

RF TEST REPORT

For

Shenzhen Liu Box plastic products Co., LTD

Product Name: Tablet

Model(s).: AT71K

Report Reference No. : POCE230921005RL001

FCC ID : 2BC4O-AT71K

Applicant's Name : Shenzhen Liu Box plastic products Co., LTD

Address : A102, Building A, No. 604, South America Road, Xiner Community, Xinqiao Street, Baoan District, Shenzhen

Testing Laboratory : Shenzhen POCE Testing Technology Co., Ltd.

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

Test Specification Standard : 47 CFR Part 15.247
ANSI C63.10-2013 & KDB 558074 D01 15.247 Meas Guidance v05r02

Date of Receipt : September 21, 2023

Date of Test : September 21, 2023 to September 27, 2023

Date of Issue : September 27, 2023

Result : Pass

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Revision History Of Report

Version	Description	REPORT No.	Issue Date
V1.0	Original	POCE230921005RL001	September 27, 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.

Compiled by:



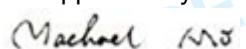
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1 TEST SUMMARY

1.1 Test Standards

The tests were performed according to following standards:

47 CFR Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

1.2 Summary of Test Result

Item	Standard	Method	Requirement	Result
Antenna requirement	47 CFR Part 15.247		47 CFR 15.203	Pass
Conducted Emission at AC power line	47 CFR Part 15.247	ANSI C63.10-2013 section 6.2	47 CFR 15.207(a)	Pass
Occupied Bandwidth	47 CFR Part 15.247	ANSI C63.10-2013, section 11.8	47 CFR 15.247(a)(2)	Pass
Maximum Conducted Output Power	47 CFR Part 15.247	ANSI C63.10-2013, section 11.9.2	47 CFR 15.247(b)(3)	Pass
Power Spectral Density	47 CFR Part 15.247	ANSI C63.10-2013, section 11.10	47 CFR 15.247(e)	Pass
Emissions in non-restricted frequency bands	47 CFR Part 15.247	ANSI C63.10-2013 section 11.11	47 CFR 15.247(d), 15.209, 15.205	Pass
Band edge emissions (Radiated)	47 CFR Part 15.247	ANSI C63.10-2013 section 6.10	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (below 1GHz)	47 CFR Part 15.247	ANSI C63.10-2013 section 6.6.4	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (above 1GHz)	47 CFR Part 15.247	ANSI C63.10-2013 section 6.6.4	47 CFR 15.247(d), 15.209, 15.205	Pass

Note: 1.N/A -this device(EUT) is not applicable to this testing item

2. RF-conducted test results including cable loss.

2 GENERAL INFORMATION

2.1 Client Information

Applicant's Name : Shenzhen Liu Box plastic products Co., LTD
Address : A102, Building A, No. 604, South America Road, Xiner Community, Xinqiao Street, Baoan District, Shenzhen

Manufacturer : SHENZHEN PEICHENG TECHNOLOGY CO.,LTD
Address : 5F Building 64/2F Building 61, Baotian Industrial Zone, Chentian Community, Xixiang Street, Baoan District, Shenzhen

2.2 Description of Device (EUT)

Product Name:	Tablet
Sample No.:	230916005-1
Model/Type reference:	AT71K
Trade Mark:	Aheadthink
Product Description:	Tablet
Power Supply:	DC 5V-2A from adapter and DC 3.85V from battery
Cable:	USB CABEL-0.5M
Operation Frequency:	2402MHz to 2480MHz
Number of Channels:	40
Modulation Type:	GFSK
Antenna Type:	FPC ANTENNA
Antenna Gain:	0.68dBi
Hardware Version:	A86V-D8UA
Software Version:	V1.0

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	11	2422MHz	21	2442MHz	31	2462MHz
2	2404MHz	12	2424MHz	22	2444MHz	32	2464MHz
3	2406MHz	13	2426MHz	23	2446MHz	33	2466MHz
4	2408MHz	14	2428MHz	24	2448MHz	34	2468MHz
5	2410MHz	15	2430MHz	25	2450MHz	35	2470MHz
6	2412MHz	16	2432MHz	26	2452MHz	36	2472MHz
7	2414MHz	17	2434MHz	27	2454MHz	37	2474MHz
8	2416MHz	18	2436MHz	28	2456MHz	38	2476MHz
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

Note:

#: The antenna gain provided by the applicant, and the laboratory will not be responsible for the accumulated calculation results which covers the information provided by the applicant.

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)
Lowest channel	2402MHz
Middle channel	2440MHz
Highest channel	2480MHz

2.3 Description of Test Modes

No	Title	Description
TM1	TX mode	Keep the EUT connect to AC power line and works in continuously transmitting mode with GFSK modulation.
		Remark: During the test, the duty cycle >98%, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.

Title	Description
TM1	Keep the EUT works in continuously transmitting mode with GFSK modulation.
	<input type="checkbox"/> Special software is used. <input type="checkbox"/> Through engineering command into the engineering mode. engineering command: *###3646633#*#* <input checked="" type="checkbox"/> Other method: adb mode
	Special software: /

2.4 Description of Support Units

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

Item	Description	Manufacturer	Model No.	Remark	Certification
1	adapter	Shenzhen Fangxin Technology Co.,Ltd.	MODEL: WRP2E-050200U; INPUT: 100-240Vac 50/60Hz 0.4A Max; OUTPUT: 5.0V 2A	Provide by Clinet	SDOC

2.5 Equipments Used During The Test

Conducted Emission at AC power line

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal. Due Date
Shielding room	CY	8*4*3	20160102	2023/1/26	2025/1/25
Pulse Limiter	Schwarzbeck	VTSD 9561	561-G071	2023/2/27	2024/2/26
Cable	Schwarzbeck	/	/	2023/2/27	2024/2/26
Test Receiver	Rohde & Schwarz	ESPI	1164.6607K03-102109-MH	2023/6/13	2024/6/12
L.I.S.N	R&S	ESH3-Z5	831.5518.52	2022/12/29	2023/12/28
L.I.S.N	Schwarzbeck	NSLK 8126	NSLK 8126	2023/8/8	2024/8/7
50ΩCoaxial Switch	Anritsu	MP59B	M20531	/	/
EMI Testsoftware	Farad	EZ -EMC	V1.1.42	/	/

Emissions in restricted frequency bands and RF

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Test Receiver	R&S	ESCI	102109	2023/6/13	2024/6/12
Spectrum Analyzer	R&S	FSP30	1321.3008K40-101729-jR	2023/6/14	2024/6/13
966 Chamber	CY	9*6*6	20160101	2023/1/26	2025/1/25
Bore-sighting Antenna rack	PBB	1308503	16033	/	/
Loop antenna	ZHINAN	ZN30900C	ZN30900C	2021/7/5	2024/7/4
Broadband Antenna	Sunol Sciences	JB6 Antenna	A090414	2023/5/21	2025/5/20
Horn Antenna	Sunol Sciences	DRH-118	A091114	2023/5/13	2025/5/12
Horn antenna	COM-POWER	AH-1840(40G)	10100008	2023/4/5	2025/4/4
Power APM(LF)	Schwarzbeck	BBV9743	9743-151	2023/6/13	2024/6/12
Power APM(HF)	Schwarzbeck	BBV9718	9718-282	2023/6/13	2024/6/12
Cable(LF)#2	Schwarzbeck	/	/	2023/2/27	2024/2/26
Cable(LF)#1	Schwarzbeck	/	/	2023/2/27	2024/2/26
Cable(HF)#2	Schwarzbeck	AK9515E	96250	2023/2/28	2024/2/27
Cable(HF)#1	Schwarzbeck	SYV-50-3-1	/	2023/2/27	2024/2/26
Power divider	MIDEWEST	PWD-2533	SMA-79	2023/5/11	2026/5/10
signal generator	Keysight	N5181A	MY48180415	2022/12/10	2023/12/9
signal generator	Keysight	N5182A	MY50143455	2022/12/29	2023/12/28
Spectrum Analyzer	Keysight	N9020A	MY53420323	2022/12/29	2023/12/28
RF Sensor Unit	TACHOY	TR1029-2	000001	/	/
RF Control Unit	TACHOY	TR1029-1	000001	/	/
Position Controller	MF	MF-7802	/	/	/
EMI Testsoftware	Farad	EZ -EMC	V1.1.42	/	/
RF TestSoftware	TACHOY	RTS-01	V2.0.0.0	/	/

2.6 Statement Of The Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Disturbance (0.15~30MHz)	±3.41dB
Occupied Bandwidth	±3.63%
RF conducted power	±0.733dB
RF power density	±0.234%
Conducted Spurious emissions	±1.98dB
Radiated Emission (Above 1GHz)	±5.46dB
Radiated Emission (Below 1GHz)	±5.79dB

Note: (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2.7 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, Shiyan, 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, Shiyan, 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 No.:	778666
A2LA Certificate Number:	6270.01

2.8 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) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

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 Radio Spectrum Matter Test Results (RF)

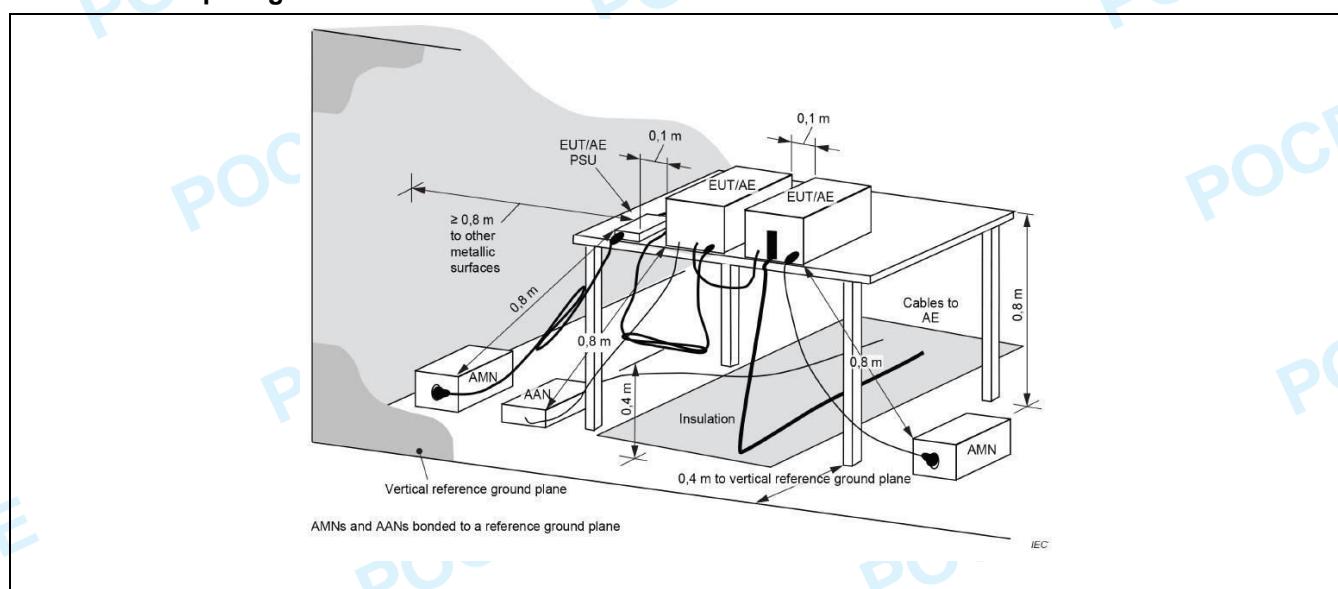
4.1 Conducted Emission at AC power line

Test Requirement:	<p>Refer to 47 CFR 15.207(a). Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).</p>			
Test Limit:	<p>Frequency of emission (MHz)</p>		<p>Conducted limit (dBμV)</p>	
	Quasi-peak		Average	
	0.15-0.5	66 to 56*	56 to 46*	
	0.5-5	56	46	
	5-30	60	50	
<p>*Decreases with the logarithm of the frequency.</p>				
Test Method:	<p>ANSI C63.10-2013 section 6.2</p>			
Procedure:	<p>Refer to ANSI C63.10-2013 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices</p>			

4.1.1 E.U.T. Operation:

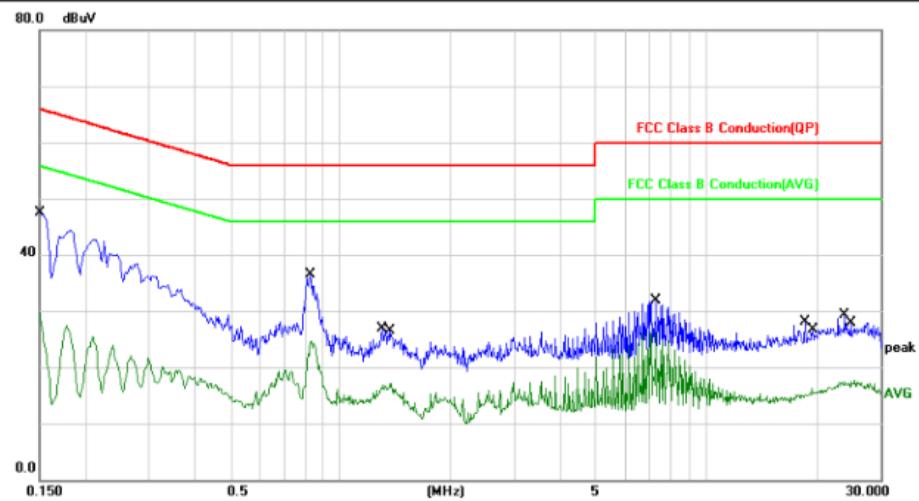
Operating Environment:					
Temperature:	22.4 °C	Humidity:	46.6 %	Atmospheric Pressure:	101 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

4.1.2 Test Setup Diagram:



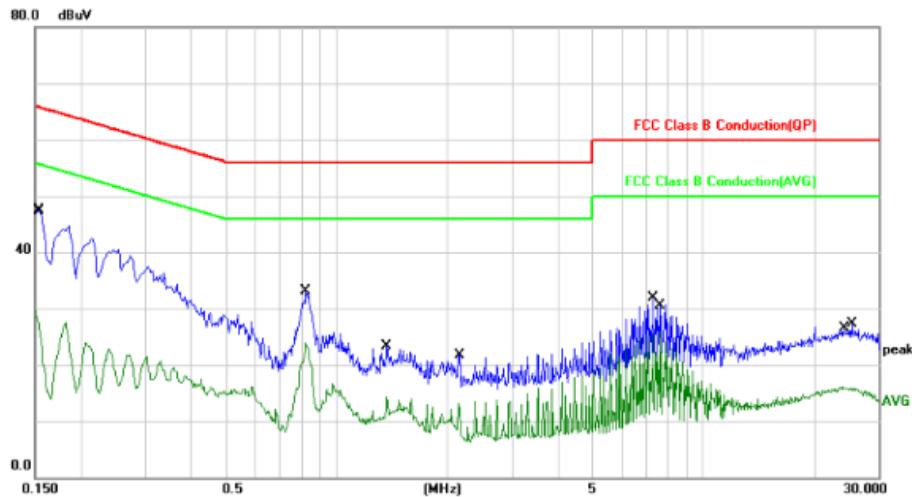
4.1.3 Test Data:

TM1 / Line / Line / Band: 2400-2483.5 MHz / CH: H



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure-ment dBuV	Limit dBuV	dB	Detector	Comment
1	*	0.1500	37.78	9.73	47.51	65.99	-18.48	QP	
2		0.1500	20.07	9.73	29.80	55.99	-26.19	AVG	
3		0.8300	26.68	9.86	36.54	56.00	-19.46	QP	
4		0.8340	14.90	9.86	24.76	46.00	-21.24	AVG	
5		1.3020	17.07	9.88	26.95	56.00	-29.05	QP	
6		1.3740	7.20	9.88	17.08	46.00	-28.92	AVG	
7		7.2900	21.86	10.05	31.91	60.00	-28.09	QP	
8		7.2900	16.33	10.05	26.38	50.00	-23.62	AVG	
9		18.6700	18.20	10.00	28.20	60.00	-31.80	QP	
10		19.4980	6.24	9.99	16.23	50.00	-33.77	AVG	
11		23.9780	19.30	10.09	29.39	60.00	-30.61	QP	
12		24.9140	7.47	10.10	17.57	50.00	-32.43	AVG	

TM1 / Line: Neutral / Band: 2400-2483.5 MHz / CH: H



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1500	19.94	9.73	29.67	55.99	-26.32	Avg	
2	*	0.1539	37.70	9.73	47.43	65.78	-18.35	QP	
3		0.8260	23.26	9.86	33.12	56.00	-22.88	QP	
4		0.8260	14.05	9.86	23.91	46.00	-22.09	Avg	
5		1.3700	13.33	9.88	23.21	56.00	-32.79	QP	
6		1.3700	4.33	9.88	14.21	46.00	-31.79	Avg	
7		2.1540	11.79	9.92	21.71	56.00	-34.29	QP	
8		2.1540	3.26	9.92	13.18	46.00	-32.82	Avg	
9		7.2900	21.77	10.05	31.82	60.00	-28.18	QP	
10		7.6300	15.81	10.05	25.86	50.00	-24.14	Avg	
11		23.9300	6.00	10.09	16.09	50.00	-33.91	Avg	
12		25.3300	17.15	10.10	27.25	60.00	-32.75	QP	

Note:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Measurement Level = Reading level + Correct Factor, Over=Limit- Measurement

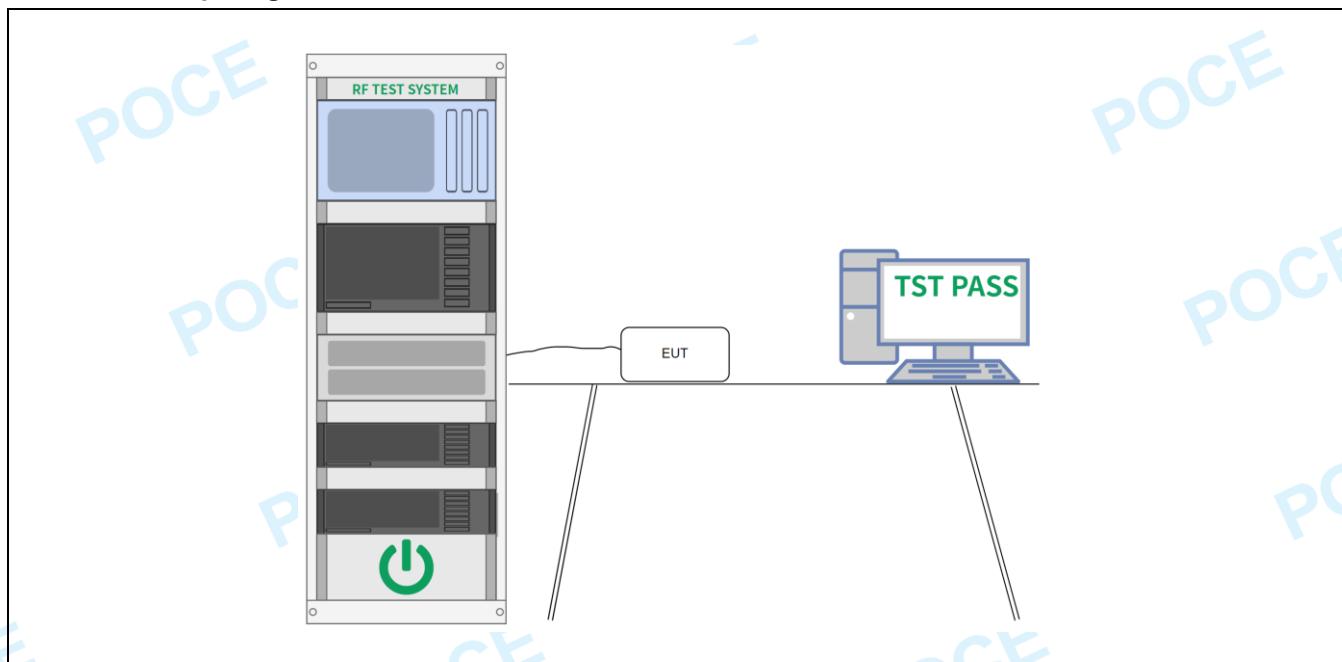
4.2 Occupied Bandwidth

Test Requirement:	47 CFR 15.247(a)(2)
Test Limit:	Refer to 47 CFR 15.247(a)(2), Systems using digital modulation techniques may operate in the 902-928 MHz, and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
Test Method:	ANSI C63.10-2013, section 11.8
Procedure:	<p>a) Set RBW = 100 kHz.</p> <p>b) Set the VBW $\geq [3 \times \text{RBW}]$.</p> <p>c) Detector = peak.</p> <p>d) Trace mode = max hold.</p> <p>e) Sweep = auto couple.</p> <p>f) Allow the trace to stabilize.</p> <p>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.</p>

4.2.1 E.U.T. Operation:

Operating Environment:			
Temperature:	22.4 °C	Humidity:	46.6 %
Pre test mode:	TM1		
Final test mode:	TM1		

4.2.2 Test Setup Diagram:



4.2.3 Test Data:

Please Refer to Appendix for Details.

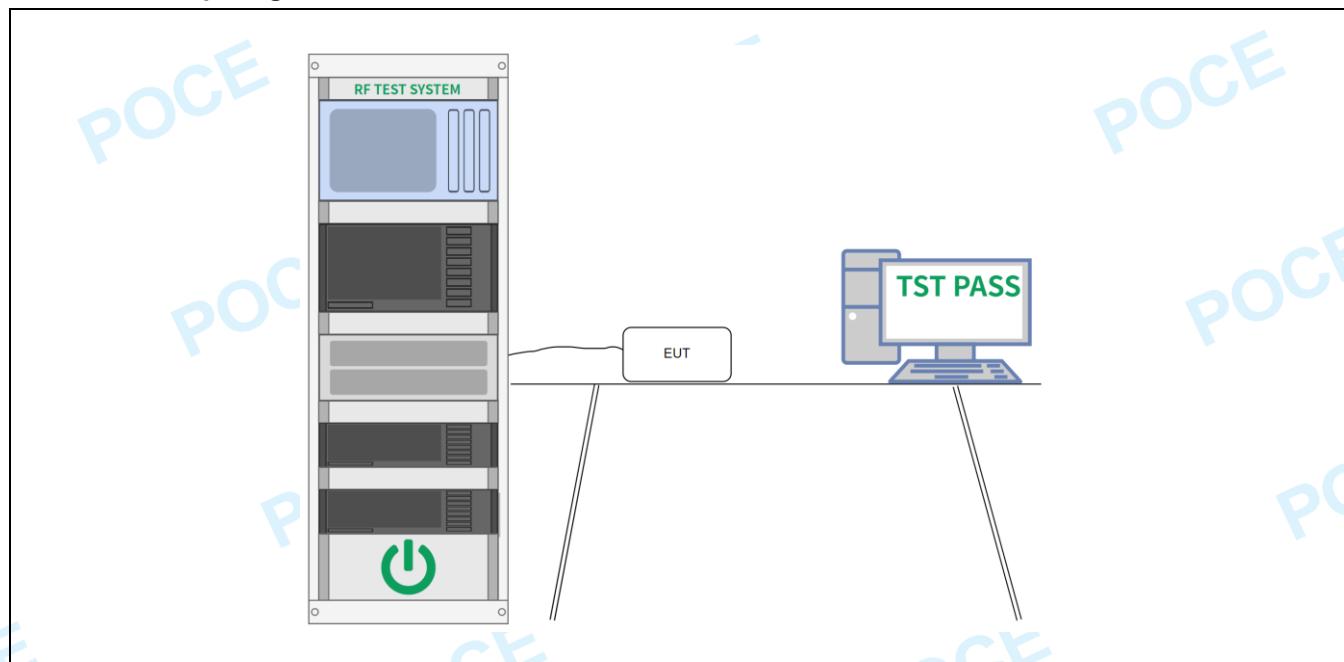
4.3 Maximum Conducted Output Power

Test Requirement:	47 CFR 15.247(b)(3)
Test Limit:	Refer to 47 CFR 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
Test Method:	ANSI C63.10-2013, section 11.9.2
Procedure:	ANSI C63.10-2013, section 11.9.2 Maximum conducted (average) output power

4.3.1 E.U.T. Operation:

Operating Environment:			
Temperature:	22.4 °C	Humidity:	46.6 %
Pre test mode:	TM1		
Final test mode:	TM1		

4.3.2 Test Setup Diagram:



4.3.3 Test Data:

Please Refer to Appendix for Details.

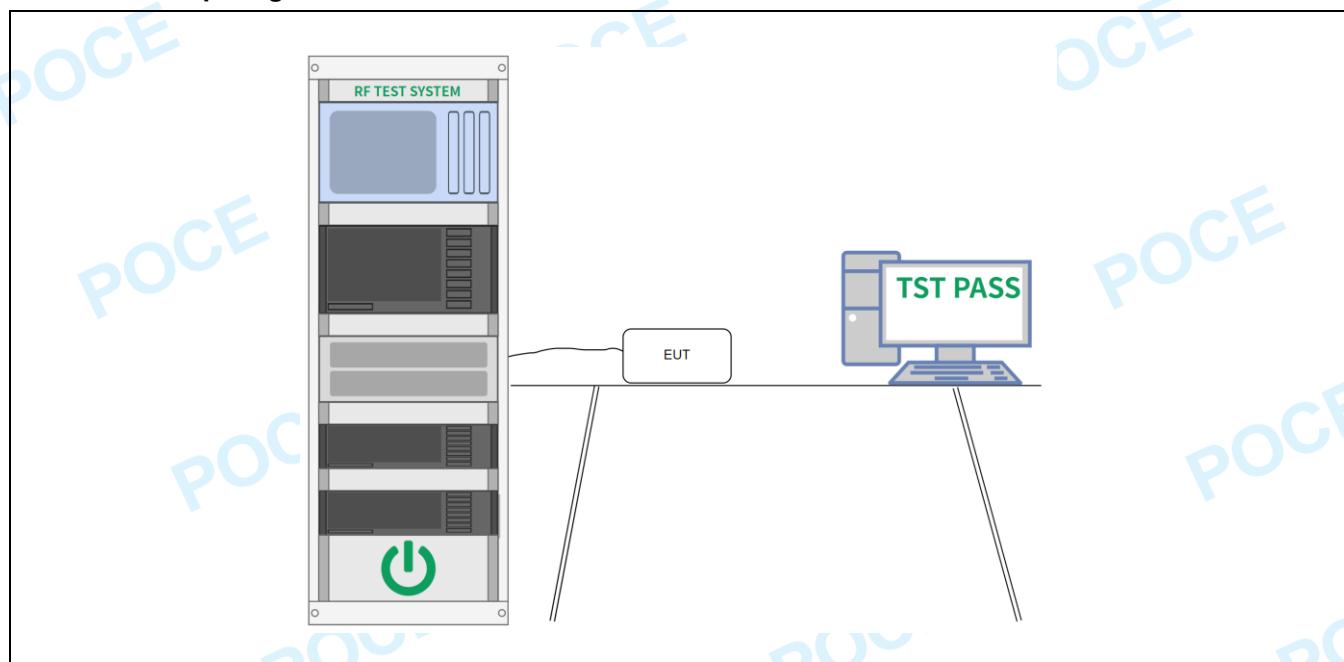
4.4 Power Spectral Density

Test Requirement:	47 CFR 15.247(e)
Test Limit:	Refer to 47 CFR 15.247(e), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.
Test Method:	ANSI C63.10-2013, section 11.10
Procedure:	ANSI C63.10-2013, section 11.10, Maximum power spectral density level in the fundamental emission

4.4.1 E.U.T. Operation:

Operating Environment:				
Temperature:	22.4 °C	Humidity:	46.6 %	Atmospheric Pressure: 101 kPa
Pre test mode:	TM1			
Final test mode:	TM1			

4.4.2 Test Setup Diagram:



4.4.3 Test Data:

Please Refer to Appendix for Details.

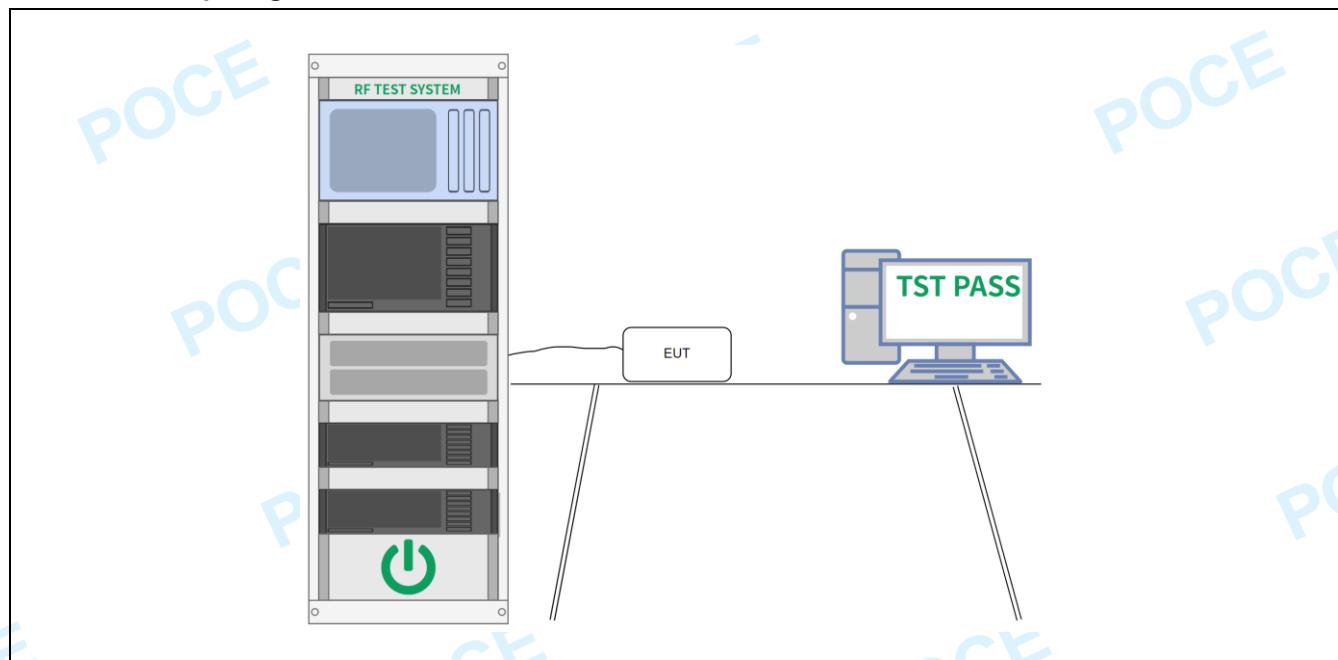
4.5 Emissions in non-restricted frequency bands

Test Requirement:	47 CFR 15.247(d), 15.209, 15.205
Test Limit:	Refer to 47 CFR 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required.
Test Method:	ANSI C63.10-2013 section 11.11
Procedure:	ANSI C63.10-2013 Section 11.11.1, Section 11.11.2, Section 11.11.3

4.5.1 E.U.T. Operation:

Operating Environment:			
Temperature:	22.4 °C	Humidity:	46.6 %
Pre test mode:	TM1		
Final test mode:	TM1		

4.5.2 Test Setup Diagram:



4.5.3 Test Data:

Please Refer to Appendix for Details.

4.6 Band edge emissions (Radiated)

Test Requirement:	Refer to 47 CFR 15.247(d). In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).		
Test Limit:	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 6.10

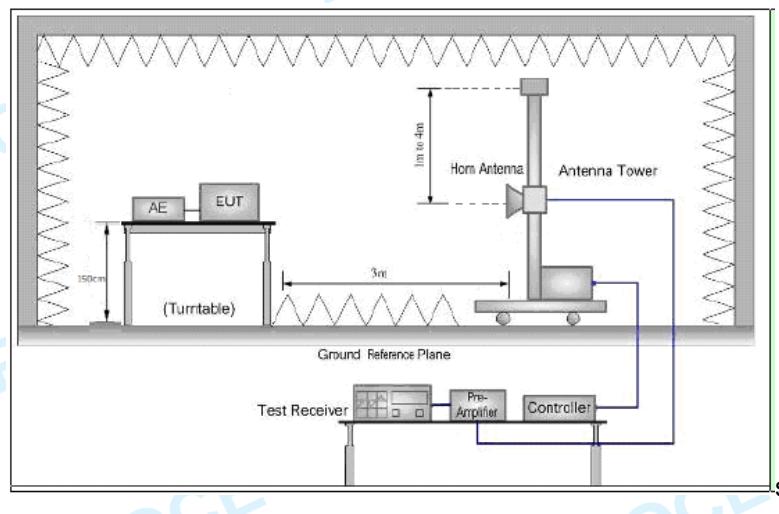
Procedure: ANSI C63.10-2013 section 6.10.5.2

4.6.1 E.U.T. Operation:

Operating Environment:

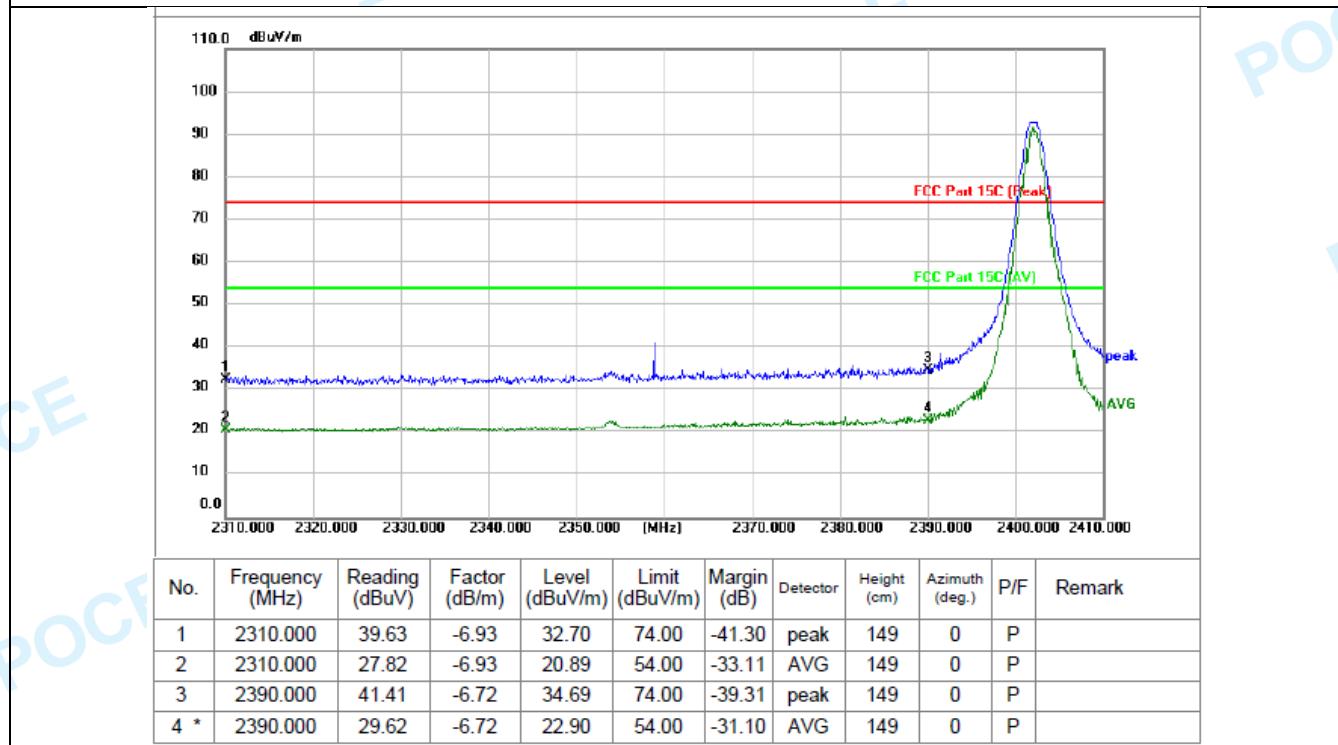
Temperature:	22.4 °C	Humidity:	46.6 %	Atmospheric Pressure:	101 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

4.6.2 Test Setup Diagram:

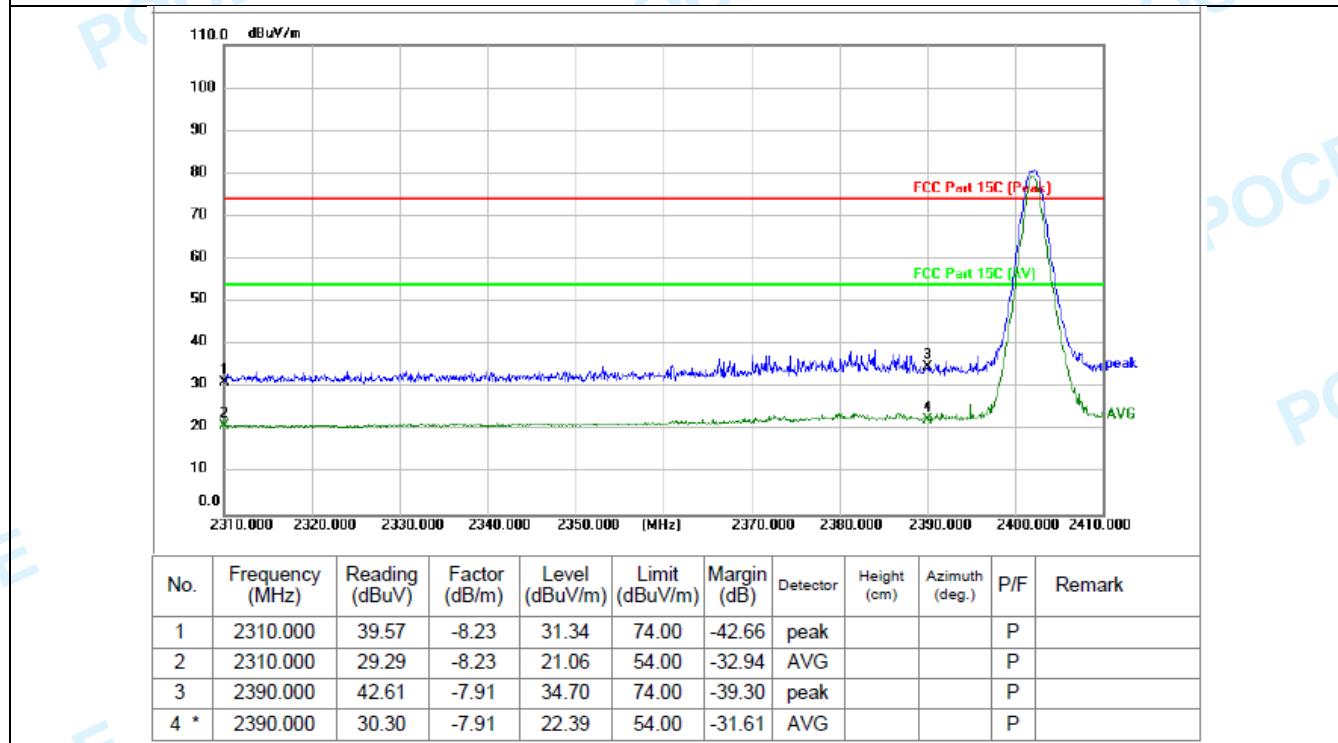


4.6.3 Test Data:

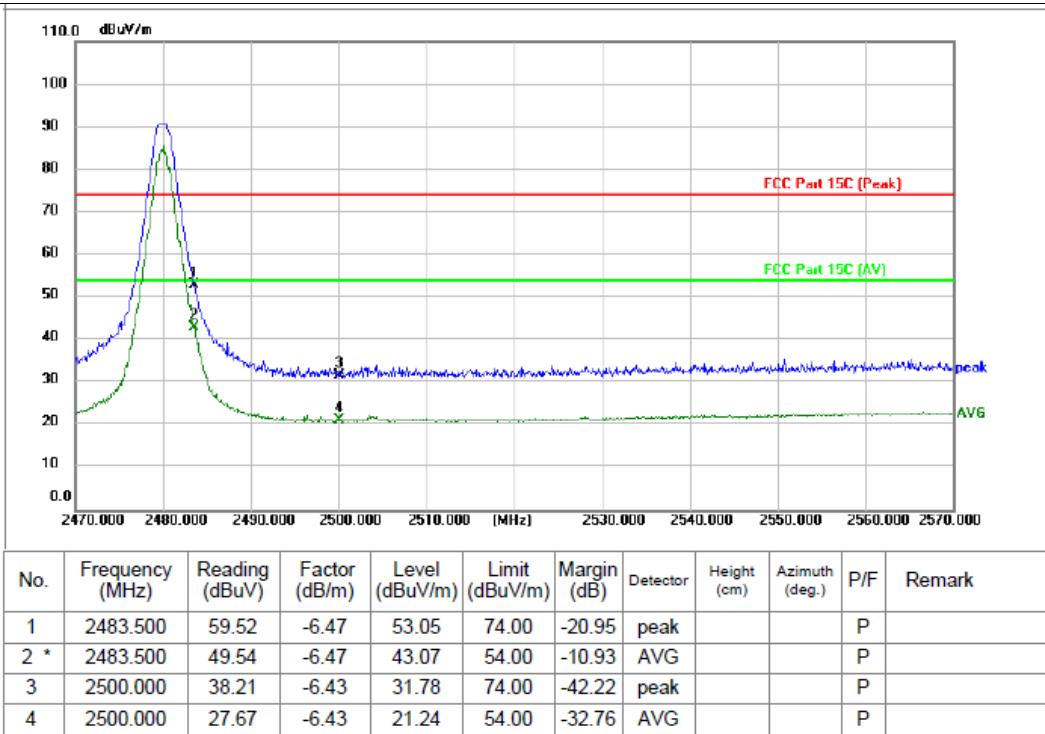
TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L



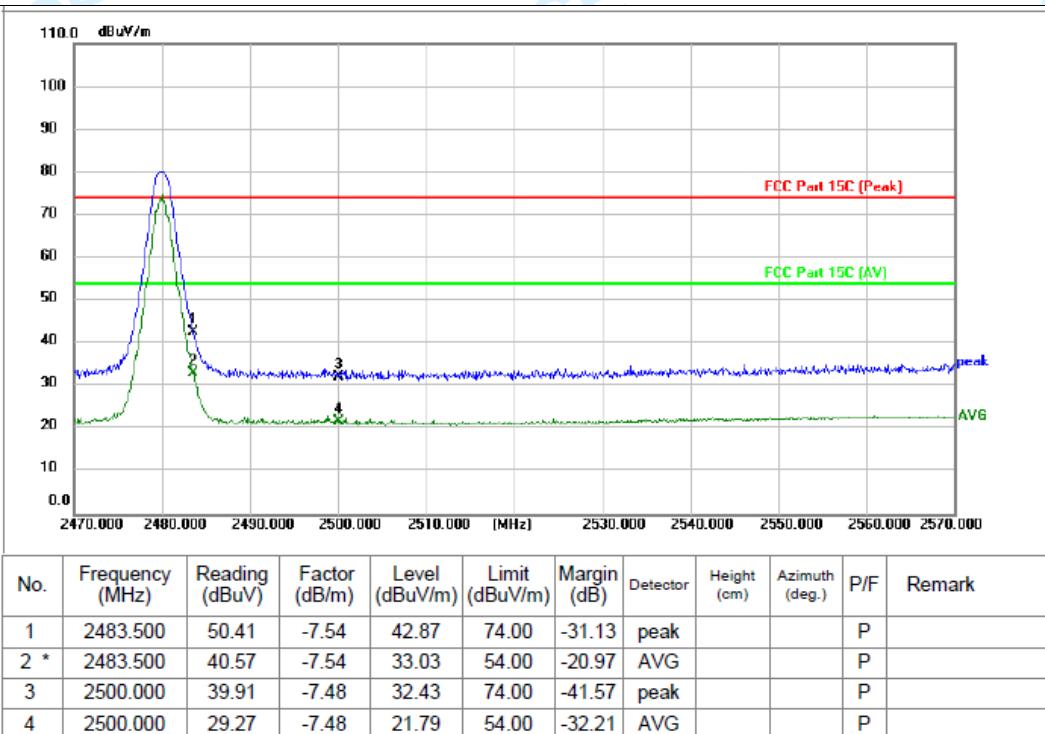
TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L



TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: H



TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: H



Remark:

1. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
2. Measurement Level = Reading level + Correct Factor, Over=Limit- Measurement
Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

Note:

Per ANSI C63.10-2013, if there are two or more antennas, the conducted powers at Core 0, Core 1, ..., Core i were first measured separately, as shown in the section above (this product only have one antenna). The measured values were then summed in linear power units then converted back to dBm.

Sample Multiple antennas Calculation: Core 0 + Core 1 + ... Core i. = MIMO/CDD
(i is the number of antennas)

(#VALUE! mW + XX mW) = #VALUE! mW = XX dBm

Sample e.i.r.p. Calculation:

XX dBm = Conducted Power (dBm) + Ant gain (dBi)

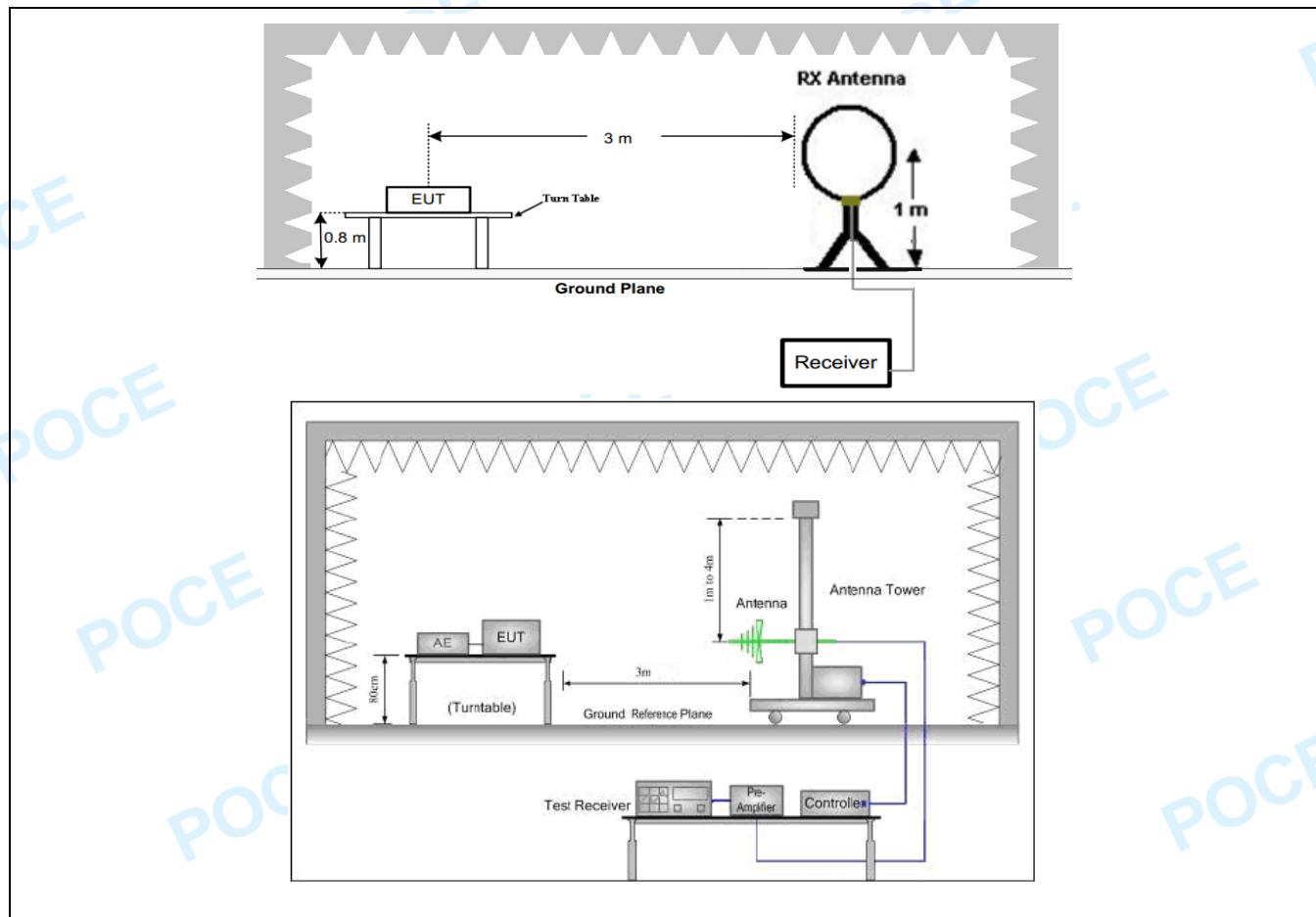
4.7 Emissions in frequency bands (below 1GHz)

Test Requirement:	Refer to 47 CFR 15.247(d). In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).		
Test Limit:	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:	<p>a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>b. 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.</p> <p>c. 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.</p> <p>d. 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.</p> <p>e. 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.</p> <p>f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</p> <p>h. Test the EUT in the lowest channel, the middle channel, the Highest channel.</p> <p>i. 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.</p> <p>j. Repeat above procedures until all frequencies measured was complete.</p> <p>Remark:</p> <p>1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.</p> <p>2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows: Final Test Level = Receiver Reading + Antenna Factor + Cable Factor "C" Preamplifier Factor</p> <p>3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and 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. Fundamental frequency is blocked by filter, and only spurious emission is shown.</p>		

4.7.1 E.U.T. Operation:

Operating Environment:			
Temperature:	22.4 °C	Humidity:	46.6 %
Pre test mode:	TM1		Atmospheric Pressure: 101 kPa
Final test mode:	TM1		

4.7.2 Test Setup Diagram:



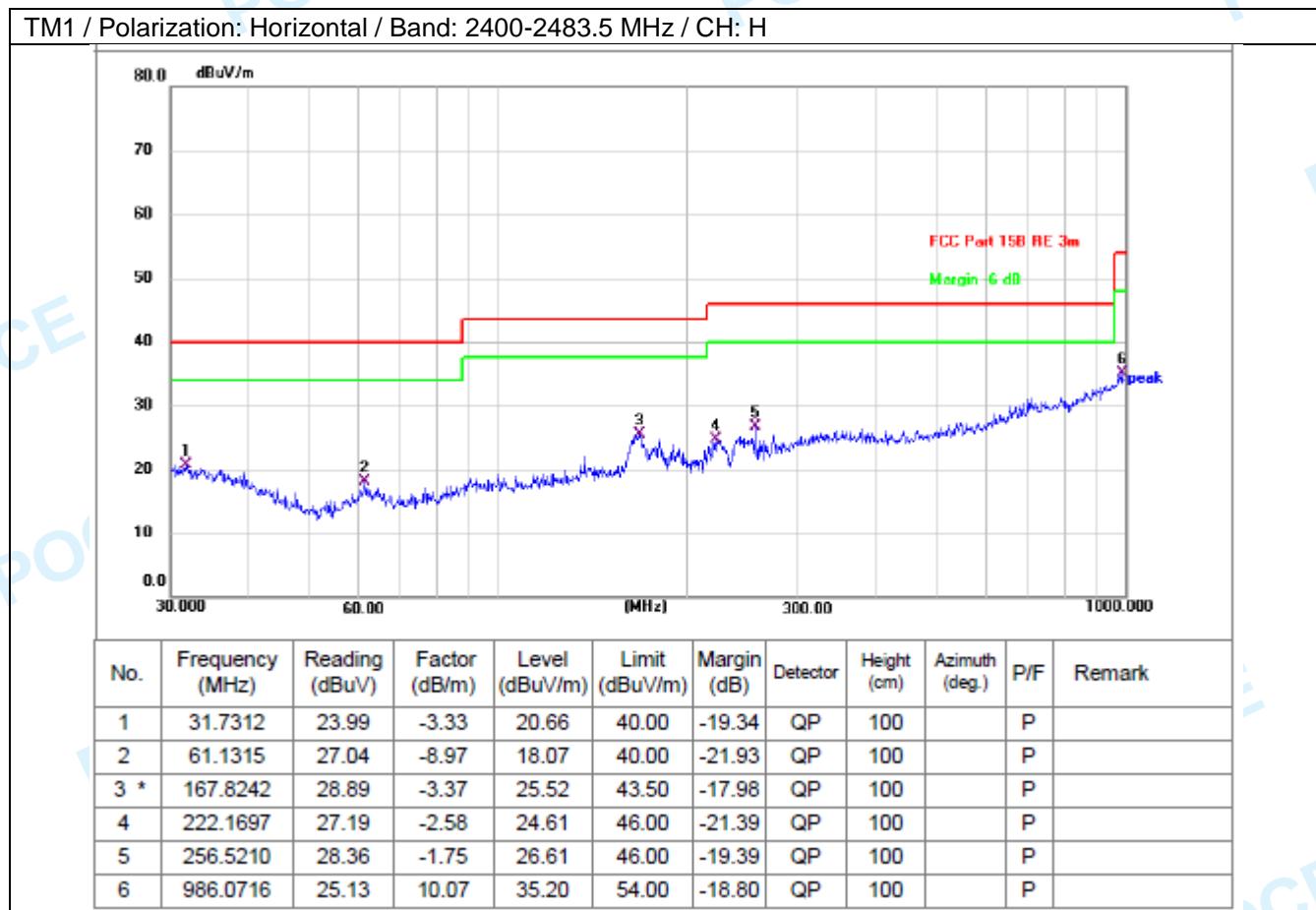
4.7.3 Test Data:

Between 9KHz – 30MHz

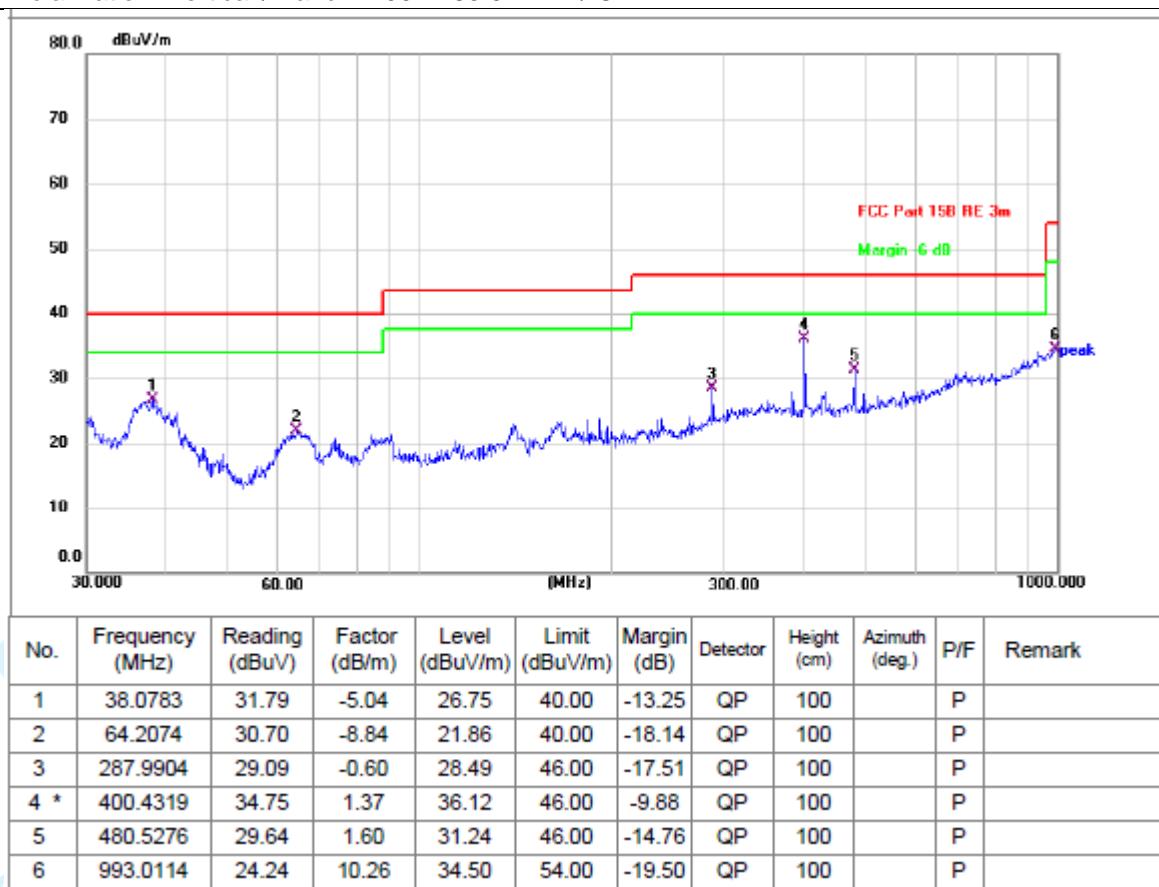
The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

Test results only record the worst mode or channel

Between 30MHz – 1000MHz



TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / CH: H



Remark: Over= Measurement Level - Limit

Measurement Level=Test receiver reading + correction factor

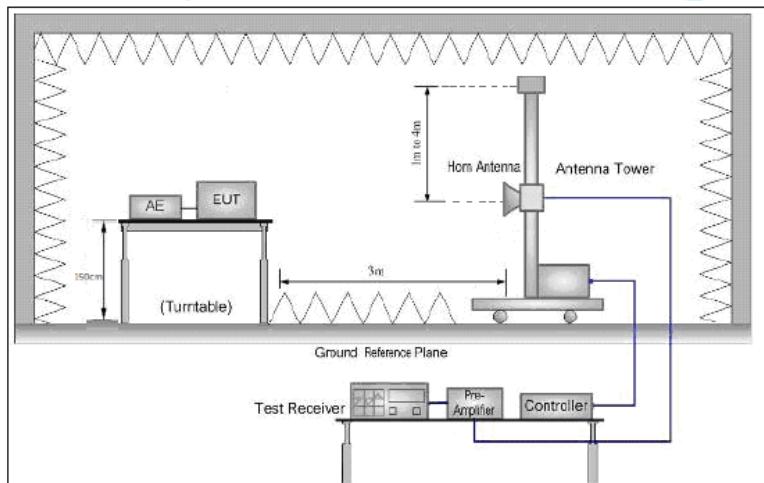
Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

4.8 Emissions in frequency bands (above 1GHz)

Test Requirement:	In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).		
Test Limit:	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:	<p>a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>b. 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.</p> <p>c. 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.</p> <p>d. 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.</p> <p>e. 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.</p> <p>f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</p> <p>h. Test the EUT in the lowest channel, the middle channel, the Highest channel.</p> <p>i. 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.</p> <p>j. Repeat above procedures until all frequencies measured was complete.</p> <p>Remark:</p> <p>1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.</p> <p>2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows: Final Test Level =Receiver Reading + Antenna Factor + Cable Factor *C Preamplifier Factor</p> <p>3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and 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. Fundamental frequency is blocked by filter, and only spurious emission is shown.</p>		

4.8.1 E.U.T. Operation:

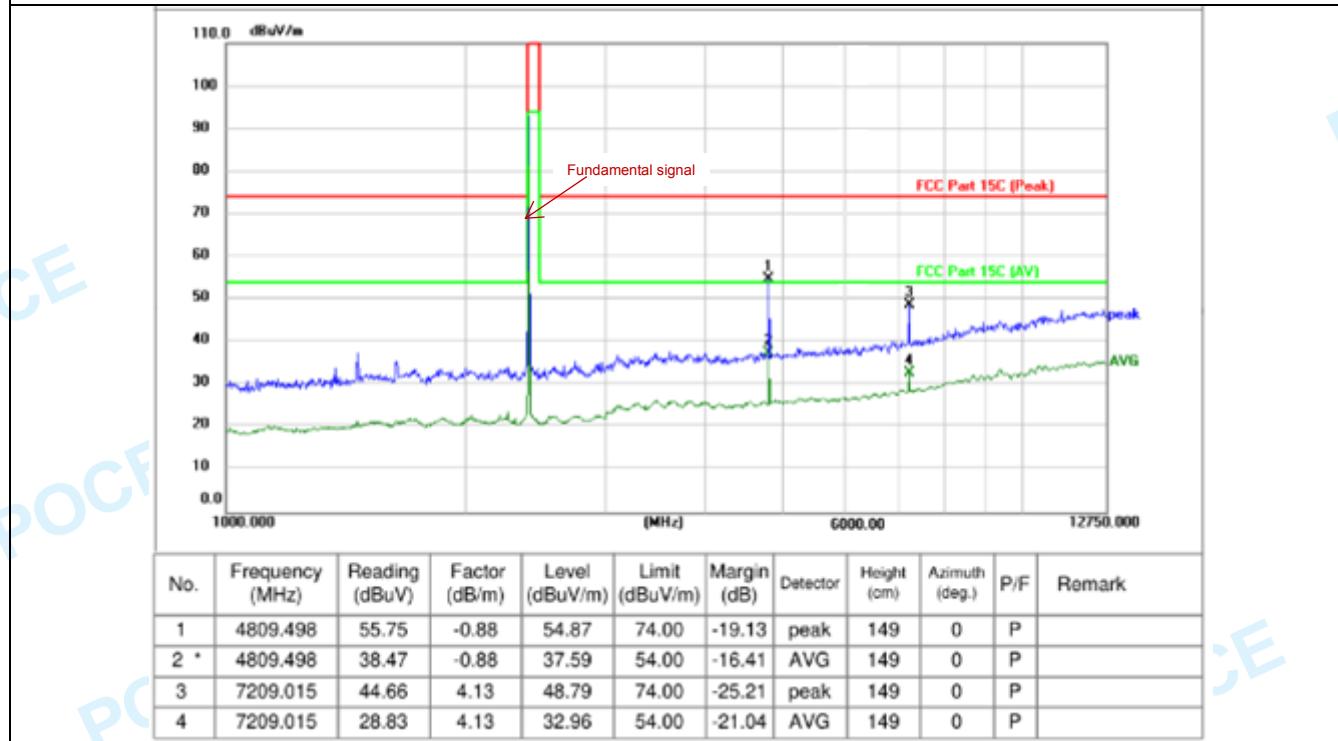
Operating Environment:			
Temperature:	22.4 °C	Humidity:	46.6 %
Pre test mode:	TM1		
Final test mode:	TM1		

4.8.2 Test Setup Diagram:

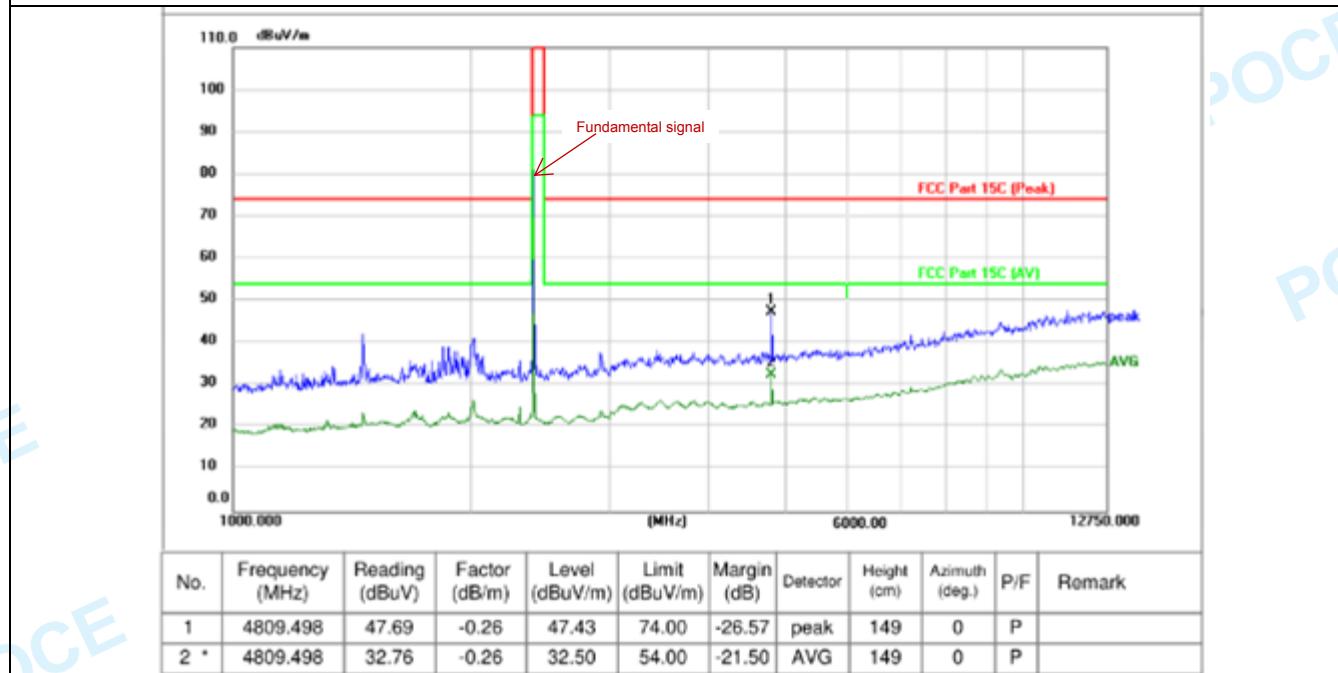
4.8.3 Test Data:

Test results only record the worst mode or channel, and test frequency 12GHz to 25GHz only background waveform, therefore not recorded in the report.

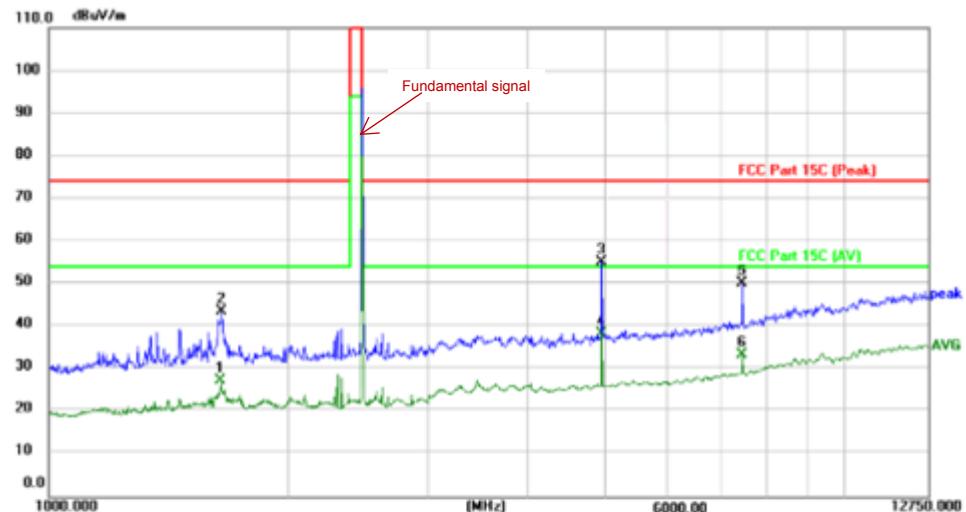
TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / CH: L



TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / CH: L

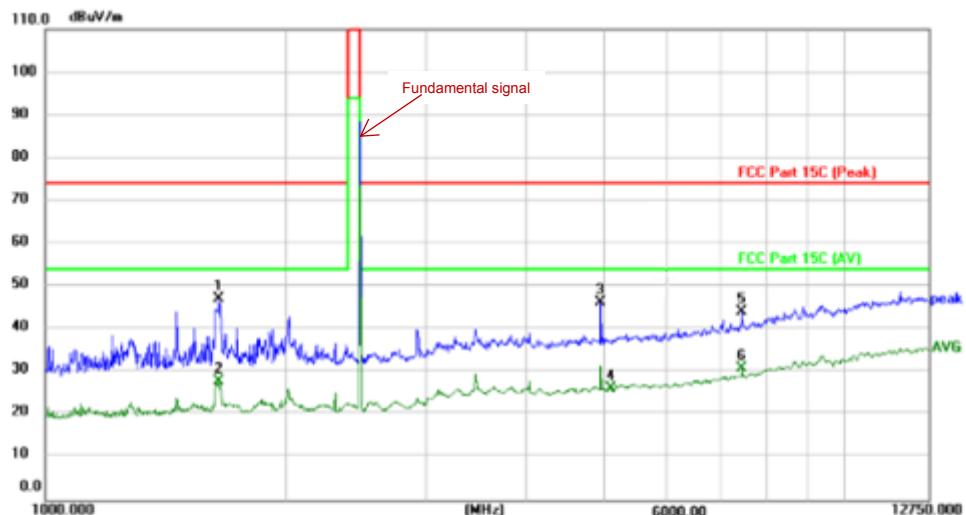


TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / CH: H



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	1646.948	36.30	-8.83	27.47	54.00	-26.53	AVG	149	0	P	
2	1651.146	52.30	-8.82	43.48	74.00	-30.52	peak	149	0	P	
3	4958.678	55.46	-0.37	55.09	74.00	-18.91	peak	149	0	P	
4 *	4958.678	38.65	-0.37	38.28	54.00	-15.72	AVG	149	0	P	
5	7451.566	45.72	4.52	50.24	74.00	-23.76	peak	149	0	P	
6	7451.566	28.93	4.52	33.45	54.00	-20.55	AVG	149	0	P	

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / 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	1651.146	57.77	-10.73	47.04	74.00	-26.96	peak	149	0	P	
2	1651.146	38.57	-10.73	27.84	54.00	-26.16	AVG	149	0	P	
3	4958.678	46.17	0.23	46.40	74.00	-27.60	peak	149	0	P	
4 *	5112.485	25.96	0.44	26.40	48.20	-21.80	AVG	149	0	P	
5	7451.566	39.57	4.68	44.25	74.00	-29.75	peak	149	0	P	
6	7451.566	26.25	4.68	30.93	54.00	-23.07	AVG	149	0	P	

Remark: Margin = Limit – Level

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

Level=Test receiver reading + correction factor

Note:

Per ANSI C63.10-2013, if there are two or more antennas, the conducted powers at Core 0, Core 1, ..., Core i were first measured separately, as shown in the section above (this product only have one antenna). The measured values were then summed in linear power units then converted back to dBm.

Sample Multiple antennas Calculation: Core 0 + Core 1 + ... Core i. = MIMO/CDD
(i is the number of antennas)

(#VALUE! mW + XX mW) = #VALUE! mW = XX dBm

Sample e.i.r.p. Calculation:

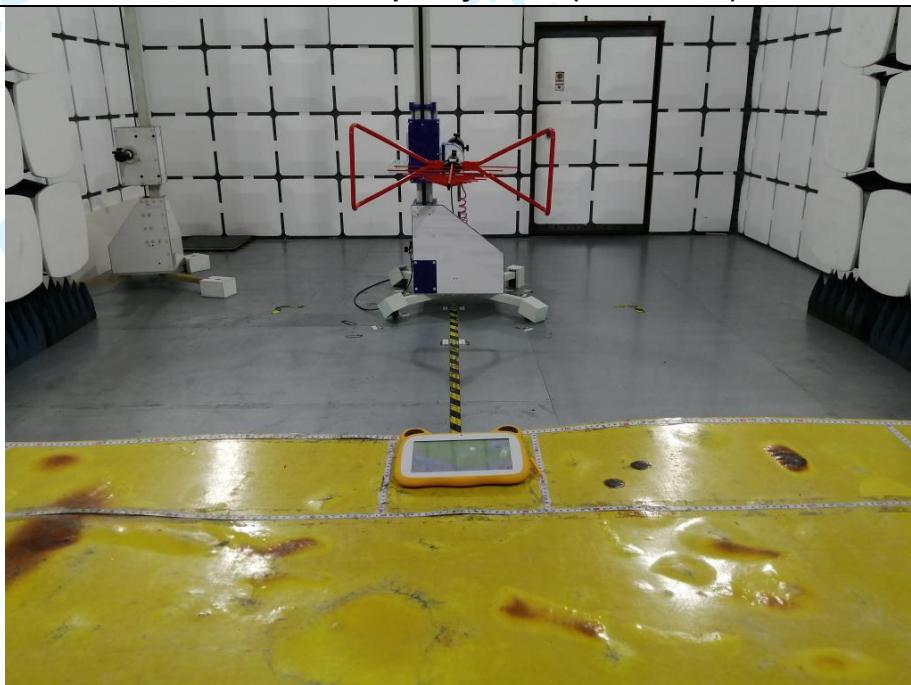
XX dBm = Conducted Power (dBm) + Ant gain (dBi)

5 TEST SETUP PHOTOS

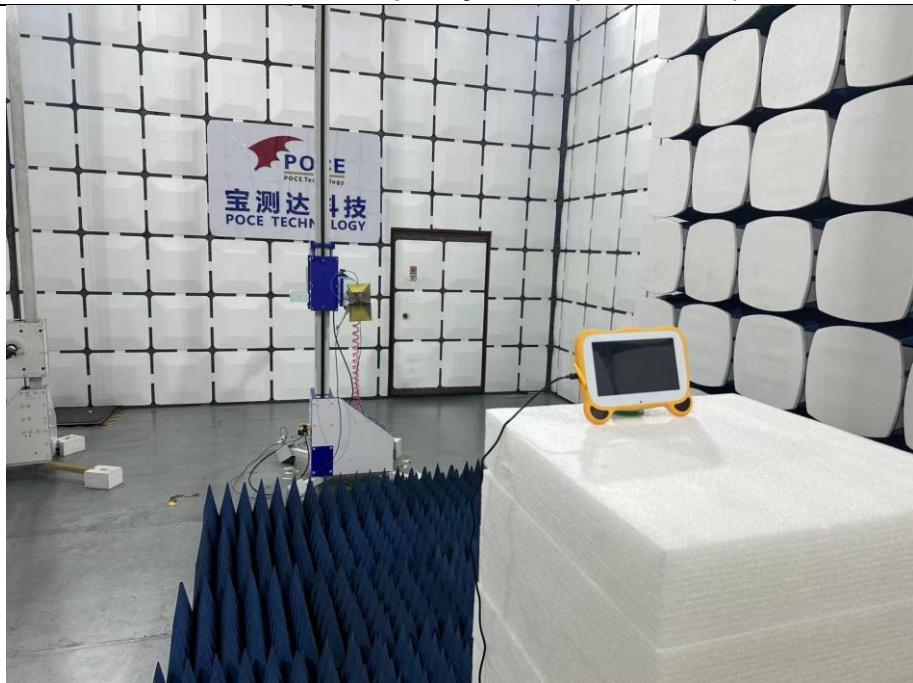
Conducted Emission at AC power line



Emissions in frequency bands (below 1GHz)

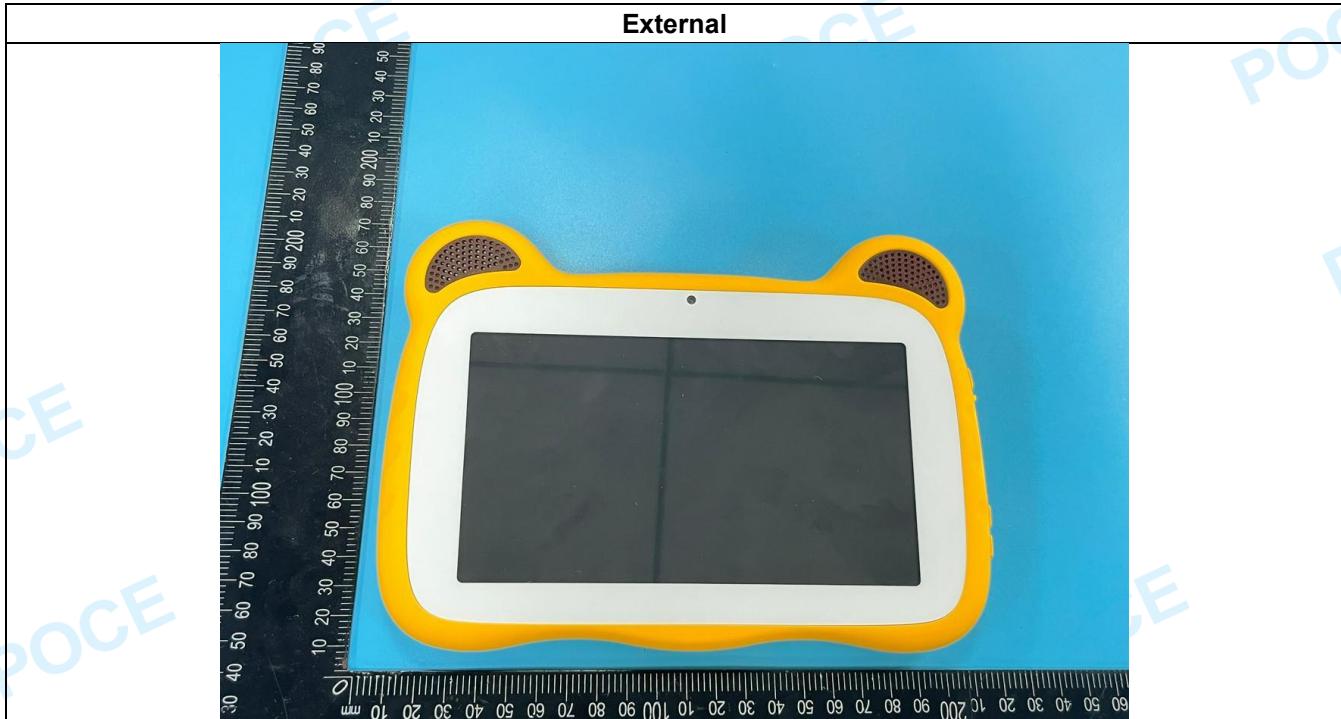


Emissions in frequency bands (above 1GHz)



6 PHOTOS OF THE EUT

External

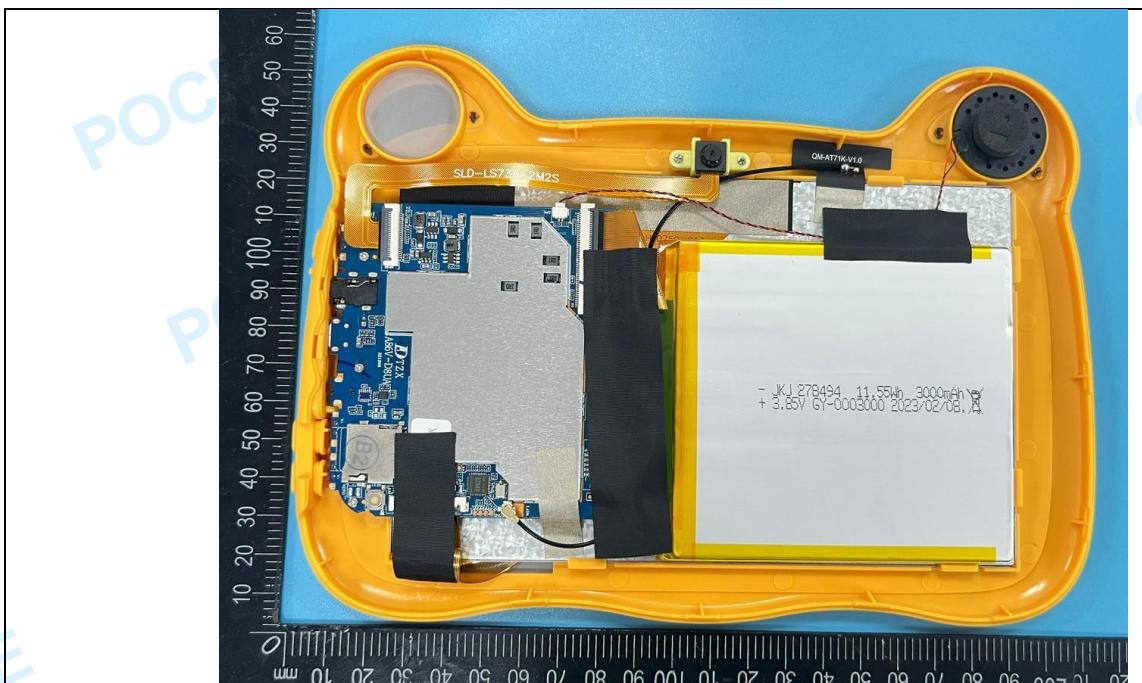


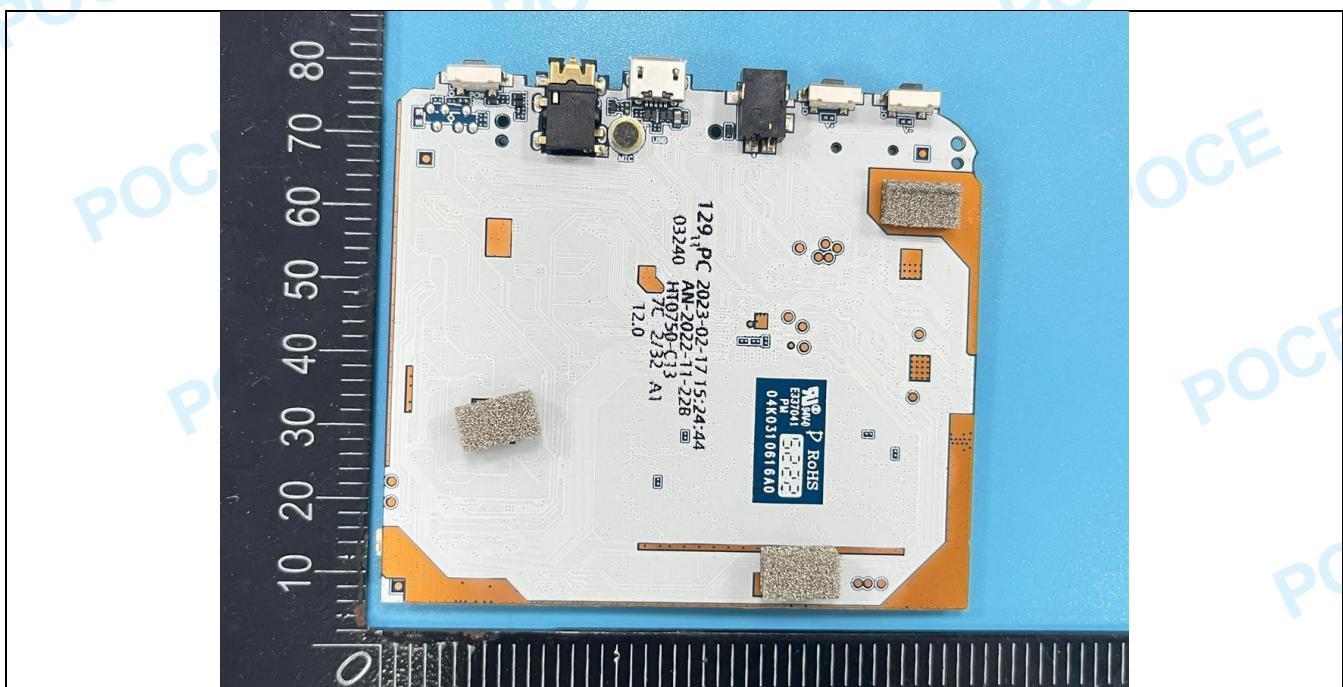
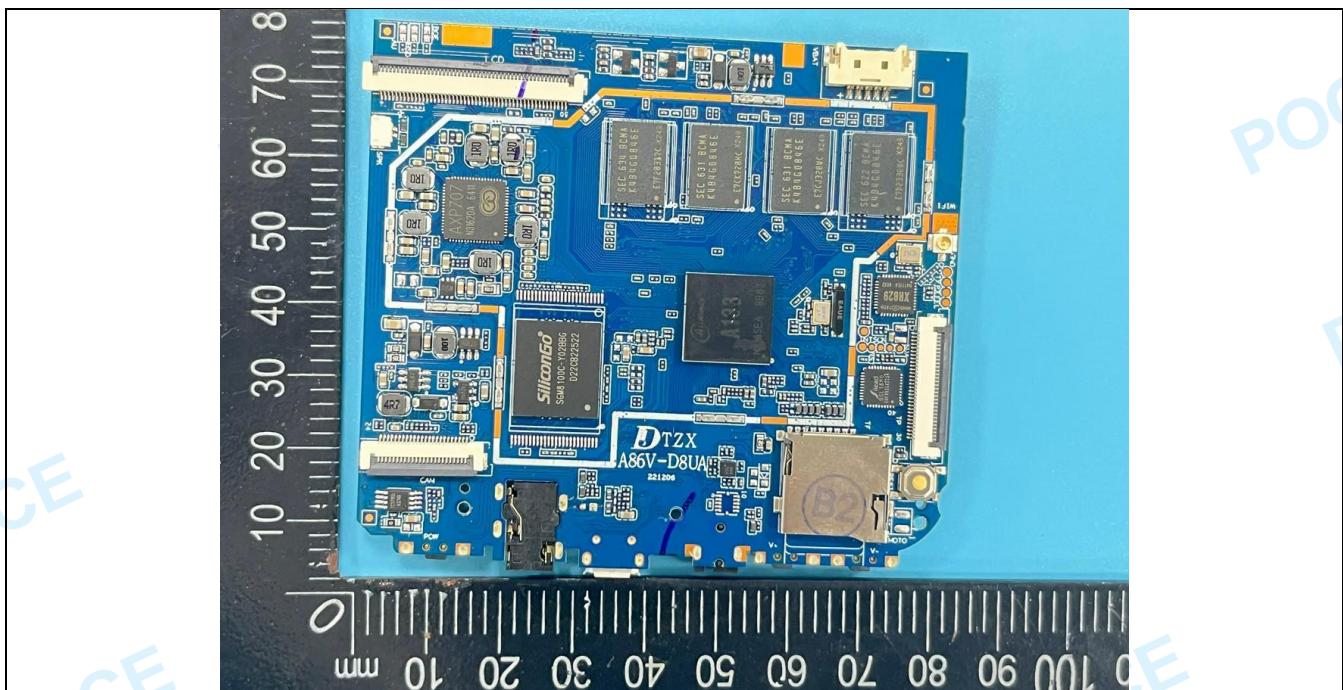


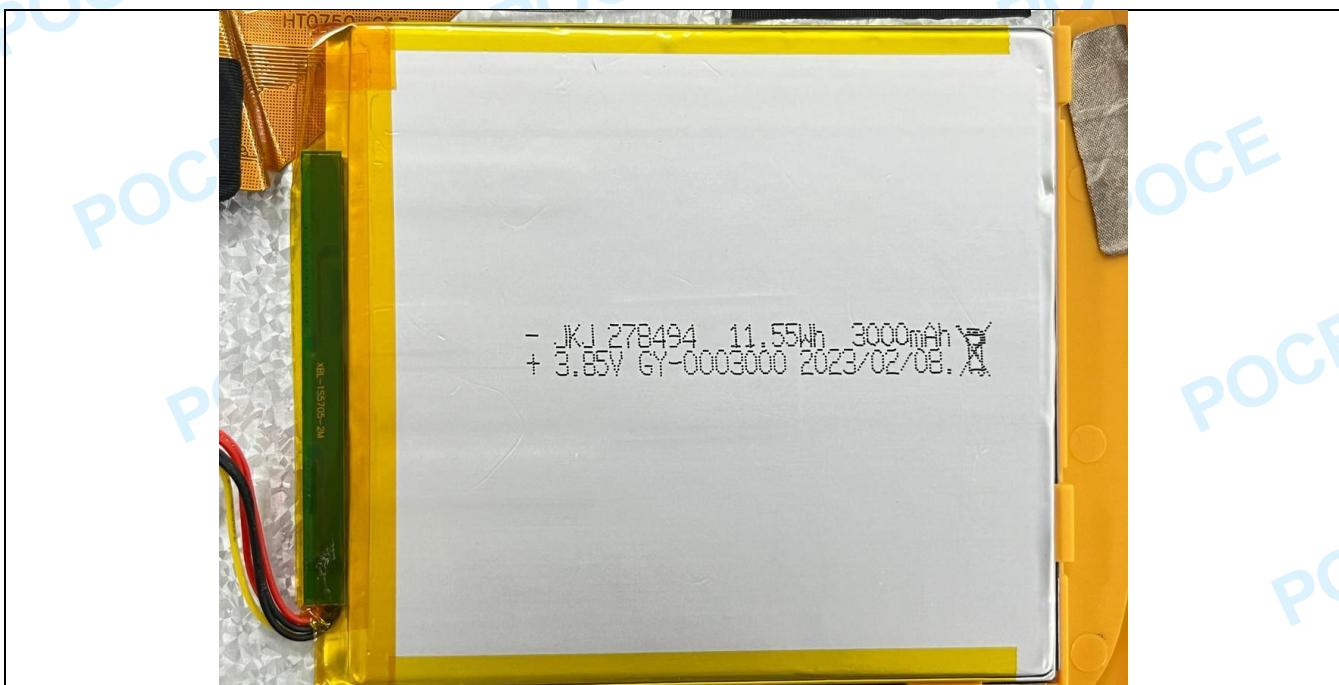
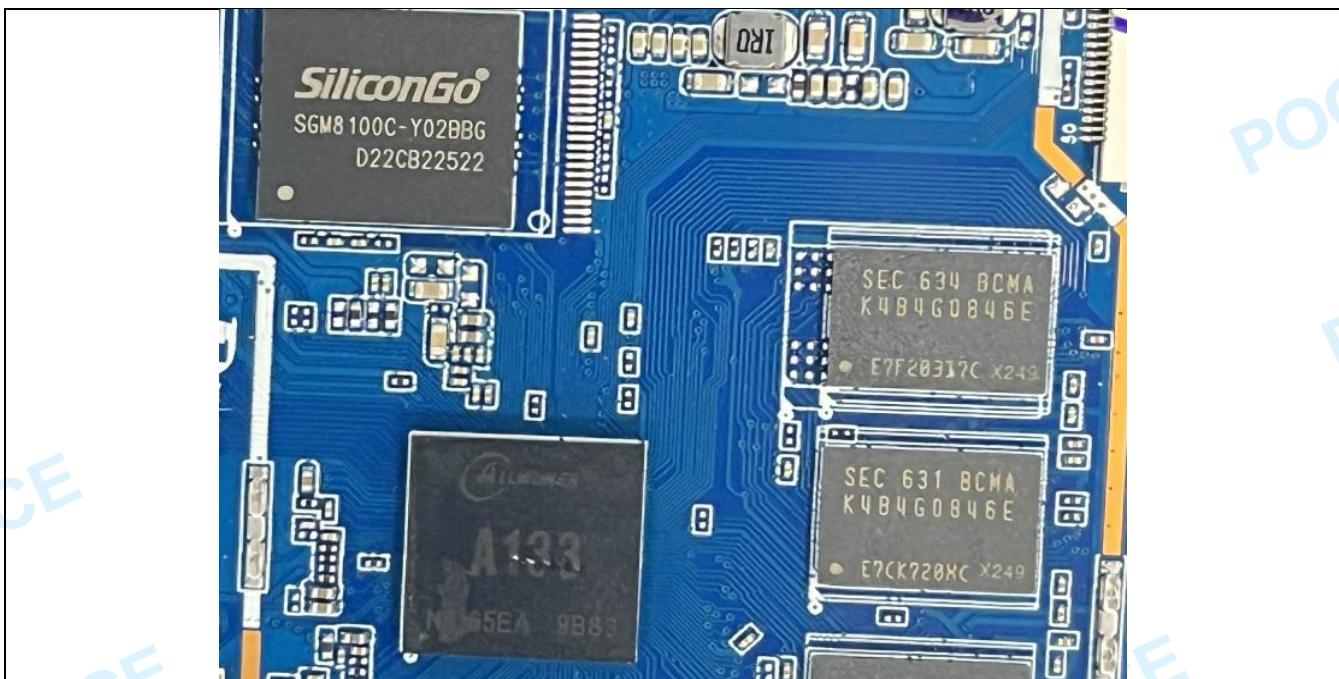




Internal





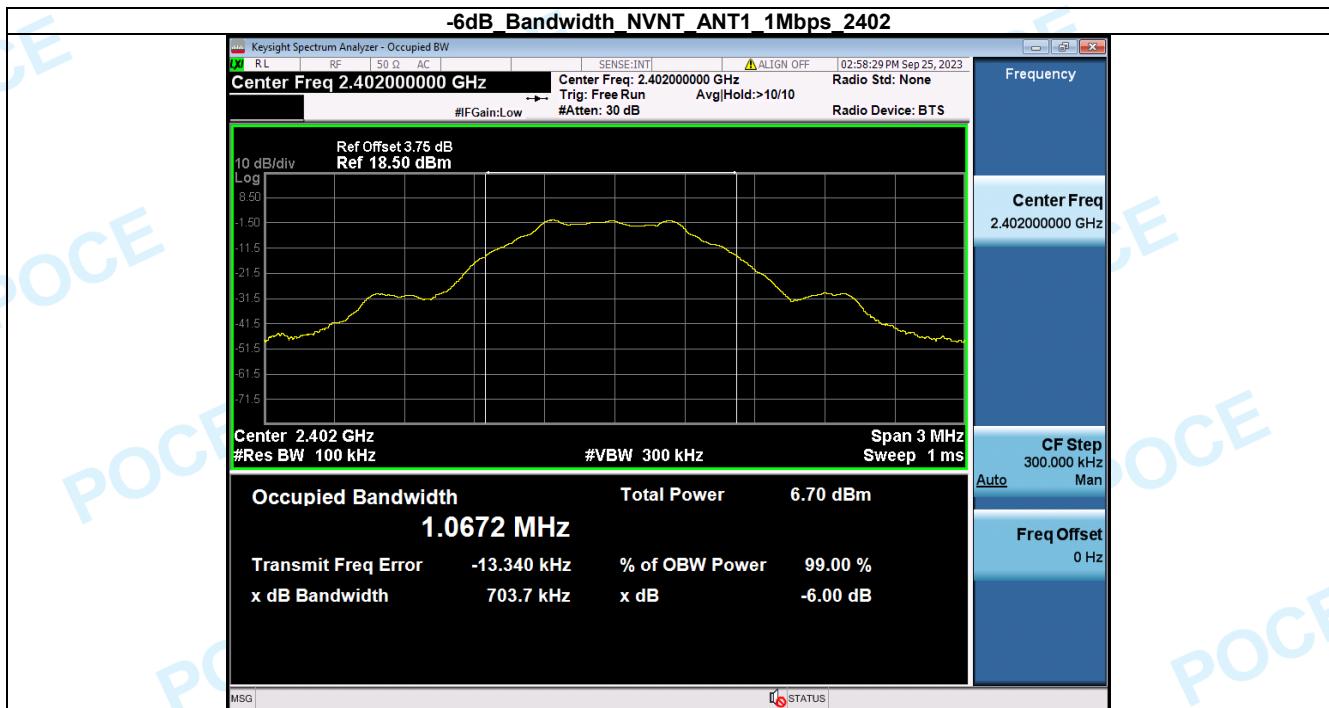


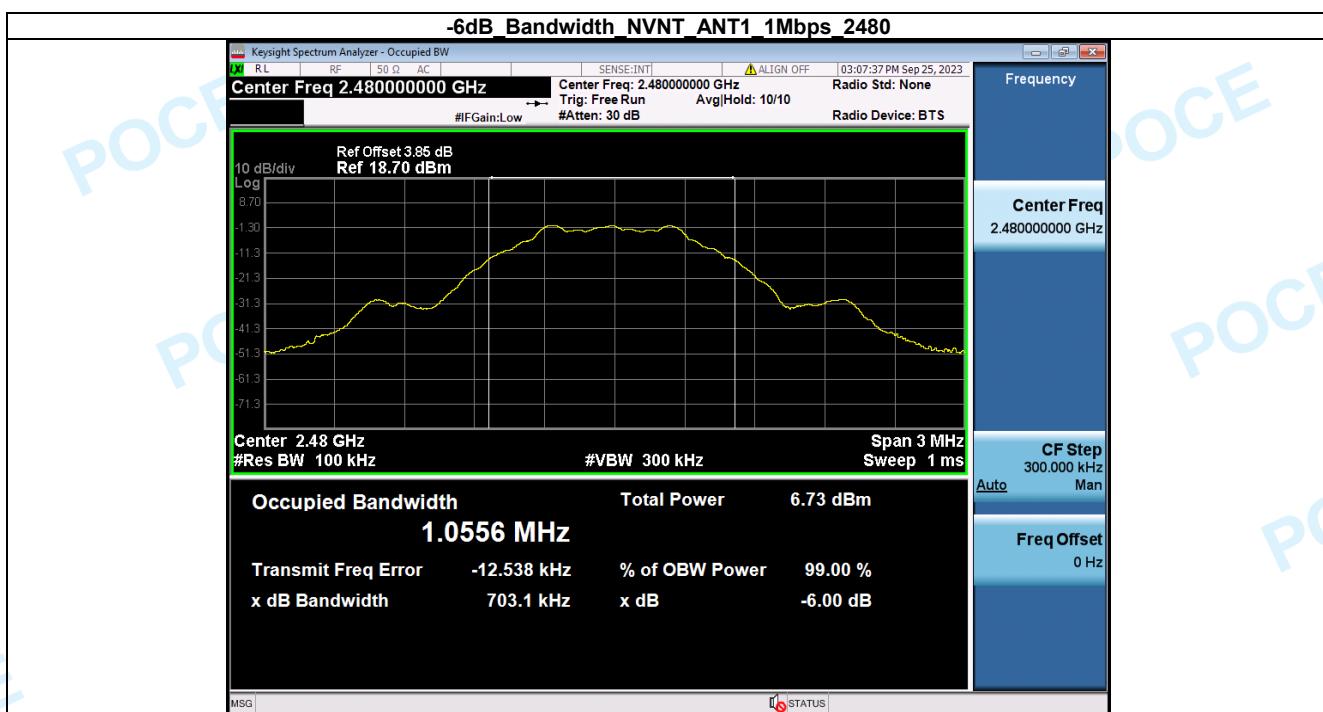
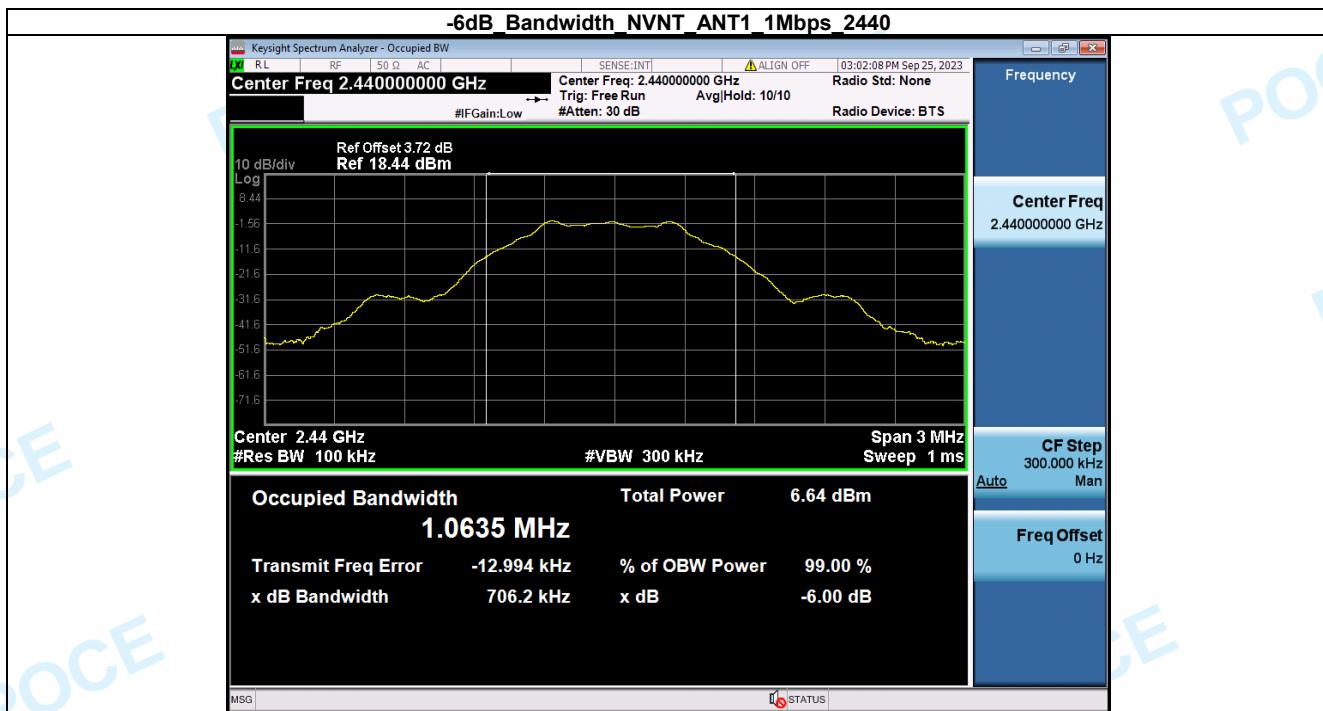
Appendix

FCC_BLE (Part15.247) Test Data

1. -6dB Bandwidth

Condition	Antenna	Rate	Frequency (MHz)	-6dB BW(kHz)	limit(kHz)	Result
NVNT	ANT1	1Mbps	2402	703.69	500	Pass
NVNT	ANT1	1Mbps	2440.00	706.17	500	Pass
NVNT	ANT1	1Mbps	2480	703.11	500	Pass





2. 99% Occupied Bandwidth

Condition	Antenna	Rate	Frequency (MHz)	99% BW(MHz)
NVNT	ANT1	1Mbps	2402	1.046
NVNT	ANT1	1Mbps	2440	1.043
NVNT	ANT1	1Mbps	2480	1.042

99% Occupied Bandwidth NVNT ANT1 1Mbps 2402



99% Occupied Bandwidth NVNT ANT1 1Mbps 2440



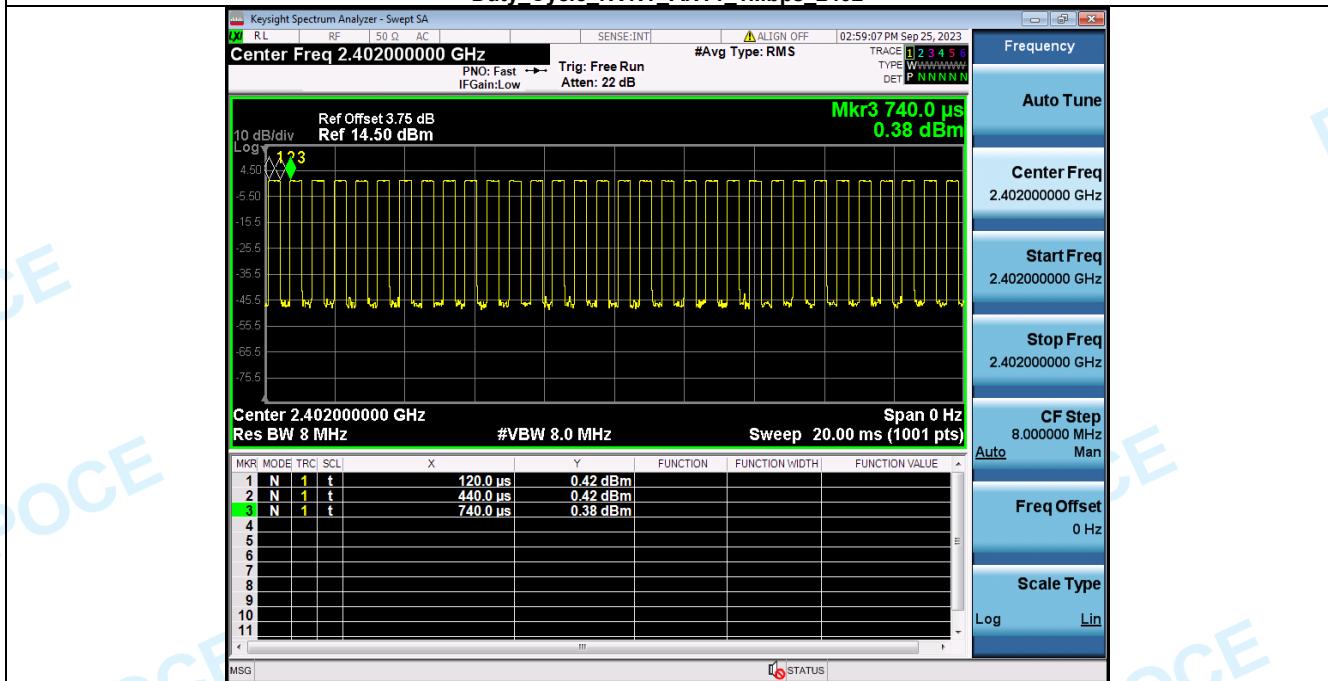
99% Occupied Bandwidth NVNT ANT1 1Mbps 2480



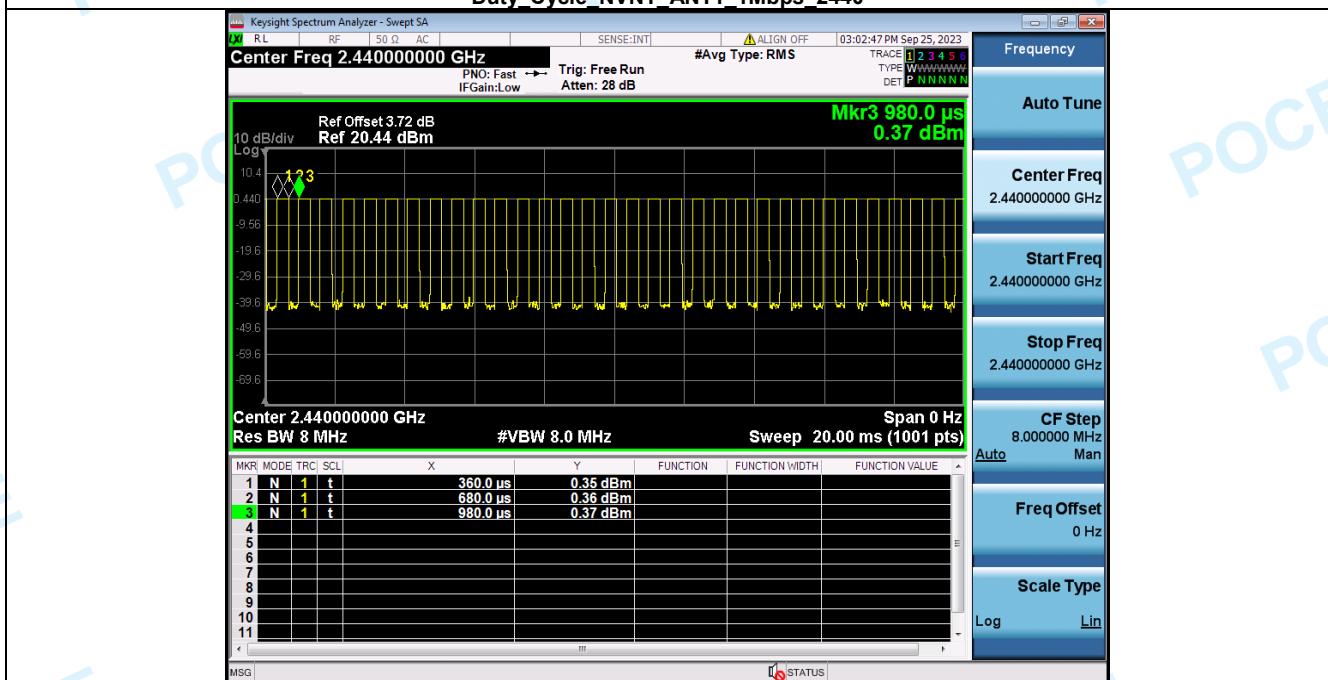
3. Duty Cycle

Condition	Antenna	Rate	Frequency (MHz)	Dutycycle(%)	Duty_factor
NVNT	ANT1	1Mbps	2402	51.61	2.87
NVNT	ANT1	1Mbps	2440	54.84	2.61
NVNT	ANT1	1Mbps	2480	25.81	5.88

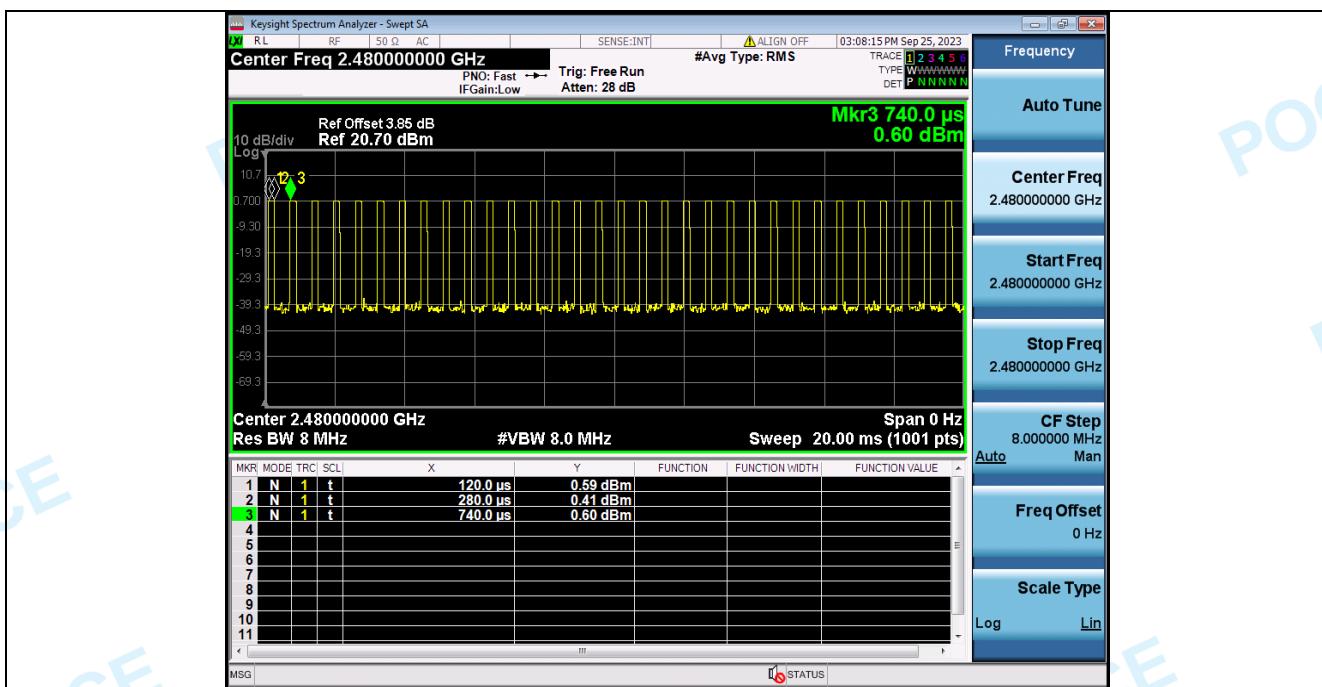
Duty Cycle NVNT ANT1 1Mbps 2402



Duty Cycle NVNT ANT1 1Mbps 2440

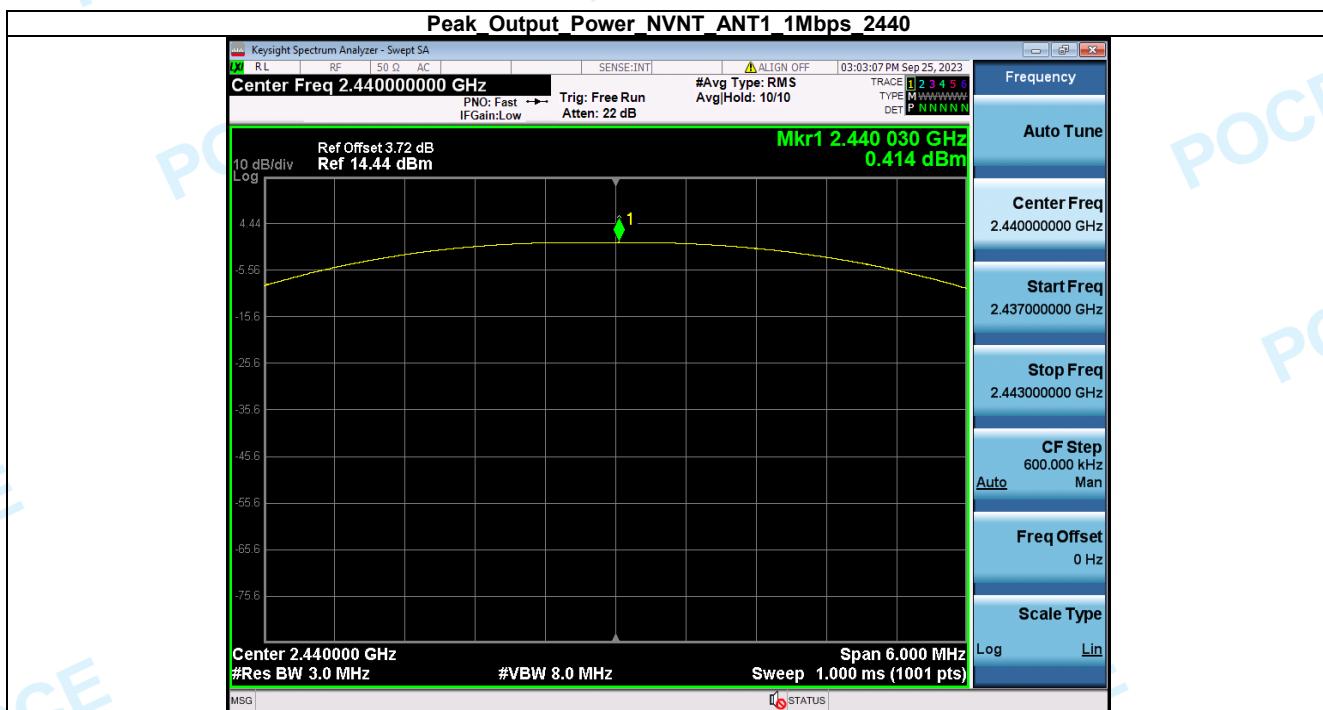


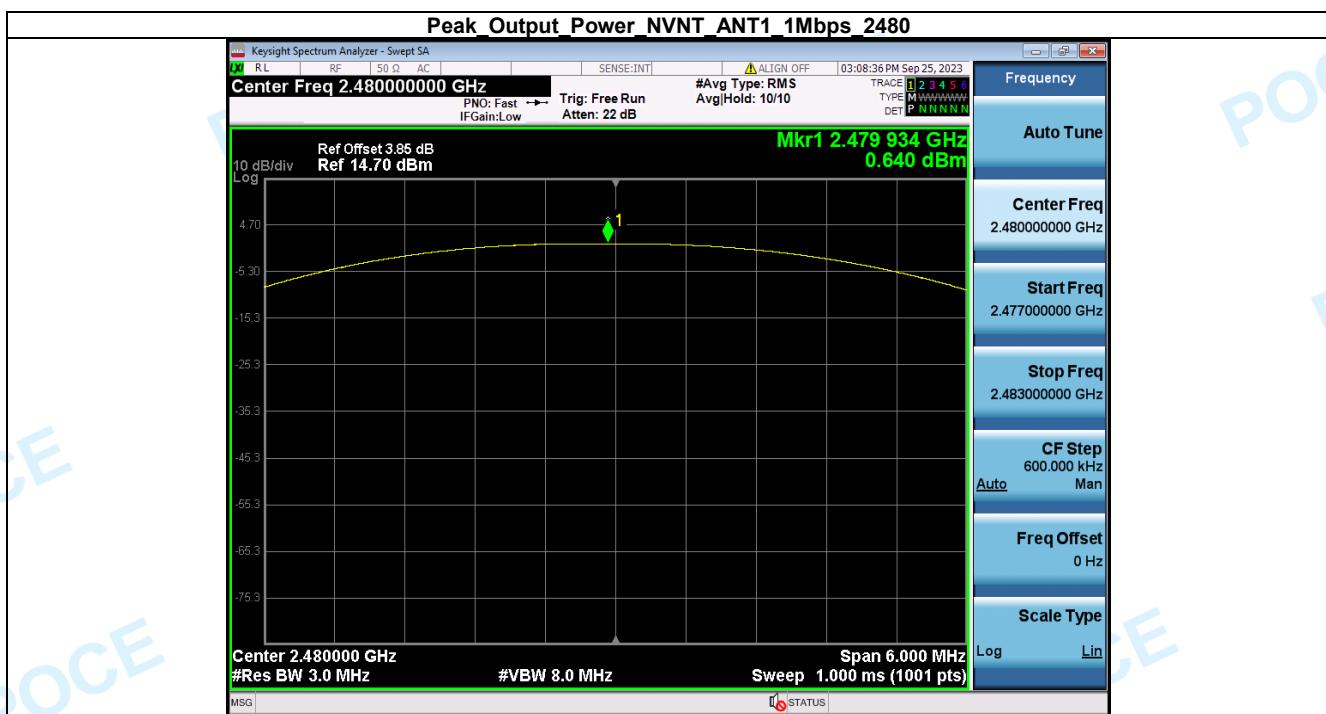
Duty Cycle NVNT ANT1 1Mbps 2480



4. Peak Output Power

Condition	Antenna	Rate	Frequency (MHz)	Max. Conducted Power (dBm)	Limit(dBm)	Result
NVNT	ANT1	1Mbps	2402	0.46	30	Pass
NVNT	ANT1	1Mbps	2440	0.41	30	Pass
NVNT	ANT1	1Mbps	2480	0.64	30	Pass

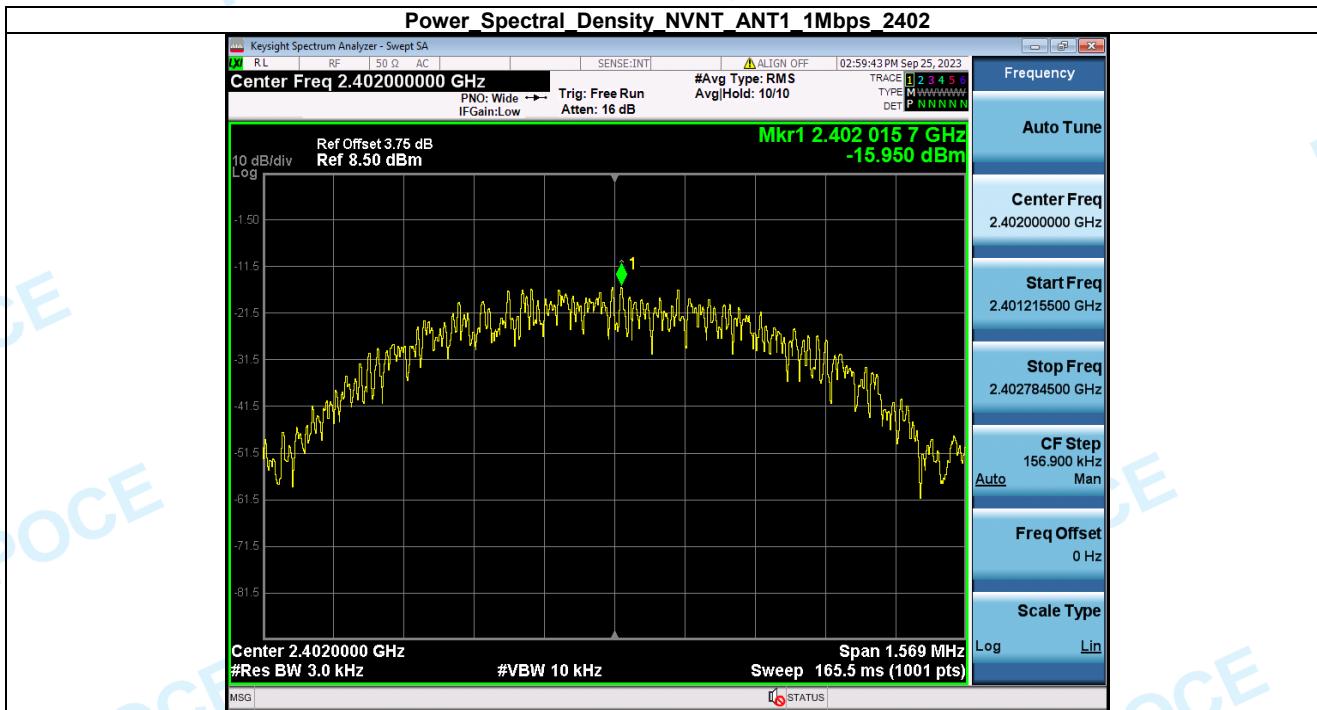




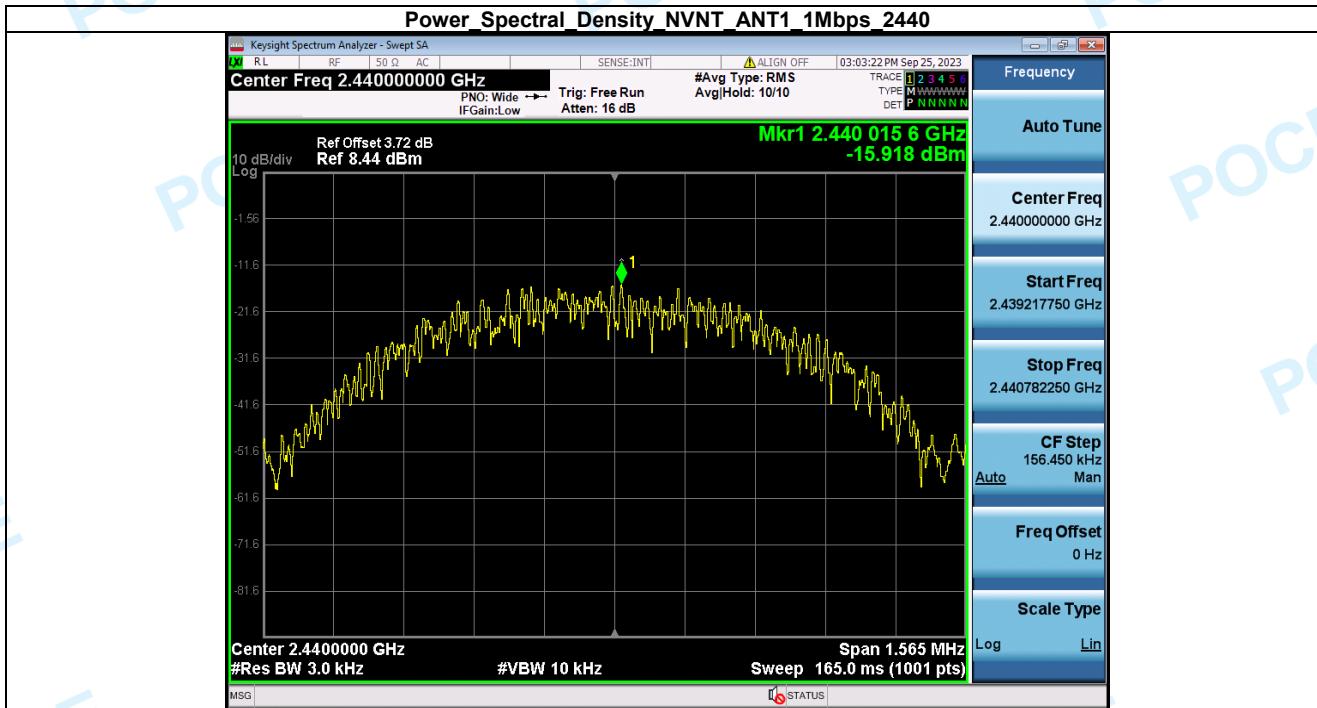
5. Power Spectral Density

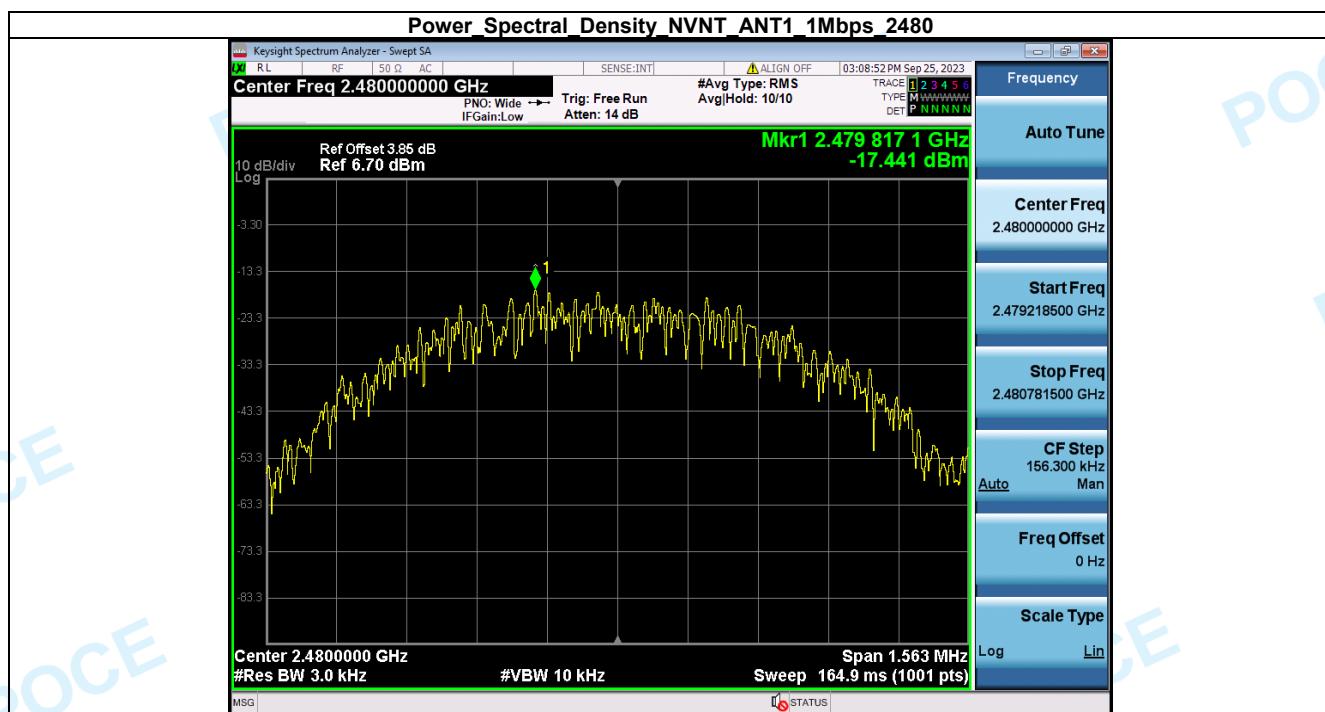
Condition	Antenna	Rate	Frequency (MHz)	Power Spectral Density(dBm)	Limit(dBm/3kHz)	Result
NVNT	ANT1	1Mbps	2402	-15.95	8	Pass
NVNT	ANT1	1Mbps	2440.00	-15.92	8	Pass
NVNT	ANT1	1Mbps	2480	-17.44	8	Pass

Power Spectral Density NVNT ANT1 1Mbps 2402



Power Spectral Density NVNT ANT1 1Mbps 2440





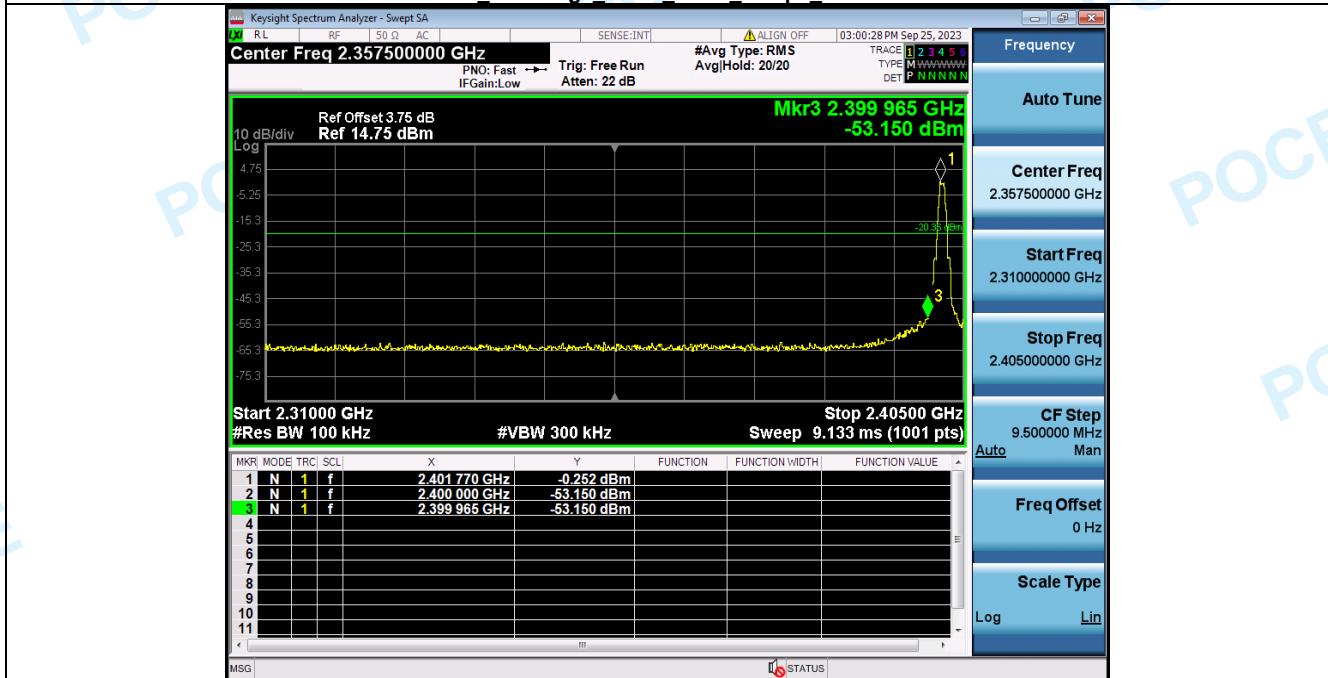
6. Band edge

Condition	Antenna	Rate	TX_Frequency (MHz)	Max. Mark Frequency (MHz)	Spurious level(dBm)	limit(dBm)	Result
NVNT	ANT1	1Mbps	2402	2399.965	-53.150	-20.365	Pass
NVNT	ANT1	1Mbps	2480	2483.775	-54.126	-20.244	Pass

1_Reference_Level_NVNT_ANT1_1Mbps_2402



2_Bandedge_NVNT_ANT1_1Mbps_2402





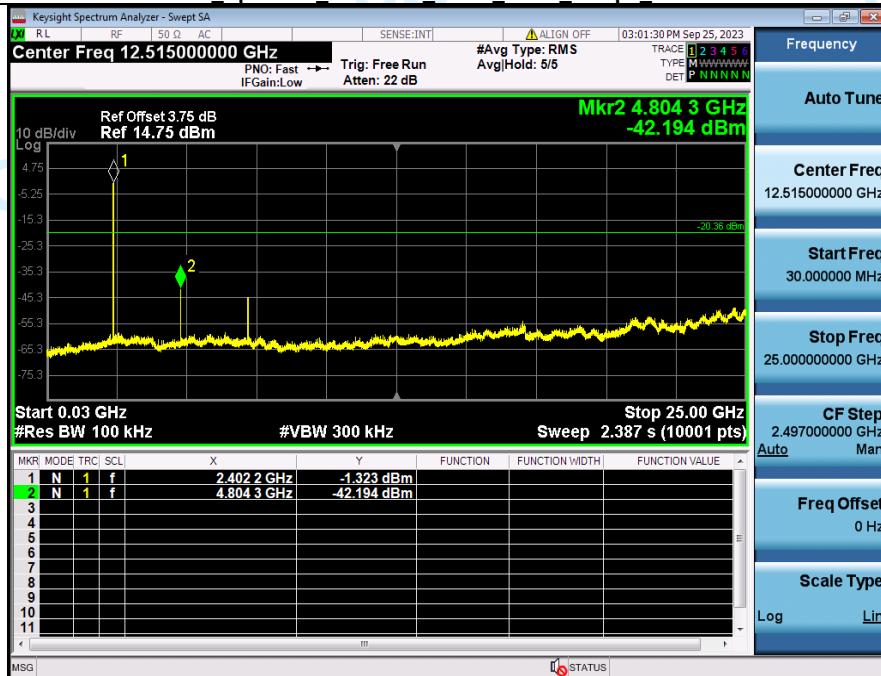
7. Spurious Emission

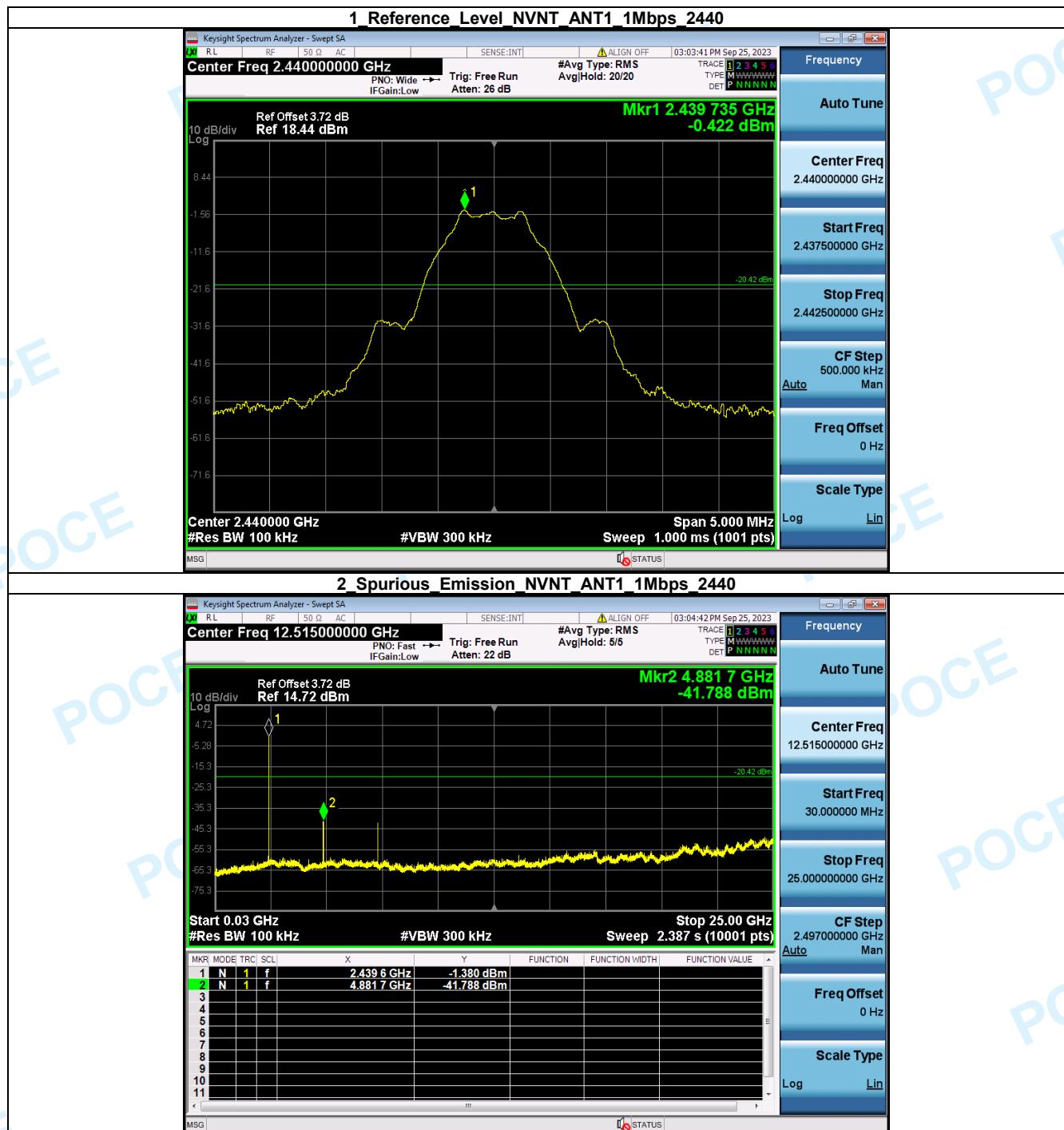
Condition	Antenna	Rate	TX Frequency(MHz)	Spurious MAX.Value(dBm)	Limit	Result
NVNT	ANT1	1Mbps	2402	-42.194	-20.365	Pass
NVNT	ANT1	1Mbps	2440.00	-41.788	-20.422	Pass
NVNT	ANT1	1Mbps	2480	-44.599	-20.244	Pass

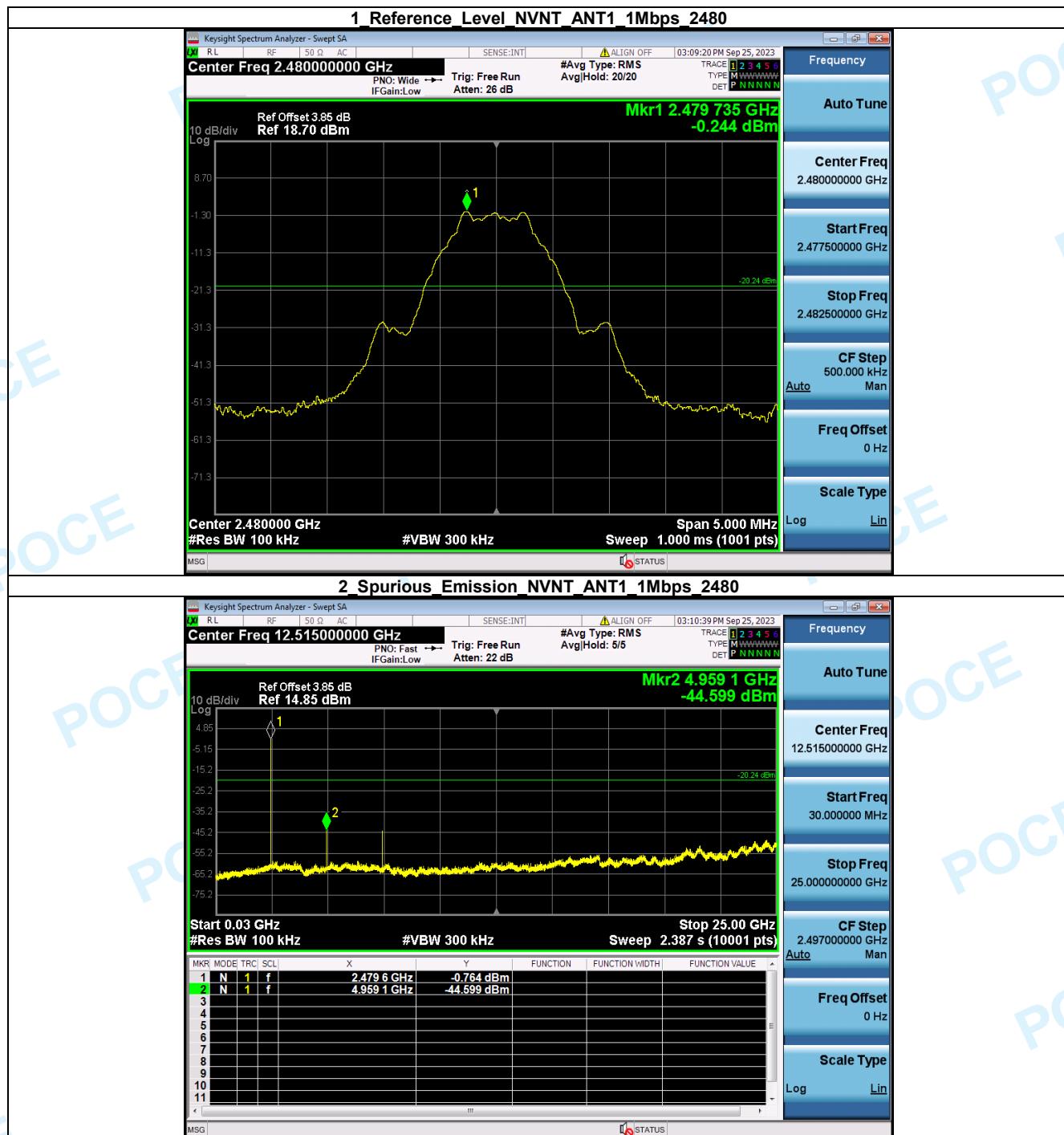
1 Reference Level NVNT ANT1 1Mbps 2402



2 Spurious Emission NVNT ANT1 1Mbps 2402







***** End of Report *****