

RF TEST REPORT

For

Shenzhen Seenda Technology Co., Ltd.

Product Name: mechanical keyboard

Model(s): R100

Report Reference No. : POCE230926008RF002

FCC ID : 2BDJR-R100

Applicant's Name : Shenzhen Seenda Technology Co., Ltd.

Address : 2nd Floor, Building C, Gelong Zhigu, Bulong Road, Bantian Street,
Longgang District, Shenzhen City, Guangdong Province

Testing Laboratory : Shenzhen POCE Technology Co., Ltd.

Address : 102 Building H1 & 1/F., Building H, Hongfa Science & Technology Park,
Tangtou, Shiyan, Bao'an District, Shenzhen, Guangdong, China

Test Specification Standard : 47 CFR Part 15.249

Date of Receipt : September 26, 2023

Date of Test : September 26, 2023 to October 13, 2023

Data of Issue : October 13, 2023

Result : Pass

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Revision History Of Report

Version	Description	REPORT No.	Issue Date
V1.0	Original	POCE230926008RF002	October 13, 2023

NOTE1:

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

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1 TEST SUMMARY

1.1 Test Standards

The tests were performed according to following standards:

47 CFR Part 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz

1.2 Summary of Test Result

Item	Standard	Method	Requirement	Result
Antenna requirement	47 CFR Part 15.249		47 CFR Part 15.203	Pass
Conducted Emission at AC power line	47 CFR Part 15.249	ANSI C63.10-2013 section 6.2	47 CFR 15.207(a)	Pass
Occupied Bandwidth	47 CFR Part 15.249	ANSI C63.10-2013, section 6.9.2	47 CFR 15.215(c)	Pass
Field strength of fundamental	47 CFR Part 15.249	ANSI C63.10-2013 section 6.6	47 CFR 15.249(a) 47 CFR 15.249(b)(1)	Pass
Band edge emissions (Radiated)	47 CFR Part 15.249	ANSI C63.10-2013 section 6.6.4	47 CFR 15.249(d)	Pass
Emissions in frequency bands (below 1GHz)	47 CFR Part 15.249	ANSI C63.10-2013 section 6.5	47 CFR 15.249(a) 47 CFR 15.249(d) 47 CFR 15.249(e)	Pass
Emissions in frequency bands (above 1GHz)	47 CFR Part 15.249	ANSI C63.10-2013 section 6.6	47 CFR 15.249(a) 47 CFR 15.249(d) 47 CFR 15.249(e)	Pass

2 GENERAL INFORMATION

2.1 Client Information

Applicant's Name : Shenzhen Seenda Technology Co., Ltd.
Address : 2nd Floor, Building C, Gelong Zhigu, Bulong Road, Bantian Street, Longgang District, Shenzhen City, Guangdong Province

Manufacturer : Shenzhen Seenda Technology Co., Ltd.
Address : 2nd Floor, Building C, Gelong Zhigu, Bulong Road, Bantian Street, Longgang District, Shenzhen City, Guangdong Province

2.2 Description of Device (EUT)

Product Name:	mechanical keyboard
Model/Type reference:	R100
Series Model:	R68,R87,R108,Y68,Y87,Y98,L75,L98,XL98,A98,A75,A104,AL98
Model Difference:	The product has many models, only the model name is different, and the other parts such as the circuit principle, pcb and electrical structure are the same.
Trade Mark:	ROYALAXE
Power Supply:	DC 5V/1A from adapter Battery:DC3.7V 300mA
Operation Frequency:	2402-2479MHz
Number of Channels:	78
Modulation Type:	GFSK
Antenna Type:	PCB Antenna
Antenna Gain:	1.58 dBi
Hardware Version:	V1.0
Software Version:	V1.0

Remark:The Antenna Gain is supplied by the customer.POCE is not responsible for this data and the related calculations associated with it.

2.3 Description of Test Modes

No	Title	Description
TM1	Lowest channel	Keep the EUT works in continuously transmitting mode with GFSK modulation.(Duty cycle $\geq$ 98%)
TM2	Middle channel	Keep the EUT works in continuously transmitting mode with GFSK modulation.(Duty cycle $\geq$ 98%)
TM3	Highest channel	Keep the EUT works in continuously transmitting mode with GFSK modulation.(Duty cycle $\geq$ 98%)

Operation Frequency each of channel

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
3	2404MHz	23	2424MHz	43	2444MHz	63	2464MHz
4	2405MHz	24	2425MHz	44	2445MHz	64	2465MHz
5	2406MHz	25	2426MHz	45	2446MHz	65	2466MHz
6	2407MHz	26	2427MHz	46	2447MHz	66	2467MHz
7	2408MHz	27	2428MHz	47	2448MHz	67	2468MHz
8	2409MHz	28	2429MHz	48	2449MHz	68	2469MHz
9	2410MHz	29	2430MHz	49	2450MHz	69	2470MHz
10	2411MHz	30	2431MHz	50	2451MHz	70	2471MHz

11	2412MHz	31	2432MHz	51	2452MHz	71	2472MHz
12	2413MHz	32	2433MHz	52	2453MHz	72	2473MHz
13	2414MHz	33	2434MHz	53	2454MHz	73	2474MHz
14	2415MHz	34	2435MHz	54	2455MHz	74	2475MHz
15	2416MHz	35	2436MHz	55	2456MHz	75	2476MHz
16	2417MHz	36	2437MHz	56	2457MHz	76	2477MHz
17	2418MHz	37	2438MHz	57	2458MHz	77	2478MHz
18	2419MHz	38	2439MHz	58	2459MHz	78	2479MHz
19	2420MHz	39	2440MHz	59	2460MHz		
20	2421MHz	40	2441MHz	60	2461MHz		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test channel	Frequency (MHz)
	BDR/EDR
Lowest channel	2402MHz
Middle channel	2446MHz
Highest channel	2479MHz

2.4 Description of Test Modes

No	Title	Description
TM1	TX-GFSK (Non-Hopping)	Keep the EUT in continuously transmitting mode (non-hopping) with GFSK modulation.

2.5 Description of Support Units

The EUT was tested as an independent device.

2.6 Equipments Used During The Test

Conducted Emission at AC power line					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
loop antenna	EVERFINE	LLA-2	80900L-C	2023-02-27	2024-02-26
Power absorbing clamp	SCHWARZ BECK	MESS-ELEKTRONIK	/	2023-02-28	2024-02-27
Electric Network	SCHWARZ BECK	CAT5 8158	CAT5 8158#207	/	/
Cable	SCHWARZ BECK	/	/	2022-12-27	2023-12-27
Pulse Limiter	SCHWARZ BECK	VTSD 9561-F Pulse limiter 10dB Ateennator	561-G071	2023-02-27	2024-02-26
50ΩCoaxial Switch	Anritsu	MP59B	M20531	/	/
Test Receiver	Rohde & Schwarz	ESPI TEST RECEIVER	ID:1164.6607K 03-102109-MH	2023-06-13	2024-06-12
L.I.S.N	R&S	ESH3-Z5	831.5518.52	2022-12-29	2023-12-28

Occupied Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
RF Test Software	TACHOY	RTS-01	V2.0.0.0	/	/
High Pass filter	ZHINAN	OQHPF1-M1.5-18G-224	6210075	/	/
Power divider	MIDEWEST	PWD-2533	SMA-79	2023-05-11	2026-05-10
DC power	HP	66311B	38444359	/	/
RF Sensor Unit	Tachoy Information Technology(she nzhen) Co.,Ltd.	TR1029-2	000001	/	/
Wideband radio communication tester	R&S	CMW500	113410	2023-06-13	2024-06-12
Vector signal generator	Keysight	N5181A	MY48180415	2022-12-10	2023-12-09
Signal generator	Keysight	N5182A	MY50143455	2022-12-29	2023-12-28
Spectrum Analyzer	Keysight	N9020A	MY53420323	2022-12-29	2023-12-28

**Field strength of fundamental
Band edge emissions (Radiated)
Emissions in frequency bands (below 1GHz)
Emissions in frequency bands (above 1GHz)**

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Test software	Farad	EZ -EMC	V1.1.42	/	/
Positioning Controller	/	MF-7802	/	/	/
High Pass filter	ZHINAN	OQHPF1-M1.5-18G-224	6210075	/	/
Amplifier(18-40G)	COM-POWER	AH-1840	10100008-1	2022-04-05	2025-04-04
Horn antenna	COM-POWER	AH-1840 (18-40G)	10100008	2023-04-05	2025-04-04
Loop antenna	ZHINAN	ZN30900C	ZN30900C	2021-07-05	2024-07-04
Cable(LF)#2	Schwarzbeck	/	/	2023-02-27	2024-02-26
Cable(LF)#1	Schwarzbeck	/	/	2023-02-27	2024-02-26
Cable(HF)#2	Schwarzbeck	AK9515E	96250	2023-02-28	2024-02-27
Cable(HF)#1	Schwarzbeck	SYV-50-3-1	/	2023-02-27	2024-02-26
Power amplifier(LF)	Schwarzbeck	BBV9743	9743-151	2023-06-13	2024-06-12
Power amplifier(HF)	Schwarzbeck	BBV9718	9718-282	2023-06-13	2024-06-12
Wideband radio communication tester	R&S	CMW500	113410	2023-06-13	2024-06-12
Spectrum Analyzer	R&S	FSP30	1321.3008K40-101729-jR	2023-06-14	2024-06-13
Horn Antenna	Sunol Sciences	DRH-118	A091114	2023-05-13	2025-05-12
Broadband Antenna	Sunol Sciences	JB6 Antenna	A090414	2023-05-21	2025-05-20
Test Receiver	R&S	ESCI	102109	2023-06-13	2024-06-12

2.7 Statement Of The Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Disturbance (0.15~30MHz)	$\pm 3.41\text{dB}$
Occupied Bandwidth	$\pm 3.63\%$
RF conducted power	$\pm 0.733\text{dB}$
RF power density	$\pm 0.234\%$
Conducted Spurious emissions	$\pm 1.98\text{dB}$
Radiated Emission (Above 1GHz)	$\pm 5.46\text{dB}$
Radiated Emission (Below 1GHz)	$\pm 5.79\text{dB}$
Note: (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.	

2.8 Identification of Testing Laboratory

Company Name:	Shenzhen POCE Technology Co., Ltd.
Address:	101-102 Building H5 & 1/F., Building H, Hongfa Science & Technology Park, Tangtou, Shiyao, Bao'an District, Shenzhen, Guangdong, China
Phone Number:	+86-13267178997
Fax Number:	86-755-29113252

Identification of the Responsible Testing Location

Company Name:	Shenzhen POCE Technology Co., Ltd.
Address:	101-102 Building H5 & 1/F., Building H, Hongfa Science & Technology Park, Tangtou, Shiyao, Bao'an District, Shenzhen, Guangdong, China
Phone Number:	+86-13267178997
Fax Number:	86-755-29113252
FCC Registration Number:	0032847402
Designation Number:	CN1342
Test Firm Registration Number:	778666
A2LA Certificate Number:	6270.01

2.9 Announcement

2.10 Announcement

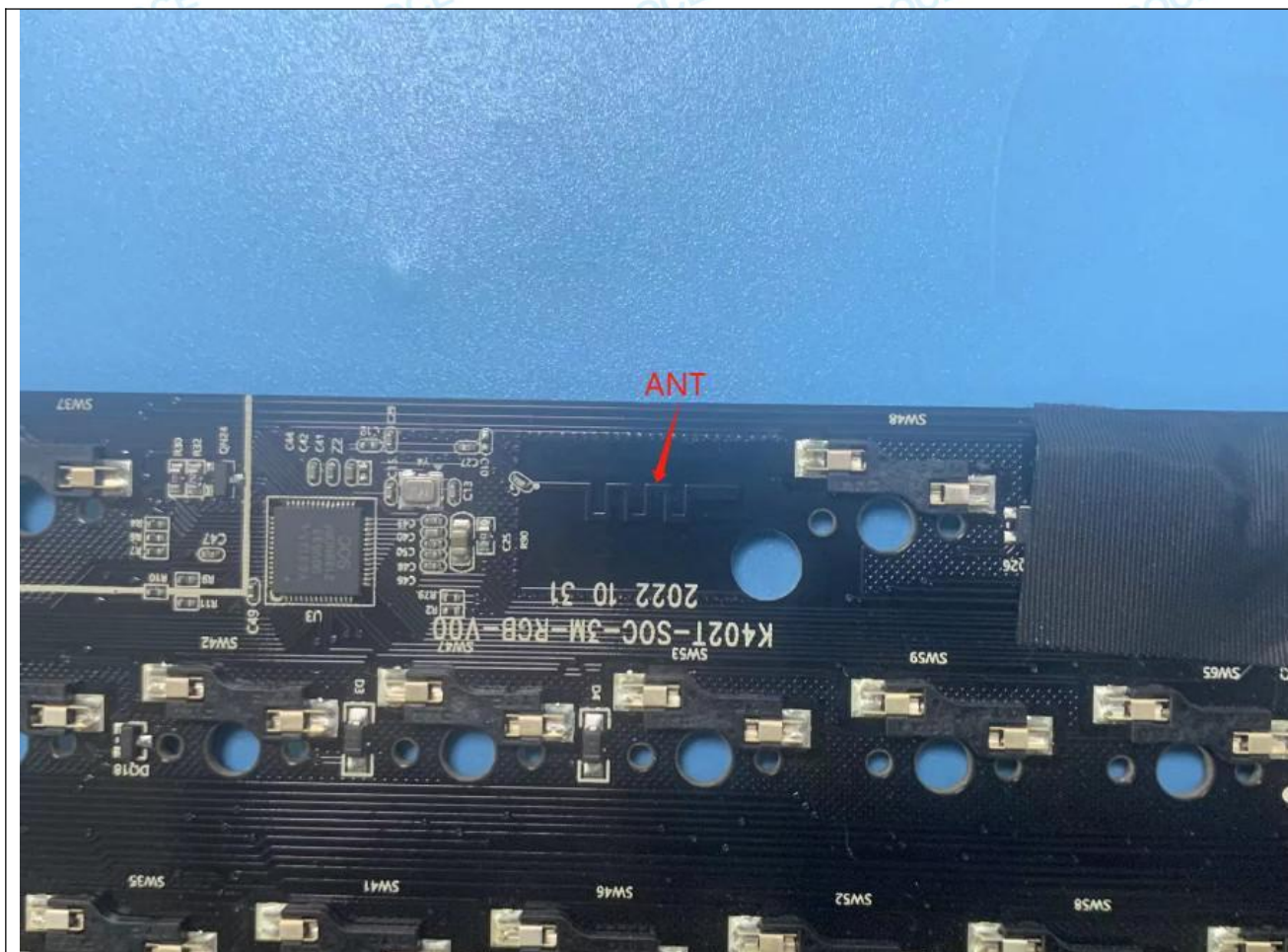
- (1) The test report reference to the report template version v0.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) This document may not be altered or revised in any way unless done so by POCE and all revisions are duly noted in the revisions section.
- (5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
- (6) We hereby declare that the laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant. the laboratory is not responsible for the accuracy of the information provided by the client. When the information provided by the customer may affect the effectiveness of the results, the responsibility lies with the customer, and the laboratory does not assume any responsibility.

3 Evaluation Results (Evaluation)

3.1 Antenna requirement

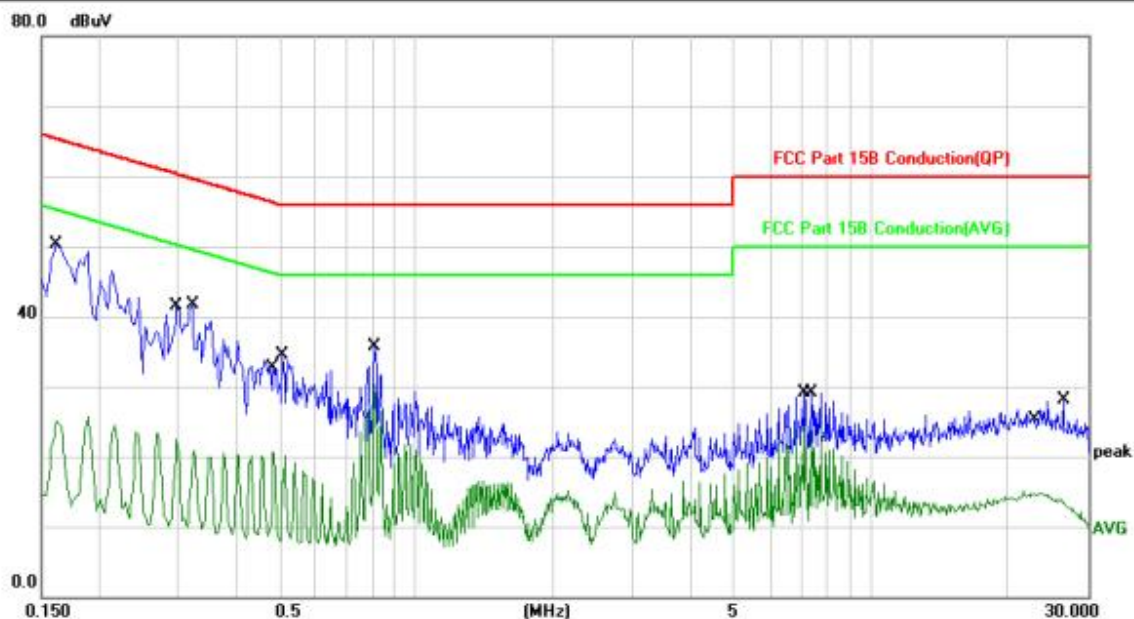
Test Requirement:	Refer to 47 CFR Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.
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3.1.1 Conclusion:



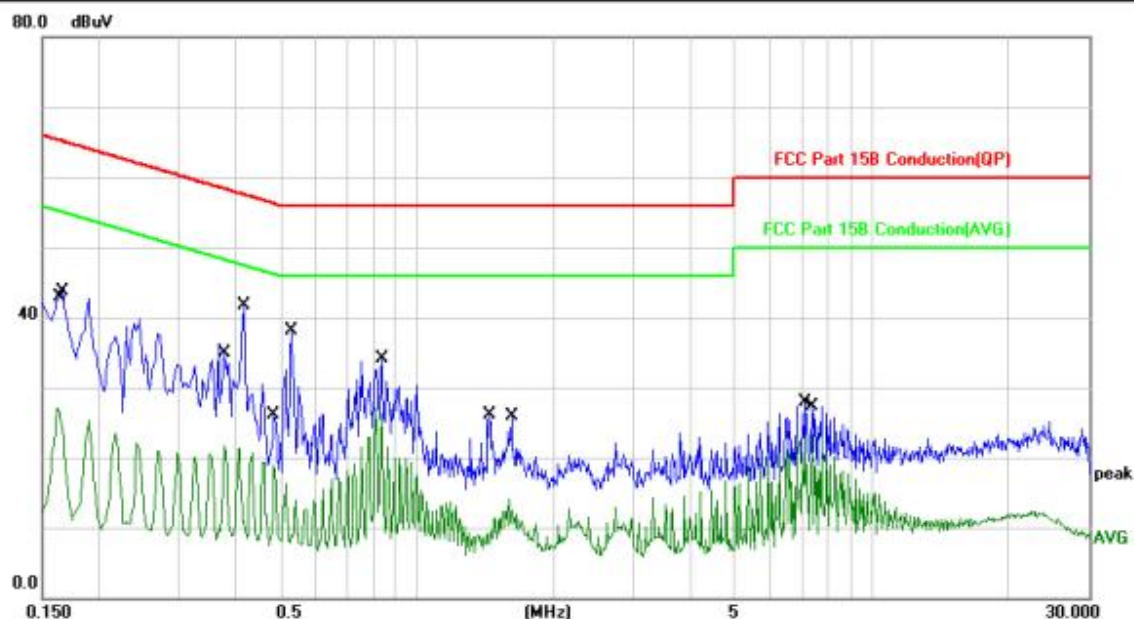
4.1.3 Test Data:

TM1 / Line: Line / Band: 2.4G / BW: 1 / CH: L
Power: AC120V60Hz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1620	40.31	10.03	50.34	65.36	-15.02	QP	
2		0.1620	15.04	10.03	25.07	55.36	-30.29	AVG	
3		0.2980	12.45	10.02	22.47	50.30	-27.83	AVG	
4		0.3220	31.74	10.01	41.75	59.65	-17.90	QP	
5		0.4860	10.74	9.98	20.72	46.24	-25.52	AVG	
6		0.5100	24.55	9.98	34.53	56.00	-21.47	QP	
7		0.8100	25.62	10.04	35.66	56.00	-20.34	QP	
8		0.8100	20.23	10.04	30.27	46.00	-15.73	AVG	
9		7.1700	14.07	10.26	24.33	50.00	-25.67	AVG	
10		7.3980	18.89	10.28	29.17	60.00	-30.83	QP	
11		22.7060	4.22	10.55	14.77	50.00	-35.23	AVG	
12		26.4460	17.52	10.61	28.13	60.00	-31.87	QP	

TM1 / Line: Neutral / Band: 2.4G / BW: 1 / CH: L
Power: AC120V60Hz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1620	17.05	10.03	27.08	55.36	-28.28	AVG	
2		0.1660	33.58	10.03	43.61	65.15	-21.54	QP	
3		0.3780	11.71	10.00	21.71	48.32	-26.61	AVG	
4	*	0.4180	31.76	9.99	41.75	57.49	-15.74	QP	
5		0.4863	8.59	9.98	18.57	46.23	-27.66	AVG	
6		0.5299	28.05	9.97	38.02	56.00	-17.98	QP	
7		0.8380	23.74	10.28	34.02	56.00	-21.98	QP	
8		0.8380	15.94	10.28	26.22	46.00	-19.78	AVG	
9		1.4420	16.13	9.93	26.06	56.00	-29.94	QP	
10		1.5940	4.09	9.94	14.03	46.00	-31.97	AVG	
11		7.1660	17.60	10.26	27.86	60.00	-32.14	QP	
12		7.3940	13.12	10.28	23.40	50.00	-26.60	AVG	

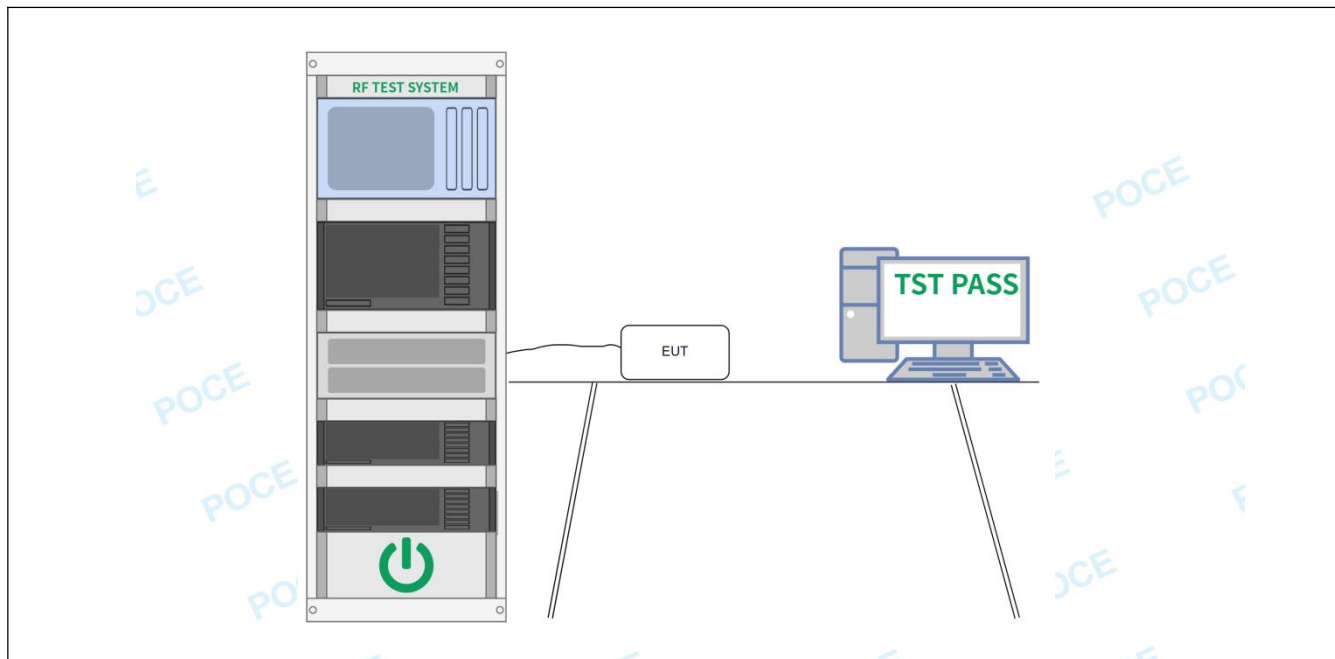
4.2 Occupied Bandwidth

Test Requirement:	47 CFR 15.215(c)
Test Limit:	Refer to 47 CFR 15.215(c), intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.
Test Method:	ANSI C63.10-2013, section 6.9.2
Procedure:	a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five 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 video bandwidth (VBW) shall be approximately three times 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) Steps a) through c) might require iteration to adjust within the specified tolerances. e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “-xx dB down” requirement; that is, if the requirement calls for measuring the -20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value. f) Set detection mode to peak and trace mode to max hold. g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value). h) Determine the “-xx dB down amplitude” using $[(\text{reference value}) - \text{xx}]$. Alternatively, this calculation may be made by using the marker-delta function of the instrument. i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j). j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “-xx dB down amplitude” determined in step h). If a marker is below this “-xx dB down amplitude” value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the “-xx dB down amplitude” determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth. k) 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).

4.2.1 E.U.T. Operation:

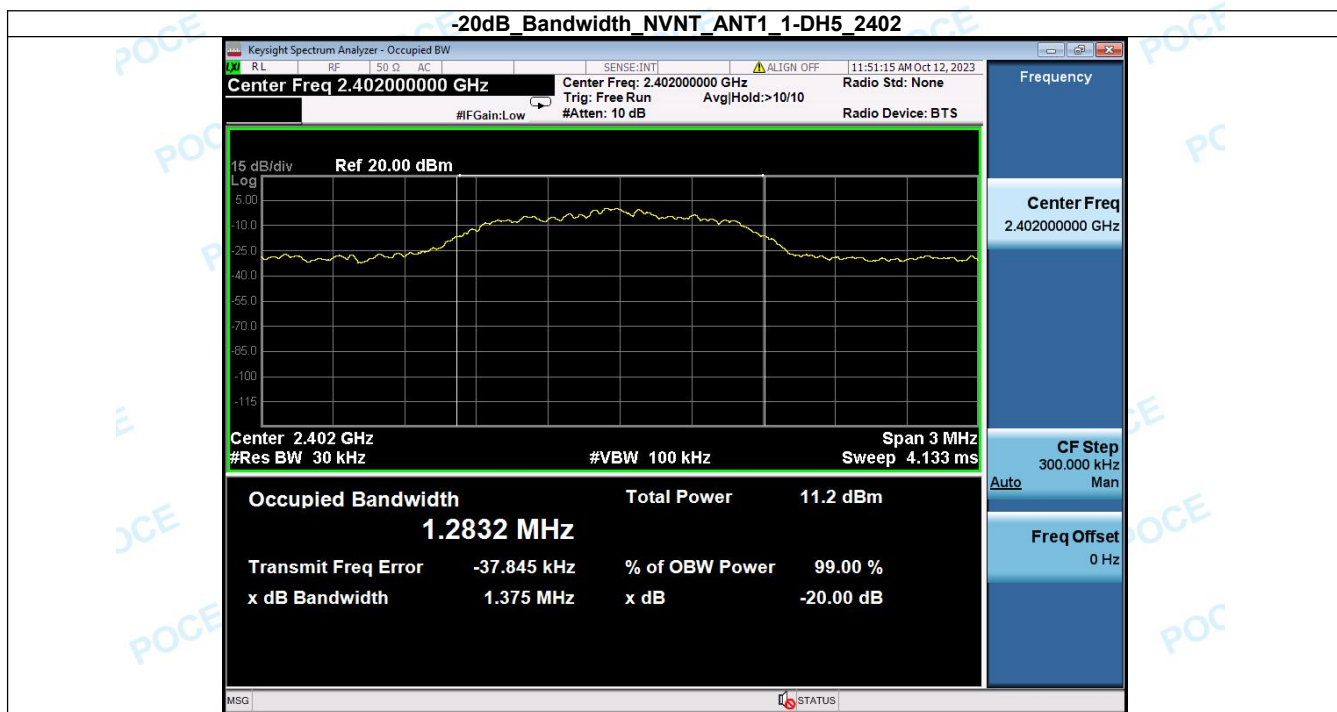
Operating Environment:					
Temperature:	22.6 °C	Humidity:	46.7 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

4.2.2 Test Setup Diagram:



4.2.3 Test Data:

Condition	Antenna	Modulation	Frequency (MHz)	-20dB BW(MHz)	if larger than CFS
NVNT	ANT1	1-DH5	2402	1.375	No
NVNT	ANT1	1-DH5	2440	1.371	No
NVNT	ANT1	1-DH5	2479	1.360	No



-20dB_Bandwidth_NVNT_ANT1_1-DH5_2440



-20dB_Bandwidth_NVNT_ANT1_1-DH5_2479



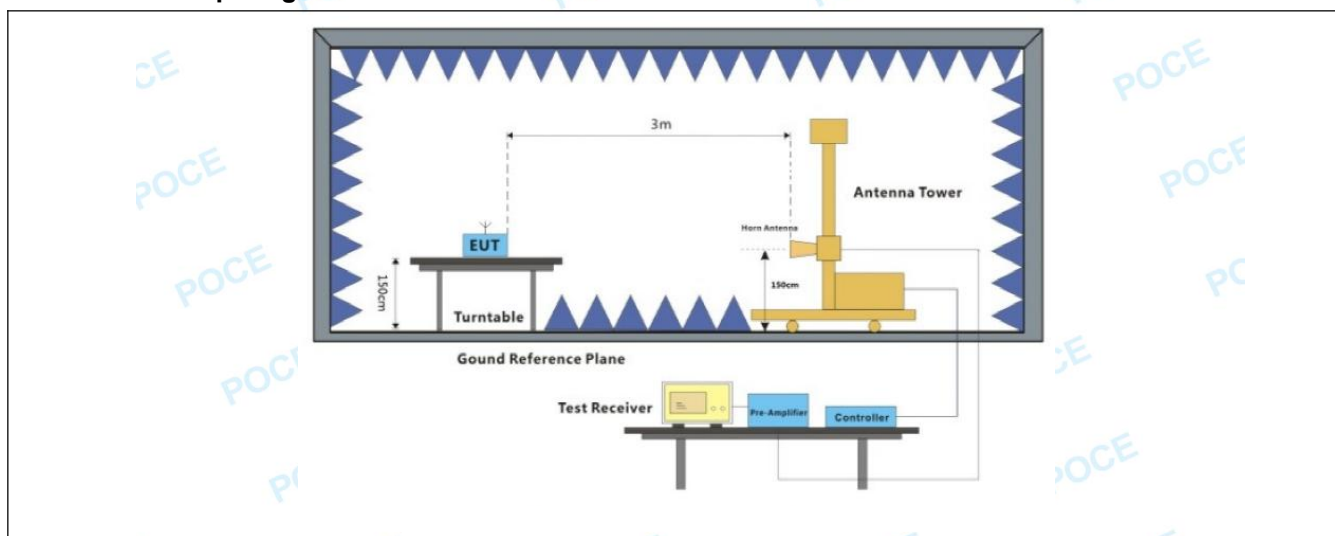
4.3 Field strength of fundamental

Test Requirement:	Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:		
	Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
	902-928 MHz	50	500
	2400-2483.5 MHz	50	500
	5725-5875 MHz	50	500
	24.0-24.25 GHz	250	2500
	The field strength of emissions in this band shall not exceed 2500 millivolts/meter.		
Test Method:	ANSI C63.10-2013 section 6.6		
Procedure:	ANSI C63.10-2013 section 6.6		

4.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.6 °C	Humidity:	46.7 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

4.3.2 Test Setup Diagram:



4.3.3 Test Data:

Frequency (MHz)	Emission (dBuV/m)	PK/AV	Ant. Pol.	Limits PK/AV (dBuV/m)	Margin (dB)
2402	78.02	Peak	H	114	-35.98
2402	76.86	AV	H	94	-17.14
2402	74.97	Peak	V	114	-39.03
2402	74.09	AV	V	94	-19.91
2446	77.60	Peak	H	114	-36.4
2446	76.73	AV	H	94	-17.27
2446	73.40	Peak	V	114	-40.6
2446	72.57	AV	V	94	-21.43
2479	76.74	Peak	H	114	-37.26
2479	75.91	AV	H	94	-18.09
2479	73.60	Peak	V	114	-40.4
2479	72.77	AV	V	94	-21.23

Note: For fundamental frequency $RBW \geq 20dB$ BW, $VBW \geq 3 \times RBW$

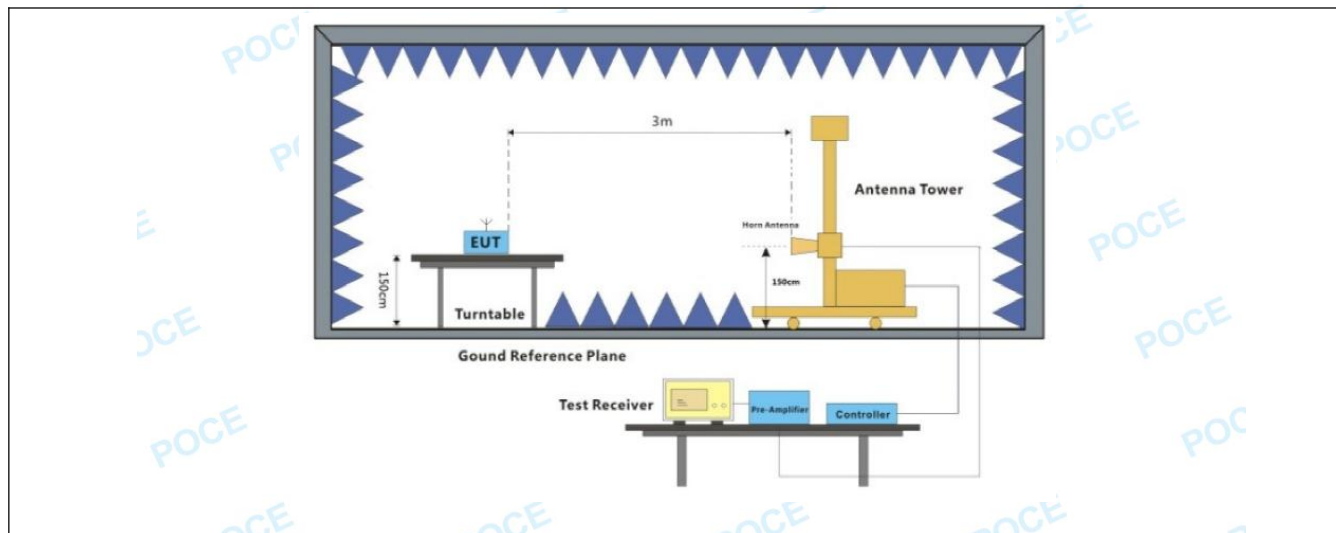
4.4 Band edge emissions (Radiated)

Test Requirement:	Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.		
Test Limit:	Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.		
	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.		
Test Method:	ANSI C63.10-2013 section 6.6.4		
Procedure:	ANSI C63.10-2013 section 6.6.4		

4.4.1 E.U.T. Operation:

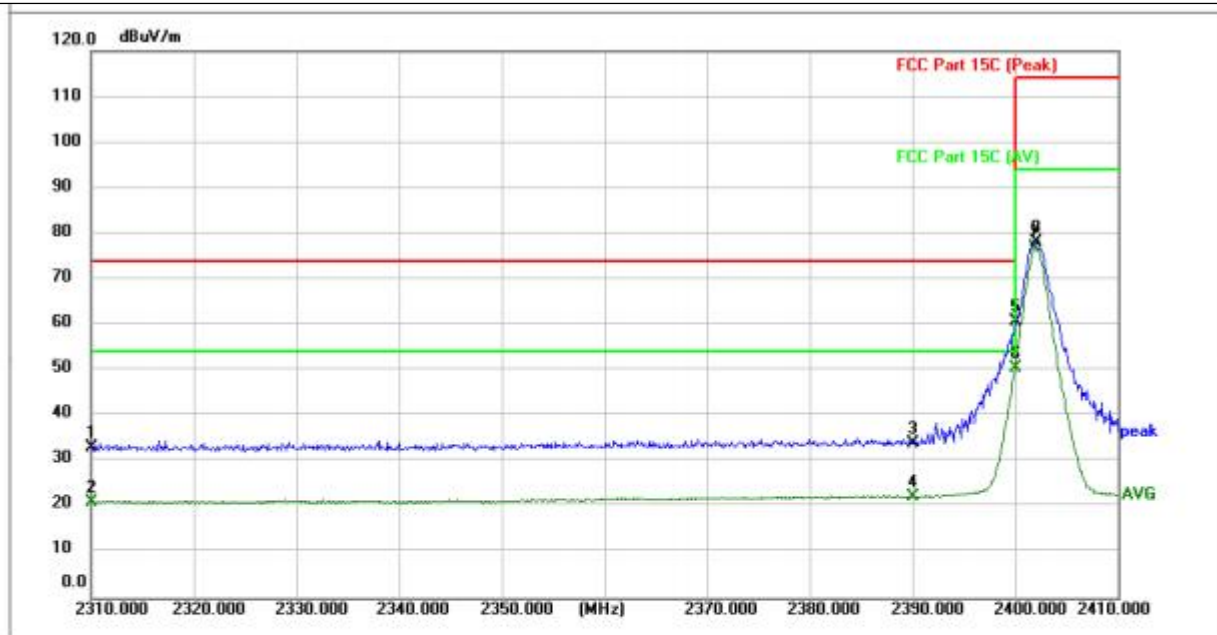
Operating Environment:					
Temperature:	22.6 °C	Humidity:	46.7 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

4.4.2 Test Setup Diagram:



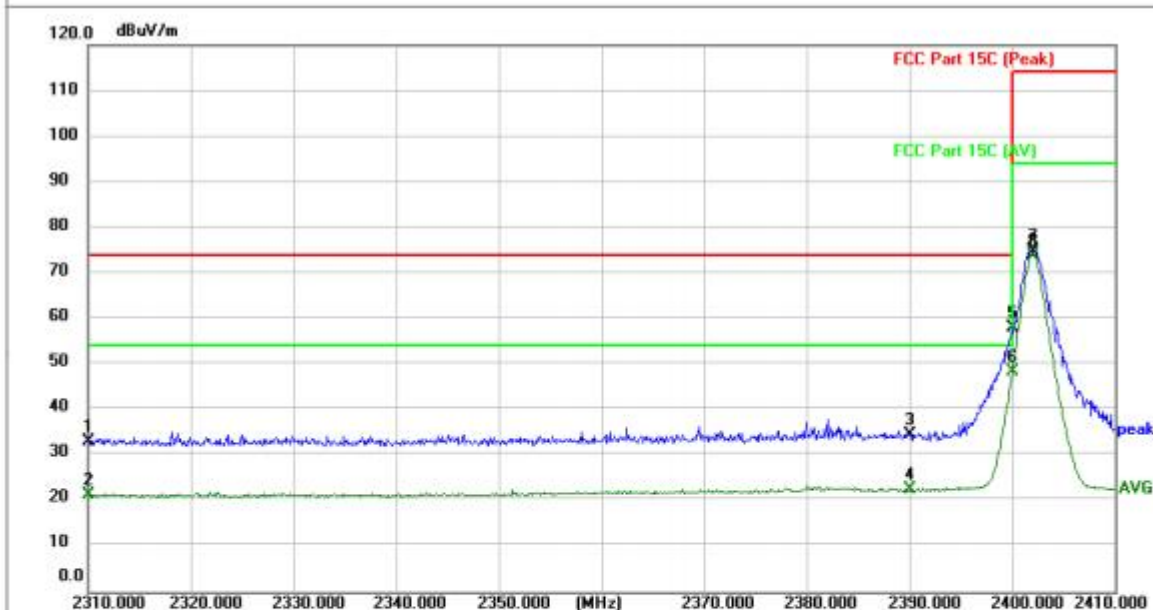
4.4.3 Test Data:

TM1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: L



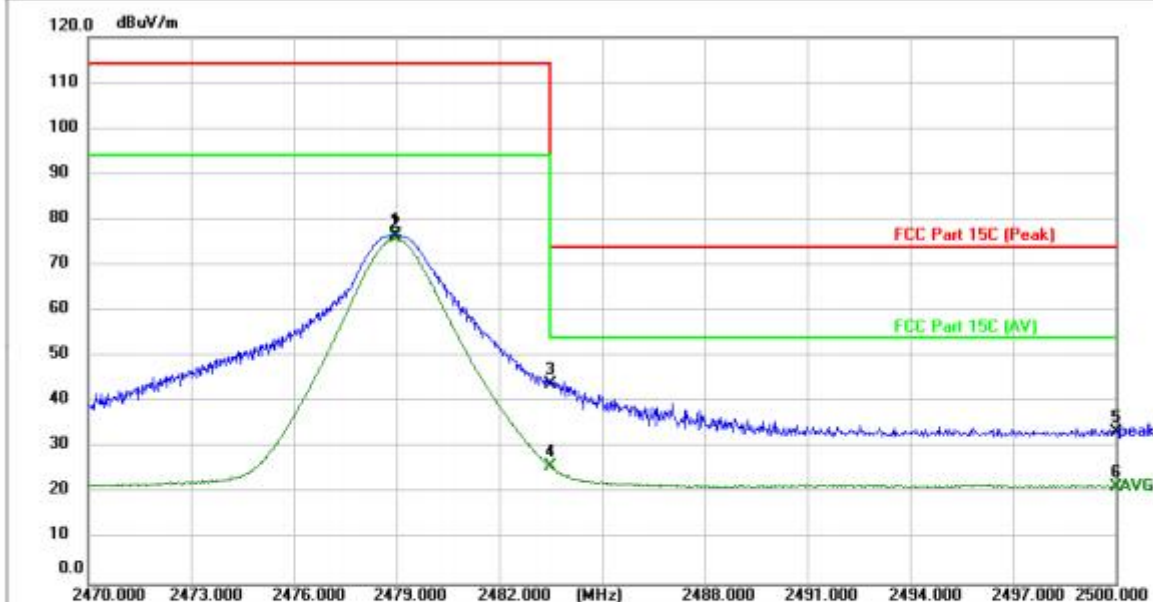
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	40.03	-6.93	33.10	74.00	-40.90	peak	150		P	
2	2310.000	28.22	-6.93	21.29	54.00	-32.71	AVG	150		P	
3	2390.000	40.80	-6.72	34.08	74.00	-39.92	peak	150		P	
4	2390.000	29.10	-6.72	22.38	54.00	-31.62	AVG	150		P	
5	2400.000	67.56	-6.69	60.87	74.00	-13.13	peak			P	
6 *	2400.000	57.12	-6.69	50.43	54.00	-3.57	AVG			P	
7	2401.900	83.55	-6.69	76.86	94.00	-17.14	AVG	150		P	
8	2402.100	84.71	-6.69	78.02	114.00	-35.98	peak	150		P	

TM1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: L



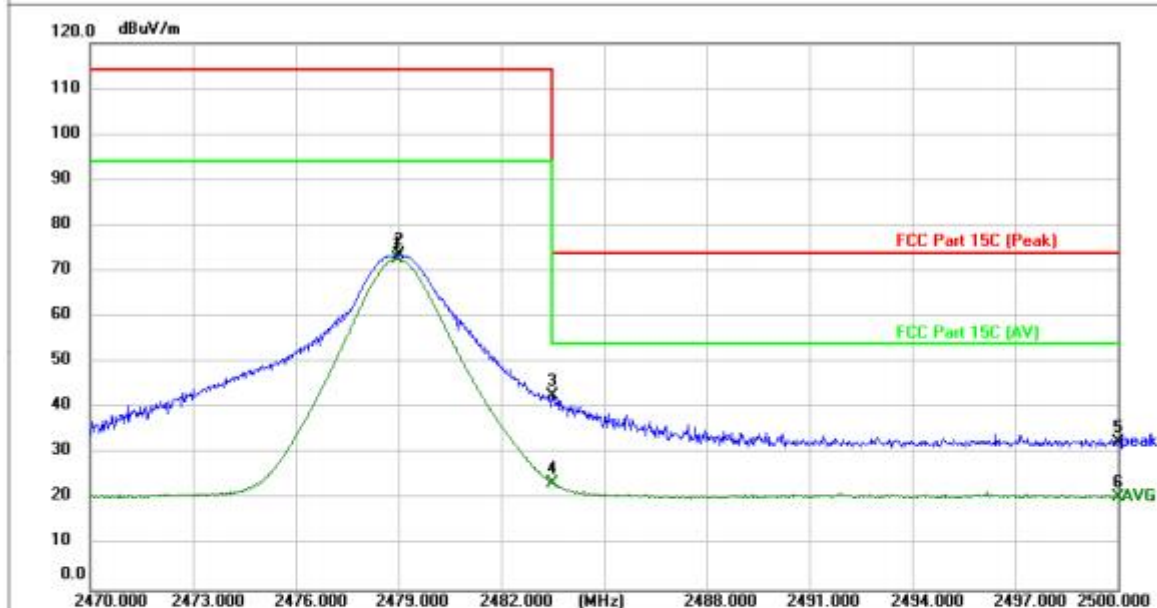
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	41.44	-8.23	33.21	74.00	-40.79	peak	150		P	
2	2310.000	29.60	-8.23	21.37	54.00	-32.63	AVG	150		P	
3	2390.000	42.42	-7.91	34.51	74.00	-39.49	peak	150		P	
4	2390.000	30.44	-7.91	22.53	54.00	-31.47	AVG	150		P	
5	2400.000	65.95	-7.87	58.08	74.00	-15.92	peak	150		P	
6 *	2400.000	56.21	-7.87	48.34	54.00	-5.66	AVG	150		P	
7	2402.000	82.83	-7.86	74.97	114.00	-39.03	peak	150		P	
8	2402.000	81.95	-7.86	74.09	94.00	-19.91	AVG	150		P	

TM1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2478.970	83.23	-6.49	76.74	114.00	-37.26	peak	150		P	
2 *	2478.970	82.40	-6.49	75.91	94.00	-18.09	AVG	150		P	
3	2483.500	50.33	-6.47	43.86	74.00	-30.14	peak	150		P	
4	2483.500	32.35	-6.47	25.88	54.00	-28.12	AVG	150		P	
5	2500.000	39.74	-6.43	33.31	74.00	-40.69	peak	150		P	
6	2500.000	27.99	-6.43	21.56	54.00	-32.44	AVG	150		P	

TM1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 *	2478.970	80.34	-7.57	72.77	94.00	-21.23	AVG	150		P	
2	2479.030	81.17	-7.57	73.60	114.00	-40.40	peak	150		P	
3	2483.500	50.16	-7.54	42.62	74.00	-31.38	peak	150		P	
4	2483.500	31.19	-7.54	23.65	54.00	-30.35	AVG	150		P	
5	2500.000	40.14	-7.48	32.66	74.00	-41.34	peak	150		P	
6	2500.000	28.05	-7.48	20.57	54.00	-33.43	AVG	150		P	

4.5 Emissions in frequency bands (below 1GHz)

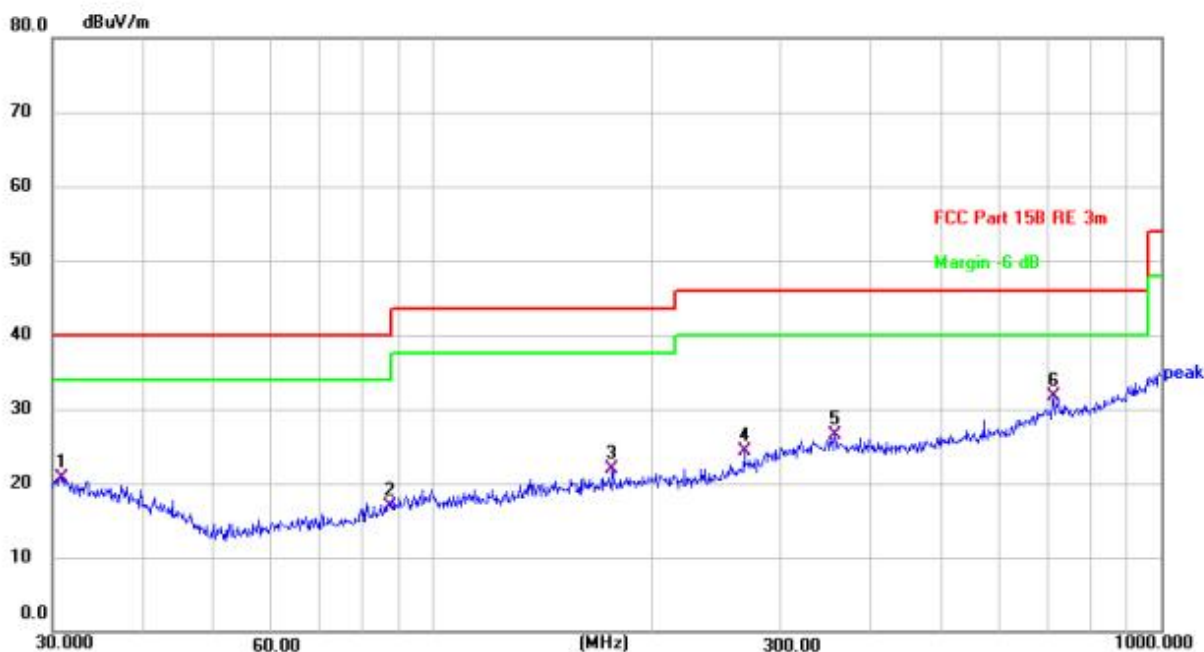
Test Requirement:	47 CFR 15.249(a) 47 CFR 15.249(d) 47 CFR 15.249(e)																																								
Test Limit:	Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following: <table border="1"> <thead> <tr> <th>Fundamental frequency</th><th>Field strength of fundamental (millivolts/meter)</th><th>Field strength of harmonics (microvolts/meter)</th></tr> </thead> <tbody> <tr> <td>902-928 MHz</td><td>50</td><td>500</td></tr> <tr> <td>2400-2483.5 MHz</td><td>50</td><td>500</td></tr> <tr> <td>5725-5875 MHz</td><td>50</td><td>500</td></tr> <tr> <td>24.0-24.25 GHz</td><td>250</td><td>2500</td></tr> </tbody> </table> Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation. <table border="1"> <thead> <tr> <th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</th></tr> </thead> <tbody> <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> </tbody> </table> ** 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. As shown in § 15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section 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 point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.		Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)	902-928 MHz	50	500	2400-2483.5 MHz	50	500	5725-5875 MHz	50	500	24.0-24.25 GHz	250	2500	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
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)																																							
902-928 MHz	50	500																																							
2400-2483.5 MHz	50	500																																							
5725-5875 MHz	50	500																																							
24.0-24.25 GHz	250	2500																																							
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																																							
Test Method:	ANSI C63.10-2013 section 6.5																																								
Procedure:	ANSI C63.10-2013 section 6.5																																								

4.5.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.6 °C	Humidity:	46.7 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

4.5.2 Test Data:

TM1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	30.8535	23.88	-3.09	20.79	40.00	-19.21	QP	100		P	
2	87.4177	23.39	-6.41	16.98	40.00	-23.02	QP	100		P	
3	176.2686	25.01	-3.20	21.81	43.50	-21.69	QP	100		P	
4	267.5455	25.43	-1.14	24.29	46.00	-21.71	QP	100		P	
5	356.6758	24.85	1.71	26.56	46.00	-19.44	QP	100		P	
6 *	711.6734	26.06	5.68	31.74	46.00	-14.26	QP	100		P	

TM1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	32.2925	24.60	-3.48	21.12	40.00	-18.88	QP	100		P	
2	86.8068	24.14	-6.51	17.63	40.00	-22.37	QP	100		P	
3	159.2251	25.26	-3.55	21.71	43.50	-21.79	QP	100		P	
4	209.3129	24.59	-2.79	21.80	43.50	-21.70	QP	100		P	
5	394.8545	25.53	1.31	26.84	46.00	-19.16	QP	100		P	
6 *	714.1734	26.41	5.08	31.49	46.00	-14.51	QP	100		P	

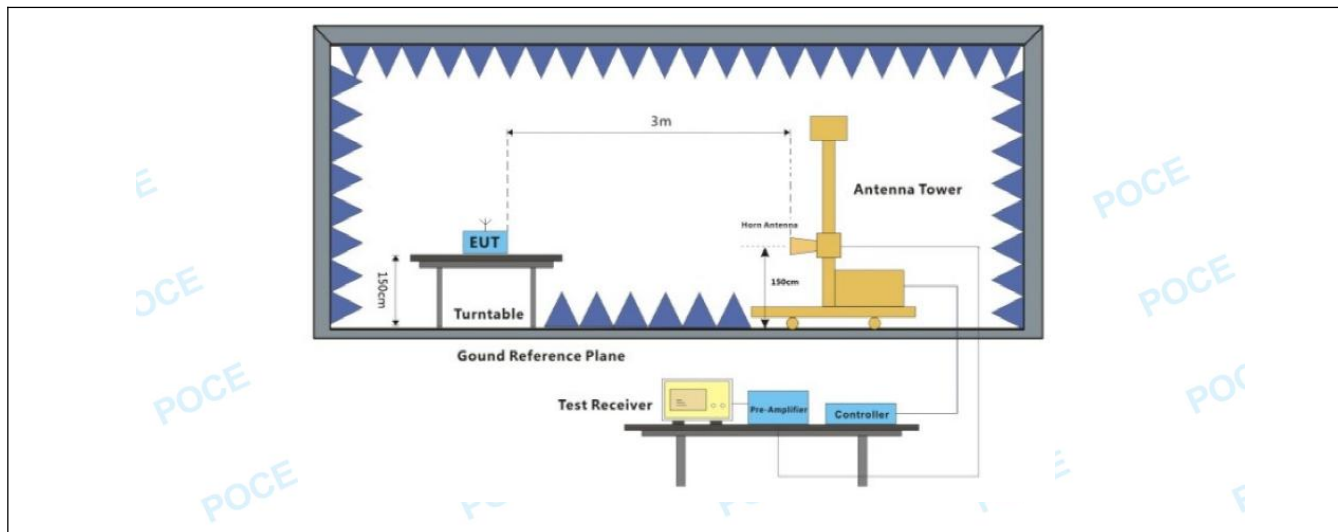
4.6 Emissions in frequency bands (above 1GHz)

Test Requirement:	47 CFR 15.249(a) 47 CFR 15.249(d) 47 CFR 15.249(e)																																								
Test Limit:	Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following: <table border="1"> <thead> <tr> <th>Fundamental frequency</th><th>Field strength of fundamental (millivolts/meter)</th><th>Field strength of harmonics (microvolts/meter)</th></tr> </thead> <tbody> <tr> <td>902-928 MHz</td><td>50</td><td>500</td></tr> <tr> <td>2400-2483.5 MHz</td><td>50</td><td>500</td></tr> <tr> <td>5725-5875 MHz</td><td>50</td><td>500</td></tr> <tr> <td>24.0-24.25 GHz</td><td>250</td><td>2500</td></tr> </tbody> </table> Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation. <table border="1"> <thead> <tr> <th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</th></tr> </thead> <tbody> <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> </tbody> </table> ** 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. As shown in § 15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section 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 point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.		Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)	902-928 MHz	50	500	2400-2483.5 MHz	50	500	5725-5875 MHz	50	500	24.0-24.25 GHz	250	2500	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
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)																																							
902-928 MHz	50	500																																							
2400-2483.5 MHz	50	500																																							
5725-5875 MHz	50	500																																							
24.0-24.25 GHz	250	2500																																							
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																																							
Test Method:	ANSI C63.10-2013 section 6.6																																								
Procedure:	ANSI C63.10-2013 section 6.6																																								

4.6.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.6 °C	Humidity:	46.7 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

4.6.2 Test Setup Diagram:



4.6.3 Test Data:

TM1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: L

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4804.000	38.90	-0.90	38.00	74.00	-36.00	peak			P	
2	4804.000	27.08	-0.90	26.18	54.00	-27.82	AVG			P	
3	7206.000	37.07	4.13	41.20	74.00	-32.80	peak			P	
4	7206.000	24.89	4.13	29.02	54.00	-24.98	AVG			P	
5	9608.000	34.51	8.09	42.60	74.00	-31.40	peak			P	
6 *	9608.000	23.04	8.09	31.13	54.00	-22.87	AVG			P	

TM1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: L

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4804.000	37.86	-0.28	37.58	74.00	-36.42	peak			P	
2	4804.000	26.44	-0.28	26.16	54.00	-27.84	AVG			P	
3	7206.000	35.95	4.09	40.04	74.00	-33.96	peak			P	
4	7206.000	24.94	4.09	29.03	54.00	-24.97	AVG			P	
5	9608.000	35.85	8.02	43.87	74.00	-30.13	peak			P	
6 *	9608.000	24.88	8.02	32.90	54.00	-21.10	AVG			P	

TM1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: M

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4880.000	38.42	-0.65	37.77	74.00	-36.23	peak	150		P	
2	4880.000	27.35	-0.65	26.70	54.00	-27.30	AVG	150		P	
3	7320.000	35.75	4.31	40.06	74.00	-33.94	peak	150		P	
4	7320.000	24.78	4.31	29.09	54.00	-24.91	AVG	150		P	
5	9760.000	35.33	8.09	43.42	74.00	-30.58	peak	150		P	
6 *	9760.000	23.93	8.09	32.02	54.00	-21.98	AVG	150		P	

TM1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: M

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4880.000	38.10	-0.03	38.07	74.00	-35.93	peak	150		P	
2	4880.000	26.70	-0.03	26.67	54.00	-27.33	AVG	150		P	
3	7320.000	36.92	4.36	41.28	74.00	-32.72	peak	150		P	
4	7320.000	24.96	4.36	29.32	54.00	-24.68	AVG	150		P	
5	9760.000	35.52	8.12	43.64	74.00	-30.36	peak	150		P	
6 *	9760.000	24.79	8.12	32.91	54.00	-21.09	AVG	150		P	

TM1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: H

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4958.000	39.22	-0.38	38.84	74.00	-35.16	peak	150		P	
2	4958.000	26.74	-0.38	26.36	54.00	-27.64	AVG	150		P	
3	7437.000	36.27	4.49	40.76	74.00	-33.24	peak	150		P	
4	7437.000	24.80	4.49	29.29	54.00	-24.71	AVG	150		P	
5	9916.000	35.03	8.09	43.12	74.00	-30.88	peak	150		P	
6 *	9916.000	24.28	8.09	32.37	54.00	-21.63	AVG	150		P	

TM1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: H

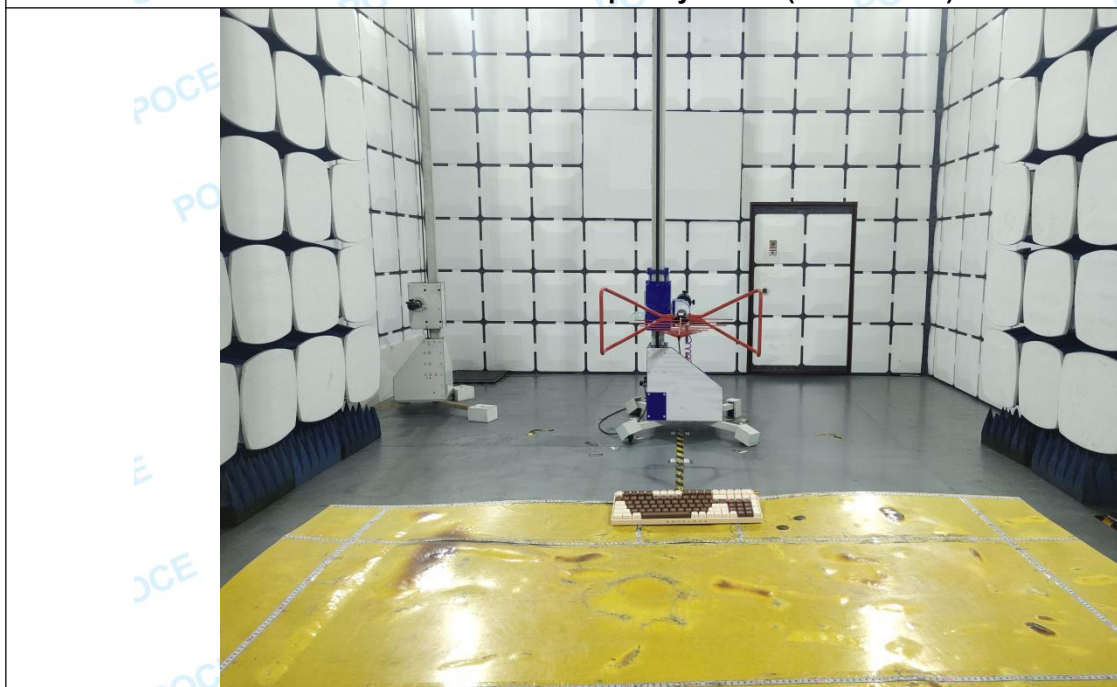
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4958.000	38.47	0.23	38.70	74.00	-35.30	peak	150		P	
2	4958.000	26.72	0.23	26.95	54.00	-27.05	AVG	150		P	
3	7437.000	35.31	4.64	39.95	74.00	-34.05	peak	150		P	
4	7437.000	24.75	4.64	29.39	54.00	-24.61	AVG	150		P	
5	9916.000	36.03	8.23	44.26	74.00	-29.74	peak	150		P	
6 *	9916.000	24.84	8.23	33.07	54.00	-20.93	AVG	150		P	

5 TEST SETUP PHOTOS

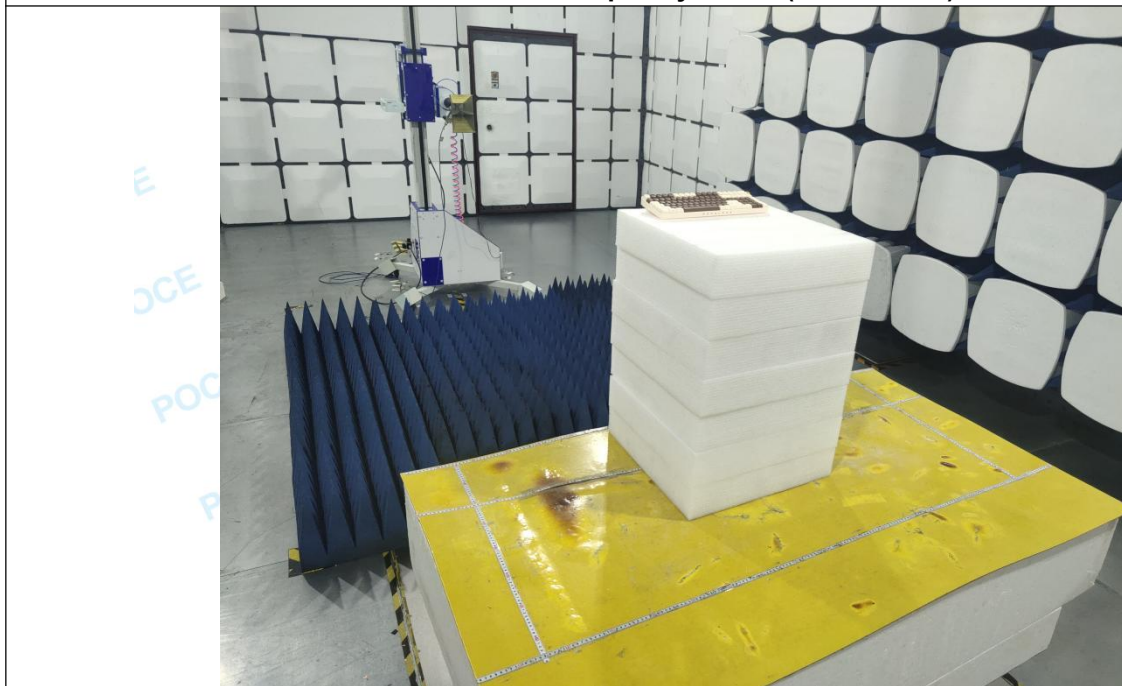
Conducted Emission at AC power line



Emissions in frequency bands (below 1GHz)

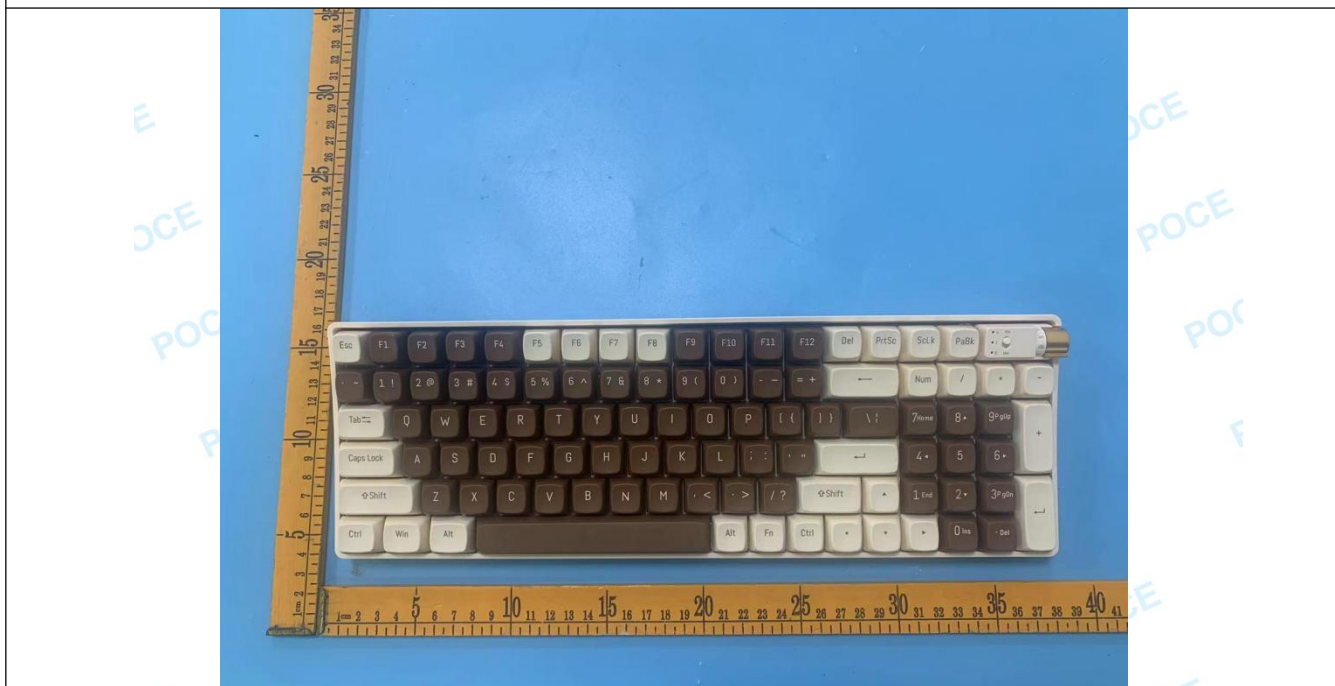


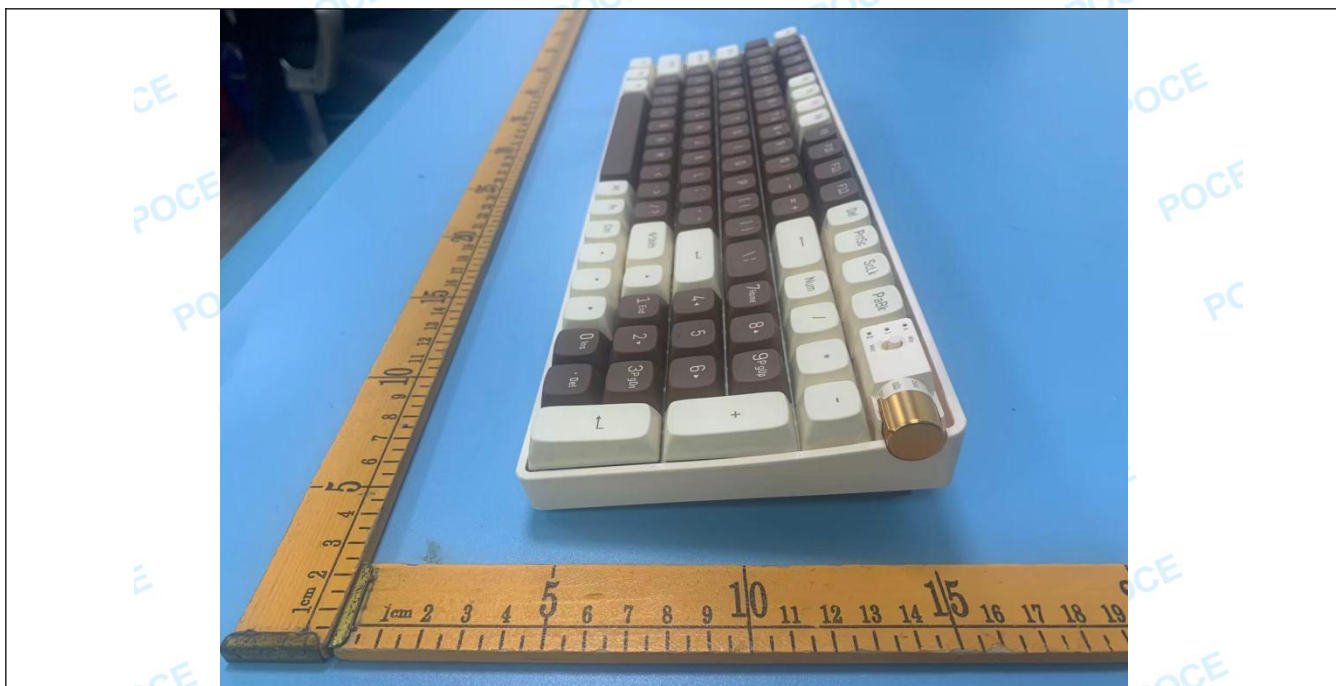
Emissions in frequency bands (above 1GHz)

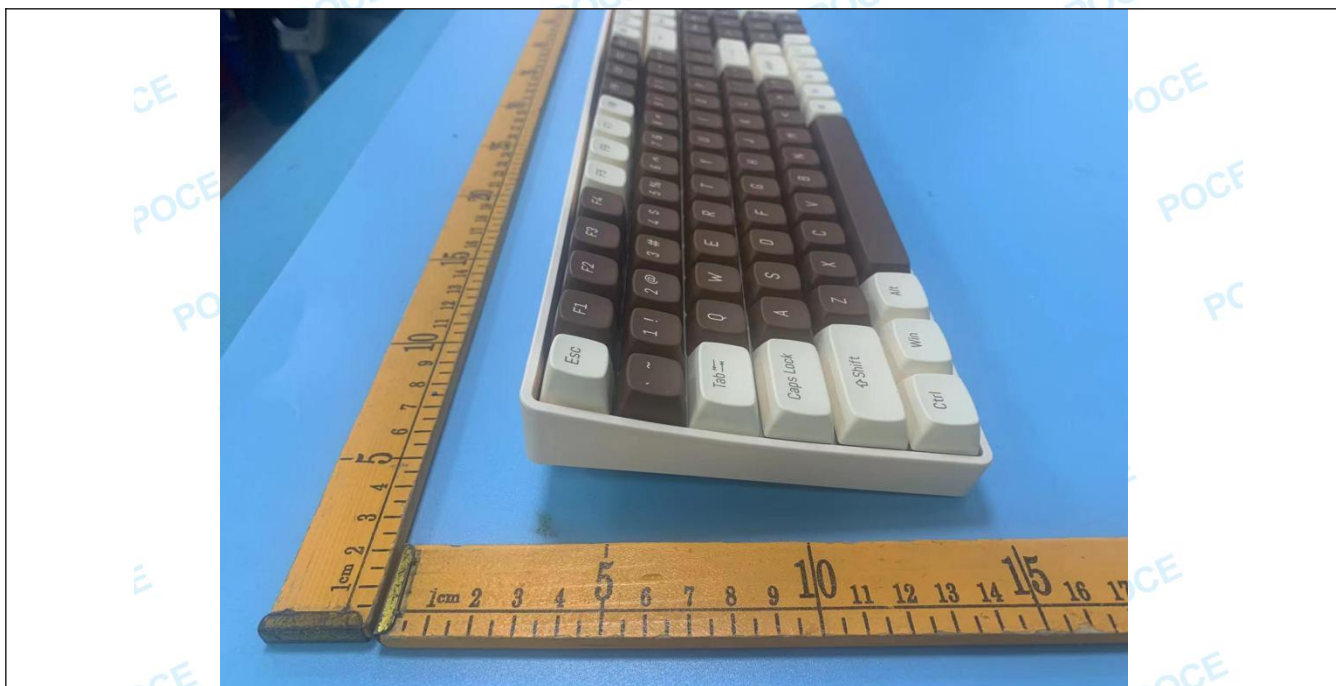
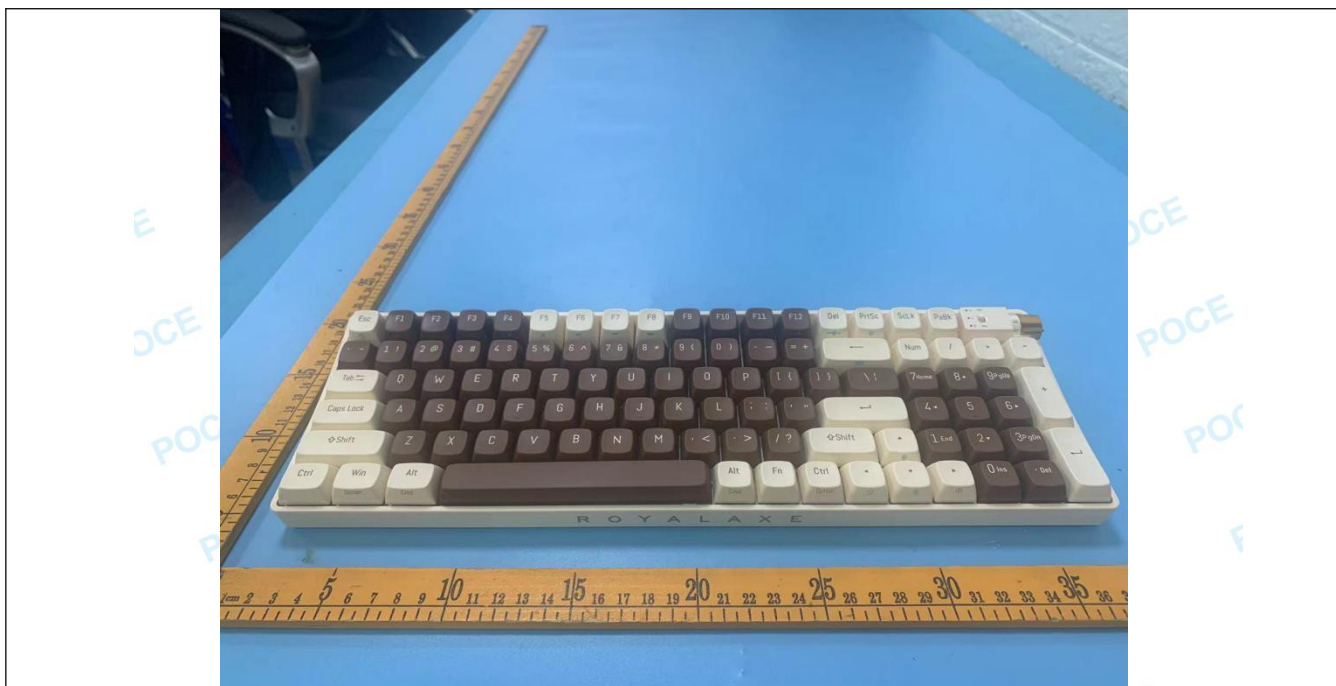


6 PHOTOS OF THE EUT

External







Internal

