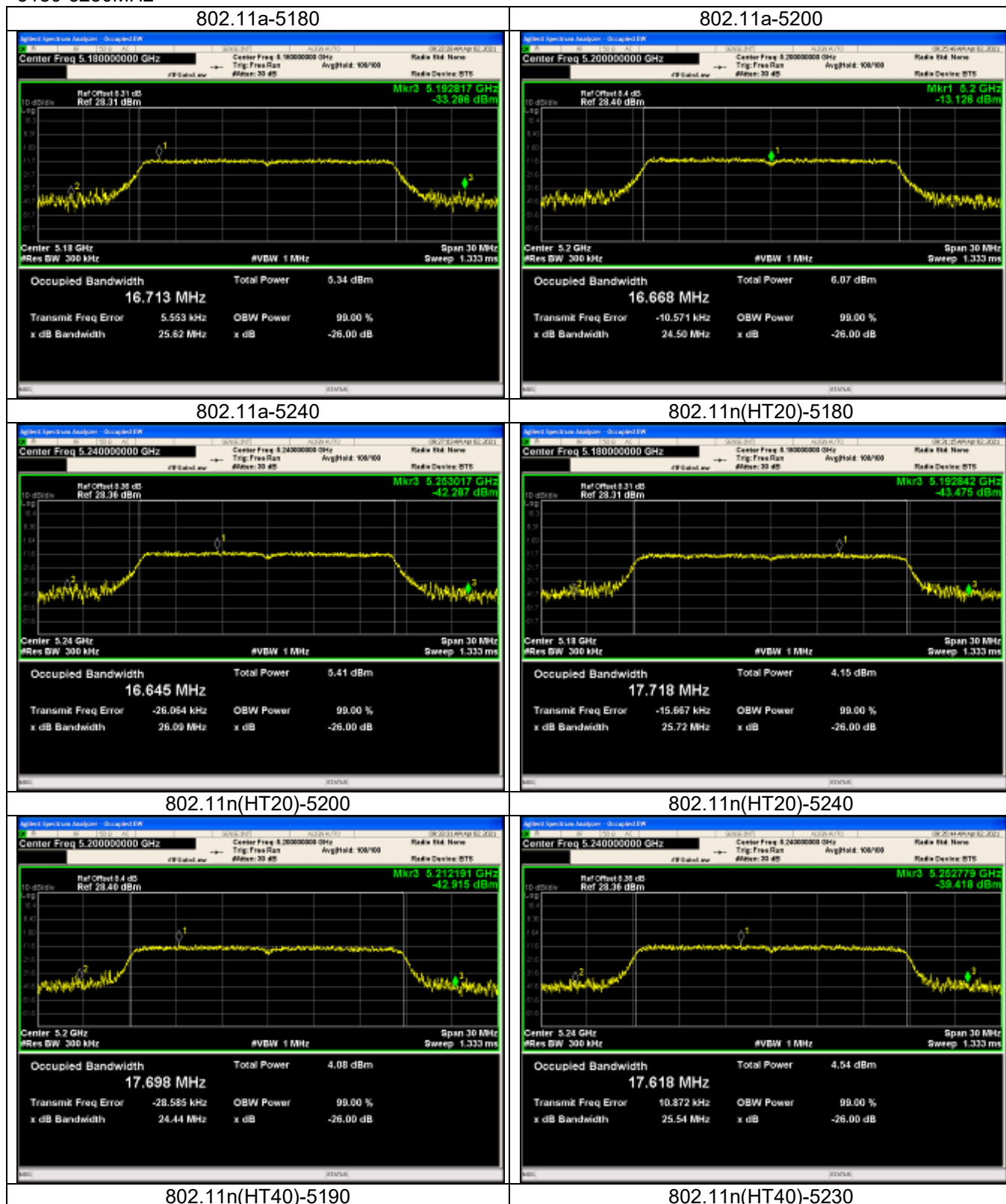
1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1% to 5% of the OBW
4. Set VBW $\geq 3 * RBW$
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection 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.

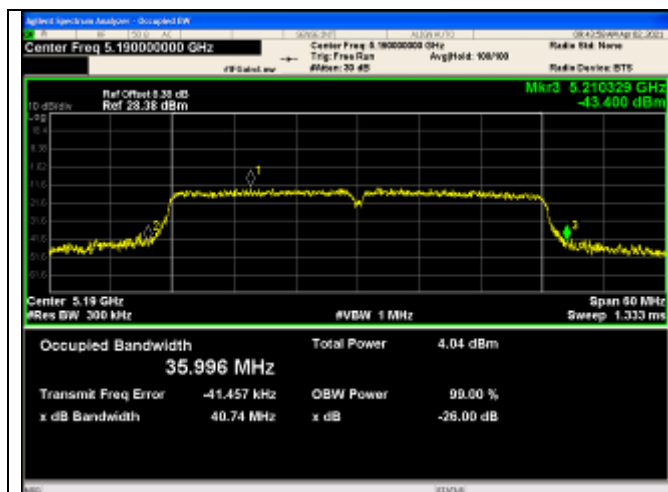
10.4 Test Results

Test mode	Test Channel (MHz)	26dB Bandwidth (MHz)	Limit (MHz)
802.11a	5180	25.623	≥ 0.5
	5200	24.501	≥ 0.5
	5240	26.086	≥ 0.5
802.11a20	5180	25.673	≥ 0.5
	5200	24.828	≥ 0.5
	5240	28.662	≥ 0.5
802.11a40	5190	40.395	≥ 0.5
	5230	41.841	≥ 0.5
802.11a80	5210	78.345	≥ 0.5
802.11n(HT20)	5180	25.715	≥ 0.5
	5200	24.44	≥ 0.5
	5240	25.535	≥ 0.5
802.11n(HT40)	5190	40.74	≥ 0.5
	5230	39.48	≥ 0.5

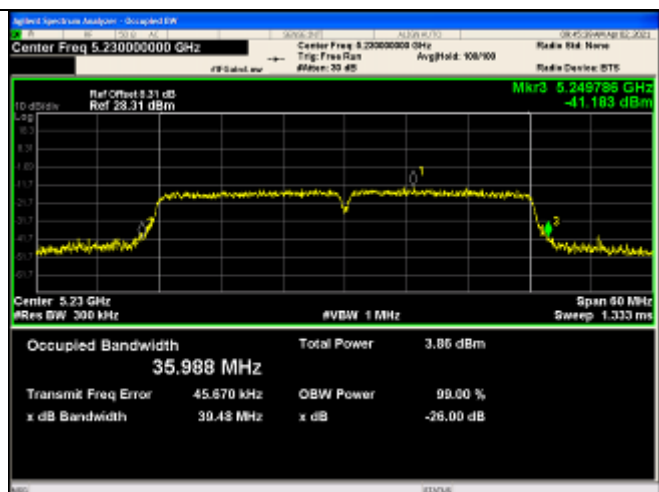
Test mode	Test Channel (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)
802.11a	5745	16.33	16.45	≥ 0.5
	5785	16.339	16.450	≥ 0.5
	5825	16.339	16.462	≥ 0.5
802.11a20	5745	17.388	17.549	≥ 0.5
	5785	17.302	17.560	≥ 0.5
	5825	17.273	17.564	≥ 0.5
802.11a40	5755	35.138	35.863	≥ 0.5
	5795	35.447	35.963	≥ 0.5
802.11a80	5775	75.186	75.312	≥ 0.5
802.11n(HT20)	5745	17.376	17.567	≥ 0.5
	5785	17.137	17.563	≥ 0.5
	5825	17.379	17.582	≥ 0.5
802.11n(HT40)	5755	35.226	35.890	≥ 0.5
	5795	35.712	35.941	≥ 0.5

Test Graph1 5180-5230MHz

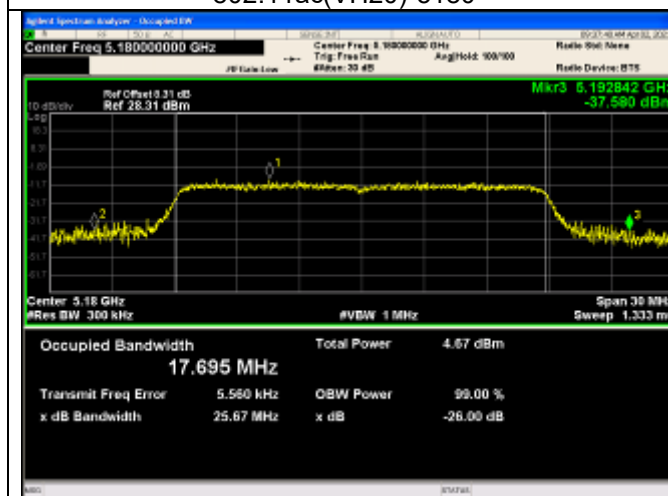




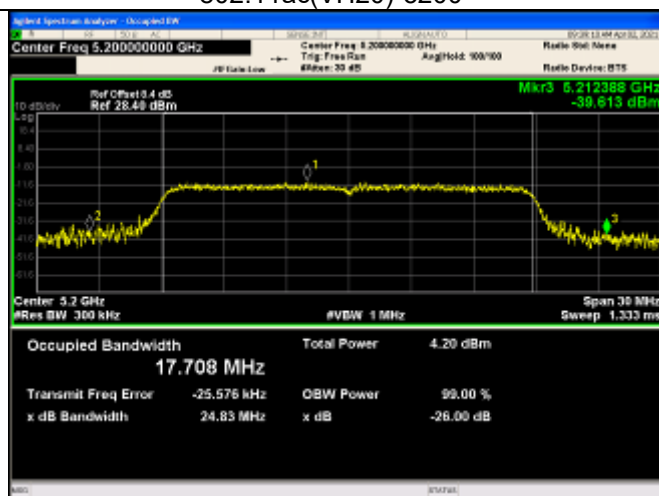
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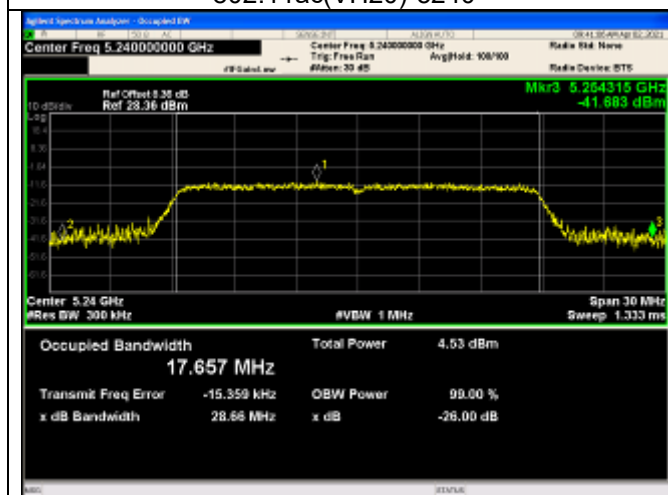
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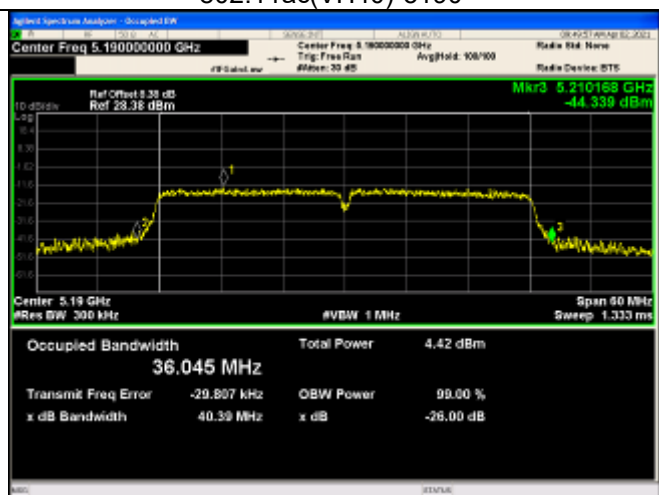
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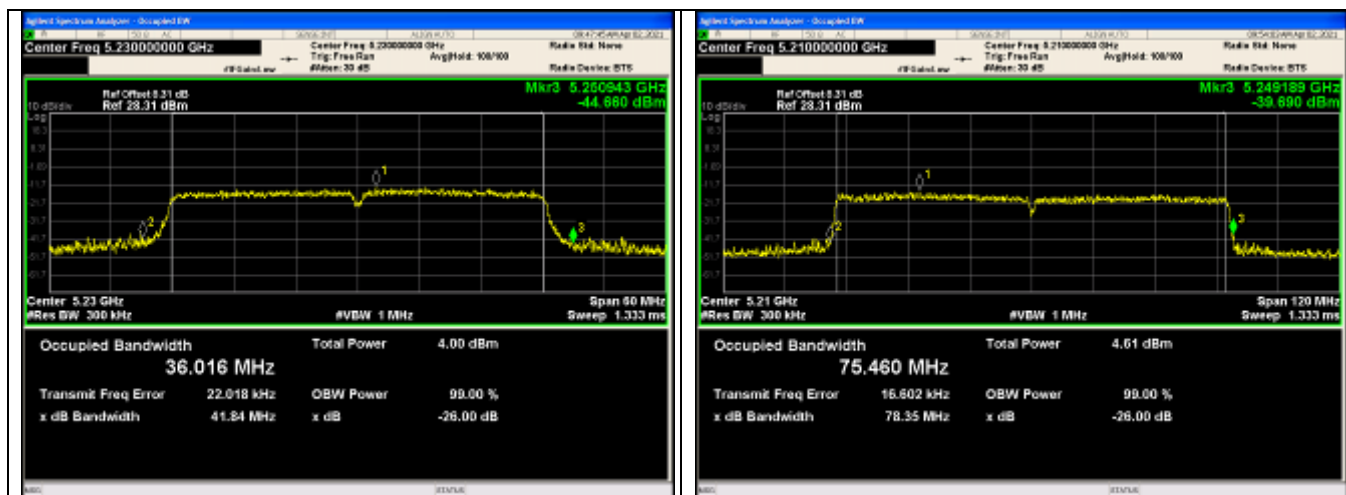
802.11ac(VH40)-5190



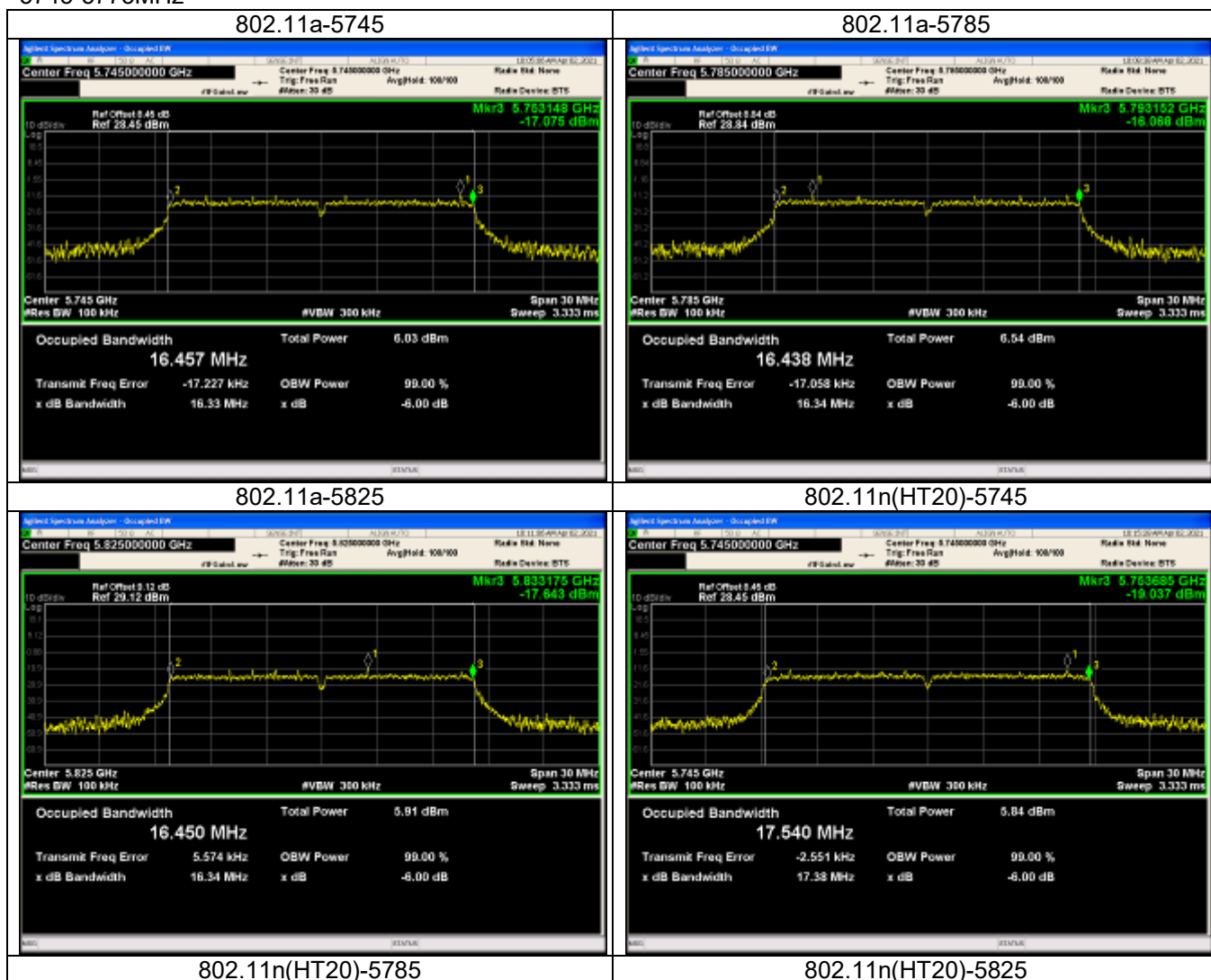
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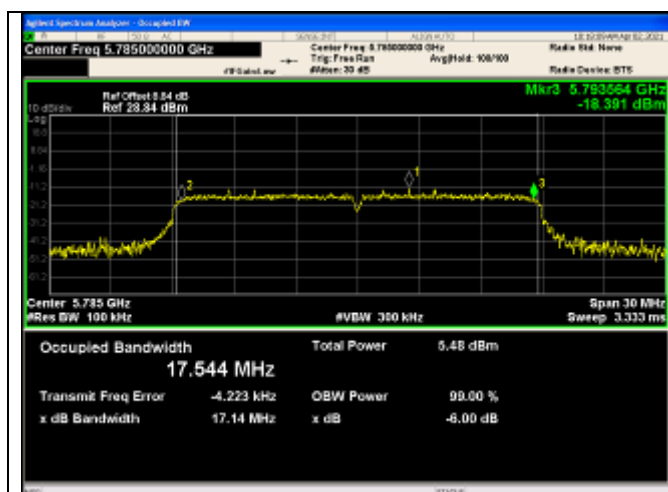


802.11ac(VH80)-5210

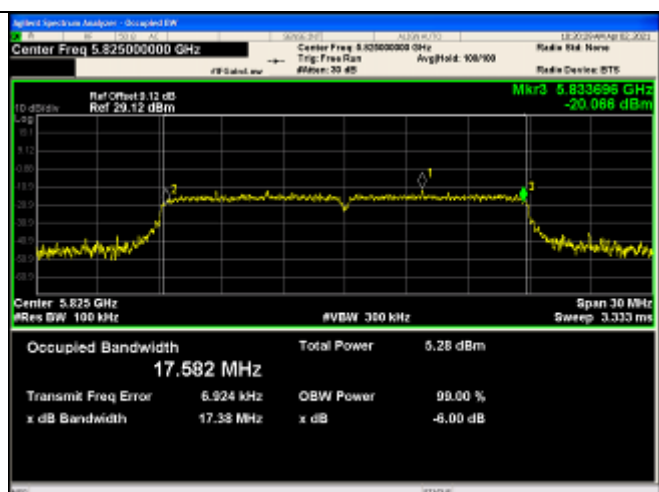


5745-5775MHz

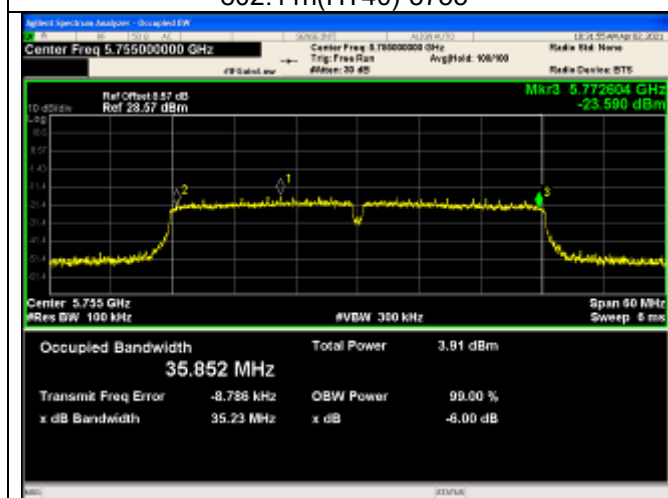




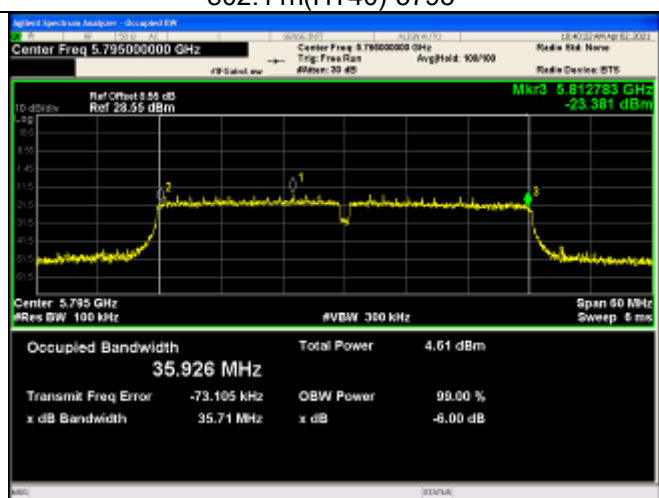
802.11n(HT40)-5755



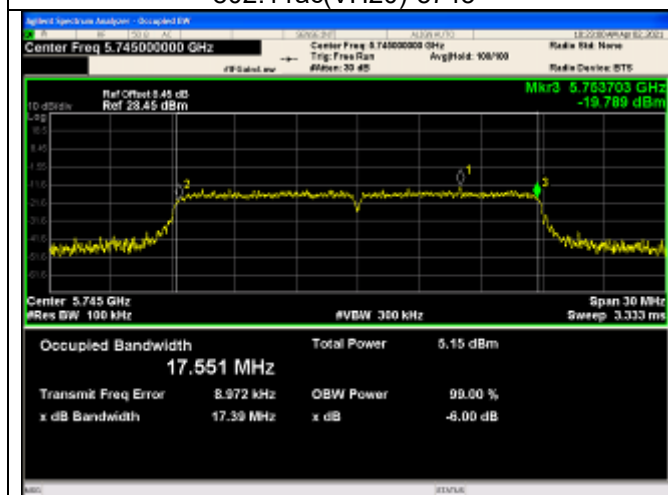
802.11n(HT40)-5795



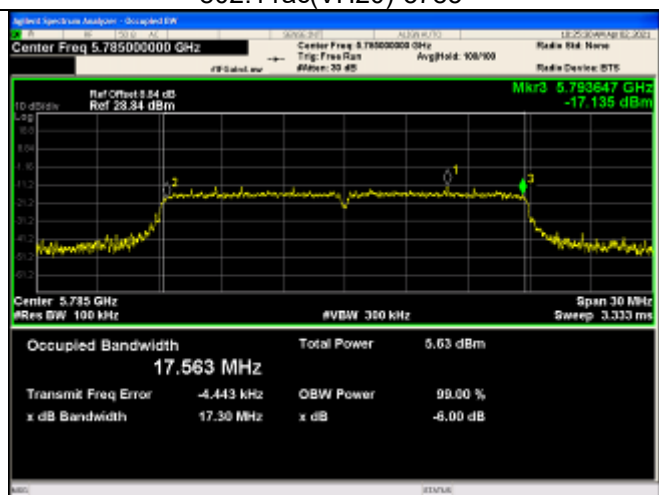
802.11ac(VH20)-5745



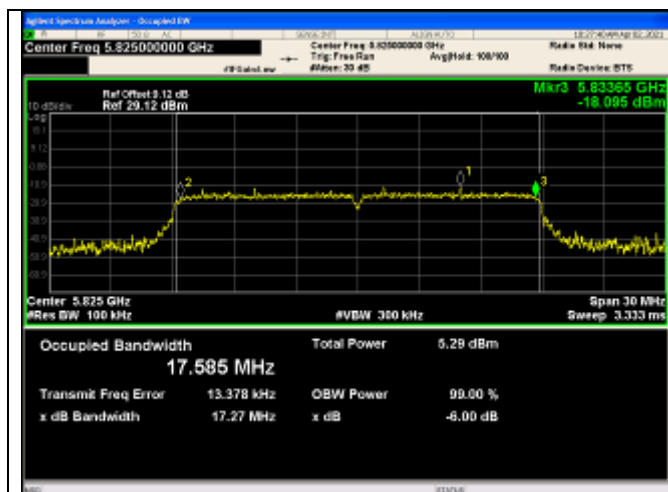
802.11ac(VH20)-5785



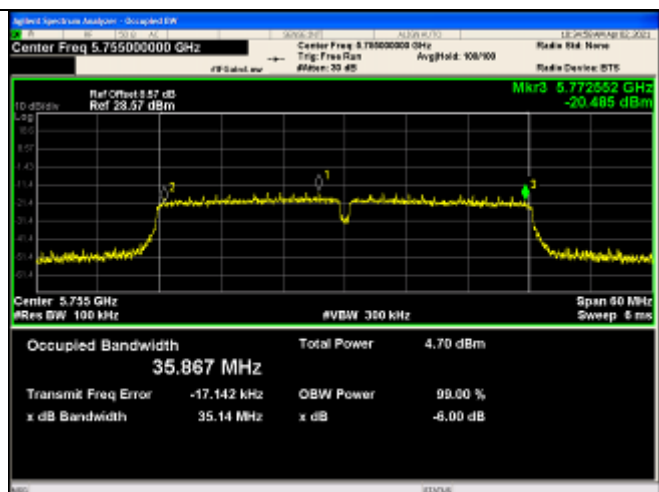
802.11ac(VH20)-5825



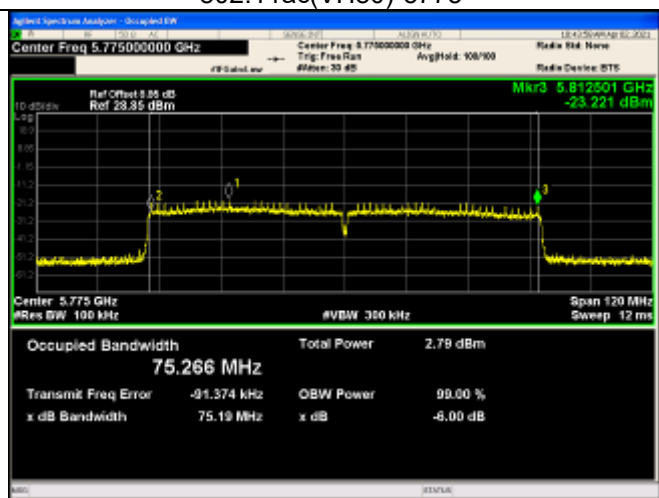
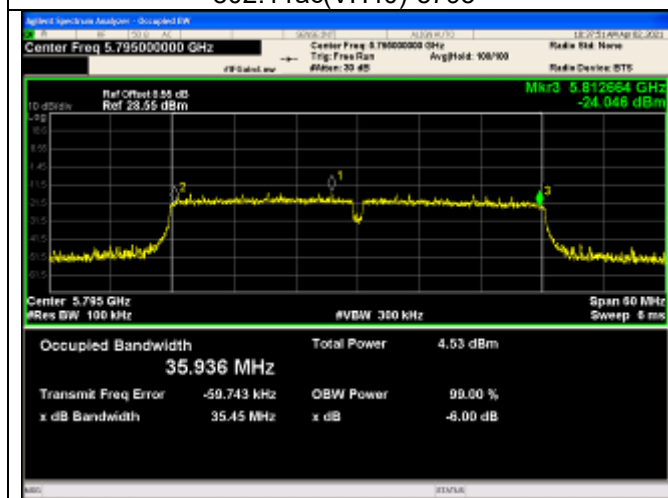
802.11ac(VH40)-5755



802.11ac(VH40)-5795

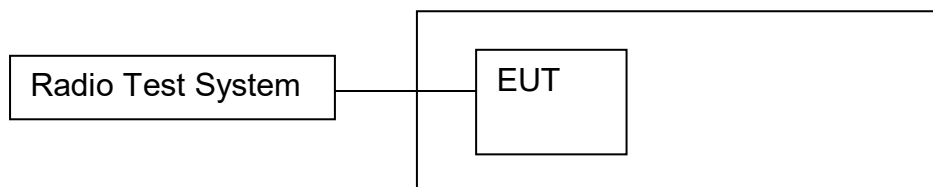


802.11ac(VH80)-5775



11. POWER SPECTRAL DENSITY

11.1 Block Diagram Of Test Setup



11.2 Limit

(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 $11 \text{ dBm} + 10 \log B$, 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.

11.3 Test procedure

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

For devices operating in the bands 5.15–5.25 GHz, 5.25–5.35 GHz, and 5.47–5.725 GHz, the preceding procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in Section 15.407(a)(5). For devices operating in the band 5.725–5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth ($< 1 \text{ MHz}$, or $< 500 \text{ kHz}$) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

a) Set $\text{RBW} \geq 1/T$, where T is defined in II.B.1.a).

b) Set $VBW \geq 3$ RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10 \log (500 \text{ kHz/RBW})$ to the measured result, whereas RBW ($< 500 \text{ kHz}$) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add $10 \log (1 \text{ MHz/RBW})$ to the measured result, whereas RBW ($< 1 \text{ MHz}$) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

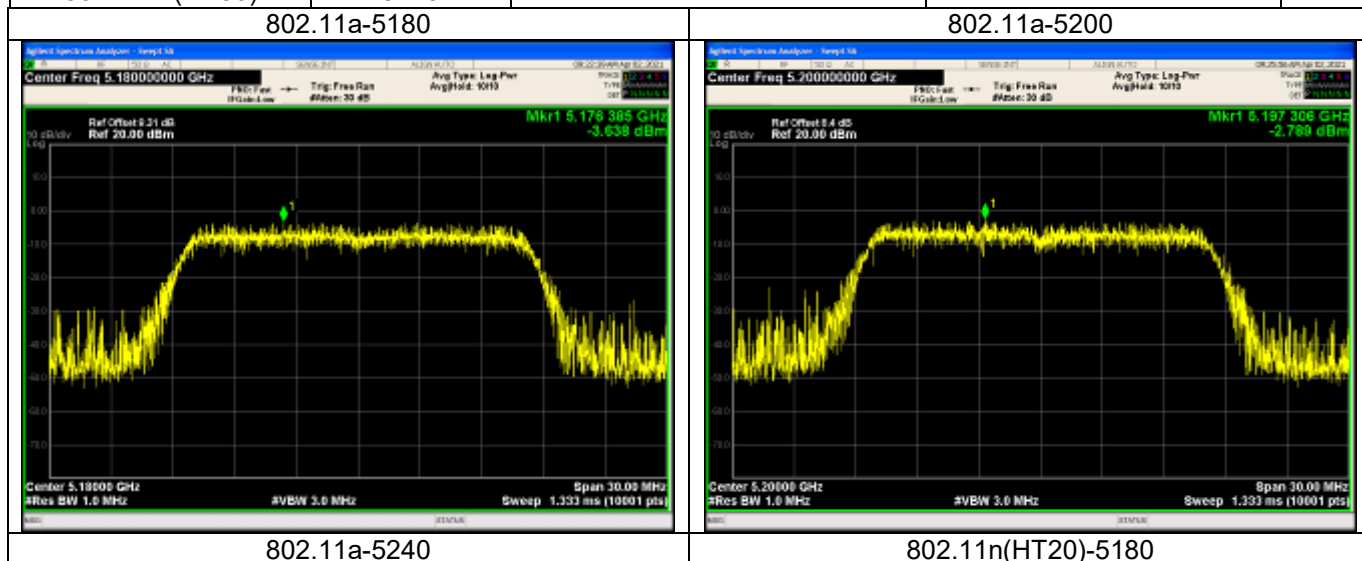
e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

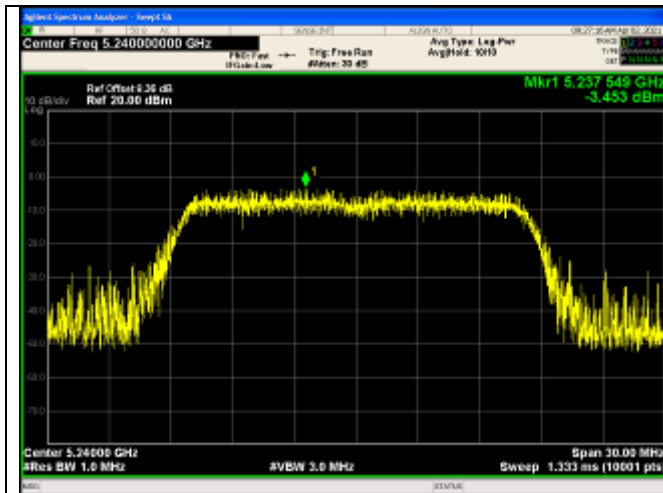
Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the II.F.5.c) and II.F.5.d), since RBW=100 kHz is available on nearly all spectrum analyzers.

11.4 Test Result

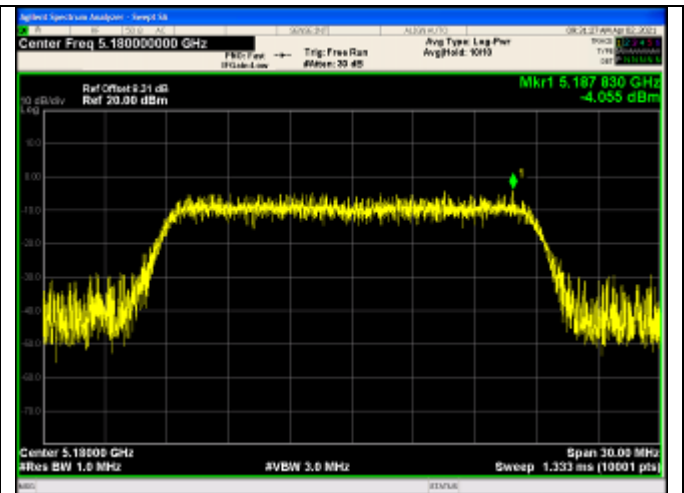
Test mode	Test Channel (MHz)	PSD [dBm/MHz]	Limit [dBm/MHz]	Result
802.11a	5180	-3.638	11	Pass
	5200	-2.789	11	Pass
	5240	-3.453	11	Pass
802.11ac(VH20)	5180	-4.166	11	Pass
	5200	-4.122	11	Pass
	5240	-4.384	11	Pass
802.11ac(VH40)	5190	-6.851	11	Pass
	5230	-7.748	11	Pass
802.11ac(VH80)	5210	-9.839	11	Pass
802.11n(HT20)	5180	-4.055	11	Pass
	5200	-4.499	11	Pass
	5240	-3.918	11	Pass
802.11n(HT40)	5190	-8.037	11	Pass
	5230	-7.915	11	Pass

Test mode1	Test Channel (MHz)	PSD [dBm/500kHz]	Result
802.11a	5745	-6.143	Pass
	5785	-6.589	Pass
	5825	-6.988	Pass
802.11n(HT20)	5745	-6.86	Pass
	5785	-6.571	Pass
	5825	-7.25	Pass
802.11n(HT40)	5755	-10.717	Pass
	5795	-11.032	Pass
802.11ac(VH20)	5745	-6.684	Pass
	5785	-6.905	Pass
	5825	-7.637	Pass
802.11ac(VH40)	5755	-10.45	Pass
	5795	-11.018	Pass
802.11ac(VH80)	5775	-16.11	Pass

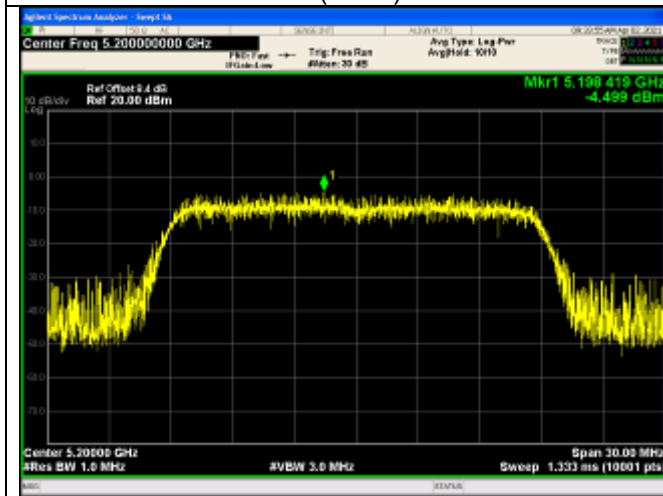




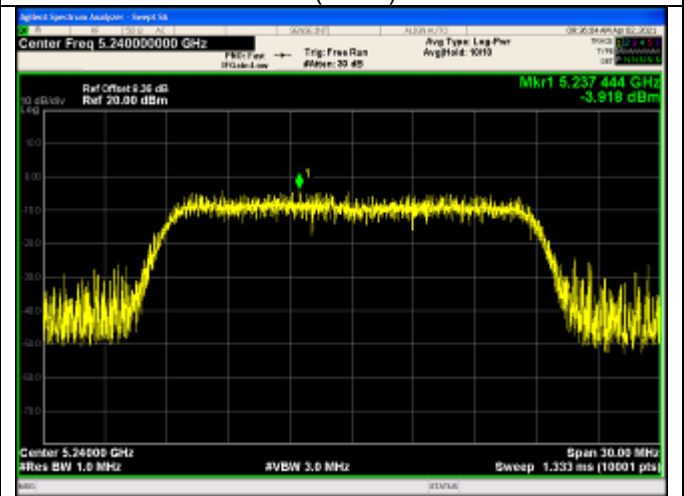
802.11n(HT20)-5200



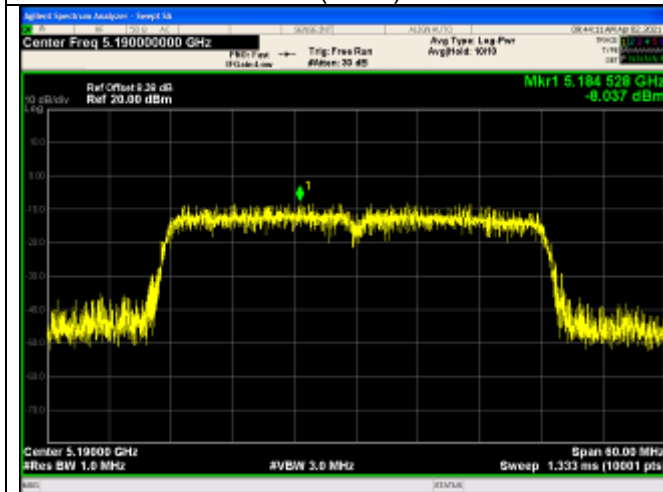
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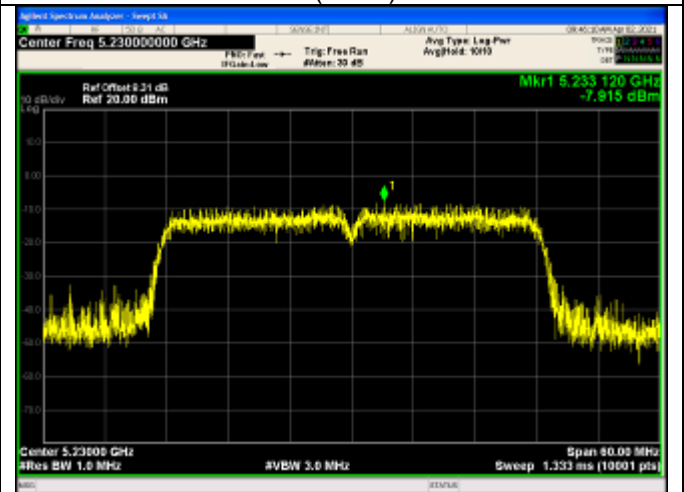
802.11n(HT40)-5190



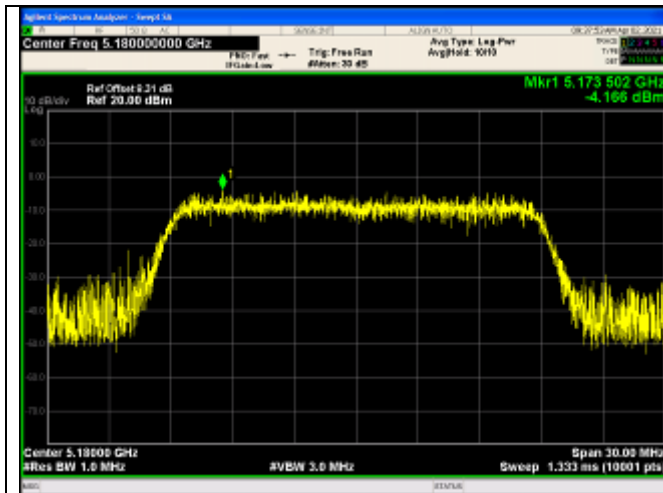
802.11n(HT40)-5230



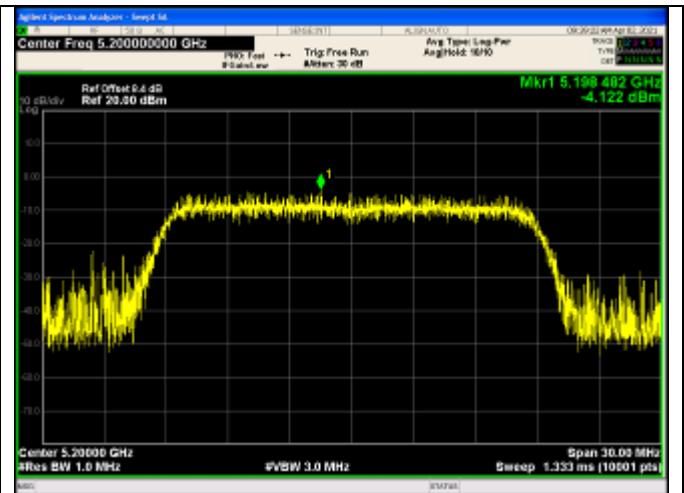
802.11ac(VH20)-5180



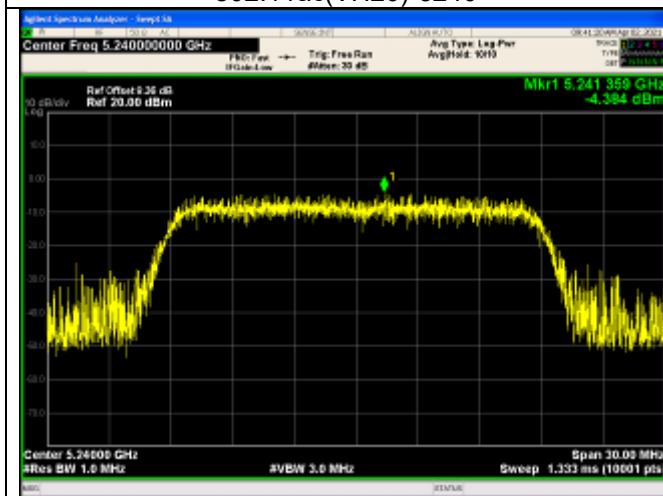
802.11ac(VH20)-5200



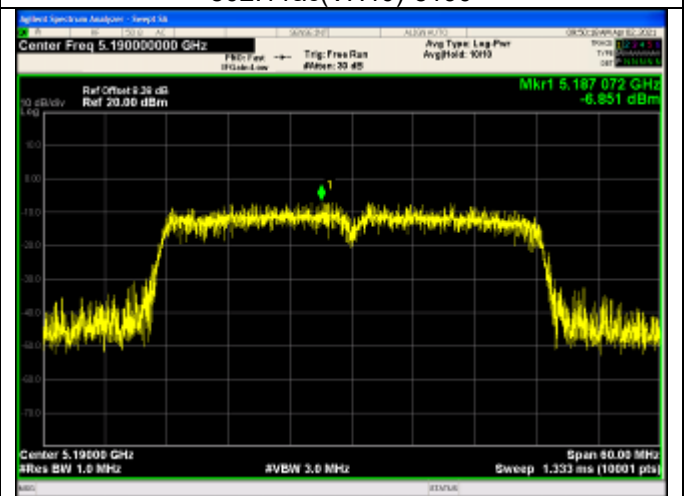
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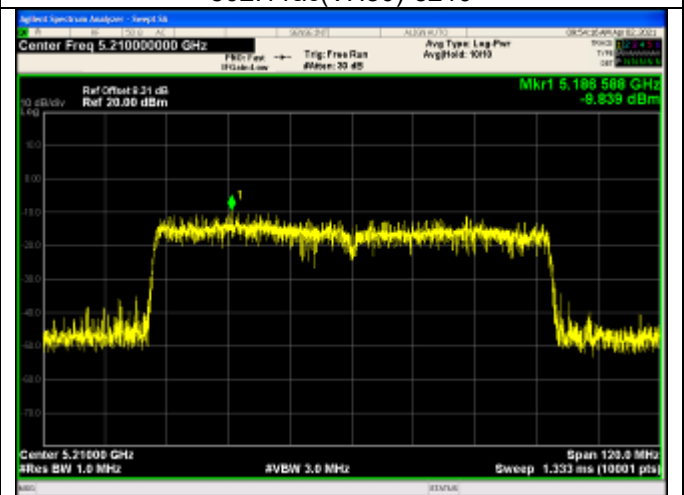
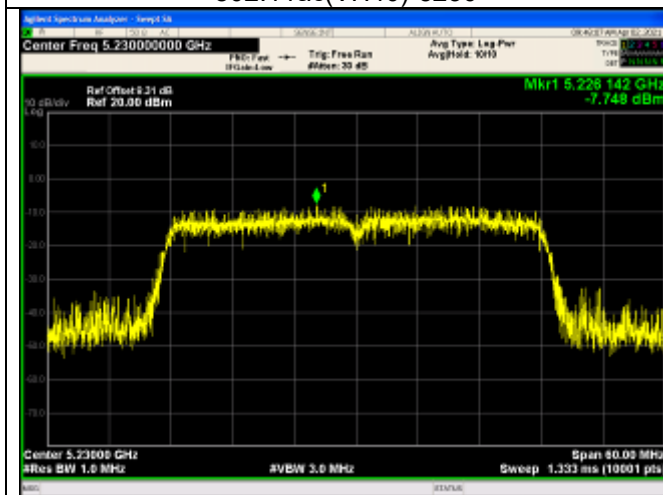
802.11ac(VH40)-5190



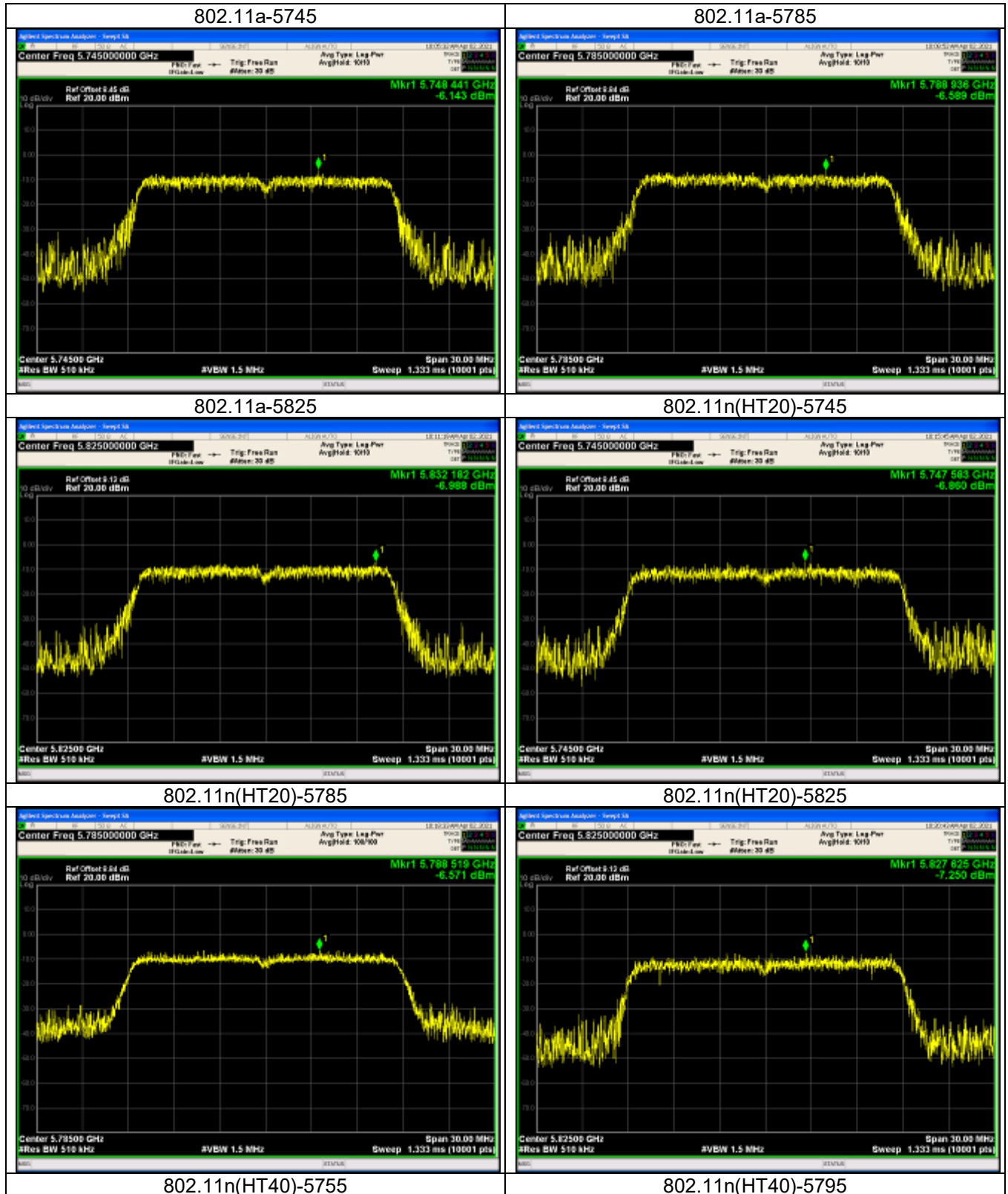
802.11ac(VH40)-5230

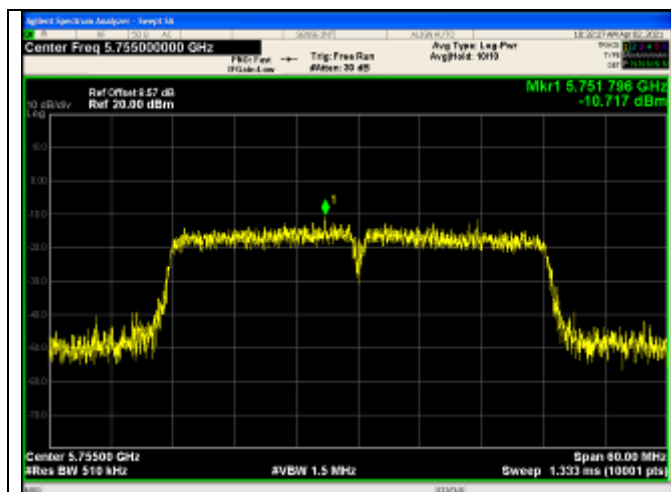


802.11ac(VH80)-5210

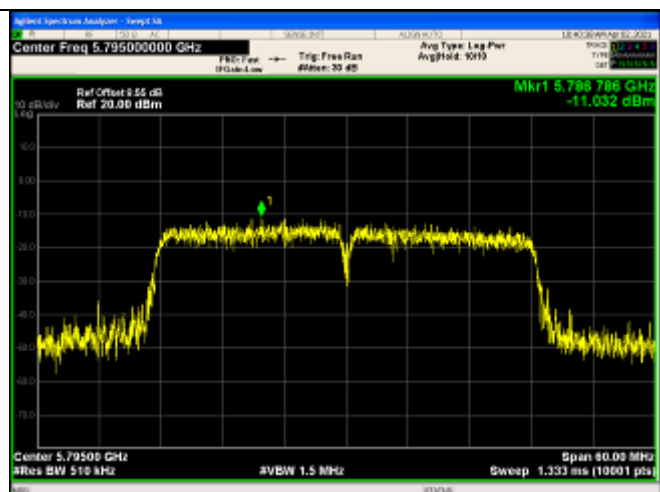


5745-5775MHz

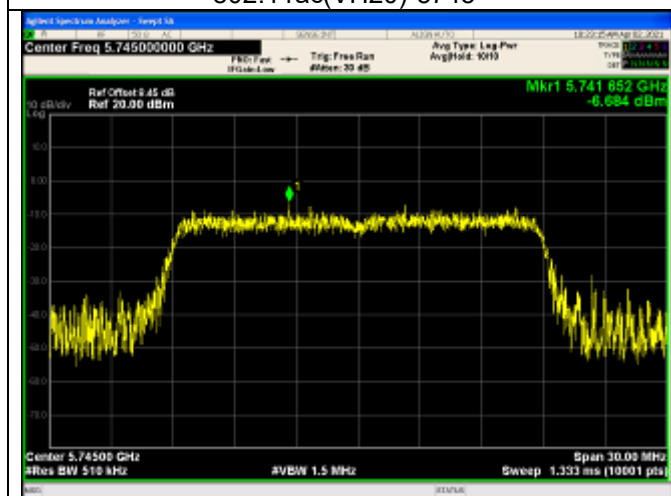




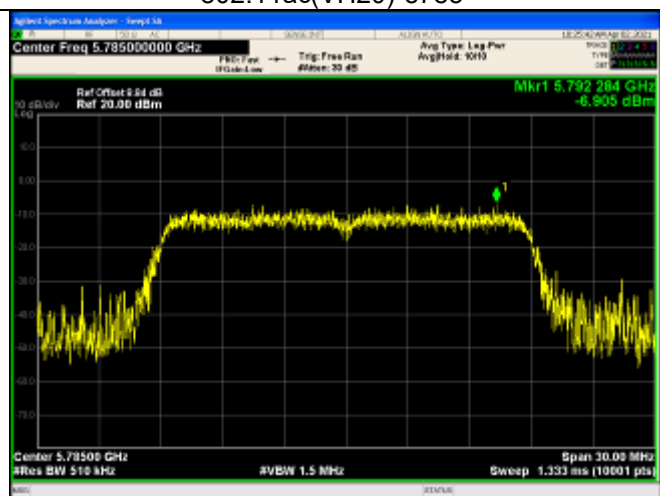
802.11ac(VH20)-5745



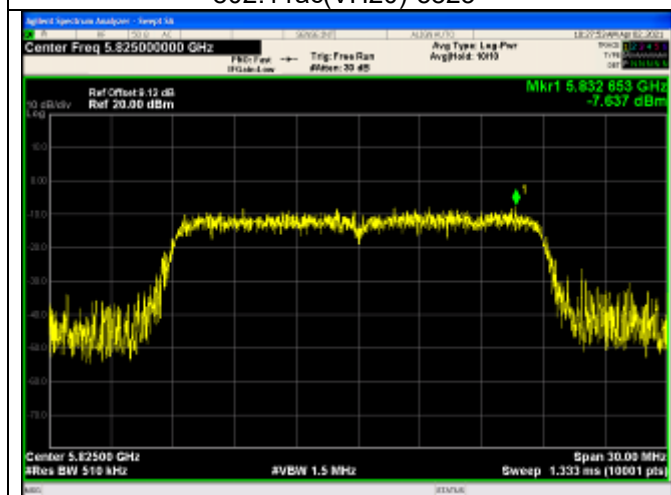
802.11ac(VH20)-5785



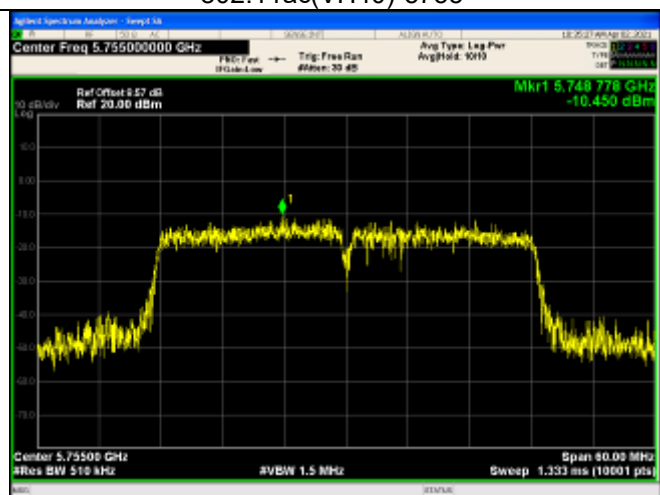
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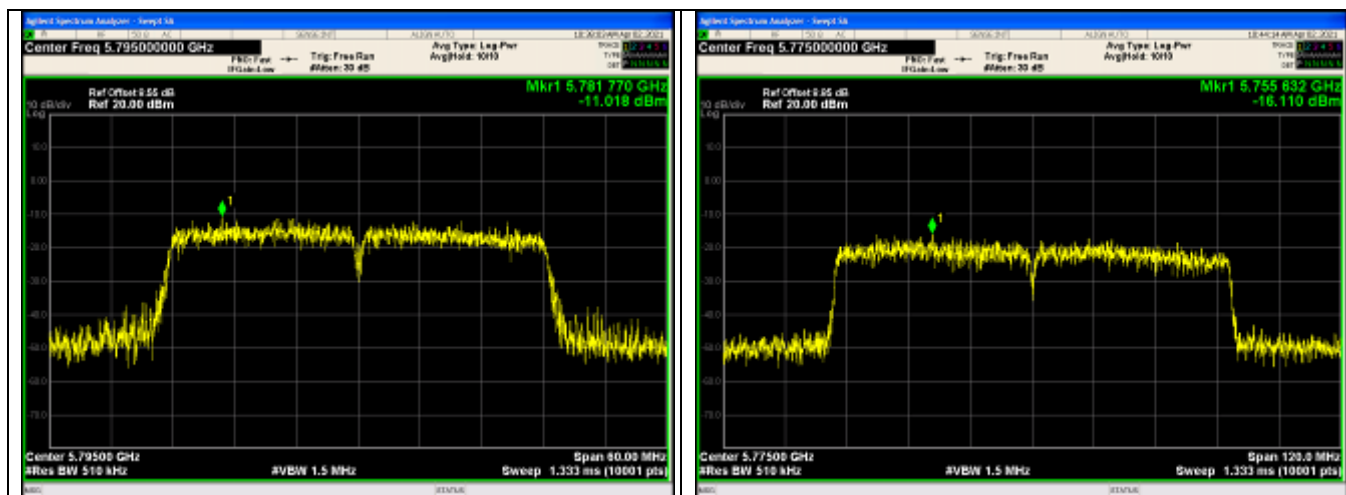
802.11ac(VH40)-5755



802.11ac(VH40)-5795

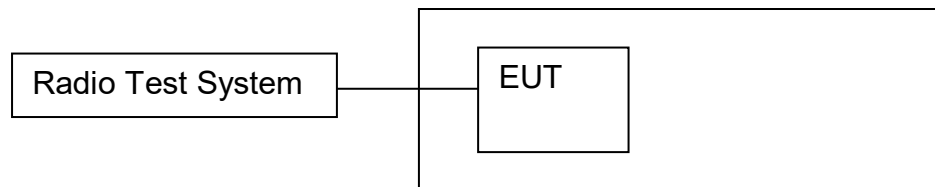


802.11ac(VH80)-5775



12. FREQUENCY STABILITY

12.1 Block Diagram Of Test Setup



12.2 Limit

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

12.3 Test procedure

1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.
2. Set EUT as normal operation.
3. Turn the EUT on and couple its output to spectrum.
4. Turn the EUT off and set the chamber to the highest temperature specified.
5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.
6. Repeat step with the temperature chamber set to the lowest temperature.

12.4 Test Result

TX Frequency (5180-5240MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.80	5180.0556	5180	0.0556	10.7336
		V max (V)	4.37	5180.0323	5180	0.0323	6.2355
		V min (V)	3.23	5180.0246	5180	0.0246	4.7490
Limits				5150-5250 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.8	T (°C)	-20	5180.0054	5180	0.0054	1.0425
		T (°C)	-10	5180.0105	5180	0.0105	2.0270
		T (°C)	0	5180.0323	5180	0.0323	6.2355
		T (°C)	10	5180.0386	5180	0.0386	7.4517
		T (°C)	20	5180.0293	5180	0.0293	5.6564
		T (°C)	30	5180.0218	5180	0.0218	4.2085
		T (°C)	40	5180.0125	5180	0.0125	2.4131
		T (°C)	50	5180.0097	5180	0.0097	1.8726
		T (°C)	60	5180.0414	5180	0.0414	7.9923
		T (°C)	70	5180.0697	5180	0.0697	13.4556
Limits				5150-5250 MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.80	5200.0254	5200	0.0254	4.8846
		V max (V)	4.37	5200.0428	5200	0.0428	8.2308
		V min (V)	3.23	5200.0694	5200	0.0694	13.3462
Limits				5150-5250MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.8	T (°C)	-20	5200.0633	5200	0.0633	12.1731
		T (°C)	-10	5200.0526	5200	0.0526	10.1154
		T (°C)	0	5200.0434	5200	0.0434	8.3462
		T (°C)	10	5200.0928	5200	0.0928	17.8462
		T (°C)	20	5200.0635	5200	0.0635	12.2115
		T (°C)	30	5200.0124	5200	0.0124	2.3846
		T (°C)	40	5200.0733	5200	0.0733	14.0962
		T (°C)	50	5200.0416	5200	0.0416	8.0000
		T (°C)	60	5200.0325	5200	0.0325	6.2500
		T (°C)	70	5200.0427	5200	0.0427	8.2115
Limits				5150-5250 MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.80	5240.0136	5240	0.0136	2.5954
		V max (V)	4.37	5240.0414	5240	0.0414	7.9008
		V min (V)	3.23	5240.0097	5240	0.0097	1.8511
Limits				5150-5250 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.8	T (°C)	-20	5240.0094	5240	0.0094	1.7939
		T (°C)	-10	5240.0035	5240	0.0035	0.6679
		T (°C)	0	5240.0144	5240	0.0144	2.7481
		T (°C)	10	5240.0856	5240	0.0856	16.3359
		T (°C)	20	5240.0114	5240	0.0114	2.1756
		T (°C)	30	5240.0125	5240	0.0125	2.3855
		T (°C)	40	5240.0063	5240	0.0063	1.2023
		T (°C)	50	5240.0076	5240	0.0076	1.4504
		T (°C)	60	5240.0053	5240	0.0053	1.0115
		T (°C)	70	5240.0105	5240	0.0105	2.0038
Limits				5150-5250 MHz			
Result				Complies			

TX Frequency(5745-5825MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (° C)	20	V nom (V)	3.80	5745.00674	5745	0.00674	1.1728
		V max (V)	4.37	5745.00624	5745	0.00624	1.0855
		V min (V)	3.23	5745.00861	5745	0.00861	1.4994
Limits				5725-5850 MHz			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.8	T (°C)	-20	5745.01033	5745	0.01033	1.7982
		T (°C)	-10	5745.01156	5745	0.01156	2.0126
		T (°C)	0	5745.00622	5745	0.00622	1.0833
		T (°C)	10	5745.00873	5745	0.00873	1.5199
		T (°C)	20	5745.01071	5745	0.01071	1.8641
		T (°C)	30	5745.00790	5745	0.00790	1.3751
		T (°C)	40	5745.00110	5745	0.00110	0.1913
		T (°C)	50	5745.00069	5745	0.00069	0.1194
		T (°C)	60	5745.00428	5745	0.00428	0.7448
		T (°C)	70	5745.00050	5745	0.00050	0.0862
Limits				5725-5850 MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.80	5785.01228	5785	0.01228	2.1222
		V max (V)	5.75	5785.01045	5785	0.01045	1.8062
		V min (V)	4.25	5785.00821	5785	0.00821	1.4187
Limits				5725-5850 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.8	T (°C)	-20	5785.01103	5785	0.01103	1.9074
		T (°C)	-10	5785.00092	5785	0.00092	0.1596
		T (°C)	0	5785.00518	5785	0.00518	0.8960
		T (°C)	10	5785.01156	5785	0.01156	1.9974
		T (°C)	20	5785.00809	5785	0.00809	1.3980
		T (°C)	30	5785.01317	5785	0.01317	2.2759
		T (°C)	40	5785.00068	5785	0.00068	0.1167
		T (°C)	50	5785.00380	5785	0.00380	0.6562
		T (°C)	60	5785.01346	5785	0.01346	2.3274
		T (°C)	70	5785.00719	5785	0.00719	1.2430
Limits				5725-5850 MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.80	5825.00385	5825	0.00385	0.6607
		V max (V)	4.37	5825.01238	5825	0.01238	2.1258
		V min (V)	3.23	5825.01027	5825	0.01027	1.7624
Limits				5725-5850 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.8	T (°C)	-20	5825.01348	5825	0.01348	2.3148
		T (°C)	-10	5825.00472	5825	0.00472	0.8108
		T (°C)	0	5825.01272	5825	0.01272	2.1828
		T (°C)	10	5825.01116	5825	0.01116	1.9166
		T (°C)	20	5825.00163	5825	0.00163	0.2791
		T (°C)	30	5825.00063	5825	0.00063	0.1078
		T (°C)	40	5825.00907	5825	0.00907	1.5563
		T (°C)	50	5825.00404	5825	0.00404	0.6939
		T (°C)	60	5825.00797	5825	0.00797	1.3683
		T (°C)	70	5825.00844	5825	0.00844	1.4483
Limits				5725-5850 MHz			
Result				Complies			

13. OPERATION IN THE ABSENCE OF INFORMATION TO THE TRANSMIT

13.1 Requirement

15.407(c) requirement:

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signal ling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

13.2 Test Results

Operation in the absence of information to the transmit:

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ASK message transmitting from remote device and verify whether it shall resend or discontinue transmission. (manufacturer declare)

14. ANTENNA REQUIREMENT

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is Internal Antenna and no consideration of replacement. The best case gain of the antenna is 0.63dBi.

15. EUT PHOTOGRAPHS

EUT Photo 1



EUT Photo 2



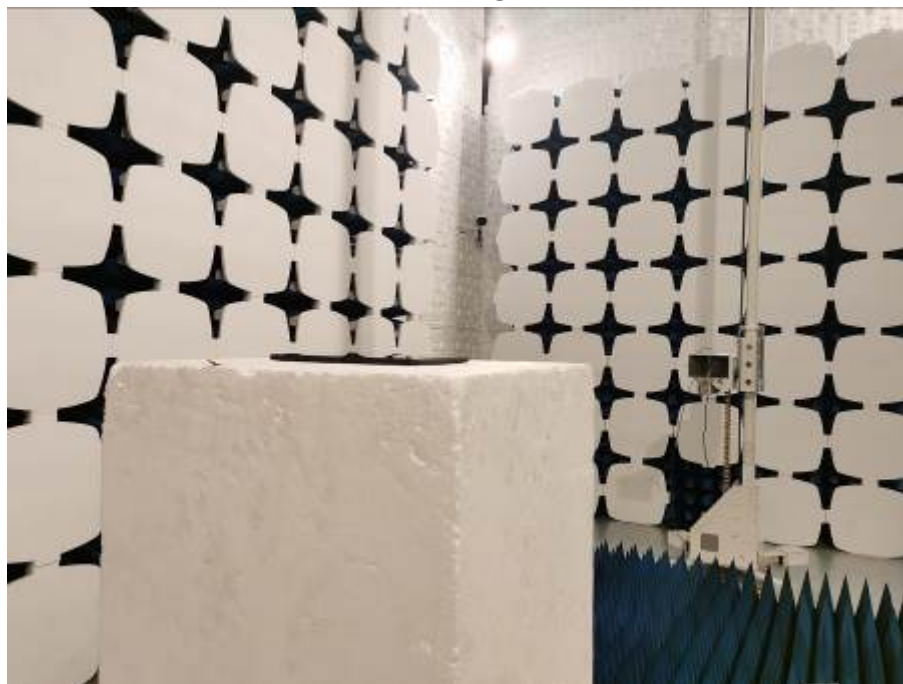
16. EUT TEST SETUP PHOTOGRAPHS

Spurious emissions

Below 1GHz



Above 1GHz



Conducted Emission



***** END OF REPORT *****