TEST REPORT

Product Name:	Interactive Flat Panel
FCC ID:	2AYJ4TT-XXV5
Trademark:	TANGO
Model Number:	TT-75V5, TT-55V5, TT-65V5, TT-86V5, TT-98V5
Prepared For:	Osborne Technologies Limited
Address:	Unit 14 Capitol Court, Capitol Park, Dodworth, Barnsley, South Yorkshire, United Kingdom
Manufacturer:	Osborne Technologies Limited
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Prepared By:	Shenzhen CTB Testing Technology Co., Ltd.
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Sample Received Date:	Apr. 13, 2023
Sample tested Date:	Apr. 13, 2023 to Apr. 18, 2023
Issue Date:	Apr. 18, 2023
Report No.:	CTB230418008RFX
Test Standards	47 CFR Part 15 Subpart E
Test Results	PASS
Remark:	This is WIFI-5GHz band radio test report.

Compiled by:	Reviewed by:	Approved by:
ChenZheng	Arron Liu	Bin Mei
Chen Zheng	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.

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(Note: N/A means not applicable)

1. VERSION

Report No.	Issue Date	Description	Approved
CTB230418008RFX	Apr. 18, 2023	Original	Valid

2. TEST SUMMARY

The Product has been tested according to the following specifications:

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

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

3. MEASUREMENT UNCERTAINTY

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

Item	Uncertainty
Occupancy bandwidth	U=±54.3Hz
Adjacent channel power	U=±1.3dB
Conducted Adjacent channel power	U=±1.38dB
Conducted output power Above 1G	U=±1.0dB
Conducted output power below 1G	U=±0.9dB
Power Spectral Density , Conduction	U=±1.0dB
Conduction spurious emissions	U=±2.8dB
Out of band emission	U=±54Hz
3m camber Radiated spurious emission(9KHz-30MHz)	U=±4.8dB
3m camber Radiated spurious emission(30MHz-1GHz)	U=±4.3dB
3m chamber Radiated spurious emission(1GHz-18GHz)	U=±4.5dB
3m chamber Radiated spurious emission(18GHz-40GHz)	U=±3.4dB
humidity uncertainty	U=±5.3%
Temperature uncertainty	U=±0.59℃
Supply voltages	U=±3%
Time	U=±5%
Conducted emission(150K-30MHz)	3.2dB

4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Model(s):	TT-75V5, TT-55V5, TT-65V5, TT-86V5, TT-98V5
Model Description:	All the model are the same circuit and RF module, only for model name. Test sample model: TT-75V5
Wi-Fi Specification:	IEEE 802.11a/b/g/n/ac
Hardware Version:	V1.0
Software Version:	V1.0
Operation Frequency:	IEEE 802.11a/n/ac(20M): 5725MHz ~5850MHz/ 5 channel IEEE 802.11n/ac(40M): 5725MHz ~5850MHz/ 2 channel IEEE 802.11ac(80M): 5725MHz ~5850MHz/ 1 channel
Max. RF output power:	WiFi (5G): 17.701dBm
Type of Modulation:	WiFi: DSSS, CCK and OFDM
Antenna installation:	External antenna
Antenna Gain:	ANT1:4.33dBi ANT2:4.33dBi ANT3:4.33dBi ANT4:4.33dBi
Ratings:	AC 100-240V~50/60Hz

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

Notes:

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

4.4 Channel List

For 802.11a/n/ac(20M) Operation in the 5745MHz ~5825 MHz band			
Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz	NA	NA

For 802.11n/ac(40M) Operation in the 5745MHz ~5825 MHz band			
Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

For 802.11ac(80M) Operation in the 5745MHz ~5825 MHz band			
Channel	Frequency	NA	NA
155	5775MHz	NA	NA

NOTE: Dutycycle>98%.

Test mode	rate
802.11a	54M
802.11n	500M
802.11/ac	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/ac(20M)	5745MHz ~5825 MHz	Channel 149	Channel 157	Channel 165
		5745MHz	5785MHz	5825MHz
802.11n/ac(40M)	5745MHz ~5825 MHz	Channel 151	N/A	Channel 159
		5755MHz	N/A	5795MHz
802.11ac(80M)	5745MHz ~5825 MHz	N/A	Channel 155	N/A
		N/A	5775MHz	N/A

4.6 Test Environment

Humidity(%):	54
Atmospheric Pressure(kPa):	101
Normal Voltage(AC):NV	120
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 Floor 1&2, Building A, No. 26 of Xinhe Road, Xinqiao Street, Baoan District, Shenzhen China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

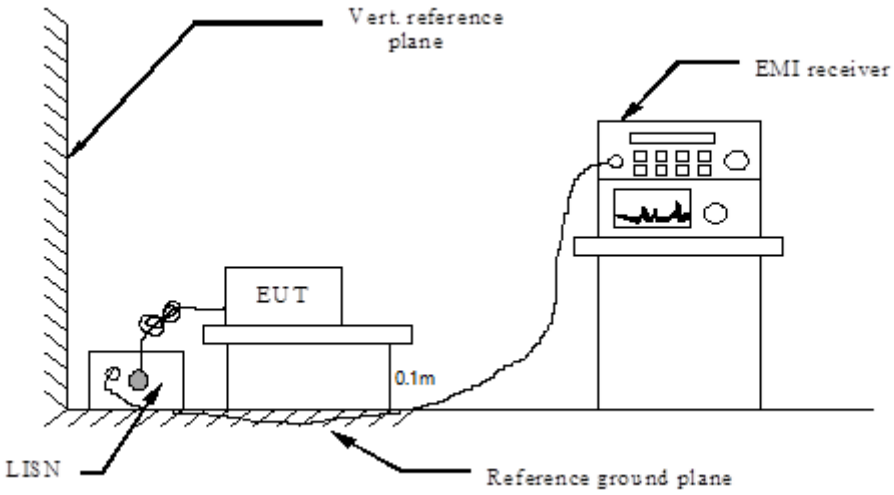
5.2 Test Instrument Used

Item	Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY52090073	2023.07.19
2	Power Sensor	Agilent	U2021XA	MY56120032	2023.07.19
3	Power Sensor	Agilent	U2021XA	MY56120034	2023.07.19
4	Communication test set	R&S	CMW500	108058	2023.07.19
5	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	2023.07.19
6	Signal Generator	Agilent	N5181A	MY50140365	2023.07.19
7	Vector signal generator	Agilent	N5182A	MY47420195	2023.07.19
8	Communication test set	Agilent	E5515C	MY50102567	2023.07.19
9	2.4 GHz Filter	Shenxiang	MSF2400-2483.5MS-1154	20181015001	2023.07.19
10	5 GHz Filter	Shenxiang	MSF5150-5850 MS-1155	20181015001	2023.07.19
11	Filter	Xingbo	XBLBQ-DZA120	190821-1-1	2023.07.19
12	BT&WI-FI Automatic test software	Micowave	MTS8000	Ver. 2.0.0.0	/
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	2023.10.30
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	2023.07.19
15	234G Automatic test software	Micowave	MTS8200	Ver. 2.0.0.0	/
16	966 chamber	C.R.T.	966	/	2024.08.11
17	Receiver	R&S	ESPI	100362	2023.07.19
18	Amplifier	HP	8447E	2945A02747	2023.07.19
19	Amplifier	Agilent	8449B	3008A01838	2023.07.19
20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	2023.07.22

21	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA9120D	01911	2023.07.22
22	EMI test software	Fala	EZ-EMC	FA-03A2 RE	/
23	Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-224	2023.07.23
24	loop antenna	ZHINAN	ZN30900A	GTS534	/
25	40G Horn antenna	A/H/System	SAS-574	588	2024.10.30
26	Amplifier	AEROFLEX	Aeroflex	097	2024.10.30

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,

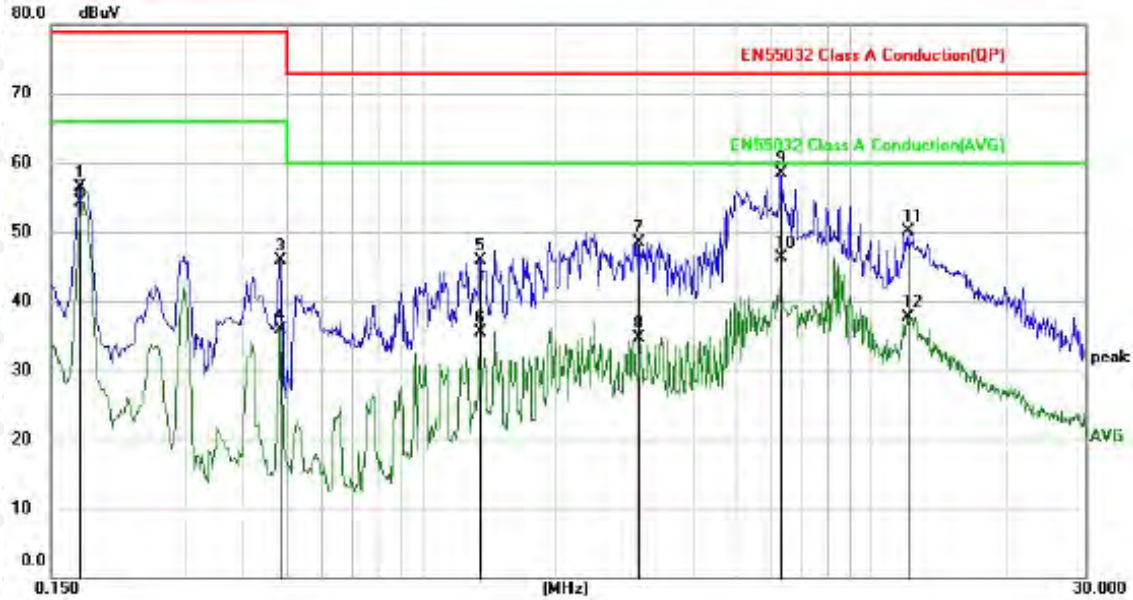
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0,4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0,8 m from the boundary of the unit under

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

L:

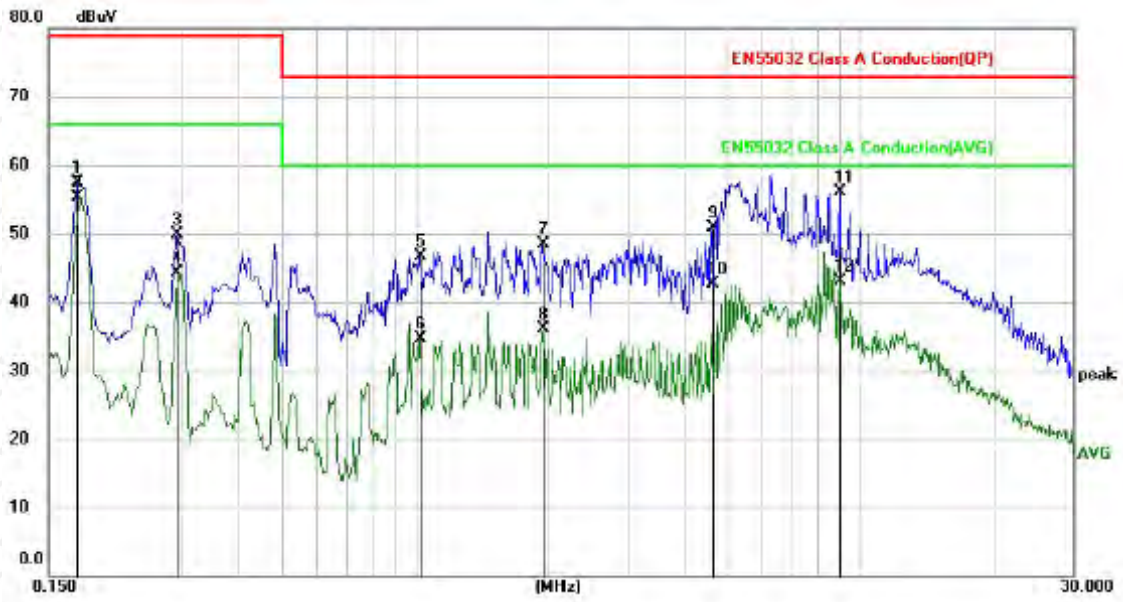


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1737	46.41	10.01	56.42	79.00	-22.58	QP
2	*	0.1737	44.21	10.01	54.22	66.00	-11.78	AVG
3		0.4858	35.94	9.97	45.91	79.00	-33.09	QP
4		0.4858	25.87	9.97	35.84	66.00	-30.16	AVG
5		1.3460	35.92	10.00	45.92	73.00	-27.08	QP
6		1.3460	25.52	10.00	35.52	60.00	-24.48	AVG
7		3.0259	38.52	10.08	48.60	73.00	-24.40	QP
8		3.0259	24.54	10.08	34.62	60.00	-25.38	AVG
9		6.3100	48.27	10.22	58.49	73.00	-14.51	QP
10		6.3100	36.05	10.22	46.27	60.00	-13.73	AVG
11		12.1059	39.65	10.40	50.05	73.00	-22.95	QP
12		12.1059	27.31	10.40	37.71	60.00	-22.29	AVG

Remark:

Factor = Cable loss + LISN factor, Margin = Measurement – Limit

N:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1737	47.41	10.01	57.42	79.00	-21.58	QP
2	*	0.1737	45.21	10.01	55.22	66.00	-10.78	AVG
3		0.2923	39.86	9.99	49.85	79.00	-29.15	QP
4		0.2923	34.36	9.99	44.35	66.00	-21.65	AVG
5		1.0220	36.74	9.98	46.72	73.00	-26.28	QP
6		1.0220	24.77	9.98	34.75	60.00	-25.25	AVG
7		1.9376	38.44	10.02	48.46	73.00	-24.54	QP
8		1.9376	26.05	10.02	36.07	60.00	-23.93	AVG
9		4.6379	40.66	10.15	50.81	73.00	-22.19	QP
10		4.6379	32.54	10.15	42.69	60.00	-17.31	AVG
11		8.9859	45.88	10.31	56.19	73.00	-16.81	QP
12		8.9859	32.80	10.31	43.11	60.00	-16.89	AVG

Remark:

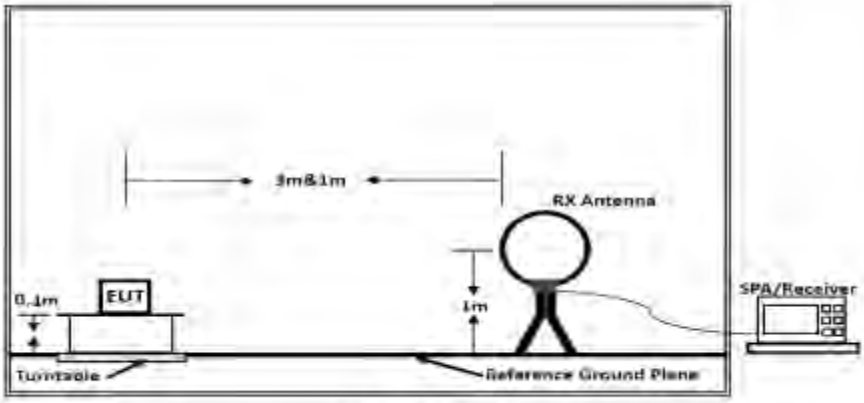
Factor = Cable loss + LISN factor, Margin = Measurement – Limit

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

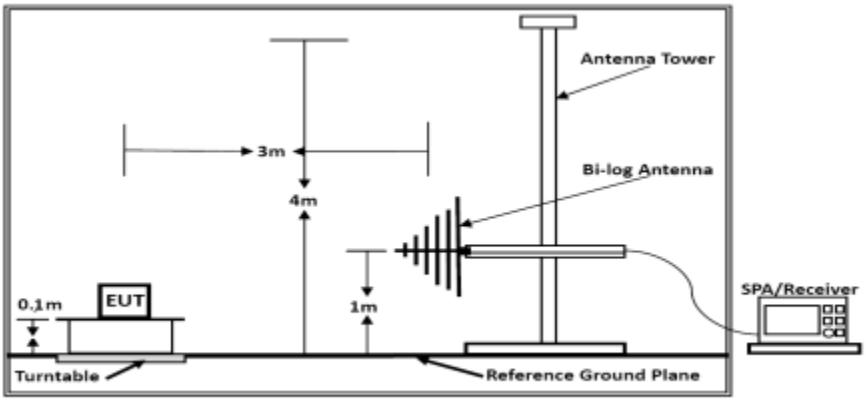
7.1 Block Diagram Of Test Setup

Figure 1. Below 30MHz



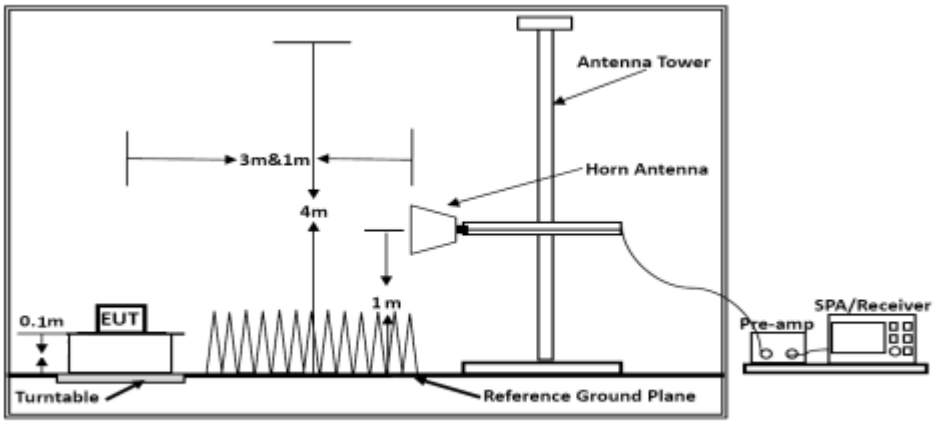
Below 30MHz

Figure 2. 30MHz to 1GHz



Below 1GHz

Figure 3. Above 1GHz



Above 1GHz

7.2 Limit

Spurious Emissions:

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

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

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

7.3 Test procedure

Below 1GHz test procedure as below:
a.The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b.The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c.The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d.For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.
e.The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f.If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Above 1GHz test procedure as below:
g.Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).
h.Test the EUT in the lowest channel ,the middle channel ,the Highest channel
j.Repeat above procedures until all frequencies measured was complete.

Receiver set:

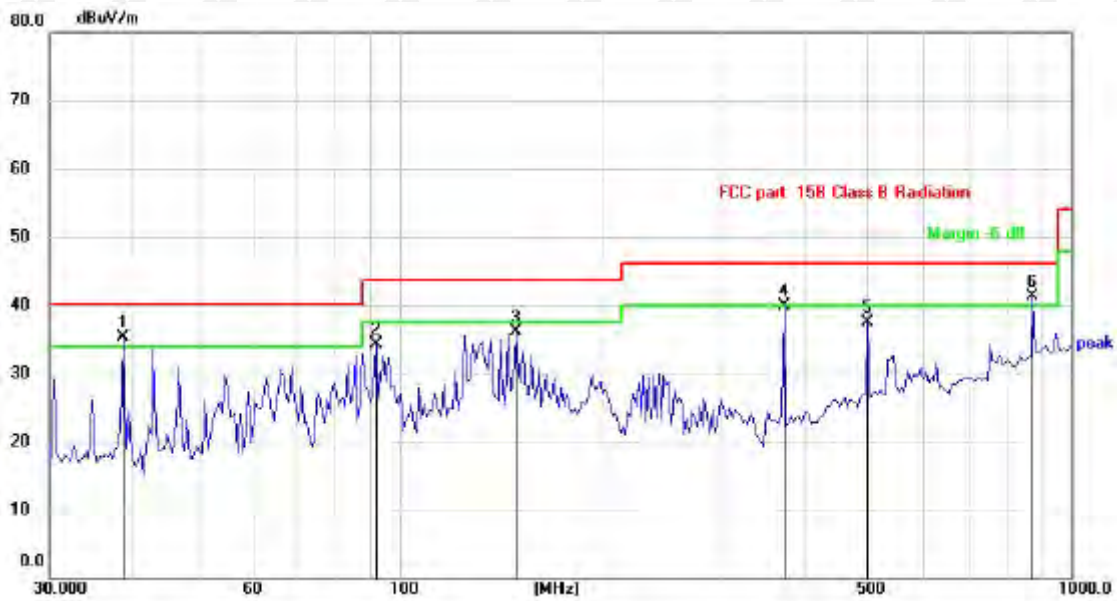
Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30KHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30KHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30KHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30KHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30KHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak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

7.4 Test Result

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

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	!	46.9123	40.95	-6.57	34.38	40.00	-5.62	QP
2		125.2258	43.85	-7.08	36.77	43.50	-6.73	QP
3		145.3505	42.01	-5.48	36.53	43.50	-6.97	QP
4		250.3010	47.14	-7.80	39.34	46.00	-6.66	QP
5		374.6225	42.77	-3.36	39.41	46.00	-6.59	QP
6	*	876.7827	34.33	6.76	41.09	46.00	-4.91	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	*	38.6837	41.84	-6.51	35.33	40.00	-4.67	QP
2		92.1386	44.36	-10.09	34.27	43.50	-9.23	QP
3		149.2238	41.65	-5.46	36.19	43.50	-7.31	QP
4		374.6225	43.23	-3.36	39.87	46.00	-6.13	QP
5		500.3009	37.37	0.04	37.41	46.00	-8.59	QP
6	!	876.7827	34.55	6.76	41.31	46.00	-4.69	QP

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

Radiated Spurious Emission (Above 1GHz):

ANT 1

Modulation : 802.11(a) (the worst data)

Freq (MHz)	Rd_level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	detector	Height	Degree	Antenna polarization
Channel:5180MHz									
10360	40.94	16.39	57.33	74	-16.67	PK	1.08	206	H
10360	25.14	16.39	41.53	54	-12.47	AV	1.15	336	H
10360	40.06	16.39	56.45	74	-17.55	PK	1.19	287	V
10360	27.76	16.39	44.15	54	-9.85	AV	1.23	206	V
Channel:5240MHz									
10480	40.94	16.11	57.05	74	-16.95	PK	1.70	248	H
10480	27.80	16.11	43.91	54	-10.09	AV	1.16	334	H
10480	39.03	16.11	55.14	74	-18.86	PK	1.52	109	V
10480	27.48	16.11	43.59	54	-10.41	AV	1.70	90	V

Modulation : 802.11(n40) (the worst data)

Freq (MHz)	Rd_level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	detector	Height	Degree	Antenna polarization
Channel:5190MHz									
10380	40.90	16.39	57.29	74	-16.71	PK	1.42	254	H
10380	26.35	16.39	42.74	54	-11.26	AV	1.10	123	H
10380	39.15	16.39	55.54	74	-18.46	PK	1.19	179	V
10380	26.53	16.39	42.92	54	-11.08	AV	1.20	285	V
Channel:5230MHz									
10460	40.90	16.11	57.01	74	-16.99	PK	1.57	266	H
10460	26.22	16.11	42.33	54	-11.67	AV	1.44	71	H
10460	40.21	16.11	56.32	74	-17.68	PK	1.34	108	V
10460	27.40	16.11	43.51	54	-10.49	AV	1.24	239	V

Modulation : 802.11(VH80) (the worst data)

Freq (MHz)	Rd_level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	detector	Height	Degree	Antenna polarization
Channel:5210MHz									
10420	39.62	16.25	55.87	74	-18.13	PK	1.54	9	H
10420	26.87	16.25	43.12	54	-10.88	AV	1.79	50	H
10420	41.36	16.25	57.61	74	-16.39	PK	1.76	293	V
10420	26.68	16.25	42.93	54	-11.07	AV	1.79	139	V
Channel:5775MHz									
11550	41.54	17.50	59.04	74	-14.96	PK	1.53	39	H
11550	26.36	17.50	43.86	54	-10.14	AV	1.80	210	H
11550	40.74	17.50	58.24	74	-15.76	PK	1.89	171	V
11550	27.05	17.50	44.55	54	-9.45	AV	1.20	318	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.

Radiated Spurious Emission (Above 1GHz):

ANT 2+ANT 3

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	40.53	16.39	56.92	74	-17.08	PK	1.15	293	H
10360	25.48	16.39	41.87	54	-12.13	AV	1.41	61	H
10360	39.68	16.39	56.07	74	-17.93	PK	1.52	216	V
10360	25.57	16.39	41.96	54	-12.04	AV	1.06	19	V
Channel:5240MHz									
10480	40.53	16.11	56.64	74	-17.36	PK	1.33	8	H
10480	26.20	16.11	42.31	54	-11.69	AV	1.38	234	H
10480	40.61	16.11	56.72	74	-17.28	PK	1.48	59	V
10480	27.21	16.11	43.32	54	-10.68	AV	1.55	44	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	41.35	16.34	57.69	74	-16.31	PK	1.13	158	H
10380	25.50	16.34	41.84	54	-12.16	AV	1.55	356	H
10380	40.71	16.34	57.05	74	-16.95	PK	1.38	149	V
10380	25.34	16.34	41.68	54	-12.32	AV	1.17	191	V
Channel:5230MHz									
10460	41.93	16.15	58.08	74	-15.92	PK	1.52	285	H
10460	25.11	16.15	41.26	54	-12.74	AV	1.74	176	H
10460	40.42	16.15	56.57	74	-17.43	PK	1.52	102	V
10460	27.46	16.15	43.61	54	-10.39	AV	1.20	292	V

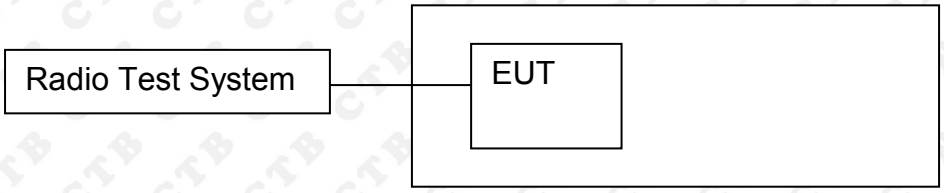
Modulation : 802.11(VH80) (the worst data)

Freq (MHz)	Rd_level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	detector	Height	Degree	Antenna polarization
Channel:5210MHz									
10420	40.10	16.25	56.35	74	-17.65	PK	1.89	156	H
10420	27.11	16.25	43.36	54	-10.64	AV	1.24	290	H
10420	39.90	16.25	56.15	74	-17.85	PK	1.11	122	V
10420	27.28	16.25	43.53	54	-10.47	AV	1.09	320	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

ANT 1

802.11a-5745

802.11a-5825

802.11(n20)-5745

802.11(n20)-5825

802.11(n40)-5755

802.11(n40)-5795

802.11ac(VH20)-5745

802.11ac(VH20)-5825

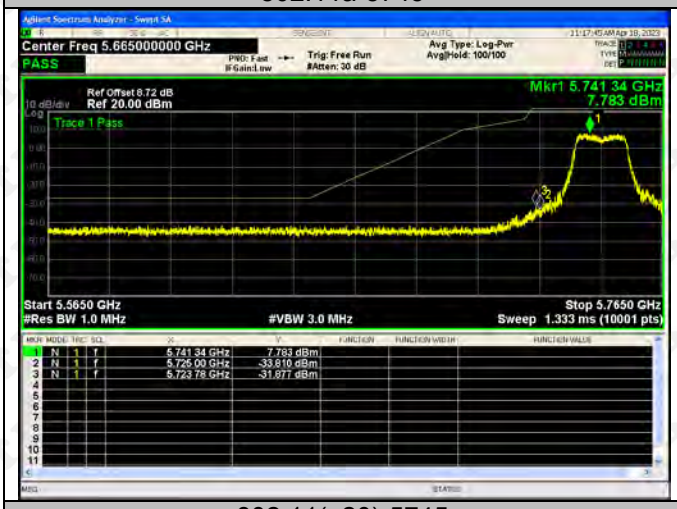
802.11ac(VH40)-5755

802.11ac(VH40)-5795

802.11ac(VH80)-5775

ANT 2

802.11a-5745



802.11a-5825

802.11(n20)-5745

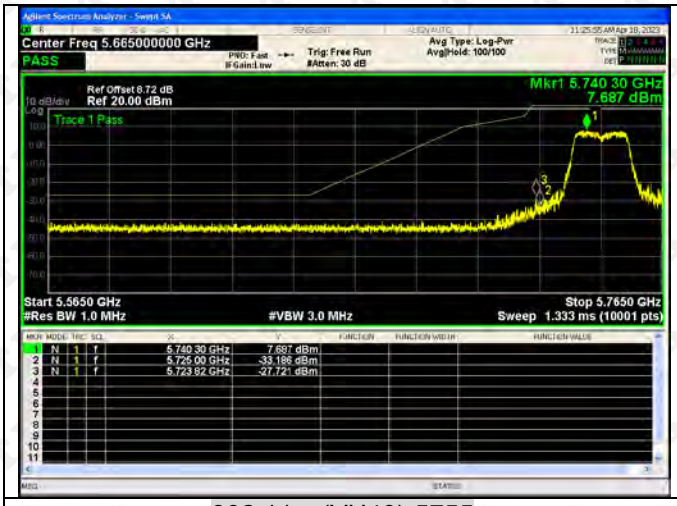
802.11(n20)-5825

802.11(n40)-5755

802.11(n40)-5795

802.11ac(VH20)-5745

802.11ac(VH20)-5825



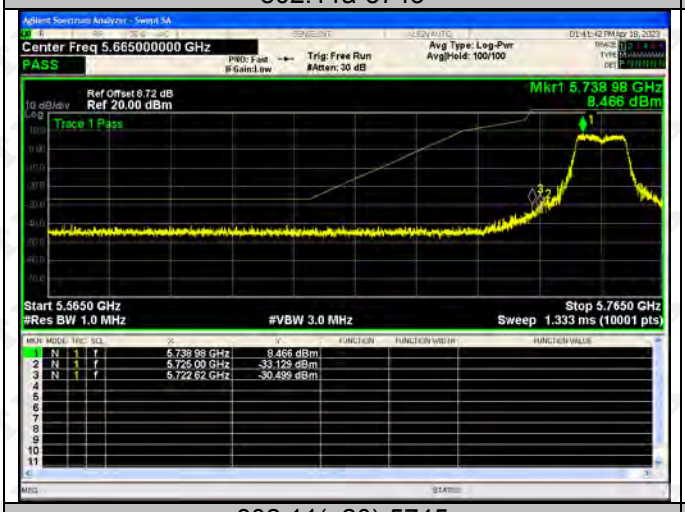
802.11ac(VH40)-5755

802.11ac(VH40)-5795

802.11ac(VH80)-5775

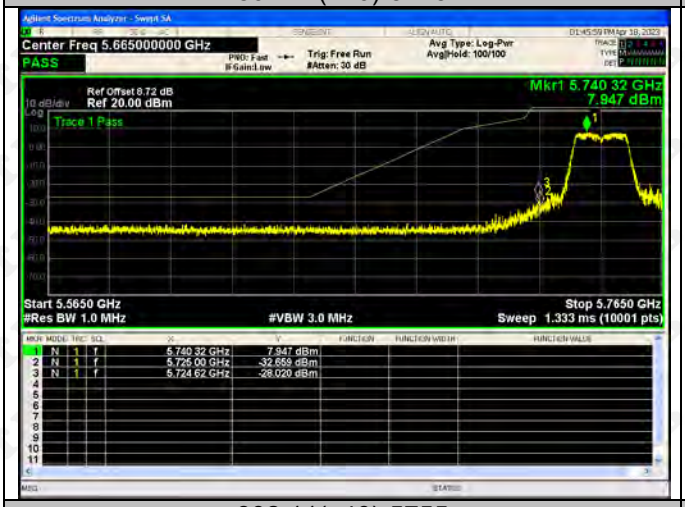
ANT 3

802.11a-5745



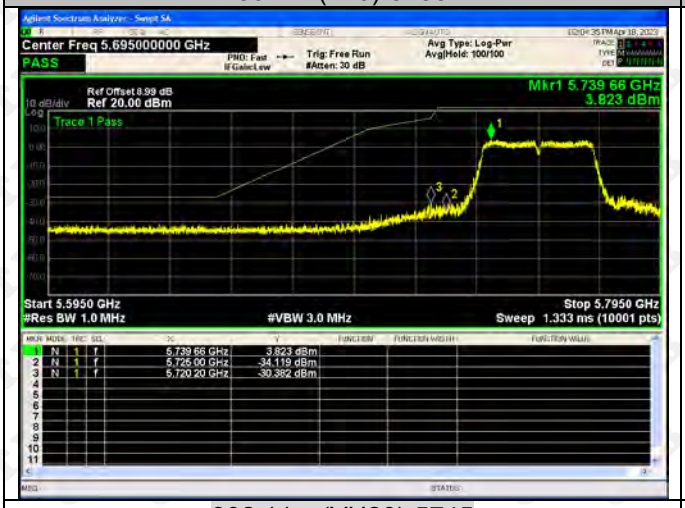
802.11a-5825

802.11(n20)-5745



802.11(n20)-5825

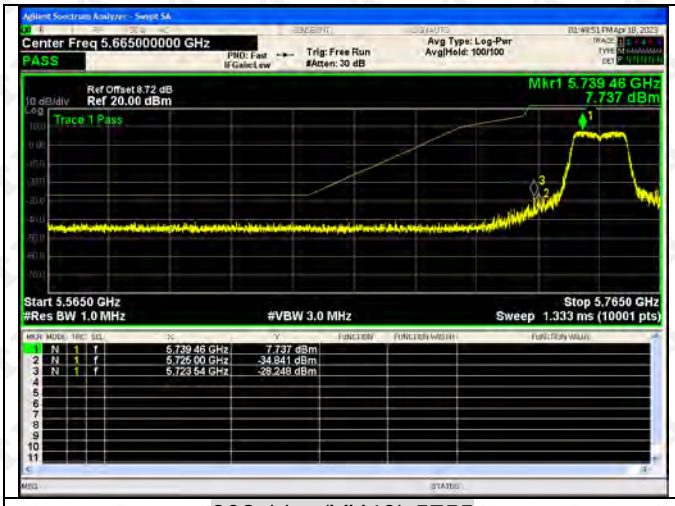
802.11(n40)-5755



802.11(n40)-5795

802.11ac(VH20)-5745

802.11ac(VH20)-5825



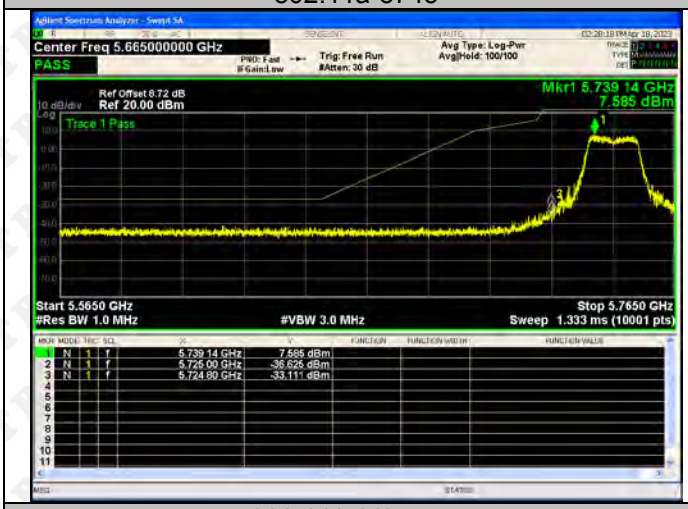
802.11ac(VH40)-5755

802.11ac(VH40)-5795

802.11ac(VH80)-5775

ANT 4

802.11a-5745



802.11a-5825

802.11(n20)-5745

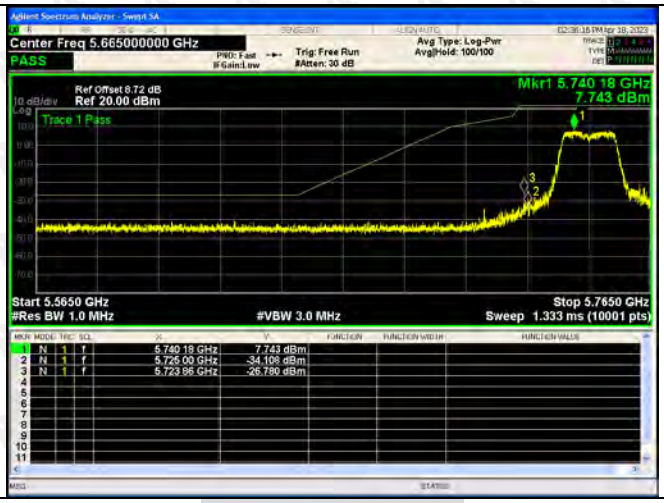
802.11(n20)-5825

802.11(n40)-5755

802.11(n40)-5795

802.11ac(VH20)-5745

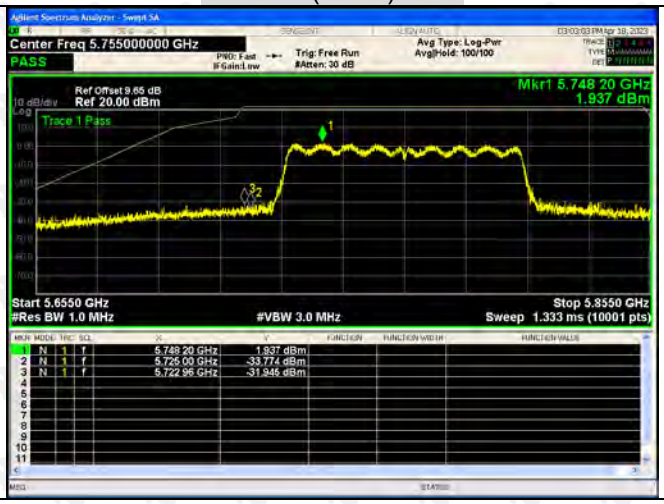
802.11ac(VH20)-5825



802.11ac(VH40)-5755

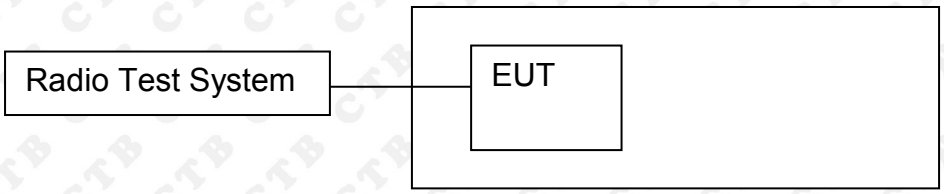
802.11ac(VH40)-5795

802.11ac(VH80)-5775



9. CONDUCTED PEAK OUTPUT POWER

9.1 Block Diagram Of Test Setup



9.2 Limit

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

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

9.3 Test procedure

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

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

(ii) Set RBW = 1 MHz.

(iii) Set VBW ≥ 3 MHz.

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

(v) Sweep time = auto.

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

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

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

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

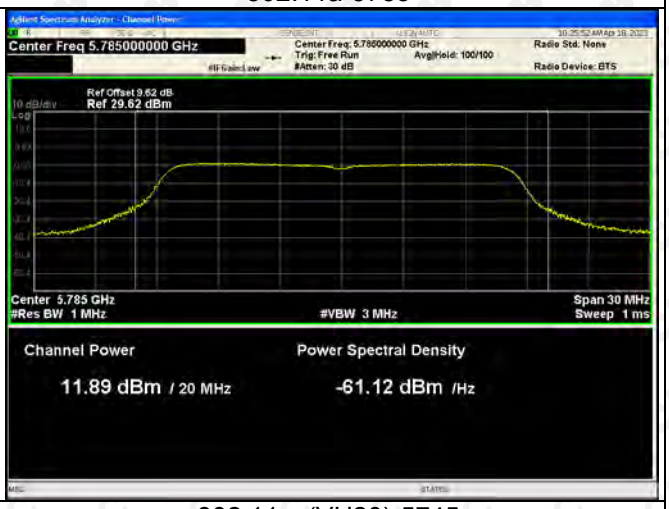
9.4 Test Result

Test mode1	Test Channel (MHz)	Antenna	Output Power(dBm)	Output Power dBm Total	Limit dBm
802.11a	5745	ANT1	11.309	/	30
		ANT2	11.805		
		ANT3	12.964		
		ANT4	11.912		
	5785	ANT1	11.893	/	30
		ANT2	11.941		
		ANT3	12.553		
		ANT4	11.914		
	5825	ANT1	10.574	/	30
		ANT2	10.676		
		ANT3	11.025		
		ANT4	10.532		
802.11ac20	5745	ANT1	11.263	17.419	30
		ANT2	11.335		
		ANT3	11.453		
		ANT4	11.537		
	5785	ANT1	11.347	17.598	30
		ANT2	11.65		
		ANT3	11.657		
		ANT4	11.647		
	5825	ANT1	10.139	16.287	30
		ANT2	10.294		
		ANT3	10.346		
		ANT4	10.285		
802.11ac40	5755	ANT1	11.334	17.347	30
		ANT2	10.994		
		ANT3	11.475		
		ANT4	11.486		
	5795	ANT1	10.275	16.408	30
		ANT2	10.291		
		ANT3	10.447		
		ANT4	10.533		
802.11ac80	5775	ANT1	10.085	16.510	30
		ANT2	10.809		
		ANT3	10.676		
		ANT4	10.351		
802.11n(HT20)	5745	ANT1	11.46	17.677	30
		ANT2	11.711		
		ANT3	11.694		
		ANT4	11.754		
	5785	ANT1	11.445	17.701	30
		ANT2	11.74		
		ANT3	11.845		
		ANT4	11.682		
	5825	ANT1	10.211	16.396	30
		ANT2	10.434		
		ANT3	10.476		
		ANT4	10.377		
802.11n(HT40)	5755	ANT1	11.108	17.443	30
		ANT2	11.561		
		ANT3	11.505		
		ANT4	11.499		
	5795	ANT1	10.465	16.600	30
		ANT2	10.841		
		ANT3	10.444		
		ANT4	10.556		

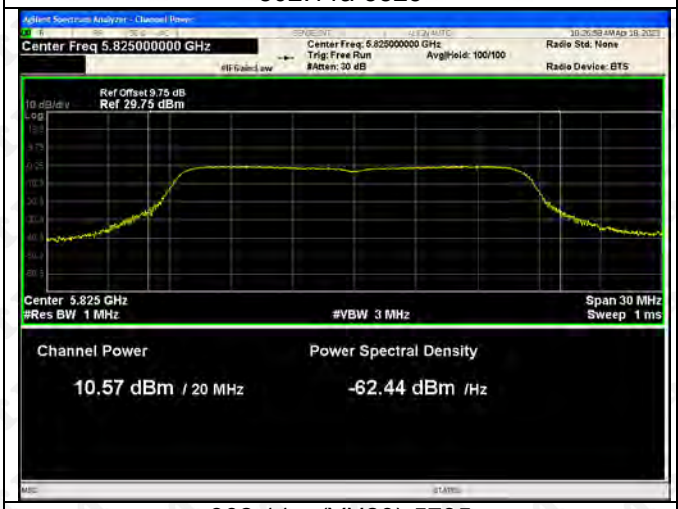
ANT 1

802.11a-5745

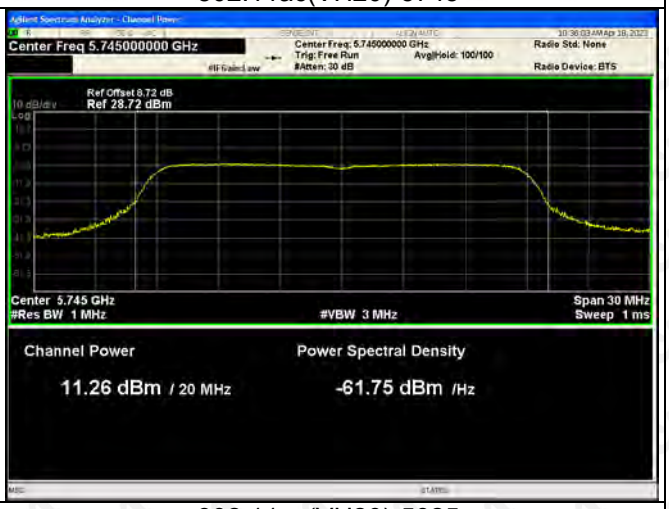
802.11a-5785



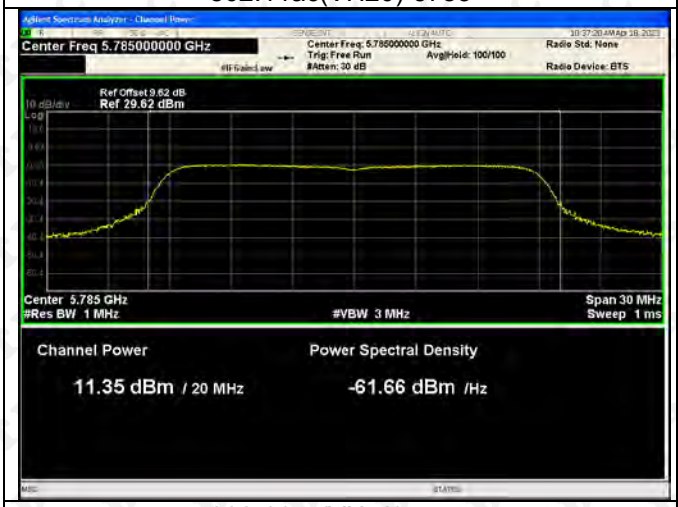
802.11a-5825



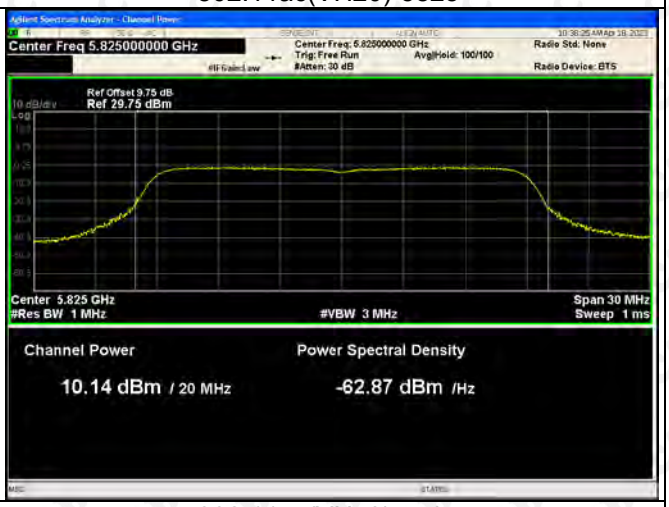
802.11ac(VH20)-5745



802.11ac(VH20)-5785

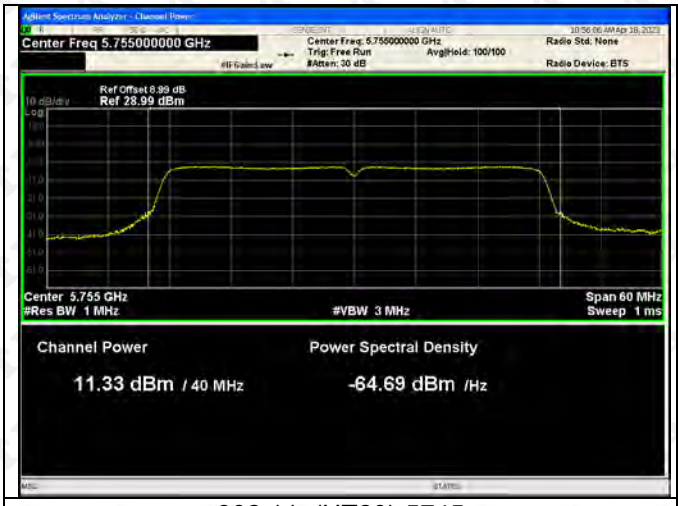


802.11ac(VH20)-5825

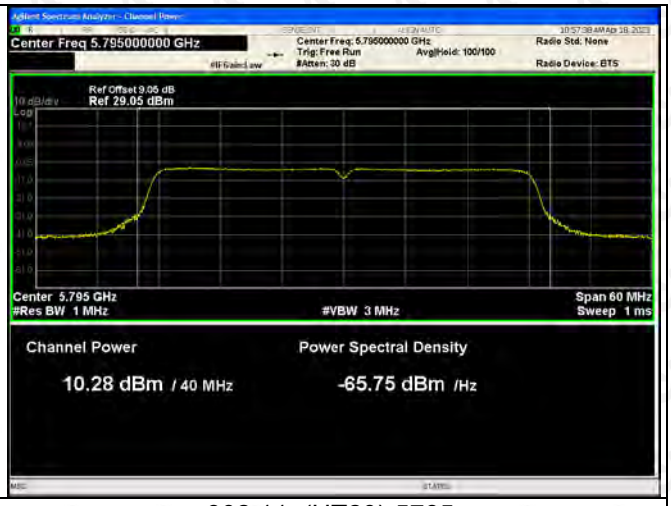


802.11ac(VH40)-5755

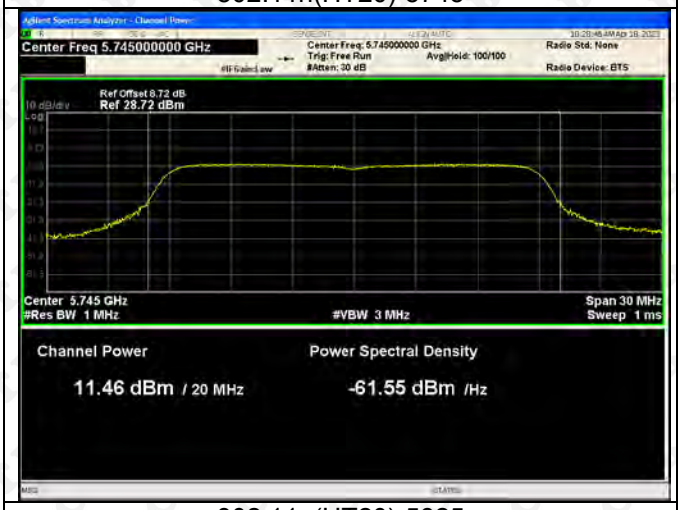
802.11ac(VH40)-5795



802.11n(HT20)-5745



802.11n(HT20)-5785



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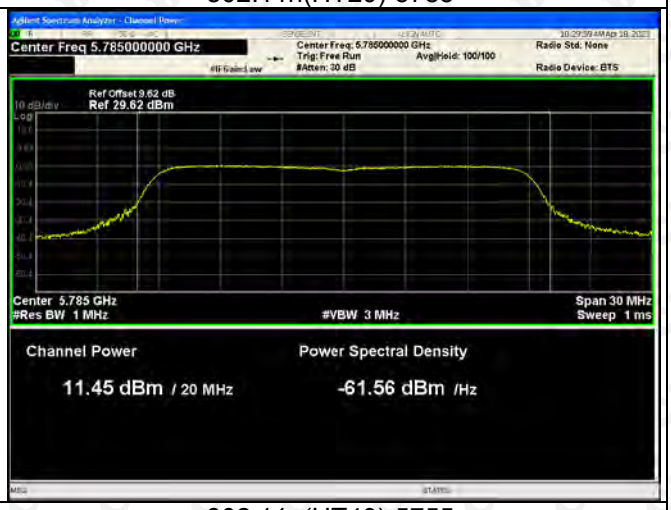
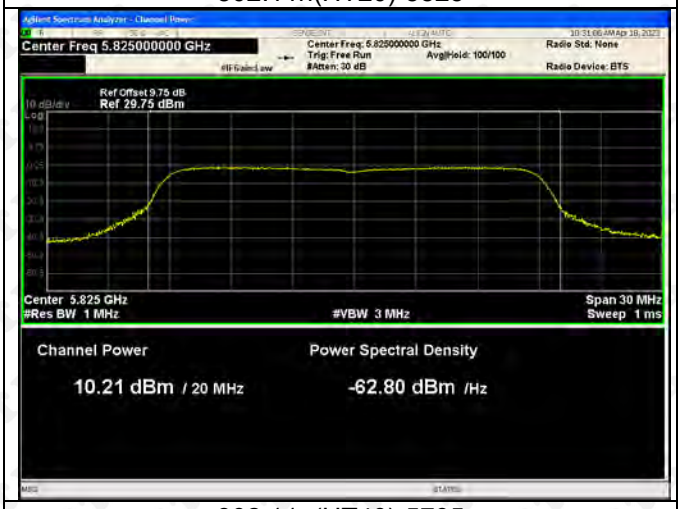
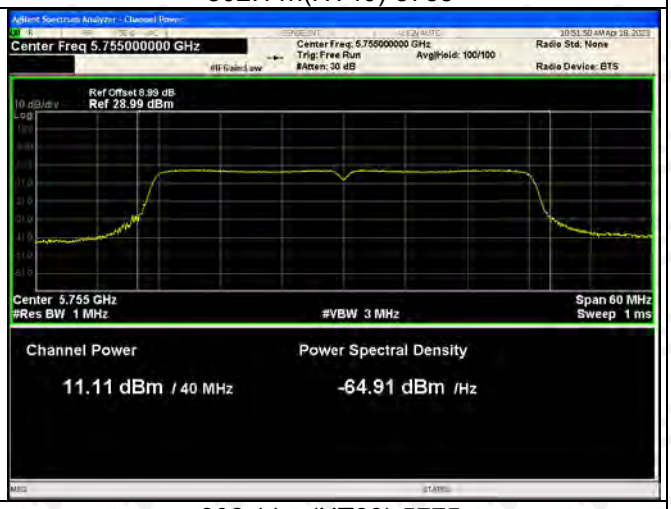


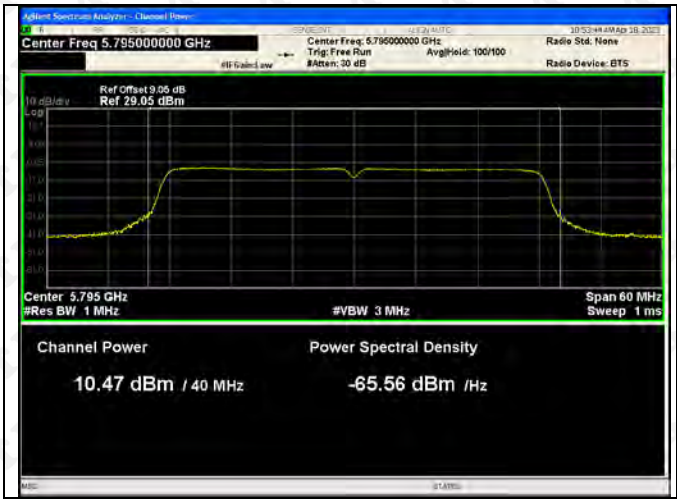
802.11n(HT40)-5755

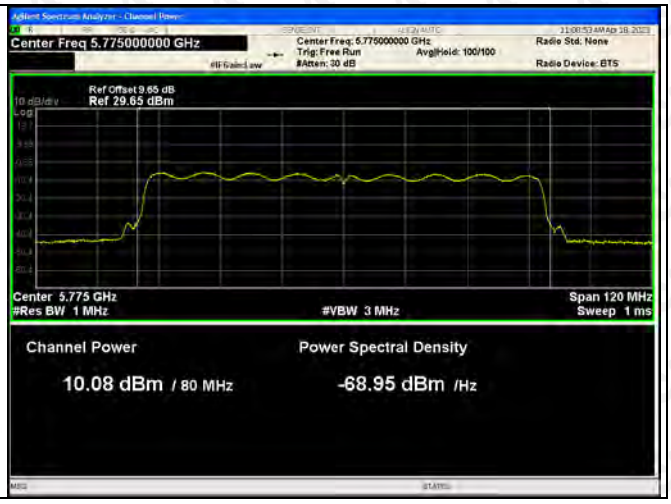


802.11n(HT40)-5795



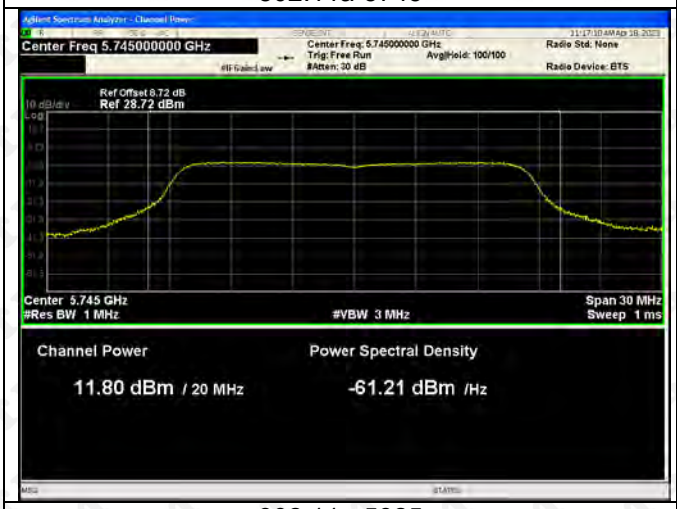
802.11ac(HT80)-5775



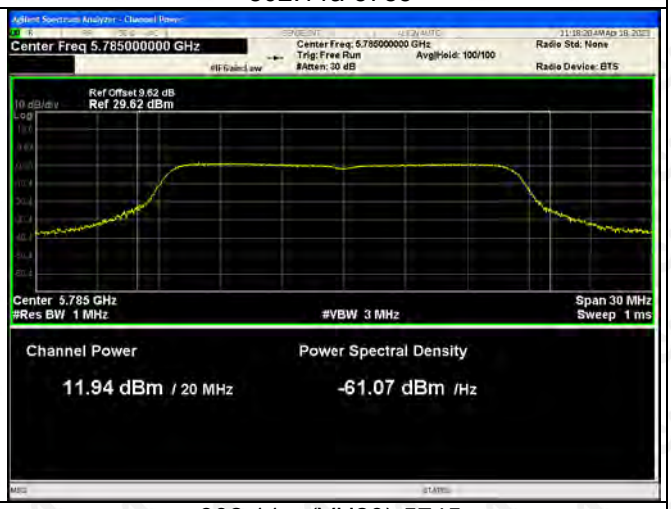


ANT 2

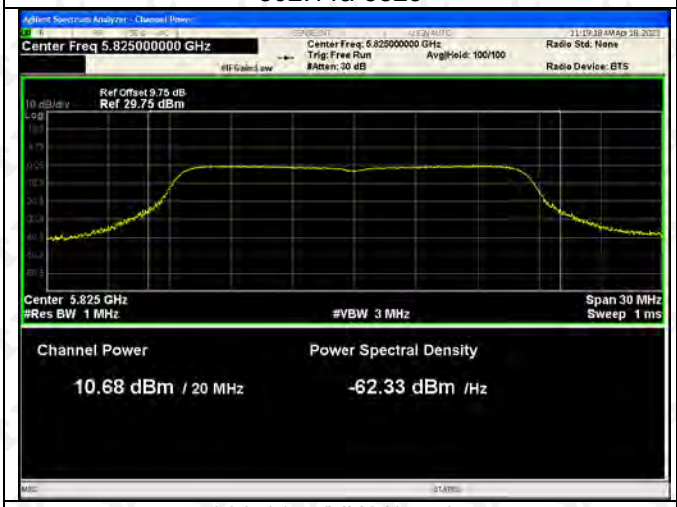
802.11a-5745



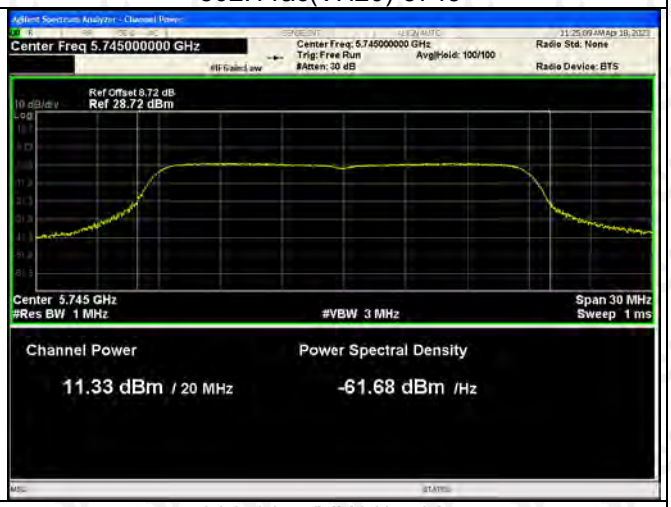
802.11a-5785



802.11a-5825

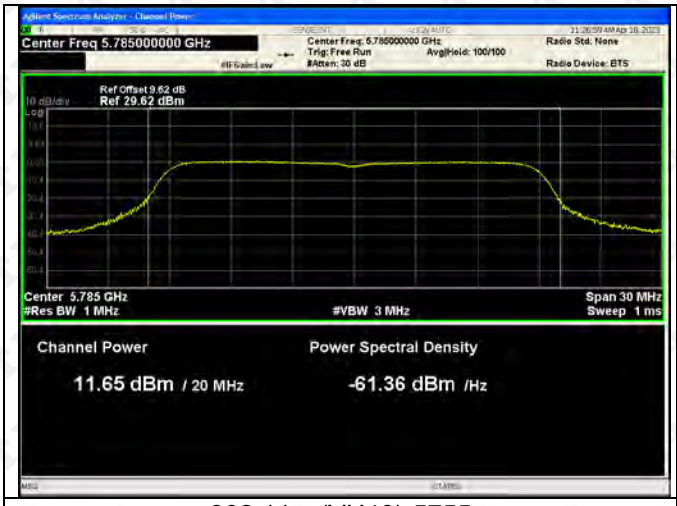


802.11ac(VH20)-5745



802.11ac(VH20)-5785

802.11ac(VH20)-5825



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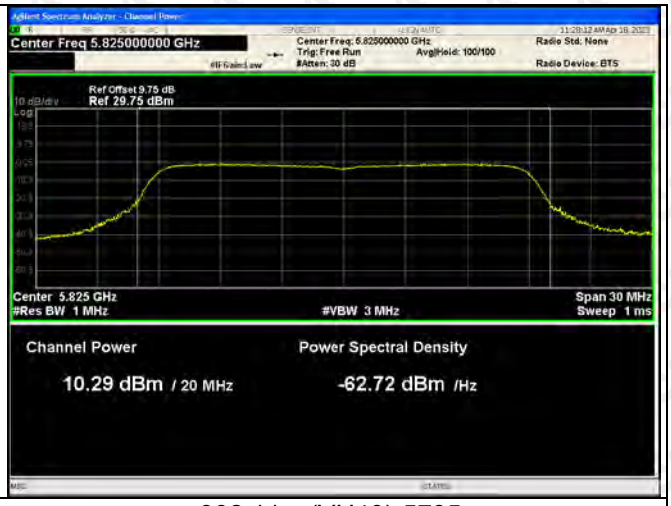

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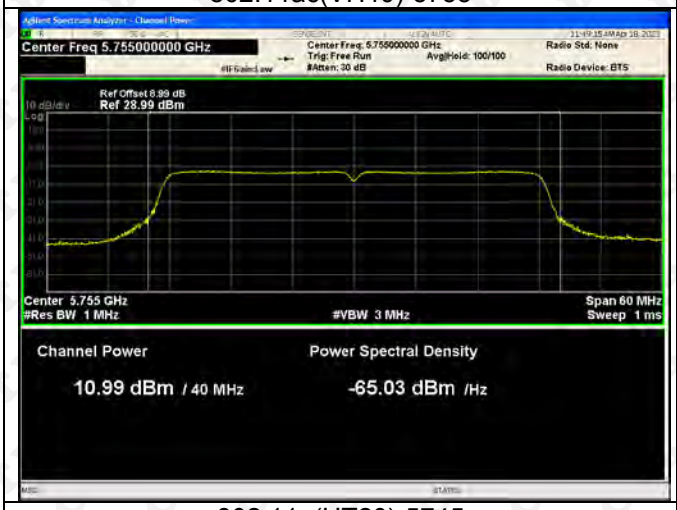
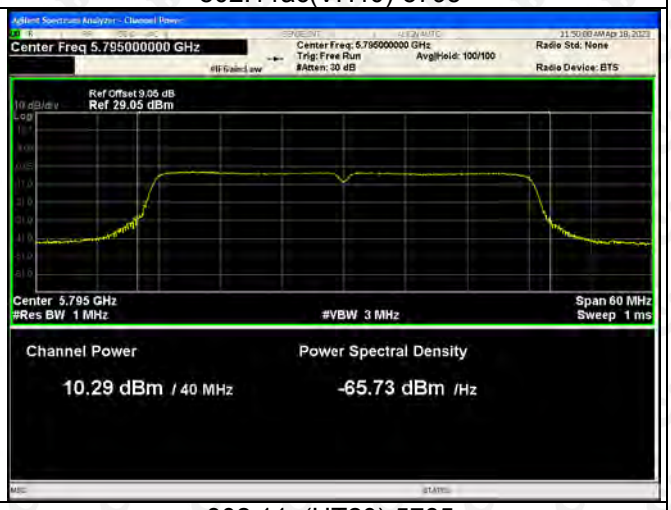


802.11n(HT20)-5745



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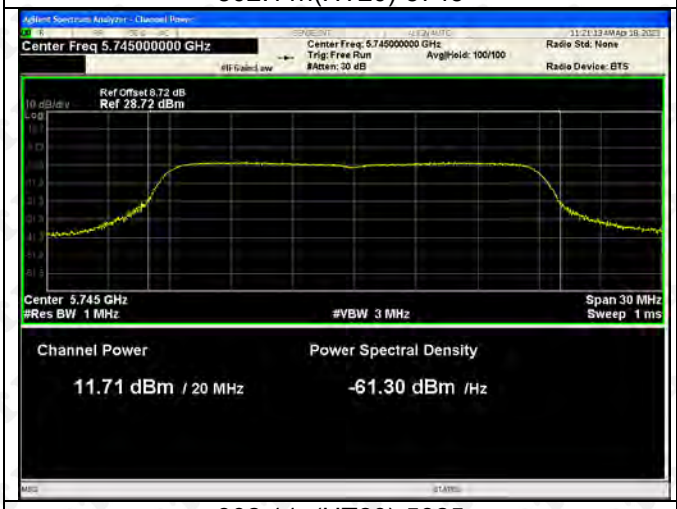

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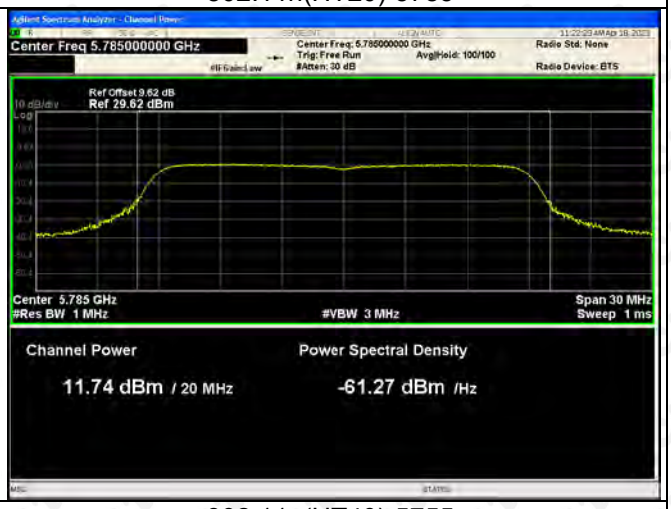
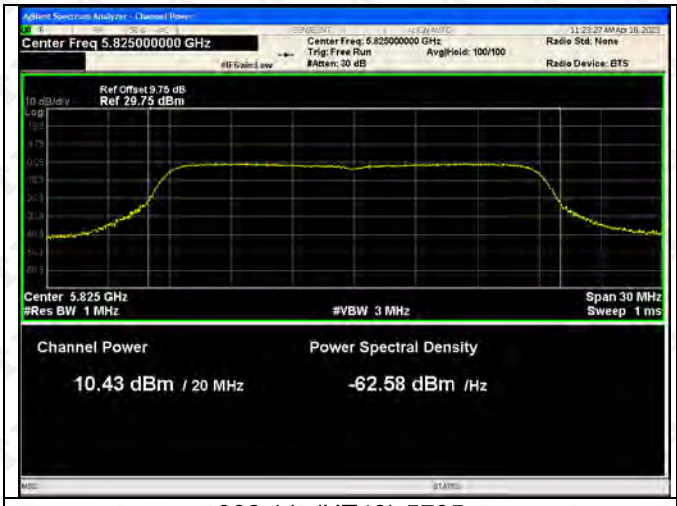
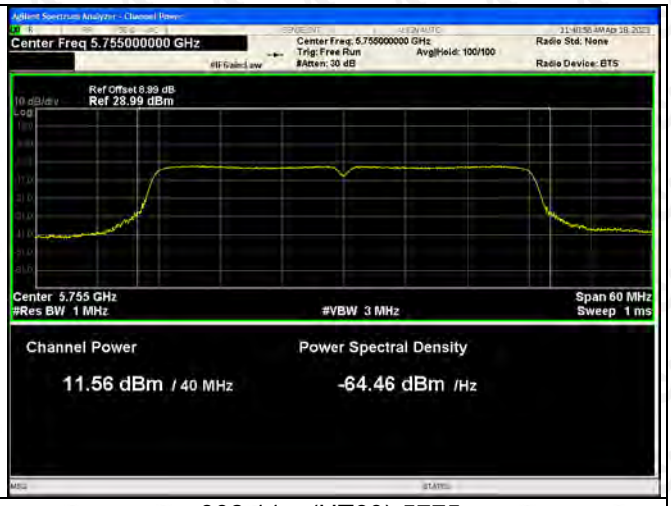


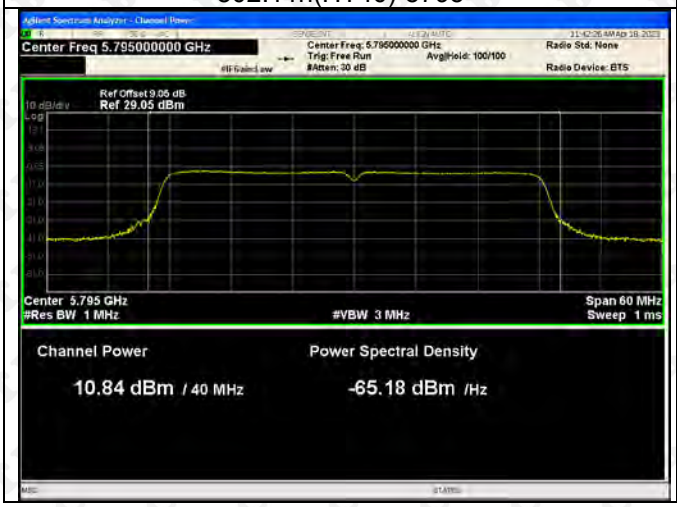
802.11n(HT40)-5755

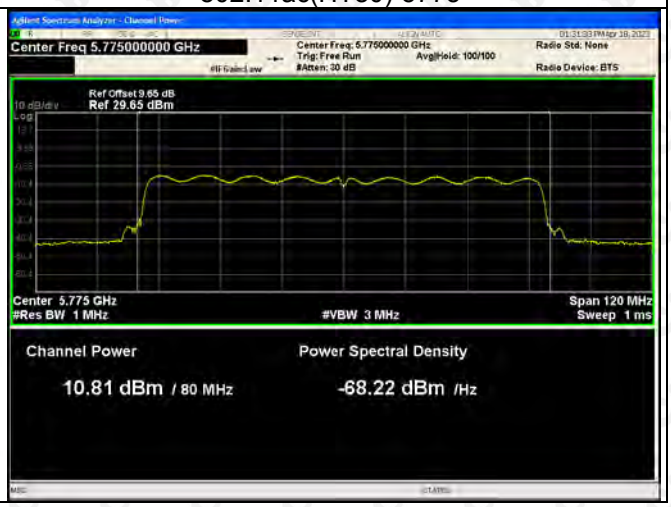




802.11n(HT40)-5795

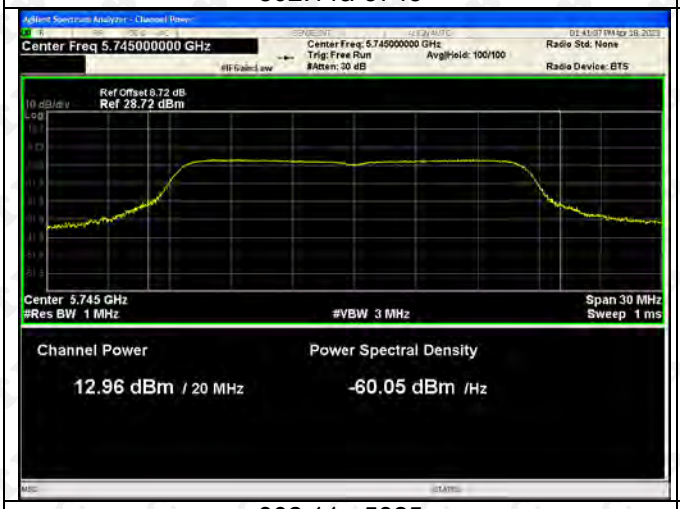
802.11ac(HT80)-5775



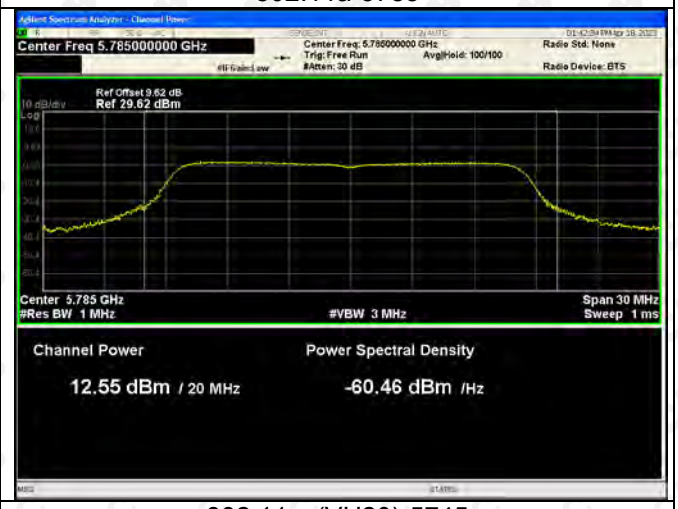


ANT 3

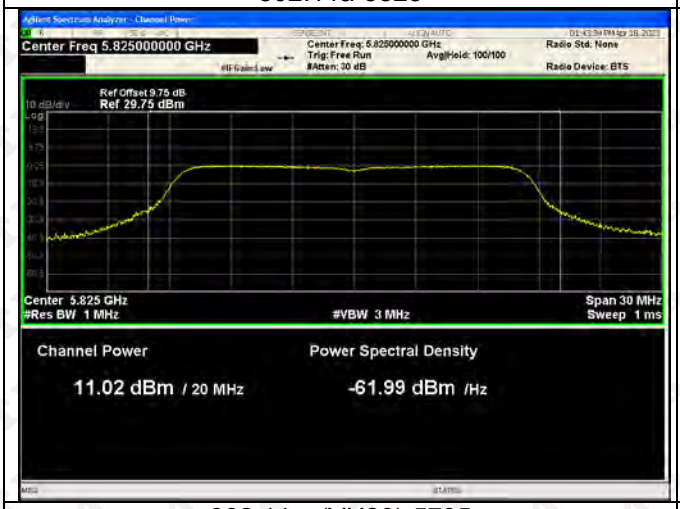
802.11a-5745



802.11a-5785



802.11a-5825



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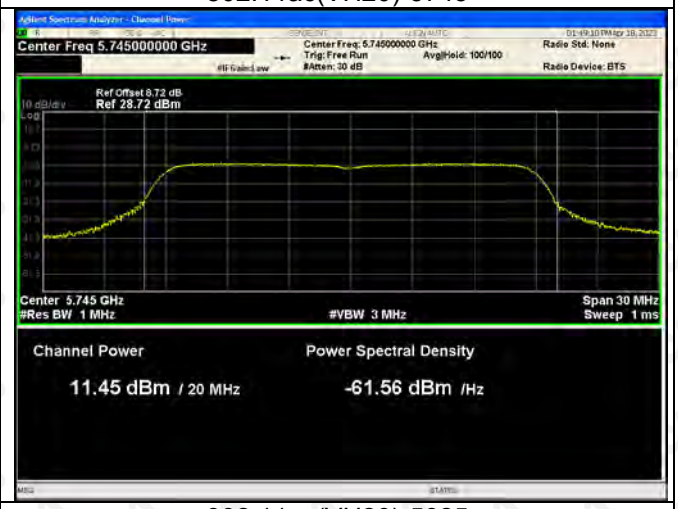

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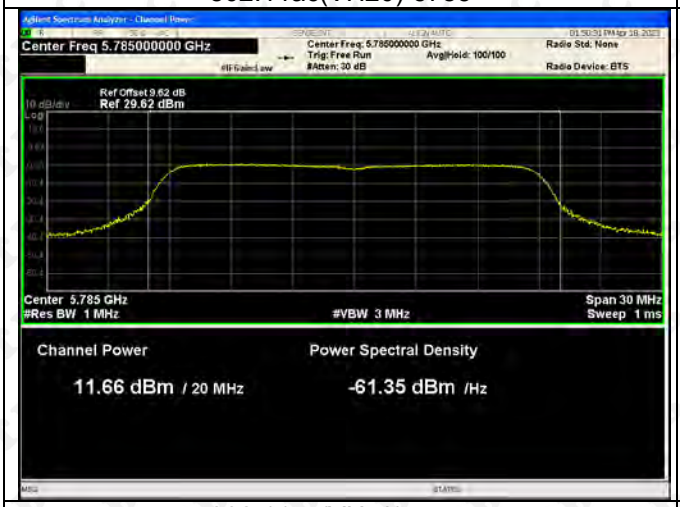

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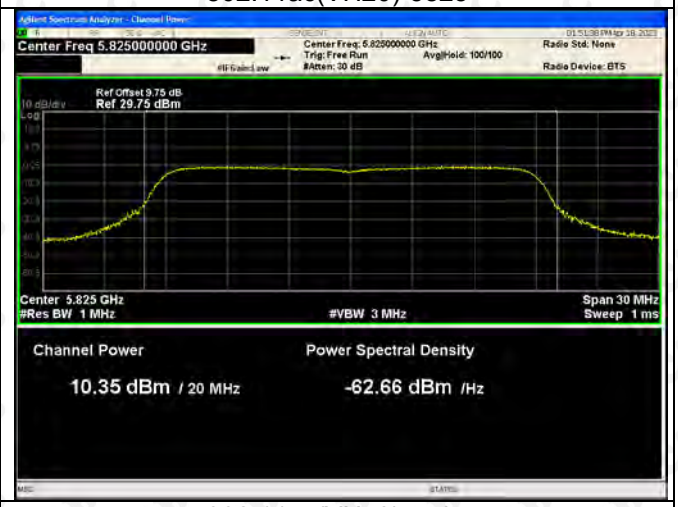
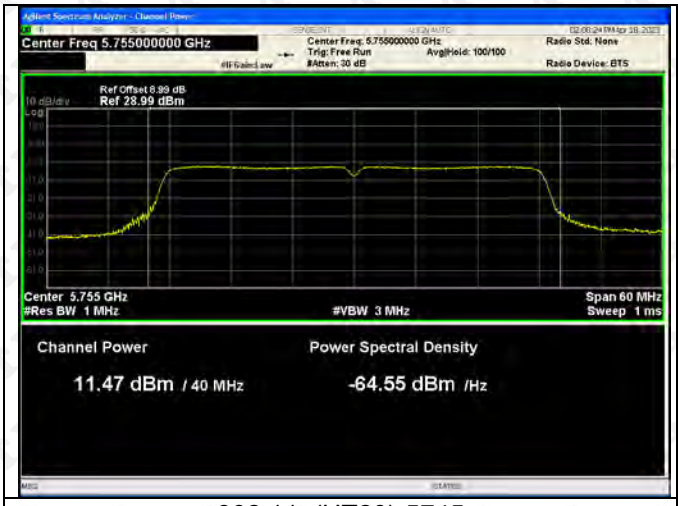
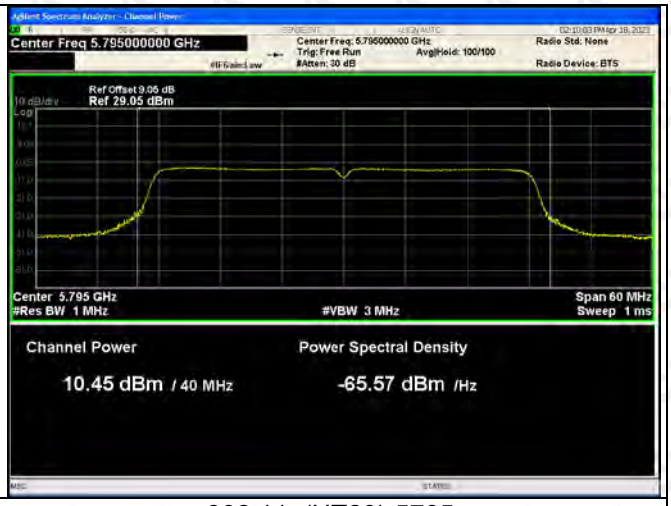


802.11ac(VH40)-5755

802.11ac(VH40)-5795



802.11n(HT20)-5745



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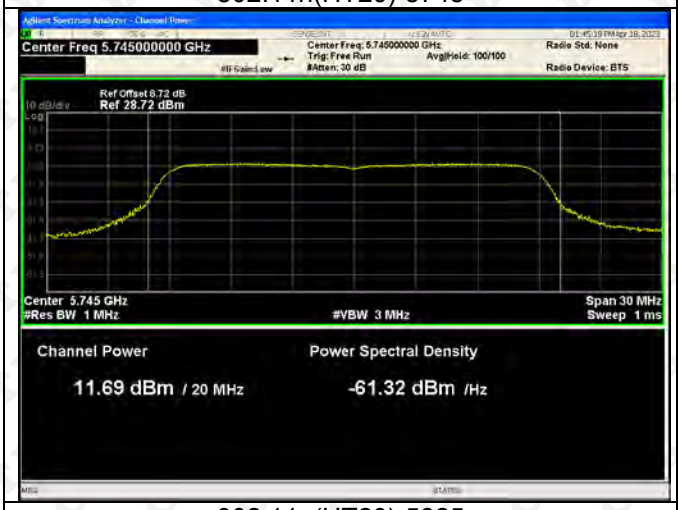

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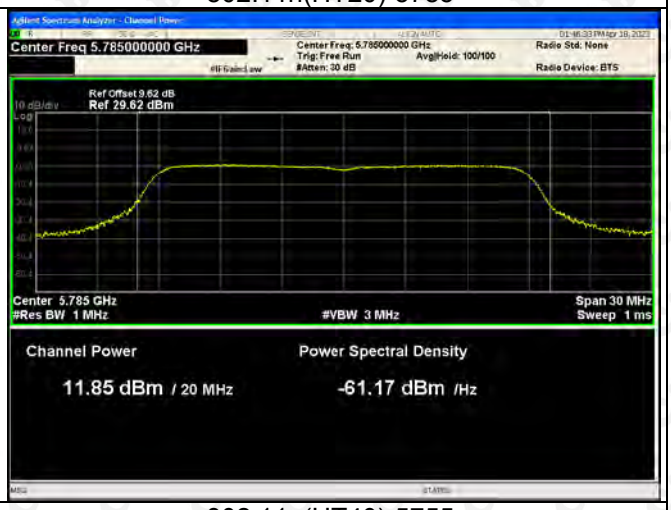
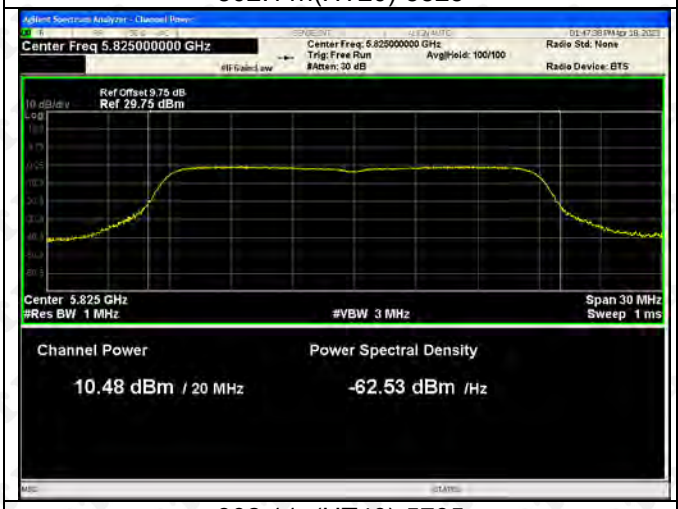


802.11n(HT40)-5755



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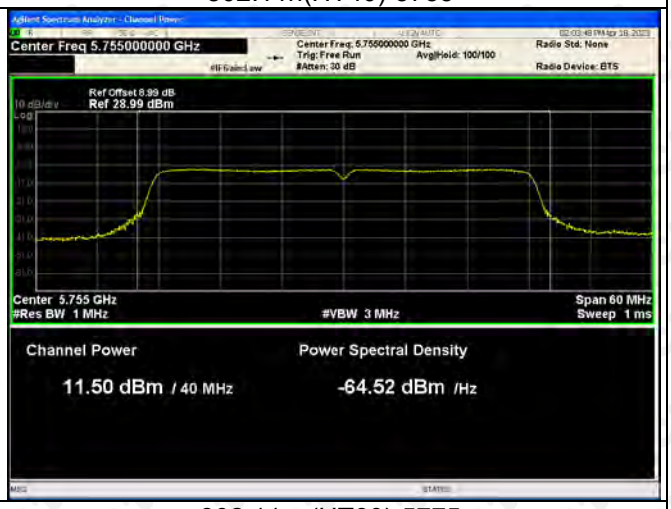
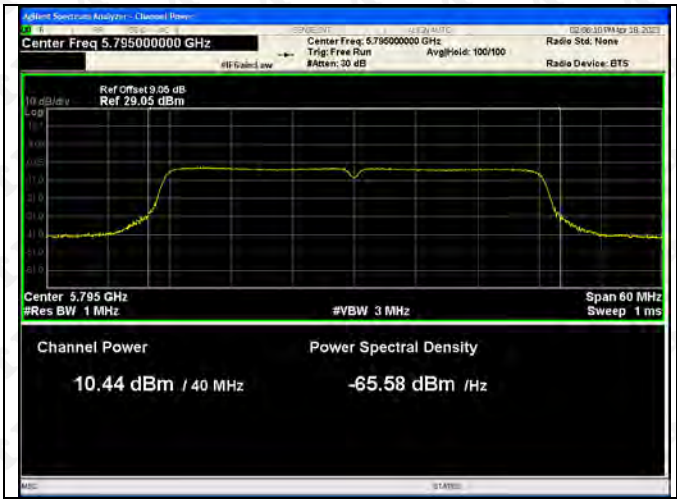
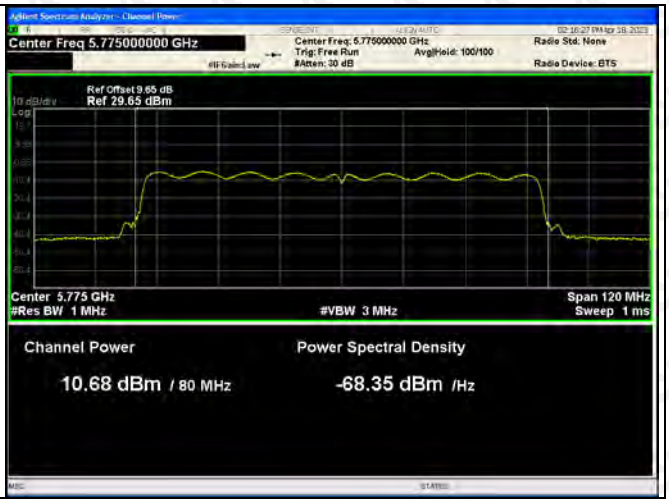


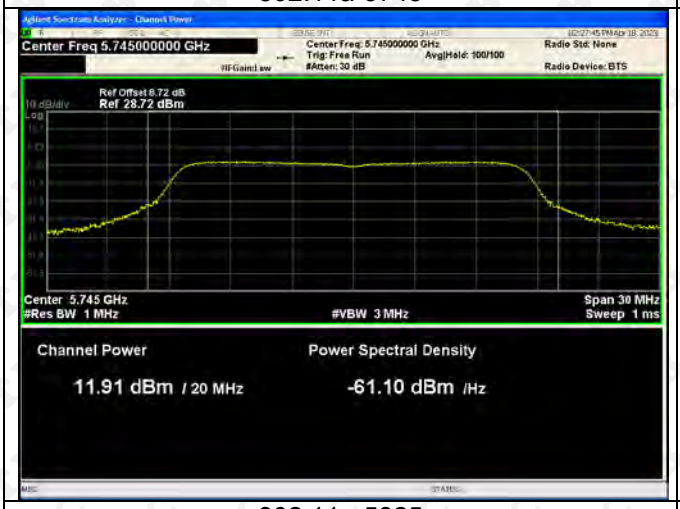
802.11ac(HT80)-5775


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 9.05 dB
Ref 29.05 dBm
Center 5.795 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 60 MHz
Sweep 1 ms
Channel Power
10.44 dBm / 40 MHz
Power Spectral Density
-65.58 dBm /Hz

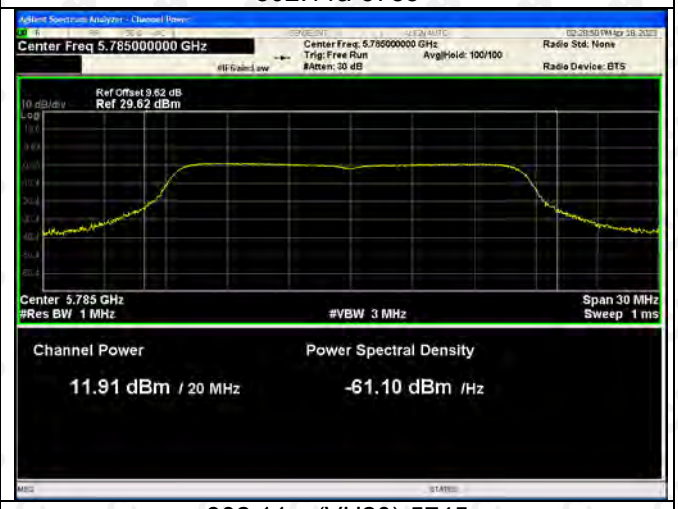

Center Freq 5.775000000 GHz
Center Freq: 5.775000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.65 dB
Ref 29.65 dBm
Center 5.775 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 120 MHz
Sweep 1 ms
Channel Power
10.68 dBm / 80 MHz
Power Spectral Density
-68.35 dBm /Hz

ANT 4

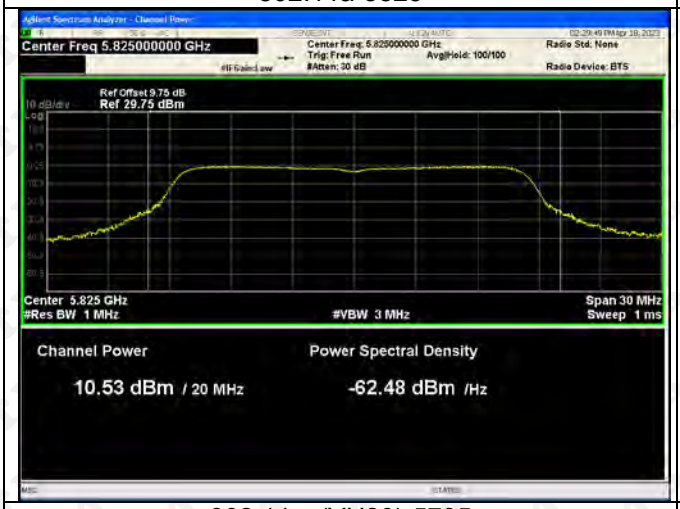
802.11a-5745



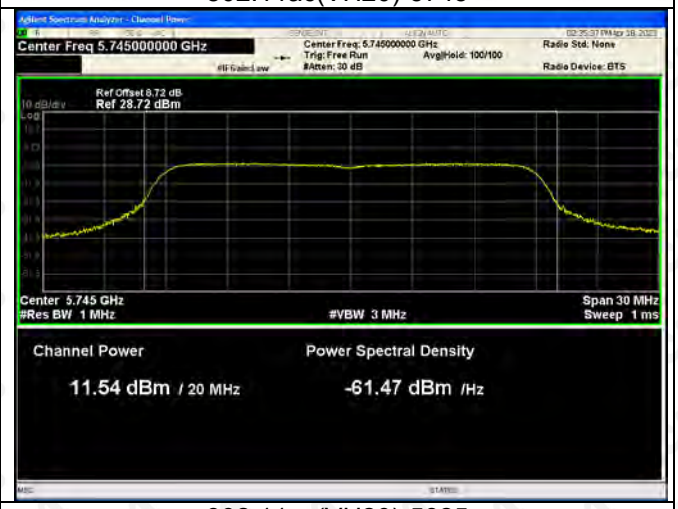
802.11a-5785



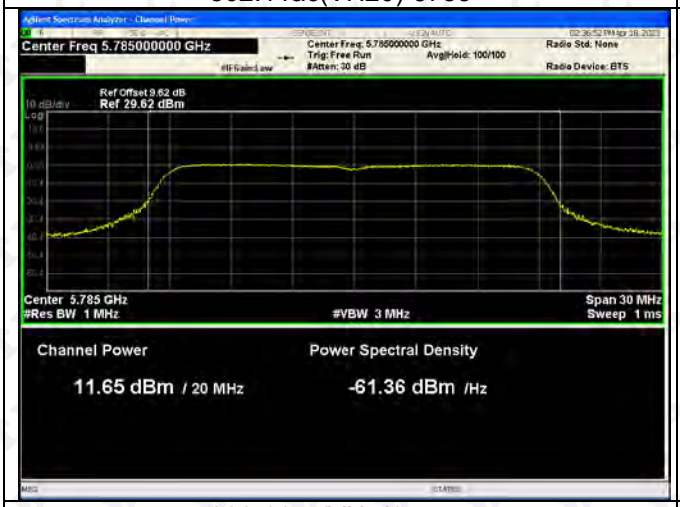
802.11a-5825



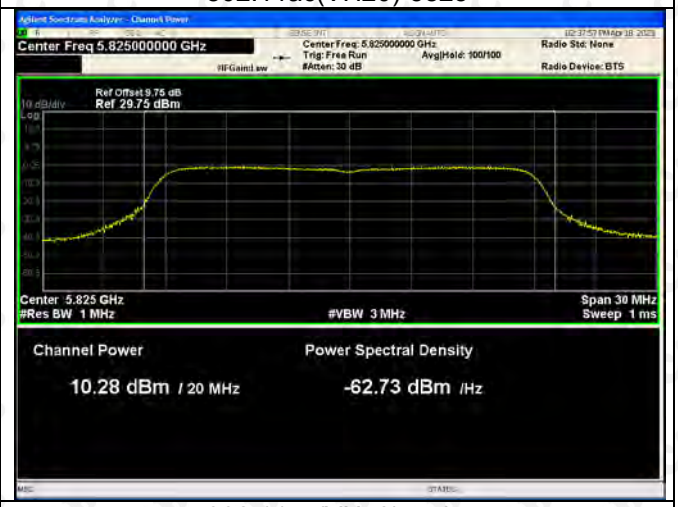
802.11ac(VH20)-5745



802.11ac(VH20)-5785

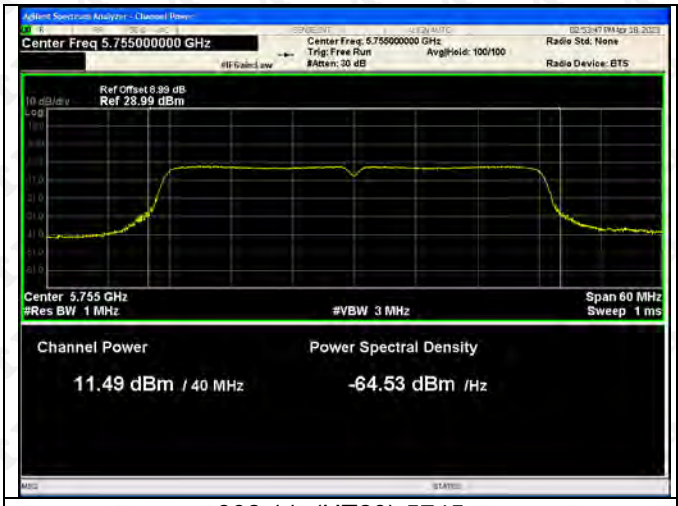


802.11ac(VH20)-5825

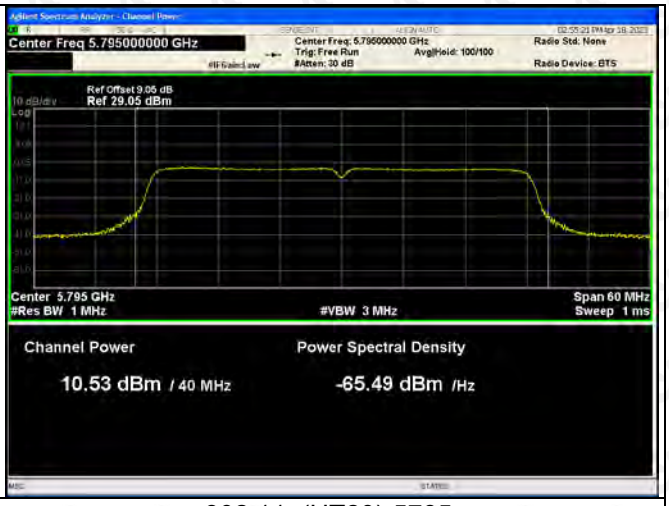


802.11ac(VH40)-5755

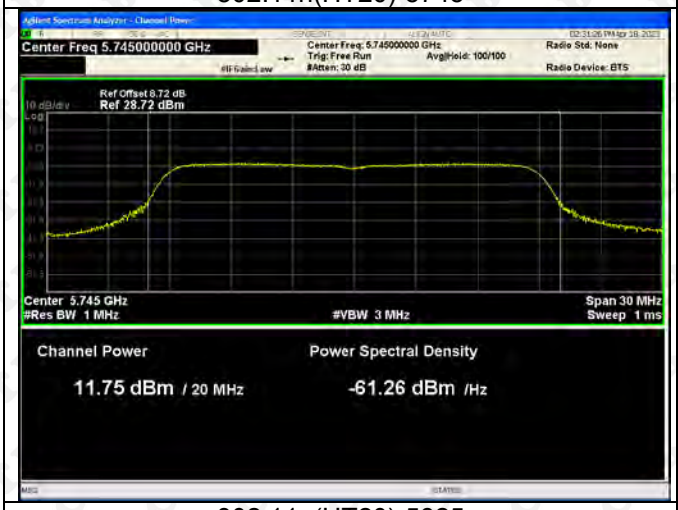
802.11ac(VH40)-5795



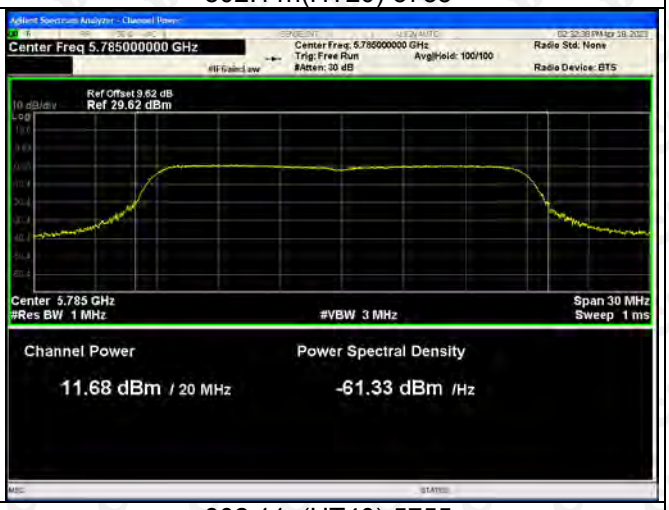
802.11n(HT20)-5745



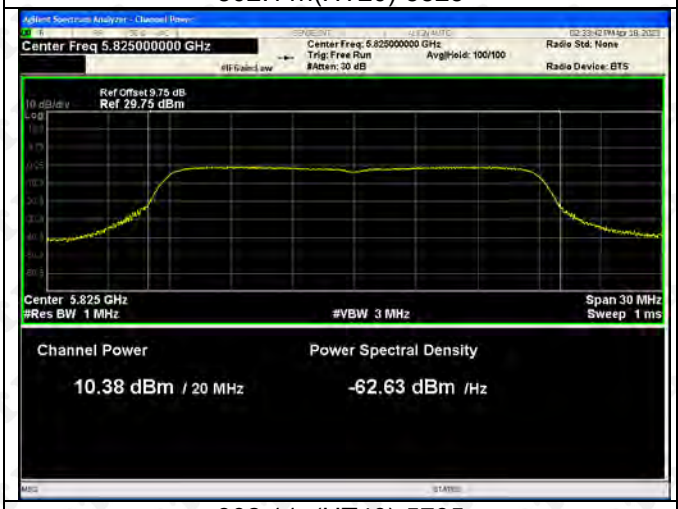
802.11n(HT20)-5785



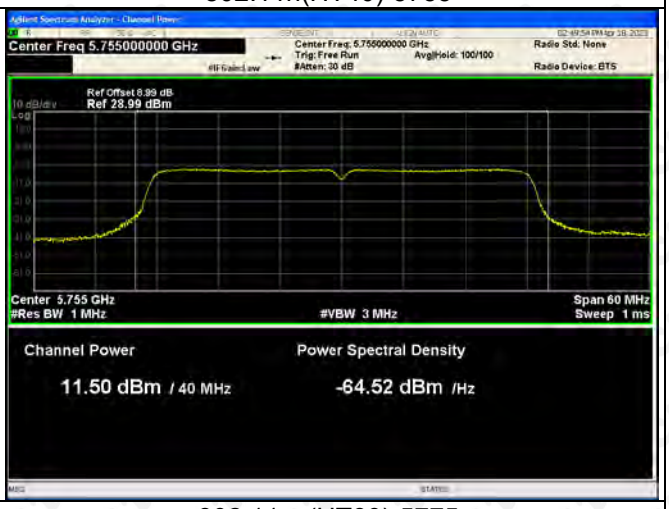
802.11n(HT20)-5825



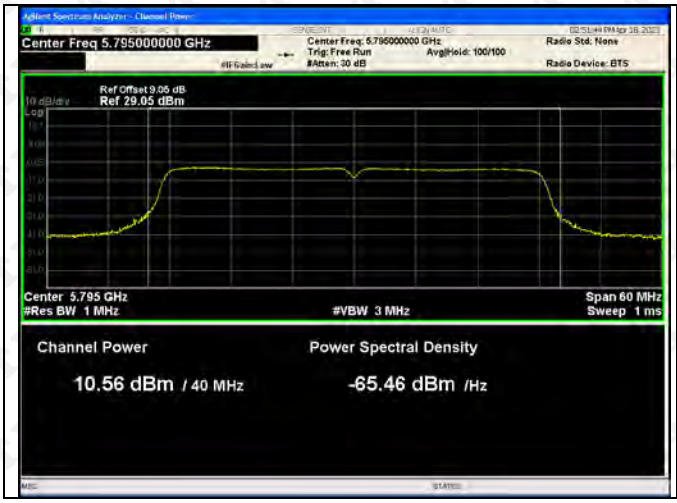
802.11n(HT40)-5755

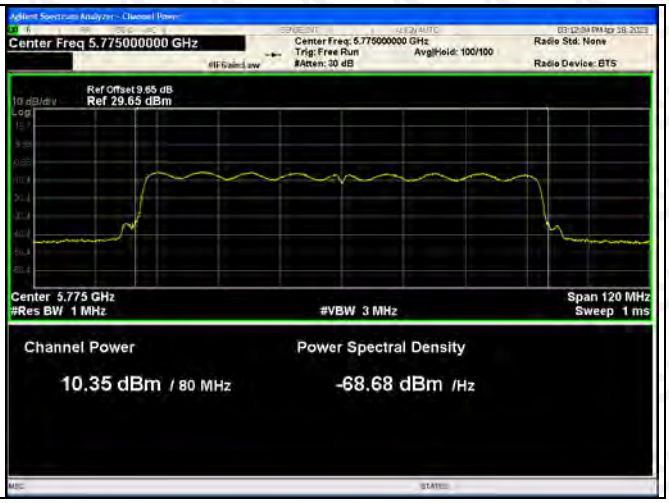


802.11n(HT40)-5795



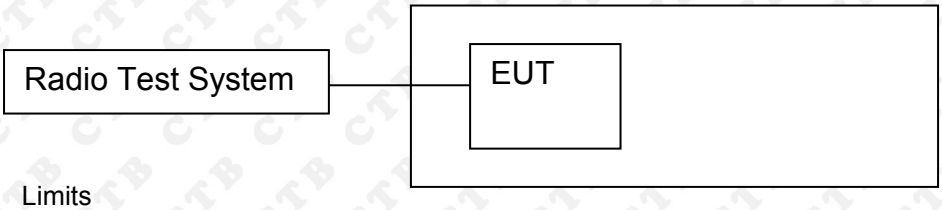
802.11ac(HT80)-5775


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 9.05 dB
Ref 29.05 dBm
Center 5.795 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 60 MHz
Sweep 1 ms
Channel Power
10.56 dBm / 40 MHz
Power Spectral Density
-65.46 dBm /Hz


Center Freq 5.775000000 GHz
Center Freq: 5.775000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.65 dB
Ref 29.65 dBm
Center 5.775 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 120 MHz
Sweep 1 ms
Channel Power
10.35 dBm / 80 MHz
Power Spectral Density
-68.68 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

5725-5850 MHz

ANT 1

Test mode Ant 1	Test Channel (MHz)	6dB Bandwidth (MHz)	Result
802.11a	5745	16.539	Pass
	5785	16.569	Pass
	5825	16.557	Pass
802.11ac(VH20)	5745	17.777	Pass
	5785	17.711	Pass
	5825	17.807	Pass
802.11ac(VH40)	5755	36.518	Pass
	5795	36.482	Pass
802.11ac(VH80)	5775	76.404	Pass
802.11n(VH20)	5745	17.699	Pass
	5785	17.738	Pass
	5825	17.696	Pass
802.11n(VH40)	5755	36.533	Pass
	5795	36.49	Pass

ANT 2

Test mode Ant 2	Test Channel (MHz)	6dB Bandwidth (MHz)	Result
802.11a	5745	16.588	Pass
	5785	16.551	Pass
	5825	16.561	Pass
802.11ac(VH20)	5745	17.681	Pass
	5785	17.706	Pass
	5825	17.771	Pass
802.11ac(VH40)	5755	36.498	Pass
	5795	36.485	Pass
802.11ac(VH80)	5775	76.4	Pass
802.11n(VH20)	5745	17.758	Pass
	5785	17.747	Pass
	5825	17.782	Pass
802.11n(VH40)	5755	36.514	Pass
	5795	36.498	Pass

ANT 3

Test mode Ant 2	Test Channel (MHz)	6dB Bandwidth (MHz)	Result
802.11a	5745	16.541	Pass
	5785	16.532	Pass
	5825	16.537	Pass
802.11ac(VH20)	5745	17.798	Pass
	5785	17.74	Pass
	5825	17.761	Pass
802.11ac(VH40)	5755	36.524	Pass
	5795	36.495	Pass
802.11ac(VH80)	5775	76.185	Pass
802.11n(VH20)	5745	17.723	Pass
	5785	17.703	Pass
	5825	17.783	Pass
802.11n(VH40)	5755	36.502	Pass
	5795	36.487	Pass

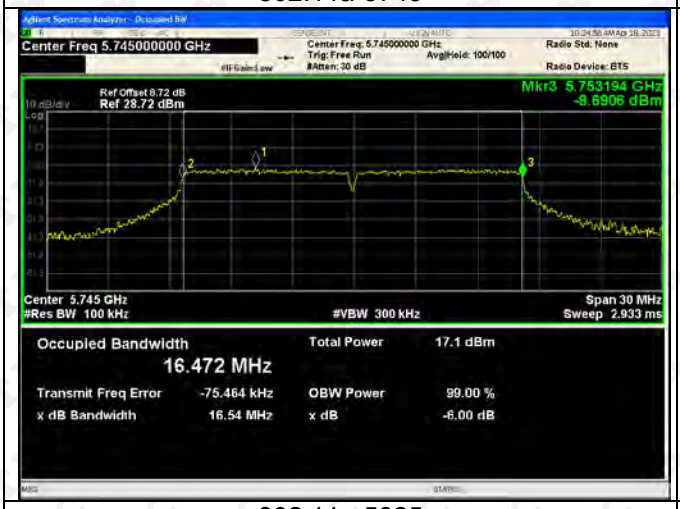
ANT 4

Test mode Ant 2	Test Channel (MHz)	6dB Bandwidth (MHz)	Result
802.11a	5745	16.555	Pass
	5785	16.543	Pass
	5825	16.587	Pass
802.11ac(VH20)	5745	17.713	Pass
	5785	17.775	Pass
	5825	17.694	Pass
802.11ac(VH40)	5755	36.522	Pass
	5795	36.502	Pass
802.11ac(VH80)	5775	76.411	Pass
802.11n(VH20)	5745	17.711	Pass
	5785	17.708	Pass
	5825	17.713	Pass
802.11n(VH40)	5755	36.518	Pass
	5795	36.521	Pass

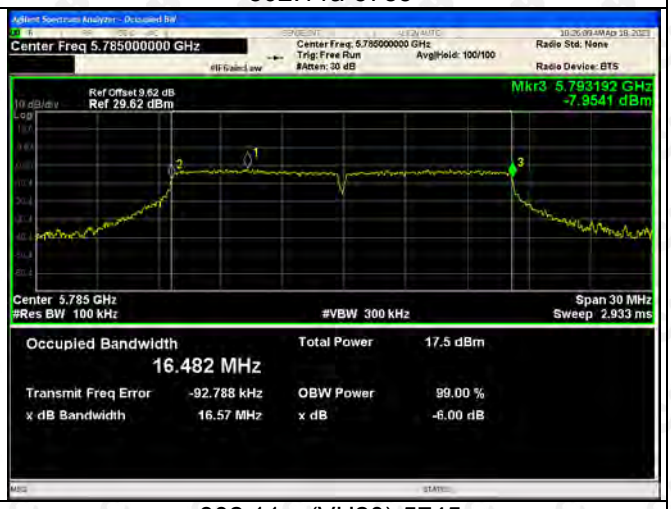
Test Graph ANT 1

5725-5850MHz

802.11a-5745

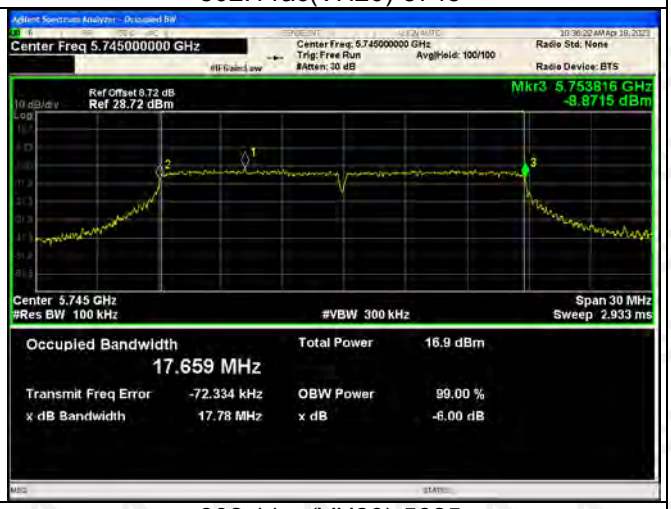


802.11a-5785



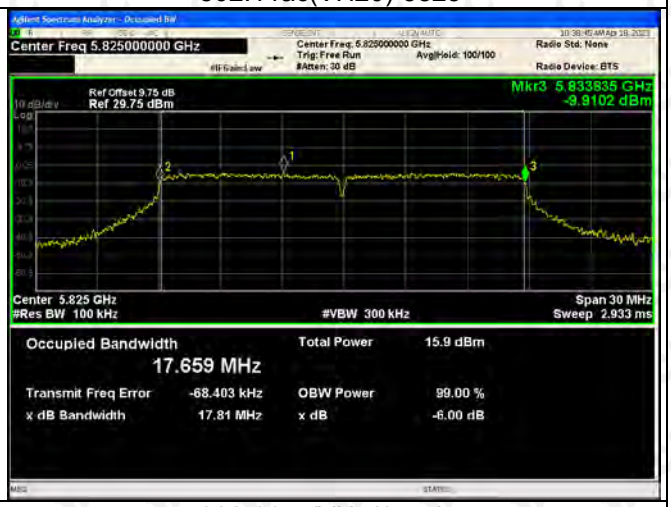
802.11a-5825

802.11ac(VH20)-5745



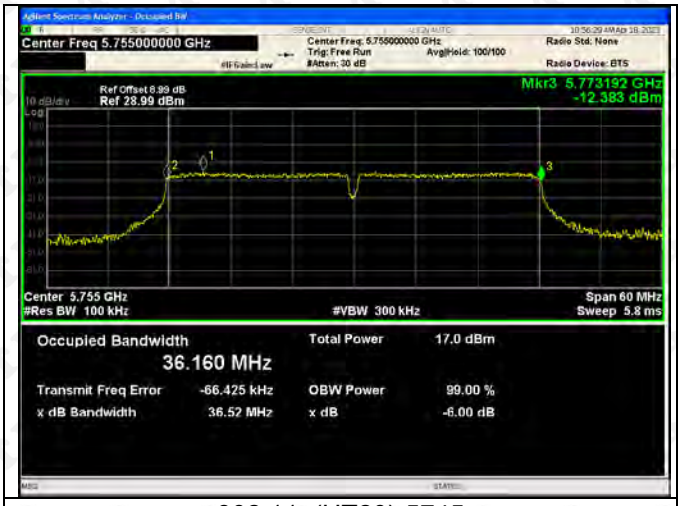
802.11ac(VH20)-5785

802.11ac(VH20)-5825

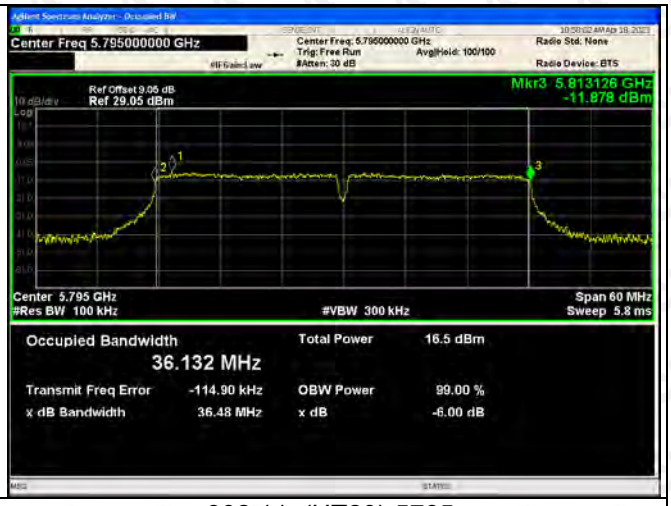


802.11ac(VH40)-5755

802.11ac(VH40)-5795



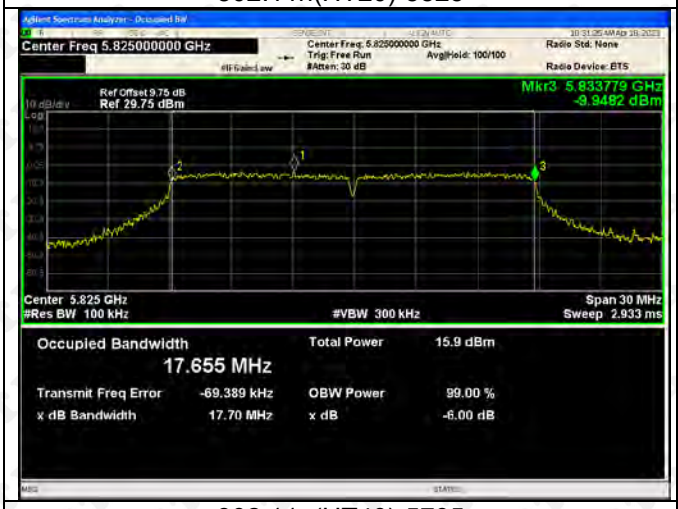
802.11n(HT20)-5745



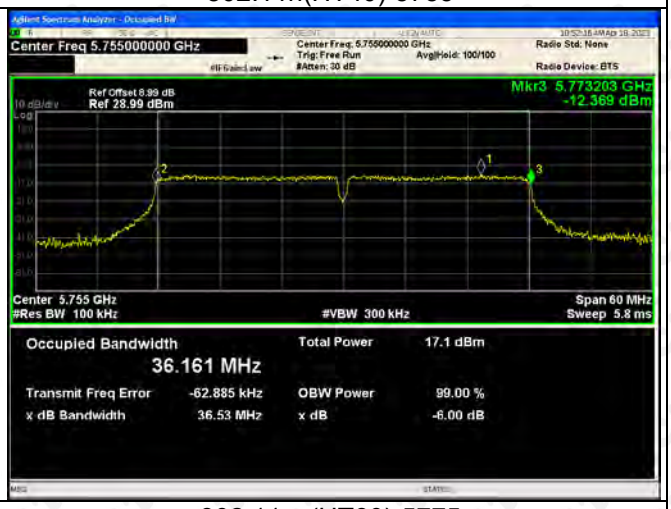
802.11n(HT20)-5785

802.11n(HT20)-5825

802.11n(HT40)-5755

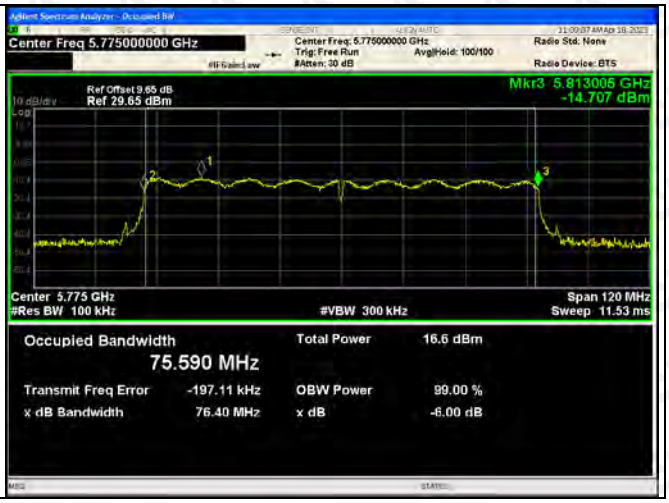


802.11n(HT40)-5795



802.11ac(HT80)-5775

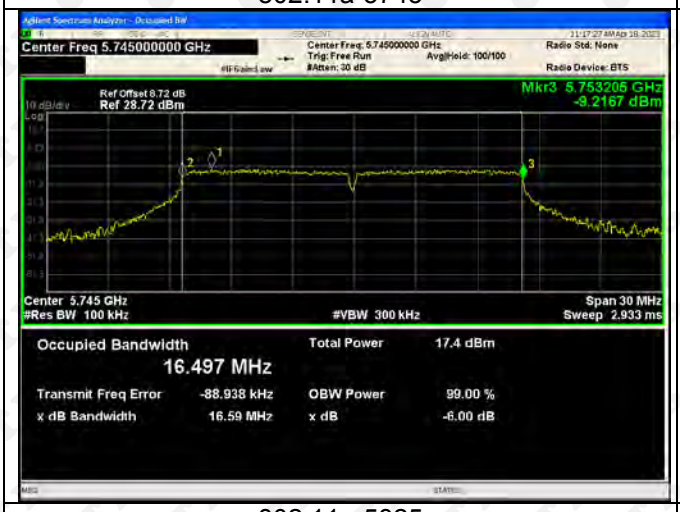
Agilent Spectrum Analyzer - Occupied BW
Center Freq 5.795000000 GHz
Center Freq: 5.795000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.05 dB
Ref 29.05 dBm
Mkr3 5.813138 GHz
-12.044 dBm
Center 5.795 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 60 MHz
Sweep 5.8 ms
Occupied Bandwidth
36.125 MHz
Total Power 16.3 dBm
Transmit Freq Error -106.86 kHz
OBW Power 99.00 %
x dB Bandwidth 36.49 MHz
x dB -6.00 dB


Agilent Spectrum Analyzer - Occupied BW
Center Freq 5.775000000 GHz
Center Freq: 5.775000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.65 dB
Ref 29.65 dBm
Mkr3 5.813005 GHz
-14.707 dBm
Center 5.775 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 120 MHz
Sweep 11.53 ms
Occupied Bandwidth
75.590 MHz
Total Power 16.6 dBm
Transmit Freq Error -197.11 kHz
OBW Power 99.00 %
x dB Bandwidth 76.40 MHz
x dB -6.00 dB

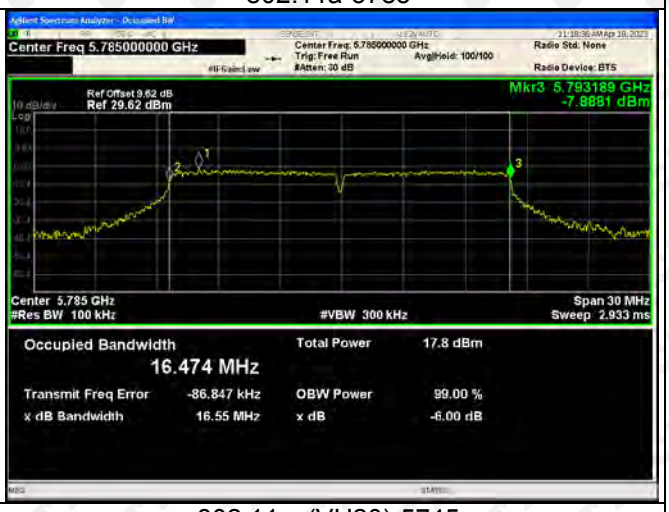
Test Graph ANT 2

5725-5850MHz

802.11a-5745



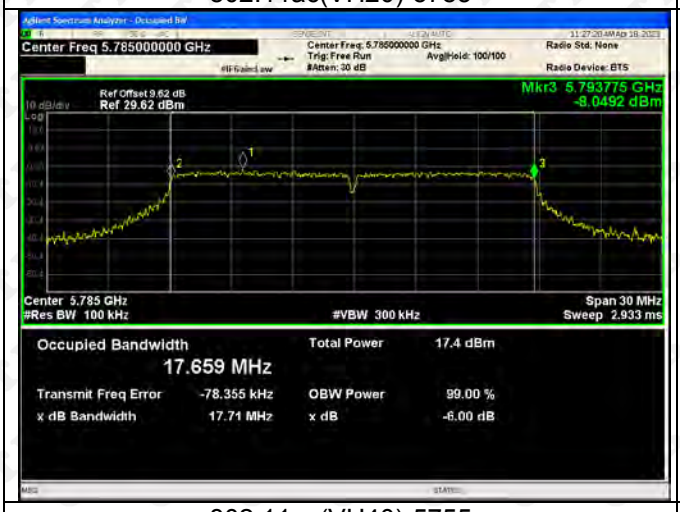
802.11a-5785



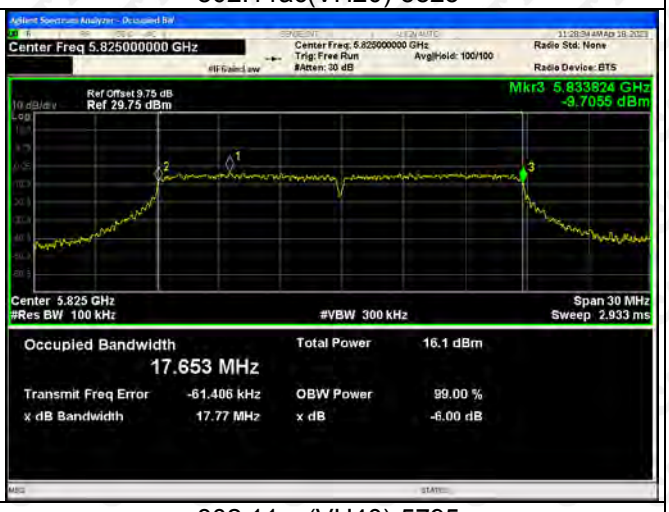
802.11a-5825

802.11ac(VH20)-5745

802.11ac(VH20)-5785

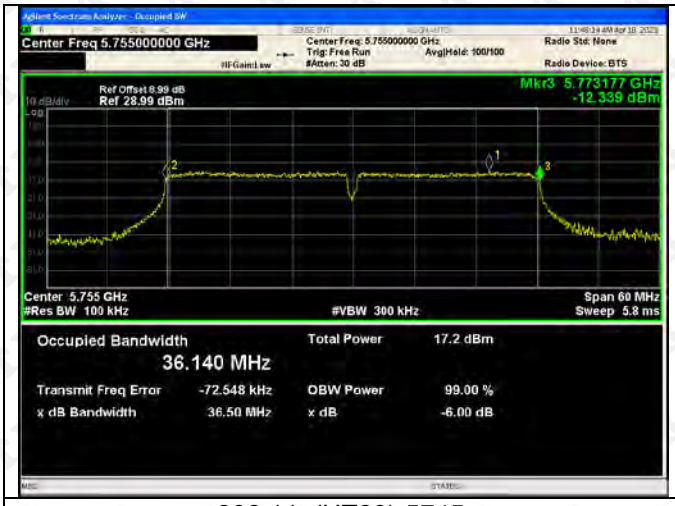


802.11ac(VH20)-5825

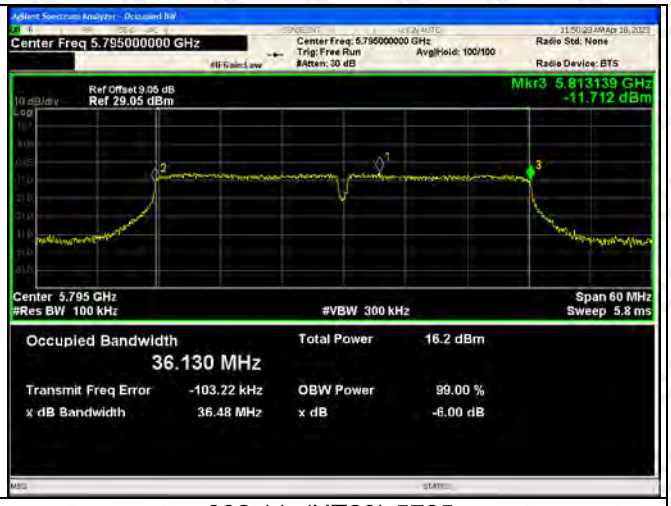


802.11ac(VH40)-5755

802.11ac(VH40)-5795



802.11n(HT20)-5745



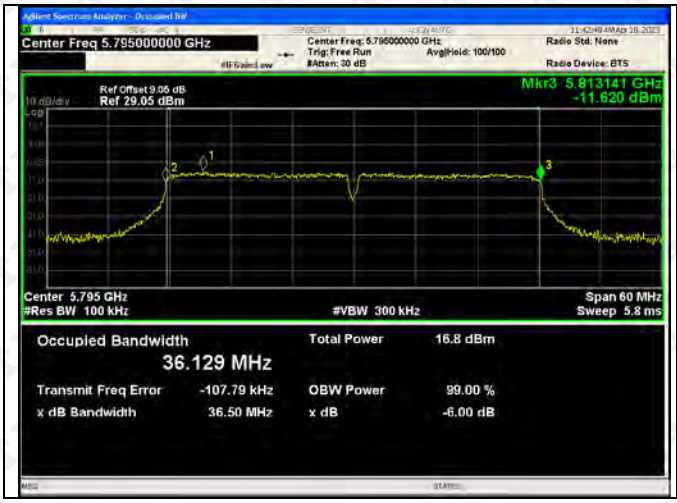
802.11n(HT20)-5785

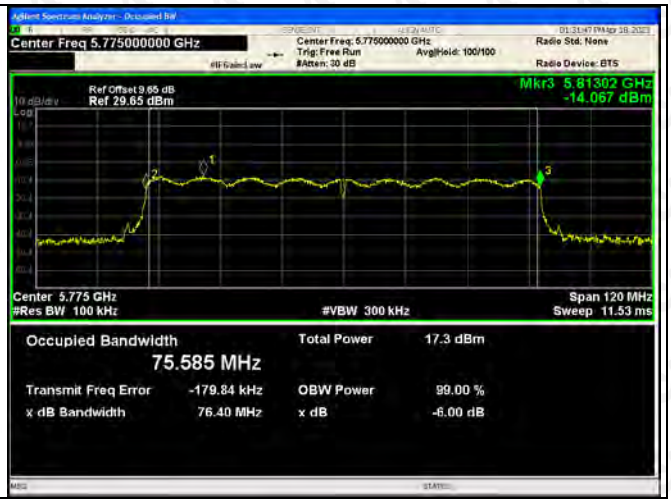
802.11n(HT20)-5825

802.11n(HT40)-5755

802.11n(HT40)-5795

802.11ac(HT80)-5775


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 9.05 dB
Ref 29.05 dBm
Mkr3 5.813141 GHz
-11.620 dBm
Center 5.795 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 60 MHz
Sweep 5.8 ms
Occupied Bandwidth
36.129 MHz
Total Power 16.8 dBm
Transmit Freq Error -107.79 kHz
OBW Power 99.00 %
x dB Bandwidth 36.50 MHz
x dB -6.00 dB


Center Freq 5.775000000 GHz
Center Freq: 5.775000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.65 dB
Ref 29.65 dBm
Mkr3 5.81302 GHz
-14.067 dBm
Center 5.775 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 120 MHz
Sweep 11.53 ms
Occupied Bandwidth
75.585 MHz
Total Power 17.3 dBm
Transmit Freq Error -179.84 kHz
OBW Power 99.00 %
x dB Bandwidth 76.40 MHz
x dB -6.00 dB

Test Graph ANT 3

5725-5850MHz

802.11a-5745

802.11a-5785

802.11a-5825

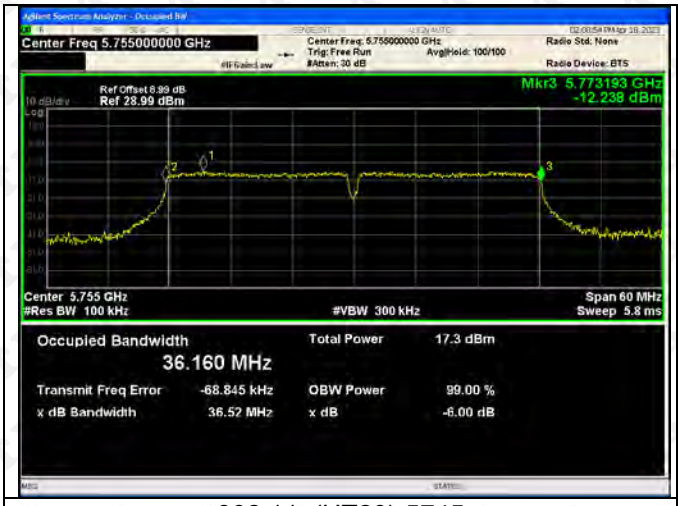
802.11ac(VH20)-5745

802.11ac(VH20)-5785

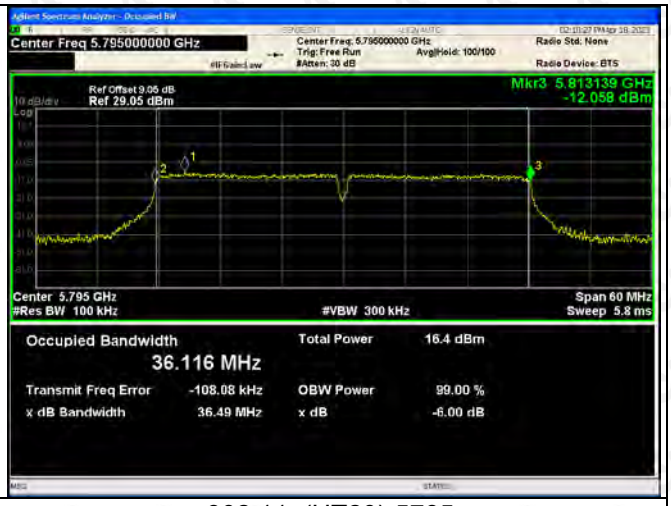
802.11ac(VH20)-5825

802.11ac(VH40)-5755

802.11ac(VH40)-5795



802.11n(HT20)-5745

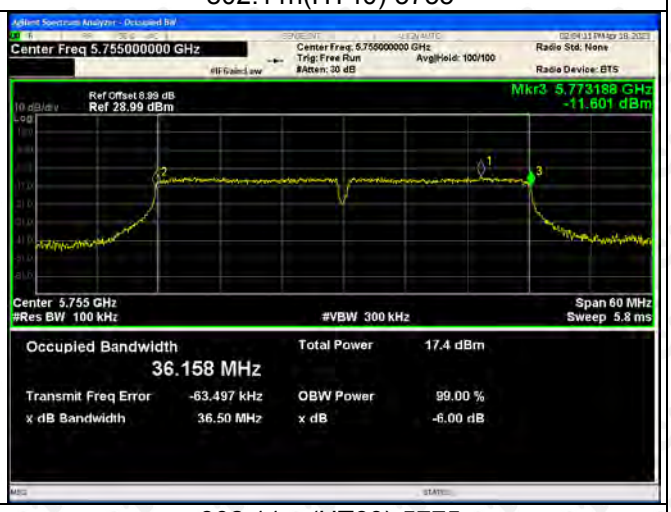


802.11n(HT20)-5785

802.11n(HT20)-5825

802.11n(HT40)-5755

802.11n(HT40)-5795



802.11ac(HT80)-5775

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 9.05 dB
Ref 29.05 dBm
Mkr3 5.813138 GHz
-11.899 dBm
Center 5.795 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 60 MHz
Sweep 5.8 ms
Occupied Bandwidth
36.127 MHz
Total Power 16.4 dBm
Transmit Freq Error -105.65 kHz
OBW Power 99.00 %
x dB Bandwidth 36.49 MHz
x dB -6.00 dB

Agilent Spectrum Analyzer - Occupied BW
Center Freq 5.775000000 GHz
Center Freq: 5.775000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.65 dB
Ref 29.65 dBm
Mkr3 5.812898 GHz
-14.918 dBm
Center 5.775 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 120 MHz
Sweep 11.53 ms
Occupied Bandwidth
75.567 MHz
Total Power 17.4 dBm
Transmit Freq Error -194.74 kHz
OBW Power 99.00 %
x dB Bandwidth 76.18 MHz
x dB -6.00 dB

Test Graph ANT 4

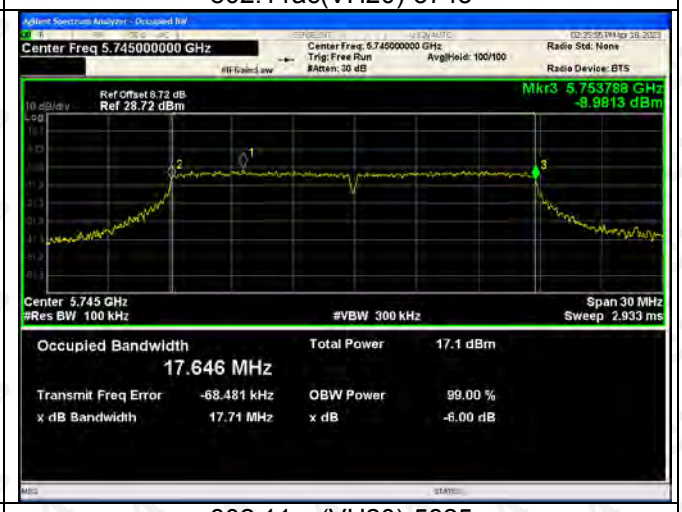
5725-5850MHz

802.11a-5745

802.11a-5785

802.11a-5825

802.11ac(VH20)-5745

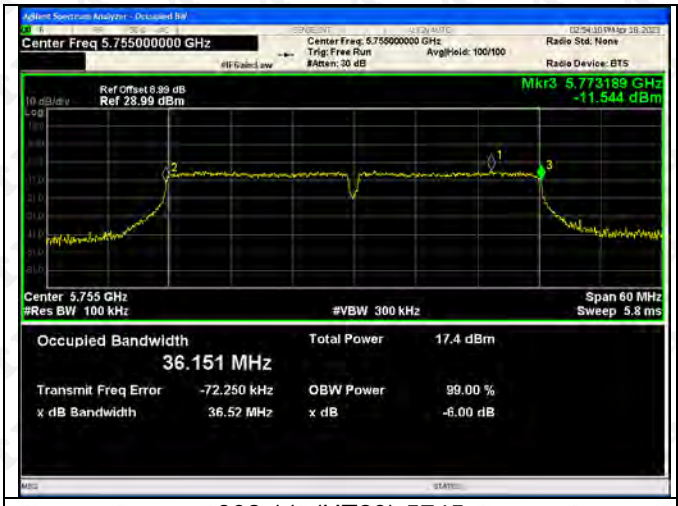


802.11ac(VH20)-5785

802.11ac(VH20)-5825

802.11ac(VH40)-5755

802.11ac(VH40)-5795



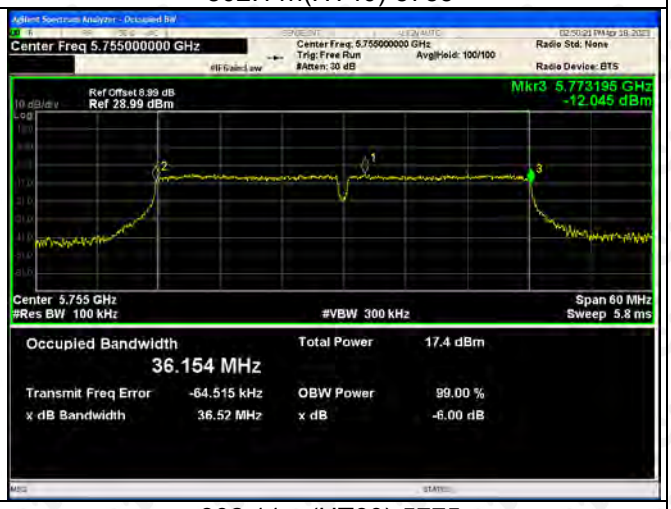
802.11n(HT20)-5745

802.11n(HT20)-5785

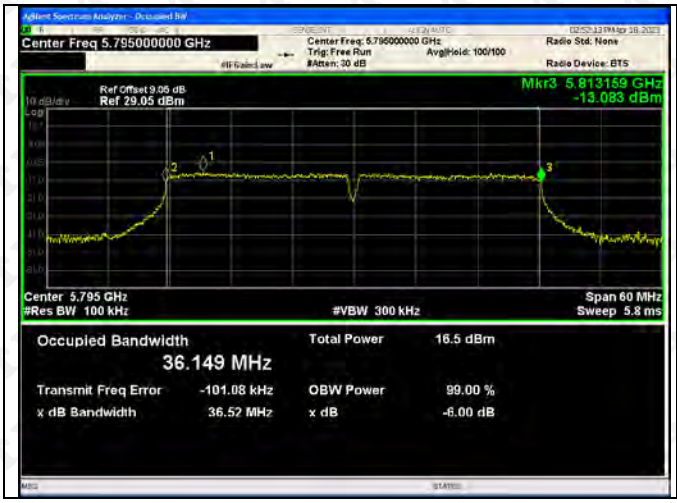
802.11n(HT20)-5825

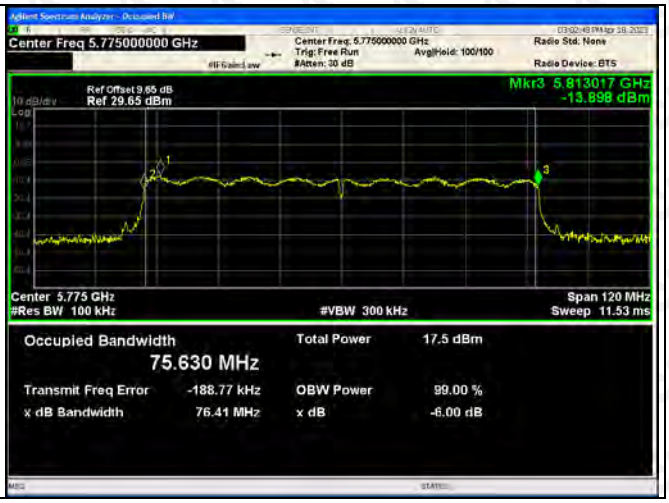
802.11n(HT40)-5755

802.11n(HT40)-5795



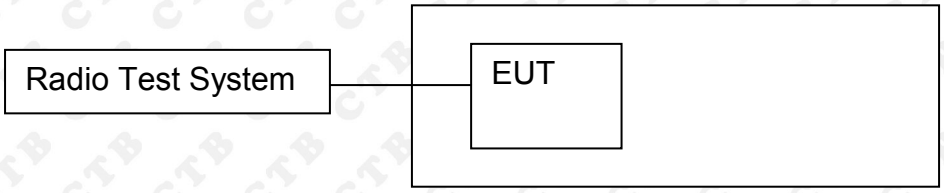
802.11ac(HT80)-5775


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 9.05 dB
Ref 29.05 dBm
Mkr3 5.813159 GHz
-13.083 dBm
Center 5.795 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 60 MHz
Sweep 5.8 ms
Occupied Bandwidth
36.149 MHz
Total Power 16.5 dBm
Transmit Freq Error -101.08 kHz
OBW Power 99.00 %
x dB Bandwidth 36.52 MHz
x dB -6.00 dB


Agilent Spectrum Analyzer - Occupied BW
Center Freq 5.775000000 GHz
Center Freq: 5.775000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.65 dB
Ref 29.65 dBm
Mkr3 5.813017 GHz
-13.898 dBm
Center 5.775 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 120 MHz
Sweep 11.53 ms
Occupied Bandwidth
75.630 MHz
Total Power 17.5 dBm
Transmit Freq Error -188.77 kHz
OBW Power 99.00 %
x dB Bandwidth 76.41 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

Test mode	Test Channel (MHz)	Antenna	PSD [dBm/500kHz]	PSD [dBm/500kHz] Total	Limit (dBm)	Result
802.11a	5745	ANT1	3.849	/	25.65	Pass
		ANT2	3.628			
		ANT3	4.542			
		ANT4	3.52			
	5785	ANT1	3.534	/	25.65	Pass
		ANT2	4.116			
		ANT3	4.425			
		ANT4	3.688			
	5825	ANT1	2.724	/	25.65	Pass
		ANT2	3.031			
		ANT3	2.844			
		ANT4	2.615			
802.11ac(VH20)	5745	ANT1	2.929	9.386	25.65	Pass
		ANT2	3.807			
		ANT3	3.414			
		ANT4	3.264			
	5785	ANT1	3.35	9.994	25.65	Pass
		ANT2	4.195			
		ANT3	4.252			
		ANT4	4.039			
	5825	ANT1	2.068	8.474	25.65	Pass
		ANT2	2.187			
		ANT3	2.826			
		ANT4	2.686			
802.11ac(VH40)	5755	ANT1	-0.032	6.164	25.65	Pass
		ANT2	0.232			
		ANT3	0.045			
		ANT4	0.319			
	5795	ANT1	-0.222	5.757	25.65	Pass
		ANT2	-0.441			
		ANT3	-0.162			
		ANT4	-0.235			
802.11n(VH20)	5745	ANT1	3.519	3.257	25.65	Pass
		ANT2	3.873			
		ANT3	4.032			
		ANT4	3.814			
	5785	ANT1	3.55	9.834	25.65	Pass
		ANT2	3.973			
		ANT3	3.814			
		ANT4	3.769			
	5825	ANT1	2.217	9.800	25.65	Pass
		ANT2	2.785			
		ANT3	2.492			
		ANT4	2.611			
802.11n(VH40)	5755	ANT1	0.223	8.552	25.65	Pass
		ANT2	0.448			
		ANT3	-0.001			
		ANT4	0.081			
	5795	ANT1	-0.307	6.212	25.65	Pass
		ANT2	0.041			
		ANT3	-0.59			
		ANT4	-0.589			
802.11ac(VH80)	5775	ANT1	-3.698	5.667	25.65	Pass
		ANT2	-2.674			
		ANT3	-2.125			
		ANT4	-2.703			

ANT 1

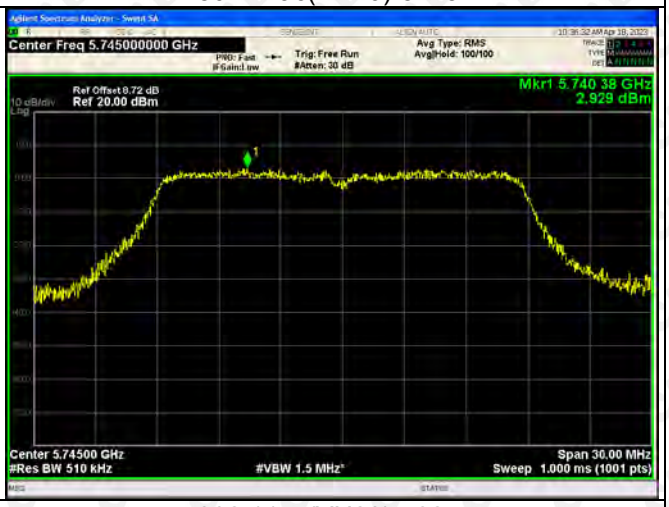
5745-5825MHz

802.11a-5745

802.11a-5785

802.11a-5825

802.11ac(VH20)-5745



802.11ac(VH20)-5785

802.11ac(VH20)-5825

802.11ac(VH40)-5755

802.11ac(VH40)-5795

802.11n(HT20)-5745

802.11n(HT20)-5785

802.11n(HT20)-5825

802.11n(HT40)-5755

802.11n(HT40)-5795

802.11ac(HT80)-5775

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 9.05 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.780 12 GHz
-0.307 dBm
Center 5.79500 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 5.775000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold: 100/100
Ref Offset 9.05 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.756 88 GHz
-3.698 dBm
Center 5.77500 GHz
#Res BW 510 kHz
#VBW 1.5 MHz*
Span 120.0 MHz
Sweep 1.000 ms (1001 pts)

ANT 2

5745-5825MHz

802.11a-5745

802.11a-5785

802.11a-5825

802.11ac(VH20)-5745

802.11ac(VH20)-5785

802.11ac(VH20)-5825

802.11ac(VH40)-5755

802.11ac(VH40)-5795

802.11n(HT20)-5745

802.11n(HT20)-5785

802.11n(HT20)-5825

802.11n(HT40)-5755

802.11n(HT40)-5795

802.11ac(HT80)-5775

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 9.05 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.779 64 GHz
0.041 dBm
Center 5.79500 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 5.775000000 GHz
PNO: Fast
IFGain: Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold: 100/100
Ref Offset 9.05 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.793 12 GHz
-2.674 dBm
Center 5.77500 GHz
#Res BW 510 kHz
#VBW 1.5 MHz*
Span 120.0 MHz
Sweep 1.000 ms (1001 pts)

ANT 3

5745-5825MHz

802.11a-5745

802.11a-5785

802.11a-5825

802.11ac(VH20)-5745

802.11ac(VH20)-5785

802.11ac(VH20)-5825

802.11ac(VH40)-5755

802.11ac(VH40)-5795

802.11n(HT20)-5745

802.11n(HT20)-5785

802.11n(HT20)-5825

802.11n(HT40)-5755

802.11n(HT40)-5795

802.11ac(HT80)-5775

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 9.05 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.780 12 GHz
-0.590 dBm
Center 5.79500 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 5.775000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold: 100/100
Ref Offset 9.05 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.746 56 GHz
-2.125 dBm
Center 5.77500 GHz
#Res BW 510 kHz
#VBW 1.5 MHz*
Span 120.0 MHz
Sweep 1.000 ms (1001 pts)

ANT 4

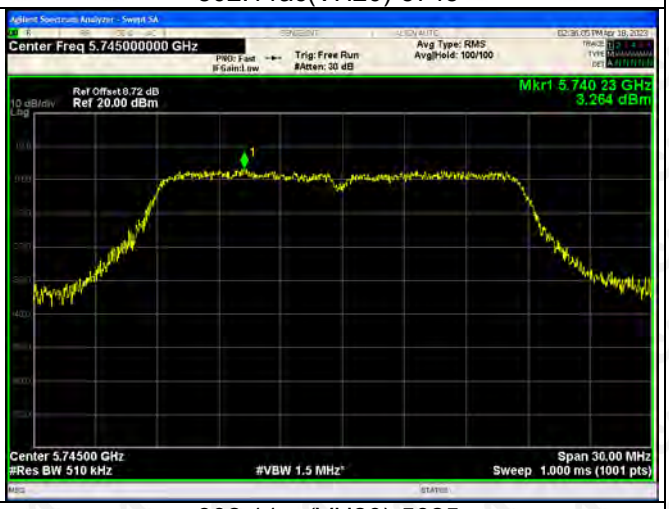
5745-5825MHz

802.11a-5745

802.11a-5785

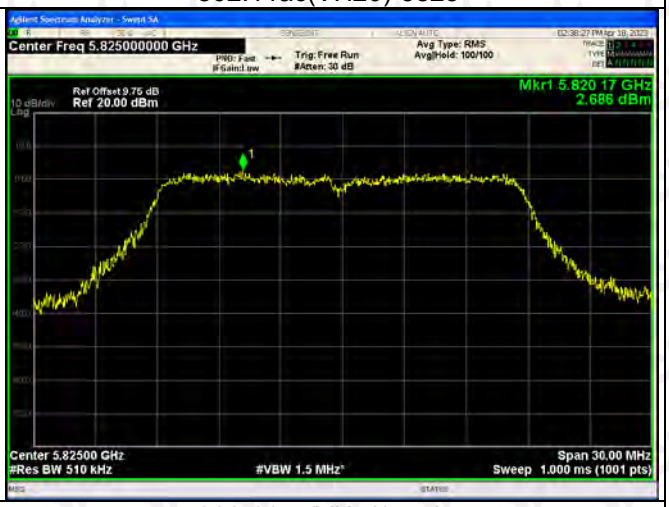
802.11a-5825

802.11ac(VH20)-5745



802.11ac(VH20)-5785

802.11ac(VH20)-5825



802.11ac(VH40)-5755

802.11ac(VH40)-5795

802.11n(HT20)-5745

802.11n(HT20)-5785

802.11n(HT20)-5825

802.11n(HT40)-5755

802.11n(HT40)-5795

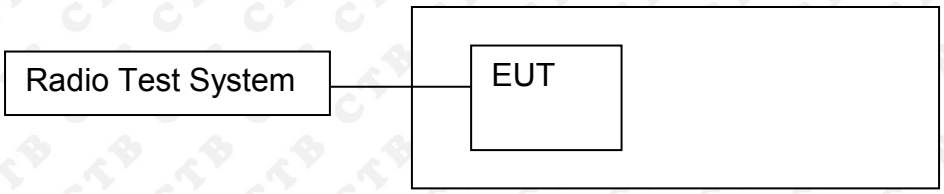
802.11ac(HT80)-5775

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 9.05 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.780 06 GHz
-0.589 dBm
Center 5.79500 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 5.775000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold: 100/100
Ref Offset 9.05 dB
10 dB/div
Ref 20.00 dBm
Mkr1 5.757 12 GHz
-2.703 dBm
Center 5.77500 GHz
#Res BW 510 kHz
#VBW 1.5 MHz*
Span 120.0 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

ANT1:
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	5745.0734	5745	0.0734	12.7744
		V max (V)	132	5745.0397	5745	0.0397	6.9146
		V min (V)	108	5745.0734	5745	0.0734	12.7744
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	5745.0883	5745	0.0883	15.3763
		T (°C)	10	5745.0786	5745	0.0786	13.6821
		T (°C)	20	5745.0807	5745	0.0807	14.0503
		T (°C)	30	5745.0806	5745	0.0806	14.0339
		T (°C)	40	5745.0179	5745	0.0179	3.1137
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	5785.0015	5785	0.0015	0.2589
		V max (V)	132	5785.0122	5785	0.0122	2.1108
		V min (V)	108	5785.0140	5785	0.0140	2.4244
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	5785.0484	5785	0.0484	8.3601
		T (°C)	10	5785.0263	5785	0.0263	4.5515
		T (°C)	20	5785.0115	5785	0.0115	1.9941
		T (°C)	30	5785.0553	5785	0.0553	9.5571
		T (°C)	40	5785.0148	5785	0.0148	2.5628
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	5825.0774	5825	0.0774	13.2817
		V max (V)	132	5825.0627	5825	0.0627	10.7589
		V min (V)	108	5825.0843	5825	0.0843	14.4718
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	5825.0824	5825	0.0824	14.1429
		T (°C)	10	5825.0560	5825	0.0560	9.6194
		T (°C)	20	5825.0396	5825	0.0396	6.8066
		T (°C)	30	5825.0417	5825	0.0417	7.1584
		T (°C)	40	5825.0273	5825	0.0273	4.6949
Limits				±20ppm			
Result				Complies			

ANT2:
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	5745.0712	5745	0.0712	12.3860
		V max (V)	132	5745.0163	5745	0.0163	2.8439
		V min (V)	108	5745.0712	5745	0.0712	12.3860
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	5745.0234	5745	0.0234	4.0809
		T (°C)	10	5745.0572	5745	0.0572	9.9541
		T (°C)	20	5745.0680	5745	0.0680	11.8307
		T (°C)	30	5745.0642	5745	0.0642	11.1693
		T (°C)	40	5745.0841	5745	0.0841	14.6391
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	5785.0918	5785	0.0918	15.8752
		V max (V)	132	5785.0615	5785	0.0615	10.6380
		V min (V)	108	5785.0066	5785	0.0066	1.1334
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	5785.0657	5785	0.0657	11.3587
		T (°C)	10	5785.0686	5785	0.0686	11.8550
		T (°C)	20	5785.0463	5785	0.0463	7.9962
		T (°C)	30	5785.0346	5785	0.0346	5.9757
		T (°C)	40	5785.0892	5785	0.0892	15.4163
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	5825.0545	5825	0.0545	9.3543
		V max (V)	132	5825.0749	5825	0.0749	12.8635
		V min (V)	108	5825.0380	5825	0.0380	6.5307
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	5825.0315	5825	0.0315	5.4068
		T (°C)	10	5825.0608	5825	0.0608	10.4370
		T (°C)	20	5825.0354	5825	0.0354	6.0776
		T (°C)	30	5825.0052	5825	0.0052	0.8936
		T (°C)	40	5825.0728	5825	0.0728	12.4895
Limits				±20ppm			
Result				Complies			

ANT3:
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	5745.0804	5745	0.0804	13.9957
		V max (V)	132	5745.0289	5745	0.0289	5.0268
		V min (V)	108	5745.0804	5745	0.0804	13.9957
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	5745.0470	5745	0.0470	8.1770
		T (°C)	10	5745.0417	5745	0.0417	7.2623
		T (°C)	20	5745.0303	5745	0.0303	5.2673
		T (°C)	30	5745.0629	5745	0.0629	10.9538
		T (°C)	40	5745.0367	5745	0.0367	6.3864
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	5785.0839	5785	0.0839	14.5112
		V max (V)	132	5785.0098	5785	0.0098	1.7022
		V min (V)	108	5785.0870	5785	0.0870	15.0332
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	5785.0069	5785	0.0069	1.1842
		T (°C)	10	5785.0115	5785	0.0115	1.9872
		T (°C)	20	5785.0072	5785	0.0072	1.2403
		T (°C)	30	5785.0471	5785	0.0471	8.1459
		T (°C)	40	5785.0686	5785	0.0686	11.8600
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	5825.0229	5825	0.0229	3.9365
		V max (V)	132	5825.0190	5825	0.0190	3.2650
		V min (V)	108	5825.0731	5825	0.0731	12.5558
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	5825.0126	5825	0.0126	2.1584
		T (°C)	10	5825.0763	5825	0.0763	13.1054
		T (°C)	20	5825.0136	5825	0.0136	2.3353
		T (°C)	30	5825.0057	5825	0.0057	0.9840
		T (°C)	40	5825.0649	5825	0.0649	11.1369
Limits				±20ppm			
Result				Complies			

ANT4:
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	5745.0192	5745	0.0192	3.3478
		V max (V)	132	5745.0179	5745	0.0179	3.1189
		V min (V)	108	5745.0192	5745	0.0192	3.3478
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	5745.0917	5745	0.0917	15.9699
		T (°C)	10	5745.0176	5745	0.0176	3.0650
		T (°C)	20	5745.0463	5745	0.0463	8.0514
		T (°C)	30	5745.0115	5745	0.0115	1.9990
		T (°C)	40	5745.0822	5745	0.0822	14.3038
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	5785.0719	5785	0.0719	12.4249
		V max (V)	132	5785.0057	5785	0.0057	0.9938
		V min (V)	108	5785.0413	5785	0.0413	7.1404
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	5785.0464	5785	0.0464	8.0163
		T (°C)	10	5785.0724	5785	0.0724	12.5197
		T (°C)	20	5785.0340	5785	0.0340	5.8811
		T (°C)	30	5785.0076	5785	0.0076	1.3168
		T (°C)	40	5785.0036	5785	0.0036	0.6157
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	5825.0121	5825	0.0121	2.0720
		V max (V)	132	5825.0209	5825	0.0209	3.5921
		V min (V)	108	5825.0253	5825	0.0253	4.3442
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	5825.0878	5825	0.0878	15.0748
		T (°C)	10	5825.0741	5825	0.0741	12.7126
		T (°C)	20	5825.0671	5825	0.0671	11.5200
		T (°C)	30	5825.0886	5825	0.0886	15.2181
		T (°C)	40	5825.0779	5825	0.0779	13.3684
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 ASK message transmitting from remote device and verify whether it shall resend or
discontinue transmission. (manufacturer declare)

14. ANTENNA REQUIREMENT

15.203 requirement:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
15.247(b) (4) requirement:
The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is External antenna and no consideration of replacement. The best case gain of the antenna is ANT1:4.33dBi, ANT2:4.33dBi, ANT3:4.33dBi, ANT4:4.33dBi.

15. EUT PHOTOGRAPHS

EUT Photo 1

EUT Photo 2

16. EUT TEST SETUP PHOTOGRAPHS

Spurious emissions

Below 1GHz

Above 1GHz

Conducted Emission

※※※※※ **END OF REPORT** ※※※※※