TEST REPORT

Product Name:	Wi-Fi + BT SoC Module
FCC ID:	2ATPO-BW20
Trademark:	B&T 博安通 Ai 安信可科技 Ai-Thinker
Model Number:	BW20-12F, BW20-07S, BW20-12S, BW20-13, BW20-13U, BW20-01M, BW20-01N, BW20-32S, BW20-32SU, BW20-CBV, BW20-CBM, BW20-01W, BW20-02W, BW20-03W, BW20-04W, BW20-02S, BW20-03S, BW20-04S
Prepared For:	Shenzhen Ai-Thinker Technology Co., Ltd
Address:	410, Block C, Huafeng Smart Innovation Port. Gushu 2nd Road, Gushu Community, Xixiang Street, Baoan District, Shenzhen, China
Manufacturer:	Shenzhen Ai-Thinker Technology Co., Ltd
Address:	410, Block C, Huafeng Smart Innovation Port. Gushu 2nd Road, Gushu Community, Xixiang Street, Baoan District, Shenzhen, China
Prepared By:	Shenzhen CTB Testing Technology Co., Ltd.
Address:	1&2/F., Building A, No.26, Xinhe Road, Xinqiao, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, China
Sample Received Date:	Sep. 11, 2024
Sample tested Date:	Sep. 11, 2024 to Sep. 26, 2024
Issue Date:	Sep. 26, 2024
Report No.:	CTB240926021RF
Test Standards	FCC CFR Title 47 Part 15 Subpart E Section 15.407
Test Results	PASS
Remark:	This is WIFI-5GHz band radio test report.

Compiled by:	Reviewed by:	Approved by:
Zhou Kui	Arron Liu	Bin Mei / Director

Note: If there is any objection to the inspection results in this report, please submit a written report to the company within 15 days from the date of receiving the report. 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. "*" indicates the testing items were fulfilled by subcontracted lab. "#" indicates the items are not in CNAS accreditation scope.

TABLE OF CONTENT

(NOTE: N/A MEANS NOT APPLICABLE)

1. VERSION

Report No.	Issue Date	Description	Approved
CTB240926021RF	Sep. 26, 2024	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)(9)	ANSI C63.10-2013	PASS
Radiated Spurious emissions	47 CFR Part 15 Subpart E Section 15.205/15.407(b)	KDB789033v02r01	PASS
Band edge	47 CFR Part 15 Subpart E Section 15.205/15.407(b)	KDB789033v02r01	PASS
Conducted Peak Output Power	47 CFR Part 15 Subpart E Section 15.407 (a)	KDB789033v02r01	PASS
Emission Bandwidth & Occupied Bandwidth	47 CFR Part 15 Subpart E Section 15.407 (a)(e)	KDB789033v02r01	PASS
Power Spectral Density	47 CFR Part 15 Subpart E Section 15.407 (a)	KDB789033v02r01	PASS
Frequency stability	47 CFR Part 15 Subpart E Section 15.407 (g)	KDB789033v02r01	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	/	PASS

Remark:
Test according to 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%
15	Conducted Emission (150KHz-30MHz)	3.2 dB
16	3m camber Radiated spurious emission(9KHz-30MHz)	4.8dB
17	3m chamber Radiated spurious emission(18GHz-40GHz)	3.4dB

4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Model(s):	BW20-12F, BW20-07S, BW20-12S, BW20-13, BW20-13U, BW20-01M, BW20-01N, BW20-32S, BW20-32SU, BW20-CBV, BW20-CBM, BW20-01W, BW20-02W, BW20-03W, BW20-04W, BW20-02S, BW20-03S, BW20-04S
Model Description:	All models are just named and appearance is different, used to distinguish different sales customers, the rest are the same. Test sample model: BW20-12F
Wi-Fi Specification:	IEEE 802.11a/n
Hardware Version:	V1.0
Software Version:	V1.0
Operation Frequency:	IEEE 802.11a/n(20M): 5150MHz ~5250MHz/ 4 channel IEEE 802.11n(40M): 5150MHz ~5250MHz/ 2 channel IEEE 802.11a/n(20M): 5250MHz ~5350 MHz/ 4 channel IEEE802.11n(40M): 5250MHz ~5350 MHz/ 2 channel IEEE 802.11a/n(20M): 5470MHz ~5725 MHz/ 11 channel IEEE802.11n(40M): 5470MHz ~5725 MHz/ 5 channel IEEE 802.11a/n(20M): 5725MHz ~5850MHz/ 5 channel IEEE 802.11n (40M): 5725MHz ~5850MHz/ 2 channel
Max. RF output power:	WiFi (5G): 23.68dBm
Type of Modulation:	WiFi: OFDM
Antenna installation:	PCB antenna
Antenna Gain:	WiFi (5.2G) : 2.91dBi WiFi (5.3G) : 3dBi WiFi (5.6G) : 3.79dBi WiFi (5.8G) : 5.33dBi
Ratings:	DC 3.3V powering from PC

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.	Laptop	DELL	Vostro 5490	N/A	AE

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(20M) Operation in the 5150MHz ~5250 MHz band			
Channel	Frequency	Channel	Frequency
36	5180MHz	44	5220MHz
40	5200MHz	48	5240MHz
For 802.11a/n(20M) Operation in the 5250MHz ~5350 MHz band			
Channel	Frequency	Channel	Frequency
52	5260MHz	60	5300MHz
56	5280MHz	64	5320MHz
For 802.11a/n(20M) Operation in the 5470MHz ~5725 MHz band			
Channel	Frequency	Channel	Frequency
100	5500MHz	124	5620 MHz
104	5520MHz	128	5640 MHz
108	5540MHz	132	5660 MHz
112	5560MHz	136	5680MHz
116	5580MHz	140	5700MHz
120	5600 MHz		
For 802.11a/n(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(40M) Operation in the 5150MHz ~5250 MHz band			
Channel	Frequency	Channel	Frequency
38	5190MHz	46	5230MHz
For 802.11n(40M) Operation in the 5250MHz ~5350 MHz band			
Channel	Frequency	Channel	Frequency
54	5270MHz	62	5310MHz
For 802.11n(40M) Operation in the 5470MHz ~5725 MHz band			
Channel	Frequency	Channel	Frequency
102	5510MHz	126	5630MHz
110	5550MHz	134	5670MHz
118	5590MHz		
For 802.11n(40M) Operation in the 5725MHz ~5850 MHz band			
Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

NOTE: Dutycycle>98%.

Test mode	rate
802.11a	54M
802.11n	500M

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 (20M)	5150MHz ~5250 MHz	Channel 36	Channel 40	Channel 48
		5180MHz	5200MHz	5240MHz
802.11n (40M)		Channel 38	N/A	Channel 46
		5190MHz	N/A	5230MHz
802.11a/n (20M)	5250MHz ~5350 MHz	Channel 52	Channel 56	Channel 64
		5260MHz	5280MHz	5320MHz
802.11n (40M)		Channel 54	N/A	Channel 62
		5270MHz	N/A	5310MHz
802.11a/n (20M)	5470MHz ~5725 MHz	Channel 100	Channel 116	Channel 140
		5500MHz	5580MHz	5700MHz
802.11n (40M)		Channel 102	N/A	Channel 134
		5510MHz	N/A	5670MHz
802.11a/n (20M)	5725MHz ~5850 MHz	Channel 149	Channel 157	Channel 165
		5745MHz	5785MHz	5825MHz
802.11n/ (40M)		Channel 151	N/A	Channel 159
		5755MHz	N/A	5795MHz

4.6 Test Environment

Humidity(%):	54
Atmospheric Pressure(kPa):	101
Normal Voltage(AC):NV	120V
Normal Temperature(℃):NT	23
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 1&2F., Building A, No. 26, Xinhe Road, Xinqiao, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, 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	Type No.	Serial No.	Firmware Version	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY52090073	A.14.16	2025/6/28
2	Power Sensor	Agilent	U2021XA	MY56120032	/	2025/6/28
3	Power Sensor	Agilent	U2021XA	MY56120034	/	2025/6/28
4	Communication test set	R&S	CMW500	108058	V3.5.80	2025/6/28
5	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	A.14.16	2025/6/28
6	Signal Generator	Agilent	N5181A	MY50140365	A.01.60	2025/6/28
7	Vector signal generator	Agilent	N5182A	MY47420195	A.01.87	2025/6/28
8	Communication test set	Agilent	E5515C	MY50102567	B.19.07 (E1962B)	2025/6/28
9	2.4 GHz Filter	Shenxiang	MSF2400-2483.5MS-1154	20181015001	/	2025/6/30
10	5 GHz Filter	Shenxiang	MSF5150-5850MS-1155	20181015001	/	2025/6/30
11	Filter	Xingbo	XBLBQ-DZA120	190821-1-1	/	2025/6/30
12	BT&WI-FI Automatic test software	Micowave	MTS8310	Ver. 2.0.0.0	/	/
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	/	2025/6/28
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	/	2025/6/28
15	234G Automatic test software	Micowave	MTS8200	Ver. 2.0.0.0	/	/
16	966 chamber	C.R.T.	966	/	/	2027/6/21
17	Receiver	R&S	ESPI	100362	RF_ATTEN_7 (104489/003)	2025/6/28
18	Amplifier	HP	8447E	2945A02747	/	2025/6/28
19	Amplifier	Agilent	8449B	3008A01838	/	2025/6/28
20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	/	2025/6/28

21	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA9120D	01911	/	2025/6/28
22	EMI test software	Fala	EZ-EMC	FA-03A2 RE	/	/
23	Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-224	/	2025/6/28
24	loop antenna	ZHINAN	ZN30900A	GTS534	/	/
25	40G Horn antenna	A/H/System	SAS-574	588	/	2025/6/28
26	Amplifier	AEROFLEX	Aeroflex	097	/	2025/6/28
27	Power Metter	KEYSIGHT	N1912AP	N/A	A.05.00	2025/6/28

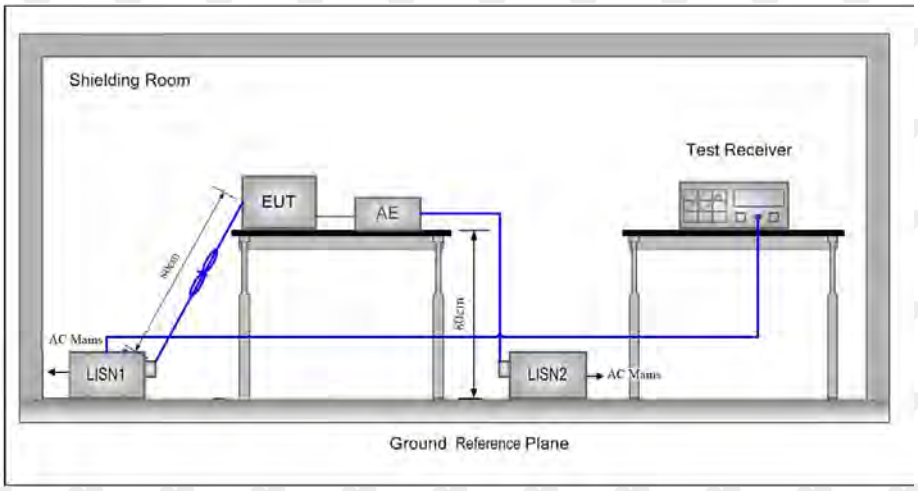
Continuous disturbance						
No.	Equipment	Manufacturer	Model No.	Serial No.	Firmware version	Calibrated until
1	843 Shield Room	C/ R/ T	843	/	/	2027/6/21
2	AMN	ROHDE&SCHWARZ	ESH3-Z5	831551852	/	2025/6/30
3	Pulse limiter	ROHDE&SCHWARZ	ESH3Z2	357881052	/	2025/6/28
4	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100428	V4.42.SP3	2025/6/30
5	Coaxial cable	ZDECL	Z302S	18091904	/	2025/6/30
6	ISN	Schwarzbeck	NTFM8158	183	/	2025/6/30
7	Voltage sensor	Schwarzbeck	TK 9420	01189	/	2024/11/16
8	EZ-EMC	Frad	EMC-con3A1.1	/	/	/
9	Current Probe	FCC	F-52B	199453	/	2025/5/27
10	Communication test set	R&S	CMW500	108058	B.19.07 (E1962B)	2025/6/28
11	Communication test set	Agilent	E5515C	MY50102567	V3.5.80	2025/6/28

Radiated emission(No.1 Chamber)						
No.	Equipment	Manufacturer	Model No.	Serial No.	Firmware version	Calibrated until
1	966 Chamber	C/ R/ T	966	/	/	2027/6/21
2	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA 9120 D	01911	/	2025/7/06
3	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	/	2025/6/29
4	Amplifier	Agilent	8449B	3008A01838	/	2025/6/30
5	Amplifier	HP	8447E	2945A02747	/	2025/6/28
6	loop antenna	Schwarzbeck	FMZB 1519B	1519B-224	/	2025/6/29

7	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESPI	100362	RF_ATTEN_7 (104489/003)	2025/6/28
8	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	A.14.16	2025/6/28
9	Coaxial cable	ETS	RFC-SNS-100-NMS-80	/	/	2025/6/28
10	Coaxial cable	ETS	RFC-SN-100-NMS-20	/	/	2025/6/28
11	Coaxial cable	ETS	RFC-SNS-100-SMS-20	/	/	2025/6/28
12	Coaxial cable	ETS	RFC-NNS-100-NMS-300	/	/	2025/6/28
13	EMI test software	Frad	EZ-EMC	Ver/ FA-03A2 RE	/	/
14	Communication test set	R&S	CMW500	108058	B.19.07 (E1962B)	2025/6/28
15	Communication test set	Agilent	E5515C	MY50102567	V3.5.80	2025/6/28

6. AC POWER LINE CONDUCTED EMISSION

6.1 Block Diagram Of Test Setup



6.2 Limit

Table 4 – AC power-line conducted emissions limits

Frequency (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56[Note 1]	56 to 46[Note 1]
0.5 – 5	56	46
5 – 30	60	50

Note 1: The level decreases linearly with the logarithm of the frequency.

* 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,

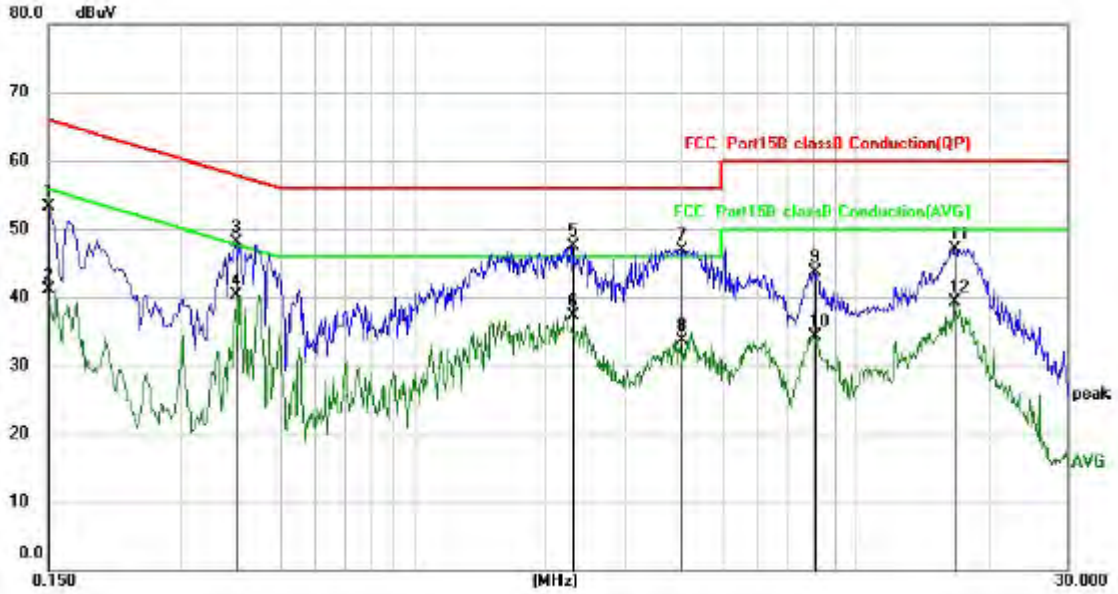
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0,4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0,8 m from the boundary of the unit under

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.

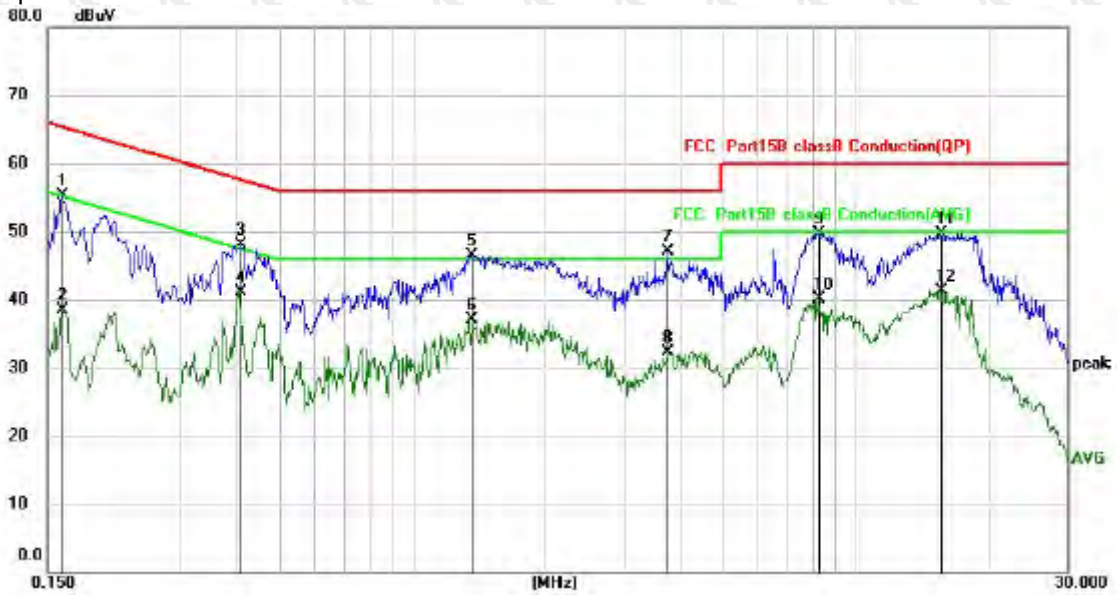
6.4 Test Result

Test Specification: Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1500	42.36	10.89	53.25	66.00	-12.75	QP
2		0.1500	30.17	10.89	41.06	56.00	-14.94	AVG
3		0.3980	37.45	10.57	48.02	57.90	-9.88	QP
4	*	0.3980	29.75	10.57	40.32	47.90	-7.58	AVG
5		2.2940	35.89	11.64	47.53	56.00	-8.47	QP
6		2.2940	25.60	11.64	37.24	46.00	-8.76	AVG
7		4.0339	34.93	12.03	46.96	56.00	-9.04	QP
8		4.0339	21.58	12.03	33.61	46.00	-12.39	AVG
9		8.0616	30.65	13.05	43.70	60.00	-16.30	QP
10		8.0616	21.35	13.05	34.40	50.00	-15.60	AVG
11		16.7334	33.70	13.43	47.13	60.00	-12.87	QP
12		16.7334	25.94	13.43	39.37	50.00	-10.63	AVG

Test Specification: Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1620	44.54	10.85	55.39	65.36	-9.97	QP
2		0.1620	27.73	10.85	38.58	55.36	-16.78	AVG
3		0.4102	37.51	10.56	48.07	57.64	-9.57	QP
4	*	0.4102	30.47	10.56	41.03	47.64	-6.61	AVG
5		1.3540	35.42	11.17	46.59	56.00	-9.41	QP
6		1.3540	25.89	11.17	37.06	46.00	-8.94	AVG
7		3.7620	35.04	11.97	47.01	56.00	-8.99	QP
8		3.7620	20.27	11.97	32.24	46.00	-13.76	AVG
9		8.2378	36.67	13.06	49.73	60.00	-10.27	QP
10		8.2378	27.10	13.06	40.16	50.00	-9.84	AVG
11		15.5500	36.28	13.37	49.65	60.00	-10.35	QP
12		15.5500	28.01	13.37	41.38	50.00	-8.62	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

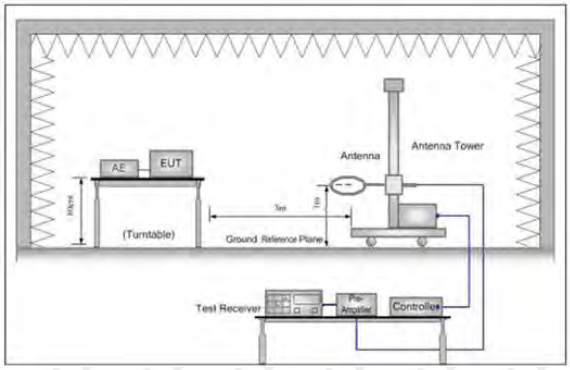


Figure 1. Below 30MHz

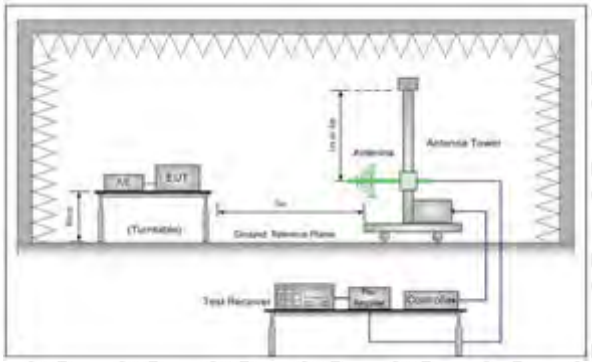


Figure 2. 30MHz to 1GHz

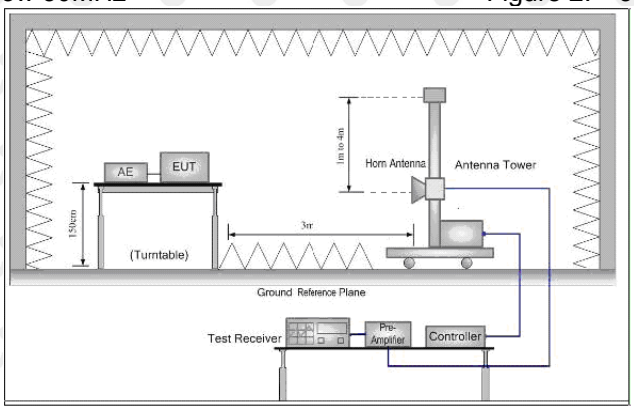


Figure 3. Above 1GHz

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.

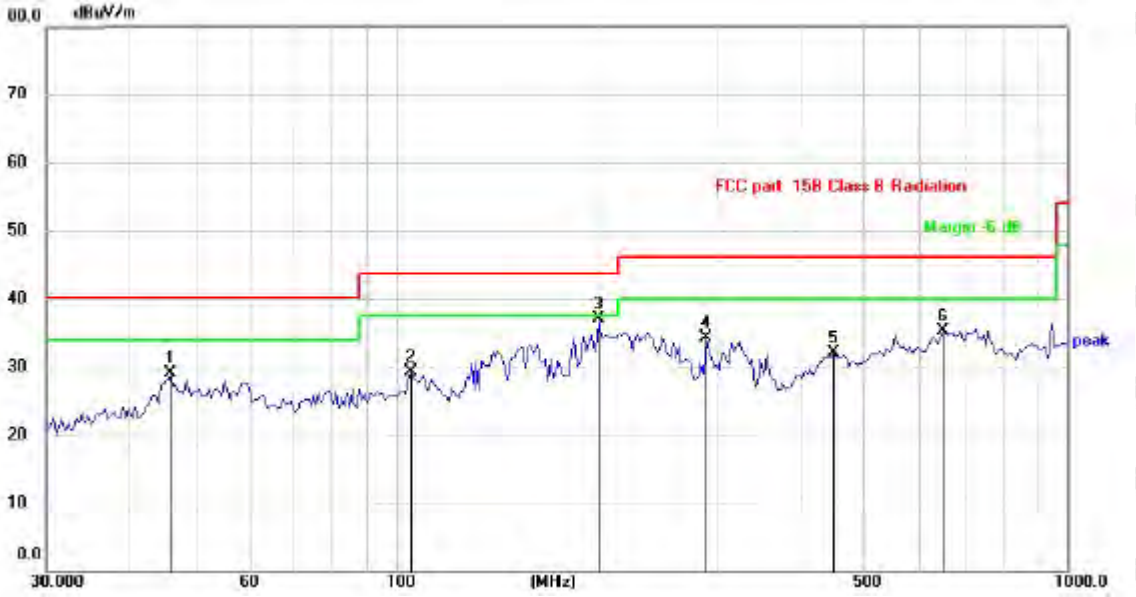
Receiver set:

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

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.

7.4 Test Result

30MHz-1GHzTest Results:
Modulation : 802.11a (the worst data)
Test Channel : 5180MHz
Antenna polarity: H



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		46.0970	35.86	-6.73	29.13	40.00	-10.87	QP
2		105.0871	37.56	-8.35	29.21	43.50	-14.29	QP
3	*	201.0399	41.95	-4.80	37.15	43.50	-6.35	QP
4		290.5260	37.33	-3.07	34.26	46.00	-11.74	QP
5		450.3446	31.48	0.72	32.20	46.00	-13.80	QP
6		650.7997	30.83	4.49	35.32	46.00	-10.68	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		66.0340	35.08	-8.15	26.93	40.00	-13.07	QP
2		104.1701	40.38	-8.57	31.81	43.50	-11.69	QP
3		194.1125	39.92	-4.69	35.23	43.50	-8.27	QP
4		527.3201	34.52	2.53	37.05	46.00	-8.95	QP
5	*	639.4886	34.61	4.29	38.90	46.00	-7.10	QP
6		948.7608	29.92	8.60	38.52	46.00	-7.48	QP

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

1. The margin of 9K-30MH measurement exceeds 20dB, so the test chart is not included. Test Mode: 802.11a20 (the worst)

Radiated Spurious Emission (Above 1GHz):
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	40.55	16.39	56.94	74	-17.06	PK	1.28	102	H
10360	26.36	16.39	42.75	54	-11.25	AV	1.02	67	H
10360	41.66	16.39	58.05	74	-15.95	PK	1.52	170	V
10360	25.76	16.39	42.15	54	-11.85	AV	1.43	148	V
Channel:5240MHz									
10480	40.55	16.11	56.66	74	-17.34	PK	1.34	128	H
10480	27.70	16.11	43.81	54	-10.19	AV	1.24	314	H
10480	39.29	16.11	55.40	74	-18.60	PK	1.65	134	V
10480	26.51	16.11	42.62	54	-11.38	AV	1.71	248	V
Channel:5260MHz									
10520	41.85	16.11	57.96	74	-16.04	PK	1.40	48	H
10520	25.26	16.11	41.37	54	-12.63	AV	1.72	161	H
10520	39.40	16.11	55.51	74	-18.49	PK	1.78	99	V
10520	26.94	16.11	43.05	54	-10.95	AV	1.66	85	V
Channel:5320MHz									
10640	41.83	17.57	59.40	74	-14.60	PK	1.61	52	H
10640	26.22	17.57	43.79	54	-10.21	AV	1.57	3	H
10640	39.15	17.57	56.72	74	-17.28	PK	1.76	57	V
10640	26.82	17.57	44.39	54	-9.61	AV	1.13	40	V
Channel:5500MHz									
11000	40.64	17.57	58.21	74	-15.79	PK	1.89	3	H
11000	25.32	17.57	42.89	54	-11.11	AV	1.73	269	H
11000	39.61	17.57	57.18	74	-16.82	PK	1.05	353	V
11000	25.64	17.57	43.21	54	-10.79	AV	1.86	158	V

Channel:5700MHz									
11400	41.45	17.46	58.91	74	-15.09	PK	1.62	342	H
11400	26.62	17.46	44.08	54	-9.92	AV	1.89	310	H
11400	41.91	17.46	59.37	74	-14.63	PK	1.49	284	V
11400	27.53	17.46	44.99	54	-9.01	AV	1.68	143	V
Channel:5745MHz									
11490	40.66	17.46	58.12	74	-15.88	PK	1.13	256	H
11490	25.13	17.46	42.59	54	-11.41	AV	1.59	163	H
11490	41.25	17.46	58.71	74	-15.29	PK	1.76	317	V
11490	25.91	17.46	43.37	54	-10.63	AV	1.77	293	V
Channel:5825MHz									
11650	40.58	17.57	58.15	74	-15.85	PK	1.68	158	H
11650	26.15	17.57	43.72	54	-10.28	AV	1.36	235	H
11650	39.72	17.57	57.29	74	-16.71	PK	1.50	263	V
11650	25.91	17.57	43.48	54	-10.52	AV	1.37	185	V

Modulation : 802.11(n40) (the worst data)

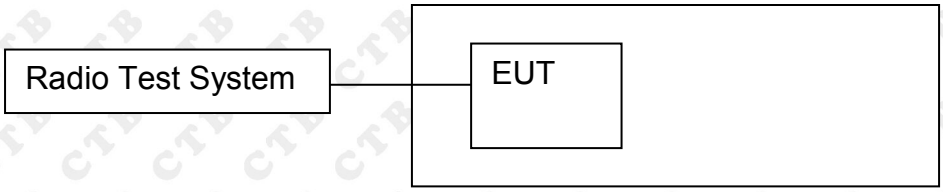
Freq (MHz)	Rd_level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	detector	Height	Degree	Antenna polarization
Channel:5190MHz									
10380	39.53	16.34	55.87	74	-18.13	PK	1.50	99	H
10380	27.91	16.34	44.25	54	-9.75	AV	1.48	215	H
10380	41.93	16.34	58.27	74	-15.73	PK	1.04	266	V
10380	27.64	16.34	43.98	54	-10.02	AV	1.52	129	V
Channel:5230MHz									
10460	41.68	16.15	57.83	74	-16.17	PK	1.35	359	H
10460	25.20	16.15	41.35	54	-12.65	AV	1.12	154	H
10460	40.62	16.15	56.77	74	-17.23	PK	1.42	262	V
10460	27.69	16.15	43.84	54	-10.16	AV	1.58	145	V
Channel:5270MHz									
10540	41.68	16.15	57.83	74	-16.17	PK	1.35	359	H
10540	25.20	16.15	41.35	54	-12.65	AV	1.12	154	H
10540	40.62	16.15	56.77	74	-17.23	PK	1.42	262	V
10540	27.69	16.15	43.84	54	-10.16	AV	1.58	145	V
Channel:5310MHz									
10620	39.31	16.15	55.46	74	-18.54	PK	1.20	289	H
10620	27.93	16.15	44.08	54	-9.92	AV	1.39	329	H
10620	39.50	16.15	55.65	74	-18.35	PK	1.13	45	V
10620	25.81	16.15	41.96	54	-12.04	AV	1.67	11	V
Channel:5510MHz									
11020	41.34	17.49	58.83	74	-15.17	PK	1.22	169	H
11020	27.20	17.49	44.69	54	-9.31	AV	1.81	353	H
11020	41.95	17.49	59.44	74	-14.56	PK	1.59	123	V
11020	25.51	17.49	43.00	54	-11.00	AV	1.28	65	V
Channel:5670MHz									
11340	40.74	17.49	58.23	74	-15.77	PK	1.30	90	H
11340	26.14	17.49	43.63	54	-10.37	AV	1.08	82	H
11340	39.87	17.49	57.36	74	-16.64	PK	1.42	289	V
11340	25.70	17.49	43.19	54	-10.81	AV	1.49	49	V

Channel:5755MHz									
11510	39.02	17.52	56.54	74	-16.02	PK	1.36	214	H
11510	27.51	17.52	45.03	54	-17.46	AV	1.79	322	H
11510	41.52	17.52	59.04	74	-14.96	PK	1.13	100	V
11510	25.94	17.52	43.46	54	-10.54	AV	1.53	18	V
Channel:5795MHz									
11590	40.54	17.52	58.06	74	-15.84	PK	1.34	82	H
11590	25.46	17.52	42.98	54	-15.94	AV	1.19	252	H
11590	41.48	17.52	59.00	74	-15.00	PK	1.21	159	V
11590	26.67	17.52	44.19	54	-9.81	AV	1.70	42	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.

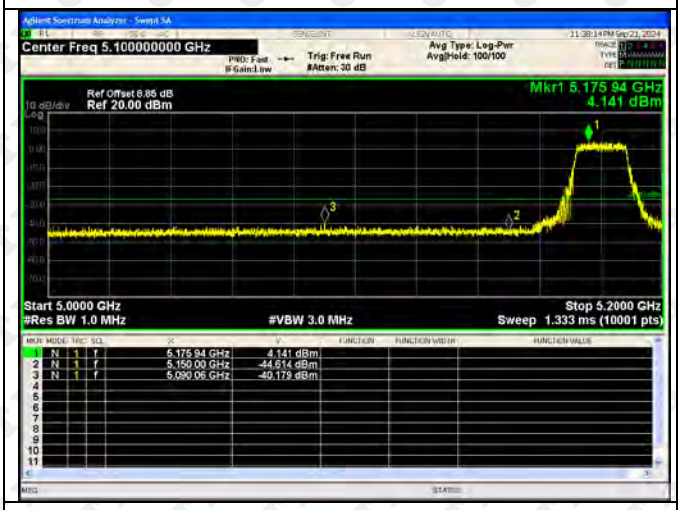
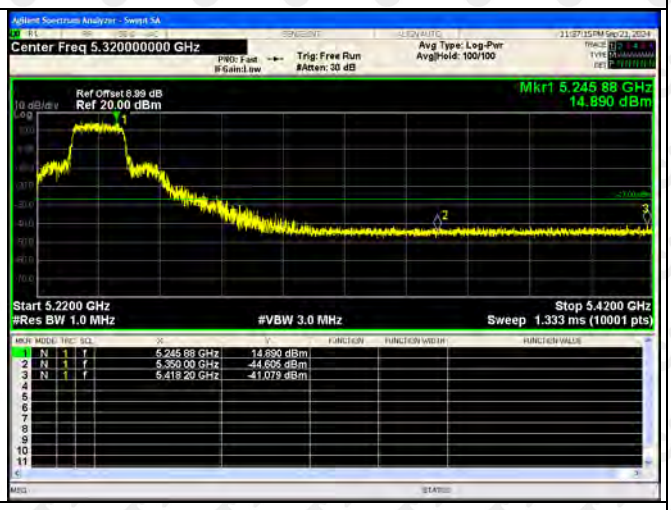
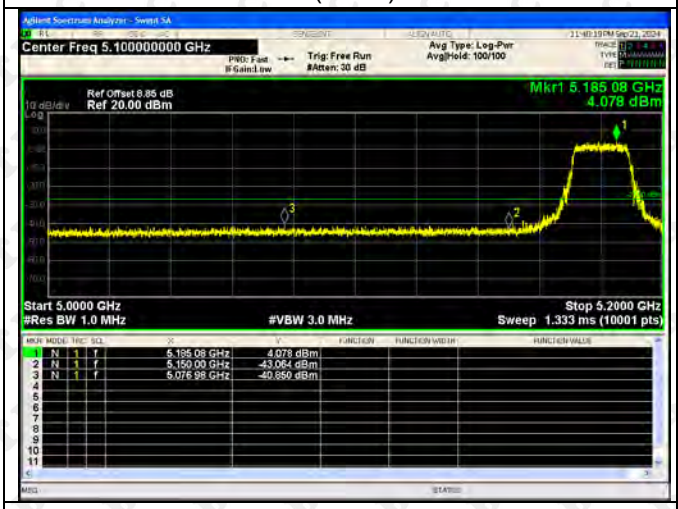
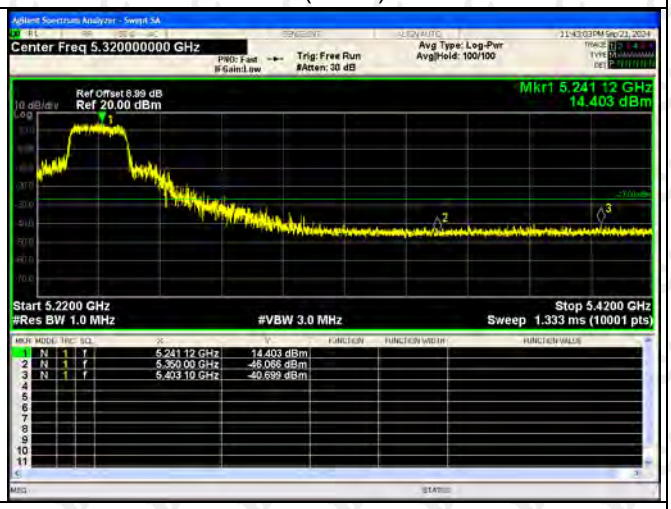
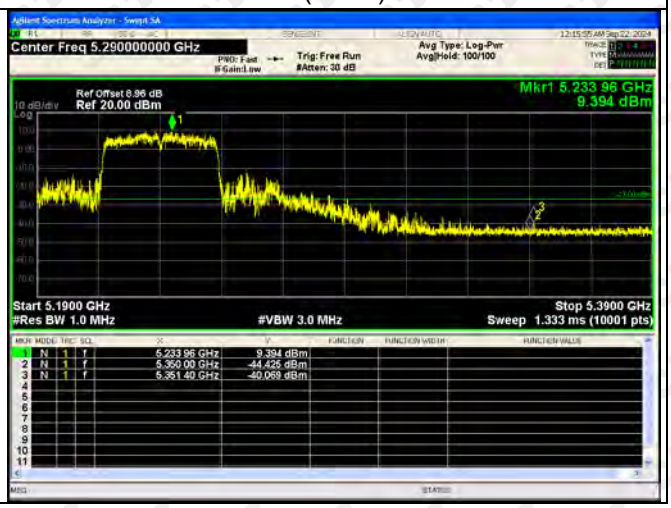
8.3 Test procedure

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.

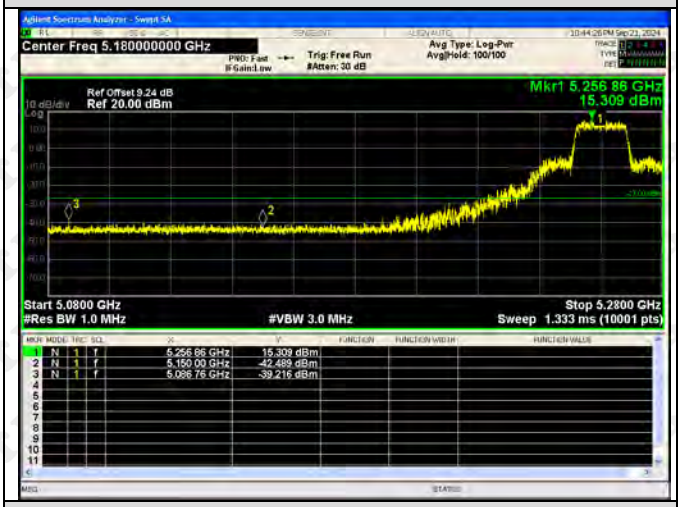
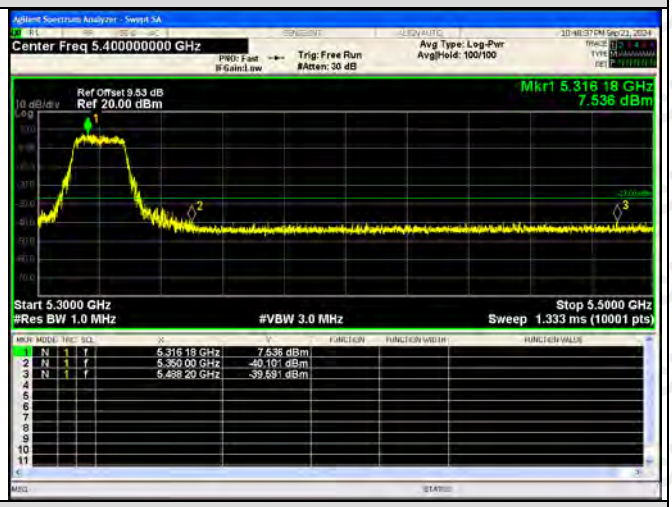
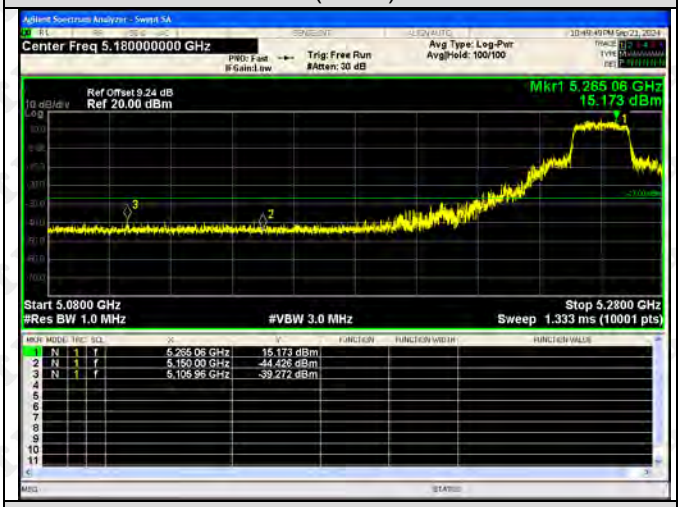
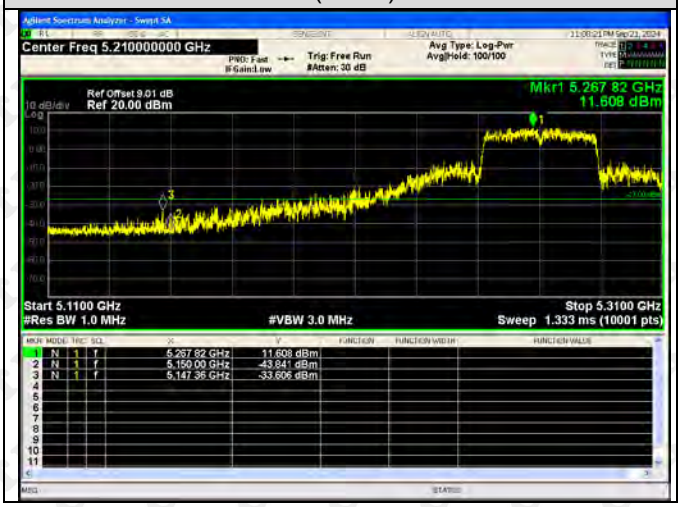
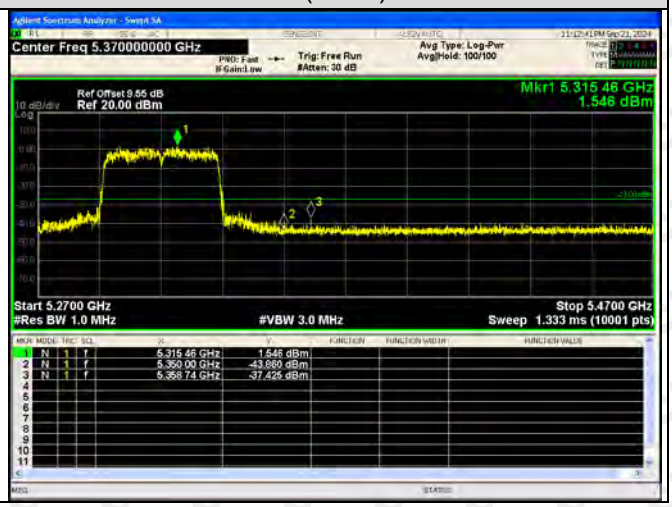
8.4 Test Result

Test Graph

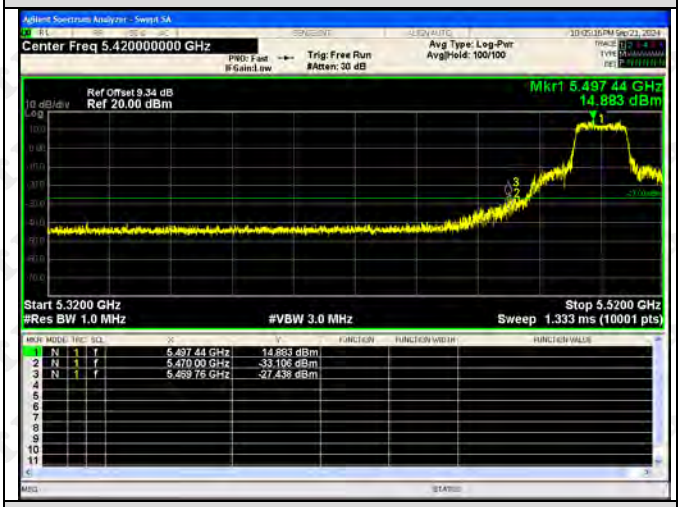
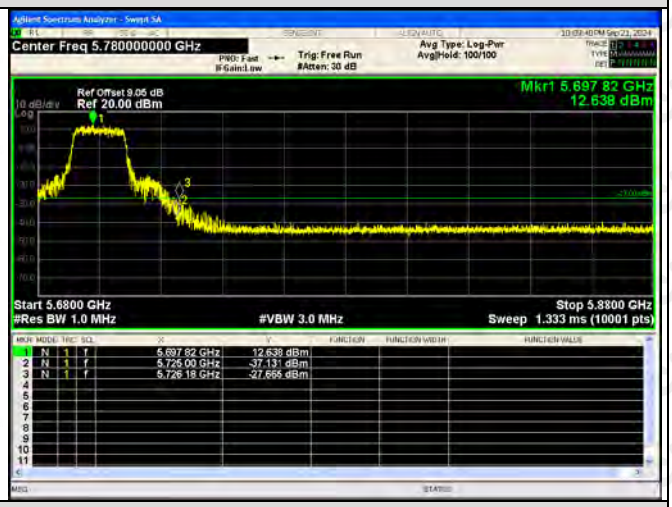
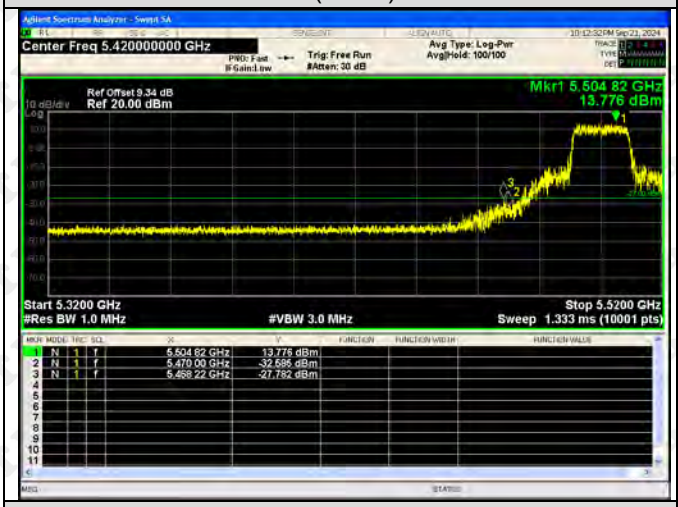
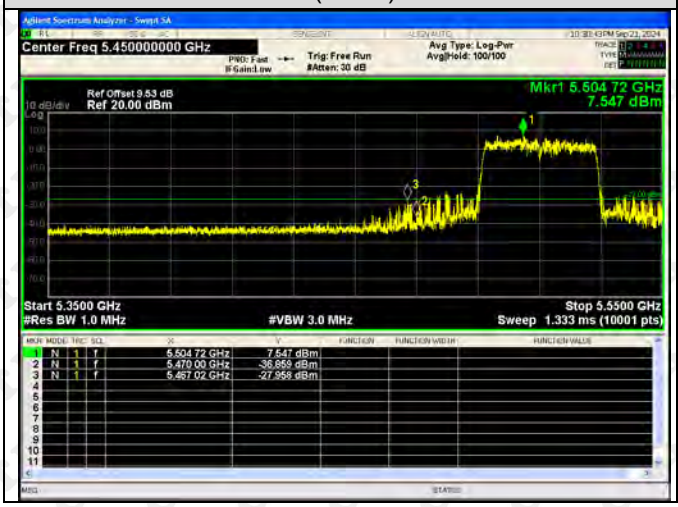
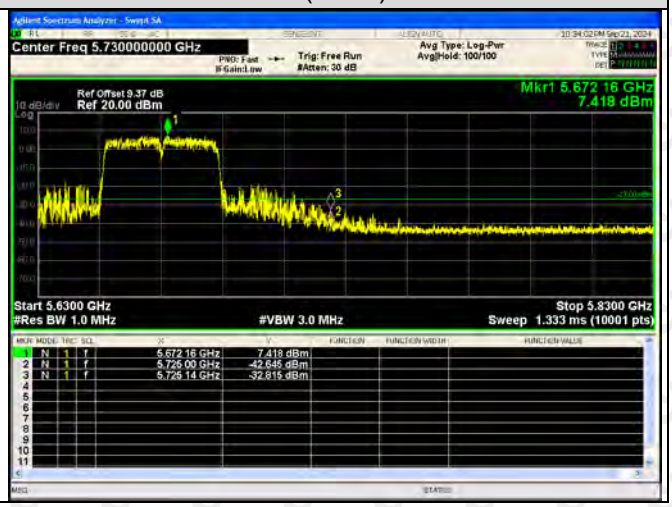
5150-5250MHz

802.11a-5180	802.11a-5240
	
802.11n(HT20)-5180	802.11n(HT20)-5240
	
802.11n(HT40)-5190	802.11n(HT40)-5230
	

5250-5350MHz:

802.11a-5260	802.11a-5320
	
802.11n(HT20)-5260	802.11n(HT20)-5320
	
802.11n(HT40)-5270	802.11n(HT40)-5310
	

5470-5725MHz:

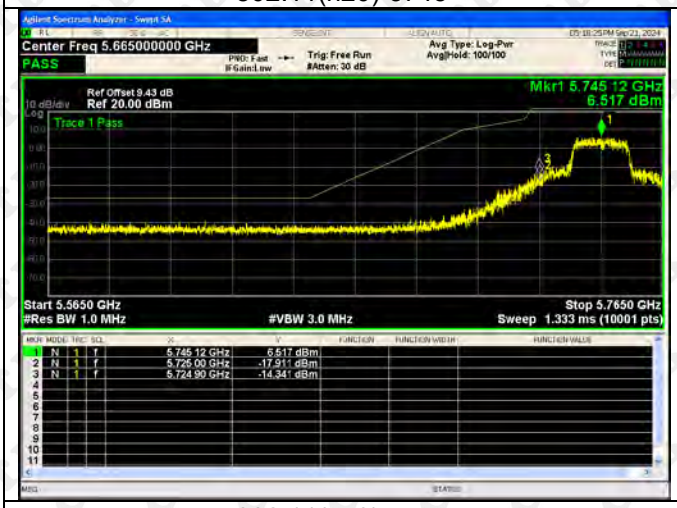
802.11a-5500	802.11a-5700
	
802.11n(HT20)-5500	802.11n(HT20)-5700
	
802.11n(HT40)-5510	802.11n(HT40)-5670
	

5725-5850MHz

802.11a-5745

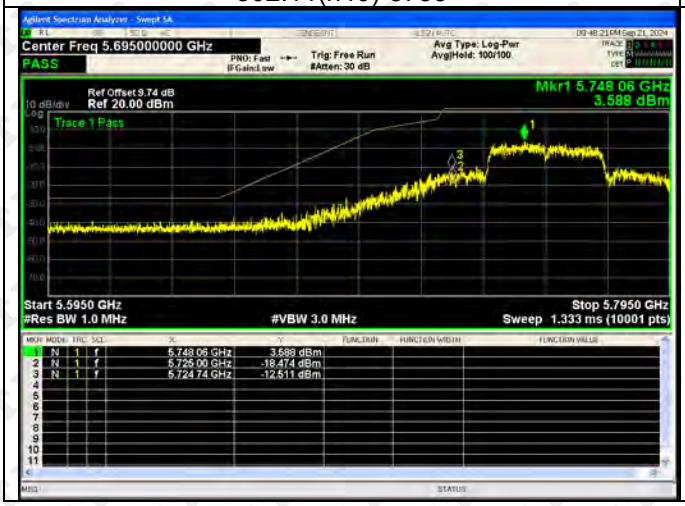
802.11a-5825

802.11(n20)-5745



802.11(n20)-5825

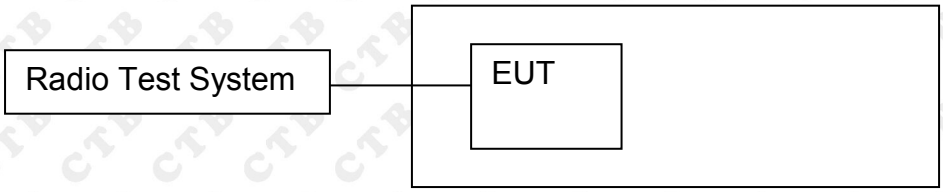
802.11(n40)-5755



802.11(n40)-5795

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

5150-5250MHz:

Test mode1	Test Channel (MHz)	Output Power dBm	Limit dBm
802.11a20	5180	16.533	23.98
	5200	16.103	23.98
	5240	16.399	23.98
802.11n(HT20)	5180	16.362	23.98
	5200	16.166	23.98
	5240	16.34	23.98
802.11n(HT40)	5190	14.32	23.98
	5230	14.514	23.98

5250-5350 MHz

Test mode1	Test Channel (MHz)	Output Power dBm	Limit dBm
802.11a20	5260	22.602	23.98
	5280	22.068	23.98
	5320	22.036	23.98
802.11n(HT20)	5260	22.415	23.98
	5280	22.226	23.98
	5320	21.829	23.98
802.11n(HT40)	5270	21.731	23.98
	5310	21.606	23.98

5470-5725MHz:

Test mode1	Test Channel (MHz)	Output Power dBm	Limit dBm
802.11a20	5500	23.063	23.98
	5580	22.925	23.98
	5700	23.389	23.98
802.11n(HT20)	5500	23.521	23.98
	5580	22.907	23.98
	5700	23.68	23.98
802.11n(HT40)	5510	22.72	23.98
	5670	23.744	23.98

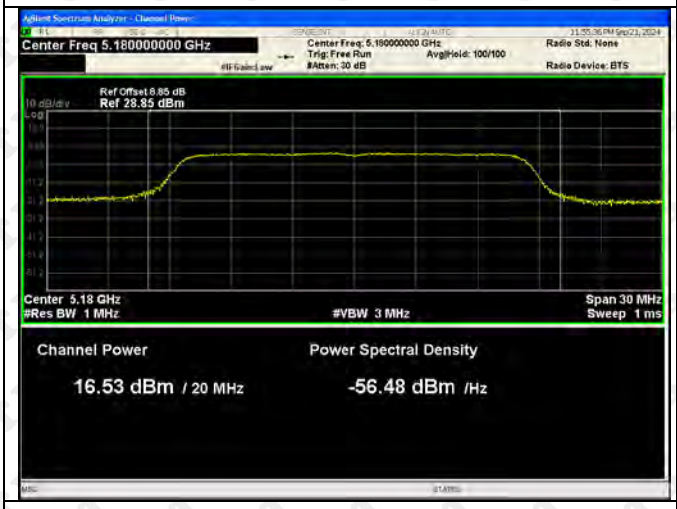
5725-5850MHz:

Test mode1	Test Channel (MHz)	Output Power dBm	Limit dBm
802.11a20	5745	13.27	30
	5785	13.971	30
	5825	13.107	30
802.11n(HT20)	5745	13.794	30
	5785	13.868	30
	5825	13.723	30
802.11n(HT40)	5755	13.157	30
	5795	13.566	30

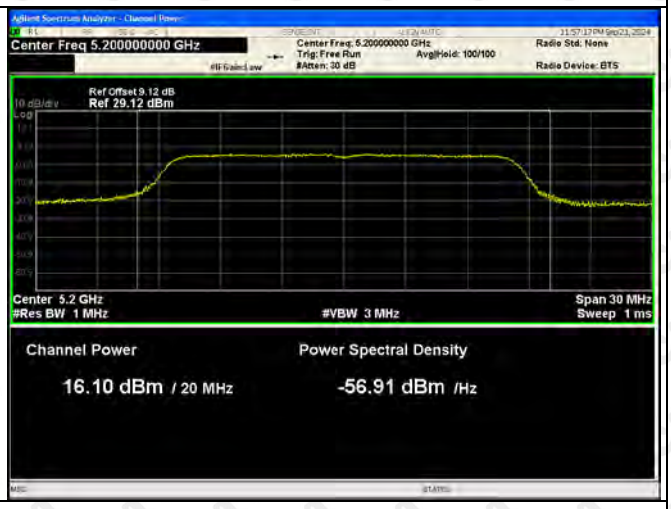
Test Graph

5150-5250MHz-Power

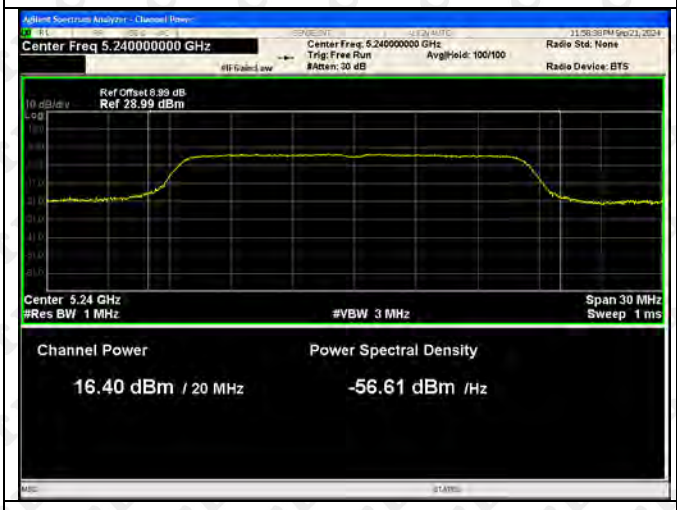
802.11a-5180



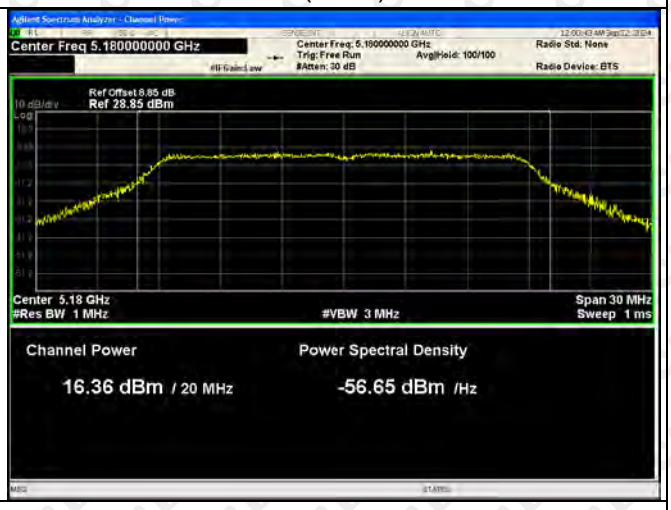
802.11a-5200



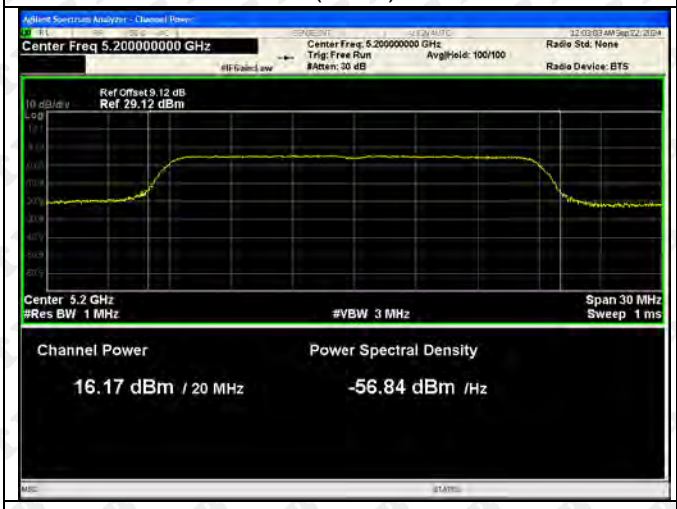
802.11a-5240



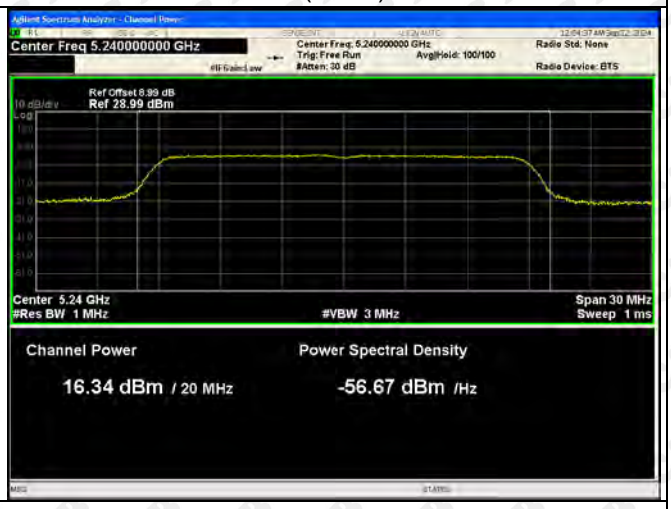
802.11n(HT20)-5180



802.11n(HT20)-5200

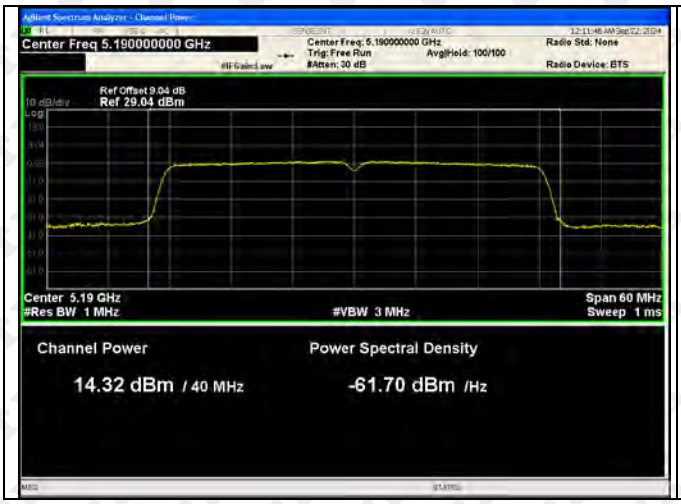


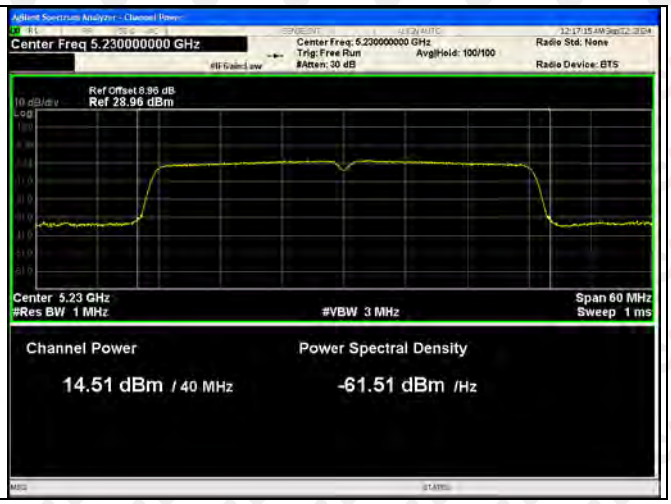
802.11n(HT20)-5240



802.11n(HT40)-5190

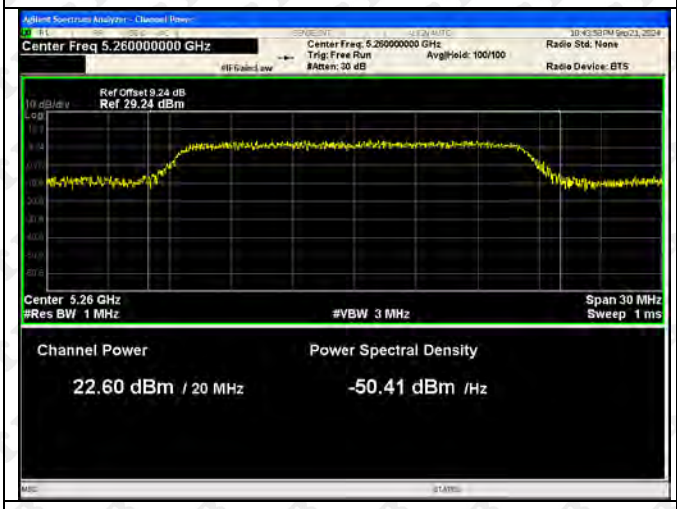
802.11n(HT40)-5230


Agilent Spectrum Analyzer - Channel Power
Center Freq 5.190000000 GHz
Center Freq: 5.190000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.04 dB
10 dB/div
Ref 29.04 dBm
Center 5.19 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 60 MHz
Sweep 1 ms
Channel Power
14.32 dBm / 40 MHz
Power Spectral Density
-61.70 dBm /Hz

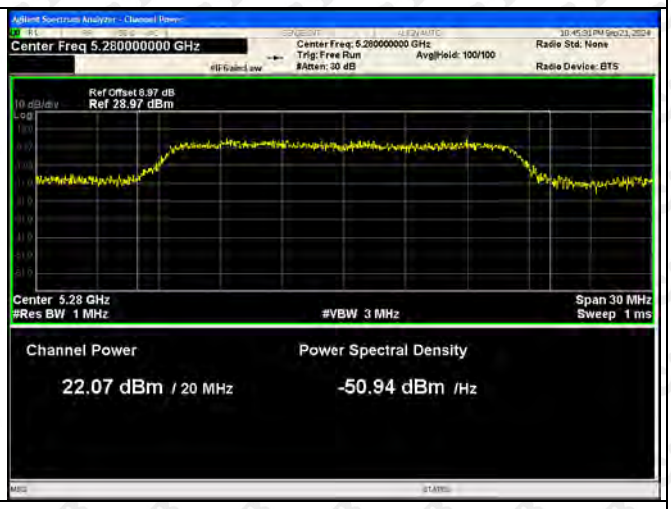

Agilent Spectrum Analyzer - Channel Power
Center Freq 5.230000000 GHz
Center Freq: 5.230000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 8.96 dB
10 dB/div
Ref 28.96 dBm
Center 5.23 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 60 MHz
Sweep 1 ms
Channel Power
14.51 dBm / 40 MHz
Power Spectral Density
-61.51 dBm /Hz

5250-5350MHz-Power

802.11a-5260

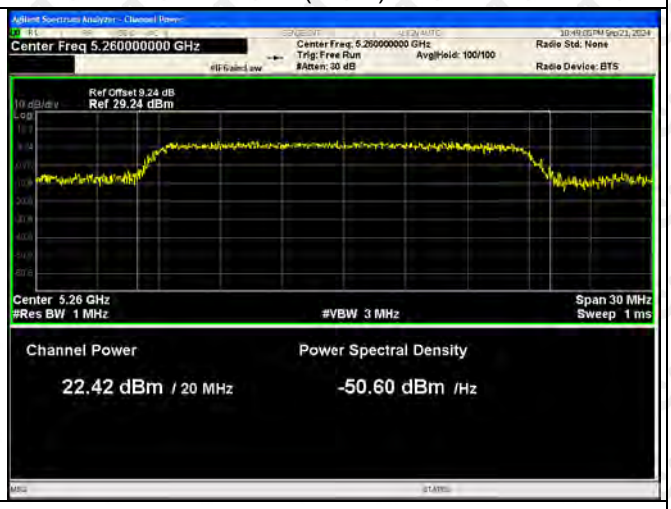


802.11a-5280

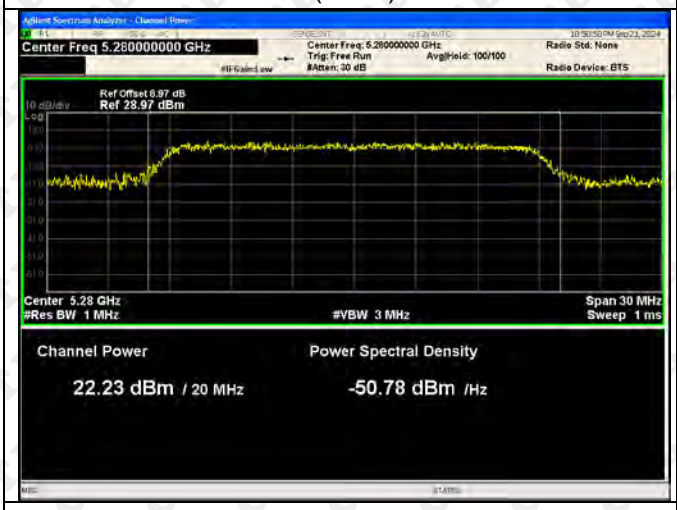


802.11a-5320

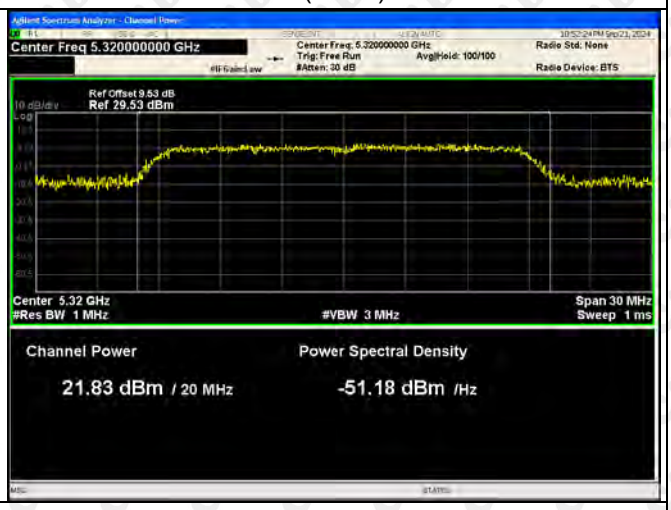
802.11n(HT20)-5260



802.11n(HT20)-5280

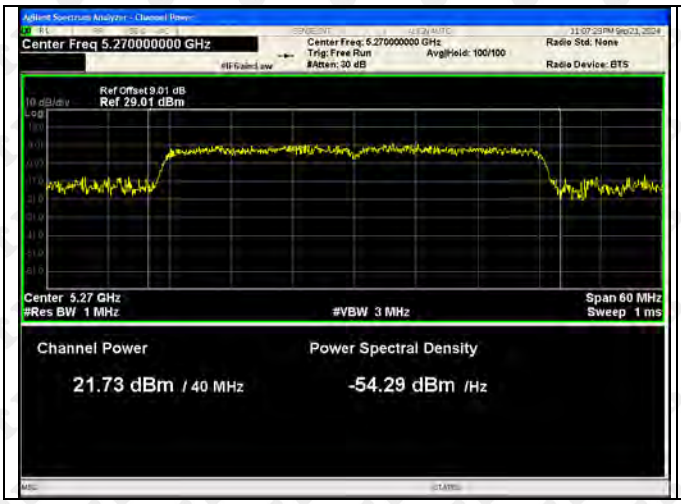


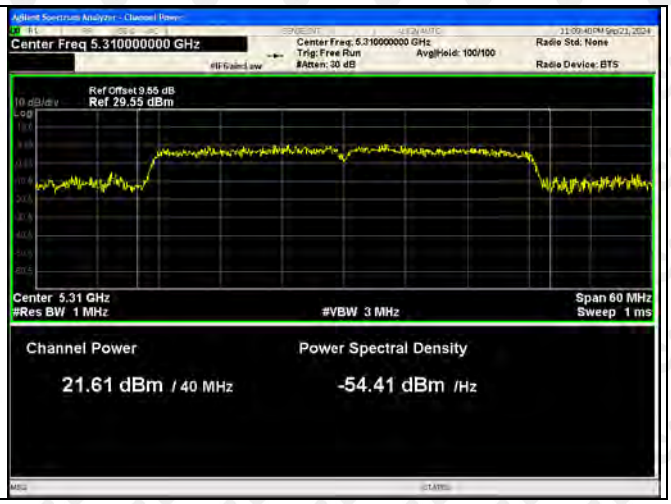
802.11n(HT20)-5320



802.11n(HT40)-5270

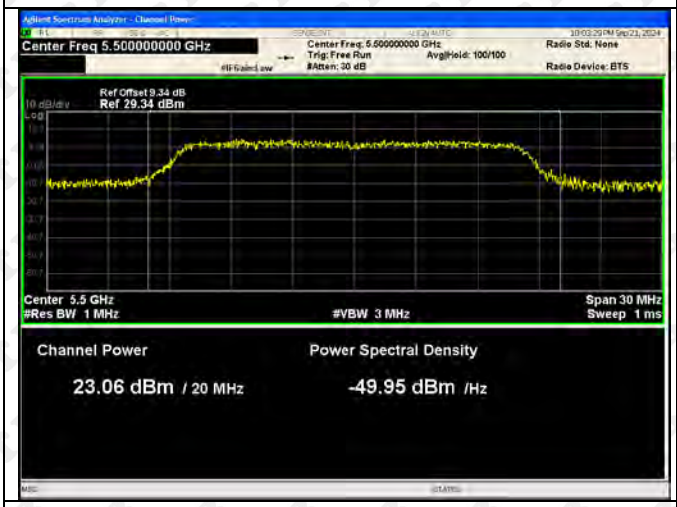
802.11n(HT40)-5310


Agilent Spectrum Analyzer - Channel Power
Center Freq 5.270000000 GHz
Center Freq: 5.270000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.01 dB
10 dB/div
Ref 29.01 dBm
Center 5.27 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 60 MHz
Sweep 1 ms
Channel Power
21.73 dBm / 40 MHz
Power Spectral Density
-54.29 dBm /Hz

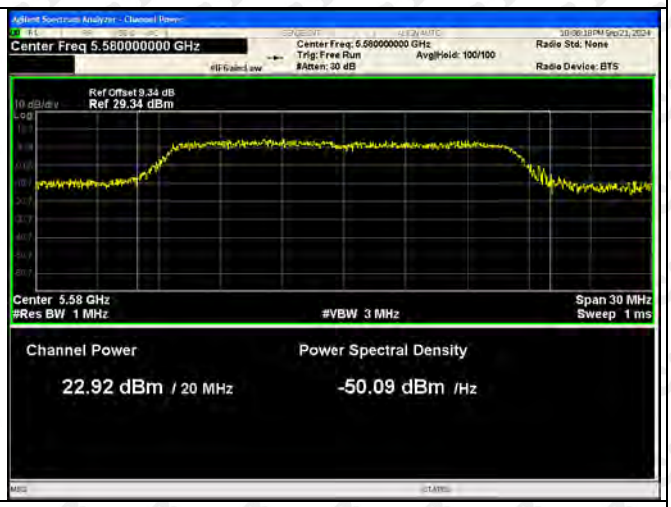

Agilent Spectrum Analyzer - Channel Power
Center Freq 5.310000000 GHz
Center Freq: 5.310000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.55 dB
10 dB/div
Ref 29.55 dBm
Center 5.31 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 60 MHz
Sweep 1 ms
Channel Power
21.61 dBm / 40 MHz
Power Spectral Density
-54.41 dBm /Hz

5470-5725MHz-Power

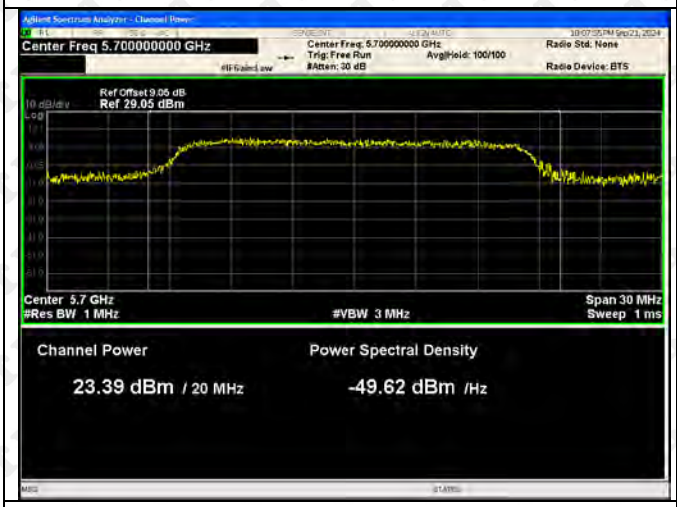
802.11a-5500



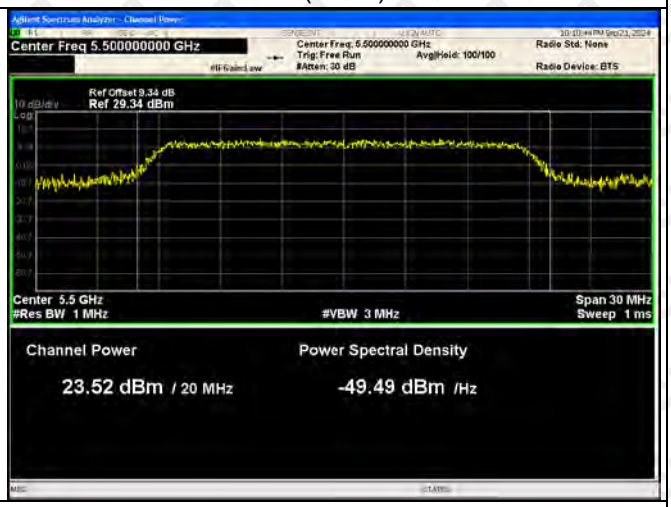
802.11a-5580



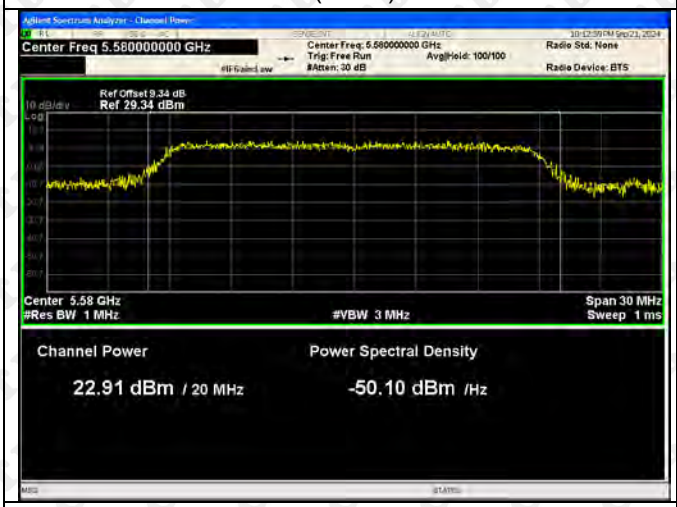
802.11a-5700



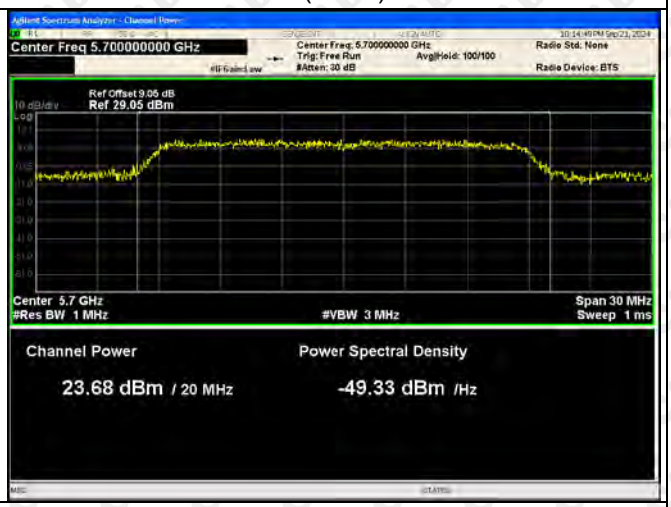
802.11n(HT20)-5500



802.11n(HT20)-5580

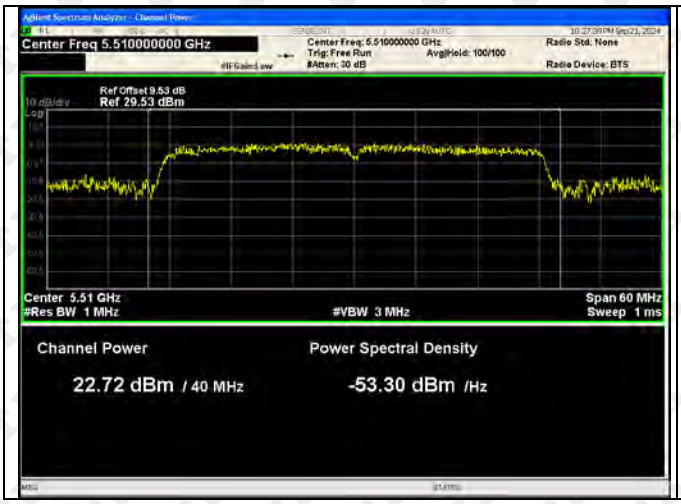


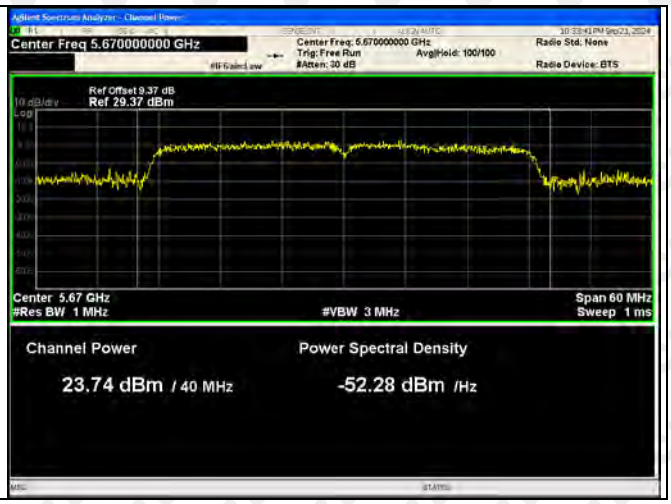
802.11n(HT20)-5700



802.11n(HT40)-5510

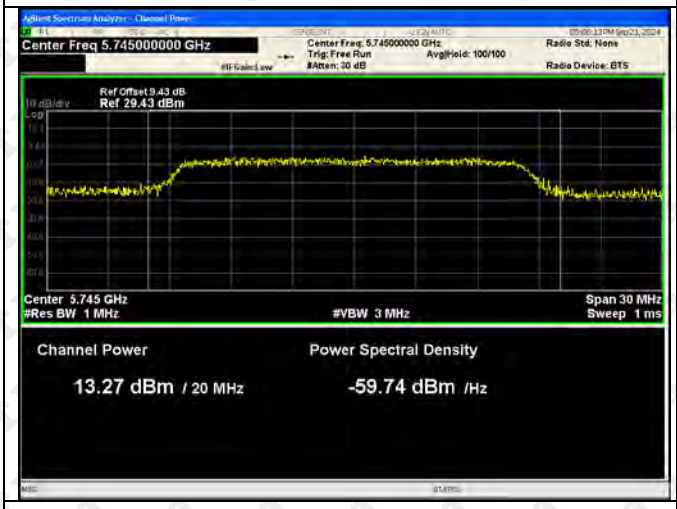
802.11n(HT40)-5670


Agilent Spectrum Analyzer - Channel Power
Center Freq 5.510000000 GHz
Center Freq: 5.510000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.53 dB
10 dB/div
Ref 29.53 dBm
Center 5.51 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 60 MHz
Sweep 1 ms
Channel Power
22.72 dBm / 40 MHz
Power Spectral Density
-53.30 dBm /Hz

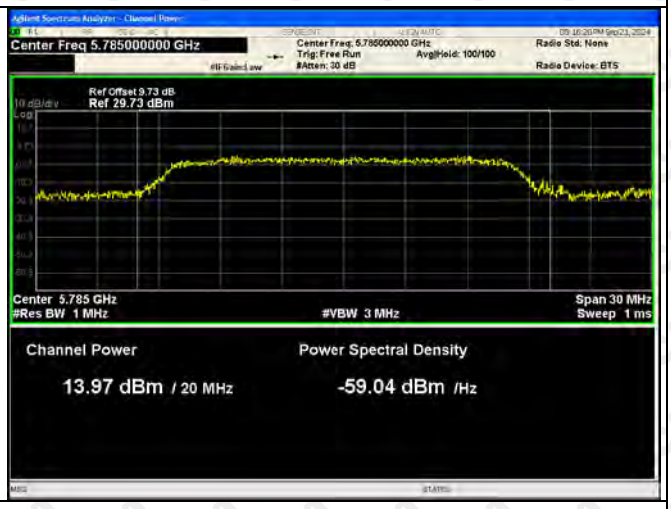

Agilent Spectrum Analyzer - Channel Power
Center Freq 5.670000000 GHz
Center Freq: 5.670000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.37 dB
10 dB/div
Ref 29.37 dBm
Center 5.67 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 60 MHz
Sweep 1 ms
Channel Power
23.74 dBm / 40 MHz
Power Spectral Density
-52.28 dBm /Hz

5725-5850MHz-Power

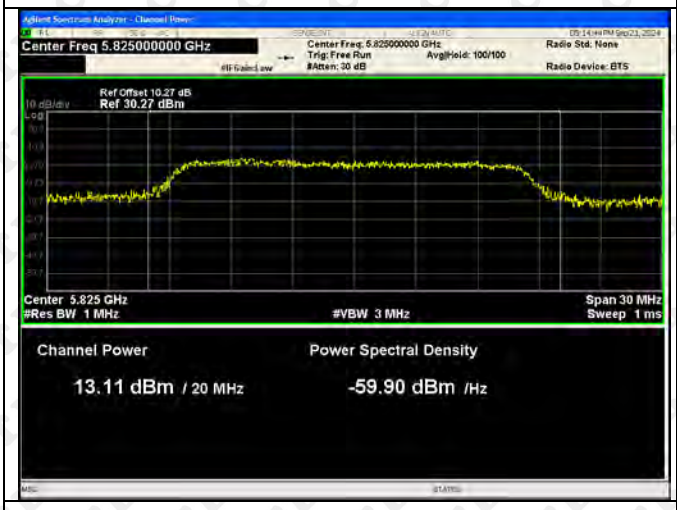
802.11a-5745



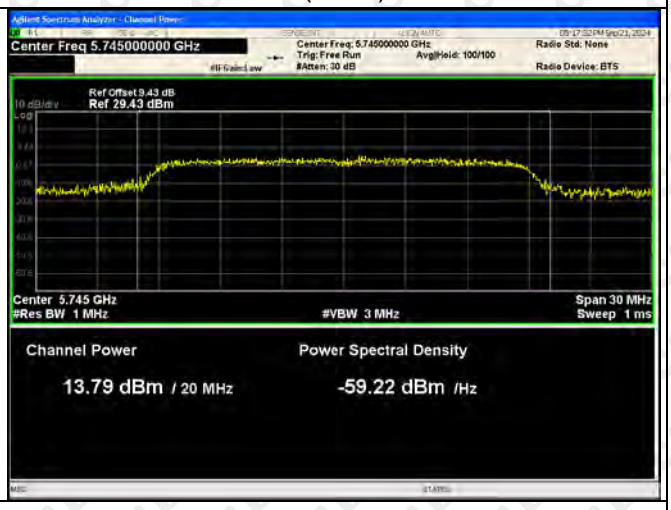
802.11a-5785



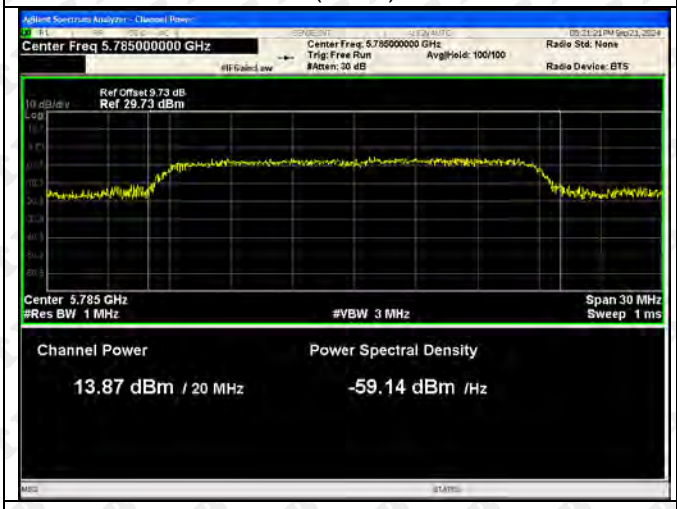
802.11a-5825



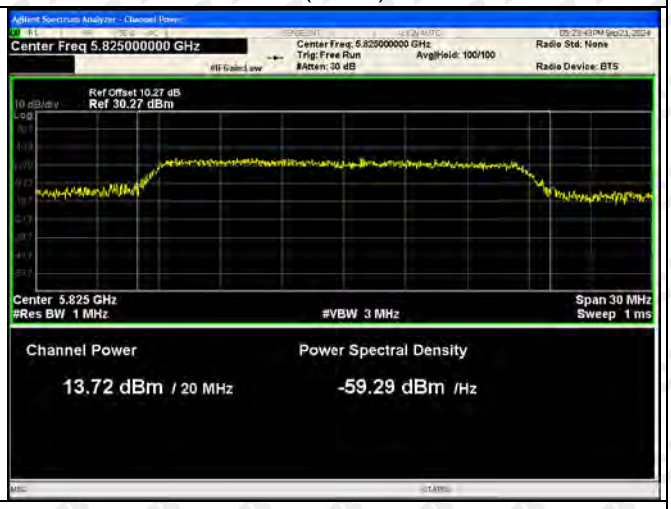
802.11n(HT20)-5745



802.11n(HT20)-5785

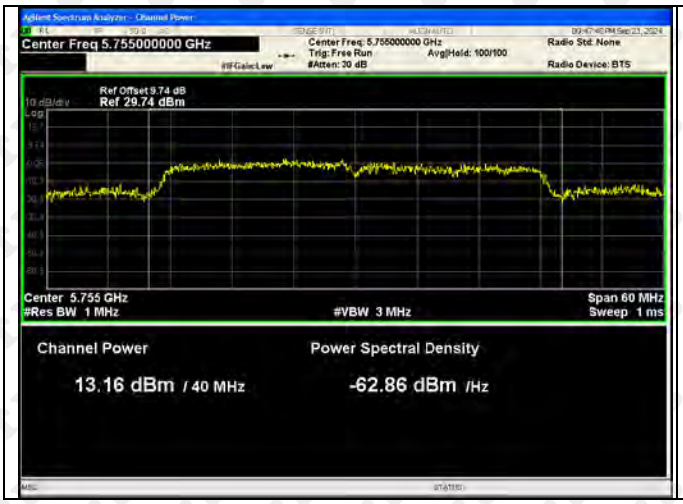


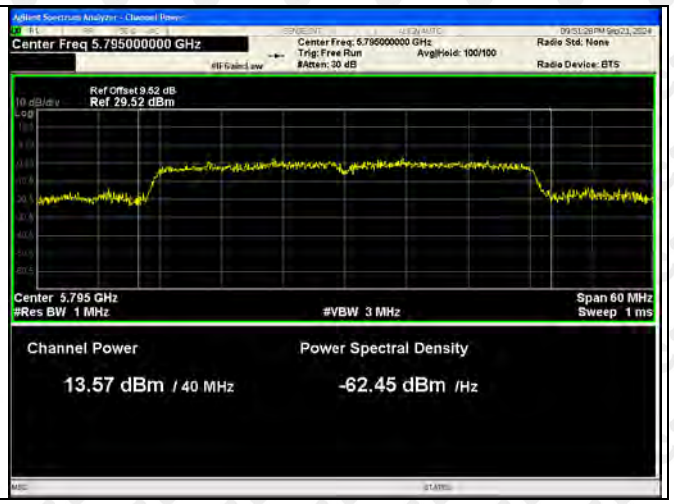
802.11n(HT20)-5825



802.11n(HT40)-5795

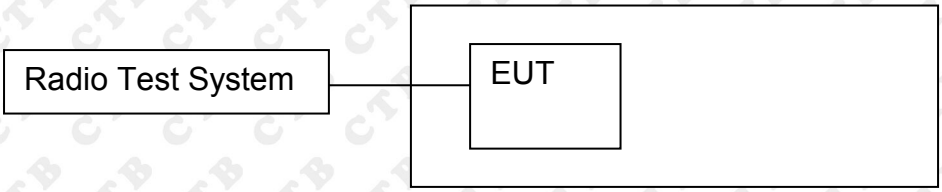
802.11n(HT40)-5825


Agilent Spectrum Analyzer - Channel Power
Center Freq 5.755000000 GHz
Center Freq: 5.755000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.74 dB
10 dB/div
Ref 29.74 dBm
Center 5.755 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 60 MHz
Sweep 1 ms
Channel Power
13.16 dBm / 40 MHz
Power Spectral Density
-62.86 dBm /Hz


Agilent Spectrum Analyzer - Channel Power
Center Freq 5.795000000 GHz
Center Freq: 5.795000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.52 dB
10 dB/div
Ref 29.52 dBm
Center 5.795 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 60 MHz
Sweep 1 ms
Channel Power
13.57 dBm / 40 MHz
Power Spectral Density
-62.45 dBm /Hz

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.

10.4 Test Results

5150-5250MHz:

Test mode	Test Channel (MHz)	26dB Bandwidth (MHz)
802.11a	5180	29.941
	5200	28.637
	5240	29.706
802.11n(HT20)	5180	22.149
	5200	29.661
	5240	30
802.11n(HT40)	5190	38.291
	5230	38.415

5250-5350 MHz

Test mode	Test Channel (MHz)	26dB Bandwidth (MHz)
802.11a	5260	30
	5280	30
	5320	30
802.11n(HT20)	5260	30
	5280	30
	5320	30
802.11n(HT40)	5270	60
	5310	60

5470-5725MHz:

Test mode	Test Channel (MHz)	26dB Bandwidth (MHz)
802.11a	5500	30
	5580	30
	5700	30
802.11n(HT20)	5500	30
	5580	30
	5700	30
802.11n(HT40)	5510	60
	5670	59.991

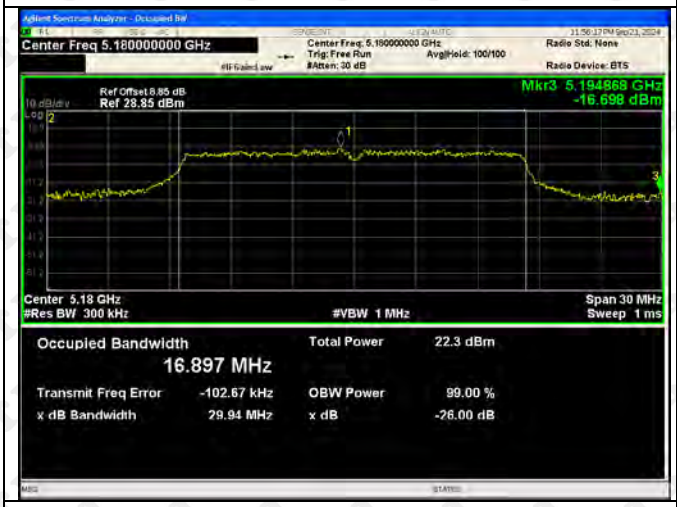
5725-5850MHz

Test mode	Test Channel (MHz)	6dB Bandwidth (MHz)
802.11a	5745	16.454
	5785	16.243
	5825	16.09
802.11n(HT20)	5745	17.36
	5785	17.231
	5825	17.265
802.11n(HT40)	5755	35.509
	5795	34.369

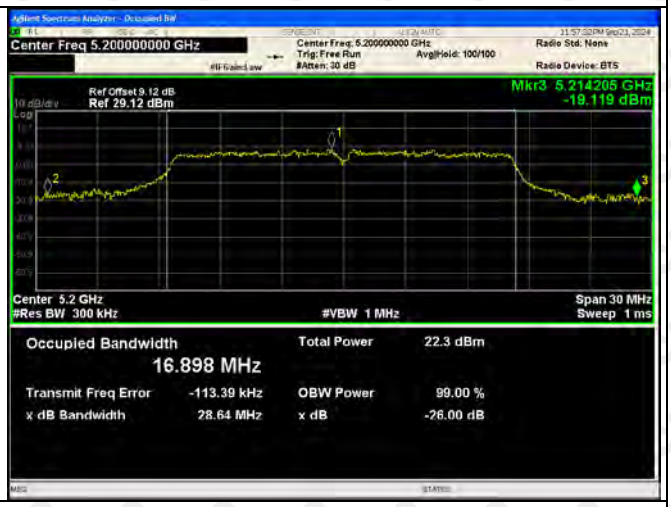
Test Graph

5150-5250MHz

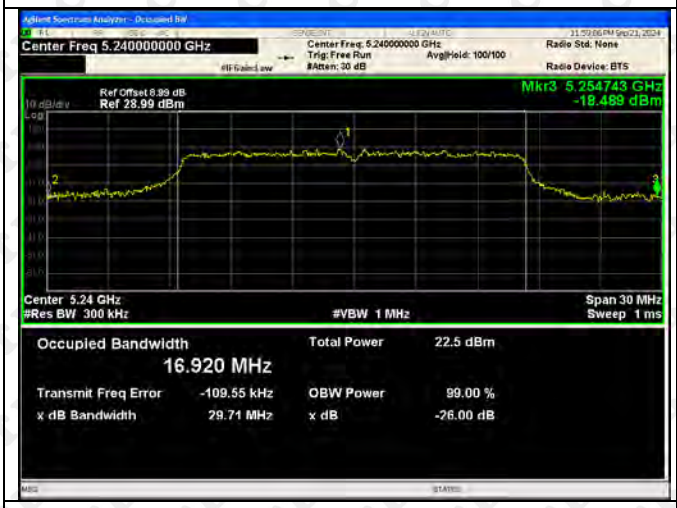
802.11a-5180



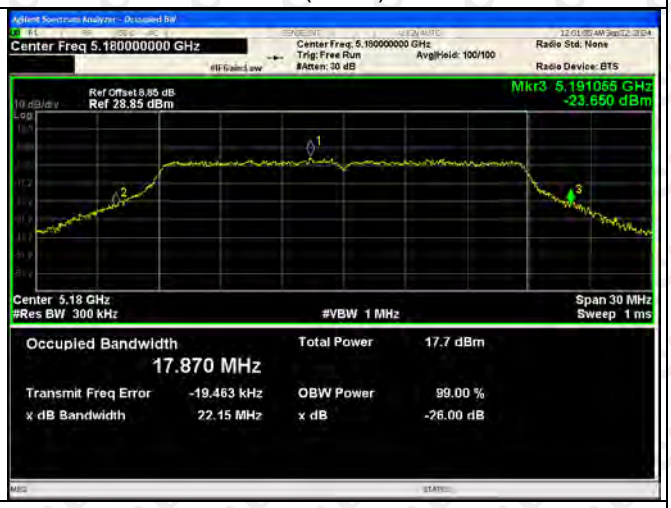
802.11a-5200



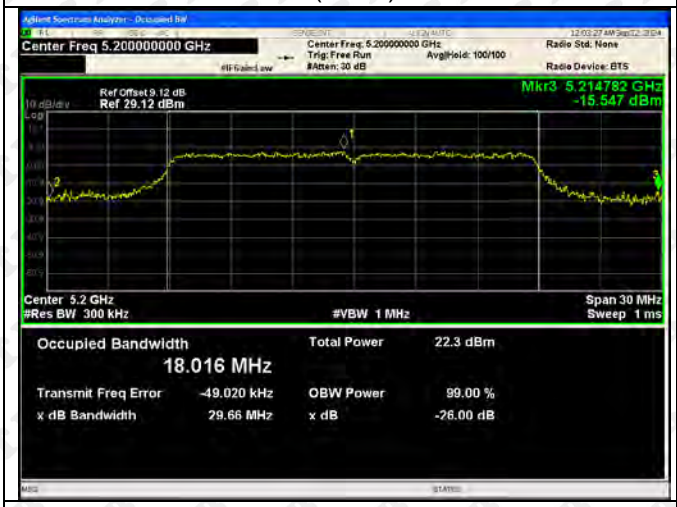
802.11a-5240



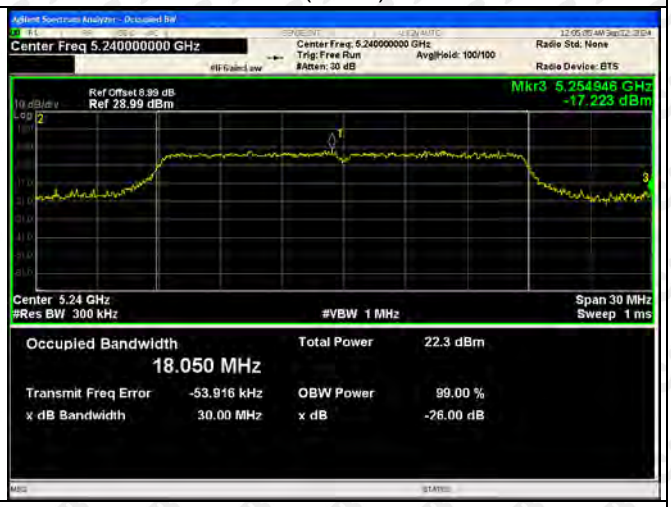
802.11n(HT20)-5180



802.11n(HT20)-5200

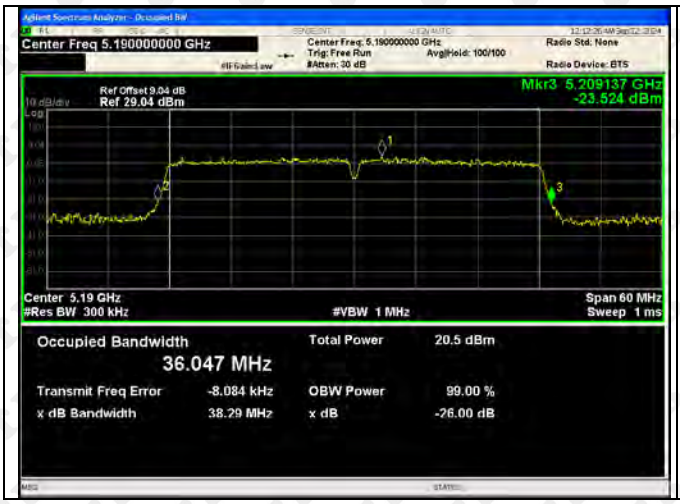


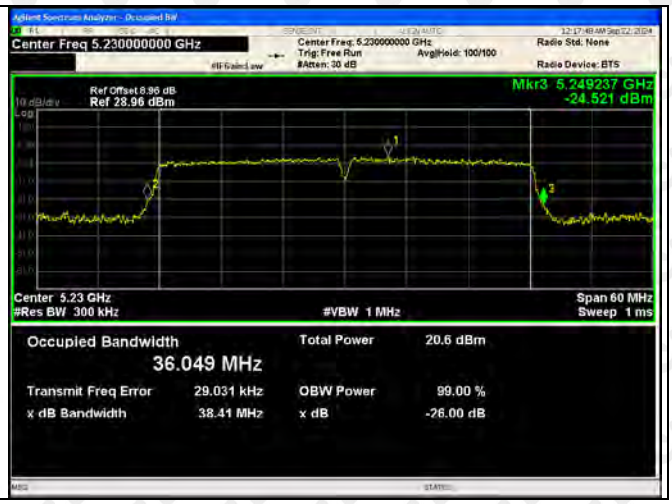
802.11n(HT20)-5240



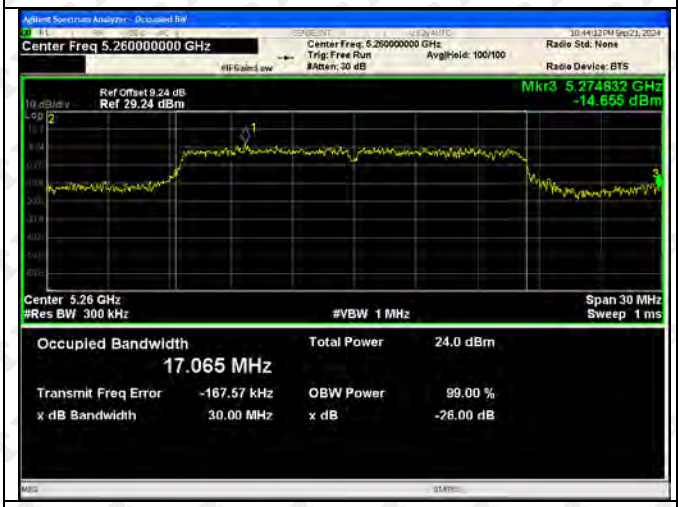
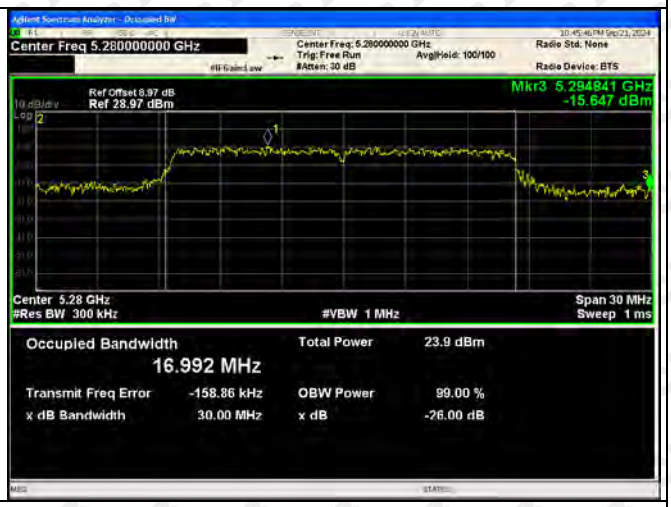
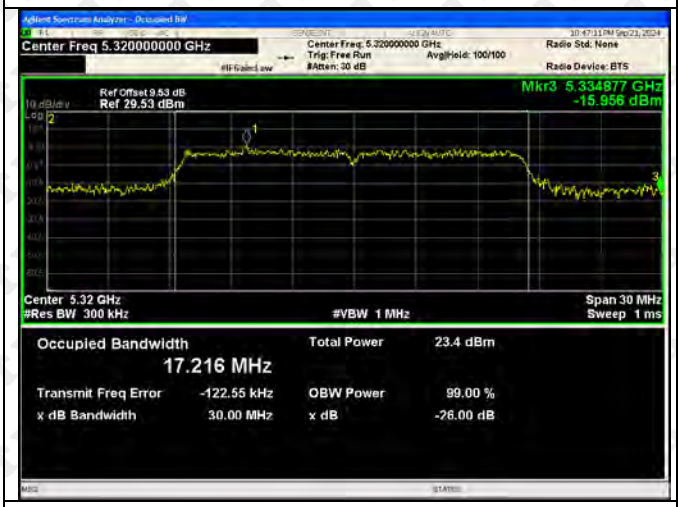
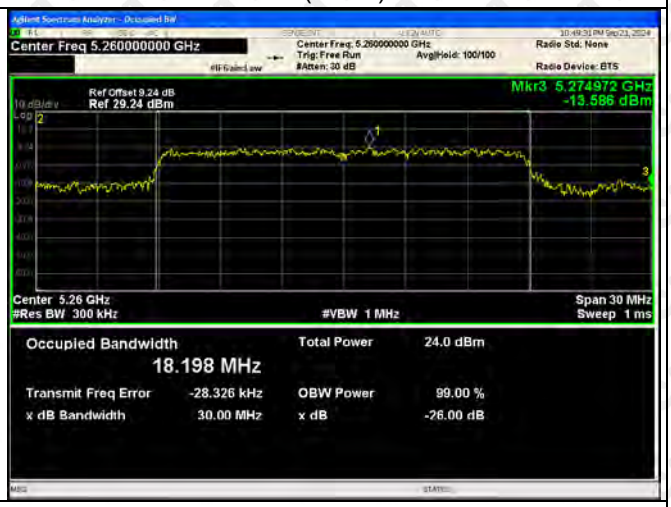
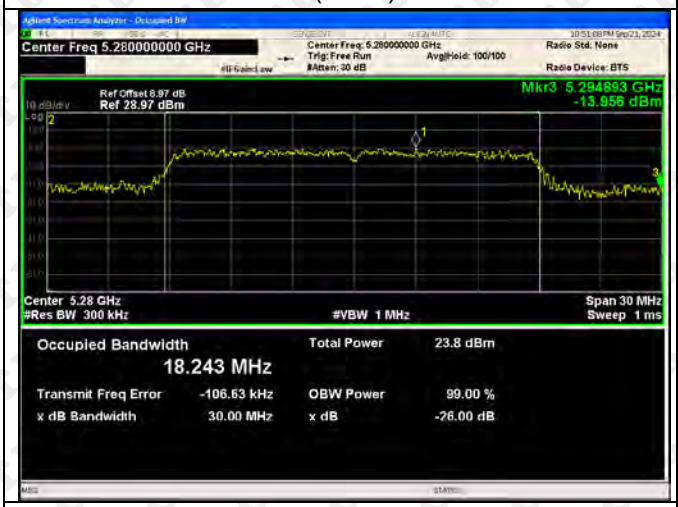
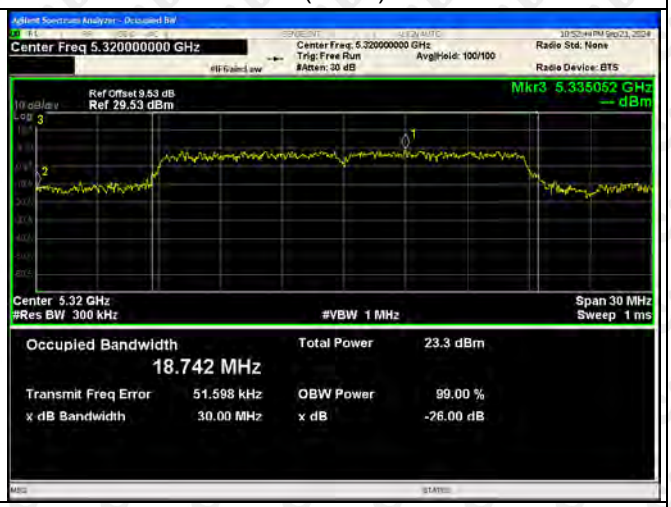
802.11n(HT40)-5190

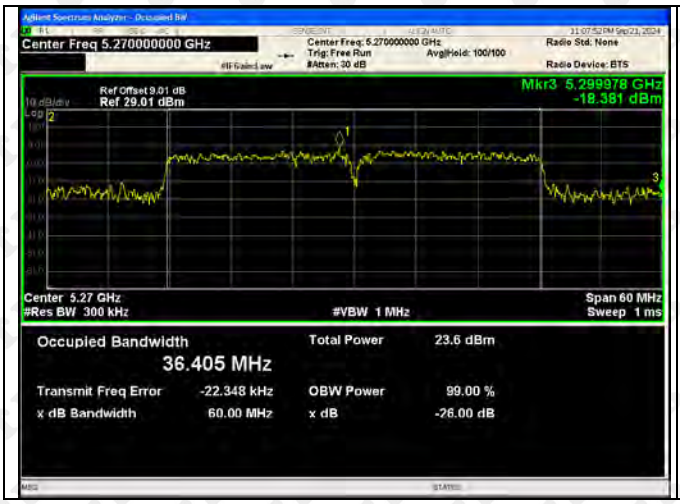
802.11n(HT40)-5230

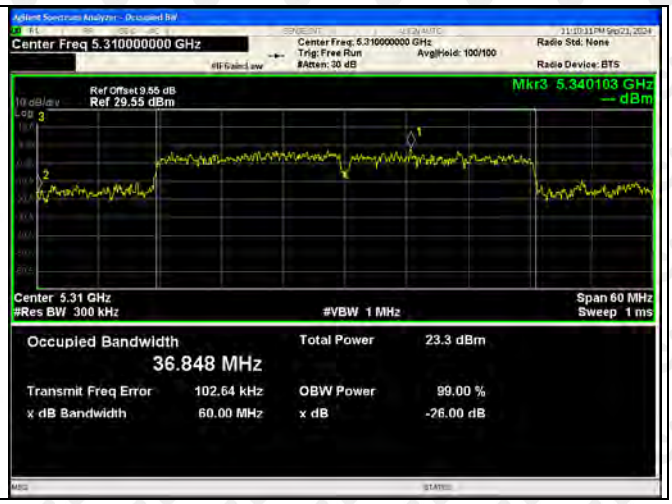

Agilent Spectrum Analyzer - Occupied BW
Center Freq 5.190000000 GHz
Center Freq: 5.190000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.04 dB
10 dB/div
Ref 29.04 dBm
Mkr3 5.209137 GHz
-23.524 dBm
Center 5.19 GHz
#Res BW 300 kHz
#VBW 1 MHz
Span 60 MHz
Sweep 1 ms
Occupied Bandwidth
36.047 MHz
Total Power 20.5 dBm
Transmit Freq Error -8.084 kHz
OBW Power 99.00 %
x dB Bandwidth 38.29 MHz
x dB -26.00 dB


Agilent Spectrum Analyzer - Occupied BW
Center Freq 5.230000000 GHz
Center Freq: 5.230000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 8.96 dB
10 dB/div
Ref 28.96 dBm
Mkr3 5.249237 GHz
-24.521 dBm
Center 5.23 GHz
#Res BW 300 kHz
#VBW 1 MHz
Span 60 MHz
Sweep 1 ms
Occupied Bandwidth
36.049 MHz
Total Power 20.6 dBm
Transmit Freq Error 29.031 kHz
OBW Power 99.00 %
x dB Bandwidth 38.41 MHz
x dB -26.00 dB

5250-5350MHz

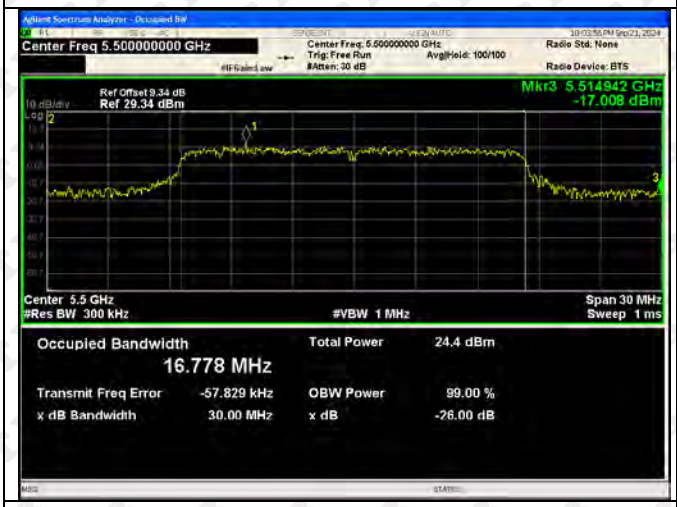
802.11a-5260	802.11a-5280
	
802.11a-5320	802.11n(HT20)-5260
	
802.11n(HT20)-5280	802.11n(HT20)-5320
	
802.11n(HT40)-5270	802.11n(HT40)-5310


Agilent Spectrum Analyzer - Occupied BW
Center Freq 5.270000000 GHz
Center Freq: 5.270000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.01 dB
10 dB/div
Ref 29.01 dBm
Mkr3 5.299978 GHz
-18.381 dBm
Center 5.27 GHz
#Res BW 300 kHz
#VBW 1 MHz
Span 60 MHz
Sweep 1 ms
Occupied Bandwidth
36.405 MHz
Total Power 23.6 dBm
Transmit Freq Error -22.348 kHz
OBW Power 99.00 %
x dB Bandwidth 60.00 MHz
x dB -26.00 dB


Agilent Spectrum Analyzer - Occupied BW
Center Freq 5.310000000 GHz
Center Freq: 5.310000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.55 dB
10 dB/div
Ref 29.55 dBm
Mkr3 5.340103 GHz
--- dBm
Center 5.31 GHz
#Res BW 300 kHz
#VBW 1 MHz
Span 60 MHz
Sweep 1 ms
Occupied Bandwidth
36.848 MHz
Total Power 23.3 dBm
Transmit Freq Error 102.64 kHz
OBW Power 99.00 %
x dB Bandwidth 60.00 MHz
x dB -26.00 dB

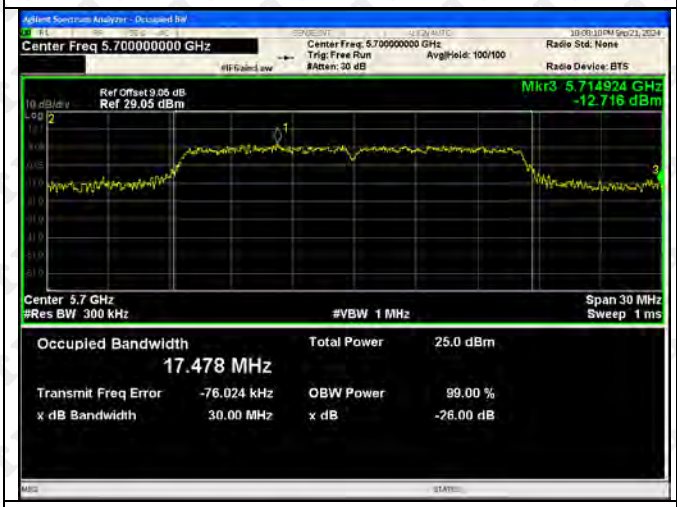
5470-5725MHz

802.11a-5500

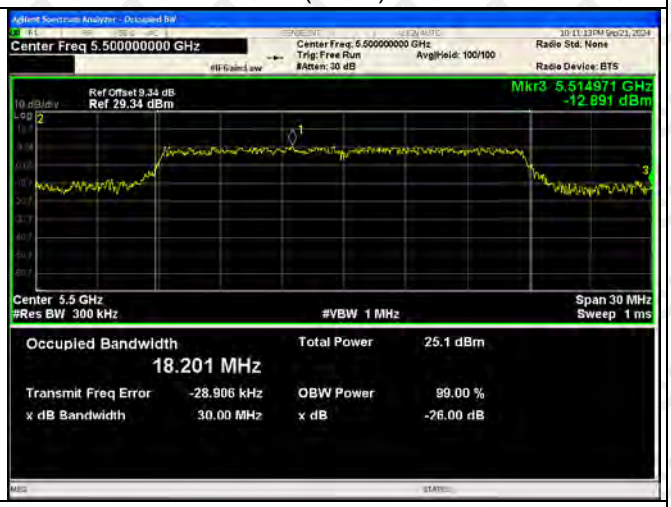


802.11a-5580

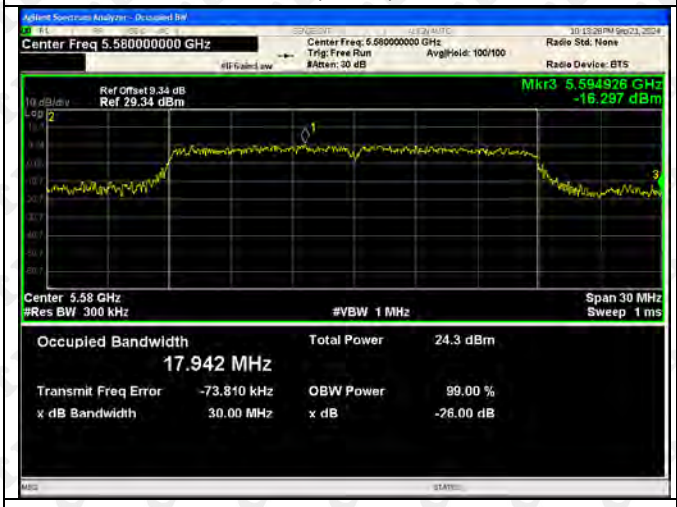
802.11a-5700



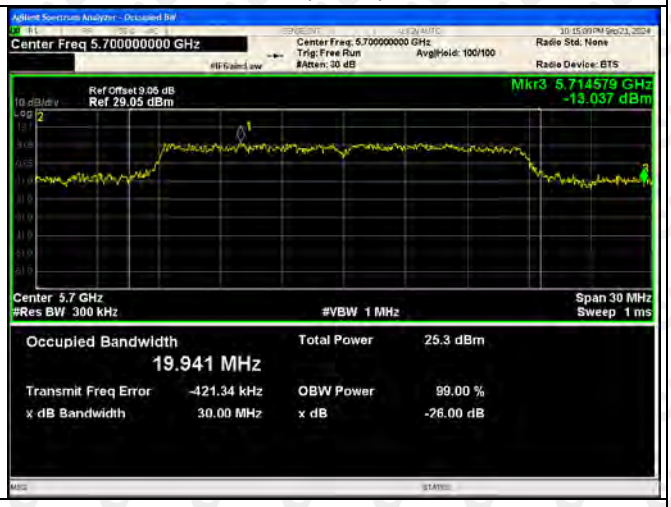
802.11n(HT20)-5500



802.11n(HT20)-5580

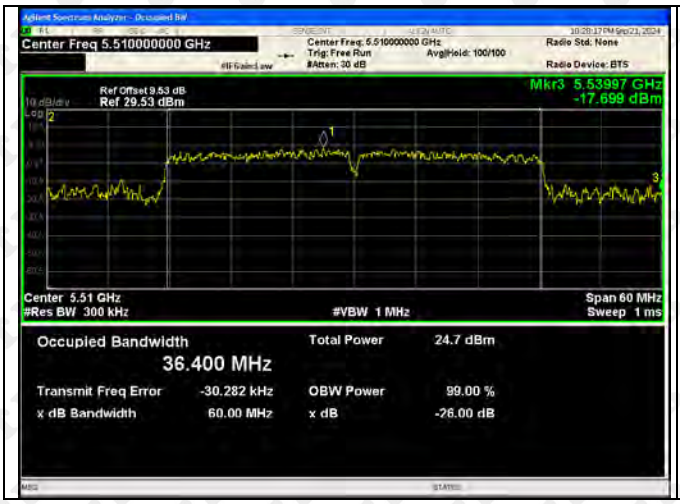


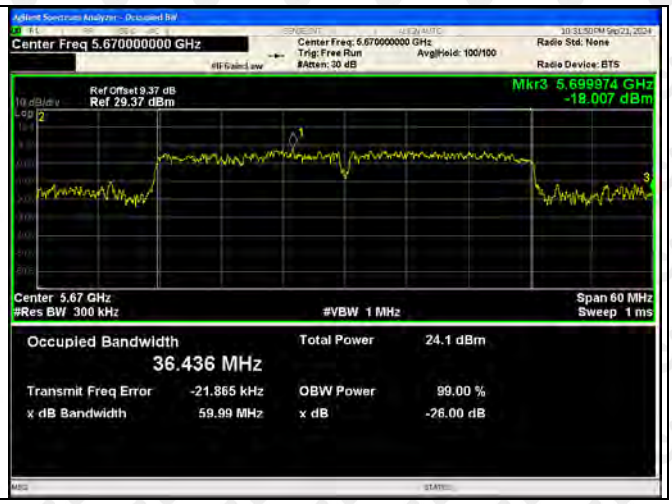
802.11n(HT20)-5700



802.11n(HT40)-5510

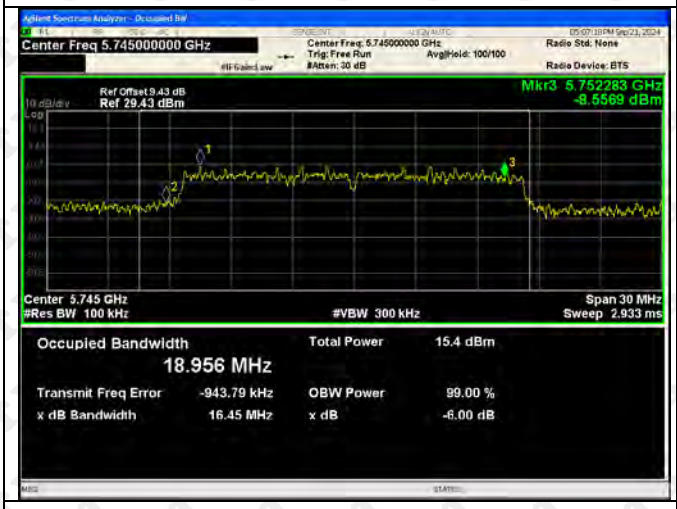
802.11n(HT40)-5670


Agilent Spectrum Analyzer - Occupied BW
Center Freq 5.510000000 GHz
Center Freq: 5.510000000 GHz
Trig: Free Run
#Atten: 30 dB
Avg|Hold: 100/100
Radio Std: None
Radio Device: BTS
Ref Offset 9.53 dB
10 dB/div
Ref 29.53 dBm
Mkr3 5.53997 GHz
-17.699 dBm
Center 5.51 GHz
#Res BW 300 kHz
#VBW 1 MHz
Span 60 MHz
Sweep 1 ms
Occupied Bandwidth
36.400 MHz
Total Power 24.7 dBm
Transmit Freq Error -30.282 kHz
OBW Power 99.00 %
x dB Bandwidth 60.00 MHz
x dB -26.00 dB

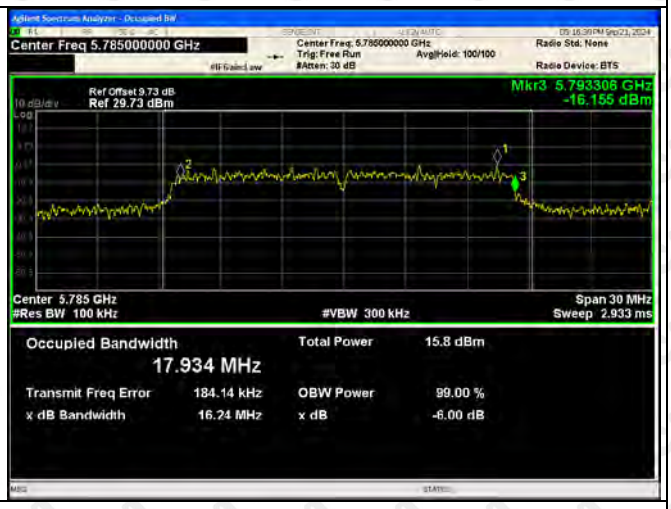

Agilent Spectrum Analyzer - Occupied BW
Center Freq 5.670000000 GHz
Center Freq: 5.670000000 GHz
Trig: Free Run
#Atten: 30 dB
Avg|Hold: 100/100
Radio Std: None
Radio Device: BTS
Ref Offset 9.37 dB
10 dB/div
Ref 29.37 dBm
Mkr3 5.699874 GHz
-18.007 dBm
Center 5.67 GHz
#Res BW 300 kHz
#VBW 1 MHz
Span 60 MHz
Sweep 1 ms
Occupied Bandwidth
36.436 MHz
Total Power 24.1 dBm
Transmit Freq Error -21.865 kHz
OBW Power 99.00 %
x dB Bandwidth 59.99 MHz
x dB -26.00 dB

5725-5850MHz

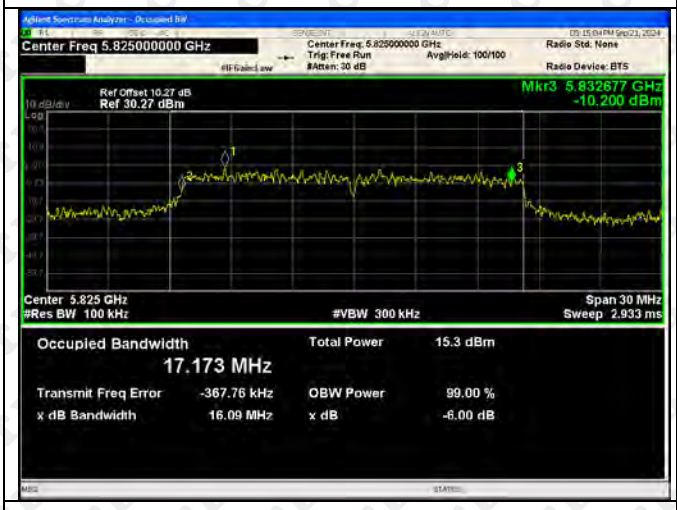
802.11a-5745



802.11a-5785

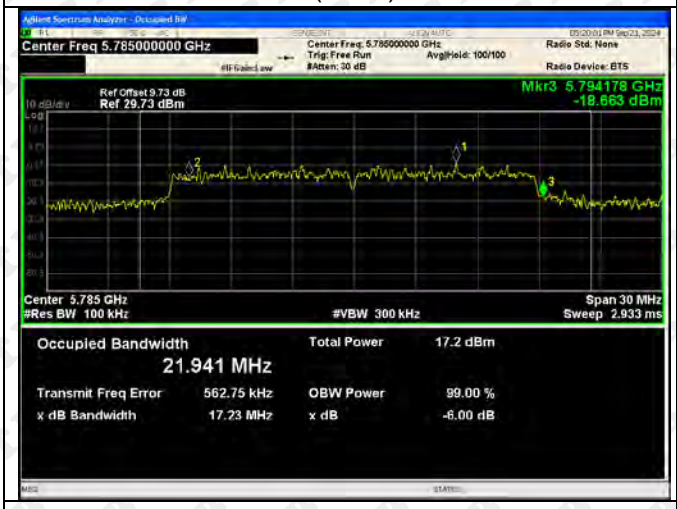


802.11a-5825

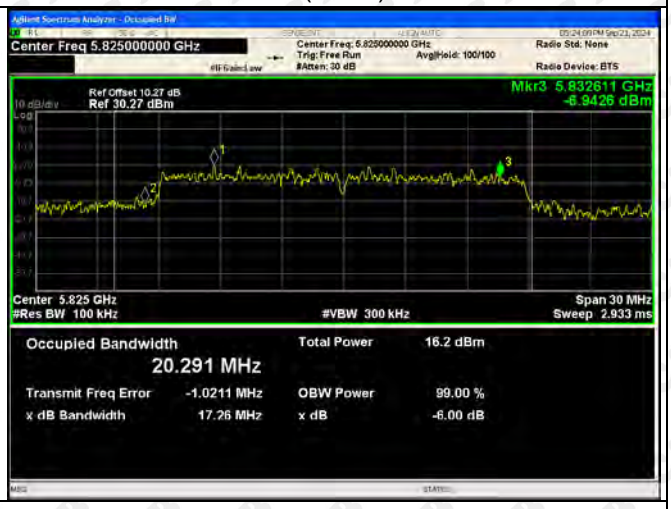


802.11n(HT20)-5745

802.11n(HT20)-5785

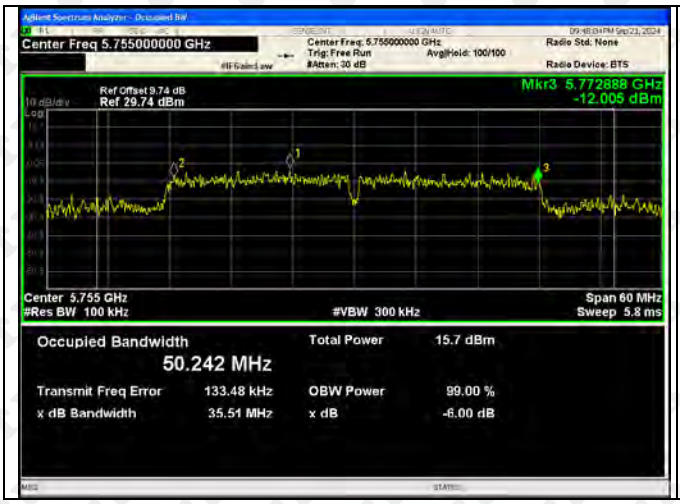


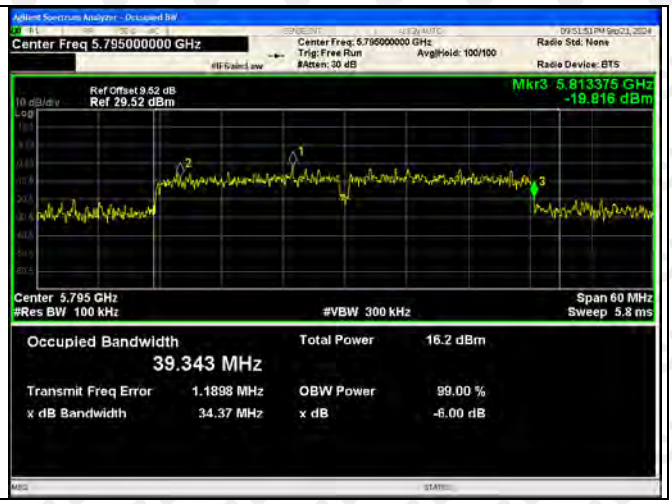
802.11n(HT20)-5825



802.11n(HT40)-5795

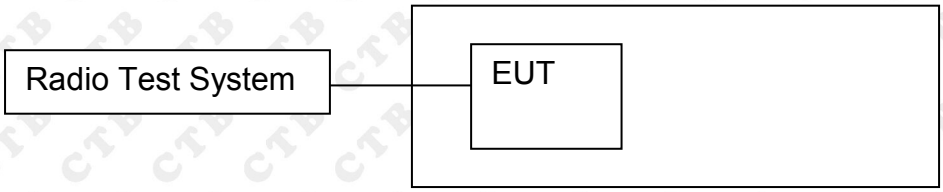
802.11n(HT40)-5825


Agilent Spectrum Analyzer - Occupied BW
Center Freq 5.755000000 GHz
Center Freq: 5.755000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.74 dB
10 dB/div
Ref 29.74 dBm
Mkr3 5.772888 GHz
-12.005 dBm
Center 5.755 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 60 MHz
Sweep 5.8 ms
Occupied Bandwidth
50.242 MHz
Total Power 15.7 dBm
Transmit Freq Error 133.48 kHz
OBW Power 99.00 %
x dB Bandwidth 35.51 MHz
x dB -6.00 dB


Agilent Spectrum Analyzer - Occupied BW
Center Freq 5.795000000 GHz
Center Freq: 5.795000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.52 dB
10 dB/div
Ref 29.52 dBm
Mkr3 5.813375 GHz
-19.816 dBm
Center 5.795 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 60 MHz
Sweep 5.8 ms
Occupied Bandwidth
39.343 MHz
Total Power 16.2 dBm
Transmit Freq Error 1.1898 MHz
OBW Power 99.00 %
x dB Bandwidth 34.37 MHz
x dB -6.00 dB

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 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 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:
a) Set RBW ≥ 1/*T*, where *T* is defined in II.B.I.a).

b) Set VBW ≥ 3 RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz/RBW) to the measured result, whereas RBW (<500 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 (1MHz/RBW) to the measured result, whereas RBW (< 1 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

5150-5250MHz:

Test mode	Test Channel (MHz)	PSD [dBm/MHz]	Limit [dBm/MHz]	Result
802.11a	5180	-1.53	11	Pass
	5200	-1.125	11	Pass
	5240	-1.005	11	Pass
802.11n(HT20)	5180	0.077	11	Pass
	5200	-1.652	11	Pass
	5240	-1.448	11	Pass
802.11n(HT40)	5190	0.394	11	Pass
	5230	0.274	11	Pass

5250-5350 MHz

Test mode	Test Channel (MHz)	PSD [dBm/MHz]	Limit [dBm/MHz]	Result
802.11a	5260	2.034	11	Pass
	5280	2.115	11	Pass
	5320	1.28	11	Pass
802.11n(HT20)	5280	1.484	11	Pass
	5320	1.196	11	Pass
	5270	0.52	11	Pass
802.11n(HT40)	5310	-2.825	11	Pass
	5290	-3.541	11	Pass

5500-5700MHz

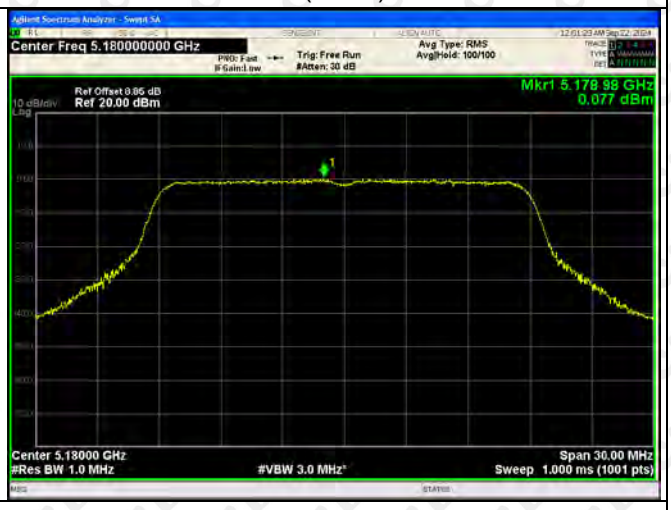
Test mode	Test Channel (MHz)	PSD [dBm/MHz]	Limit [dBm/MHz]	Result
802.11a	5500	2.518	11	Pass
	5580	1.604	11	Pass
	5700	1.925	11	Pass
802.11n(HT20)	5500	2.142	11	Pass
	5580	1.498	11	Pass
	5700	2.764	11	Pass
802.11n(HT40)	5510	-1.854	11	Pass
	5670	-2.973	11	Pass

5725-5850 MHz

Test mode	Test Channel (MHz)	PSD [dBm/500kHz]	Limit [dBm/MHz]	Result
802.11a	5745	-9.448	30	Pass
	5785	-9.494	30	Pass
	5825	-10.507	30	Pass
802.11n(HT20)	5745	-9.78	30	Pass
	5785	-8.893	30	Pass
	5825	-9.885	30	Pass
802.11n(HT40)	5755	-13.202	30	Pass
	5795	-13.512	30	Pass

Test Graph

5150-5250MHz

802.11a-5180	802.11a-5200
	
802.11a-5240	802.11n(HT20)-5180
	
802.11n(HT20)-5200	802.11n(HT20)-5240
	
802.11n(HT40)-5190	802.11n(HT40)-5230


Agilent Spectrum Analyzer - Swept SA
Center Freq 5.190000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold: 100/100
Ref Offset 9.04 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.185 98 GHz
0.394 dBm
Center 5.19000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 60.00 MHz
Sweep 1.000 ms (1001 pts)


Agilent Spectrum Analyzer - Swept SA
Center Freq 5.230000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold: 100/100
Ref Offset 8.96 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.231 80 GHz
0.274 dBm
Center 5.23000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 60.00 MHz
Sweep 1.000 ms (1001 pts)

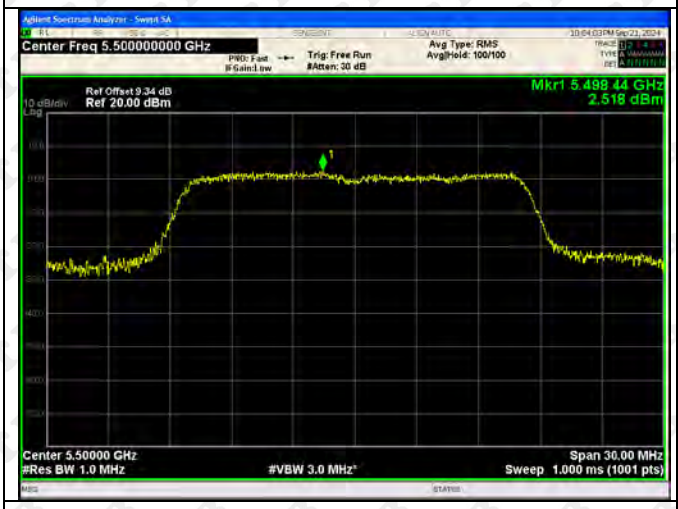
5250-5350MHz

802.11a-5260	802.11a-5280
	
802.11a-5320	802.11n(HT20)-5260
	
802.11n(HT20)-5280	802.11n(HT20)-5320
	
802.11n(HT40)-5270	802.11n(HT40)-5310


Agilent Spectrum Analyzer - Swept SA
Center Freq 5.270000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold: 100/100
Ref Offset 9.01 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.274 02 GHz
-2.825 dBm
Center 5.27000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 60.00 MHz
Sweep 1.000 ms (1001 pts)


Agilent Spectrum Analyzer - Swept SA
Center Freq 5.310000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold: 100/100
Ref Offset 9.66 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.315 82 GHz
-3.541 dBm
Center 5.31000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 60.00 MHz
Sweep 1.000 ms (1001 pts)

5470-5725MHz

802.11a-5500	802.11a-5580
	
802.11a-5700	802.11n(HT20)-5500
	
802.11n(HT20)-5580	802.11n(HT20)-5700
	
802.11n(HT40)-5510	802.11n(HT40)-5670


Agilent Spectrum Analyzer - Swept SA
Center Freq 5.510000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold: 100/100
Ref Offset 9.53 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.508 20 GHz
-1.854 dBm
Center 5.51000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 60.00 MHz
Sweep 1.000 ms (1001 pts)


Agilent Spectrum Analyzer - Swept SA
Center Freq 5.670000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold: 100/100
Ref Offset 9.37 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.663 76 GHz
-2.973 dBm
Center 5.67000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 60.00 MHz
Sweep 1.000 ms (1001 pts)

5725-5850MHz

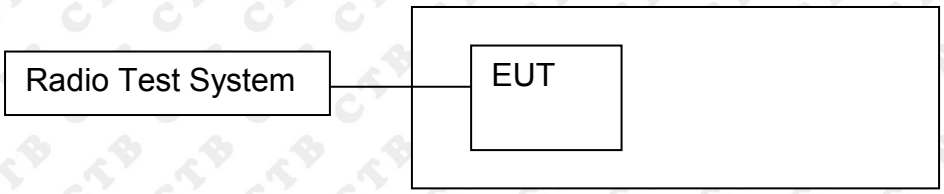
802.11a-5745	802.11a-5785
	
802.11a-5825	802.11n(HT20)-5745
	
802.11n(HT20)-5785	802.11n(HT20)-5825
	
802.11n(HT40)-5795	802.11n(HT40)-5825


Agilent Spectrum Analyzer - Swept SA
Center Freq 5.755000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold: 100/100
Ref Offset 9.74 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.748 58 GHz
-13.202 dBm
Center 5.75500 GHz
#Res BW 510 kHz
#VBW 1.5 MHz*
Span 60.00 MHz
Sweep 1.000 ms (1001 pts)


Agilent Spectrum Analyzer - Swept SA
Center Freq 5.795000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold: 100/100
Ref Offset 9.52 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.798 60 GHz
-13.512 dBm
Center 5.79500 GHz
#Res BW 510 kHz
#VBW 1.5 MHz*
Span 60.00 MHz
Sweep 1.000 ms (1001 pts)

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 (5150-5250MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120.00	5180.0773	5180	0.0773	14.9317
		V max (V)	132.00	5180.0604	5180	0.0604	11.6639
		V min (V)	108.00	5180.0469	5180	0.0469	9.0598
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5180.0510	5180	0.0510	9.8513
		T (°C)	10	5180.0205	5180	0.0205	3.9603
		T (°C)	20	5180.0231	5180	0.0231	4.4556
		T (°C)	30	5180.0176	5180	0.0176	3.3957
		T (°C)	40	5180.0179	5180	0.0179	3.4613
Limits				±20ppm			
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)	120.00	5200.0081	5200	0.0081	1.5620
		V max (V)	132.00	5200.0410	5200	0.0410	7.8800
		V min (V)	108.00	5200.0480	5200	0.0480	9.2353
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5200.0430	5200	0.0430	8.2685
		T (°C)	10	5200.0424	5200	0.0424	8.1464
		T (°C)	20	5200.0340	5200	0.0340	6.5422
		T (°C)	30	5200.0430	5200	0.0430	8.2784
		T (°C)	40	5200.0147	5200	0.0147	2.8321
Limits				±20ppm			
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	120.00	5240.0446	5240	0.0446	8.5032
		V max (V	132.00	5240.0182	5240	0.0182	3.4750
		V min (V	108.00	5240.0120	5240	0.0120	2.2981
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5240.0032	5240	0.0032	0.6117
		T (°C)	10	5240.0529	5240	0.0529	10.0867
		T (°C)	20	5240.0245	5240	0.0245	4.6754
		T (°C)	30	5240.0478	5240	0.0478	9.1286
		T (°C)	40	5240.0526	5240	0.0526	10.0341
Limits				±20ppm			
Result				Complies			

TX Frequency (5250-5350MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5260MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120.00	5260.0490	5260	0.0490	9.3093
		V max (V)	132.00	5260.0122	5260	0.0122	2.3187
		V min (V)	108.00	5260.0351	5260	0.0351	6.6697
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5260MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5260.0811	5260	0.0811	15.4132
		T (°C)	10	5260.0313	5260	0.0313	5.9588
		T (°C)	20	5260.0010	5260	0.0010	0.1836
		T (°C)	30	5260.0273	5260	0.0273	5.1814
		T (°C)	40	5260.0283	5260	0.0283	5.3736
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5280MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120.00	5280.0628	5280	0.0628	11.8912
		V max (V)	132.00	5280.0473	5280	0.0473	8.9677
		V min (V)	108.00	5280.0282	5280	0.0282	5.3370
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5280MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5280.0850	5280	0.0850	16.0911
		T (°C)	10	5280.0626	5280	0.0626	11.8481
		T (°C)	20	5280.0602	5280	0.0602	11.3943
		T (°C)	30	5280.0748	5280	0.0748	14.1749
		T (°C)	40	5280.0115	5280	0.0115	2.1747
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5320MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120.00	5320.0159	5320	0.0159	2.9887
		V max (V)	132.00	5320.0393	5320	0.0393	7.3862
		V min (V)	108.00	5320.0047	5320	0.0047	0.8743
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5320MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5320.0750	5320	0.0750	14.1066
		T (°C)	10	5320.0733	5320	0.0733	13.7703
		T (°C)	20	5320.0424	5320	0.0424	7.9711
		T (°C)	30	5320.0582	5320	0.0582	10.9307
		T (°C)	40	5320.0199	5320	0.0199	3.7315
Limits				±20ppm			
Result				Complies			

TX Frequency (5470-5725MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5500MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120.00	5500.0282	5500	0.0282	5.1211
		V max (V)	132.00	5500.0682	5500	0.0682	12.3993
		V min (V)	108.00	5500.0481	5500	0.0481	8.7436
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5500MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5500.0842	5500	0.0842	15.3020
		T (°C)	10	5500.0557	5500	0.0557	10.1279
		T (°C)	120	5500.0669	5500	0.0669	12.1644
		T (°C)	30	5500.0555	5500	0.0555	10.0979
		T (°C)	40	5500.0576	5500	0.0576	10.4729
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5580MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120.00	5580.0121	5580	0.0121	2.1718
		V max (V)	132.00	5580.0316	5580	0.0316	5.6616
		V min (V)	108.00	5580.0480	5580	0.0480	8.6031
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5580MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5580.0656	5580	0.0656	11.7618
		T (°C)	10	5580.0108	5580	0.0108	1.9349
		T (°C)	20	5580.0627	5580	0.0627	11.2403
		T (°C)	30	5580.0127	5580	0.0127	2.2751
		T (°C)	40	5580.0160	5580	0.0160	2.8709
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5700MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120.00	5700.0800	5700	0.0800	14.0330
		V max (V)	132.00	5700.0031	5700	0.0031	0.5498
		V min (V)	108.00	5700.0818	5700	0.0818	14.3537
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5700MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5700.0361	5700	0.0361	6.3311
		T (°C)	10	5700.0143	5700	0.0143	2.5099
		T (°C)	20	5700.0839	5700	0.0839	14.7108
		T (°C)	30	5700.0832	5700	0.0832	14.5970
		T (°C)	40	5700.0700	5700	0.0700	12.2795
Limits				±20ppm			
Result				Complies			

TX Frequency (5725-5850MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120.00	5745.0866	5745	0.0866	15.0801
		V max (V)	132.00	5745.0874	5745	0.0874	15.2141
		V min (V)	108.00	5745.0866	5745	0.0866	15.0801
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5745.0132	5745	0.0132	2.3031
		T (°C)	10	5745.0116	5745	0.0116	2.0234
		T (°C)	20	5745.0237	5745	0.0237	4.1326
		T (°C)	30	5745.0727	5745	0.0727	12.6510
		T (°C)	40	5745.0720	5745	0.0720	12.5399
Limits				±20ppm			
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)	120.00	5785.0570	5785	0.0570	9.8539
		V max (V)	132.00	5785.0555	5785	0.0555	9.6002
		V min (V)	108.00	5785.0523	5785	0.0523	9.0442
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5785.0851	5785	0.0851	14.7070
		T (°C)	10	5785.0204	5785	0.0204	3.5262
		T (°C)	20	5785.0072	5785	0.0072	1.2363
		T (°C)	30	5785.0079	5785	0.0079	1.3687
		T (°C)	40	5785.0517	5785	0.0517	8.9354
Limits				±20ppm			
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)	120.00	5825.0038	5825	0.0038	0.6583
		V max (V)	132.00	5825.0016	5825	0.0016	0.2825
		V min (V)	108.00	5825.0730	5825	0.0730	12.5340
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5825.0651	5825	0.0651	11.1721
		T (°C)	10	5825.0662	5825	0.0662	11.3716
		T (°C)	20	5825.0490	5825	0.0490	8.4111
		T (°C)	30	5825.0146	5825	0.0146	2.5019
		T (°C)	40	5825.0403	5825	0.0403	6.9229
Limits				±20ppm			
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 WLAN message transmitting from remote device and verify whether it shall reconnect. (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.

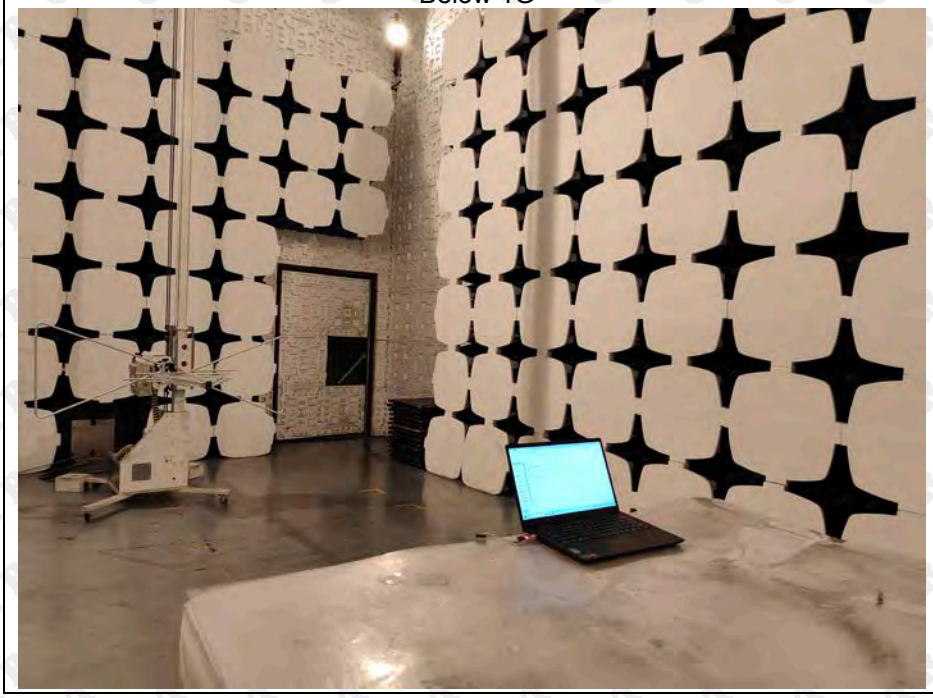
EUT Antenna:

The antenna is FPC Antenna and no consideration of replacement. The best case gain of the antenna is WiFi (5.2G) : 2.91dBi, WiFi (5.3G) : 3dBi, WiFi (5.6G) : 3.79dBi, WiFi (5.8G) : 5.33dBi.

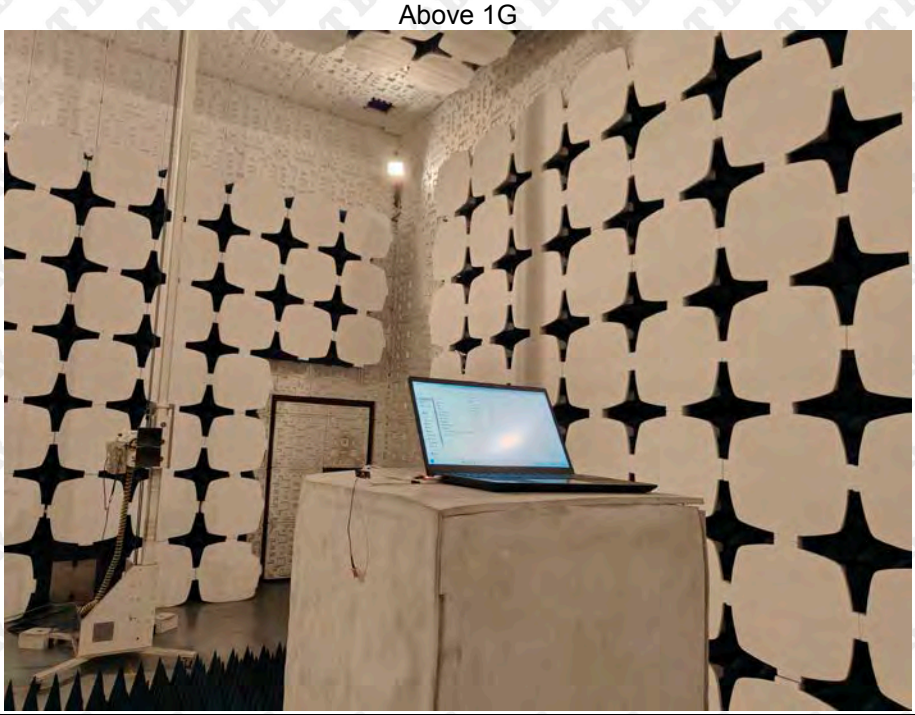
15. EUT TEST SETUP PHOTOGRAPHS

Radiated Emission

Below 1G



Above 1G



Conducted Emission

※※※※※ END OF REPORT ※※※※※