

TEST REPORT

Report No.: 8429EU010403W

Applicant: Shenzhen Rango Innovation Technology co., Ltd.

Address: 3/F, block A, Coolpad building, Gaoxin North 1st Road,
Nanshan District, Shenzhen, China

Product Name: Wireless Subwoofer

Model No.: S032

Trademark: OXS

FCC ID: 2AYJI-S032

Test Standard(s): 47 CFR Part 15E

Test Result: Pass

Date of Receipt: Mar. 04, 2026

Test Date: Mar. 04, 2026 - May 20, 2026

Date of Issue: Jul. 28, 2026

ISSUED BY:

SHENZHEN EU TESTING LABORATORY LIMITED



Prepared by:



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Reviewed and Approved by:



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2 General Information

2.1 Applicant Information

Applicant	Shenzhen Rango Innovation Technology co., Ltd.
Address	3/F, block A, Coolpad building, Gaoxin North 1st Road, Nanshan District, Shenzhen, China

2.2 Manufacturer Information

Manufacturer	Shenzhen Rango Innovation Technology co., Ltd.
Address	3/F, block A, Coolpad building, Gaoxin North 1st Road, Nanshan District, Shenzhen, China

2.3 Factory Information

Factory	Soundlab Technology Co; LTD
Address	No. 6-2, Shangxia Middle Road, Shangxia Area, Dongjiang Science Park, Zhongkai High-tech Zone, Huizhou, China 516255

2.4 General Description of E.U.T.

Product Name	Wireless Subwoofer
Model No. Under Test	S032
List Model No.	N/A
Description of Model differentiation	N/A
Rating(s)	Input: 100-240VAC, 50/60Hz, 1A
Product Type	☒ Mobile ☐ Portable ☐ Fix Location
Test Sample No.	8429EU010403W-1/2(Normal), 8429EU010403W-2/2(Engineering)
Hardware Version	V1
Software Version	V1.05
Remark	For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.5 Technical Information of E.U.T.

Network and Wireless Connectivity	5.8G ISM Proprietary Band
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The requirement for the following technical information of the EUT was tested in this report:

Technology	5.8G ISM Proprietary Band
Operating Frequency	5728MHz to 5848MHz
Modulation Type	GFSK
Test Channel	00 (5728 MHz), 30 (5788 MHz), 60 (5848MHz)
Number of Channels	61
Antenna Type	PCB Antenna
Antenna Gain(Peak)	1.17 dBi
Remark	The above information are declared by the applicant, EU-LAB is not responsible for the information accuracy provided by the applicant.

All channels were listed on the following table:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	5728	16	5760	32	5792	48	5824
01	5730	17	5762	33	5794	49	5826
02	5732	18	5764	34	5796	50	5828
03	5734	19	5766	35	5798	51	5830
04	5736	20	5768	36	5800	52	5832
05	5738	21	5770	37	5802	53	5834
06	5740	22	5772	38	5804	54	5836
07	5742	23	5774	39	5806	55	5838
08	5744	24	5776	40	5808	56	5840
09	5746	25	5778	41	5810	57	5842
10	5748	26	5780	42	5812	58	5844
11	5750	27	5782	43	5814	59	5846
12	5752	28	5784	44	5816	60	5848
13	5754	29	5786	45	5818		
14	5756	30	5788	46	5820		
15	5758	31	5790	47	5822		

3 Test Summary

3.1 Test Standard

The tests were performed according to following standards:

47 CFR Part 15E: Unlicensed National Information Infrastructure Devices

Remark:

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.

3.2 Test Verdict

Test Items	Standard	Method	Requirement	Results
Conducted Emission at AC power line	47 CFR Part 15E	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 section 6.2	47 CFR Part 15.207(a)	Pass
Duty Cycle	47 CFR Part 15E	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 section 12.2 (b)	---	Pass
Emission bandwidth and occupied bandwidth	47 CFR Part 15E	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 6.9 & 12.5 KDB 789033 D02, Clause C.2	47 CFR Part 15.407(e)	Pass
Maximum conducted output power	47 CFR Part 15E	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 12.4	47 CFR Part 15.407(a)(3)(i)	Pass
Power spectral density	47 CFR Part 15E	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 12.6	47 CFR Part 15.407(a)(3)(i)	Pass
Frequency stability	47 CFR Part 15E	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 6.8	47 CFR Part 15.407(g)	Pass
Band edge emissions (Conducted)	47 CFR Part 15E	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-	47 CFR Part 15.407(b)(4) 47 CFR Part	Pass

		2024 + Errata to C63.10a-2024, section 12.7.4, 12.7.6, 12.7.7	15.407(b)(10)	
Band edge emissions (Radiated)	47 CFR Part 15E	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 12.7.4, 12.7.6, 12.7.7	47 CFR Part 15.407(b)(4) 47 CFR Part 15.407(b)(10)	Pass
Undesirable emission limits (below 1GHz)	47 CFR Part 15E	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 12.7.4, 12.7.5	47 CFR Part 15.407(b)(9)	Pass
Undesirable emission limits (above 1GHz)	47 CFR Part 15E	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 12.7.4, 12.7.6, 12.7.7	47 CFR Part 15.407(b)(4) 47 CFR Part 15.407(b)(10)	Pass
Note: (1) "N/A" denotes test is not applicable in this Test Report.				

3.3 Test Laboratory

Test Laboratory	Shenzhen EU Testing Laboratory Limited
Address	101, Building B1, Fuqiao Fourth Area, Qiaotou Community, Fuhai Subdistrict, Baoan District, Shenzhen, Guangdong, China
Designation Number	CN1368
Test Firm Registration Number	952583

4 Test Configuration

4.1 Test Environment

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	30% to 60%	
Atmospheric Pressure	86 kPa to 106 kPa	
Temperature	NT (Normal Temperature)	+15°C to +35°C
Working Voltage of the EUT	NV (Normal Voltage)	120VAC, 60Hz

4.2 Test Equipment

Conducted Emission at AC power line					
Equipment	Manufacturer	Model No	Serial No	Cal Date	Cal Due Date
Test Software	Farad	EZ-EMC	EE-014	/	/
EMI Test Receiver	Rohde & Schwarz	ESCI	EE-005	2026-01-07	2027-01-06
L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	EE-004	2026-01-07	2027-01-06

Duty Cycle

Emission bandwidth and occupied bandwidth

Maximum conducted output power

Power spectral density

Frequency stability

Band edge emissions (Conducted)

Equipment	Manufacturer	Model No	Serial No	Cal Date	Cal Due Date
MXA Signal Analyzer	Agilent	N9020A	EE-011	2026-01-07	2027-01-06
MXG RF Vector Signal Generator	Agilent	N5182A	EE-012	2026-01-07	2027-01-06
MIMO Power Measurement Module	TSTPASS	TSPS 2023R	EE-016	2026-01-07	2027-01-06
Wideband Radio Communication Tester	ROHDE & SCHWARZ	CMW500	EE-402	2026-02-13	2027-02-12
MXG RF Analog Signal Generator	Agilent	N5181A	EE-406	2026-02-13	2027-02-12
Power Meter	Anritsu	ML2495A	EE-416	2026-02-13	2027-02-12
Constant Temperature Humidity Chamber	Guangxin	GXP-401	ES-002	2025-07-29	2026-07-28
RF Test Software	TSTPASS	TS32893 V2.0	EE-017	/	/

Band edge emissions (Radiated)					
Undesirable emission limits (above 1GHz)					
Equipment	Manufacturer	Model No	Serial No	Cal Date	Cal Due Date
EMI Test Receiver	ROHDE & SCHWARZ	ESPI	EE-006	2026-01-07	2027-01-06
Double Ridged Horn Antenna	A-INFOMW	LB-10180-NF	EE-008	2026-01-11	2029-01-10
Pre-amplifier	Agilent	8449B	EE-010	2026-01-07	2027-01-06
MXG RF Vector Signal Generator	Agilent	N5182A	EE-012	2026-01-07	2027-01-06
DRG Horn Antenna	SCHWARZBECK	BBHA 9170	EE-410	2026-02-13	2027-02-12
Pre-amplifier	SKET	LNPA-1840-50	EE-411	2026-02-13	2027-02-12
Loop Antenna	TESEQ	HLA6121	EE-403	2026-02-13	2027-02-12
Test Software	Farad	EZ-EMC	EE-015	/	/

Undesirable emission limits (below 1GHz)					
Equipment	Manufacturer	Model No	Serial No	Cal Date	Cal Due Date
EMI Test Receiver	ROHDE & SCHWARZ	ESPI	EE-006	2026-01-07	2027-01-06
Bilog Broadband Antenna	SCHWARZBECK	VULB 9163	EE-007	2026-01-13	2029-01-12
Pre-amplifier	Agilent	8447D	EE-009	2026-01-07	2027-01-06
MXA Signal Analyzer	Agilent	N9020A	EE-011	2026-01-07	2027-01-06
Loop Antenna	TESEQ	HLA6121	EE-403	2026-02-13	2027-02-12
Test Software	Farad	EZ-EMC	EE-015	/	/

4.3 Description of Support Unit

No.	Title	Manufacturer	Model No.	Serial No.
1	Speaker	Shenzhen Rango Innovation Technology co., Ltd	S031	--
2	Lenovo Notebook	Lenovo	Xiaoxin Air 14ALC 2021	EMC-PJ-052

4.4 Test Mode

No.	Test Modes	Description
TM1	5.8G TX Mode	Keep the EUT works in continuously transmitting mode at lowest, middle and highest channel.

4.5 Description of Calculation

4.5.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS \text{ (dBuV/m)} = RA \text{ (dBuV)} + AF \text{ (dB/m)} + CL \text{ (dB)} - AG \text{ (dB)}$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

4.5.2 Disturbance Calculation

The AC mains conducted disturbance is calculated by adding the 10dB Pulse Limiter and Cable Factor and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$CD \text{ (dBuV)} = RA \text{ (dBuV)} + PL \text{ (dB)} + CL \text{ (dB)}$$

Where CD = Conducted Disturbance	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	PL = 10 dB Pulse Limiter Factor

4.6 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT 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 $k=2$.

Test Item	Measurement Uncertainty
Conducted Emission	2.65 dB
Time of Occupancy (Dwell Time)	1.8 %
Occupied Channel Bandwidth	69 kHz
RF output power, conducted	1.07 dB
Power Spectral Density, conducted	0.94 dB
Unwanted Emissions, conducted	2.73 dB
Radiated Emission (1GHz- 18GHz)	Ur = 3.58 dB (Horizontal) Ur = 3.58 dB (Vertical)
Radiated Emission (9kHz- 30MHz)	Ur = 3.06 dB
Radiated Emission (30MHz- 1GHz)	Ur = 2.76 dB (Horizontal) Ur = 2.76 dB (Vertical)
Radiated Emission (18GHz- 40GHz)	Ur = 5.29 dB (Horizontal) Ur = 5.21 dB (Vertical)

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Condition

None

5 Radio Spectrum Matter Test Results (RF)

5.1 Conducted Emission at AC power line

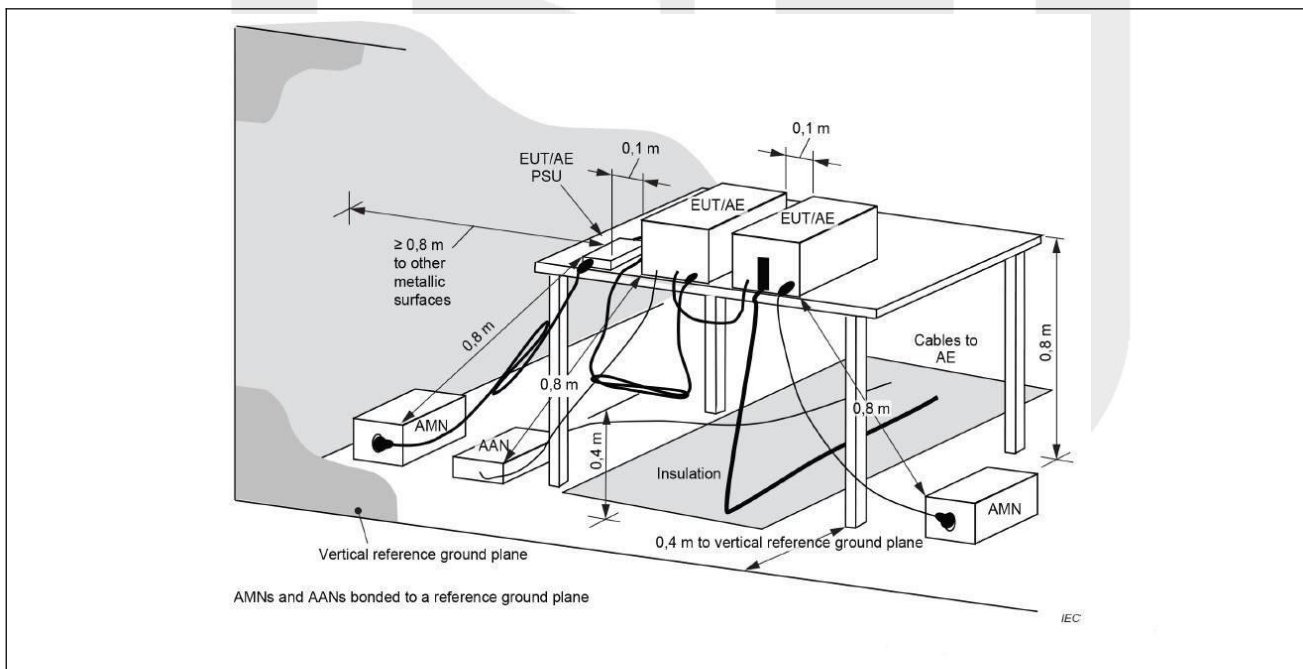
5.1.1 Test Specification

Test Requirement:	47 CFR Part 15.207(a)		
Test Limit:	Frequency of emission (MHz)	Conducted limit (dBμV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
	*Decreases with the logarithm of the frequency.		
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 section 6.2		

5.1.2 E.U.T. Operation

Pre test mode:	TM1
Final test mode:	TM1

5.1.3 Test Setup Diagram



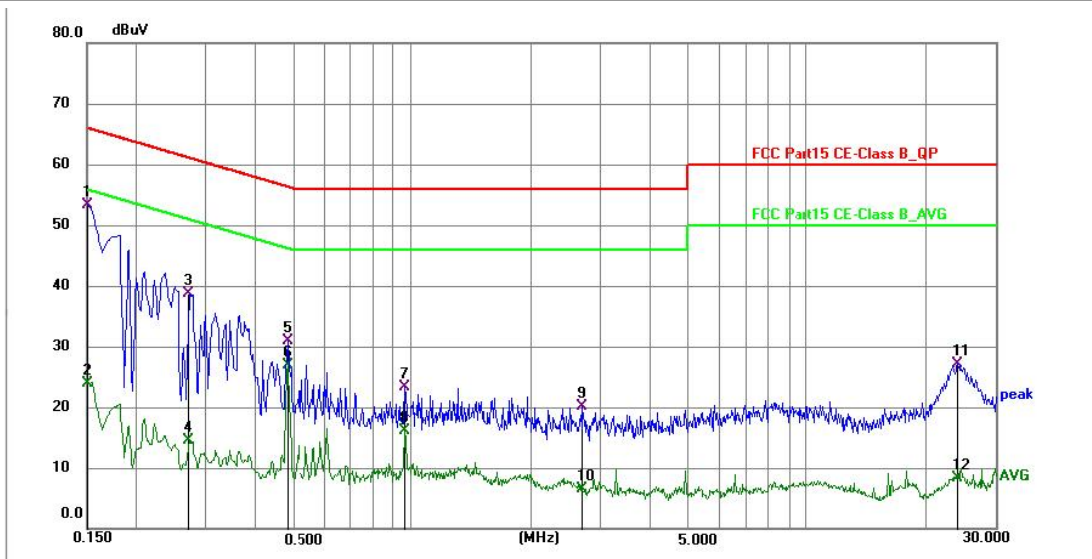
5.1.4 Test Data

PASS.

Only the worst case data was showed in the report, please to see the following pages.

Conducted Emission at AC power line Test Data

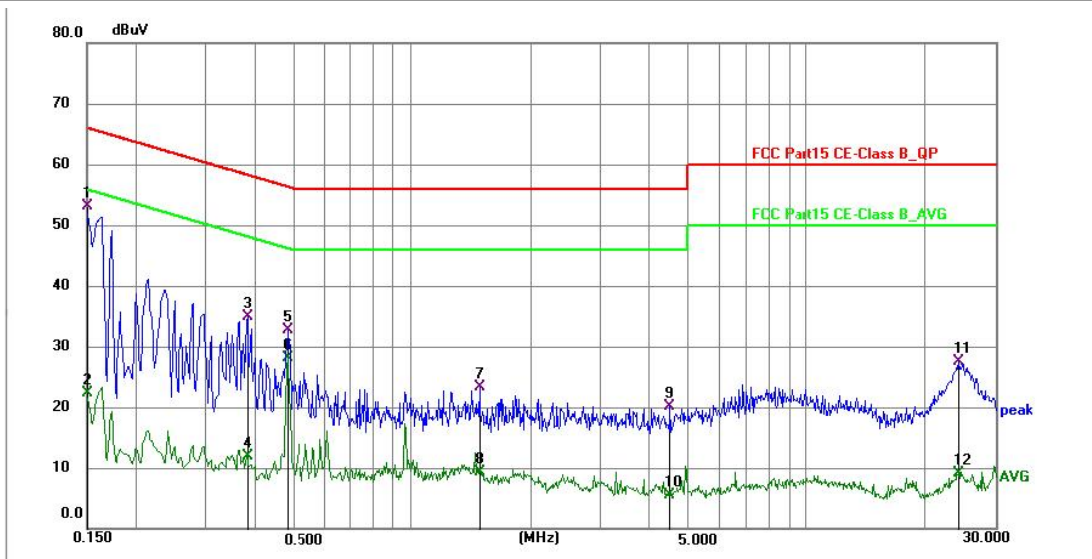
TM1 / Line: Line / Band: 5725-5850 MHz / BW: 3 / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1 *	0.1500	43.45	9.95	53.40	66.00	-12.60	QP	P	
2	0.1500	13.95	9.95	23.90	56.00	-32.10	AVG	P	
3	0.2714	28.65	9.99	38.64	61.07	-22.43	QP	P	
4	0.2714	4.49	9.99	14.48	51.07	-36.59	AVG	P	
5	0.4830	20.89	10.04	30.93	56.29	-25.36	QP	P	
6	0.4830	16.86	10.04	26.90	46.29	-19.39	AVG	P	
7	0.9600	13.18	10.04	23.22	56.00	-32.78	QP	P	
8	0.9600	5.97	10.04	16.01	46.00	-29.99	AVG	P	
9	2.6970	9.99	10.05	20.04	56.00	-35.96	QP	P	
10	2.6970	-3.58	10.05	6.47	46.00	-39.53	AVG	P	
11	24.1080	16.99	10.16	27.15	60.00	-32.85	QP	P	
12	24.1080	-1.84	10.16	8.32	50.00	-41.68	AVG	P	

Conducted Emission at AC power line Test Data

TM1 / Line: Neutral / Band: 5725-5850 MHz / BW: 3 / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1 *	0.1500	43.07	9.97	53.04	66.00	-12.96	QP	P	
2	0.1500	12.37	9.97	22.34	56.00	-33.66	AVG	P	
3	0.3795	24.92	10.04	34.96	58.29	-23.33	QP	P	
4	0.3795	1.95	10.04	11.99	48.29	-36.30	AVG	P	
5	0.4830	22.69	10.07	32.76	56.29	-23.53	QP	P	
6	0.4830	17.97	10.07	28.04	46.29	-18.25	AVG	P	
7	1.4865	13.17	10.06	23.23	56.00	-32.77	QP	P	
8	1.4865	-0.71	10.06	9.35	46.00	-36.65	AVG	P	
9	4.4925	9.96	10.05	20.01	56.00	-35.99	QP	P	
10	4.4925	-4.53	10.05	5.52	46.00	-40.48	AVG	P	
11	24.2115	17.38	10.15	27.53	60.00	-32.47	QP	P	
12	24.2115	-1.14	10.15	9.01	50.00	-40.99	AVG	P	

5.2 Duty Cycle

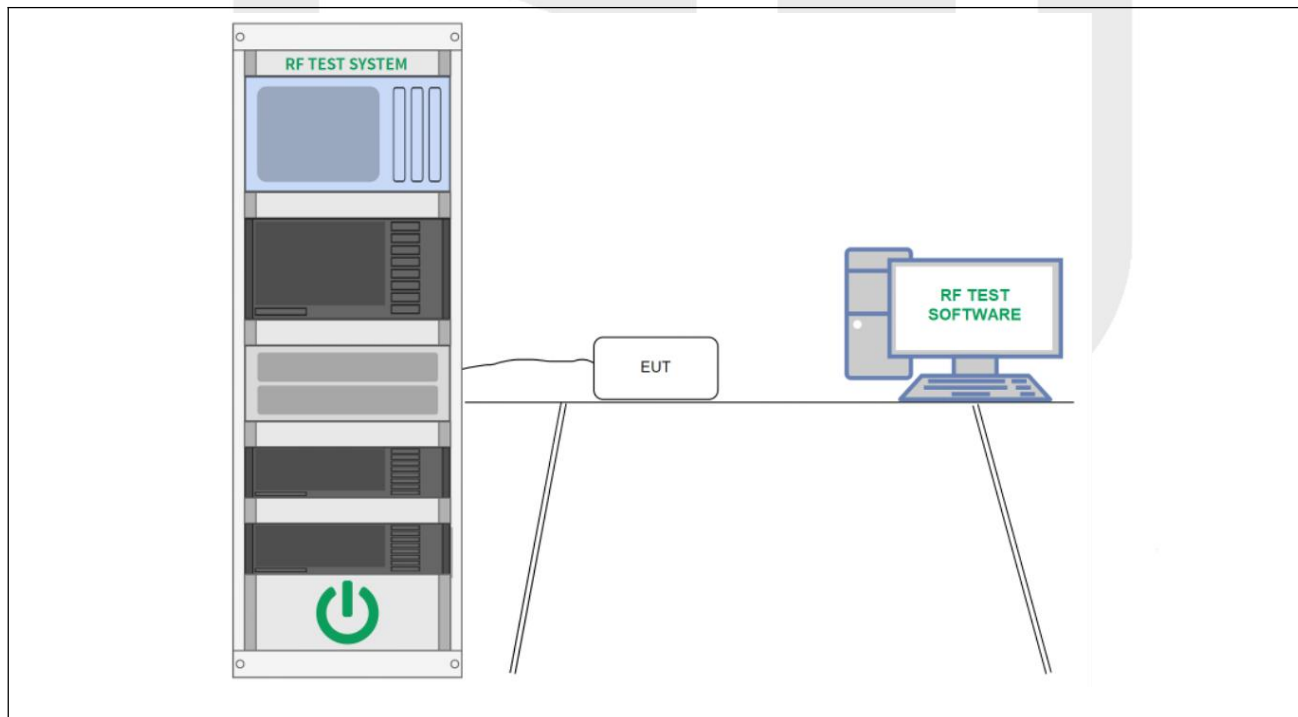
5.2.1 Test Specification

Test Requirement:	All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximum-power transmission duration, T, are required for each tested mode of operation.
Test Limit:	No limits, only for report use.
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 section 12.2 (b)
Procedure:	i) Set the center frequency of the instrument to the center frequency of the transmission. ii) Set RBW $\geq$ EBW if possible; otherwise, set RBW to the largest available value. iii) Set VBW $\geq$ RBW. iv) Set detector = peak. v) The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$, where T is defined in item a1) of 12.2, and the number of sweep points across duration T exceeds 100.

5.2.2 E.U.T. Operation

Pre test mode:	TM1
Final test mode:	TM1

5.2.3 Test Setup Diagram



5.2.4 Test Data

PASS.

Please refer to Annex D for details.

5.3 Emission bandwidth and occupied bandwidth

5.3.1 Test Specification

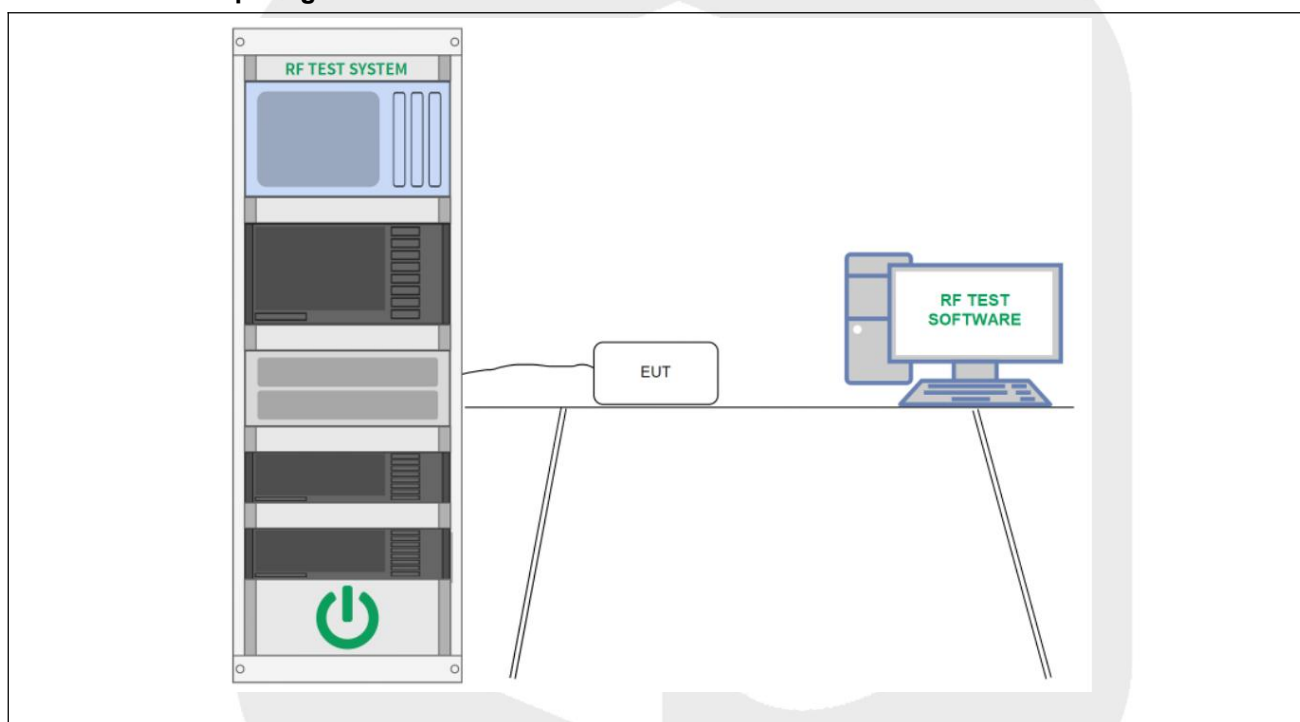
Test Requirement:	U-NII 3, U-NII 4: 47 CFR Part 15.407(e)
Test Limit:	U-NII 3, U-NII 4: Within the 5.725-5.850 GHz and 5.850-5.895 GHz bands, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 6.9 & 12.5 KDB 789033 D02, Clause C.2
Procedure:	Occupied bandwidth: a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (OBW/RBW)]$ below the reference level. Specific guidance is given in 4.1.5.2. d) Step a) through step c) might require iteration to adjust within the specified range. e) 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. f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth. g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. 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% power bandwidth is the difference between these two frequencies. h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s). 6 dB emission bandwidth: a) Set RBW = 100 kHz. b) Set the video bandwidth (VBW) $\geq 3 \times$ 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.
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5.3.2 E.U.T. Operation

Pre test mode:	TM1
Final test mode:	TM1

5.3.3 Test Setup Diagram



5.3.4 Test Data

PASS.

Please refer to Annex D for details.

5.4 Maximum conducted output power

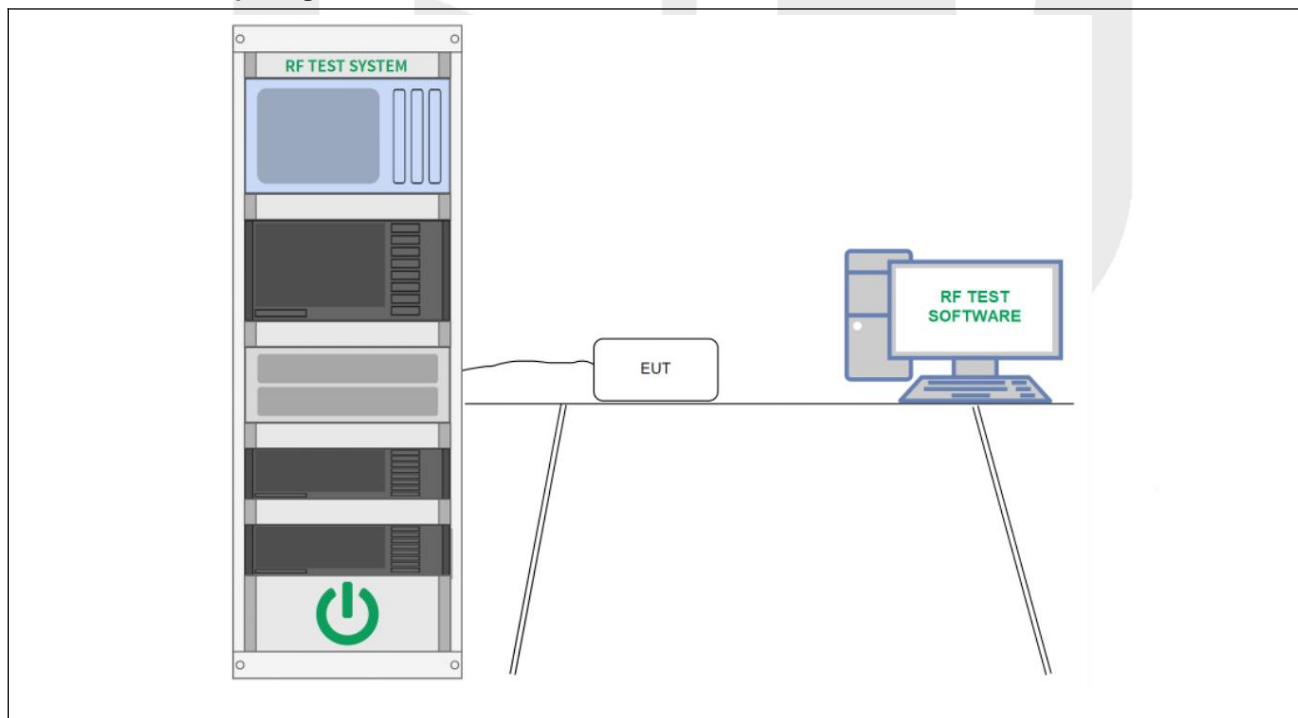
5.4.1 Test Specification

Test Requirement:	47 CFR Part 15.407(a)(3)(i)
Test Limit:	For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power 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.
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 12.4
Procedure:	Refer to ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 section 12.4

5.4.2 E.U.T. Operation

Pre test mode:	TM1
Final test mode:	TM1

5.4.3 Test Setup Diagram



5.4.4 Test Data

PASS.

Please refer to Annex D for details.

5.5 Power spectral density

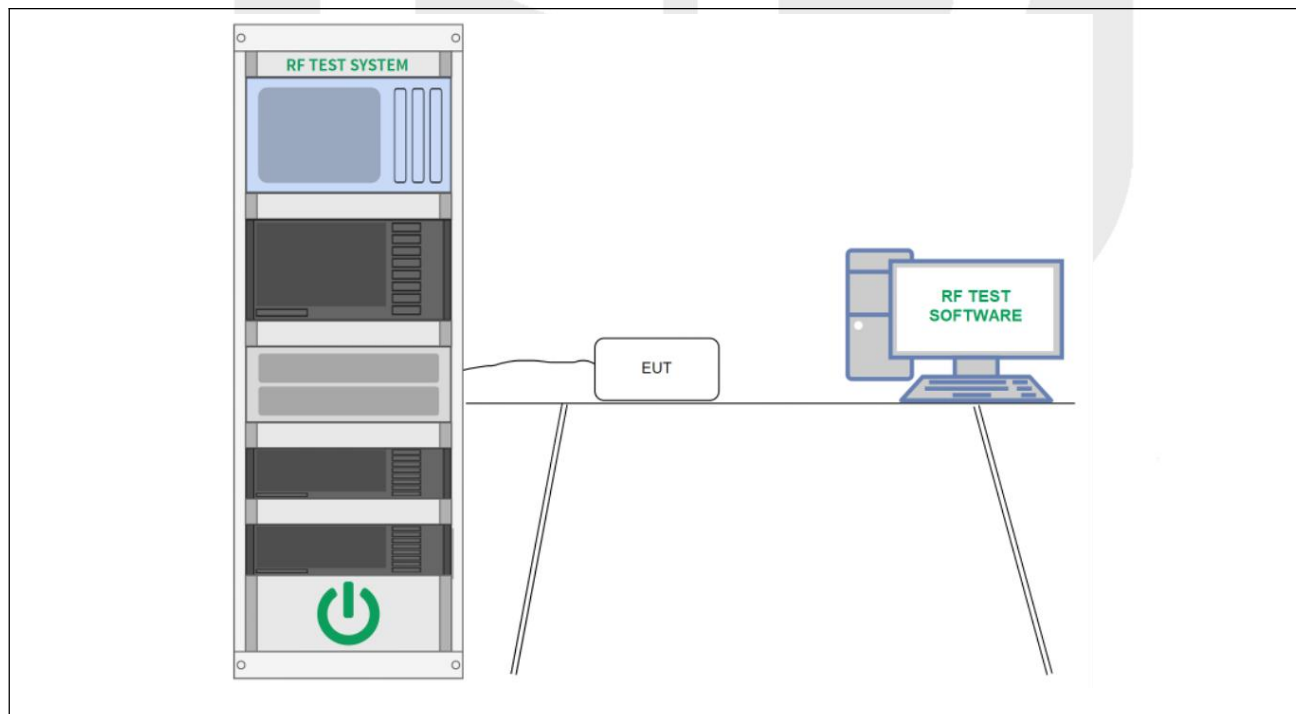
5.5.1 Test Specification

Test Requirement:	47 CFR Part 15.407(a)(3)(i)
Test Limit:	For the band 5.725-5.850 GHz, 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, 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.
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 12.6
Procedure:	Refer to ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 12.6

5.5.2 E.U.T. Operation

Pre test mode:	TM1
Final test mode:	TM1

5.5.3 Test Setup Diagram



5.5.4 Test Data

PASS.

Please refer to Annex D for details.

5.6 Frequency stability

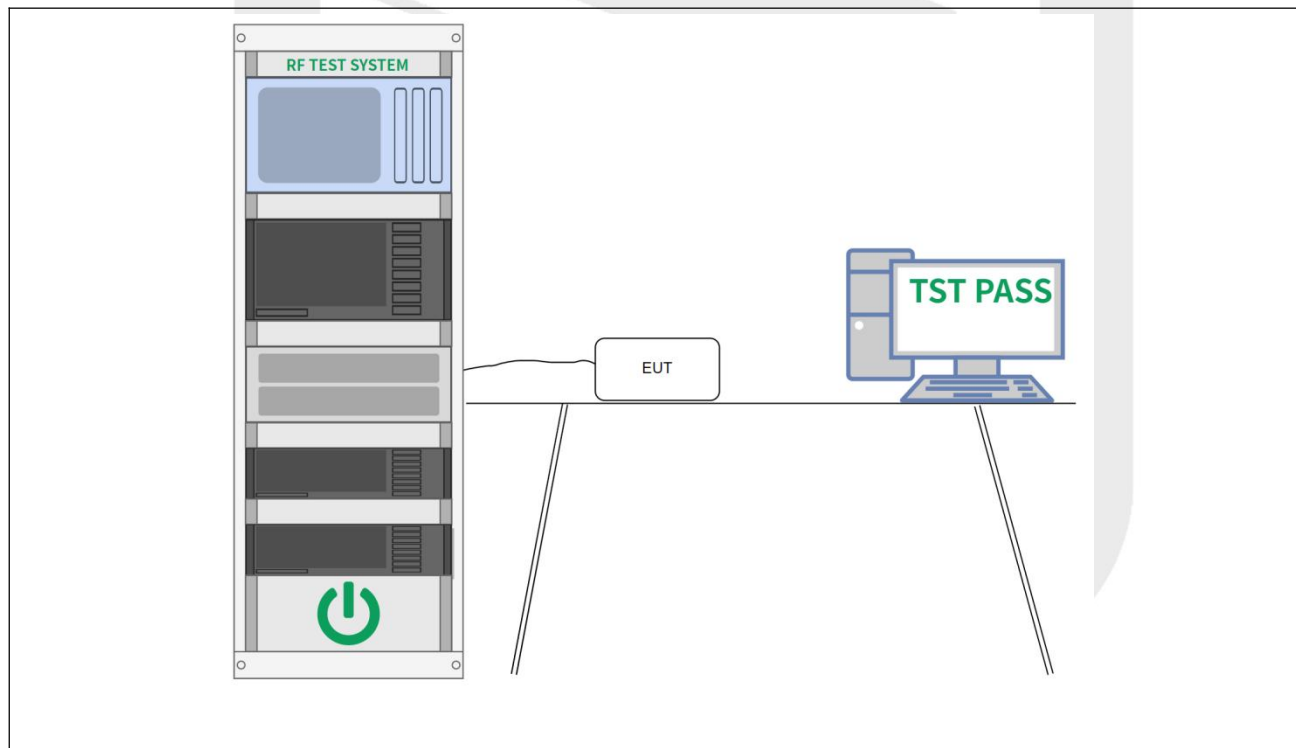
5.6.1 Test Specification

Test Requirement:	47 CFR Part 15.407(g)
Test 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 users manual.
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 6.8
Procedure:	Refer to ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 section 6.8

5.6.2 E.U.T. Operation

Pre test mode:	TM1
Final test mode:	TM1

5.6.3 Test Setup Diagram



5.6.4 Test Data

PASS.

Please refer to Annex D for details.

5.7 Band edge emissions (Conducted)

5.7.1 Test Specification

Test Requirement:	47 CFR Part 15.407(b)(4) 47 CFR Part 15.407(b)(10)			
Test Limit:	For transmitters operating solely in the 5.725-5.850 GHz band: 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.			
	MHz	MHz	MHz	GHz
	0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
	¹ 0.495-0.505	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	108-121.94	1718.8-1722.2	13.25-13.4
	6.31175-6.31225	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			
	¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.			
² Above 38.6				
The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35 apply to these measurements.				
Except as provided elsewhere in this subpart, the emissions from an intentional				

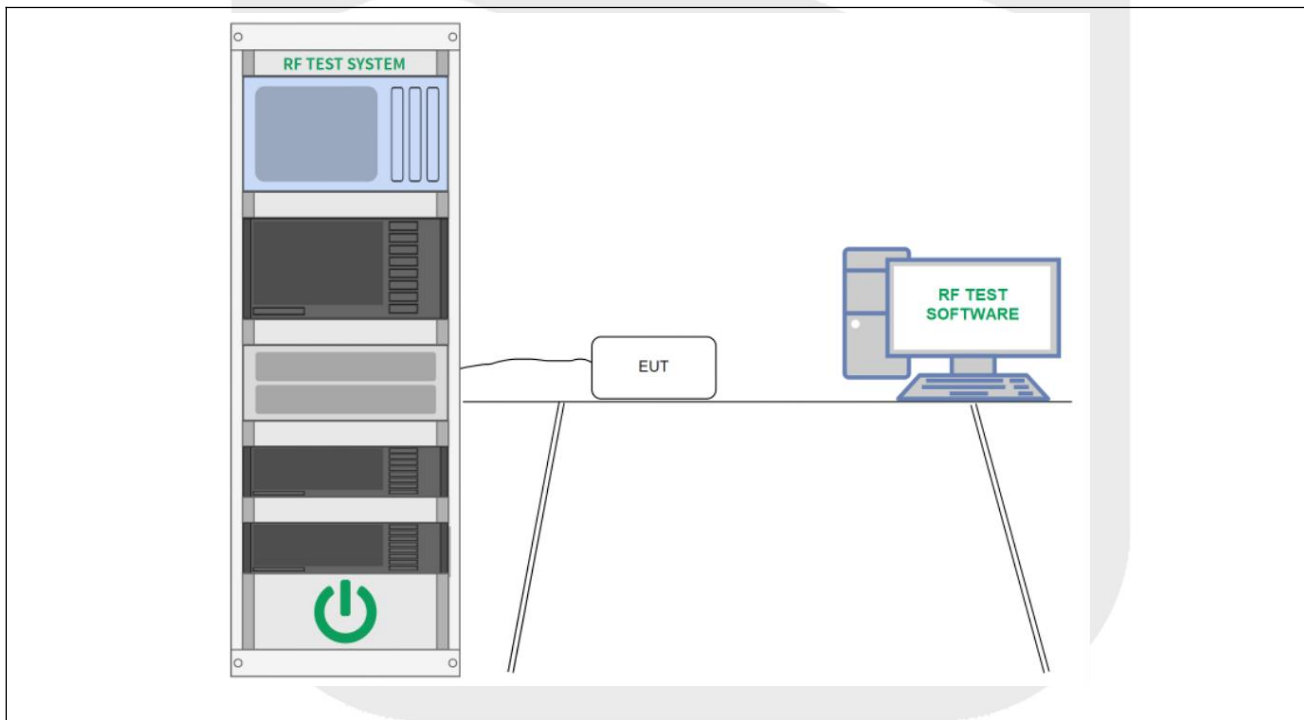
	radiator shall not exceed the field strength levels specified in the following table:		
	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
	0.009-0.490	2400/F(kHz)	300
	0.490-1.705	24000/F(kHz)	30
	1.705-30.0	30	30
	30-88	100 **	3
	88-216	150 **	3
	216-960	200 **	3
	Above 960	500	3
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241. In the emission table above, the tighter limit applies at the band edges. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.			
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 12.7.4, 12.7.6, 12.7.7		
Procedure:	Above 1GHz: a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable 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 or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel, the middle channel, the Highest channel. h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete. Remark: 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor 2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious		

	emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report. 4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.
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5.7.2 E.U.T. Operation

Pre test mode:	TM1
Final test mode:	TM1

5.7.3 Test Setup Diagram



5.7.4 Test Data

PASS.

Please refer to Annex D for details.

5.8 Band edge emissions (Radiated)

5.8.1 Test Specification

Test Requirement:	47 CFR Part 15.407(b)(4) 47 CFR Part 15.407(b)(10)			
Test Limit:	For transmitters operating solely in the 5.725-5.850 GHz band: 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.			
	MHz	MHz	MHz	GHz
	0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
	¹ 0.495-0.505	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	108-121.94	1718.8-1722.2	13.25-13.4
	6.31175-6.31225	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			
	¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.			
² Above 38.6				
The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35 apply to these measurements.				
Except as provided elsewhere in this subpart, the emissions from an intentional				

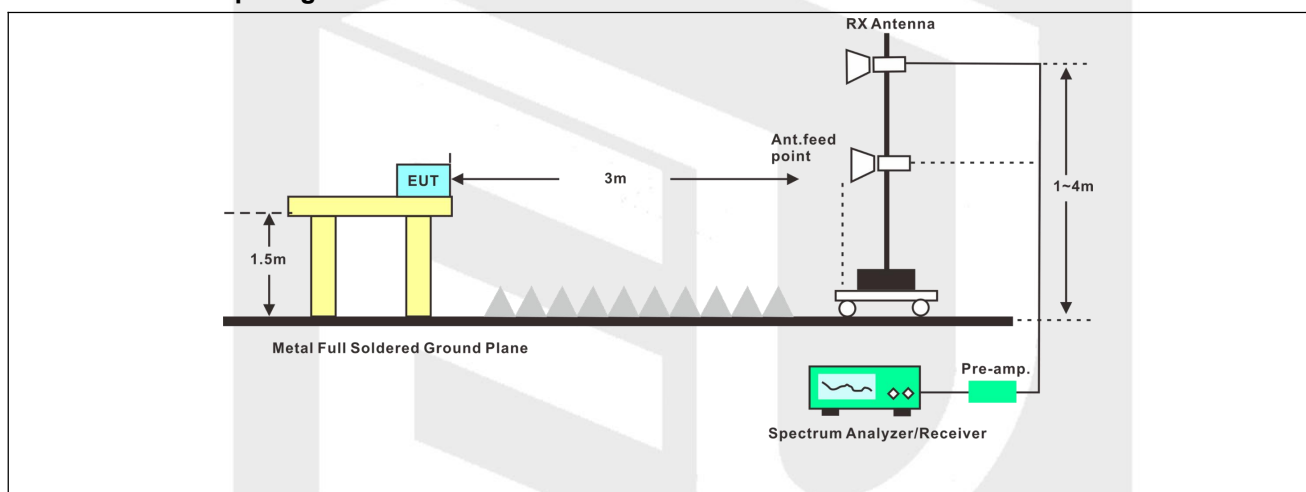
	radiator shall not exceed the field strength levels specified in the following table:		
	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
	0.009-0.490	2400/F(kHz)	300
	0.490-1.705	24000/F(kHz)	30
	1.705-30.0	30	30
	30-88	100 **	3
	88-216	150 **	3
	216-960	200 **	3
	Above 960	500	3
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241. In the emission table above, the tighter limit applies at the band edges. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.			
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 12.7.4, 12.7.6, 12.7.7		
Procedure:	Above 1GHz: a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable 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 or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel, the middle channel, the Highest channel. h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete. Remark: 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor 2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious		

	emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report. 4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.
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5.8.2 E.U.T. Operation

Pre test mode:	TM1
Final test mode:	TM1

5.8.3 Test Setup Diagram



5.8.4 Test Data

PASS.

Please refer to the following pages.

Band Edge Emissions Test Data:

Test Mode: 5.8G TX Mode					CH Low: 5728 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	5650.00	43.98	7.55	51.53	68.23	-16.71	PK	PASS
H	5700.00	48.13	7.56	55.69	105.23	-49.54	PK	PASS
H	5720.00	48.95	7.59	56.54	110.83	-54.29	PK	PASS
H	5725.00	51.46	7.68	59.14	122.23	-63.10	PK	PASS
V	5650.00	43.25	7.55	50.80	68.23	-17.43	PK	PASS
V	5700.00	46.48	7.56	54.04	105.23	-51.20	PK	PASS
V	5720.00	48.73	7.59	56.32	110.83	-54.52	PK	PASS
V	5725.00	49.01	7.68	56.69	122.23	-65.55	PK	PASS
H	5650.00	29.53	7.55	37.08	54.00	-16.93	AV	PASS
H	5700.00	30.25	7.56	37.81	54.00	-16.20	AV	PASS
H	5720.00	32.79	7.59	40.38	54.00	-13.63	AV	PASS
H	5725.00	35.94	7.68	43.62	54.00	-10.39	AV	PASS
V	5650.00	29.27	7.55	36.82	54.00	-17.18	AV	PASS
V	5700.00	33.98	7.56	41.54	54.00	-12.47	AV	PASS
V	5720.00	34.53	7.59	42.12	54.00	-11.88	AV	PASS
V	5725.00	35.48	7.68	43.16	54.00	-10.84	AV	PASS

Remark:

1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.

Band Edge Emissions Test Data:

Test Mode: 5.8G TX Mode					CH High: 5848 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	5850.00	50.36	7.55	57.91	122.23	-64.32	PK	PASS
H	5855.00	48.96	7.56	56.52	110.83	-54.31	PK	PASS
H	5875.00	48.24	7.59	55.83	105.23	-49.41	PK	PASS
H	5925.00	46.61	7.68	54.29	68.23	-13.95	PK	PASS
V	5850.00	51.80	7.55	59.35	122.23	-62.88	PK	PASS
V	5855.00	47.75	7.56	55.31	110.83	-55.52	PK	PASS
V	5875.00	46.18	7.59	53.77	105.23	-51.47	PK	PASS
V	5925.00	43.95	7.68	51.63	68.23	-16.60	PK	PASS
H	5850.00	37.76	7.55	45.31	54.00	-8.69	AV	PASS
H	5855.00	34.42	7.56	41.98	54.00	-12.02	AV	PASS
H	5875.00	31.88	7.59	39.47	54.00	-14.53	AV	PASS
H	5925.00	29.32	7.68	37.00	54.00	-17.00	AV	PASS
V	5850.00	35.73	7.55	43.28	54.00	-10.73	AV	PASS
V	5855.00	35.77	7.56	43.33	54.00	-10.67	AV	PASS
V	5875.00	30.75	7.59	38.34	54.00	-15.66	AV	PASS
V	5925.00	30.36	7.68	38.04	54.00	-15.97	AV	PASS

Remark:

1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.

5.9 Undesirable emission limits (below 1GHz)

5.9.1 Test Specification

Test Requirement:	47 CFR Part 15.407(b)(9)																								
Test Limit:	Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209.																								
	Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:																								
	<table><tr><th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</th></tr><tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr><tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr><tr><td>1.705-30.0</td><td>30</td><td>30</td></tr><tr><td>30-88</td><td>100 **</td><td>3</td></tr><tr><td>88-216</td><td>150 **</td><td>3</td></tr><tr><td>216-960</td><td>200 **</td><td>3</td></tr><tr><td>Above 960</td><td>500</td><td>3</td></tr></table>	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)	0.009-0.490	2400/F(kHz)	300	0.490-1.705	24000/F(kHz)	30	1.705-30.0	30	30	30-88	100 **	3	88-216	150 **	3	216-960	200 **	3	Above 960	500	3
	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)																						
	0.009-0.490	2400/F(kHz)	300																						
	0.490-1.705	24000/F(kHz)	30																						
	1.705-30.0	30	30																						
	30-88	100 **	3																						
	88-216	150 **	3																						
	216-960	200 **	3																						
Above 960	500	3																							
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.																									
In the emission table above, the tighter limit applies at the band edges.																									
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.																									
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 12.7.4, 12.7.5																								
Procedure:	Below 1GHz: a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 or 10 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 rotatable 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 quasi-peak method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel, the middle channel, the Highest channel.																								

h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
i. Repeat above procedures until all frequencies measured was complete.

Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. The disturbance below 1GHz was very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

Above 1GHz:

- a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable 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 or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

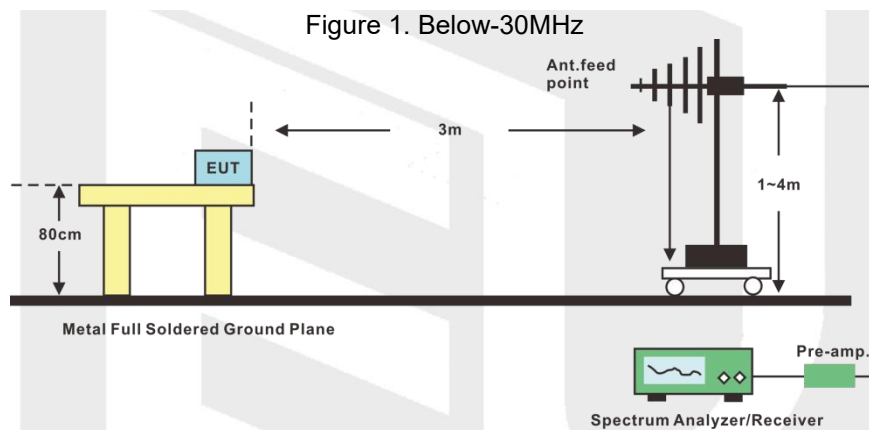
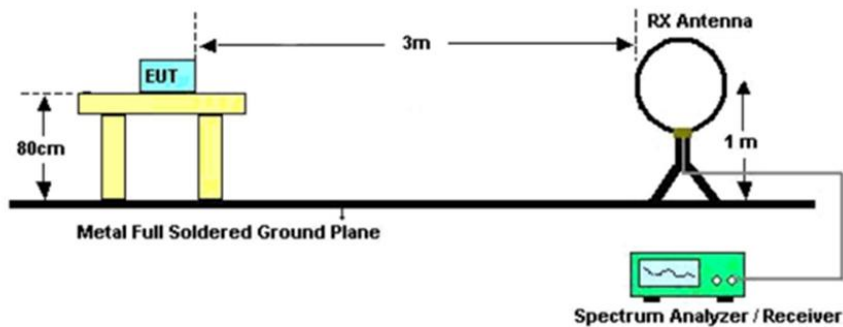
Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.
4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

5.9.2 E.U.T. Operation

Pre test mode:	TM1
Final test mode:	TM1

5.9.3 Test Setup Diagram



5.9.4 Test Data

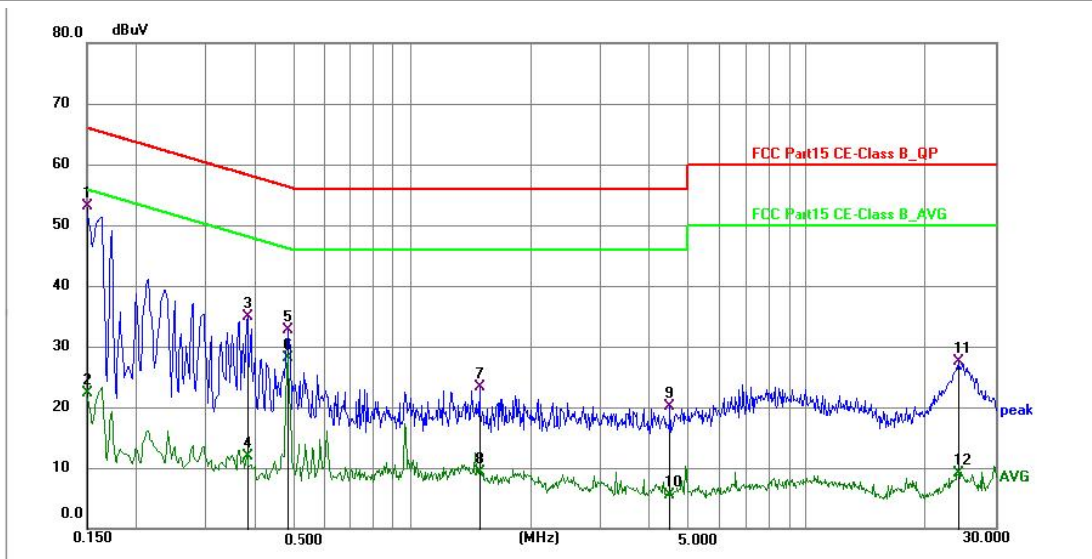
PASS.

The test results of 9kHz-30MHz was attenuated more than 20dB below the permissible limits, so the results don't record in the report.

During the test, for 30MHz to 1000MHz, pre-scan all modulations, and found the 5.8G TX modulation Low channel which is the worst case, only the worst case is recorded in the report.

Undesirable emission limits (below 1GHz) Test Data

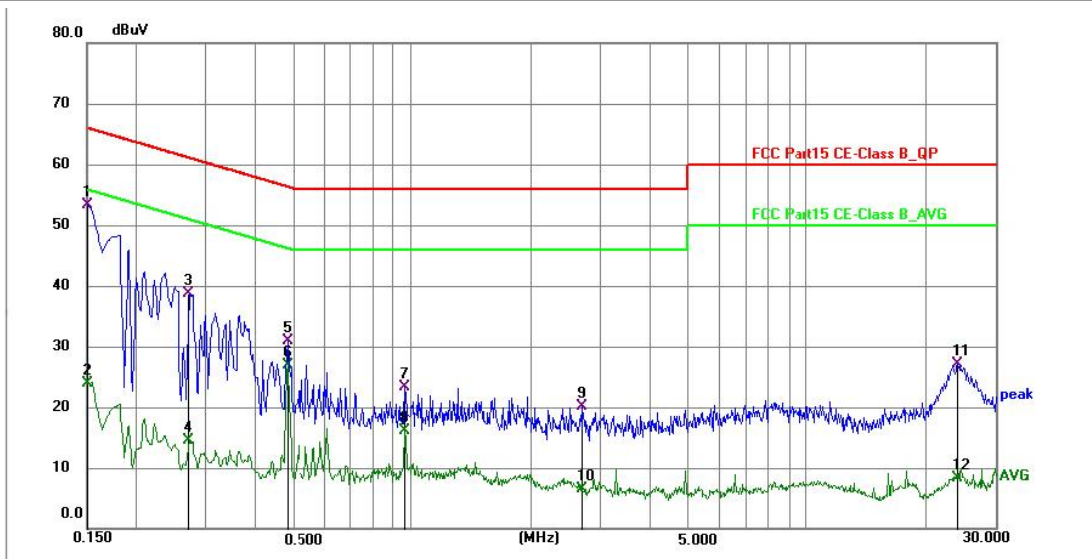
TM1 / Polarization: Horizontal / Band: 5725-5850 MHz / BW: 3 / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1 *	0.1500	43.07	9.97	53.04	66.00	-12.96	QP	P	
2	0.1500	12.37	9.97	22.34	56.00	-33.66	AVG	P	
3	0.3795	24.92	10.04	34.96	58.29	-23.33	QP	P	
4	0.3795	1.95	10.04	11.99	48.29	-36.30	AVG	P	
5	0.4830	22.69	10.07	32.76	56.29	-23.53	QP	P	
6	0.4830	17.97	10.07	28.04	46.29	-18.25	AVG	P	
7	1.4865	13.17	10.06	23.23	56.00	-32.77	QP	P	
8	1.4865	-0.71	10.06	9.35	46.00	-36.65	AVG	P	
9	4.4925	9.96	10.05	20.01	56.00	-35.99	QP	P	
10	4.4925	-4.53	10.05	5.52	46.00	-40.48	AVG	P	
11	24.2115	17.38	10.15	27.53	60.00	-32.47	QP	P	
12	24.2115	-1.14	10.15	9.01	50.00	-40.99	AVG	P	

Undesirable emission limits (below 1GHz) Test Data

TM1 / Polarization: Vertical / Band: 5725-5850 MHz / BW: 3 / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1 *	0.1500	43.45	9.95	53.40	66.00	-12.60	QP	P	
2	0.1500	13.95	9.95	23.90	56.00	-32.10	AVG	P	
3	0.2714	28.65	9.99	38.64	61.07	-22.43	QP	P	
4	0.2714	4.49	9.99	14.48	51.07	-36.59	AVG	P	
5	0.4830	20.89	10.04	30.93	56.29	-25.36	QP	P	
6	0.4830	16.86	10.04	26.90	46.29	-19.39	AVG	P	
7	0.9600	13.18	10.04	23.22	56.00	-32.78	QP	P	
8	0.9600	5.97	10.04	16.01	46.00	-29.99	AVG	P	
9	2.6970	9.99	10.05	20.04	56.00	-35.96	QP	P	
10	2.6970	-3.58	10.05	6.47	46.00	-39.53	AVG	P	
11	24.1080	16.99	10.16	27.15	60.00	-32.85	QP	P	
12	24.1080	-1.84	10.16	8.32	50.00	-41.68	AVG	P	

5.10 Undesirable emission limits (above 1GHz)

5.10.1 Test Specification

Test Requirement:	47 CFR Part 15.407(b)(4) 47 CFR Part 15.407(b)(10)			
Test Limit:	For transmitters operating solely in the 5.725-5.850 GHz band: 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.			
	MHz	MHz	MHz	GHz
	0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
	¹ 0.495-0.505	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	108-121.94	1718.8-1722.2	13.25-13.4
	6.31175-6.31225	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			
	¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.			
² Above 38.6				
The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35 apply to these measurements.				
Except as provided elsewhere in this subpart, the emissions from an intentional				

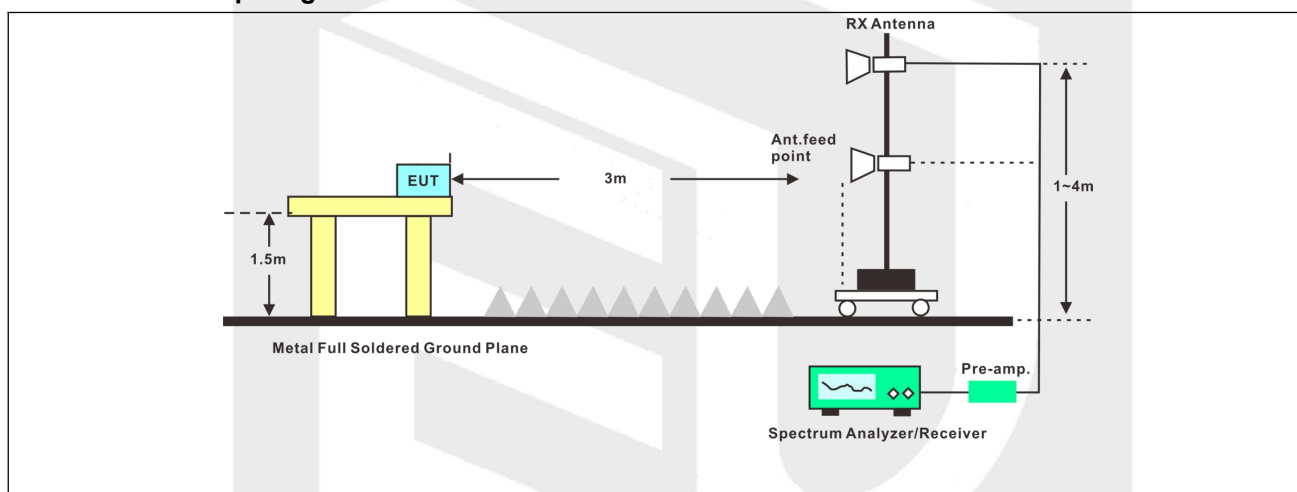
	radiator shall not exceed the field strength levels specified in the following table:		
	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
	0.009-0.490	2400/F(kHz)	300
	0.490-1.705	24000/F(kHz)	30
	1.705-30.0	30	30
	30-88	100 **	3
	88-216	150 **	3
	216-960	200 **	3
	Above 960	500	3
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241. In the emission table above, the tighter limit applies at the band edges. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.			
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 12.7.4, 12.7.6, 12.7.7		
Procedure:	Above 1GHz: a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable 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 or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel, the middle channel, the Highest channel. h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete. Remark: 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor 2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious		

	emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report. 4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.
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5.10.2 E.U.T. Operation

Pre test mode:	TM1
Final test mode:	TM1

5.10.3 Test Setup Diagram



5.10.4 Test Data

PASS.

For test of 1GHz-40GHz, during the test, pre-scan all modes, and found the 5.8G TX modulation which is worse case, the report only record this mode.

The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

Undesirable emission limits (above 1GHz) Test Data

Test Mode: 5.8G TX Mode					CH Low: 5728 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
V	3210.23	46.54	-0.83	45.71	68.23	-22.52	PK	PASS
V	7511.66	42.26	9.84	52.10	68.23	-16.13	PK	PASS
V	9511.87	35.34	13.18	48.53	68.23	-19.70	PK	PASS
V	11491.00	42.27	15.22	57.49	68.23	-10.74	PK	PASS
V	14001.54	36.28	17.33	53.61	68.23	-14.62	PK	PASS
V	17236.75	*	*	*	68.23	*	PK	PASS
H	3202.00	47.54	-0.86	46.68	68.23	-21.55	PK	PASS
H	7500.25	42.47	9.83	52.30	68.23	-15.93	PK	PASS
H	9500.75	36.40	13.14	49.54	68.23	-18.69	PK	PASS
H	11491.75	42.84	15.22	58.06	68.23	-10.17	PK	PASS
H	14011.91	37.07	17.35	54.41	68.23	-13.82	PK	PASS
H	17237.50	*	*	*	68.23	*	PK	PASS
V	3210.23	34.43	-0.83	33.59	54.00	-20.41	AV	PASS
V	7511.66	28.66	9.84	38.50	54.00	-15.50	AV	PASS
V	9511.87	22.37	13.18	35.55	54.00	-18.45	AV	PASS
V	11491.00	32.56	15.22	47.78	54.00	-6.22	AV	PASS
V	14001.54	22.37	17.33	39.70	54.00	-14.30	AV	PASS
V	17236.75	*	*	*	54.00	*	AV	PASS
H	3202.00	34.82	-0.86	33.95	54.00	-20.05	AV	PASS
H	7500.25	30.84	9.83	40.67	54.00	-13.33	AV	PASS
H	9500.75	24.13	13.14	37.27	54.00	-16.73	AV	PASS
H	11491.75	30.59	15.22	45.81	54.00	-8.19	AV	PASS
H	14011.91	24.21	17.35	41.56	54.00	-12.44	AV	PASS
H	17237.50	*	*	*	54.00	*	AV	PASS

Remark:

1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.
2. “*” means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.

Undesirable emission limits (above 1GHz) Test Data

Test Mode: 5.8G TX Mode					CH Middle: 5788 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
V	3418.96	46.91	-0.06	46.85	68.23	-21.38	PK	PASS
V	8007.57	41.12	10.34	51.46	68.23	-16.77	PK	PASS
V	9715.59	37.36	13.20	50.56	68.23	-17.67	PK	PASS
V	11571.75	44.10	15.31	59.41	68.23	-8.82	PK	PASS
V	14311.83	36.19	17.45	53.64	68.23	-14.59	PK	PASS
V	17355.25	*	*	*	68.23	*	PK	PASS
H	3410.21	47.38	-0.10	47.28	68.23	-20.95	PK	PASS
H	8004.73	42.46	10.33	52.79	68.23	-15.44	PK	PASS
H	9712.44	35.80	13.20	49.00	68.23	-19.23	PK	PASS
H	11570.50	43.94	15.31	59.25	68.23	-8.98	PK	PASS
H	14304.74	36.78	17.44	54.22	68.23	-14.01	PK	PASS
H	17355.25	*	*	*	68.23	*	PK	PASS
V	3418.96	34.12	-0.06	34.06	54.00	-19.94	AV	PASS
V	8007.57	28.59	10.34	38.92	54.00	-15.08	AV	PASS
V	9715.59	24.13	13.20	37.33	54.00	-16.67	AV	PASS
V	11571.75	30.50	15.31	45.81	54.00	-8.19	AV	PASS
V	14311.83	24.93	17.45	42.37	54.00	-11.63	AV	PASS
V	17355.25	*	*	*	54.00	*	AV	PASS
H	3410.21	34.96	-0.10	34.86	54.00	-19.14	AV	PASS
H	8004.73	29.29	10.33	39.62	54.00	-14.38	AV	PASS
H	9712.44	23.87	13.20	37.08	54.00	-16.92	AV	PASS
H	11570.50	30.44	15.31	45.75	54.00	-8.25	AV	PASS
H	14304.74	22.75	17.44	40.19	54.00	-13.81	AV	PASS
H	17355.25	*	*	*	54.00	*	AV	PASS

Remark:

1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.
2. “*” means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.

Undesirable emission limits (above 1GHz) Test Data

Test Mode: 5.8G TX Mode					CH High: 5848 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
V	3712.19	46.86	1.10	47.96	68.23	-20.27	PK	PASS
V	8203.88	41.66	10.86	52.52	68.23	-15.71	PK	PASS
V	9802.96	35.09	13.23	48.32	68.23	-19.91	PK	PASS
V	11651.75	43.76	15.39	59.15	68.23	-9.08	PK	PASS
V	14708.87	35.83	17.58	53.40	68.23	-14.83	PK	PASS
V	17477.50	*	*	*	68.23	*	PK	PASS
H	3718.57	46.55	1.11	47.65	68.23	-20.58	PK	PASS
H	8217.24	40.73	10.90	51.63	68.23	-16.60	PK	PASS
H	9806.86	35.70	13.23	48.94	68.23	-19.29	PK	PASS
H	11651.75	42.99	15.39	58.38	68.23	-9.85	PK	PASS
H	14708.66	36.28	17.57	53.85	68.23	-14.38	PK	PASS
H	17475.25	*	*	*	68.23	*	PK	PASS
V	3712.19	34.01	1.10	35.11	54.00	-18.89	AV	PASS
V	8203.88	29.18	10.86	40.04	54.00	-13.96	AV	PASS
V	9802.96	24.14	13.23	37.37	54.00	-16.63	AV	PASS
V	11651.75	32.24	15.39	47.63	54.00	-6.37	AV	PASS
V	14708.87	24.20	17.58	41.78	54.00	-12.22	AV	PASS
V	17477.50	*	*	*	54.00	*	AV	PASS
H	3718.57	32.08	1.11	33.19	54.00	-20.81	AV	PASS
H	8217.24	28.56	10.90	39.46	54.00	-14.54	AV	PASS
H	9806.86	23.41	13.23	36.64	54.00	-17.36	AV	PASS
H	11651.75	31.89	15.39	47.28	54.00	-6.72	AV	PASS
H	14708.66	22.07	17.57	39.64	54.00	-14.36	AV	PASS
H	17475.25	*	*	*	54.00	*	AV	PASS

Remark:

1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.
2. “*” means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.

ANNEX A TEST SETUP PHOTOS

Please refer to the document "8429EU010403W-ANNEX A.PDF"

ANNEX B EXTERNAL PHOTOS

Please refer to the document "8429EU010403W-ANNEX B.PDF"

ANNEX C INTERNAL PHOTOS

Please refer to the document "8429EU010403W-ANNEX C.PDF"



ANNEX D TEST DATA

1. Duty Cycle

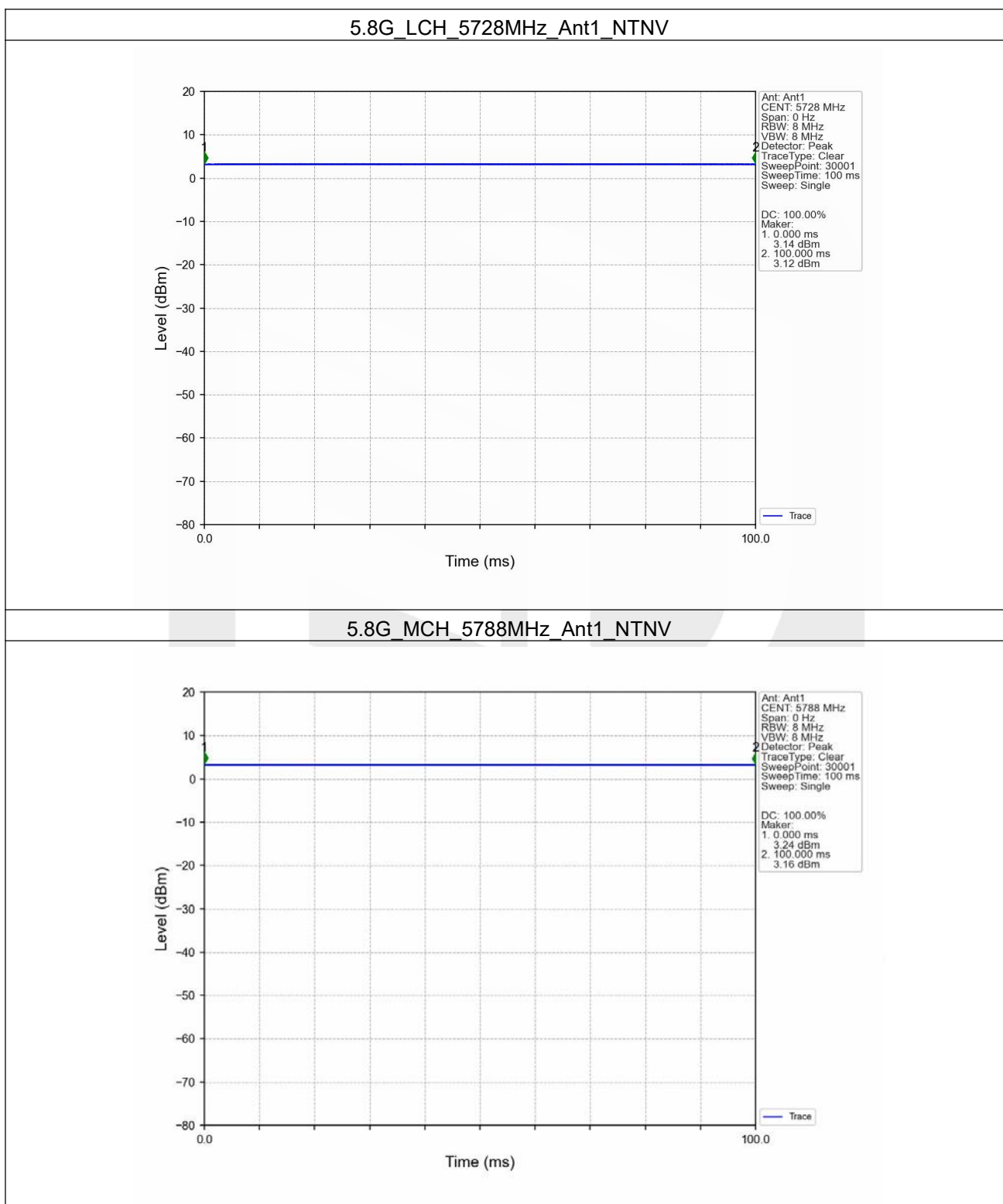
1.1 Test Result

1.1.1 Ant1

Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
5.8G	SISO	5728	100.000	100.000	100.00	0.00	0.00
		5788	100.000	100.000	100.00	0.00	0.00
		5848	100.000	100.000	100.00	0.00	0.00

1.2 Test Graph

1.2.1 Ant1





2. Bandwidth

2.1 Test Result

2.1.1 OBW

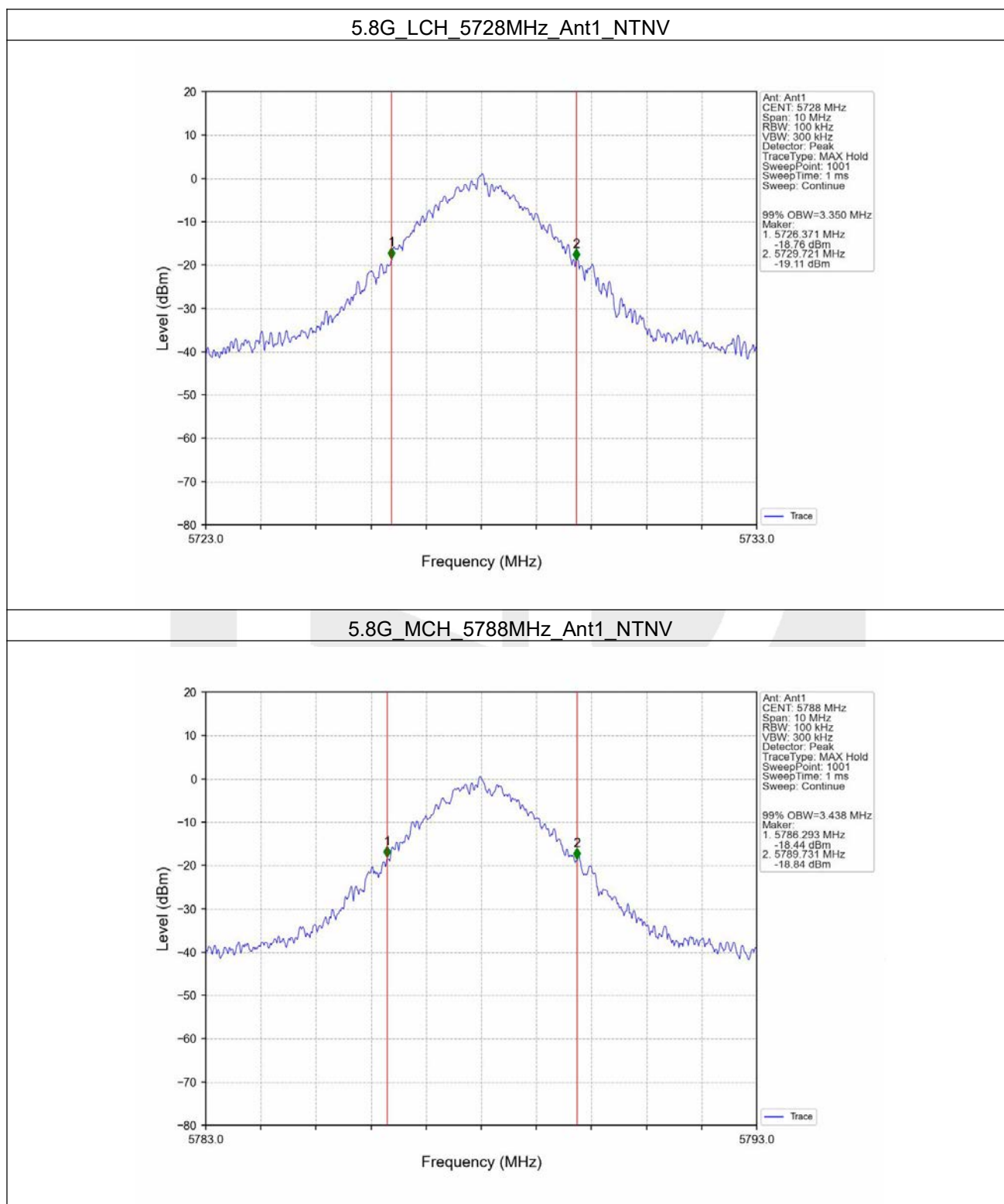
Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)		Verdict
				Result	Limit	
5.8G	SISO	5728	1	3.350	/	Pass
		5788	1	3.438	/	Pass
		5848	1	3.279	/	Pass

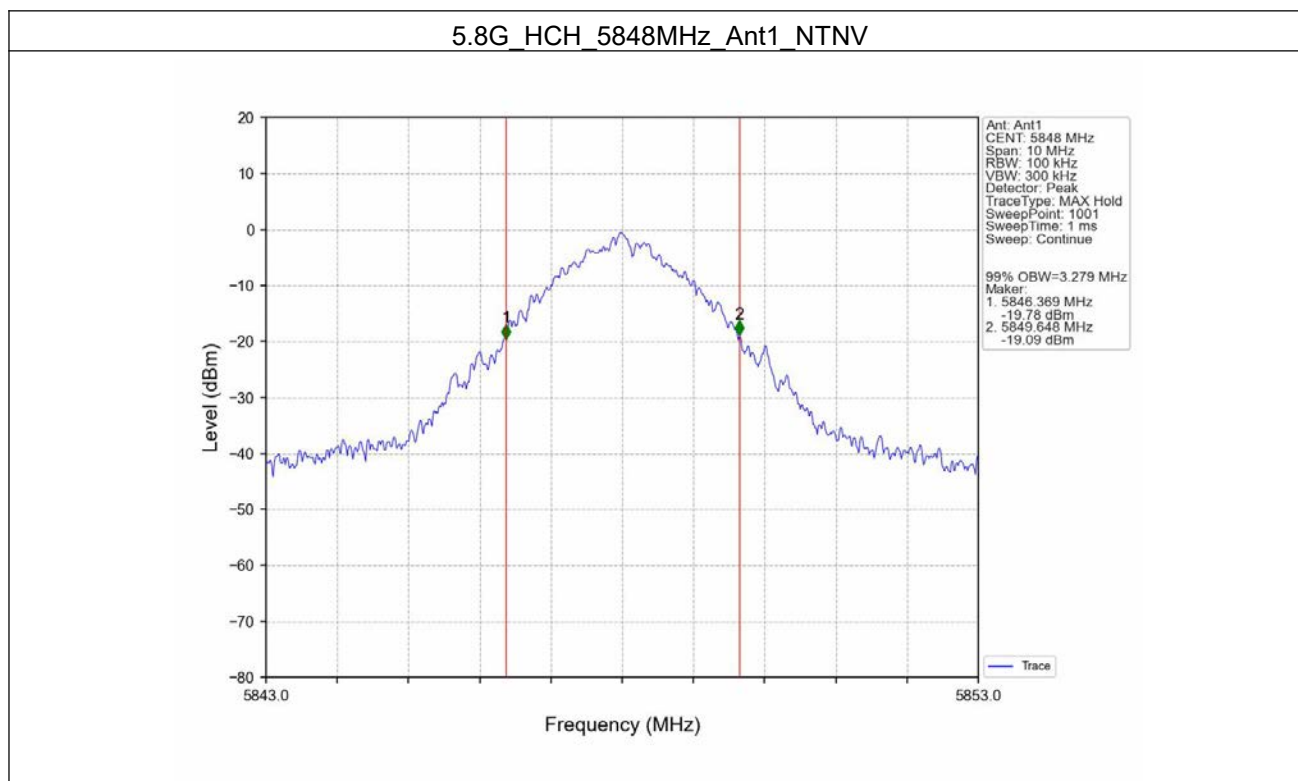
2.1.2 6dB BW

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
5.8G	SISO	5728	1	1.385	≥ 0.5	Pass
		5788	1	1.493	≥ 0.5	Pass
		5848	1	1.496	≥ 0.5	Pass

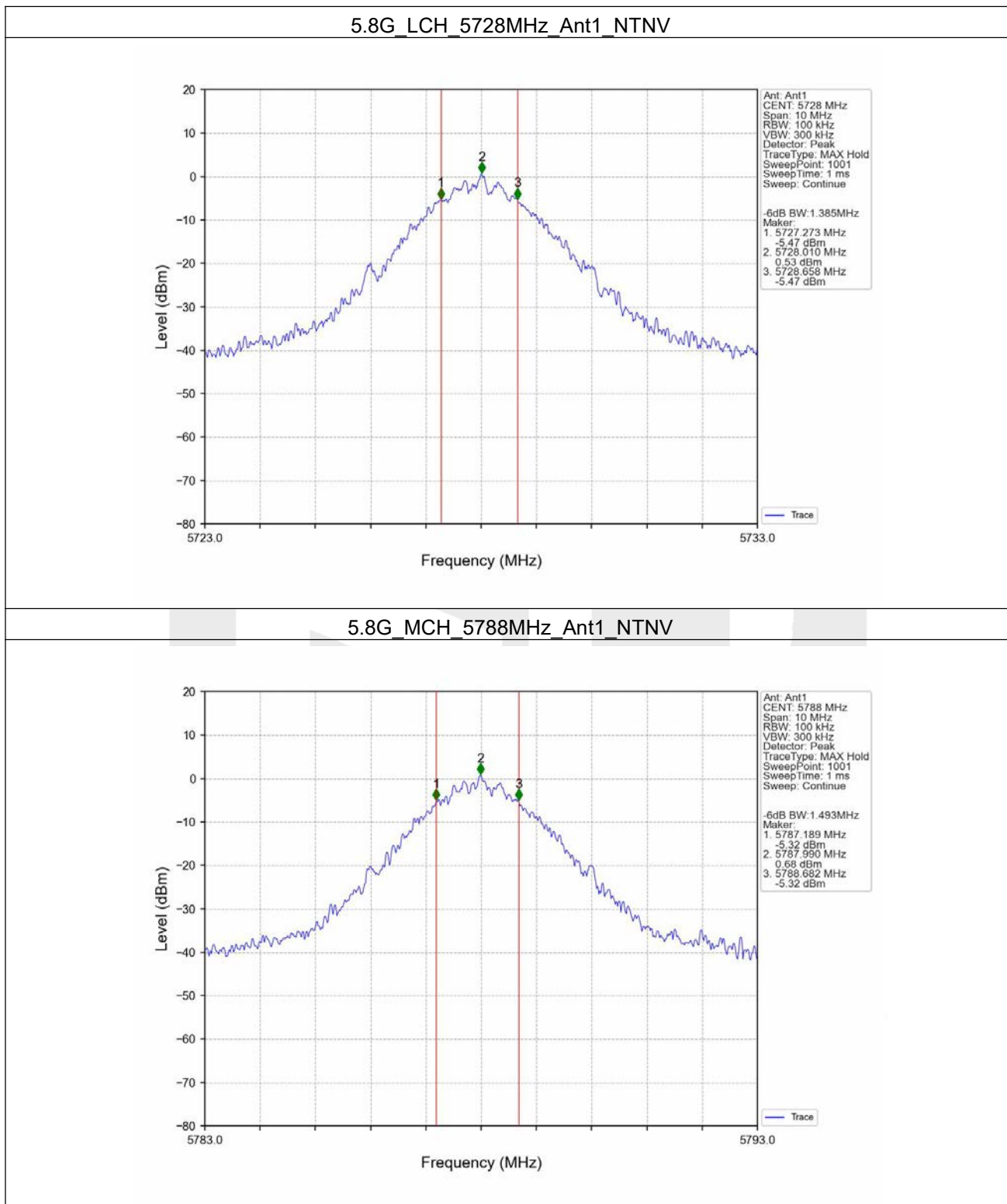
2.2 Test Graph

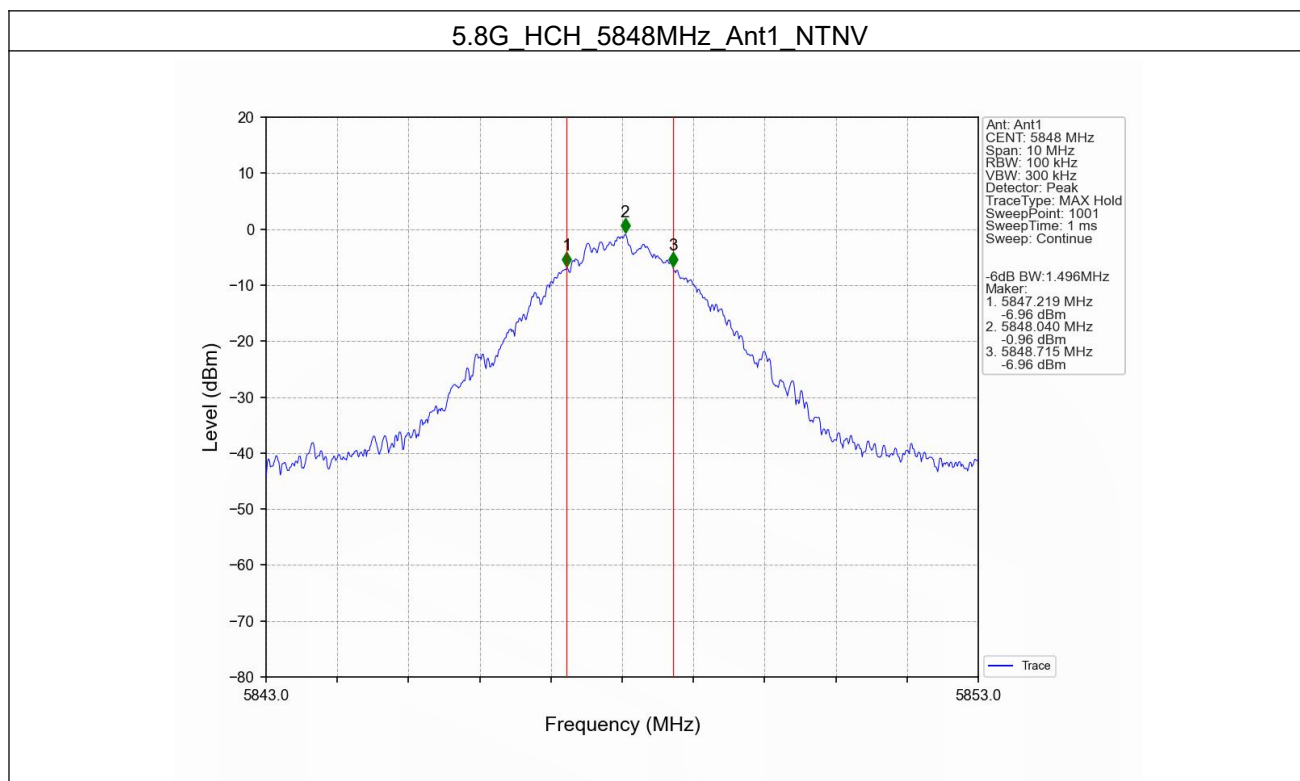
2.2.1 OBW





2.2.2 6dB BW





3. Maximum Conducted Output Power

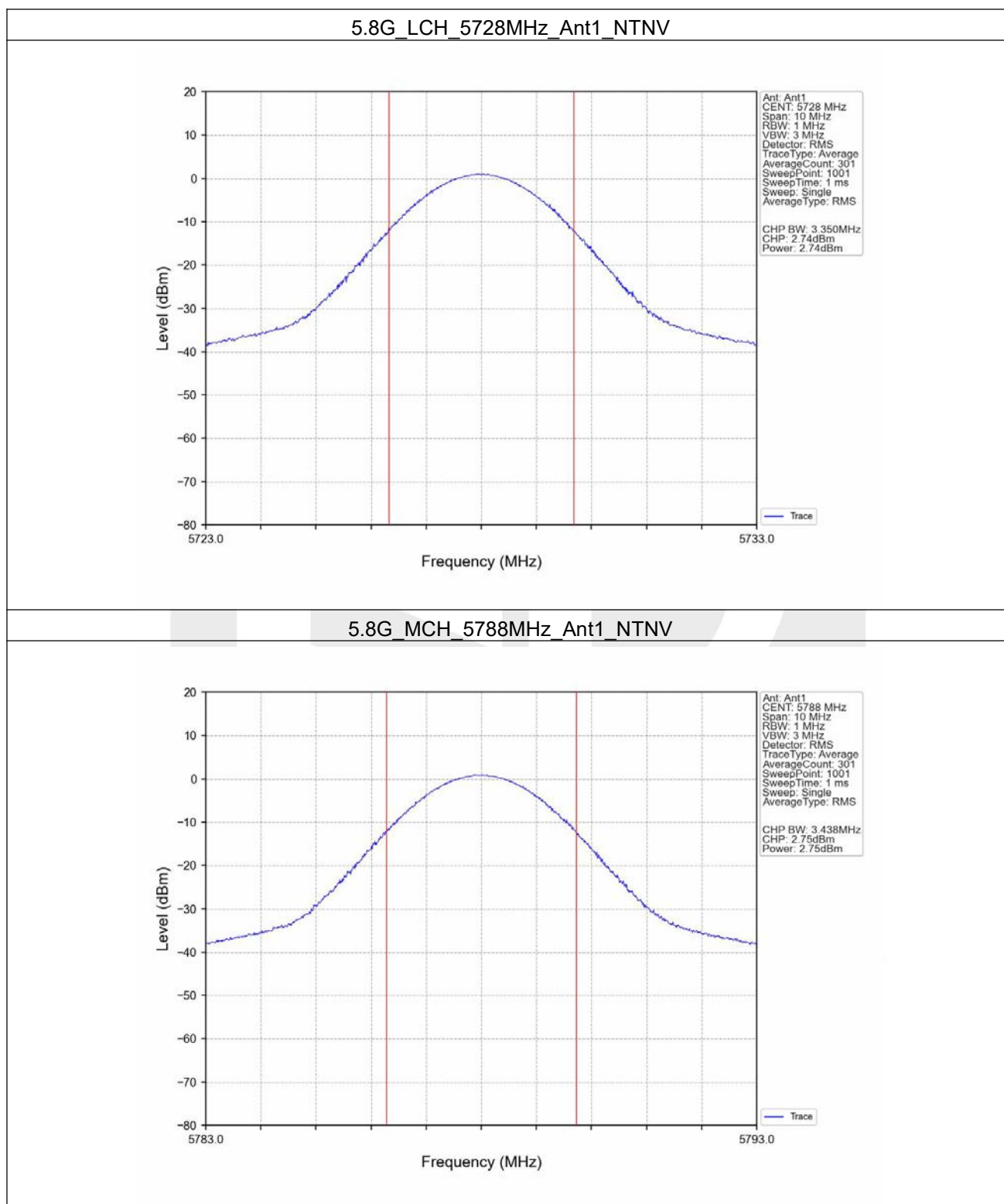
3.1 Test Result

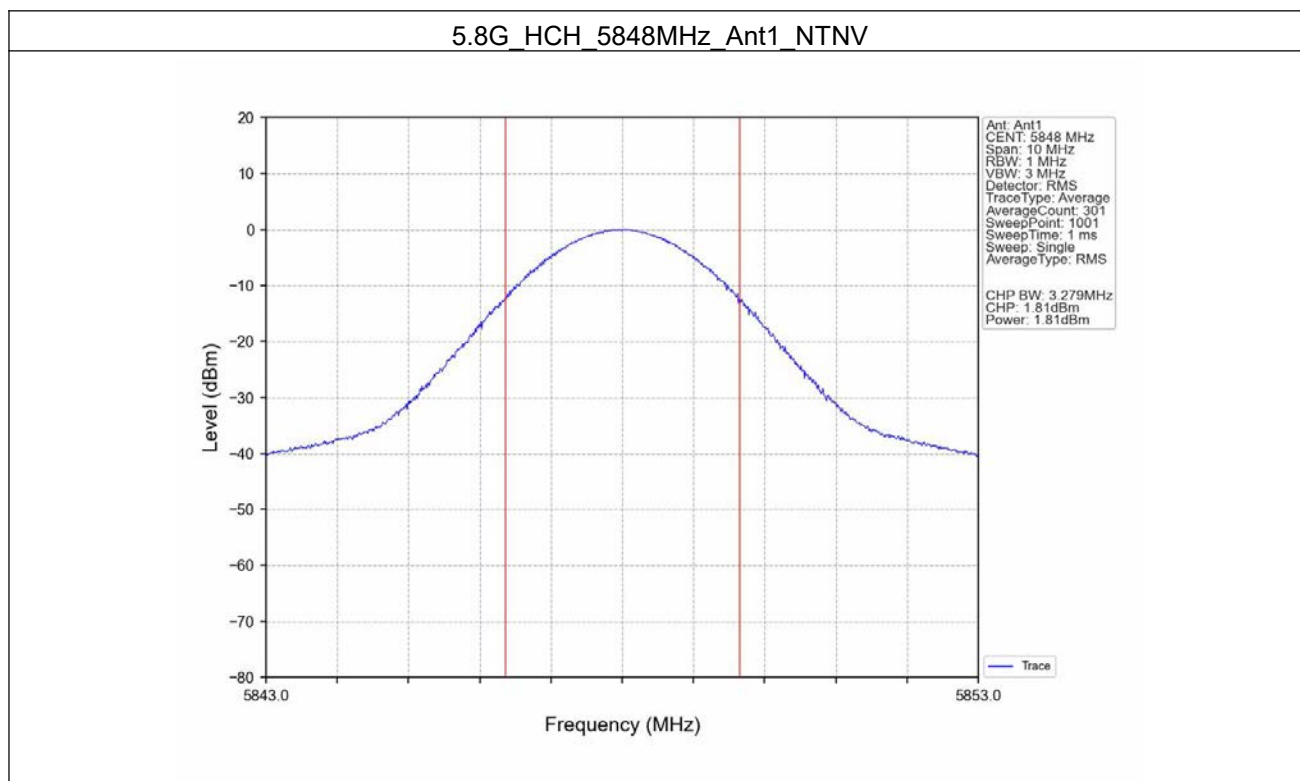
3.1.1 Power

Mode	TX Type	Frequency (MHz)	Maximum Average Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
5.8G	SISO	5728	2.74	<=30	Pass
		5788	2.75	<=30	Pass
		5848	1.81	<=30	Pass
Note1: Antenna Gain: Ant1: 1.17dBi;					

3.2 Test Graph

3.2.1 Power





4. Maximum Power Spectral Density

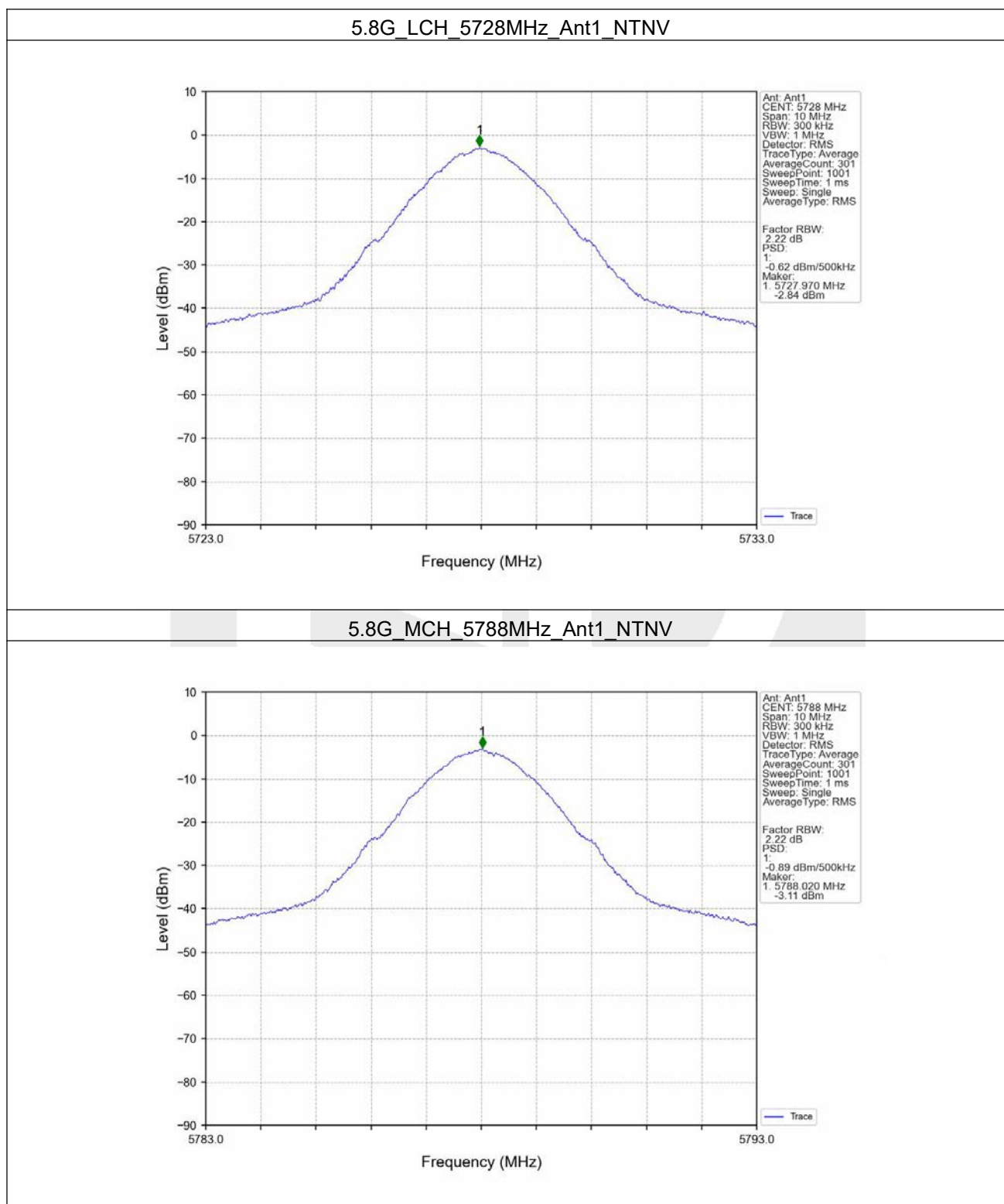
4.1 Test Result

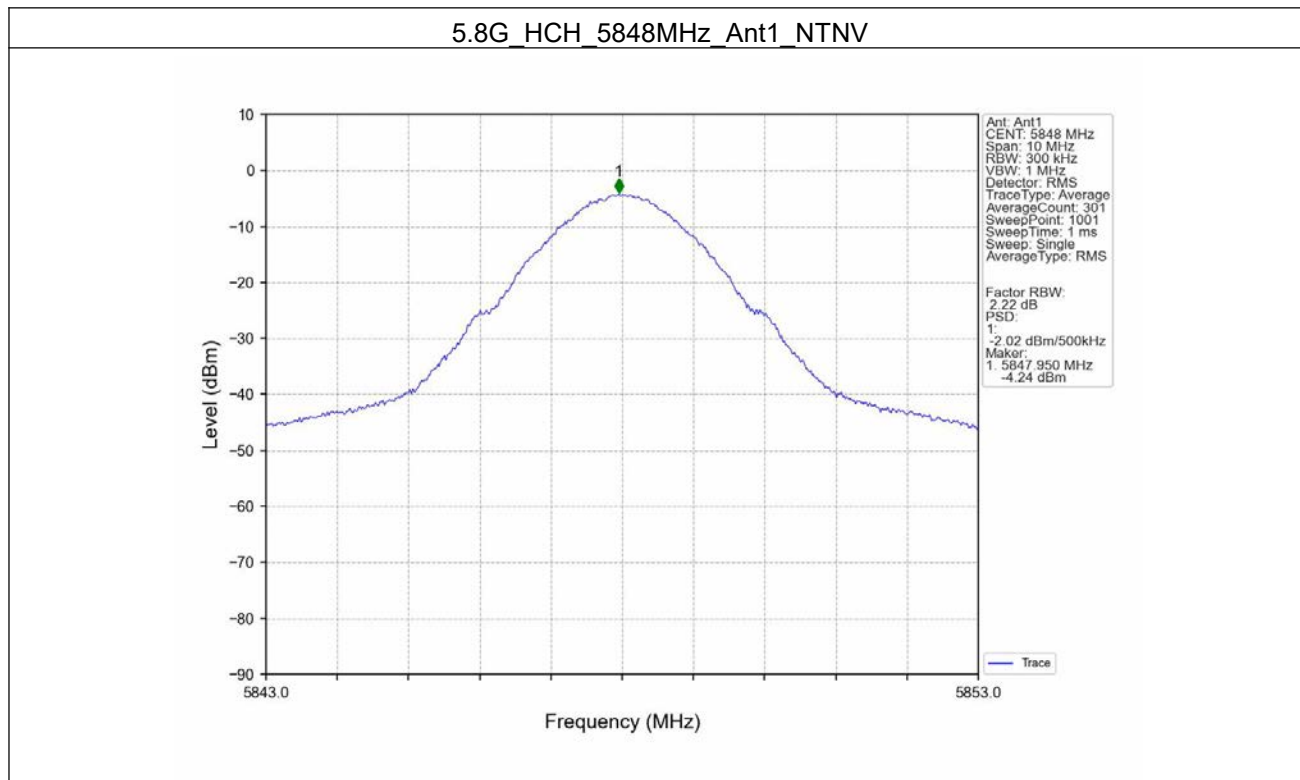
4.1.1 PSD-Band3

Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/500kHz)		Verdict
			ANT1	Limit	
5.8G	SISO	5728	-0.62	≤ 30	Pass
		5788	-0.89	≤ 30	Pass
		5848	-2.02	≤ 30	Pass

4.2 Test Graph

4.2.1 PSD-Band3





5. Unwanted Emissions In Restricted Frequency Bands

5.1 Test Result

5.1.1 CSE

Mode	TX Type	Frequency (MHz)	ANT	Level of Unwanted Emissions (dBm)		Verdict
				Result	Limit	
5.8G	SISO	5728	1	Refer To Test Graph		Pass
		5848	1	Refer To Test Graph		Pass

Note:

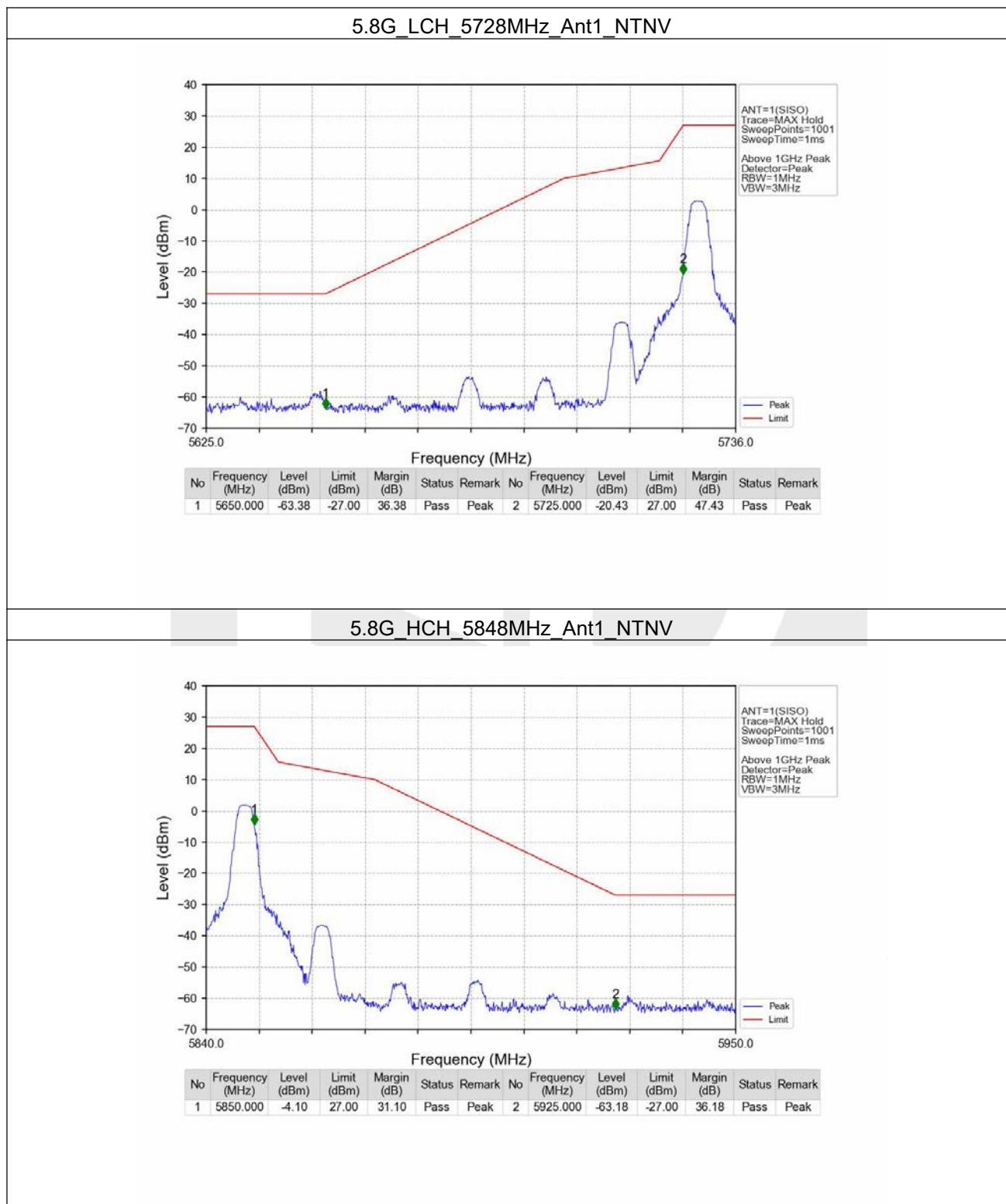
1) $EIRP[dBm]=E[dBuV/m]- 95.2$, for $d= 3\text{ m}$;

2) Level[dBm] results have calculated the antenna gain;

3) Antenna gain= 1.17 dBi

5.2 Test Graph

5.2.1 CSE



6. Frequency Stability

6.1 Test Result

6.1.1 Ant1

Ant1							
Mode	TX Type	Frequency (MHz)	Temperature (°C)	Voltage	Measured Frequency (MHz)	Limit (MHz)	Verdict
Carrier Wave	SISO	5728	20	LV	5727.989	5725 to 5850	Pass
				NV	5727.988	5725 to 5850	Pass
				HV	5727.988	5725 to 5850	Pass
			-30	NV	5727.988	5725 to 5850	Pass
			-20	NV	5727.988	5725 to 5850	Pass
			-10	NV	5727.988	5725 to 5850	Pass
			0	NV	5727.988	5725 to 5850	Pass
			10	NV	5727.988	5725 to 5850	Pass
			30	NV	5727.988	5725 to 5850	Pass
			40	NV	5727.988	5725 to 5850	Pass
			50	NV	5727.988	5725 to 5850	Pass
		5788	20	LV	5787.989	5725 to 5850	Pass
				NV	5787.989	5725 to 5850	Pass
				HV	5787.989	5725 to 5850	Pass
			-30	NV	5787.989	5725 to 5850	Pass
			-20	NV	5787.989	5725 to 5850	Pass
			-10	NV	5787.988	5725 to 5850	Pass
			0	NV	5787.989	5725 to 5850	Pass
			10	NV	5787.988	5725 to 5850	Pass
			30	NV	5787.988	5725 to 5850	Pass
			40	NV	5787.989	5725 to 5850	Pass
			50	NV	5787.988	5725 to 5850	Pass
		5848	20	LV	5847.990	5725 to 5850	Pass
				NV	5847.989	5725 to 5850	Pass
				HV	5847.990	5725 to 5850	Pass
			-30	NV	5847.989	5725 to 5850	Pass
			-20	NV	5847.989	5725 to 5850	Pass
			-10	NV	5847.989	5725 to 5850	Pass
			0	NV	5847.988	5725 to 5850	Pass
			10	NV	5847.989	5725 to 5850	Pass
			30	NV	5847.989	5725 to 5850	Pass
			40	NV	5847.989	5725 to 5850	Pass
			50	NV	5847.989	5725 to 5850	Pass

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