FCC TEST REPORT

FCC ID:2AEK8-CB04

Applicant:	Gofuture Technology Co., Ltd.
Address:	5F,C2 building,Jia'an Industrial Park,District72, Baoan District,Shenzhen,China
Manufacturer:	Gofuture Technology Co., Ltd.
Address:	5F,C2 building,Jia'an Industrial Park,District72, Baoan District,Shenzhen,China
EUT:	Carplay wireless adapter
Trade Mark:	N/A
Model Number:	CB04 CB01, CB02, CB03, CB04, CB05, CB06, CB07, CB08, CB09, CB10, CB11, CB12, CB21, CB23, CB61, CB62, CB63, CB65, CB66, CB67, CB68, CB69, CB70, CB71, CB75, CB76, CB77, CB78, CB79, CB80, CB81, CB82, CB83, CB85, CB86, CB87, CB88, CB89, CB90, CB91, CB92, CB93, CB95, CB96, CB97, CB98, CB99
Date of Receipt:	Apr. 02, 2025
Test Date:	Apr. 02, 2025 - Apr. 14, 2025
Date of Report:	Apr. 14, 2025
Prepared By:	Shenzhen DL Testing Technology Co., Ltd.
Address:	101-201, Building C, Shuanghuan, No.8, Baoqing Roa Baolong Industrial Zone, Baolong Street, Longgang Shenzhen, Guangdong, China
Applicable Standards:	FCC CFR Title 47 Part 15 Subpart E Section 15.407 ANSI C63.10:2013 KDB 789033 D02 v02r01
Test Result:	Pass
Report Number:	DLE-250427014R

Prepared (Test Engineer):	Dimon Tan
Reviewer (Supervisor):	Jack Bu
Approved (Manager):	Jade Yang

This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Shenzhen DL Testing Technology Co., Ltd.

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1. VERSION

Report No.	Version	Description	Approved
DLE-250427014R	Rev.01	Initial issue of report	Apr. 14, 2025

2.SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.407) , Subpart E			
Standard Section	Test Item	Judgment	Remark
15.207 (a)	AC Power Line Conducted Emission	PASS	
789033 D02 General U-NII	Duty Cycle	PASS	
15.205 (a) 15.209 (a) 15.407 (b)(4)	Radiated Emissions & Band Edge	PASS	
15.407 (e)	6dB Occupied Bandwidth	PASS	
15.407 (a)(3) i	Maximum Conducted Output Power	PASS	
2.1051 15.407 (b)(4) 15.407 (b)(8)	Conducted Band Edge	PASS	
15.407 (a)(3) i	Power Spectral Density	PASS	
2.1051, 15.407 (b)(4)	Conducted Emissions at Antenna Terminals	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

2.1 TEST FACILITY

Test lab: Shenzhen DL Testing Technology Co., Ltd.

Address: 101-201, Building C, Shuanghuan, No.8, Baoqing Roa Baolong Industrial Zone, Baolong Street, Longgang Shenzhen, Guangdong, China

FCC Test Firm Registration Number: 854456
Designation Number: CN1307
IC Registered No.: 27485
CAB ID.: CN0118

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ± U，where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2，providing a level of confidence of approximately 95 %。

No.	Item	Uncertainty
1	3m camber Radiated spurious emission(9KHz-30MHz)	U=4.5dB
2	3m camber Radiated spurious emission(30MHz-1GHz)	U=4.8dB
3	3m chamber Radiated spurious emission(1GHz-6GHz)	U=4.9dB
4	3m chamber Radiated spurious emission(6GHz-40GHz)	U=5.0dB
5	Conducted disturbance	U=3.2dB
6	RF Band Edge	U=1.68dB
7	RF power conducted	U=1.86dB
8	RF conducted Spurious Emission	U=2.2dB
9	RF Occupied Bandwidth	U=1.8dB
10	RF Power Spectral Density	U=1.75dB
11	humidity uncertainty	U=5.3%
12	Temperature uncertainty	U=0.59℃

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Product Name:	Carplay wireless adapter	
Model No.:	CB04 CB01, CB02, CB03, CB04, CB05, CB06, CB07, CB08, CB09, CB10, CB11, CB12, CB21, CB23, CB61, CB62, CB63, CB65, CB66, CB67, CB68, CB69, CB70, CB71, CB75, CB76, CB77, CB78, CB79, CB80, CB81, CB82, CB83, CB85, CB86, CB87, CB88, CB89, CB90, CB91, CB92, CB93, CB95, CB96, CB97, CB98, CB99	
Serial Model:	N/A	
Model Different.:	All the model are the same circuit and RF module, except model names.	
Sample ID	DLE-250427014R	
Sample(s) Status:	Engineer sample	
Product Description	IEEE 802.11 WLAN Mode Supported	☒ 802.11a/n/ac
	Modulation Technology	802.11a/n/ac: Orthogonal Frequency Division Multiplexing(OFDM)
	Data Rate	802.11a: 6/9/12/24/18/36/48/54Mbit/s 802.11n: MCS0-MCS7 802.11ac: MCS0-MCS9
	Operating Frequency Range	☒ 5745-5825 MHz for 802.11 a/n/ac(20M); ☒ 5755-5795 MHz for 802.11 n/ac(40M); ☒ 5775MHz for 802.11 ac (80M).
	Number of Channels	☒ 5 channels for 802.11 a/n/ac (20M) in the 5745-5825MHz band ; ☒ 2 channels for 802.11 n/ac (40M) in the 5755-5795 MHz band ; ☒ 1 channels for 802.11 ac (80M) in the 5775MHz band
Antenna Type:	PCB Antenna	
Antenna gain:	5.8G: 1.3dBi	
Power supply:	Input: 5V⎓1A	
AC/DC Adapter:	N/A	
AC/DC Adapter Mode:	N/A	

Note:

For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

802.11a/n/ac(20 MHz) Frequency Channel for 5.8G							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	153	5765	157	5785	161	5805
165	5825	-	-	-	-	-	-

802.11n/ac(40MHz) Frequency Channel for 5.8G					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795	-	-

802.11ac (80MHz) Frequency Channel for 5.8G	
Channel	Frequency (MHz)
155	5775

3.2 DESCRIPTION OF TEST MODES

Transmitting mode	Keep the EUT in continuously transmitting mode
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

Test Software	REALTEK 11ac 8821AU
Power level setup	Default

Pretest Mode	Description
Mode 1	802.11a/n20/ac20 CH149/ CH157/ CH 165 for 5.8G
Mode 2	802.11n 40/ac 40 CH 151 / CH 159 for 5.8G
Mode 3	802.11 ac80 CH 155 for 5.8G

For Conducted Emission	
Final Test Mode	Description
Mode 1	802.11a/n20/ac20 CH149/ CH157/ CH 165 for 5.8G
Mode 2	802.11n 40/ac 40 CH 151 / CH 159 for 5.8G
Mode 3	802.11 ac80 CH 155 for 5.8G

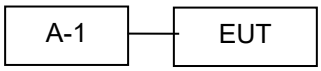
For Radiated Emission	
Final Test Mode	Description
Mode 1	802.11a/n20/ac20 CH149/ CH157/ CH 165 for 5.8G
Mode 2	802.11n 40/ac 40 CH 151 / CH 159 for 5.8G
Mode 3	802.11 ac80 CH 155 for 5.8G

Note:

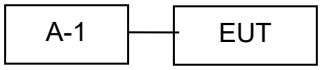
(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.

3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

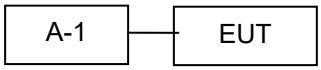
Conducted Emission



Radiated Emission



Conducted Spurious



3.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Carplay wireless adapter	N/A	CB04	N/A	EUT
A-1	Adapter	N/A	GA-0502000V	N/A	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

3.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Conduction Emissions Test

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Firmware Version	Last calibration	Calibrated until
1	LISN	R&S	ENV216	101471	N/A	Sep. 30, 2024	Sep. 29, 2025
2	LISN	CYBERTEK	EM5040A	E1850400149	N/A	Sep. 30, 2024	Sep. 29, 2025
3	Test Cable	N/A	C-01	N/A	N/A	Sep. 30, 2024	Sep. 29, 2025
4	EMI Test Receiver	R&S	ESCI3	101393	4.42 SP3	Sep. 29, 2024	Sep. 28, 2025
5	EMC Software	Frad	EZ-EMC	Ver.EMC-CON 3A1.1	N/A	\	\

Radiation Emissions & Radiation Spurious Emissions Test

Item	Equipment	Manufacturer	Type No.	Serial No.	Firmware Version	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	KEYSIGHT	N9020A	MY55370835	A.17.05	Sep. 29, 2024	Sep. 28, 2025
2	Spectrum Analyzer (10kHz-39.9GHz)	R&S	FSV40-N	100363	1.71 SP2	Sep. 30, 2024	Sep. 29, 2025
3	EMI Test Receiver (9kHz-7GHz)	R&S	ESCI7	100969	4.32	Sep. 29, 2024	Sep. 28, 2025
4	Bilog Antenna (30MHz-1500MHz)	Schwarzbeck	VULB9168	00877	N/A	Sep. 30, 2024	Sep. 29, 2025
5	Horn Antenna (1GHz-18GHz)	Agilent	AH-118	071145	N/A	Sep. 30, 2024	Sep. 29, 2025
6	Horn Antenna (15GHz-40GHz)	A.H.System	SAS-574	588	N/A	Sep. 30, 2024	Sep. 29, 2025
7	Loop Antenna	TESEQ	HLA6121	58357	N/A	Oct. 11, 2024	Oct. 10, 2025
8	Amplifier (30-1000MHz)	EM Electronics	EM330 Amplifier	60747	N/A	Sep. 29, 2024	Sep. 28, 2025
9	Amplifier (1GHz-26.5GHz)	HuiPu	8449B	3008A00315	N/A	Sep. 29, 2024	Sep. 28, 2025
10	Amplifier (500MHz-40GHz)	QuanJuDa	DLE-161	097	N/A	Sep. 30, 2024	Sep. 29, 2025
11	Test Cable	N/A	R-01	N/A	N/A	Sep. 30, 2024	Sep. 29, 2025
12	Test Cable	N/A	R-02	N/A	N/A	Sep. 30, 2024	Sep. 29, 2025
13	Test Cable	N/A	R-03	N/A	N/A	Sep. 30, 2024	Sep. 29, 2025
14	D.C. Power Supply	LongWei	TPR-6405D	GQ7516	N/A	Sep. 29, 2024	Sep. 28, 2025
15	EMC Software	Frad	EZ-EMC	Ver.EMC-CO N 3A1.1	N/A	\	\
16	Turntable	MF	MF-7802BS	N/A	N/A	\	\
17	Antenna tower	MF	MF-7802BS	N/A	N/A	\	\

RF Conducted Test

Item	Equipment	Manufacturer	Type No.	Serial No.	Firmware Version	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	KEYSIGHT	N9020A	MY55370835	A.17.05	Sep. 29, 2024	Sep. 28, 2025
2	Spectrum Analyzer (10kHz-39.9GHz)	R&S	FSV40-N	100363	1.71 SP2	Sep. 30, 2024	Sep. 29, 2025
3	Test Cable	N/A	RF-01	N/A	N/A	Sep. 30, 2024	Sep. 29, 2025
4	Test Cable	N/A	RF-02	N/A	N/A	Sep. 30, 2024	Sep. 29, 2025
5	Test Cable	N/A	RF-03	N/A	N/A	Sep. 30, 2024	Sep. 29, 2025
6	ESG Signal Generator	Agilent	E4421B	GB40051203	B.03.84	Sep. 29, 2024	Sep. 28, 2025
7	Signal Generator	Agilent	N5182A	MY47420215	A.01.87	Sep. 29, 2024	Sep. 28, 2025
8	Magnetic Field Probe Tester	Narda	ELT-400	0-0344/M-1752	N/A	Sep. 29, 2024	Sep. 28, 2025
9	Van der Hoofden measuring head	Schwarzbeck Mess-elektronik	VDHH 9502	9502-039	N/A	Sep. 30, 2024	Sep. 29, 2025
10	Wideband Radio Communication Test	R&S	CMW500	106504	V 3.7.22	Sep. 30, 2024	Sep. 29, 2025
11	MWRF Power Meter Test system	MW	MW100-RFCB	10371	N/A	Sep. 29, 2024	Sep. 28, 2025
12	Power Meter	KEYSIGHT	N1912AP	926431	A.05.00	Sep. 29, 2024	Sep. 28, 2025
13	D.C. Power Supply	LongWei	TPR-6405 D	GQ7516	N/A	Sep. 29, 2024	Sep. 28, 2025
14	RF Software	MW	MTS8310	V2.0.0.0	N/A	\	\

4.EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto

4.1.1 POWER LINE CONDUCTED EMISSION Limits

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

(1) *Decreases with the logarithm of the frequency.

4.1.2 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

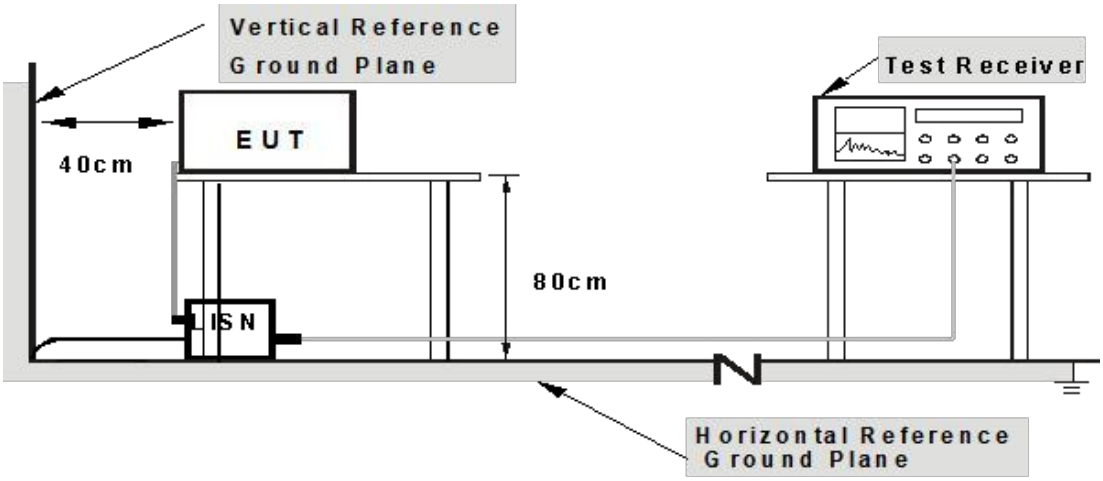
d. LISN at least 80 cm from nearest part of EUT chassis.

e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

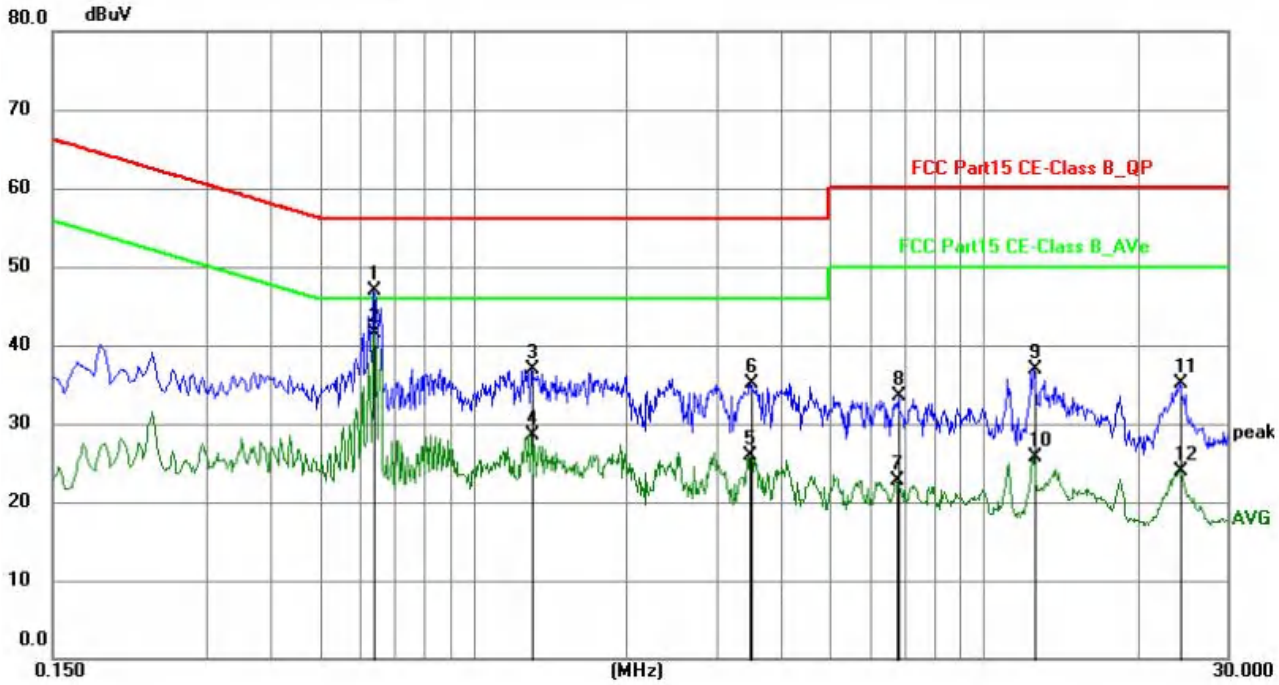
4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

4.1.6 TEST RESULT

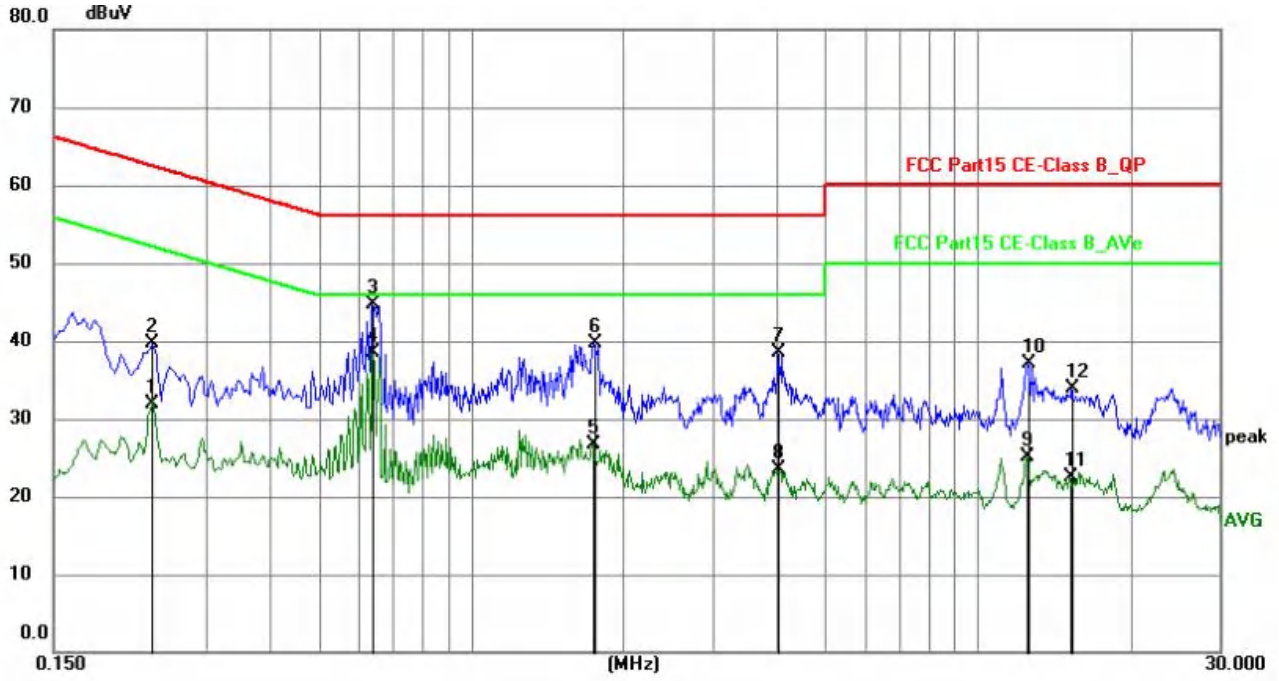
5.8G:

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	L
Test Voltage:	AC 120V/60Hz	Test Mode:	802.11n20 - 5745MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.6401	26.68	20.29	46.97	56.00	-9.03	QP	P	
2	0.6401	21.29	20.29	41.58	46.00	-4.42	AVG	P	
3	1.3018	16.64	20.31	36.95	56.00	-19.05	QP	P	
4	1.3018	8.25	20.31	28.56	46.00	-17.44	AVG	P	
5	3.4800	5.55	20.34	25.89	46.00	-20.11	AVG	P	
6	3.4980	14.86	20.34	35.20	56.00	-20.80	QP	P	
7	6.7335	2.24	20.38	22.62	50.00	-27.38	AVG	P	
8	6.8368	13.19	20.38	33.57	60.00	-26.43	QP	P	
9	12.5340	16.46	20.47	36.93	60.00	-23.07	QP	P	
10	12.5340	5.33	20.47	25.80	50.00	-24.20	AVG	P	
11	24.2070	14.52	20.61	35.13	60.00	-24.87	QP	P	
12	24.3371	3.33	20.62	23.95	50.00	-26.05	AVG	P	

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	N
Test Voltage:	AC 120V/60Hz	Test Mode:	802.11n20 - 5745MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.2340	11.45	20.36	31.81	52.31	-20.50	AVG	P	
2	0.2353	19.41	20.36	39.77	62.26	-22.49	QP	P	
3	0.6401	24.42	20.30	44.72	56.00	-11.28	QP	P	
4	0.6401	18.12	20.30	38.42	46.00	-7.58	AVG	P	
5	1.7380	6.48	20.30	26.78	46.00	-19.22	AVG	P	
6	1.7474	19.45	20.30	39.75	56.00	-16.25	QP	P	
7	4.0380	18.19	20.33	38.52	56.00	-17.48	QP	P	
8	4.0380	3.09	20.33	23.42	46.00	-22.58	AVG	P	
9	12.4799	4.59	20.48	25.07	50.00	-24.93	AVG	P	
10	12.5340	16.66	20.48	37.14	60.00	-22.86	QP	P	
11	15.2202	1.97	20.50	22.47	50.00	-27.53	AVG	P	
12	15.3870	13.40	20.50	33.90	60.00	-26.10	QP	P	

Notes:
1.An initial pre-scan was performed on the line and neutral lines with peak detector.
2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3.Mesurement Level = Reading level + Correct Factor
4.The test data shows only the worst case 802.11n20 - 5745MHz.

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 APPLICABLE STANDARD

According to FCC Part 15.407(d) and 15.209

4.2.2 CONFORMANCE LIMIT

According to FCC Part 15.407(b)(7): radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

According to FCC Part15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

.

Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009~0.490	2400/F(KHz)	20 log (uV/m)	300
0.490~1.705	2400/F(KHz)	20 log (uV/m)	30
1.705~30.0	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Limits of Radiated Emission Measurement(Above 1000MHz)

Frequency(MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

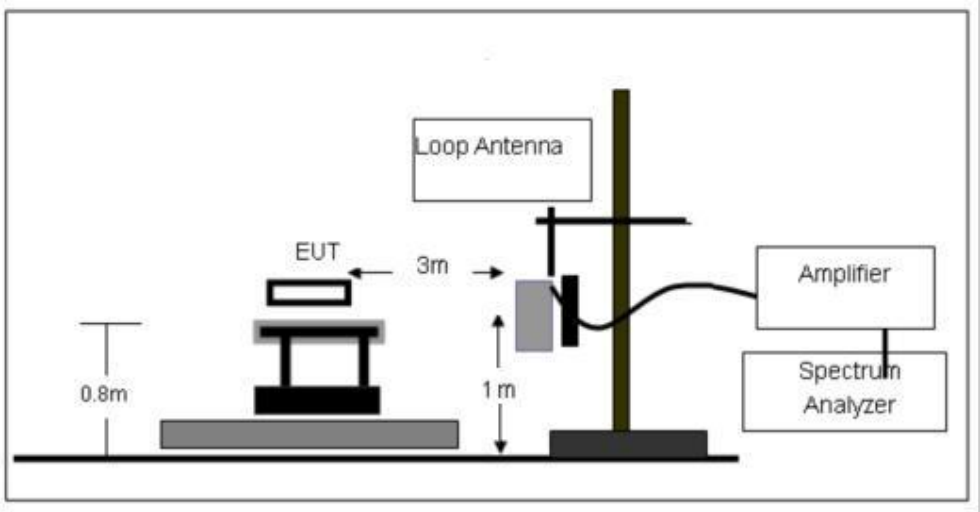
Remark :1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

4.2.3 MEASURING INSTRUMENTS

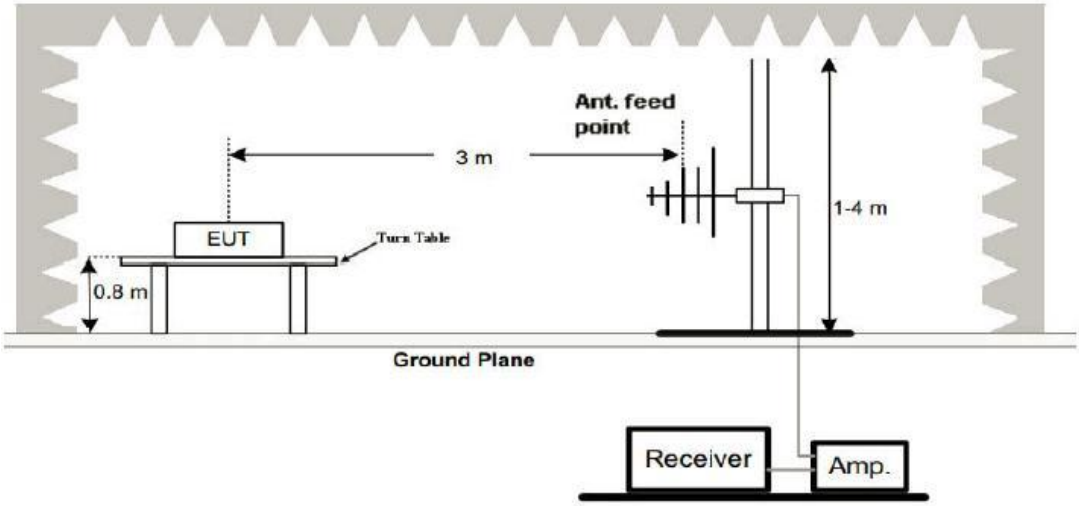
The Measuring equipment is listed in the section 6.3 of this test report.

4.2.4 TEST CONFIGURATION

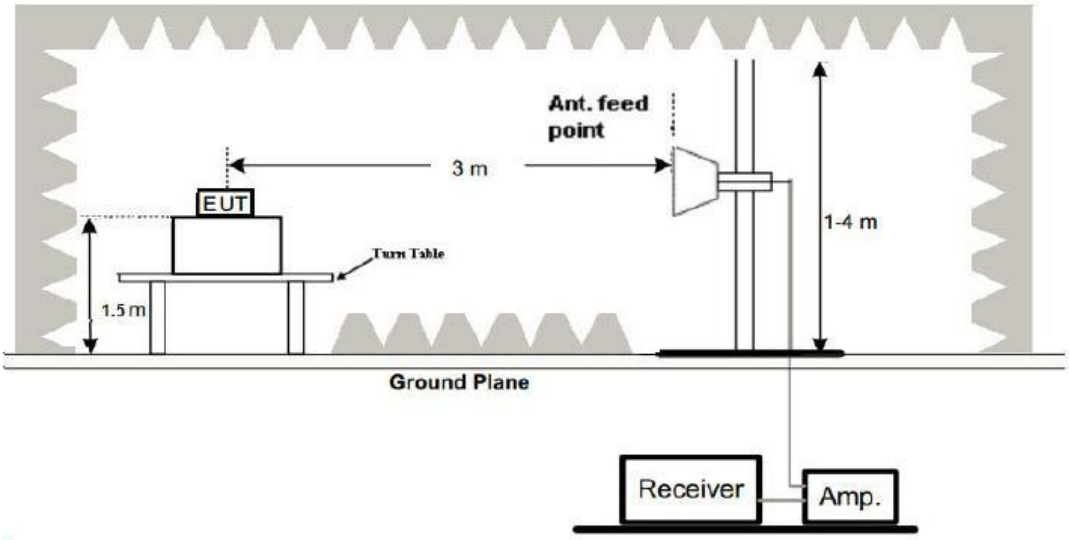
1.For radiated emissions below 30MHz



2.For radiated emissions from 30MHz to 1000MHz



3. Radiated Emission Test-Up Frequency Above 1GHz



4.2.5 TEST PROCEDURE

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10-2013. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.
This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT.
Use the following spectrum analyzer settings:

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m for below 1GHz and 1.5m for above 1GHz; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item – EUT Test Photos.

Note:

Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

Note: for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where RBWCF [dB] =10*lg(100 [kHz]/narrower RBW [kHz]). , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

4.2.6 TEST RESULT

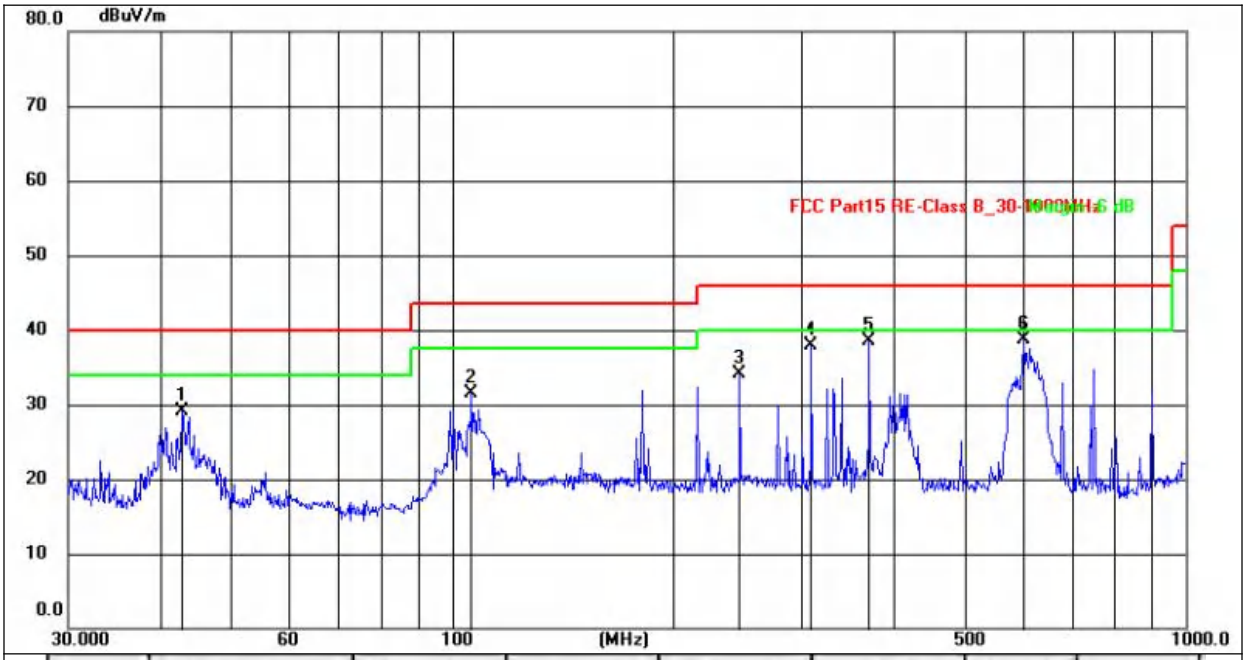
Between 9KHz – 30MHz

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

Between 30MHz – 1GHz

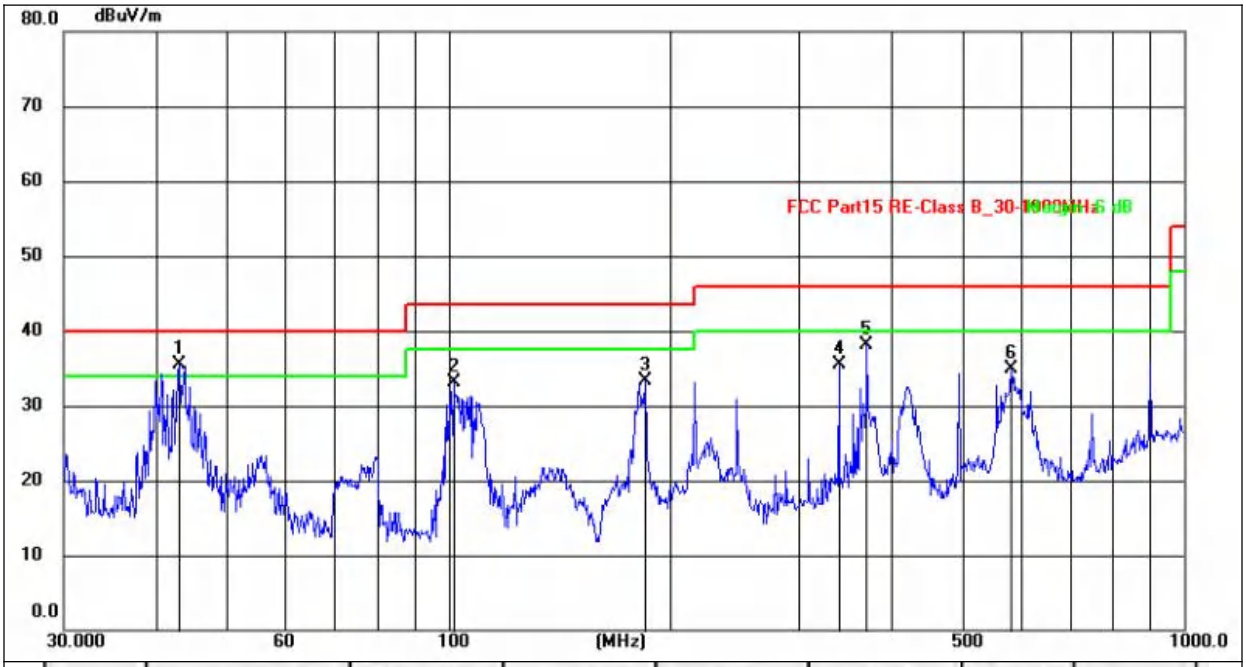
5.8G:

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	Horizontal
Test Voltage:	DC 5V	Test Mode :	TX 802.11n20 - 5745MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	42.8997	43.15	-14.00	29.15	40.00	-10.85	QP
2	106.3850	50.70	-19.29	31.41	43.50	-12.09	QP
3	246.8146	49.75	-15.66	34.09	46.00	-11.91	QP
4	308.9125	54.51	-16.51	38.00	46.00	-8.00	QP
5	370.7022	54.70	-16.20	38.50	46.00	-7.50	QP
6	601.4265	47.05	-8.36	38.69	46.00	-7.31	QP

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	DC 5V	Test Mode :	TX 802.11n20 - 5745MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	43.0504	52.48	-16.89	35.59	40.00	-4.41	QP
2	101.6443	54.13	-21.11	33.02	43.50	-10.48	QP
3	185.1374	53.10	-19.79	33.31	43.50	-10.19	QP
4	339.5887	52.01	-16.56	35.45	46.00	-10.55	QP
5	370.7022	53.65	-15.51	38.14	46.00	-7.86	QP
6	582.7423	42.91	-7.96	34.95	46.00	-11.05	QP

Remarks:
1.Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2.The emission levels of other frequencies are very lower than the limit and not show in test report.
3.All modes were tested, and only the worst test data was recorded is 802.11n20 - 5745MHz.

Between 1GHz – 40GHz

Temperature :	26℃	Relative Humidity :	54%
Pressure :	1010 hPa	Test Voltage :	DC 5V
Test Mode :	5.8G TX - 802.11a / n20 / n40 / ac20 / ac40 / ac80		
Note: All patterns have been tested, and only the worst test data recorded in this report is 802.11a/n20/ac20			

802.11a

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:5745MHz									
V	11490.00	42.34	30.55	5.77	24.66	42.22	74.00	-31.78	PK
V	11490.00	41.07	30.55	5.77	24.66	40.95	54.00	-13.05	AV
V	17235.00	45.25	30.33	6.32	24.55	45.79	68.20	-22.41	PK
V	17235.00	41.51	30.33	6.32	24.55	42.05	54.00	-11.95	AV
V	22980.00	47.61	30.85	7.45	24.69	48.90	74.00	-25.10	PK
V	22980.00	41.68	30.85	7.45	24.69	42.97	54.00	-11.03	AV
V	28725.00	52.46	31.02	8.99	25.57	56.00	68.20	-12.20	PK
V	28725.00	41.86	31.02	8.99	25.57	45.40	54.00	-8.60	AV
H	11490.00	44.97	30.55	5.77	24.66	44.85	74.00	-29.15	PK
H	11490.00	41.07	30.55	5.77	24.66	40.95	54.00	-13.05	AV
H	17235.00	48.66	30.33	6.32	24.55	49.20	68.20	-19.00	PK
H	17235.00	41.30	30.33	6.32	24.55	41.84	54.00	-12.16	AV
H	22980.00	43.48	30.85	7.45	24.69	44.77	74.00	-29.23	PK
H	22980.00	41.06	30.85	7.45	24.69	42.35	54.00	-11.65	AV
H	28725.00	40.12	31.02	8.99	25.57	43.66	68.20	-24.54	PK
H	28725.00	41.40	31.02	8.99	25.57	44.94	54.00	-9.06	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:5785MHz									
V	11570.00	46.86	30.55	5.77	24.66	46.74	74.00	-27.26	PK
V	11570.00	41.07	30.55	5.77	24.66	40.95	54.00	-13.05	AV
V	17355.00	45.96	30.33	6.32	24.55	46.50	68.20	-21.70	PK
V	17355.00	41.65	30.33	6.32	24.55	42.19	54.00	-11.81	AV
V	23140.00	47.54	30.85	7.45	24.69	48.83	74.00	-25.17	PK
V	23140.00	41.93	30.85	7.45	24.69	43.22	54.00	-10.78	AV
V	28925.00	52.57	31.02	8.99	25.57	56.11	68.20	-12.09	PK
V	28925.00	41.51	31.02	8.99	25.57	45.05	54.00	-8.95	AV
H	11570.00	45.72	30.55	5.77	24.66	45.60	74.00	-28.40	PK
H	11570.00	41.95	30.55	5.77	24.66	41.83	54.00	-12.17	AV
H	17355.00	44.22	30.33	6.32	24.55	44.76	68.20	-23.44	PK
H	17355.00	41.27	30.33	6.32	24.55	41.81	54.00	-12.19	AV
H	23140.00	42.41	30.85	7.45	24.69	43.70	74.00	-30.30	PK
H	23140.00	41.14	30.85	7.45	24.69	42.43	54.00	-11.57	AV
H	28925.00	44.89	31.02	8.99	25.57	48.43	68.20	-19.77	PK
H	28925.00	41.37	31.02	8.99	25.57	44.91	54.00	-9.09	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel:5825MHz									
V	11650.00	43.69	30.55	5.77	24.66	43.57	74.00	-30.43	PK
V	11650.00	41.62	30.55	5.77	24.66	41.50	54.00	-12.50	AV
V	17475.00	42.03	30.33	6.32	24.55	42.57	68.20	-25.63	PK
V	17475.00	41.86	30.33	6.32	24.55	42.40	54.00	-11.60	AV
V	23300.00	43.62	30.85	7.45	24.69	44.91	74.00	-29.09	PK
V	23300.00	41.36	30.85	7.45	24.69	42.65	54.00	-11.35	AV
V	29125.00	54.78	31.02	8.99	25.57	58.32	68.20	-9.88	PK
V	29125.00	41.07	31.02	8.99	25.57	44.61	54.00	-9.39	AV
H	11650.00	42.71	30.55	5.77	24.66	42.59	74.00	-31.41	PK
H	11650.00	41.89	30.55	5.77	24.66	41.77	54.00	-12.23	AV
H	17475.00	48.57	30.33	6.32	24.55	49.11	68.20	-19.09	PK
H	17475.00	41.76	30.33	6.32	24.55	42.30	54.00	-11.70	AV
H	23300.00	44.12	30.85	7.45	24.69	45.41	74.00	-28.59	PK
H	23300.00	41.22	30.85	7.45	24.69	42.51	54.00	-11.49	AV
H	29125.00	41.52	31.02	8.99	25.57	45.06	68.20	-23.14	PK
H	29125.00	41.21	31.02	8.99	25.57	44.75	54.00	-9.25	AV

Remark:
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

802.11n20

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:5745MHz									
V	11490.00	46.29	30.55	5.77	24.66	46.17	74.00	-27.83	PK
V	11490.00	41.47	30.55	5.77	24.66	41.35	54.00	-12.65	AV
V	17235.00	44.36	30.33	6.32	24.55	44.90	68.20	-23.30	PK
V	17235.00	41.99	30.33	6.32	24.55	42.53	54.00	-11.47	AV
V	22980.00	47.67	30.85	7.45	24.69	48.96	74.00	-25.04	PK
V	22980.00	41.36	30.85	7.45	24.69	42.65	54.00	-11.35	AV
V	28725.00	51.64	31.02	8.99	25.57	55.18	68.20	-13.02	PK
V	28725.00	41.33	31.02	8.99	25.57	44.87	54.00	-9.13	AV
H	11490.00	44.98	30.55	5.77	24.66	44.86	74.00	-29.14	PK
H	11490.00	41.87	30.55	5.77	24.66	41.75	54.00	-12.25	AV
H	17235.00	44.13	30.33	6.32	24.55	44.67	68.20	-23.53	PK
H	17235.00	41.22	30.33	6.32	24.55	41.76	54.00	-12.24	AV
H	22980.00	42.24	30.85	7.45	24.69	43.53	74.00	-30.47	PK
H	22980.00	41.05	30.85	7.45	24.69	42.34	54.00	-11.66	AV
H	28725.00	44.75	31.02	8.99	25.57	48.29	68.20	-19.91	PK
H	28725.00	41.57	31.02	8.99	25.57	45.11	54.00	-8.89	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:5785MHz									
V	11570.00	44.37	30.55	5.77	24.66	44.25	74.00	-29.75	PK
V	11570.00	41.94	30.55	5.77	24.66	41.82	54.00	-12.18	AV
V	17355.00	43.75	30.33	6.32	24.55	44.29	68.20	-23.91	PK
V	17355.00	41.84	30.33	6.32	24.55	42.38	54.00	-11.62	AV
V	23140.00	47.73	30.85	7.45	24.69	49.02	74.00	-24.98	PK
V	23140.00	41.08	30.85	7.45	24.69	42.37	54.00	-11.63	AV
V	28925.00	52.01	31.02	8.99	25.57	55.55	68.20	-12.65	PK
V	28925.00	41.99	31.02	8.99	25.57	45.53	54.00	-8.47	AV
H	11570.00	45.05	30.55	5.77	24.66	44.93	74.00	-29.07	PK
H	11570.00	41.96	30.55	5.77	24.66	41.84	54.00	-12.16	AV
H	17355.00	44.43	30.33	6.32	24.55	44.97	68.20	-23.23	PK
H	17355.00	41.84	30.33	6.32	24.55	42.38	54.00	-11.62	AV
H	23140.00	44.06	30.85	7.45	24.69	45.35	74.00	-28.65	PK
H	23140.00	41.89	30.85	7.45	24.69	43.18	54.00	-10.82	AV
H	28925.00	44.91	31.02	8.99	25.57	48.45	68.20	-19.75	PK
H	28925.00	41.64	31.02	8.99	25.57	45.18	54.00	-8.82	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel:5825MHz									
V	11650.00	45.34	30.55	5.77	24.66	45.22	74.00	-28.78	PK
V	11650.00	41.39	30.55	5.77	24.66	41.27	54.00	-12.73	AV
V	17475.00	45.15	30.33	6.32	24.55	45.69	68.20	-22.51	PK
V	17475.00	41.18	30.33	6.32	24.55	41.72	54.00	-12.28	AV
V	23300.00	46.38	30.85	7.45	24.69	47.67	74.00	-26.33	PK
V	23300.00	41.22	30.85	7.45	24.69	42.51	54.00	-11.49	AV
V	29125.00	52.65	31.02	8.99	25.57	56.19	68.20	-12.01	PK
V	29125.00	41.85	31.02	8.99	25.57	45.39	54.00	-8.61	AV
H	11650.00	42.70	30.55	5.77	24.66	42.58	74.00	-31.42	PK
H	11650.00	41.81	30.55	5.77	24.66	41.69	54.00	-12.31	AV
H	17475.00	45.49	30.33	6.32	24.55	46.03	68.20	-22.17	PK
H	17475.00	41.45	30.33	6.32	24.55	41.99	54.00	-12.01	AV
H	23300.00	46.56	30.85	7.45	24.69	47.85	74.00	-26.15	PK
H	23300.00	41.27	30.85	7.45	24.69	42.56	54.00	-11.44	AV
H	29125.00	43.00	31.02	8.99	25.57	46.54	68.20	-21.66	PK
H	29125.00	41.60	31.02	8.99	25.57	45.14	54.00	-8.86	AV

Remark:
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

802.11ac20

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:5745MHz									
V	11490.00	43.56	30.55	5.77	24.66	43.44	74.00	-30.56	PK
V	11490.00	41.93	30.55	5.77	24.66	41.81	54.00	-12.19	AV
V	17235.00	42.71	30.33	6.32	24.55	43.25	68.20	-24.95	PK
V	17235.00	41.94	30.33	6.32	24.55	42.48	54.00	-11.52	AV
V	22980.00	44.51	30.85	7.45	24.69	45.80	74.00	-28.20	PK
V	22980.00	41.77	30.85	7.45	24.69	43.06	54.00	-10.94	AV
V	28725.00	50.88	31.02	8.99	25.57	54.42	68.20	-13.78	PK
V	28725.00	41.87	31.02	8.99	25.57	45.41	54.00	-8.59	AV
H	11490.00	45.70	30.55	5.77	24.66	45.58	74.00	-28.42	PK
H	11490.00	41.24	30.55	5.77	24.66	41.12	54.00	-12.88	AV
H	17235.00	48.66	30.33	6.32	24.55	49.20	68.20	-19.00	PK
H	17235.00	41.17	30.33	6.32	24.55	41.71	54.00	-12.29	AV
H	22980.00	42.07	30.85	7.45	24.69	43.36	74.00	-30.64	PK
H	22980.00	41.52	30.85	7.45	24.69	42.81	54.00	-11.19	AV
H	28725.00	42.63	31.02	8.99	25.57	46.17	68.20	-22.03	PK
H	28725.00	41.76	31.02	8.99	25.57	45.30	54.00	-8.70	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:5785MHz									
V	11570.00	42.38	30.55	5.77	24.66	42.26	74.00	-31.74	PK
V	11570.00	41.10	30.55	5.77	24.66	40.98	54.00	-13.02	AV
V	17355.00	45.77	30.33	6.32	24.55	46.31	68.20	-21.89	PK
V	17355.00	41.04	30.33	6.32	24.55	41.58	54.00	-12.42	AV
V	23140.00	45.89	30.85	7.45	24.69	47.18	74.00	-26.82	PK
V	23140.00	41.21	30.85	7.45	24.69	42.50	54.00	-11.50	AV
V	28925.00	50.90	31.02	8.99	25.57	54.44	68.20	-13.76	PK
V	28925.00	41.42	31.02	8.99	25.57	44.96	54.00	-9.04	AV
H	11570.00	43.20	30.55	5.77	24.66	43.08	74.00	-30.92	PK
H	11570.00	41.34	30.55	5.77	24.66	41.22	54.00	-12.78	AV
H	17355.00	46.00	30.33	6.32	24.55	46.54	68.20	-21.66	PK
H	17355.00	41.68	30.33	6.32	24.55	42.22	54.00	-11.78	AV
H	23140.00	45.46	30.85	7.45	24.69	46.75	74.00	-27.25	PK
H	23140.00	41.03	30.85	7.45	24.69	42.32	54.00	-11.68	AV
H	28925.00	40.93	31.02	8.99	25.57	44.47	68.20	-23.73	PK
H	28925.00	41.89	31.02	8.99	25.57	45.43	54.00	-8.57	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel:5825MHz									
V	11650.00	45.98	30.55	5.77	24.66	45.86	74.00	-28.14	PK
V	11650.00	41.46	30.55	5.77	24.66	41.34	54.00	-12.66	AV
V	17475.00	43.50	30.33	6.32	24.55	44.04	68.20	-24.16	PK
V	17475.00	41.28	30.33	6.32	24.55	41.82	54.00	-12.18	AV
V	23300.00	46.50	30.85	7.45	24.69	47.79	74.00	-26.21	PK
V	23300.00	41.70	30.85	7.45	24.69	42.99	54.00	-11.01	AV
V	29125.00	53.62	31.02	8.99	25.57	57.16	68.20	-11.04	PK
V	29125.00	41.67	31.02	8.99	25.57	45.21	54.00	-8.79	AV
H	11650.00	44.83	30.55	5.77	24.66	44.71	74.00	-29.29	PK
H	11650.00	41.12	30.55	5.77	24.66	41.00	54.00	-13.00	AV
H	17475.00	44.61	30.33	6.32	24.55	45.15	68.20	-23.05	PK
H	17475.00	41.45	30.33	6.32	24.55	41.99	54.00	-12.01	AV
H	23300.00	45.63	30.85	7.45	24.69	46.92	74.00	-27.08	PK
H	23300.00	41.56	30.85	7.45	24.69	42.85	54.00	-11.15	AV
H	29125.00	42.34	31.02	8.99	25.57	45.88	68.20	-22.32	PK
H	29125.00	41.02	31.02	8.99	25.57	44.56	54.00	-9.44	AV

Remark:
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

5.POWER SPECTRAL DENSITY TEST

5.1 APPLIED PROCEDURES / LIMIT

According to FCC §15.407(a) (3) (i)

(1) Power limits:

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.

5.2 TEST PROCEDURE

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 a 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 section II.B.I.a).

b) Set VBW ≥ 3 RBW.

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

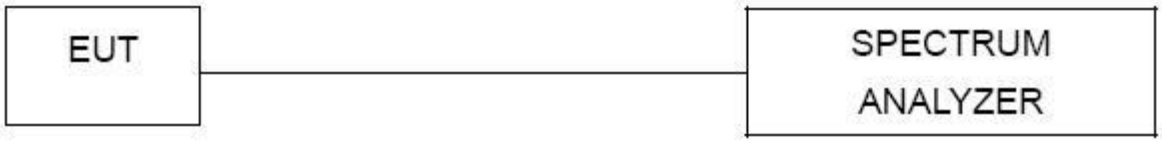
e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

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

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP



5.5 EUT OPERATION CONDITIONS

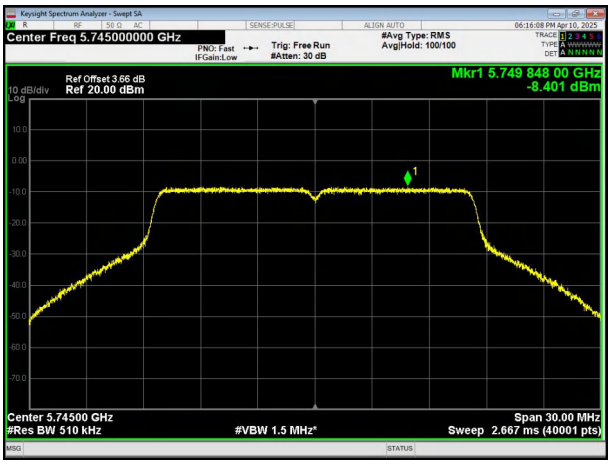
The EUT tested system was configured as the statements of 5.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.6 TEST RESULTS

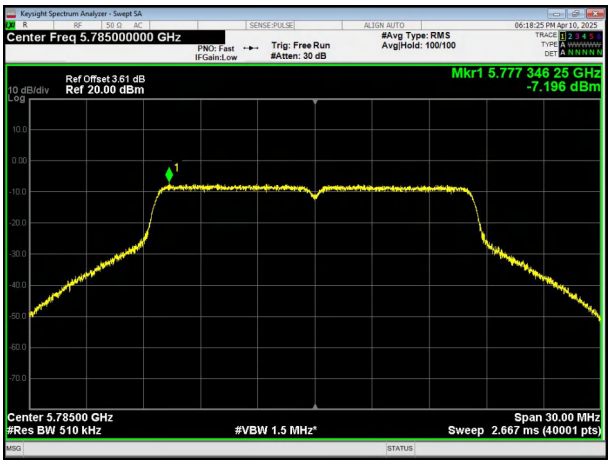
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1015 hPa	Test Voltage ：	DC 5V
Test Band ：	5.8G		

5.8G						
Test mode	Test Channel (MHz)	PSD (dBm/500kHz)	duty cycle Factor (dB)	Total PSD (dBm)	Limit (dBm/500kHz)	Result
802.11a	5745	-8.401	0	-8.401	30	Pass
	5785	-7.196	0	-7.196	30	Pass
	5825	-6.827	0	-6.827	30	Pass
802.11n20	5745	-8.026	0	-8.026	30	Pass
	5785	-7.277	0	-7.277	30	Pass
	5825	-6.663	0	-6.663	30	Pass
802.11n40	5755	-10.016	0	-10.016	30	Pass
	5795	-10.112	0	-10.112	30	Pass
802.11ac20	5745	-8.015	0	-8.015	30	Pass
	5785	-6.947	0	-6.947	30	Pass
	5825	-6.594	0	-6.594	30	Pass
802.11ac40	5755	-10.328	0	-10.328	30	Pass
	5795	-9.83	0	-9.83	30	Pass
802.11ac80	5775	-12.29	0	-12.29	30	Pass
Note: duty cycle Factor see page 58						

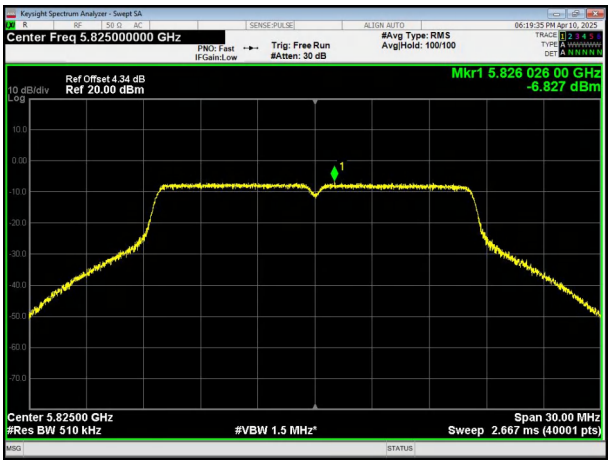
(802.11a) PSD plot on channel 149



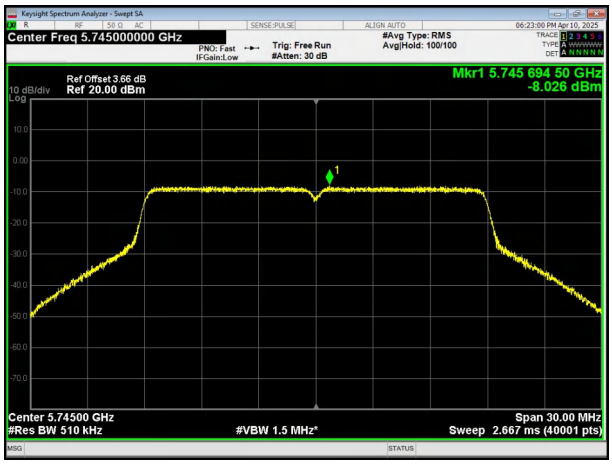
(802.11a) PSD plot on channel 157



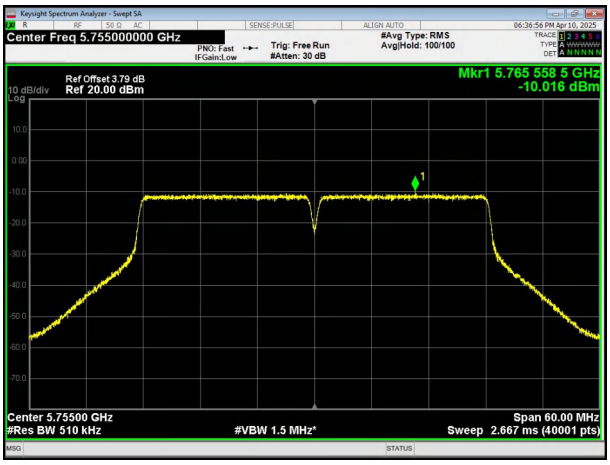
(802.11a) PSD plot on channel 165



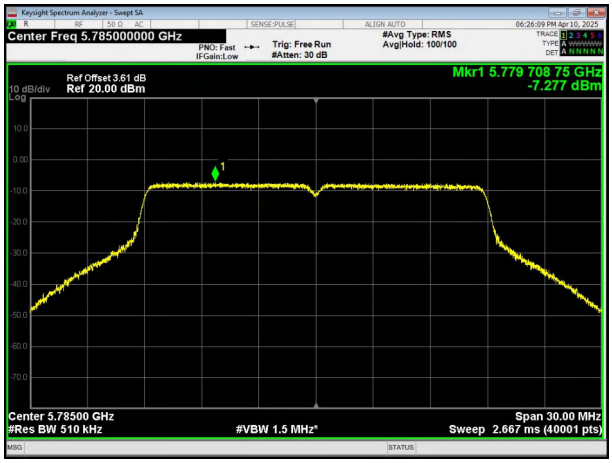
(802.11n20) PSD plot on channel 149



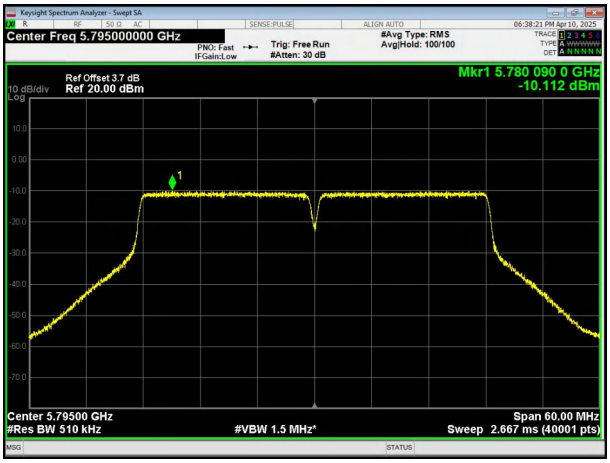
(802.11n40) PSD plot on channel 151



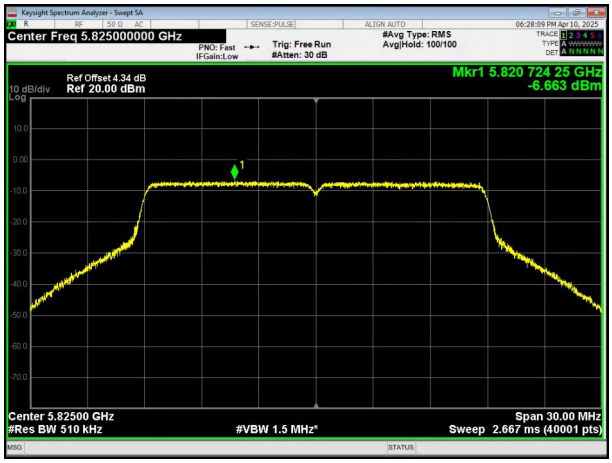
(802.11n20) PSD plot on channel 157



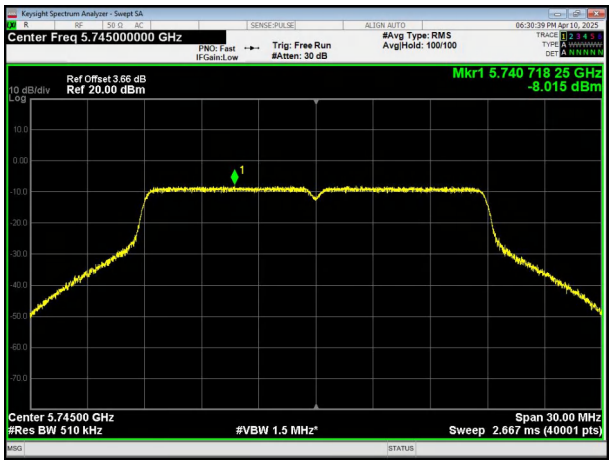
(802.11n40) PSD plot on channel 159



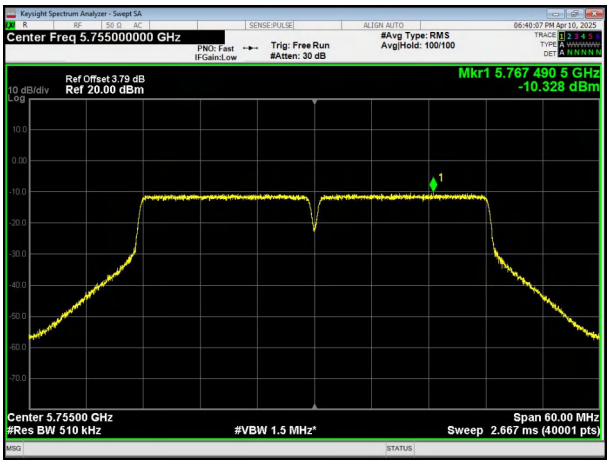
(802.11n20) PSD plot on channel 165



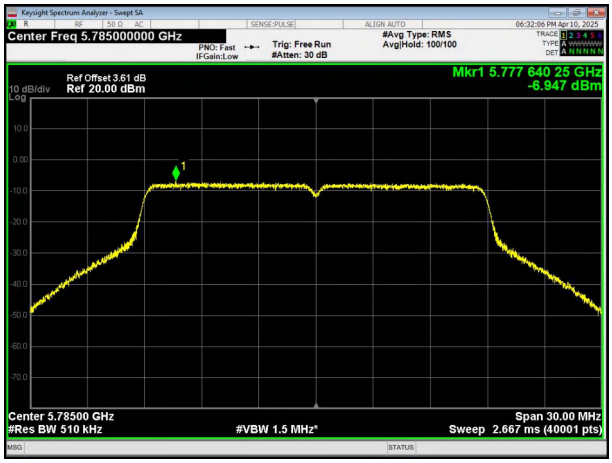
(802.11ac20) PSD plot on channel 149



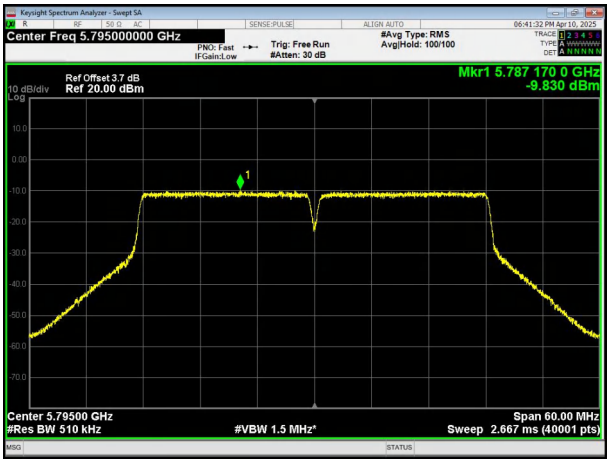
(802.11ac40) PSD plot on channel 151



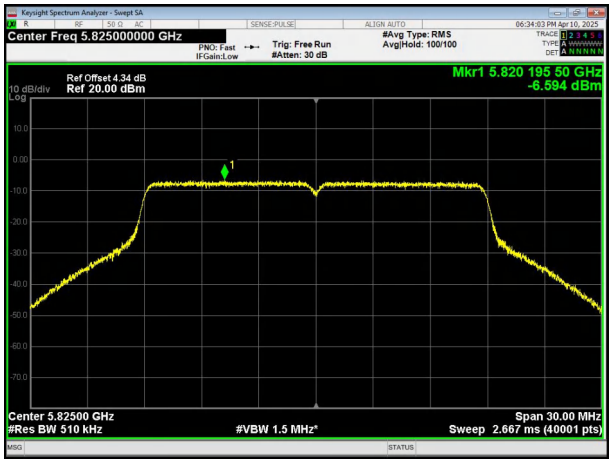
(802.11ac20) PSD plot on channel 157



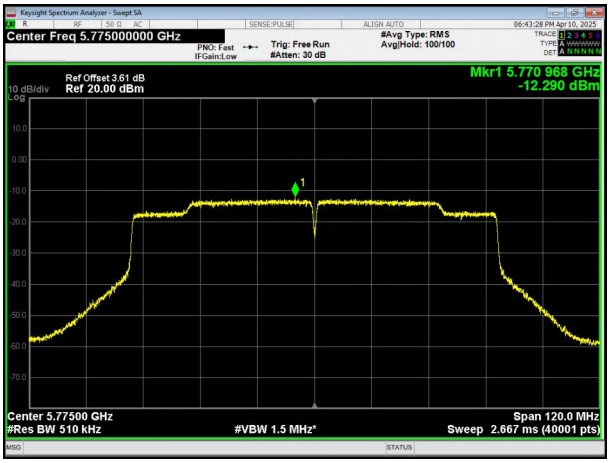
(802.11ac40) PSD plot on channel 159



(802.11ac20) PSD plot on channel 165



(802.11ac80) PSD plot on channel 155



6. 6DB OCCUPIED BANDWIDTH

6.1 APPLIED PROCEDURES / LIMIT

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, the minimum bandwidth 6 dB bandwidth of U-NII devices shall be at least 500KHz. 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.

6.2 TEST PROCEDURE

The following procedure shall be used for measuring 6dB Occupied Bandwidth:

The procedure for this method is as follows:

a) Set RBW = 100KHz.

b) Set the VBW > RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) 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.

6.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 6.2 Unless otherwise a special operating condition is specified in the follows during the testing.

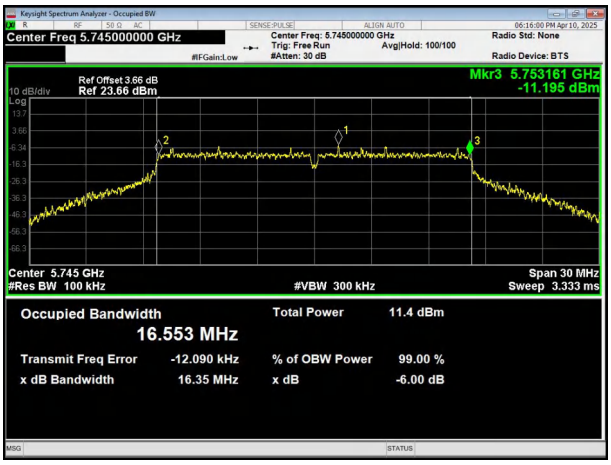
6.4 TEST RESULTS

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage ：	DC 5V
Test Band ：	5.8G		

5.8G				
Test Mode	Test Channel (MHz)	6dB Occupied Bandwidth (MHz)	Limit(KHz)	Result
802.11a	5745	16.345	>500	Pass
	5785	16.3		
	5825	16.337		
802.11n20	5745	17.591	>500	Pass
	5785	17.598		
	5825	17.628		
802.11n40	5755	36.326	>500	Pass
	5795	36.342		
802.11ac20	5745	17.58	>500	Pass
	5785	17.578		
	5825	17.541		
802.11ac40	5755	36.345	>500	Pass
	5795	36.327		
802.11ac80	5775	72.622	>500	Pass

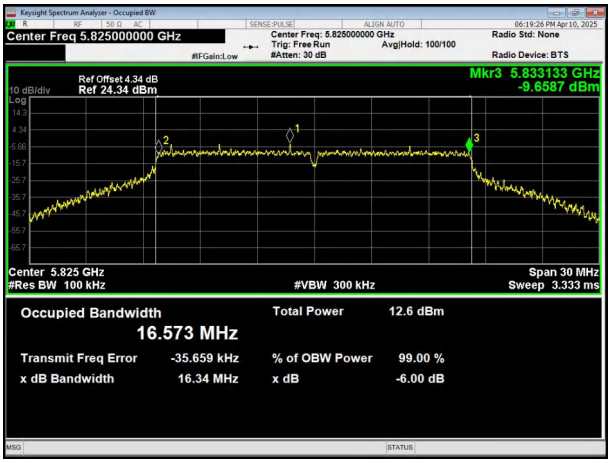
5.8G Test plot

(802.11a) 6dB Bandwidth plot on channel 149



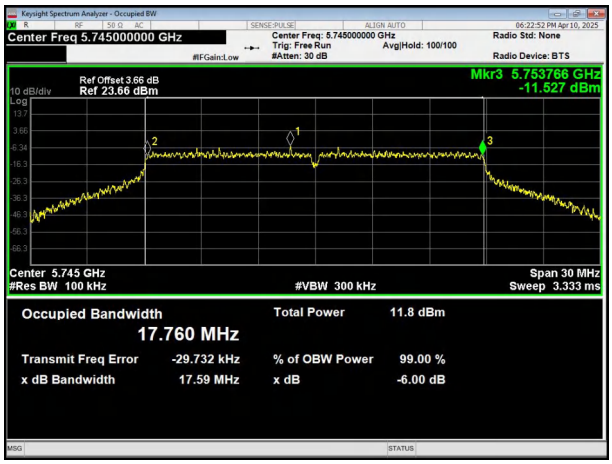
(802.11a) 6dB Bandwidth plot on channel 157

(802.11a) 6dB Bandwidth plot on channel 165

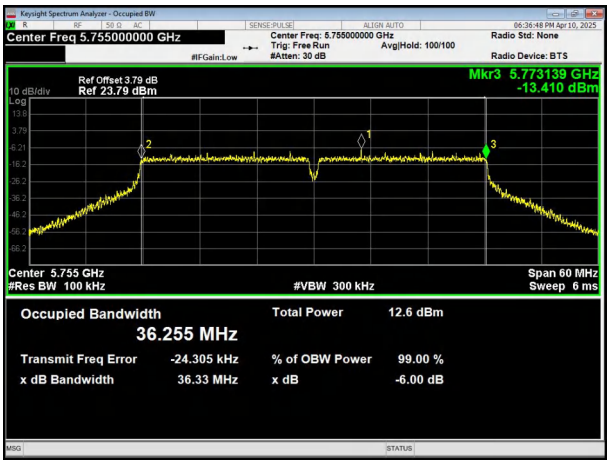


5.8G Test plot

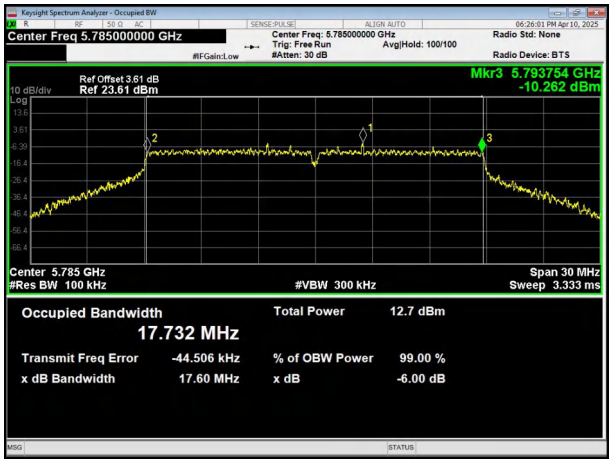
(802.11n20) 6dB Bandwidth plot on channel 149



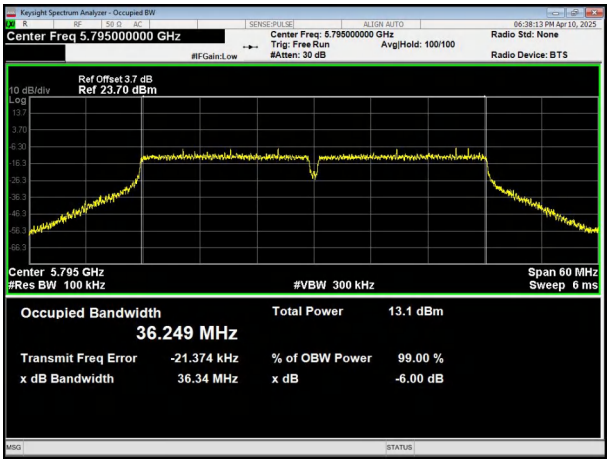
(802.11n40) 6dB Bandwidth plot on channel 151



(802.11n20) 6dB Bandwidth plot on channel 157



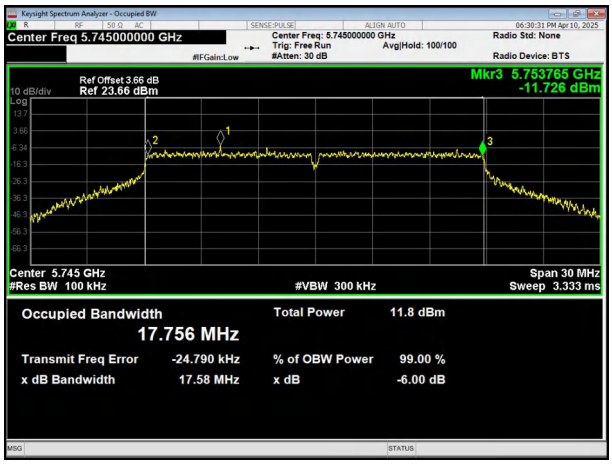
(802.11n40) 6dB Bandwidth plot on channel 159



(802.11n20) 6dB Bandwidth plot on channel 165

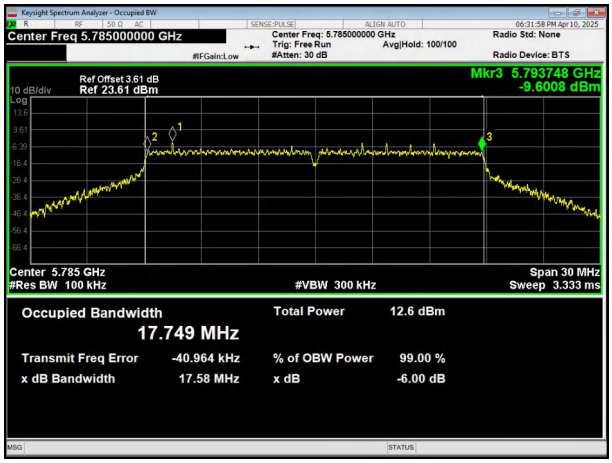
5.8G Test plot

(802.11ac20) 6dB Bandwidth plot on channel 149



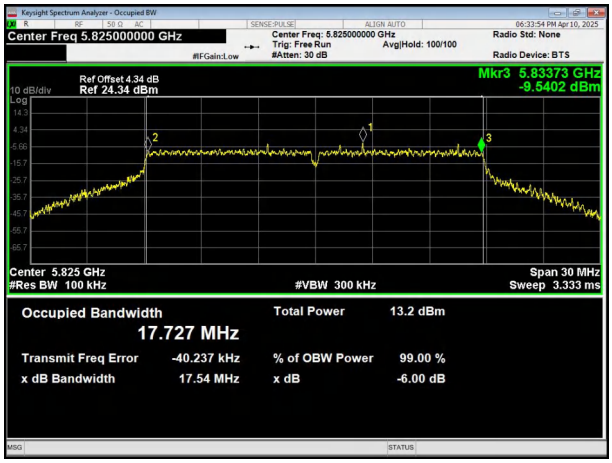
(802.11ac40) Bandwidth plot on channel 151

(802.11ac20) 6dB Bandwidth plot on channel 157

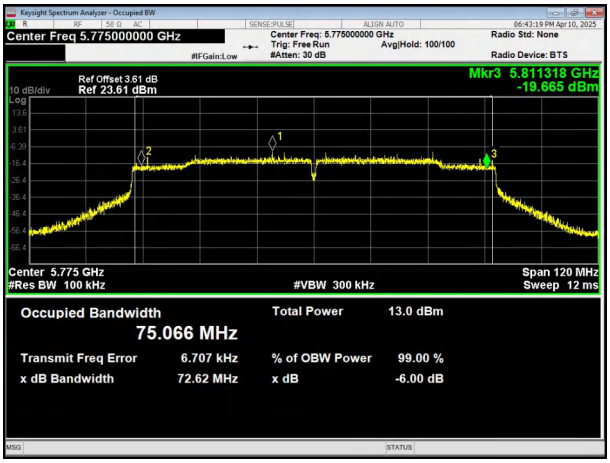


(802.11ac40) Bandwidth plot on channel 159

(802.11ac20) 6dB Bandwidth plot on channel 165



(802.11ac80) Bandwidth plot on channel 155



7.MAXIMUM CONDUCTED OUTPUT POWER

7.1 PPLIED PROCEDURES / LIMIT

According to FCC §15.407
The maximum conduced output power should not exceed:

Frequency Band(MHz)	Limit
5150~5250	250mW
5725~5850	1W

7.2 TEST PROCEDURE

The EUT was directly connected to the Power meter

1. Device Configuration
If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see section II.B.).
a) The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (to no lower than 98 percent) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.
b) If continuous transmission (or at least 98 percent duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level with the transmit duration as long as possible and the duty cycle as high as possible.

2. Measurement using a Spectrum Analyzer or EMI Receiver (SA)
Measurement of maximum conducted output power using a spectrum analyzer requires integrating the spectrum across a frequency span that encompasses, at a minimum, either the EBW or the 99-percent occupied bandwidth of the signal.1 However, the EBW must be used to determine bandwidth dependent limits on maximum conducted output power in accordance with § 15.407(a).
a) The test method shall be selected as follows: (i) Method SA-1 or SA-1 Alternative (averaging with the EUT transmitting at full power throughout each sweep) shall be applied if either of the following conditions can be satisfied:
• The EUT transmits continuously (or with a duty cycle ≥ 98 percent).
• Sweep triggering or gating can be implemented in a way that the device transmits at the maximum power control level throughout the duration of each of the instrument sweeps to be averaged. This condition can generally be achieved by triggering the instrument's sweep if the duration of the sweep (with the analyzer configured as in Method SA-1, below) is equal to or shorter than the duration T of each transmission from the EUT and if those transmissions exhibit full power throughout their durations.
(ii) Method SA-2 or SA-2 Alternative (averaging across on and off times of the EUT transmissions, followed by duty cycle correction) shall be applied if the conditions of (i) cannot be achieved and the transmissions exhibit a constant duty cycle during the measurement duration. Duty cycle will be considered to be constant if variations are less than ± 2 percent.
(iii) Method SA-3 (RMS detection with max hold) or SA-3 Alternative (reduced VBW with max hold) shall be applied if the conditions of (i) and (ii) cannot be achieved.
b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep): (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 = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

(vii) If transmit duty cycle < 98 percent, 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 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run”.

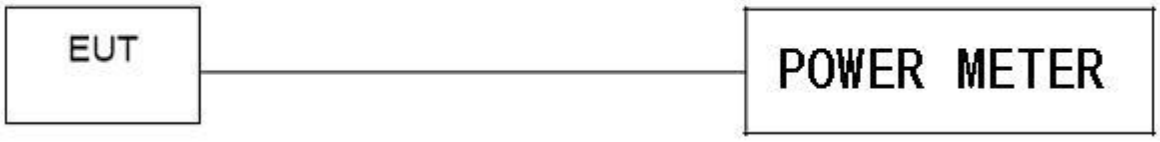
(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

(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

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 7.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.6 TEST RESULTS

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Band ：	5.8G		

802.11 a Mode						
Test Channel	Frequency (MHz)	Output power (dBm)	duty cycle Factor (dB)	Total power (dBm)	Limit (dBm)	Result
CH149	5745	4.634	0	4.634	30	Pass
CH157	5785	4.749	0	4.749	30	Pass
CH165	5825	5.387	0	5.387	30	Pass
802.11 n20 Mode						
Test Channel	Frequency (MHz)	Output power (dBm)	duty cycle Factor (dB)	Total power (dBm)	Limit (dBm)	Result
CH149	5745	4.537	0	4.537	30	Pass
CH157	5785	4.712	0	4.712	30	Pass
CH165	5825	5.361	0	5.361	30	Pass
802.11 n40 Mode						
Test Channel	Frequency (MHz)	Output power (dBm)	duty cycle Factor (dB)	Total power (dBm)	Limit (dBm)	Result
CH151	5755	5.173	0	5.173	30	Pass
CH159	5795	5.045	0	5.045	30	Pass

802.11 ac20 Mode						
Test Channel	Frequency (MHz)	Output power (dBm)	duty cycle Factor (dB)	Total power (dBm)	Limit (dBm)	Result
CH149	5745	4.617	0	4.617	30	Pass
CH157	5785	4.682	0	4.682	30	Pass
CH165	5825	5.347	0	5.347	30	Pass
802.11 ac40 Mode						
Test Channel	Frequency (MHz)	Output power (dBm)	duty cycle Factor (dB)	Total power (dBm)	Limit (dBm)	Result
CH151	5755	4.148	0	4.148	30	Pass
CH159	5795	4.969	0	4.969	30	Pass
802.11 ac80 Mode						
Test Channel	Frequency (MHz)	Output power (dBm)	duty cycle Factor (dB)	Total power (dBm)	Limit (dBm)	Result
CH155	5775	5.448	0	5.448	30	Pass

8.OUT OF BAND EMISSIONS

8.1 APPLICABLE STANDARD

According to FCC §15.407 (b) (4)

Undesirable emission limits. Except as shown in paragraph (b)(10) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

For transmitters operating solely in the 5.725-5.850 GHz band:

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in § 15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in § 15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

8.2 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.

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP

8.5 EUT OPERATION CONDITIONS

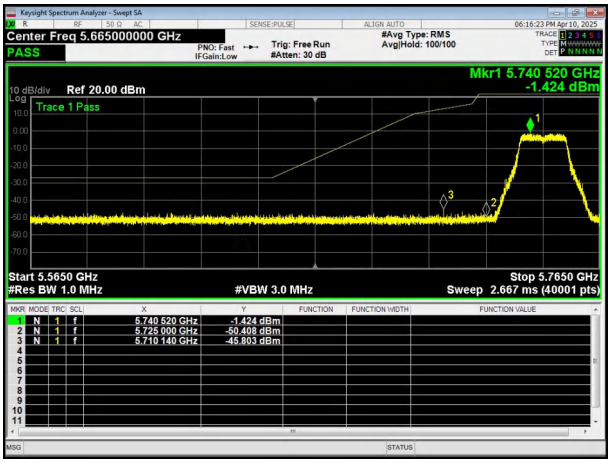
The EUT tested system was configured as the statements of 8.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.6 TEST RESULTS

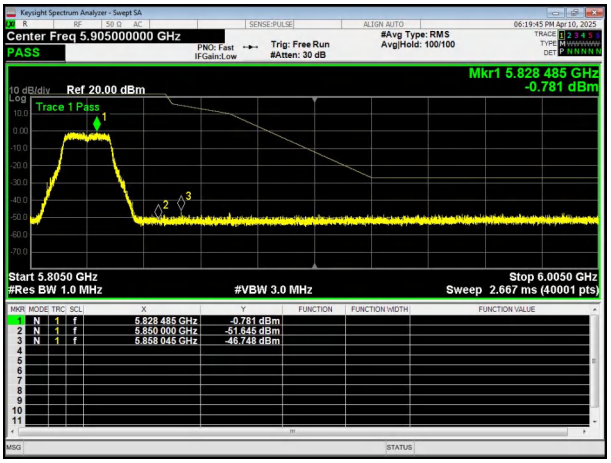
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1012 hPa	Test Voltage：	DC 5V
Test band：	5.8G	Antenna gain：	1.3dBi

5.745~5.825 GHz

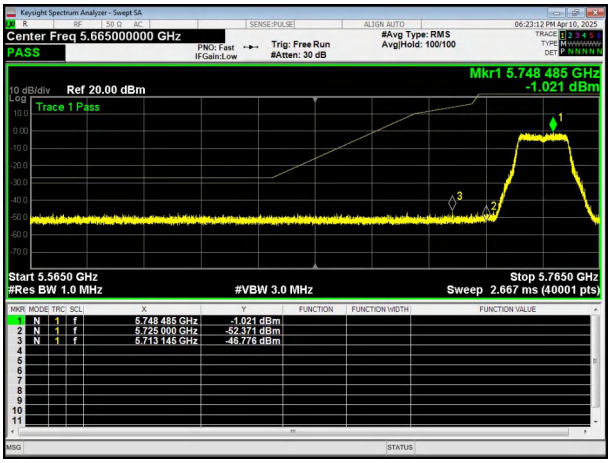
(802.11a) Band Edge, Left Side



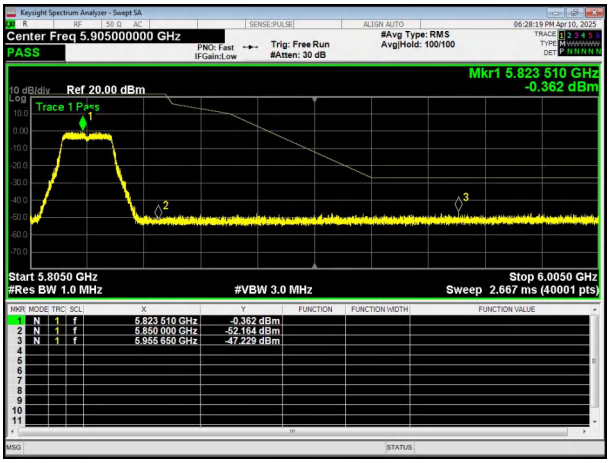
(802.11a) Band Edge, Right Side



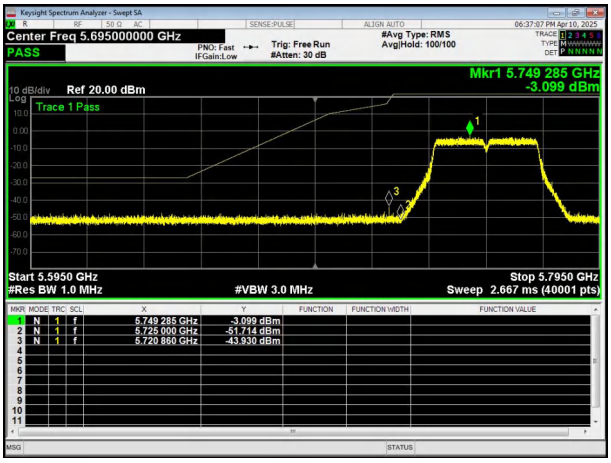
(802.11n20) Band Edge, Left Side



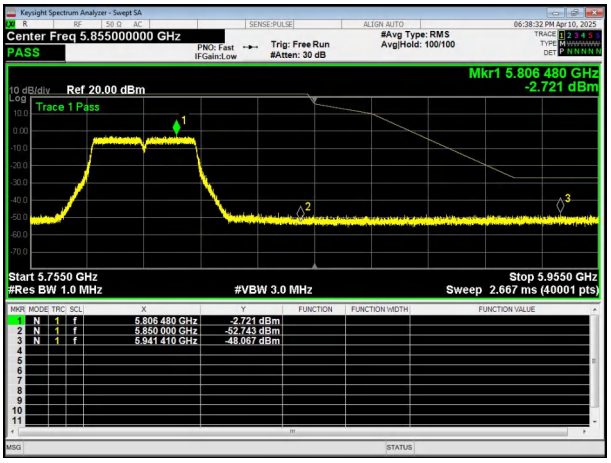
(802.11n20) Band Edge, Right Side



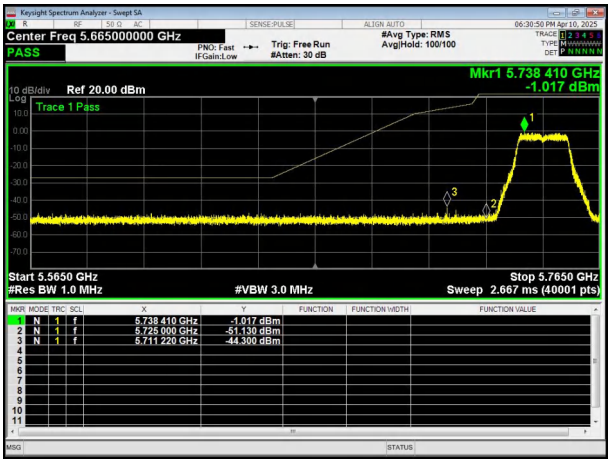
(802.11n40) Band Edge, Left Side



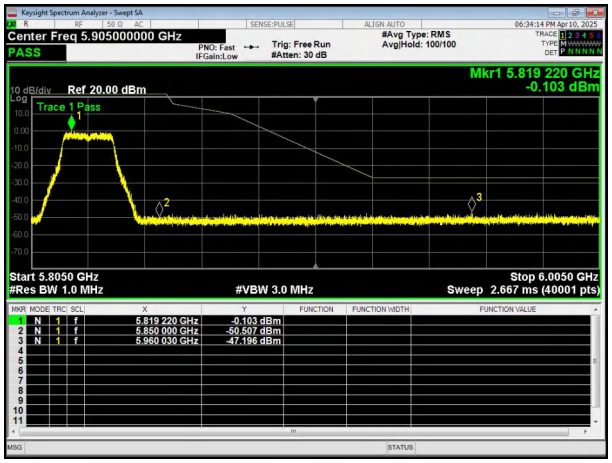
(802.11n40) Band Edge, Right Side



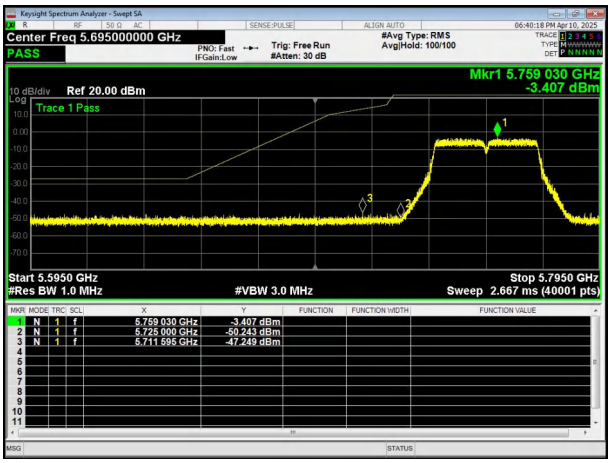
(802.11ac20) Band Edge, Left Side



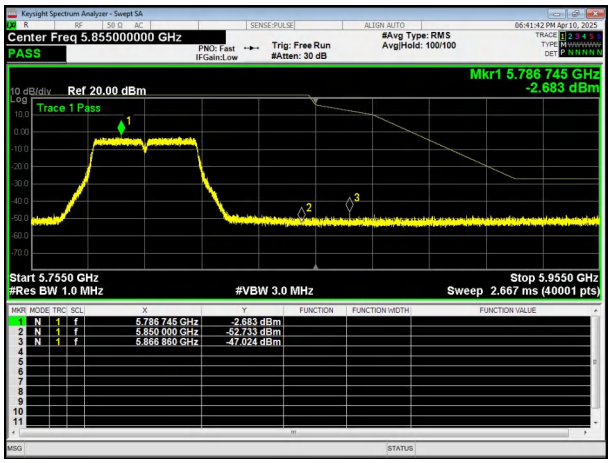
(802.11ac20) Band Edge, Right Side



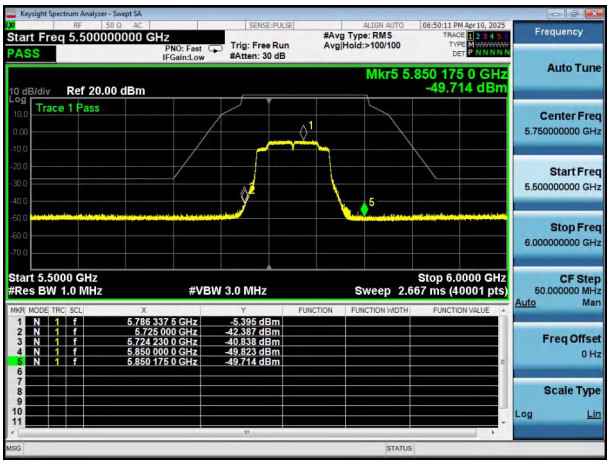
(802.11ac40) Band Edge, Left Side



(802.11ac40) Band Edge, Right Side



(802.11ac80) Band Edge, Left Side



9.SPURIOUS RF CONDUCTED EMISSIONS

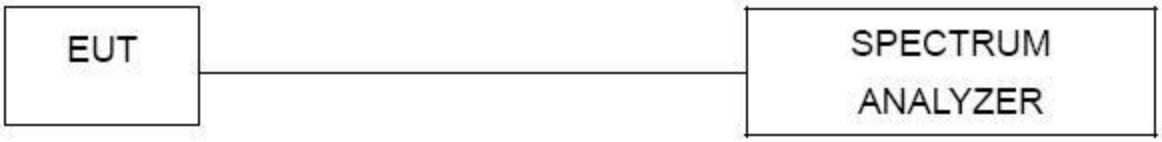
9.1 CONFORMANCE LIMIT

Frequency Band (MHz)	Limit
5150 - 5250	Outside of the 5.15-5.35 GHz band: e.i.r.p. -27 dBm
5250 - 5350	Outside of the 5.15-5.35 GHz band: e.i.r.p. -27 dBm
5470 - 5725	Outside of the 5.47-5.725 GHz band: e.i.r.p. -27 dBm
5725 - 5850	All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

9.2 MEASURING INSTRUMENTS

The Measuring equipment is listed in the section 3.5 of this test report.

9.3 TEST SETUP



9.4 TEST PROCEDURE

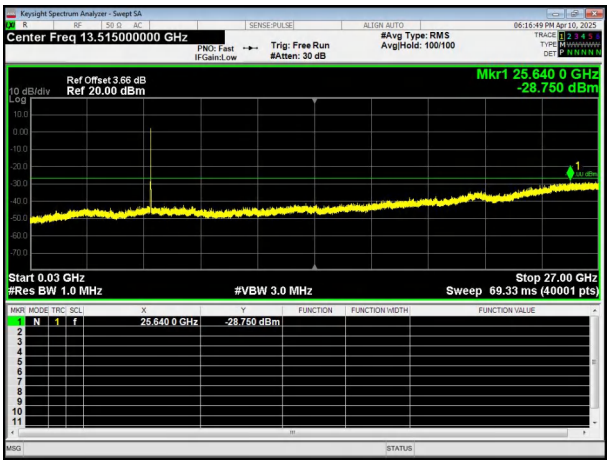
The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=1MHz and VBW= 3MHz to measure the peak field strength, and measure frequency range from 30MHz to 26.5GHz.

9.5 TEST RESULTS

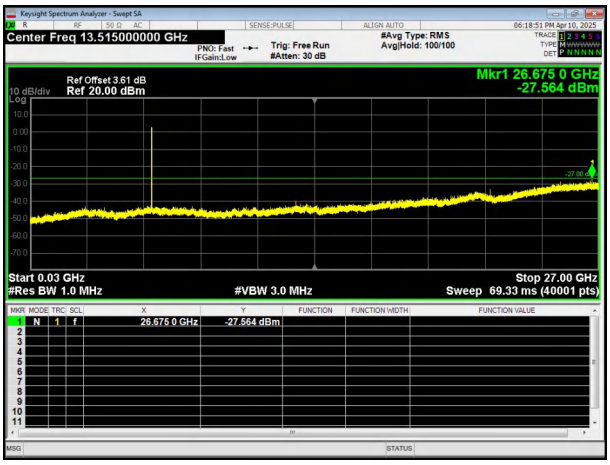
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1012 hPa	Test Voltage：	DC 5V
Test band：	5.8G		
Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. And above 26.5GHz of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported. The lowest, middle and highest channels are tested to verify the spurious emissions and band edge measurement data.			

5.8G Test Plot

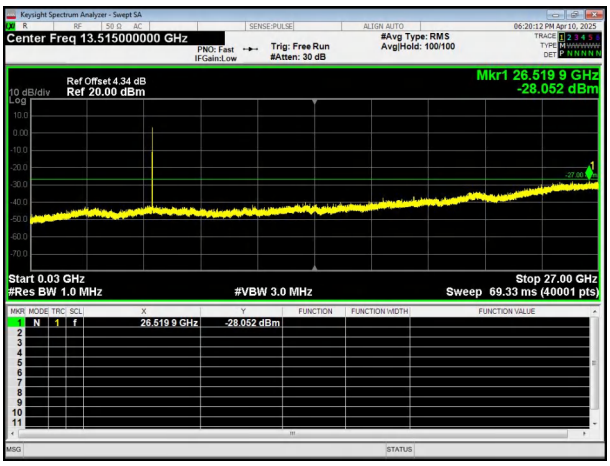
802.11a on channel 149



802.11a on channel 157

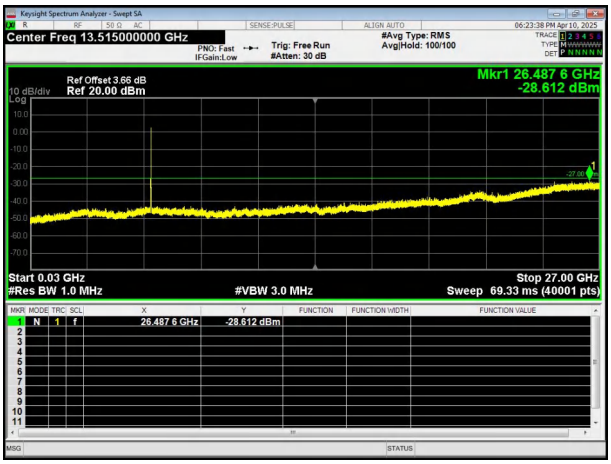


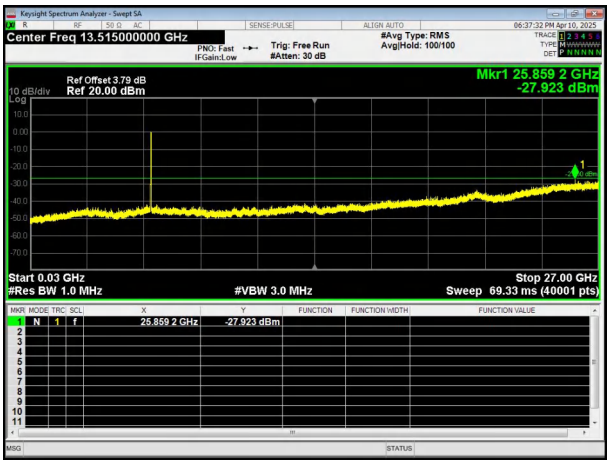
802.11a on channel 165



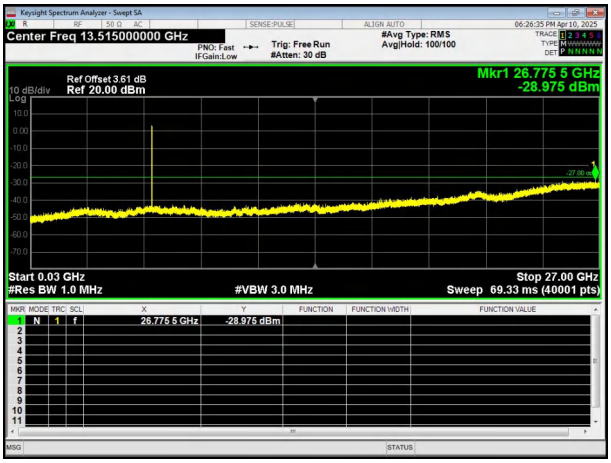
5.8G Test Plot

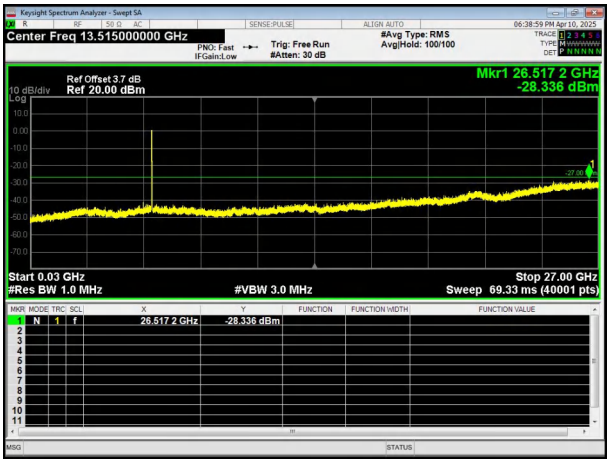
802.11n20 on channel 149



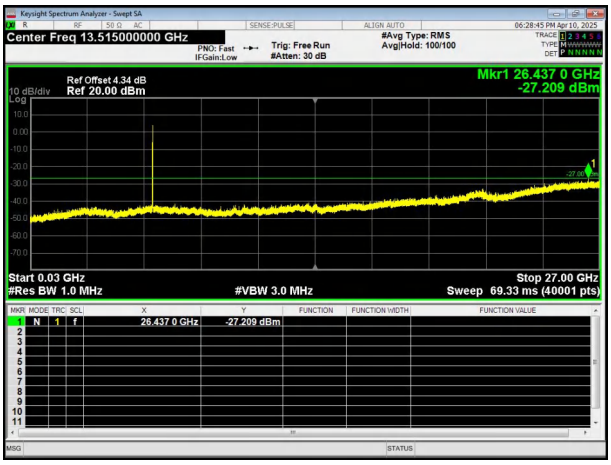


802.11n20 on channel 157



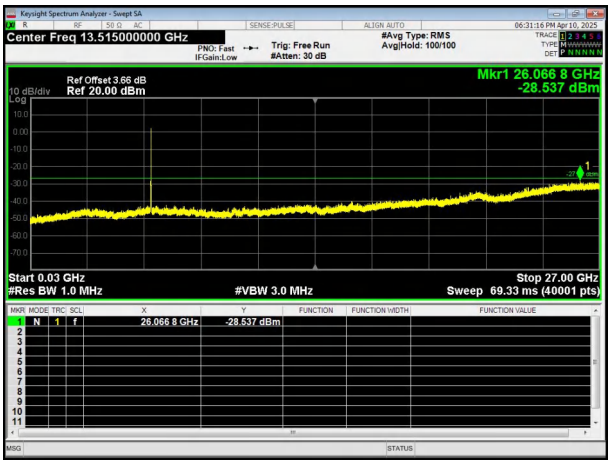


802.11n20 on channel 165

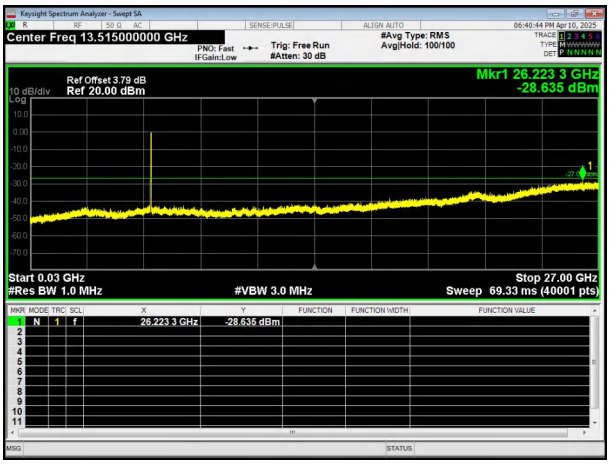


5.8G Test Plot

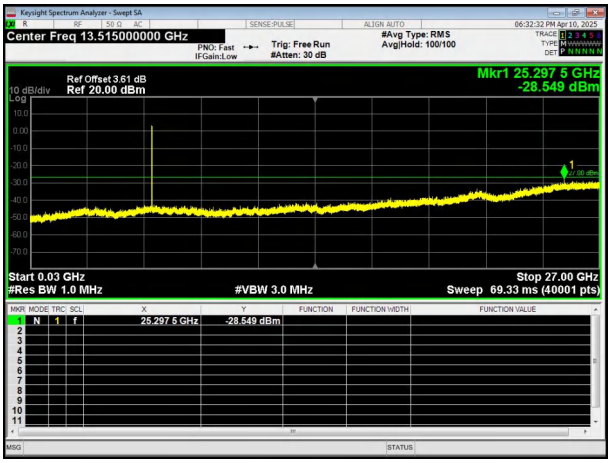
802.11ac20 on channel 149



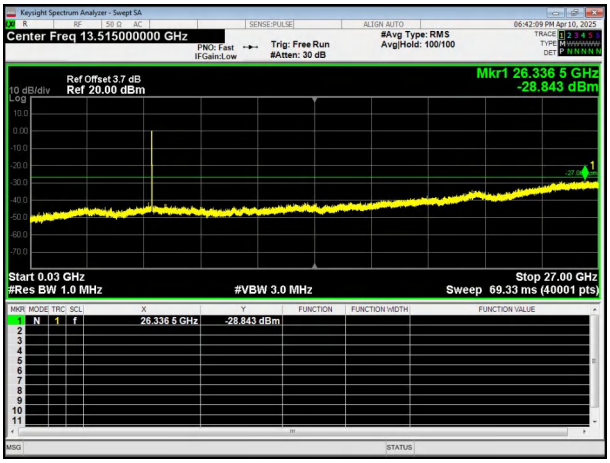
802.11ac40 on channel 159



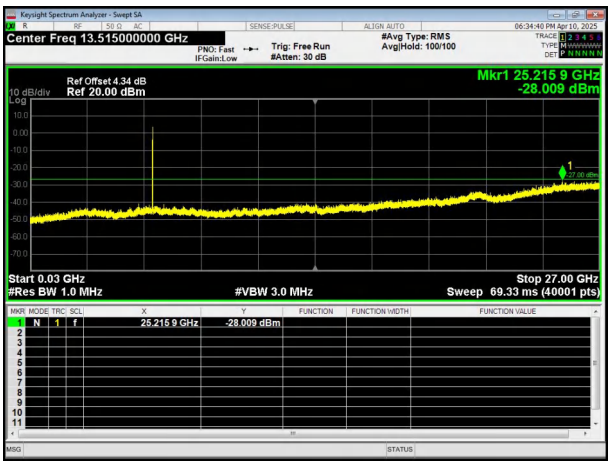
802.11ac20 on channel 157



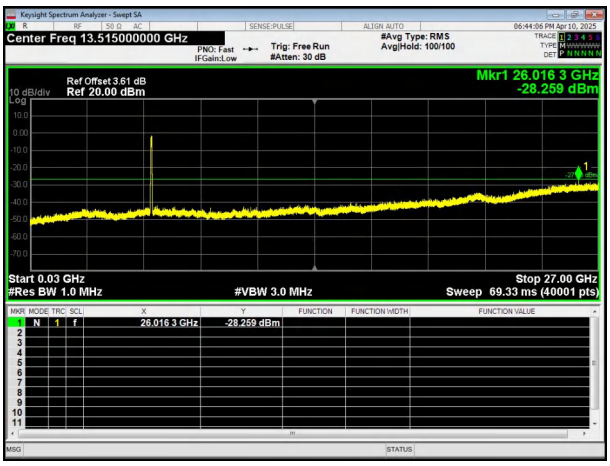
802.11ac40 on channel 159



802.11ac20 on channel 165



802.11ac80 on channel 155



10.Frequency Stability Measurement

10.1 LIMIT

Manufactures 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.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band (IEEE 802.11n specification).

10.2 TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 106 ppm and the limit is less than ±20ppm (IEEE 802.11nspecification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is -20°C~50°C.

10.3 TEST SETUP LAYOUT

10.4 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously un-modulation transmitting mode.

10.5 TEST RESULTS

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Band ：	5.8G		
Note: All channels have been tested, and only the worst test data is recorded in this report.			

Reference Frequency: 802.11a - 5745MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120	5744.974	-4.587
40	120	5744.954	-7.998
30	120	5744.962	-6.606
25	120	5744.962	-6.541
10	120	5744.979	-3.731
0	120	5744.977	-3.954
-10	120	5744.969	-5.407
-20	120	5744.964	-6.185

Reference Frequency: 802.11n20 - 5745MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120	5744.965	-6.031
40	120	5744.968	-5.572
30	120	5744.967	-5.718
25	120	5744.954	-7.945
10	120	5744.966	-5.930
0	120	5744.968	-5.532
-10	120	5744.966	-5.918
-20	120	5744.974	-4.579

Reference Frequency: 802.11n40 - 5755MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120	5754.961	-6.816
40	120	5754.957	-7.467
30	120	5754.971	-5.008
25	120	5754.964	-6.317
10	120	5754.980	-3.511
0	120	5754.979	-3.705
-10	120	5754.964	-6.171
-20	120	5754.965	-6.059

Reference Frequency: 802.11ac20 - 5745MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120	5744.973	-4.760
40	120	5744.963	-6.463
30	120	5744.978	-3.771
25	120	5744.968	-5.591
10	120	5744.978	-3.760
0	120	5744.971	-5.106
-10	120	5744.970	-5.195
-20	120	5744.965	-6.045

Reference Frequency: 802.11ac40 - 5755MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120	5754.963	-6.358
40	120	5754.970	-5.127
30	120	5754.977	-3.934
25	120	5754.964	-6.210
10	120	5754.977	-3.920
0	120	5754.957	-7.483
-10	120	5754.958	-7.299
-20	120	5754.960	-6.943

Reference Frequency: 802.11ac80 - 5775MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120	5774.974	-4.581
40	120	5774.985	-2.563
30	120	5774.987	-2.244
25	120	5774.977	-3.995
10	120	5774.979	-3.665
0	120	5774.970	-5.151
-10	120	5774.983	-2.895
-20	120	5774.984	-2.741

11.DUTY CYCLE

11.1 APPLIED PROCEDURES / LIMIT

Measurements of duty cycle and transmission duration shall be performed using one of the following techniques:

a) A diode detector and an oscilloscope that together have a sufficiently short response time to permit accurate measurements of the ON and OFF times of the transmitted signal.

b) The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:

1) Set the center frequency of the instrument to the center frequency of the transmission.

2) Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.

3) Set VBW ≥ RBW. Set detector = peak or average.

4) The zero-span measurement method shall not be used unless both RBW and VBW are > 50/*T* and the number of sweep points across duration *T* exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring the duty cycle shall not be used if $T \leq 16.7$ µs.)

11.2 DEVIATION FROM STANDARD

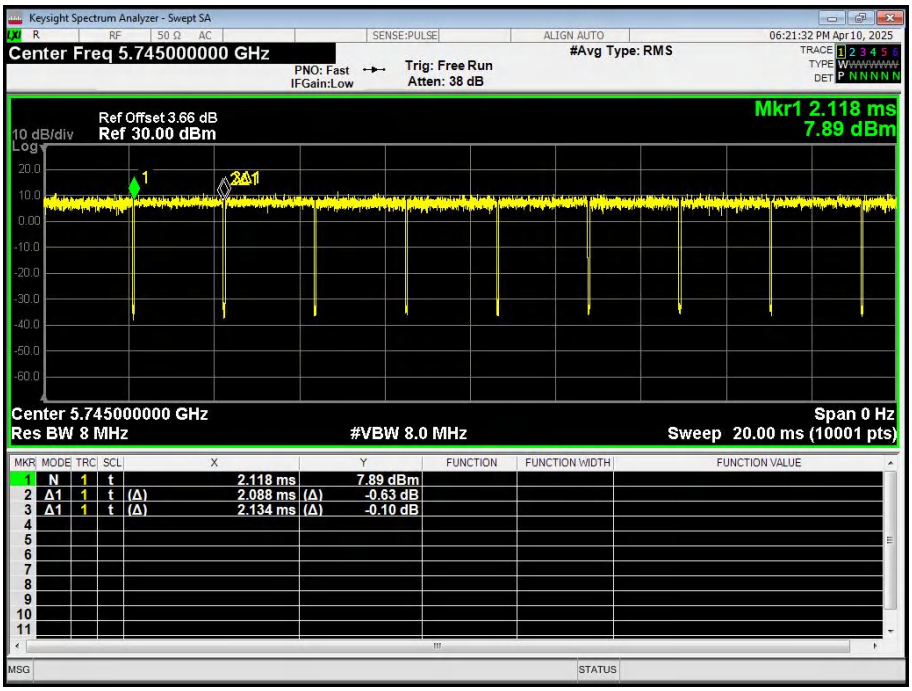
No deviation.

11.3 TEST SETUP

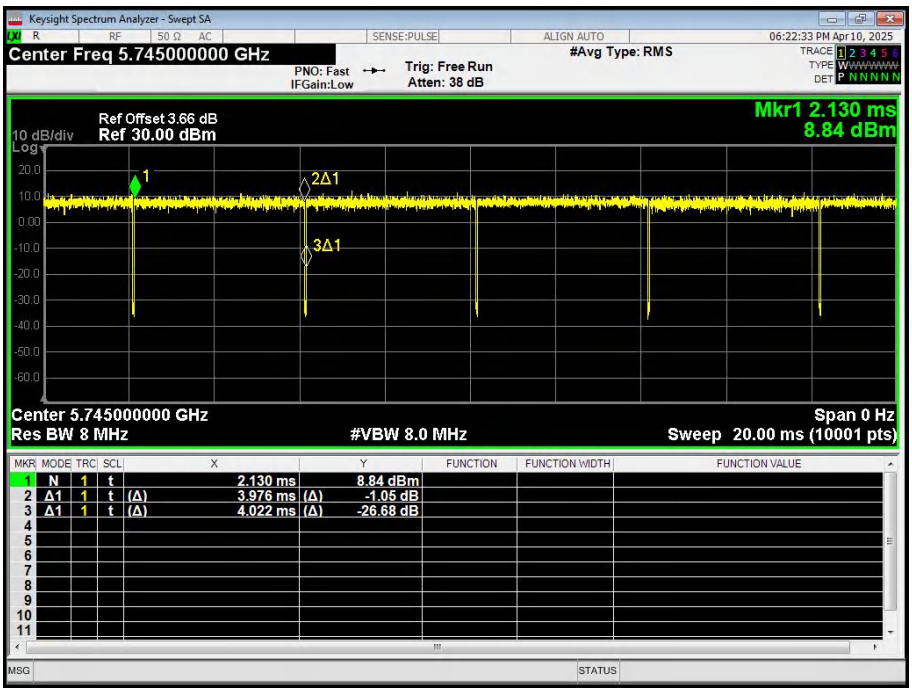
11.4 TEST RESULTS

5.8G				
Mode	Frequency (MHz)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Result
802.11a	5745	98.12	0	Pass
802.11n20	5745	99	0	Pass
802.11n40	5755	98.76	0	Pass
802.11ac20	5745	99	0	Pass
802.11ac40	5755	98.75	0	Pass
802.11ac80	5745	99	0	Pass

802.11a



802.11n20



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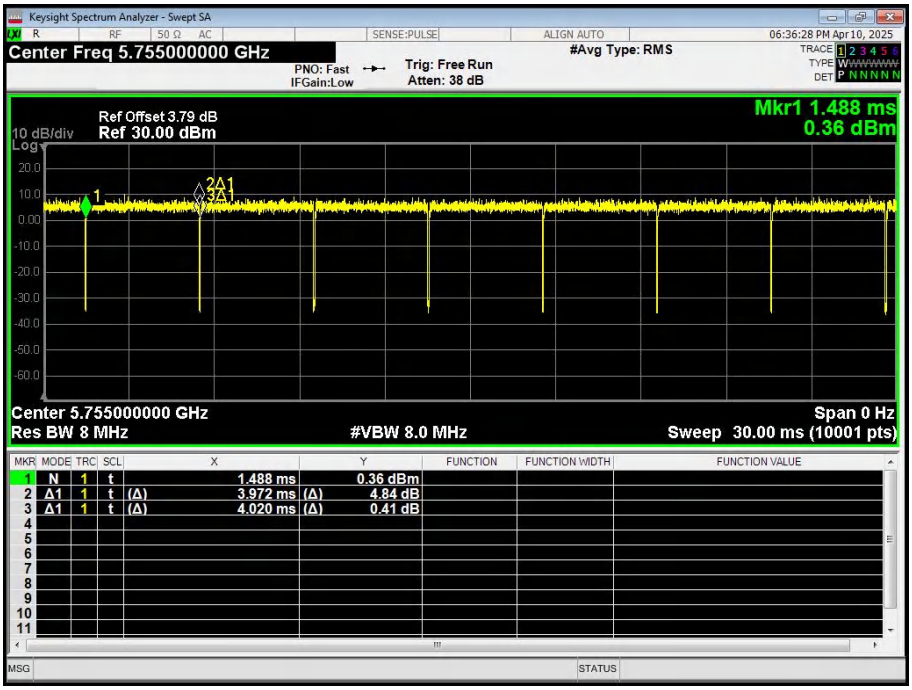

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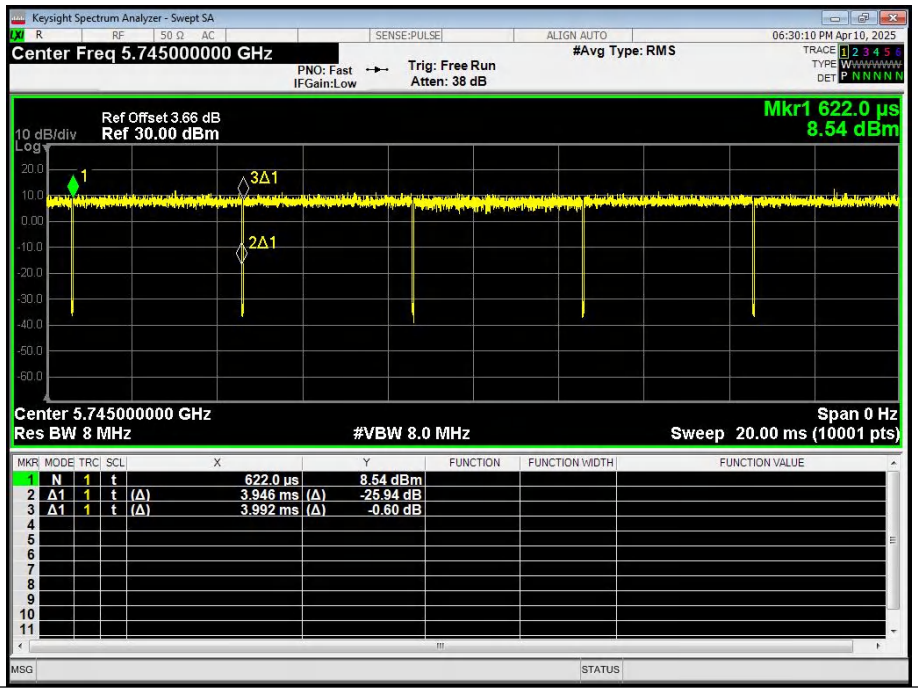

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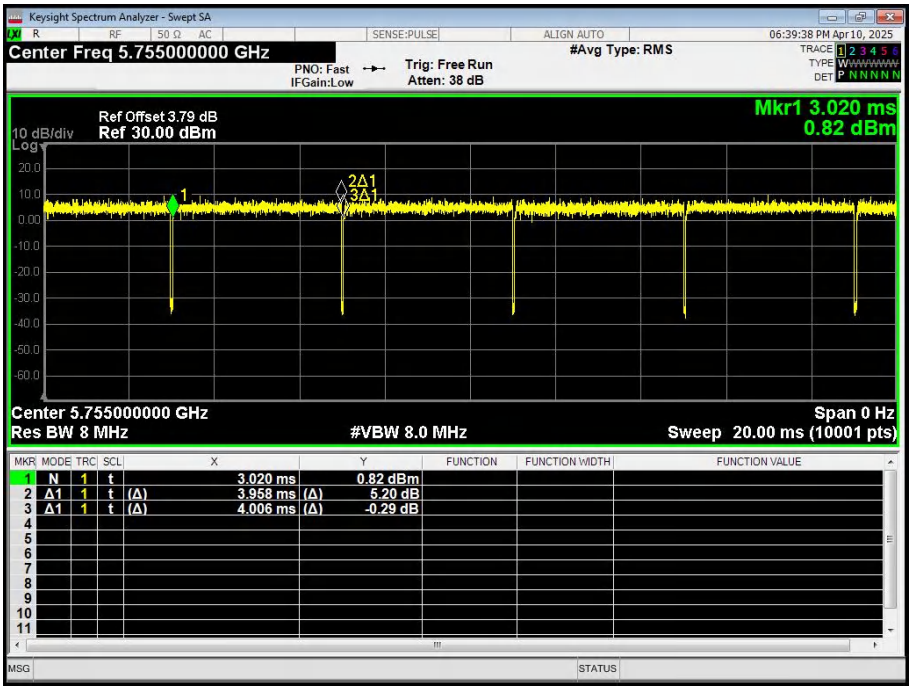
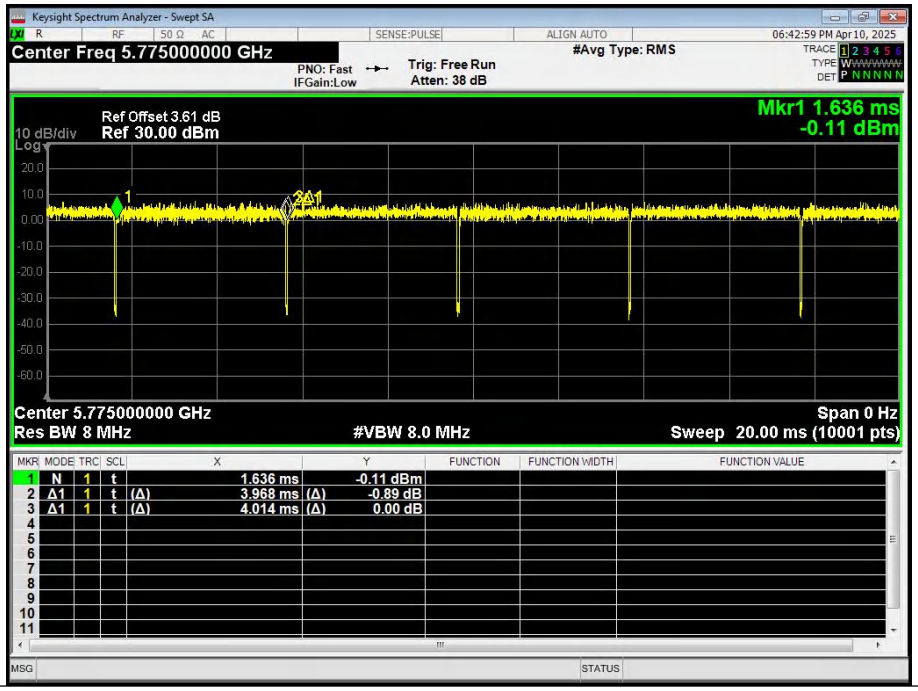


802.11ac 80



Note: All channel have been tested, and the report only reflects the worst case data.

Duty Cycle= Ton /Total*100%

Duty Cycle Correction Factor = 10log (1/Duty Cycle)

12.ANTENNA REQUIREMENT

Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.	
EUT Antenna:	
The antenna is PCB Antenna, the best case gain of the antenna is 1.3Bi, reference to the appendix II for details	

13. TEST SETUP PHOTO

Reference to the appendix I for details.

14. EUT CONSTRUCTIONAL DETAILS

Reference to the appendix II for details.

※※※※※ **END OF REPORT** ※※※※※